

Revised Syllabi for Three - Year Integrated B.Com. Degree course (From June 2013)

1) INTRODUCTION

The revised syllabi for B.Com Degree Course will be introduced in the following order.

i)	First Year B.Com.	2013-2014
ii)	Second Year B.Com.	2014-2015
iii)	Third Year B.Com.	2015-2016

The B.Com. Degree Course (Revised Structure) will consist of three Years. The first year annual examination will be held at the end of the first year. The Second Year annual examination will be held at the end of the second year. The Third annual examination shall be held at the end of the third year.

2) ELIGIBILITY

1. No Candidates shall be admitted to enter the First Year of the B.Com. Degree Course (Revised Structure) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Board or equivalent or University with English as a passing subject.
2. No candidate shall be admitted to the annual examination of the First year B.Com. (Revised Structure) unless he/ she has satisfactorily kept two terms for the course at the college at the college affiliated to this University.
3. No candidate shall be admitted to the annual examination of the Second Year unless he/she has kept two terms satisfactorily for the course at the college affiliated to this University.
4. No candidate shall be admitted to the Third year of the B.Com. Degree Course (Revised Structure) unless he/she has passed in all the papers at the First Year B.Com. Examination and has passed in all the papers at the first Year B.Com. Examination and has satisfactorily kept terms for the second year and also two terms for the third year of B.Com. satisfactorily in a college affiliated to this University.

3) A.T.K.T. Rules :

As far as A.T.K.T. is concerned, a student who fails in two theories and one practical head of passing at F.Y.B.Com may be admitted to S.Y.B.Com. likewise a student who fails in the two theory and one practical head of passing at S.Y.B.Com may be admitted to T.Y.B.Com. But a student passing S.Y.B.Com but fails in any subject at F.Y.B.Com cannot be admitted to T.Y.B.Com.

4) (A) Revised Structure of B.Com. Course.

F.Y.B.Com. w.e.f. 2013-14	
Sr. No.	Compulsory / Main Subjects
101	Compulsory English
102	Financial Accounting
103	Business Economics (Micro)
104 (A)	Business Mathematics and Statistics
	or
104 (B)	Computer Concepts and Applications
105	Optional Group (Any one of the following) a) Organizational Skill Development. b) Banking & Finance c) Commercial Geography d) Defense Organization and Management in India e) Co-Operation. f) Managerial Economics
106	Optional Group (Any one of the following) a) Essentials of E-Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection & Business Ethics. e) Business Environment & Entrepreneurship f) Foundation Course in Commerce
107	(Any one of the language from the following groups) Modern Indian Languages (M.I.L.) -: Compulsory English / Marathi / Hindi / Gujarathi / Sindhi / Urdu / Persian. Modern European Languages (M.E.L.) -: French / German. Ancient Indian Languages (A.I.L.) -: Sanskrit. Arabic.

S.Y.B.Com. w.e.f. 2014-15	
Sr. No.	Compulsory / Main Subjects
201	Business Communication.
202	Corporate Accounting.
203	Business Economics (Macro)
204	Business Management
205	Elements of Company Law
206	Special Subject – Paper I (Any one of the following) a) Business Administration b) Banking & Finance. c) Business Laws & Practices.

	d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

T.Y. B.Com. w.e.f. 2015-16	
Sr. No.	Compulsory / Main Subjects
301	Business Regulatory Framework (Mercantile Law)
302	Advanced Accounting.
303 (A)	Indian & Global Economic Development Or
303 (B)	International Economics
304	Auditing & Taxation
305	Special Subject – Paper II (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.
306	Special Subject – Paper III (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

B) Subjects Carrying Practical's

There will be practical examination for the F.Y.B.Com. for the subject Financial Accounting. There will be practical and practical examinations for the special subjects at S.Y.B.Com. and T.Y.B.Com. levels. There will be Practical for the S.Y.B.Com level Compulsory subject Business Communication & for T.Y.B.Com Auditing & Taxation.

(C) A Student must offer the same Special Subject at T.Y.B.Com. which he has offered at S.Y.B.Com.

(D) In an exceptional cases, a student may change the subject chosen by him at second year during the first term of the third year provided he keeps the additional terms of the new subject at S.Y.B.Com.

4. EXTERNAL CANDIDATES

- 1) The student who has registered his name as the external student will appear at the annual examination.
- 2) The result of external student will be declared on the basis of Annual Examination of 80 marks for practical subjects by converting the same out of 100.
- 3) No foreign student shall be allowed to register as an External Student.

5. MEDIUM OF INSTRUCTION.

Medium of instruction for B.Com. degree course shall be either Marathi or English except languages.

The Medium of instructions for Business Communication (S.Y.B.Com) shall be English only.

6. WORKLOAD

The present norms of workload of lectures, tutorials and practicals per subject in respect of B.Com. Course shall continue.

7. UNIVERSITY TERMS

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. The terms can be kept only by duly admitted students. The present relevant ordinances pertaining to grant of terms will be applicable.

8. VERIFICATION AND REVALUATION

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. EQUIVALENCE AND TRANSITORY PROVISION

The University will conduct examination of old course for next three academic years from the date of implementation of new course.

The candidate of old course will be given three chances to clear his subjects as per the old course and thereafter he will have to appear for the subjects under new course as per the equivalence given to old course.

10. RESTRUCTURING OF COURSES

This new revised structure shall be made applicable to the colleges implementing 'Restructured Programme' at the undergraduate level from June, 2004. The existing pattern of 'C', 'D', and 'E' Components shall be continued.

The Colleges under the Restructured Programme which has revised their structure in the light of the "2008 Pattern" shall be introduced with effect from academic year 2010-11.

11. SETTING OF QUESTION PAPERS

1. A candidate shall have the option of answering the question in any of the subjects either in Marathi or English except in languages.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have combination of long and short answer type question. As far as possible short answer type questions should not exceed 15 to 20 percent.
5. There shall be no overall option in the question paper, instead, there shall be internal options (such as either/ or and three short answers out of five etc.).
6. In case of question paper under the Special Subject (Paper No. III) one question carrying 10 marks will be set on current knowledge in relating subject in the academic year.

F.Y. B.Com.
Compulsory Paper
Subject Name -: Financial Accounting.
Course Code -: 102

Objectives :-

1. To impart the knowledge of various accounting concepts
2. To instill the knowledge about accounting procedures, methods and techniques.
3. To acquaint them with practical approach to accounts writing by using software package.

Term I

Unit No.	Topic	No. of Lectures
1.	Piecemeal Distribution of Cash Meaning and Introduction, Surplus Capital Method and Maximum Loss Method	12
2.	Amalgamation of Partnership Firms:- Meaning and Introduction, Objectives, Methods of accounting	12
3.	Conversion of a partnership firm into a limited company Meaning and introduction, objectives, effects, methods of calculation of purchase consideration (Net Asset and Net Payment method), accounting procedure in the books of the firm and balance sheet of new company	12
4.	Computerized Accounting Environment Meaning and Introduction, application of accounting software package, Voucher entry through software package.	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Introduction and Relevance of Accounting Standards Overview of Accounting Standards in India-Concept, Need, Scope and Importance. Study of AS- 1, AS- 2, AS- 4 and AS- 9	10
6.	Royalty Accounts [excluding sub-lease]: Royalty, Minimum Rent, Short Workings, Recoupment of Short Working, Lapse of Short Working. Journal Entries and Ledger Accounts in the Books of Landlord and Lessee.	12
7.	Hire Purchase and Installment System:[Excluding H. P. Trading] Basic Concepts and Distinction, Calculation of Interest and Cash Price, Journal Entries And Ledger Accounts in The Books of Purchaser and Seller.	16
8.	Departmental Accounts Meaning and Introduction, Methods and Techniques, Allocation of expenses, Inter Departmental Transfers, Provision for unrealized profits	10
Total		48

Notes:-

1. Question Paper for Term and Annual Examination should consist of :
 Theory Questions: -30%
 Problems:- 70%
2. There will be minimum two practicals.
3. Accounting practical be conducted in Computer or Commerce Laboratory only.
4. Students are expected to study and practice the application of accounting software packages.
5. Colleges are expected to use only licensed copy of software.
6. Practical examination need to be conducted in the computer laboratory.
7. Each student should be given separate set of transactions for practical examination.
8. For practical examination, internal and external examiner shall be appointed by the college.

Recommended Books	
1. Financial Accounting: By P. C. Tulsian (Tata McGraw-Hill Publishing Co. Ltd. New Delhi)	
2. Financial Accounting: By A. Mukharji & M. Hanif (Tata McGraw-Hill Publishing Co. Ltd. New Delhi)	
3. Financial Accounting: By S.N. Maheshwari & S.K. Maheshwari (Vikas Publishing House Pvt. Ltd)	
4. Financial Accounting: By Dr. K.N. Jagtap, Dr. S. Zagade & Dr. A.H. Gaikwad (Success Publications, Pune)	
5. Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd. New Delhi)	
6. Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers, New Delhi)	
7. Advanced Accountancy: By R.L.Gupta & M. Radhaswamy (Sultan Chand & Sons, New Delhi)	

Journals:-

1. The Chartered Accountant: Journal of the Institute of Chartered Accountants of India.
2. The Accounting World : ICFAI Hyderabad

F.Y. B.Com.
Compulsory Paper
Subject Name -: Business Economics (Micro)
Course Code -: 103

Objectives -:

1. To expose Students of Commerce to basic micro economic concepts and inculcate an analytical approach to the subject matter.
2. To stimulate the student interest by showing the relevance and use of various economic theories.
3. To apply economic reasoning to problems of business.

Term I

Unit No.	Topic	No. of Lectures
1.	INTRODUCTION. 1.1 Meaning, Nature and Scope of Business Economics- (Micro) 1.2 Difference between Micro and Macro Economics. 1.3 Tools for Analysis a. Functional Relationships b. Schedules c. Graphs d. Equations 1.4 Goals of firms a) Economic Goals of Firms 1. Profit Maximization 2. Shareholders Wealth Maximization 3. Management Reward Maximization 4. Growth of the firm 5. Sales maximization 6. Long run survival b) Non-Economic goals 1. Political power, Prestige 2. Social responsibility and welfare 3. Goodwill of employees	12
2.	DEMAND ANALYSIS 2.1 Elasticity of Demand, Types of Elasticity, Price Elasticity, Income Elasticity and Cross Elasticity. 2.2 Consumer Behaviour a) Marginal Utility Approach - Limitations b) Indifference Curve Analysis - Concept - Characteristics - Consumer Equilibrium 2.3 Demand Forecasting and Estimation a) Meaning and objectives of Demand Forecasting b) Methods of Demand Forecasting c) Descriptive Analysis of	20

	i) Direct Methods 1) Consumer Survey 2) Expert opinion 3) Simulating market situation 4) Controlled Market Experiments ii) Indirect Methods 1) Simple correlation 2) Trend Projections	
3.	PRODUCTION AND COST ANALYSIS 3.1 Production Function – Meaning 3.2 Law of Variable Proportions - The Three Stages 3.3 Law of Returns to Scale - The Three Stages 3.4 Economies and Diseconomies of Scale – Internal and External 3.5 Cost Analysis – Types of Costs a) Types of Costs 1) Total cost 2) Average Cost 3) Marginal Cost 4) Opportunity cost b) Behaviour of Cost Curves 1) In the Short Run 2) In the Long Run	16
Total		48

Term II

Unit No.	Topic	No. of Lectures
4.	REVENUE BEHAVIOUR 4.1 Meaning and Importance of Revenue Concepts 4.2 Total Revenue (TR), Average Revenue (AR) Marginal Revenue (MR). 4.3 Relationship between Total Revenue, Average Revenue and Marginal Revenue	8
5.	PRICING UNDER VARIOUS MARKET CONDITIONS 5.1 Perfect Competition – Features and equilibrium 5.2 Monopoly – Features and equilibrium, Price Discrimination 5.3 Monopolistic competition - Features and equilibrium 5.4 Oligopoly – Features	20
6.	FACTOR PRICING 6.1 Marginal Productivity theory of Distribution. 6.2 Rent a) Theories of Rent i) Ricardian Theory of Rent ii) Modern Theory of Rent	20

	6.3 WAGES - i) Backward sloping Supply curve of Labour. ii) Collective Bargaining & Trade Unions 6.4 INTEREST - a) Theories of Interest – i) Loanable Fund Theory of Interest ii) Keynes Liquidity Preference Theory of Interest 6.5 PROFIT - a) Theories of Profit – i) Dynamic Theory of Profits ii) Innovation Theory of Profit iii) Risk and Uncertainty Theory of Profit	
Total		48

Recommended Books	
1. Economics – Samuelson P. A. and Nordhaus W. D. TataMcGraw Hill Publishing Co. Ltd. N.Delhi. 2. A text Book of Economic Theory – Stonier A. W. and Hague D. C. Longman Green and Co. London 3. Business Economics – V. G. Mankar, Macmillan India Ltd. N. Delhi. 4. Vyavasaik Arth Shastra (Sukshm) Dr. T. G. Gite, Atharv Publication. Pune 5. Modern Micro Economics – Theory and Applications H.L. Ahujna S. Chand and Co Ltd. N Delhi. 6. Business Economics – Dr. Girija Shankar – Atharv Publication, Pune. 7. Principals of Economics – N.Gregory Mankiw 6th edition 2012 Cengage learning india pvt ltd Delhi 8. Understanding Microeconomics- Robert L. Helibroner and Lester C. Thurow. Prentice Hall International Inc. London. 9. Micro Economic Theory An Analytical Approach – J M Joshi and R. Joshi Wishwa Prakashan (Division of Wiley Eastern Limited) N. Delhi. 10. Business & Managerial Economics (in the global Context) Sampat Mukherjee. New Central Book Agency, Calcutta. 11. Micro Economics Theory and Application D.N.Dwivedi Second Edition PEARSON.	

F.Y. B.Com.
Optional Paper
Subject Name :- Business Mathematics and Statistics
Course Code :- 104 (A)

Objectives :-

1. To prepare for competitive examinations
2. To understand the concept of Simple interest, compound interest and the concept of EMI.
3. To understand the concept of shares and to calculate Dividend
4. To understand the concept of population and sample.
5. To use frequency distribution to make decision.
6. To understand and to calculate various types of averages and variations.
7. To understand the concept and application of profit and loss in business.
8. To solve LPP to maximize the profit and to minimize the cost.
9. To use correlation and regression analysis to estimate the relationship between two variables.
10. To understand the concept and techniques of different types of index numbers.

FIRST TRM

Medium for this subject shall be ENGLISH only

Unit 1.	Pre-requisites (For objective type questions only)	(10)
	1. Natural Numbers and Integers 2. H.C.F and L.C.M. 3. Fractions- addition, subtraction multiplication and division of two or more fractions 4. Laws of Indices 5. Ratio and Percentage 6. Proportion and partnership	
Unit 2.	Interest	(08)
	1. Simple Interest 2. Compound interest (nominal and effective rate of interest) 3. Equated Monthly Installments (EMI) (Reducing and flat rate of interest) 4. Examples	
Unit 3.	Shares and dividends	(06)
	1. Concept of Shares, face value, market value, Net Asset Value 2. Equity Shares and Preference shares 3. Dividend 4. Bonus Shares 5. Examples	
-----		Total [24]

Unit 4.	Population and Sample	(08)
	1. Definition and concept of Statistics	
	2. Scope of Statistics in Economics, Management Science and Industry	
	3. Concept of Population and Sample	
	4. Methods of Sampling: Simple Random Sampling and Stratified Random Sampling (Description of procedures only)	
Unit 5.	Measures of central tendency	(16)
	1. Variables Qualitative and Quantitative, Raw data, Classification of data,	
	2. Frequency distribution, cumulative frequency distribution,	
	3. Histogram (finding mode graphically) Ogive curves and its uses.	
	4. Measures of central tendency: Mean, Median for ungrouped and Grouped data.	
	5. Examples	
-----		Total [48]

SECOND TERM

Unit 6.	Profit and Loss	(12)
	1. Concept of Cost Price, Marked Price and Selling Price	
	2. Trade Discount and Cash Discount	
	3. Commission and Brokerage	
	4. Examples	
Unit 7.	Linear Programming Problems (For two Variables only)	(12)
	1. Definition and terms in a L.L.P.	
	2. Formulation of L.L.P.	
	3. Solution by Graphical Method	
	4. Examples	
-----		Total [24]
Unit 8.	Measures of dispersion	(08)
	1. Concept of Dispersion	
	2. Measures of Dispersion – Range, Variance and Standard Deviation (S.D.) for Grouped and ungrouped data	
	3. Measures of relative dispersion- Coefficient of range and coefficient of Variation	
	4. Examples	
Unit 9.	Correlation and Regression	(08)
	1. Concept of Bivariate data, correlation using scatter diagram	
	2. Karl Pearson's Coefficient correlation for ungrouped data	
	3. Spearman's Rank correlation coefficient	
	4. Concept of regression, lines of regression	
	5. Regression as prediction Model	
	6. Examples	

Unit 10.	Index number	(08)
	1. Concept of Index Number	

2. Construction of Price Index Number
3. Laspeyre's, Paasche's and Fisher's Method
4. Family Budget and Aggregate Expenditure Method
5. Concept of – Cost of Living /Consumer Price Index Number, SENSEX and NIFTY
6. Examples

----- **Total [24]**

Grand Total [48]

Recommended Books:

1. Practical Business Mathematics by S.A.Bari (New Literature Publishing Company)
2. Business Mathematics by V.K.Kapoor (Sultan Chand And Sons)
3. Fundamentals of Statistics by S.C.Gupta (Himalaya Publishing House)
4. Basic Statistics by B.L.Agrawal (New Age International Publishers)
5. Statistical Methods by S.P.Gupta (Sultan Chand And Sons)

F.Y. B.Com.
Optional Paper
Subject Name :- Computer Fundamentals
Course Code :- 104 (B)

Objective:

1. To make the students familiar with Computer environment.
2. To make the students familiar with the basics of Operating System and business communication tools.
3. To make the students familiar with basics of Network, Internet and related concepts.
4. To make awareness among students about applications of Internet in Commerce.
5. To enable students to develop their own web site.

Term - I

Unit No.	Topic	Lectures
1.	Introduction to Computer Fundamentals	[10]
	Introduction to Computer Computer System Hardware Computer Memory Input and Output Devices Interaction between User and Computer Introduction to Free and Open Source Software Definition of Computer Virus, Types of Viruses, Use of Antivirus software	
2.	Basics of Operating System	[12]
	Definition of Operating System Objectives, types, and functions of Operating Systems Working with Windows Operating System: Introduction, The Desktop, Structure of Windows, Windows Explorer, File and Folder Operations, The Search, The Recycle Bin, Configuring the Screen, Adding or Removing New Programs using Control Panel, Applications in windows (Paint, Notepad, WordPad, Calculator)	
3.	Introduction to Business Communication Tools	[12]
	MS-Word: Introduction, Starting MS-Word, MS-Word Screen and its Components, Elementary Working with MS-Word MS-Excel: Introduction, Starting MS-Excel, Basics of Spreadsheet, MS-Excel Screen and Its Components, Elementary Working with MS-Excel MS-Powerpoint: Introduction, Starting MS-PowerPoint, Basics of PowerPoint, MS-PowerPoint Screen and Its Components, Elementary Working with MS-PowerPoint	
4.	Introduction to Computer Network	[06]
	Introduction Importance of Networking Computer Network (LAN, WAN, MAN) Network Components (Hub, Switch, Bridge, Gateway, Router, Modem) Network Topology, Wireless Networks	
5.	Use of Computer in Commerce	[08]

	Data Processing, Files and Records, File Organization (Sequential, Direct/Random, Index) Computer Applications in Business – Need and Scope Computer Applications in various fields of Commerce: Personnel Administration, Accounting, Cost and Budgetary Management, Purchasing, Banking, Insurance and Stock-broking, e-governance Introduction to E-Commerce, Evolution of E-Commerce, Role of E-Commerce, E-Commerce Framework, E-Commerce Categories	

Term - II

Unit No.	Topic	Lectures
1.	Internet and Internet application Introduction, Internet evolution Working of Internet, Use of Internet Overview of World Wide Web (Web Server and Client) Introduction to Search engine and Searching the Web Downloading files Introduction to Web Browsers Working with E-mail (creation and use of the same)	[08]
2.	Electronic Data Interchange Introduction to EDI EDI Architecture Financial EDI Overview of the technology involved in EDI	[04]
3.	Electronic Payment System Introduction to EPS Introduction to EFT (Electronic Fund Transfer) Introduction to SET (Secure Electronic Transaction) Business requirement addressed by SET Introduction to Digital Signature and Digital Certificates , Stages of SET Types of Payment System: Digital Cash, Electronic Cheque, Smart Card, Credit/Debit Card	[08]
4	Introduction to HTML. Introduction to HTML. Working of HTML Creating and loading HTML page, tags Structure of on HTML, Document, Stand Alone Tags Formatting text, Adding Images Creating hyper Links, Tables Sending E-mails through Web Page Sample web pages	[10]
5.	Introduction To Web page Design Introduction to Web design, Types of Web Pages Web design Pyramid Building web sites	[07]

	Web development process model	
6.	Designing The web pages Page size, Page type, Page margin, Entrance page Exit page, Graphics in Webpage design Animation Effect, Sound Effect Color Effect Uploading the web site (Web space, Domain Name, Hosting the web site)	[08]
7.	Internet Security Security, Privacy Ethical Issues & Cyber Law	[03]

Reference Books

1. Computer Fundamentals by: Anita Goel, Pearson Education India ISBN: 9788131742136
2. Connecting with Computer Science, by Greg Anderson, David Ferro, Robert Hilton, Course Technology, Cengage Learning, ISBN: 9781439080351
3. Fundamentals of Computer : For undergraduate courses in commerce and management, ITL Education Solutions Limited, Pearson Education, ISBN: 9788131733349
4. Introduction to Computer Science, 2/e, ITL Education Solutions Limited, Pearson Education, ISBN: 9788131760307
5. Frontiers of Electronic Commerce, Ravi Kalakota, Andrew B. Whinston, Pearson Education, ISBN: 9788177583922
6. Internet: The Complete Reference, Margaret Levine Young, Tata McGraw Hill Education Private Limited, ISBN: 9780070486997
7. Murach's HTML, XHTML and CSS: Training & Reference, Anne Boehm, Shroff/Murachs Publication, ISBN-9789350230954
8. On the Way to the Web: The Secret History of the Internet and Its Founders, A. Banks, Apress Publication, ISBN: 9781430208693
9. Computers and Commerce: A Study of Technology and Management at Eckert-Mauchly Computer Company, Engineering Research Associates, and Remington, Arthur L. Norberg, MIT Press (MA), ISBN: 9780262140904

Guidelines for Examination:

1. Term End Exam (20 Marks):
To be conducted by college as per rules provided by University of Pune.
2. Annual Exam (80 Marks):
To be conducted by University of Pune at the end of the academic year.
Passing marks for the course are 40 (Out of which **minimum 32** marks are compulsory in Annual Examination).

F.Y. B.Com.

Optional Paper

Subject Name :- Organizational Skill Development.

Course Code :- 105 – a.

Objective:

1. To orient the students towards the concept of Organization and Modern Office.
2. To acquaint the students with the role of and Functions of Office Manager.
3. To develop the insights regarding Organizational Skills for Office Managers.
4. To know the functioning of Modern office appliances equipments and e- format records

Term I

Unit No.	Topic	No. of Lectures
1.	Modern Office 1.1 Introduction, Definition, Characteristics, Importance and Functions 1.2 Traditional and Modern Concepts of Office 1.3 Office Location Meaning, Objectives , Principles of Office Location Office Layout – Meaning , Objectives , Principles and Layout ,Modular and Structured Furniture 1.4 Factors of Good Ambience Office Lighting, ventilation. Temperature, Sanitation, Interior Decoration, Noise and Cleanliness.	12
2.	Office Organization 1.1 Definition, Importance of office organization, 1.2 Principles, Steps. 1.3 Types of Organization 1.4 Concept and Functions of Office Administrator.	12
3.	Office Manager and Organizational Skills 3.1 Office Manager – Role, duties and responsibilities 3.2 Qualification, Qualities and skills of an office manager 3.3 Time Management –Definition, Need, Principles, advantages and Disadvantages, Time Management techniques. 3.4 Goal Setting-Concept of goal-setting - Importance of goals, SMART(Specific, Measurable, Achievable, Realistic, Time-bound) goals , Do's and Don'ts about goals.	12
4.	Office services 4.1 Mail Routine , Courier Services its need and Importance 4.2 Office Forms - objectives, advantages and types of office forms E-forms – advantages. 4.3 Organizational Web Page – Contents, advantages, Internet/Web basedapplications of office activities. 4.4 Office Stationary and Supplies - Importance of stationary, Essentials of	12

	a good system of regulating stationary, purchases, storage, Record of stationary,	
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Office Records Management 5.1 Introduction - Need - Objectives - Kinds of Records. 5.2 Organization of records department. 5.3 Classifying and Indexing of Records and Files. Principles - Retention and disposition of records. 5.4 Digitalization of Records: Meaning, advantages, process, utility and feasibility.	12
6.	Office Communications 6.1 Meaning and Elements of Office Communications, 6.2 Channels of Communication – Internal and External 6.3 Significance and barriers to effective communications 6.4 Recent trends in modern communications such as Fax - E-Mail, Internet, Intranet, www(World Wide Web), Tele conferencing, Video Conferencing as means of Communication	12
7.	Public Relations : 7.1 Definition, nature, Scope of PR with customers, investors , employees, government offices and others 7.2 Objectives, importance and functions 7.3 Role of Public Relation Officer in Modern Office 7.4 – Modern methods of Public Relations	12
8	Office Automation 8.1 Office Automation – meaning, scope, feasibility, and advantages 8.2 Different types of modern appliances and machines used in Offices. 8.3 Computerization of office activities - LAN – WAN 8.4 Accounting Packages, Payroll Accounting, Inventory statements, - Vouchers –Invoices - Salary - Maintenance of records and Accounting Books and preparation of financial Report, Leave accounting, Attendance.	12
Total		48

Recommended Books
1. Office Organization and Management – By S. P. Arora 2. Office Methods - By M. L. Basu 3. Office Automation – By G. R. Terry 4. Office Management & Control – By G. R. Terry 5. Office Management – By P. K. Ghosh 6. Files and Record Management By Pophan 7. A text book of Office Management By William II &Leffingwell& Robinson 8. Office Administration and Management – by Dr. KhorshedMadon. and Dr.Homai M. Dowell, Vikas Publishing House , Delhi

F.Y. B.Com.
Optional Paper
Subject Name :- Banking and Finance
[Fundamentals of Banking]
Course Code :- 105 – b.

Objective:

1. To acquaint the students with the fundamentals of banking.
2. To develop the capability of students for knowing banking concepts and operations.
3. To make the students aware of banking business and practices.
4. To give thorough knowledge of banking operations.
5. To enlighten the students regarding the new concepts introduced in the banking system.

Term I

Unit No.	Topic	No. of Lectures
1.	Evolution of banking 1.1 Origin, Meaning and Definition of 'Bank' 1.2 Evolution of banking- Europe, USA & Asia 1.3 Evolution of banking in India. 1.4 Structure of Indian Banking System	06
2.	Functions of Bank 2.1 Primary functions: A) Accepting deposits: Demand deposits: Current and Savings; No Frills Account, Time deposits-Recurring and Fixed deposits, Flexi Deposits (Auto Sweep) B) Granting Loans and Advances- Term Loan, Short term credit, Overdraft, Cash Credit, Purchasing, Discounting of bills, 2.2 Secondary functions: A) Agency Functions- Payment and Collection of Cheques, Bills and Promissory notes, Execution of standing instructions, Acting as a Trustee, Executor. B) General Utility Functions: Safe Custody, Safe deposit vaults, Remittances of funds, Pension Payments, Acting as a dealer in foreign exchange.	14
3.	Procedure for opening and operating of deposit account 3.1 Procedure for Opening of Deposit Account: Know Your Customer- Needs and Norms (KYC Norms), Application form, Introduction, Proof of residence, Specimen signature and Nomination: Their Importance 3.2 Procedure for Operating Deposit Account: Pay-in-slips, Withdrawal slips, Issue of pass book, (Current Savings or Recurring deposits), Issue of Cheque book, Issue of fixed deposit receipt, Premature encashment of fixed deposits and loan against fixed deposit. Recurring deposits: Premature encashment and loan against recurring deposit. 3.3 a) Closure of accounts b) Transfer of accounts to other branches/Banks 3.4 Types of account holders a) Individual account holders- Single or joint, Illiterate, Minor, Married	14

	woman, Pardahnashin woman, Non resident accounts b) Institutional account holders- Sole proprietorship, Partnership firm, Joint stock company, Hindu undivided family, Clubs, Associations and Societies and Trusts.	
4.	Methods of Remittances 4.1 Demand drafts, bankers' Cheques and Truncated Cheques 4.2 Mail transfer, Telegraphic transfer, 4.3 Electronic Funds Transfer- RTGS, NEFT and SWIFT	14
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Lending principles, Credit Creation and Balance Sheet of a bank 5.1 Safety, Liquidity, Profitability, Diversification of risks Conflict between liquidity and profitability 5.2 Multiple Credit Creation: Process and Limitations 5.3 Balance sheet of a commercial bank.	16
6.	Negotiable Instruments 6.1 Definition, meaning and characteristics of Promissory note, Bill of Exchange and Cheque 6.2 Types of Cheques- Bearer, Order and Crossed 6.3 Types of Crossing- General and Special.	16
7.	Endorsement 7.1 Definition and meaning of endorsement 7.2 Types of endorsement- Blank, Full or Special, Restrictive, Partial, Conditional, Sans Recourse, Facultative.	08
8	Technology in Banking 8.1 Need and importance of technology in banking 8.2 E-Banking: ATM, Credit card, Debit card, Tele Banking, Mobile Banking, Net Banking, SWIFT (Society for Worldwide Inter-bank Financial Telecommunication) 8.3 Concept and benefits of Core Banking Solution.	08
Total		48

Recommended Books
1. Practice and Law of Banking- G.S.Gill 2. Banking: Law and Practice- P.N. Varshney 3. Banking: Theory and practice- E.Gordon, K. Talraj 4. Banking: Law and practice in India- Tannan 5. Banking: Law and practice in India- Maheshwari 6. Fundamentals of Banking- Dr. G.V.Kayandepatil, Prof. B.R.Sangle, Dr. G.T.Sangle, Prof. N.C.Pawar 8. Banking: Law and Practice- Prof. Mugle 9. Banking and financial system - Vasant Desai 10. Banking theory and practice- K.C.Shekhar 11. Fundamentals of banking'- Dr. R.S.S.Swami 12. Annual Report on trends and progress of banking in India- R.B.I. 13. Toor N. S., Handbook of Banking Information

F.Y. B.Com.
Optional Paper
Subject Name -: Defense Organization and Management in India
Course Code -: 105 – d.

Objective:

1. To understand the role of Armed Forces for maintaining national security of the country.
2. To understand Higher Defense Mechanism, Role of Intelligence and Management Technique in Decision making at Strategic & Tactical Level

Term I

Unit No.	Topic	No. of Lectures
1.	Principles of Defense Organization 1.1 Reconstruction of Indian Armed Forces since 1947 1.1.1 Development of the Army after Independence 1.1.2 Development of the Navy after Independence 1.1.3 Development of the Air Force after Independence	12
2.	Higher Defense Organization in India 2.1. Powers of the President in relation to the Armed Forces 2.2. Defense Committee of the Cabinet. 2.3. Ministry of Defense – its organization & function 2.4. National Security Council	12
3.	Defense Mechanism of the Indian Armed Forces 3.1 Chief of Staff Committee 3.2 Organization of Army, Naval & Air Headquarters. 3.3 Organization of Army, Naval & Air Commands.	12
4.	Second Line of Defense 4.1. Border Security Force 4.2. Coast Guard 4.3. Territorial Army 4.4. Home Guard 4.5. Civil Defense 4.6. National Cadet Corps (N.C.C) 4.7. Central Reserve Police Force 4.8. State Reserve Police Force	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5.	Intelligence 5.1. History & Types of Intelligence 5.2. Process & Principles of Intelligence 5.3. Devices for Collecting Intelligence 5.4. Role of Intelligence 5.5. Counter Intelligence 5.6. Indian Intelligence Organization	12

6.	The Combat Branches 6.1. Infantry 6.1.1. Characteristic, Role & Limitations. 6.1.2. Division & Battalion Organization. 6.2. Armoured Crops 6.2.1. Characteristics, Role & Limitations 6.3. Supporting Arms 6.3.1. Artillery – Characteristics, Role & Limitations 6.3.2. Engineers - Characteristics, Role & Limitations 6.3.3. Signal Corps - Characteristics, Role & Limitations means of signals	12
7.	The Administrative Services 7.1 Army Service Crops 7.2 Army Ordnance Crops 7.3 Electrical & Medical Engineers. 7.4 Army Medical Crops – its role in Peace & War time	12
8	Indian Navy & Indian Air Force 8.1. Characteristic, Role & Limitations Navy & Air Force 8.2. Various Types of Battle Ships in Indian Navy 8.3. Various Types of Aircrafts in Indian Air Force	12
Total		48

Recommended Books	
1. Ron Mathews – “Defence Production in India” ABC – New Delhi 2. Raju G. C. Thomas – “The Defence of India – A Budgetary perspective of strategy & politics”, Mac Millan Publication, New Delhi – 1978 3. Sam-C-Sarkesian – “The Military Industrial Complex – A Reassessment”, Sage Publication, 1972 4. Maj. Gen. Pratap Narain (Retd.) “India’s Arms Bazaar” Shilpa Publication, New Delhi – 1998 5. Y. Lakshmi, “Trends in India’s Defence Expenditure” ABC, New Delhi 1998. 6. Lt. Gen. R.K. Jasbir Singh, “India’s Defence Year Books”, Natraj Publication, Dehradun 1999 7. Annual Report, Ministry of Defence, Government of India 8. Venkateshwaram A.L. – “Defence organisation in India” 9. Nagendra Singh – “Defence Mechanism of Modern State”. 10. Lt. Col. Abhyankar M. G. – “Defence Principle & Organisation”. 11. U. C. Jain, Jeevan Nair – “Indian Defence & Security”, Pointer Publishers, Jaipur, 2000 12. D.C.Pathak, “Intelligence: A Security Weapon”, Manas Publication, New Delhi, 2003 13. Stephen Peter Rosen, “Societies & Military Power – India & its Armies”, Oxford University Press, New Delhi, 1996 14. Maj. K.C. Praval, “Indian Army after Independence”, Lancer International, New Delhi, 1990 15. H. B. Mishra, “Defence Programmes of India” – Author Press – New Delhi – 2000 16. Maj. Udaya Chandar, “The Art of Military Leadership”, Jaico Publishing House, Mumbai - 1979	

F.Y. B.Com.
Optional Paper

Subject Name -: Co-operation

Course Code -: 105 – e.

Objectives:

1. To acquaint the students with the concept of co-operation and its movement.
2. To introduce the scope of Co-operation.
3. To make students build their career in the field of Co-operation and Rural Development.

Term I

Unit No.	Topic	No. of Lectures
1	Concept of Co-operation- ➤ Meaning & Definitions ➤ Objectives ➤ Nature and Scope of Co-operation.	12
2	Principles of Co-operation- Evaluation of Co-operative principles and modifications there in from time to time. ➤ International Co-operative Alliance (I.C.A) Committee-1937 ➤ International Co-operative Alliance (I.C.A.) Commission-1966 ➤ International Co-operative Alliance (I.C.A.) Commission-1995	12
3	History of Indian Co-operative Movement – Origin of Co-operative movement in India. ➤ Sir Fedrick Nicholson Report 1904 ➤ Maclagen Committee Report 1912 ➤ Gorewala Committee Report 1954 ➤ Vaidyanathan Committee Report 2005	12
4	Contribution to the development of Co-operative Movement in India of: ➤ Dr. Dhananjay Gadgil ➤ Padmashri. Vaikuntbhai Mehta ➤ Padmashri. Vitthalrao Vikhe Patil ➤ Dr. Verghese Kurien ➤ Karmaveer Bhausaheb Hiray	12
Total		48

Term II

Unit No.	Topic	No. of Lectures
5	Different Types of Co-operative: ➤ Rural Co-operative and Urban Co-operative ➤ Agriculture Co-operative and Non Agriculture Co-operative. ➤ Credit Co-operative and Non Credit Co-operative.	12

	➤ Weaker Sections Co-operatives. ➤ Federation of Co-operatives.	
6	Government and Co-operative movement: ➤ Role of Central Government ➤ Role of State Government	12
7	Achievement of Co-operative movement: ➤ Strength and Weakness ➤ Future Trends of Co-operative Movement in India.	12
8	Co-operative Education and Training: ➤ Objectives of Co-operative Education and Training. ➤ Training arrangement in India. ➤ Evaluation of education and training programmes. ➤ Problems and suggestions.	12
Total		48

Recommended Books	
1. Co-operation- Principles and Practice- Dr. D.G. Karve 2. Co-operation in India- Dr. B.S. Mathur 3. Theory, History and Practice of Co-operation- Dr. R.D. Beddy 4. Co-operation in India- Dr. C. B. Memoriya and R.D. Saxena 5. Theory and Practice of Co-operation in India and Abroad- Prof. R.K. Kulkarni 6. Bhartiya Sahkari Chadvad- Tatve va Vyavhar (Marathi)- Prof. Jagdish Killol; Prof. Arvind Bondre; Prof. A. C. Bhavsar 7. Sahkari Chalval 1904-2004 (Marathi) – Prof. K. L. Fale	

F.Y. B.Com.
Optional Paper
Subject Name -: Managerial Economics
Course Code -: 105 – f.

Objectives:

1. To enable students of Commerce to apply economic theory and analysis, practices of business firms.
2. To use tools and techniques of economic analysis to develop managerial decision making
3. To apply economic analysis in the formulation of business policies.

Term I

Unit No.	Topic	No. of Lectures
1	INTRODUCTION 1.1 Definition, Nature & Scope and Characteristics of Managerial Economics. 1.2 Theories of the Firm 1.3 Objectives of the Firm – a. Profit Maximization b. Security Objective c. Profit Satisfying Objective d. Sales maximization e. Utility Maximization f. Growth Maximization	13
2	DEMAND ANALYSIS 2.1 Law of Demand 2.2 Determinants of Demand 2.3 Elasticity of Demand – Concept and Measurement of – 2.3.1 Price Elasticity of Demand 2.3.2 Income Elasticity of Demand 2.3.3 Cross Elasticity of Demand 2.4 Importance of Elasticity of Demand in business decision making. 2.5 Business or Economic Forecasting - 2.5.1 Objectives 2.5.2 Methods of Business Forecasting 2.6 Theory of Supply	20
3	PRODUCTION AND COST ANALYSIS 3.1 Production Function –Meaning & Nature 3.2 Law of Variable-the three stages. 3.3 Law of Returns to scale - the three stages. 3.4 Cost Analysis – 3.4.1 In the short run 3.4.3 In the long run	15
Total		48

Term II

Unit No.	Topic	No. of Lectures
4	PRICING AND INVESTMENT DECISIONS 4.1 Pricing Practices -Objectives 4.2 Investment Decisions – 4.2.1 Concept and Types – a. For Expansion b. For Replacement c. For Modernization d. For Diversification e. For Research and Development. 4.2.2 Aids to Investment Decisions – a. Capital Budgeting – Meaning and Usefulness. 4.2.3 Methods of Investment Decision – Concept and Descriptive analysis of – a. Payback period. b. Average Rate of Return	20
5	COST – BENEFIT ANALYSIS 5.1 Meaning 5.2 Use 5.3 Limitations	13
6	MACRO ECONOMIC ENVIRONMENT 6.1 Business Trends in India – 6.2 Overview of Economic Reforms and Business. 6.3 Role of Multinational Corporations (MNCs) 6.4 Acquisitions and Mergers	15
Total		48

Recommended Books
1. Dean Joel – managerial Economics. Prentice Hill India Pvt. Ltd. New Delhi. 2. Gupta G.S. –Managerial Economics. Tata Mcgrew Hill, New Delhi. 3. Mithani D.M. – Managerial Economics Theory and Applications. Himalaya Publishing House, N. Delhi. 4. Mmankar V.G. –Business Economics, Macmillan India Ltd. N. Delhi. 5. Varshney and Maheshwari – Managerial Economics.Sultan Chand and sons, N. Delhi. 6. Dr. T. G. Gite - Vyavasaik Arthshstra (Sukshma) Atharve Publication, Pune. 7. Salvatore Dominick – Managerial Economics in a Global Economy. Mcgraw Hill N. York. 8. Dr.Girija Shankar: Micro Economics – Atharva Publication. 9. H. Craig Peterson, W. Cris Lewis – Managerial Economics. Prentice Hill of India Ltd. New Delhi. 10. Dwivedi D. N. Managerial Economics; Tata Mcgrew Hill, New Delhi

F.Y. B.Com.
Optional Paper
Subject Name :- Essentials of E-Commerce
Course Code :- 106 – a.

Objective:

To make a student familiar with the mechanism of conducting business transactions through electronic media. Learning Outcomes: After completing this course, a student is expected to be able to

- explain various components of e-commerce,
- understand the dynamics of e-commerce,
- appreciate the Internet technology and its utility in commercial activities,
- understand the methodology of online business dealings using e-commerce infrastructure.

Term I

Unit No.	Topic	No. of Lectures
1.	Overview of Electronic Commerce (EC): Concept, features, and functions of e-commerce, e-commerce practices v/s traditional practices, scope and limitations of e-commerce.	10
2.	Fundamental of e-commerce: Definition and types of e-commerce: B2B, B2C, C2C, and P2P, B2B service provider, e-distributor, procurement and just-in-time delivery.	12
3.	Infrastructure: Internet and its role in e-commerce, procedure of registering Internet domain, establishing connectivity to Internet, tools and services of Internet.	10
4.	E-Payment: Transactions through Internet, requirements of e-payment systems, functioning of debit and credit cards, pre and post payment services.	06
5.	Electronic Data Interchange: Evolution, uses, Benefits, Working of EDI, EDI Standards (includes variable length EDI standards), Cost Benefit Analysis of EDI, Electronic Trading Networks, EDI Components, File Types, EDI Services, EDI Software	10
Total		48

Term II

Unit No.	Topic	No. of Lectures
6.	Digital economy: Major characteristics, economic rules, impact on trading and intermediaries, impact on business processes and functional areas in banking, financial and insurance organizations.	08

7.	E-Marketing: Market place v/s Market space, impact of e-commerce on market, marketing issues in e-marketing, direct marketing, one-to-one marketing.	08
8.	E-Finance: Areas of e-finance, e-banking, traditional v/s e-banking, trading v/s e-trading, importance and advantages of e-trading, operational aspects of e-trading.	08
9.	E-Ticketing: Online booking systems, online booking procedure of railways, airlines, tourist and religious places, hotels and entertainment industry.	08
10	E-Commerce in India: State of e-commerce in India, problems and opportunities in e-commerce in India, legal issues, Social and Ethical Issues, future of e-commerce, Mobile Commerce.	08
11	Security in e-commerce: Setting up Internet security, maintaining secure in Formation, encryption, digital signature and other security measures.	08
Total		48

Recommended Books
Reference Books: 1. Daniel Amor, E Business R(Evolution), Pearson Edude. 2. Krishnamurthy, E-Commerce Management, Vikas Publishing House. 3. David Whiteley, E-Commerce: Strategy, Technologies and Applications, Tata McGraw Hill. 4. P. T. Joseph, E-Commerce: A managerial Perspectives, Tata McGraw Hill. 5. Doing Business on the Internet E-COMMERCE (Electronic Commerce for Business): S. Jaiswal, Galgotia Publications. 6. C.S.V.Murthy: E-Commerce-Concepts, Models & Strategies, Himalaya Publishing. 7. Kamalesh K Bajaj & Debjani Nag: E-Commerce, the Cutting Edge of Business- Tata McGraw-Hill, New Delhi.

F.Y. B.Com.
Optional Paper
Subject Name :- Insurance and Transport
Course Code :- 106 – b.

Objectives :-

1. To acquaint students with the concept of Insurance and Transport.
2. To introduce the scope of Insurance including Life & General Insurance and Transport including Travel & Tourism.
3. To make the students aware of carrier opportunities in the field of Insurance & Transport and impart appropriate skills.

Marks : 100

No. of Lectures 48

Term I - INSURANCE

Unit No.	Topic	Lectures
1.	Concept of Insurance Risk : Meaning, Definition & Scope ---Types: Human & Business ---Types of Business Risk. Insurance : Meaning, Definition, Need & Scope -Insurance Contract: Meaning, Components.	12
2.	Life Insurance Meaning, Definition, Need, Scope & Principles of Life Insurance. Types of Life Insurance Policies---Carrier Options in Life insurance Business.	12
3.	General Insurance Meaning, Definition, Need, Scope & Principles of General Insurance. Types of General Insurance --- Carrier Options in General Insurance Business.	12
4.	Role of Insurance in Logistics Meaning and significance of logistics – Need for social security – Procedure for claim settlement – Role of Insurance in Logistics in the Global age and challenges.	12
Total		48

Term II - TRANSPORT

Unit No.	Topic	Lectures
5.	Concept & Role of Transport Meaning, Need & Scope of Transport. ---- Transport being a primary mode of Service Trade--Role of Transport in Indian economy --- Existing problems & suggestions.	12
6.	Modes of Transport Types of Transportations in India --- Meaning, Need, Scope & Advantages. Road Transport & Rail Transport in India – Their Suitability and Limitations.	12
7.	Other means of Transports Water Transport : Meaning, Scope, Advantages & Limitations. Air Transport : Meaning, Scope, Advantages and Limitations -- Choice of Transport Mode : Cost, Speed & Flexibility.	12
8.	Travel & Tourism Meaning & Scope - Role and contribution to Economic Development -- Means of Travel & Tourism in India. – Career Options in Travel, Tourism and Hospitality Management.	12
Total		48

Recommended List of Reference Books

Insurance

1. Insurance -- Principles & Practices of Insurance – By : G.S. Pande
2. Theory & Practice of Life Insurance – By : Mitra
3. Insurance Principles & Practice
– By : M.N.Mishra & S.B. Mishra (S. Chand Publication)
4. Insurance & Risk Management – By : P.K.Gupta (Himalaya Publication)

Transport

1. Economics of Transport – By : S.K. Shrivastava
2. Transport in Modern India – By : P.P. Bhatnagar
3. Rail & Road Transport in India – By : M.D. Mathur
4. Transportation System & Policy Analysis
– By : S. Sriraman (Himalaya Publication)
5. Challenges To Transportation – By : Rupenthal Karl M. (ASRC Hyderabad)

Tourism

1. Introduction to Tourism – By : M.A. Khan
2. Tourism Management – By Seth P.N. (Sterling Publishers, Delhi)
3. Tourism & Travel : Concepts & Principles
– By : Negi Jagmohan (Gitanjalee Publishers, Delhi)
4. Tourism in India : Trends & Issues – By : Dharmarajan S & Seth Rabindra (Har-Anand Publishers, Delhi)

F.Y. B.Com.
Optional Paper
Subject Name :- Marketing and Salesmanship
[Fundamentals of Marketing]
Course Code :- 106 – c.

Objectives :-

1) General Objective of the Paper.

- a) To create awareness about market and marketing.
- b) To establish link between commerce/Business and marketing.

2) Core Objectives of the paper.

- a) To understand the basic concept of marketing.
- b) To understand marketing philosophy and generating ideas for marketing research.
- c) To know the relevance of marketing in modern competitive world.
- d) To develop an analytical ability to plan for various marketing strategy.

Term I

Unit No.	Topic	No. of Lectures
1	<u>Basics of marketing</u> 1.1) Market – Marketing – Introduction, Meaning, Definition, Scope, Types and Significance. 1.2) Marketing Management – Introduction, Meaning, Definition, Scope, and Significance. 1.3) Functions of Marketing – Basic Functions, Functions of Exchanges, and Subsidiary Functions. 1.4) Marketing Mix - Introduction, Meaning, Definition, Scope, and Significance.	
2	<u>Marketing Environment</u> 2.1) Introduction – Definition and Nature. 2.2) Factors Constituting Marketing Environment. 2.3) Micro and Macro Environment. 2.4) Impact of Marketing Environment on Marketing Decisions.	
3	<u>Buyer Behaviour and Market Segmentation</u> 3.1) Introduction – Meaning, Definition, Scope and Significance of Buyer Behavior. 3.2) Determinants of Buyer Behaviour, Stages of Buyer Behaviour – Buying Process.. 3.3) Introduction, Meaning, Importance of Market Segmentation. 3.4) Bases for Segmentation – Qualities of Good Segmentation.	
4	<u>Product and Pricing Decision</u> 4.1) Concept of Product – Product Classification. 4.2) Factors Considered For Product Management – Role of Product Manager. 4.3) Factors Affecting Pricing Decisions – Pricing Objectives. 4.4) Pricing and Product Life Cycle – Pricing Methods.	
Total		48

Term II

Unit No.	Topic	No. of Lectures
5	<u>Logistics and Supply Chain Management</u> – 5.1) Introduction – Definition – Objectives – Scope and Significance 5.2) Market Logistics Decisions – Channel Structure. 5.3) Designing Distribution Channels. 5.4) Types of Marketing Channels.	
6	<u>Market Promotion Mix</u> – 6.1) Promotion Mix – Meaning, Scope and Significance. 6.2) Factors Affecting Market Promotion Mix 6.3) Advertisement and sales Promotion – Meaning and Definition. Means and Methods of Sales Promotion. 6.4) Advertising Meaning and Goals – Advertising Media– Meaning, Types, Advantages and Limitations.	
7	<u>Rural Marketing</u> – 7.1) Introduction – Meaning – Definition – Features – Importance – 7.2) Rural Marketing Mix – Importance, Elements, Scope 7.3) Present Scenario of Rural Market – 7.4) Problems And Challenges of Rural Market –	
8	<u>Services Marketing</u> – 8.1) Introduction – Meaning – Definition – Features – Importance of Services – Significance of Services in Marketing. 8.2) Classification of Services – Marketing of Industrial Goods Services, Marketing of Consumer Goods Services. 8.3) Marketing Mix for Services 8.4) Services Marketing And Economy – Scope of Services Marketing in Generation of Job Opportunity, Role of Services in Economy, Services Quality	
Total		48

Recommended Books

Sr. No.	Name of the Book	Publisher	Author
1	Marketing Management	Macmillan Publication	V.S.Ramaswamy S. Namakumari
2	Principals of Marketing	Prentice- Hall of India Pvt. Ltd.	Philip Kotler Gary Aramstrong
3	Rural Marketing	Dorling Kindersley (India) Pvt.Ltd.Pearson	Pradeep Kashyap
4	Marketing Management	Himalaya Publishing House	Dr.K.Karuna Karan
5	Marketing in India	Vikas Publishing House	S. Neelamegham
6	Basics of Marketing Management	S. Chand	Dr.R.B.Rudani
7	Services Marketing	Himalaya Publishing House	V. Venugopal Raghu V.N.

**F.Y. B.Com.
Optional Paper**

Subject Name :- Consumer Protection and Business Ethics

Course Code :- 106 – d.

Objectives:

- 1) To acquaint the students with consumer and consumer movement.
- 2) To make the students aware about consumer rights, duties and mechanism for resolving their disputes.
- 3) To make students aware about role of united nations and consumers' associations in protection of consumers.
- 4) To make the students aware about laws relating to consumers.
- 5) To acquaint the students with role of Business Ethics in various functional areas.

First Term		Periods
Unit – I	Consumer and Consumerism:	[18]
	1. 1. Consumer: Concept, Meaning, Definition and Features 1. 2. Problems of consumers: Rural and urban, Its Nature and Types 1. 3. Consumerism – Meaning, objectives, Benefits-Consumerism in India 1. 4. Rights, Duties and Responsibilities of Consumers. 1. 5. Consumer Movement-Meaning-Definition-Importance, Scope and Features 1. 6. Development of Consumer Movement in India- Problems and Prospects.	
Unit – II	Voluntary Consumer Organizations (VCO) and Consumer Protection:	[06]
	2. 1. VCO: Origin, Importance, Functions and Limitations 2. 2. Challenges before VCOs 2. 3. Role of Voluntary Consumer Organization in Consumer Protection in the area of marketing & Advertisements. 2. 4. Consumer Education-Meaning-Definition-Objectives	
Unit - III	United Nations Guidelines for Consumer Protection:	[06]
	3. 1. United Nations and Consumer Protection 3. 2. United Nations Guidelines for Consumer protection, 1985. 3.2.1. Objectives. 3.2.2. General principles. 3.2.3. Guidelines a) Physical Safety b) Promotion and protection of consumers' economic interests c) Standards for the safety and quality of consumer	

	goods and services d) Education and Information Programme e) Promotion of Sustainable Consumption	
Unit - IV	Consumer Protection Act, 1986:	[18]
	4. 1. Background – Need-Scope and Features 4. 2. Definitions- Consumer-Goods-Services- Complaints, Complainant- Defect in Goods- Deficiency in Services, Unfair Trade Practices, Restricted Trade Practices. 4. 3. Consumer Protection Councils-Composition-Working-and Objectives of: a) District Consumer Protection Council b) State Consumer Protection Council c) National Consumer Protection Council 4. 4. Mechanism for Redressal-Composition and working of- Consumer Disputes Redressal Agencies: a) District Consumer Disputes Redressal Forum b) State Consumer Disputes Redressal Commission c) National Consumer Disputes Redressal Commission 4. 5. Procedure of filing complaints	
Second Term		
Unit - V	An overview of various Laws for the Protection of Consumers:	[18]
	5. 1. The Bureau of Indian Standards Act, 1986 (Sections - 1,10,11,14,33) 5. 2. The Competition Act, 2002 (Sections – 1, 3 to 6) 5. 3. Right to Information Act, 2005 (Sections – 1 to 11, 18, 19 and 20) 5. 4. Food Safety and Standards Act, 2006 (Sections– 1to 3, 18 to 28)	
Unit - VI	Protection of Consumer against Standard Form of Contract:	[04]
	6. 1. Nature and Relevance of Standard Form of Contract 6. 2. Judicial Response to Standard Form of Contract in India and abroad 6. 3. Legislative Reforms	
Unit - VII	Conceptual Framework of Business Ethics:	[08]
	7. 1. Concept of Ethics: Its Meaning and Nature 7. 2. Definition importance and Scope of Business Ethics 7. 3. Types of Business Ethics; viz:- i. Professional business ethics	

	ii. Ethics of accounting information iii. Ethics of Production iv. Ethics of intellectual property skill, knowledge etc.	
Unit - VIII	Business Ethics in Modern Times:	[10]
	8. 1. Social Responsibilities of Business 8. 2. Business Ethics and Environmental Issues: Indian and International level - Green initiatives 8. 3. Management and Ethics i. Ethical Issues in Marketing ii. Ethical Issues in Human Resource Management	

Recommended Books:

1. Law of Consumer Protection in India- P.K. Majumdar (2011), Orient Publishing Co. New Delhi.
2. Practical Guide to Consumer Protection Law, Anup K. Kaushal (2006), Universal Law Publishing Co, New Delhi.
3. Consumer Protection Laws, Prof. RakeshKhanna, (2005) Central Law Agency, Alahabad.
4. Business Ethics and Corporate Governance, S.K. Bhatia 92005),
5. Consumer Protection Law, Dr. S. R. Myneni,(2010), Asia Law House, Hyderabad.
6. Law of Consumer Protection, Dr. Gurbax Singh, Bharat Law Publication, Jaipur.

F.Y. B.Com.
Optional Paper
Subject Name -: Business Environment & Entrepreneurship
Course Code -: 106 – e.

Objectives :

1. To make the students aware about the Business Environment.
2. To create entrepreneurial awareness among students,
3. To motivate students to make their mind set for taking up entrepreneurship as career.

FIRST TERM

Unit No.	Name of the Topic	Periods
1	Business Environment - Concept- Importance - Inter relationship between environment and entrepreneur, Types of Environment- Natural, Economic - Political - Social - Technical - Cultural - Educational - Legal - Cross-cultural – Geographical etc.	12
2	Environment Issues Protecting the Natural Environment – prevention of pollution and depletion of natural resources; conservation of natural resources, Opportunities in Environment.	12
3	Problems of growth Relevance to entrepreneurship -Unemployment- Poverty-Regional imbalance- Social injustice-Inflation - Parallel Economy- Lack of Technical knowledge and information.	12
4	The Entrepreneur- Evolution of the term entrepreneur-" Competencies of an entrepreneur - Distinction between entrepreneur and manager- Entrepreneur and enterprise -Entrepreneur and Intrapreneur. Entrepreneur and Entrepreneurship.	12

SECOND TERM

Unit No.	Name of the Topic	Periods
1	Entrepreneurial Behaviour - Comparison between entrepreneurial and non-entrepreneurial Personality-Habits of Entrepreneurs - Dynamics of Motivation	12
2	Entrepreneurship Importance of Entrepreneurship - Economic Development and Industrialization, Entrepreneurship in Economic Theory- Role of Entrepreneurship ~ Entrepreneur as a catalyst.	12
3	<u>National Level</u> Training Organizations in promoting entrepreneurship (1) Entrepreneurship Development Institute of India (EDII) <u>State Level</u> Training Organizations in promoting entrepreneurship (1) MCED (2) DIC (3) Maratha Chamber of Commerce and their role. (4) Local NGO's and their roles.	12
4	Biographical study of entrepreneurs i) Narayan R. Murthy ii) Cyrus Poonawala iii) Any successful Entrepreneur from your area (Milind Kamble)	12

Recommended Books & Journals

Recommended Books

1. Dynamics of Entrepreneurship Development and Management - Desai Vasant – Himalaya Publishing House
2. Crusade - Shirke B.G. - Ameya Prakashan
3. Entrepreneurship - Robert D. Histrith - Tata McGraw Hill Publishing Co.
4. Entrepreneurial Development – Khanka - S. Chand.
5. Entrepreneurial Development – Gupta, Shrinivasan - S. Chand.
6. Essentials of Business Environment - K. Aswathappa - Himalaya Publishing House
7. Indian Economy - Dutta Sundaram –
8. A complete guide to successful Entrepreneurship – Pandya G. N. – Vikas Publishing House
9. Trainers Manuals - NIESBUD, New Delhi.
10. Trainers Manuals - NIMID, Mumbai,
11. Business Environment - Francis Cherunilam – Himalaya Publishing House.
12. Business Environment - Tandon B C.
13. Udyog - Udyog Sanchalaya, Mumbai.
14. Environmental Studies basic concepts – U. K. Ahluwalia
15. Environmental Pollution & Health – U. K. Ahluwalia

Recommended Journal

1. The Journal of Entrepreneurship EDI Ahmedabad.
2. Udyojak – M.C.E.D.
3. Government of Maharashtra Website
4. Government of India Website

F.Y. B.Com.
Optional Paper
Subject Name :- Foundation Course in Commerce.
Course Code :- 106 – f.

Objective :

1. To Study the forms of Business Organization.
2. To understand the basic concepts and recent trends in Commerce & Business Practices.
3. To Understand the functioning of Stock Exchange, Commodity exchange, Trade. Associations and Chamber of Commerce.

FIRST TERM

Unit No.	Name of the Topic	Periods
1	Organization - Meaning, Importance Forms of business organizations; Proprietary - Partnership firms- Limited Liability Partnership (LLP) -Joint Ventures and Business Alliances, Organizational structures, Functional areas of business and their operations, Formal & informal organizations: principles of organizations, Criteria for grouping	12
2	Economic Sector - Role and challenges of Public sector, Co operative Sector, Joint Sector (Public and Private). Corporate Sector and Non Government organizations. Industrial Policy, Foreign Investment Policy, Current Foreign Policy, Joint ventures, drafting of agreement	12
3	Business Practices and Government Policies - Importance - Role of Trade. Commerce & Industry, Outsourcing - franchising -Turn key Management - Important Features of current labour policy. Indian joint ventures abroad & Indian experiences.	12
4	Recent Trends in Service Sector, Banking Sector - ATM Debit & Credit Cards Internet Banking etc. Insurance Sector - Malhotra Committee Report - Opening of insurance sector for private players. Logistics - Net working – Importance - Challenges.	12

SECOND TERM

Unit No.	Name of the Topic	Periods
1	Security Market Stock Exchange –Introduction of stock exchanges in India, Online Trading, Working of Stock Exchange, Trading through NSDL, Role of SEBI, Protection & Education of Investors. SEBI & Its Guidelines.	12
2	Commodity Exchange & its working - History & overview, terms used of Commodity Market - working & procedure followed in commodity exchanges, future of commodity exchanges. Study of regional / local commodity market.	12
3	Business Ethics	12

	Nature, purpose of ethics and morals for organizational interests; ethics and conflicts of interests; ethical and social implications of business policies and decisions; Corporate Social Responsibility; ethical issues in Corporate Governance. Ethics in Accounting and Finance	
4	Basic Concepts in Commerce Study of following terms & concepts used in recent field of commerce	12

Sr. No.	Terms / Concepts	Meaning
1	Affidavit	A declaration in writing made on oath.
2	Automation	Use of automatic machinery in industries / organizations.
3	Assimilation	Joining the culture of two or more activities / organizations.
4	Agmark	A mark showing standard / quality of agriculture produce.
5	B P O	Business Process Outsourcing
6	Benchmarking	A level or standard in a scale against which performance can be evaluated. It is a method of job evaluation
7	Body Shopping	A consultancy supplying people at work contract basis.
8	Brand Equity	Goodwill attached to name
9	Bank rate	It is the rate at which the central bank of a country grants credit to the other banks.
10	Capital Intensive	Those industrial activities where the preparation of fixed capital is more than the other factors of production like land, labour, etc.
11	Consortium	A combination of large number of bidder to fulfill the contract deal.
12	Consumer Delight	Consumer's complete satisfaction.
13	Credit rating	Assessment of credit worthiness of an organization by external agency.
14	Credit squeeze	It is state's interference to regulate the level of economic activity by reducing the money supply. In other words, it is an effort of making credit more expensive through controls on bank.
15	Corporate Governance	Accountability of the managers / directors of a company. The recent provision about the listed companies required them to comply with the through annual accounts & reports.
16	Consumerism	A materialistic attitude of consumers of consuming maximum without any consideration of future.
17	Dis-Investment	A policy of the government of gradually withdrawing the investments of public funds from a public sector unit.
18	Distributive negotiation	A term used in personal management of a trade unions approach for solving disputes.
19	Dumping & antidumping	A policy of capturing slice of market by pouring a huge stock a policy of the government of prohibiting the capturing of market by way of dumping.
20	Depository	A system whereby the shares can be lodged physically & need not be handled in the course of each transaction.
21	EXIM	Policy regarding import & exports.
22	E-Commerce	Commercial activities with help of electronic devices.
23	Factoring	Taking responsibility of collecting accounts receivable.

24	Franchise	An agency given for distribution of manufactured products.
25	Fringe benefit	A reward beyond the basic pay for the job.
26	Globalization	A process of world market open to local markets.
27	Grapevine	The informal communication of an organization many times more effective than the formal one.
28	Hacking	The unauthorized breaking into data base of a computer.
29	Hedging	Protecting oneself against the financial loss.
30	Internal customer	One department within an organization becoming customer of another.
31	Entrepreneurship	Entrepreneurship is developed from a particular organization.
32	ISO	International Organization of Standard's.
33	ISI	Indian Standard Institute.
34	Internet Banking	Banking activities with the help of internet service.
35	Just in Time	A system of procuring inventory as & when required.
36	Knowledge worker	A worker working in modern society with lot of areas of knowledge.
37	Kaizen	The Japanese concept of continuous improvement.
38	Labour intensive	An organization or an activity mainly relying on labour force as it's investment / capital.
39	Learning organization	An organization where the worker's are always wanting to learn.
40	Liberalization	An economic policy of allowing foreign players to enter the local markets in competition with the indigenous ones.
41	Logistics	A term originally used in military organizations, for moving of troops & equipments, it refers to the detailed planning of the process of distribution or redistribution.
42	Mutual Funds	A method of raising finance for investing in some other capital issues.
43	Mission	An organization goal / objective behind its establishment.
44	Market niche	A unique place or gap in the market for a given product.
45	Mergers & Acquisitions	Mergers is a combination of two or more business to share risk & rewards no one party to obtain control over the other . Acquisition is the acquiring of share of a company by another by paying purchase consideration as a fair value.
46	Non performing assets	An asset created but not showing any results (a banking asset created by way of loans / advances now becoming unrecoverable.
47	Niche strategy	A marketing strategy adopted for a small segment.
48	Negotiable Instrument	An instrument in commercial transactions recognized by the Negotiable Instrument Act.
49	Organizational Behaviour	A branch of personal management considering interperson & behavioral aspects.
50	Outsourcing	A policy of an organization of depending on external agency for a functional area.
51	Organizational Development	Efforts made for the development of human factor in an organization.
52	Patent	A right on a product or invention claiming its originality or know-how.
53	Primary Market	The Market where the first sale of securities is made by way of an offer from the corporate body to the investors.
54	Portfolio	A branch of financial management dealing with the investment of an

	Management	organization.
55	Public Relations	Efforts made by an organization of establishing report with the stake holders & the general public.
56	Privatization	A policy of the state of disinvestments in the public sector organization by offering its shares to the public at large.
57	Quality circle	A small group of individuals of an organization, trying to solve there practical problems.
58	Recession	A phase in an economy when there is sharp decline of demand for goods & services.
59	Sensex	Sensitive index number of a stock market.
60	Subsidy	A financial support provided by the government.
61	Security market	A market where the corporate securities i.e. shares are bought & sold.
62	Surrender value	It is the left out value that the insurance company is expected to pay.
63	Speed capital	It is the initial amount of capital required for any business to invested by the owner.
64	Service Organization	An organization establish for rendering service is support of trade.
65	SWOT analysis	An analysis of an individual or organization about the strength, weaknesses, opportunities & Threads.
66	TQM	Total Quality Management.
67	Trade Cycle	A recurring sequence of changes in business activity, indicating period of prosperity, decline, depression etc.
68	Trade mark	A mark / logo of an organization treated as official seal.
69	Technology transfer	The transfer of a technology from an area in which it had been successfully applied to an area, which it has not yet been tried.
70	Tele Conferencing	A discussion of participants, geographically scattered
71	Underwrite	To ensure or guarantee to purchase the stock of shares.
72	Value Addition	Increase in the value of an item by adding inputs on it.
73	WTO	World Trade Organization established in 1995.
74	Yellow page	A pace reserved for commercial advertisers.
75	Zero based budgeting	The use of budgets which starts from a present base of zero and regard all items as being new rather than in continuation of existing ones. In practice, this means a budget has to justify each of expenditure every year.

Recommended Books	
RECOMMENDED BOOKS AND PERIODICALS. 1. Financial Management – I. M. Pandey. 2. Financial Management – Theory & practical – Prasanna Chandra 3. Financial Management – S. C. Kuchhal 4. Public Sector in India – Laxmi Nariyan 5. Indian Economy – Rudder Datt 6. Indian Economy – KPM Sundaram 7. Law & practice of banking – S. R. Davar 8. Chamber of Commerce and Trade Association in India – Dr. B. R. Sabade & M. V. Namjoshi 9. The Indian Financial System – Vasant Desai 10. Business Administration – Dr. Y. K. Bhushan 11. Stock exchange Official Directory – The Bombay Stock exchange Publication	

Journals & Periodicals

1. World of Business and –The Maharashtra Chamber Of Commerce, Industries & Agriculture, Pune
2. Sampada Chamber patrika – The Maharashtra Chamber of Commerce & Industries, Mumbai
3. Vanijya Vishwa – Pune Merchants Chamber, Pune

UNIVERSITY OF PUNE
COURSE STRUCTURE FOR
BACHELOR OF BUSINESS ADMINISTRATION (B.B.A.)
(From 2013-14)

1. Title:

The degree shall be titled as Bachelor of Business Administration (B.B.A.) under the Faculty of Commerce Part I w.e.f. the academic year 2013-2014 B.B.A. Part II w.e.f. 2014-2015 and B.B.A. Part III w.e.f. 2015-2016.

2. Objectives:

- (i) To provide adequate basic understanding about Management Education among the students.
- (ii) To prepare students to exploit opportunities being newly created in the Management Profession.
- (iii) To train the students in communication skills effectively.
- (iv) To develop appropriate skills in the students so as to make them competent and provide themselves self-employment.
- (v) To inculcate Entrepreneurial skills.

3. Duration:

The Course shall be a full time course and the duration of the course shall be of three years.

4. Eligibility:

- (i) A candidate for being eligible for admission to the Degree course in Bachelor of Business Administration shall have passed 12th Std. Examination (H.S.C. 10+2) from any stream with English as passing subject and has secured 40% marks at 12th Std.
- (ii) Two years Diploma in Pharmacy after H.S.C., Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- (iii) Three Year Diploma Course (after S.S.C., i.e. 10th Standard) of Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- (iv) MCVC

(v) Every eligible candidate has to pass a Common Entrance Test to be conducted by the respective Institute/College.

5. Medium of Instruction:

Medium of instruction shall be in English only.

6. Scheme of Examination:

The B.B.A. Examination will be 3600 marks divided into 3 parts as per details given below:

(i) B.B.A. Part I (Sem I, II) Aggregate marks	1200
(ii) B.B.A. Part II (Sem III, IV) Aggregate marks	1200
(iii) B.B.A. Part III (Sem V, VI) Aggregate marks	1200

There will be written Examination of 80 marks and 3 hrs duration for every course at the end of each Semester. The class work will carry 20 marks in each course. For Courses in Business Exposure (Sem IV) there will be viva voce examination of 50 marks and for Written Report on Industrial visits 50 marks. For course on Project work (Sem VI) there will be oral presentation test consisting of 20 marks and Written Report of 30 marks.

7. Backlog:

- a) A student shall be allowed to keep term for the Second Year, if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the First Year examination, which consist of First & Second Semester.
- b) A student shall be allowed to keep for the Third Year, if he/she has no backlog of First Year & if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the Second Year examination, which consist of Third & Fourth Semester.

8. Verification and Revaluation

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. Equivalence and Transitory Provision

The University will conduct examination of old course for next three academic years from the date of implementation of new course.

The candidate of old course will be given three chances to clear his subjects as per the old course and thereafter he will have to appear for the subjects under new course as per the equivalence given to old course.

10. Standard of Passing and Award of Class:

In order to pass examination a candidate has to obtain 40% marks out of 100 (Sem-end exam 80 + class work marks 20 taken together) in each course.

The award of class:

The class shall be awarded to the student on the basis of aggregate marks obtained by him in all three years (Part I, II and III). The award of Class is as follows:

(i) Aggregate 70% and above	First Class with Distinction.
(ii) Aggregate 60% and above but less than 70%	First Class.
(iii) Aggregate 55% and above but less than 60%	Higher Second Class
(iv) Aggregate 50% and above but less than 55%.	Second Class.
(v) Aggregate 40% and above but less than 50%	Pass Class.
(vi) Below 40%	Fail.

11. Setting of Question Papers

1. A candidate shall have to answer the questions in all the subjects in English only.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have a combination of long and short answer type questions.
5. There shall be no overall option in the question paper; instead, there shall be internal options.

12. The subject wise Revised Syllabus for F.Y. BBA Course shall be as given in the following pages.

Subject wise Course Structure

B.B.A. First Year (F.Y.) (2013-14)

Sr. No.	Sub. Code	Sem I	Sr. No.	Sub Code	Sem II
1	101	Business Organization and System	1	201	Principles of Management
2	102	Business Communication Skills	2	202	Principles of Marketing
3	103	Business Accounting	3	203	Principles of Finance
4	104	Business Economics (Micro)	4	204	Basics of Cost Accounting
5	105	Business Mathematics	5	205	Business Statistics
6	106	Business Demography and Environmental Studies	6	206	Business Informatics

B.B.A. Second Year (S.Y.) (2014-15)

Sr. No.	Sub. Code	Sem III	Sr. No.	Sub Code	Sem IV
1	301	Personality Development	1	401	Production and Operations Management
2	302	Business Ethics	2	402	Industrial Relations & Labour Laws
3	303	Human Resource Management and Organization Behaviour	3	403	Business Taxation
4	304	Management Accounting	4	404	International Business
5	305	Business Economics (Macro)	5	405	Management Information System
6	306	I.T. in Management	6	406	Business Exposure (Field Visits)

B.B.A. Third Year (T.Y.) (2015-16)

Sr. No.	Sub. Code	Sem V	Sr. No.	Sub Code	Sem VI
1	501	Supply Chain and Logistics Management	1	601	Business Planning and Project Management
2	502	Entrepreneurship Development	2	602	Event Management
3	503	Business Law	3	603	Management Control System
4	504	Research Methodology (Tools and Analysis)	4	604	E-Commerce
5	505	Specialization- I	5	605	Specialization- III
6	506	Specialization- II	6	606	Specialization- IV

Available Specializations

- 1) Finance 2) Marketing 3) Human Resource Management
4) Service Sector Management 5) Agri Business Management

Semester I

Business Organization and Systems

Course code 101

Objectives:

1. To make the students aware about various activities of business, business practices and recent trends in business world.
2. To study the challenges before the businesses and setting up of a business enterprise.
3. To develop the spirit of entrepreneurship among the students.

	Contents	No. of Lectures
Unit 1	Nature and Evolution of Business 1.1 Human Occupations – characteristics of Business— Divisions of Business—Objectives of Business— Requisites for success in Business 1.2 Development of commerce – Evolution of Industry—The Industrial Revolution— Globalization—Emergence of MNCs 1.3 Recent Trends—Mergers and Acquisitions, Networking, Franchising. BPOs and KPOs, E-Commerce, On-line trading, Patents, trademarks and copy rights—Challenges before Indian business Sector	10
Unit 2	Forms of Business Organizations 2.1 Mixed Economy—Private Sector—Public Sector—Co- operative sector—Joint sector Service Sector 2.2 Forms of Business Organizations—Sole proprietorship— Partnership firm—Joint stock company—Features—Merits demerits and suitability of various forms of business	10
Unit 3	Setting up of a Business Enterprise 3.1 Decision in setting up of an enterprise—Opportunity and idea generation - Role of creativity and innovation 3.2 Project Report—Business size and Location decisions— Factors to be considered in starting a new unit—Government policies	10
Unit 4	Domestic and Foreign Trade 4.1 Whole sale and Retail Trade –Emergence of Foreign players in trading –Government policy-Effects of FDI on retail trade	10

	4.2 Organization of finance –Insurance—Transportation and communication and other Services—Import and Export procedure	
Unit 5	Business and Society 5.1 Objectives of Business—Changing concept, Professionalization 5.2 Business Ethics and culture—Technological and social changes –Social responsibility of business—CSR—Social Audit	08
	Total	48

Recommended Books:

1. *Modern Business Organization* - S.A. Sherlekar
2. *Industrial Organization Management* - Sherlekar
3. *Business Organization and management* – Y.K. Bhushan
4. *Business Organization and system* – Dr.M.V.Gite, Dr.R.D.Darekar, Prof.S.N.Nanaware, Dr.V.D. Barve- Success Publication,Pune
5. *Business Environment* - F. Cherunilam
6. *Business Organization & Management* – C.B. Gupta.
7. *Entrepreneurial Development* – S.S. Khanna.
8. *Organizing and Financing of Small scale Industry* – Dr. V. Desai

Semester I

Business Communication Skills

Course Code: 102

Objectives:

1. To improve various skills such as linguistic, non linguistic and Paralinguistic skills.
2. To develop an integrative approach where reading, writing, oral and speaking components are used together to enhance the students' ability to communicate and write effectively.
3. To create awareness among student about Methods and Media of communication.

	Contents	No. of Lectures
Unit 1	Introduction to Communication Meaning, Definition, objective, Process, importance. Principles of good Communication, Barriers to Communication, Overcoming Barriers.	08
Unit 2	Methods and Types of Communication Written Communication, Oral Communication, Silent Communication – Body Language, Proximity, Touch, Signs and Symbols, Paralinguistic, -Advantages and disadvantages of each	10
Unit 3	Oral Communication Meaning, Nature, Scope, Principles of Effective Oral Communication, Techniques of Effective Speech, Press Conference, Group Discussion, Interviews, Negotiation, Presentations, The Art of Listening, Principles of Good Listening, Barriers of Listening, Phone Etiquette, Grapevine	12
Unit 4	Business Correspondence Need, Functions, Component and layout of Business letter, Drafting of letters: Enquiry letter, Placing order, Complaints and follow up letters, Sales letter, Circulars, Application for employment and Resume, Notices, Agenda, Memo, Email etiquette	10
Unit 5	Media of Communication Introduction, Advantages and Disadvantages of – Telex, Telegram, Fax, Voice Mail, Teleconferencing, Video Conferencing, SIM Card, Dictaphone, SMS, MMS, Internet and Social Media Sites.	08
	Total	48

Recommended Books:

- 1) *Business Communication (Principles, Methods and Techniques)* - Nirmal Singh- Deep & Deep Publications Pvt. Ltd, New Delhi.
- 2) *Essentials of Business Communication* – Rajendra Pal & J. S. Korlhalli- Sultan Chand & Sons, New Delhi.
- 3) *Media and Communication Management* – C.S.Raydu - Himalaya Publishing House, Mumbai.
- 4) *Professional Communication-* Aruna Koneru- Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
- 5) *Creating a Successful CV* - Siman Howard - Dorling Kindersley.
- 6) *Business Communication skills* – Dr.G.M.Dumbre, Dr.Anjali Kalkar, Dr.P.N.Shende, Dr.S.D.Takalkar-success Publication, Pune
- 7) *Effective Documentation and Presentation-* Urmila Rai & S.M. Rai – Himalaya Publishing House, Mumbai.
- 8) *Principles Practices of Business Communication* – Aspi Doctor & Rhoda Doctor – Sheth Publishers Pvt. Ltd.
- 9) *Business Communication – Concepts, Cases and Applications* – P.D. Chaturvedi, Mukesh Chaturvedi, 2nd Edition (2013)

Semester I
Business Accounting
Course Code – 103

Objectives:

1. To enable the students to acquire sound knowledge of basic concepts of accounting
2. To impart basic accounting knowledge
3. To impart the knowledge about recording of transactions and preparation of final accounts
4. To acquaint the students about accounting software packages

	Contents	No. of lectures
Unit 1	Introduction: Financial Accounting-definition and Scope, objectives, Accounting concepts , principles and conventions Accounting Standards in general: - AS1, AS2, AS6.	6
Unit 2	Accounting Transactions and Final Accounts :- Voucher system; Accounting Process, Journals, Ledger, Cash Book , subsidiary books ,Trial Balance preparation of Final Accounts of Sole Proprietorship(Trading and Profit & Loss Account and Balance Sheet)	18
Unit 3	Bank Reconciliation Statement :- Meaning , importance and preparation of Bank Reconciliation Statement	12
Unit 4	Depreciation: - Meaning, need, importance and methods of charging depreciation - Written Down Value, Straight Line Method.	8
Unit 5	Computerized Accounting: Computers and Financial application, Accounting Software packages.	4
	Total	48

Allocation of Marks:

Theory - 30%

Practical problems - 70%

Recommended Books

1. *Fundamentals of Accounting & Financial Analysis: By Anil Chowdhry (Pearson Education)*
2. *Business Accounting-Dr.G.M.Dumbre, Dr.Kishor Jagtap, Dr.A.H.Gaikwad, Dr.N.M.Nare-Success Publication,Pune*
2. *Financial accounting: By Jane Reimers (Pearson Education)*
3. *Accounting Made Easy By Rajesh Agarwal & R Srinivasan (Tata McGraw –Hill)*
4. *Financial Accounting For Management: By Amrish Gupta (Pearson Education)*
5. *Financial Accounting For Management: By Dr. S. N. Maheshwari (Vikas Publishing)*
6. *Advanced Accounts – M.C. Shukla and S P Grewal (S.Chand & Co., New Delhi)*

Semester I
Business Economics (Micro)

Course Code - 104

Objectives:

1. To expose students to basic micro economic concepts.
2. To apply economic analysis in the formulation of business policies.
3. To use economic reasoning to problems of business.

	Contents	No. of Lectures
Unit 1	INTRODUCTION 1.1 Meaning, Nature and Scope of Business Economics – Micro and Macro 1.2 Basic Economic Problems 1.3 Circular Flow of Income and Expenditure	07
Unit 2	DEMAND and SUPPLY ANALYSIS 2.1 Concept of Demand and Supply 2.2 Elasticity of Demand and their types. 2.3 Factors Affecting Supply 2.4 Concept and Law of Supply	09
Unit 3	REVENUE AND COST ANALYSIS 3.1 Revenue Concepts - Total Revenue, Marginal Revenue, Average Revenue and their relationship 3.2 Types of costs – i) Accounting Costs and Economic Costs ii) Short Run Cost Analysis: Fixed, Variable and Total Cost Curves, Average and Marginal Costs iii) Long Run Cost Analysis: Long Run Average and Marginal Cost Curves	10
Unit 4	PRICING UNDER VARIOUS MARKET CONDITIONS 4.1 Perfect Competition - Equilibrium of Firm and Industry under Perfect Competition 4.2 Monopoly - Price Determination under Monopoly 4.3 Monopolistic Competition – Non- price competition 4.4 Duopoly and Oligopoly – Meaning and characteristics	10
Unit 5	DISTRIBUTION 5.1 Rent: Modern Theory of Rent 5.2 Wages: Marginal Productivity Theory of Wage Determination 5.3 Interest: Liquidity Preference Theory of Interest 5.4 Profits: Dynamic, Innovation, Risk - Bearing and Uncertainty Bearing Theories of Profits	12
	Total	48

Recommended Books:

1. *Textbook of Economic Theory* - Stonier and Hague; Longman Green and Co., London.
2. *Introduction to Positive Economics* - Richard G. Lipsey
3. *Business Economics (Micro)* - Dr. Girijashankar; Atharva Prakashan, Pune.
4. *Micro Economics* - M. L. Seth
5. *Business Economics(Micro)*-Dr.Girija Shankar, Dr.B.D.Khedkar, Dr.S.G.Shinde, Prof.Anjali Sane-Success Publication,Pune
6. *Micro Economics* - M. L. Jhingan; Vrinda Publications, New Delhi.
7. *Business Economics* – Dr. D. M. Mithani and Mrs. Anjali Sane, Himalaya Publications

Semester I
Business Mathematics
Course code 105

Objectives:

1. To understand applications of matrices in business.
2. To understand the concept and application of Permutations & Combinations in business.
3. To use L.P.P. and its applications in business.
4. To understand the concept of Transportation problems & its applications in business world.
5. To understand the concept of shares & share market.

	Contents	No. of Lectures
Unit 1	Shares and Dividends Concept of Shares, Stock exchange, Face Value, Market Value, Dividend, Equity Shares, Preferential Shares, Bonus Shares, Examples.	08
Unit 2	Permutations and Combinations Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetition). $nPr = n! / (n-r)!$ (Without proof). Combinations of 'r' objects taken from 'n' objects. $nCr = n! / r! (n-r)!$ (Without proof) problems, Applications.	08
Unit 3	Matrices and Determinants (up to order 3 only) Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Adjoint of a Matrix, Inverse of a Matrix via Adjoint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.	14
Unit 4	Linear Programming problem (L.P.P.) Meaning of LPP, Formulation of LPP, and solution by graphical methods.	10
Unit 5	Transportation problem (T.P.) Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems (concept of degeneracy is not expected).	08
	Total	48

Reference Books:

- 1) *Business Mathematics by Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain.*
- 2) *Business Mathematics by Padmalochan Hazarika – Sultan chand & sons, Delhi*
- 3) *Business Mathematics by Bari - New Literature publishing company, Mumbai*
- 4) *Operations Research by V.K. Kapoor - Sultan chand & sons*
- 5) *Operations Research by Dr. S. D. Sharma – Sultan Chand & Sons.*
- 6) *Operations Research by Dr. J. K. Sharma – Sultan Chand & Sons.*
- 7) *Business mathematics – Dr.Anwar Shaikh, Prof.R.G.Gurav, Prof.Tawade, Prof. Vaibhav Joshi- Success Publication,Pune*

Semester I

Business Demography and Environmental Studies

Course Code: 106

Objectives :

- 1) To develop knowledge base for demographic and environmental factors affecting business.
- 2) To make the students aware of environmental problems related to business and Commerce.
- 3) To inculcate values of Environmental ethics amongst the students.

	Contents	No. of Lectures
Unit 1	Introduction of demography 1.1 Meaning, Definition, Need, Importance & need of Demography Studies for Business 1.2 Scope of demography, interdisciplinary approach of demography 1.3 Components of demography: Fertility, mortality and migration 1.4 Measures to calculate fertility and mortality rate 1.5 Factors affecting fertility and mortality	10
Unit 2	Distribution of Population and Population Growth 2.1 Meaning of population distribution and population density, Physical and cultural factors affecting the distribution of population 2.2 Concepts of over, optimum and under population with suitable examples 2.3 Meaning and definition of population growth, Methods of calculating population growth 2.4 Population growth in India since 1901	08
Unit 3	Population as Resource 3.1 Meaning of resource, types of resources 3.2 Importance of human resource in development and growth of business 3.3 Concept of Literacy: importance of literate population as a resource 3.4 Concept of sex ratio, Concept of Age & Sex Pyramid, Types of age and sex pyramid, age and sex pyramids of different countries 3.5 Classification of population - Urban and rural population 3.6 Population below poverty line, working population, dependent Population	12
	Urbanization	06

Unit 4	4.1 Meaning, definitions of urbanization, factors responsible for urbanization and problems of urbanization 4.2 Urbanization as Behavioral concept, structural concepts and demographic concept	
Unit 5	Environment and Environmental issues related to Business 5.1 Meaning and definition of environment 5.2 Types of Environment 5.3 Physical and Cultural components of environment 5.4 Need of environmental studies for Business Management 5.5 Environment factors affecting Business – Physical factors –topography, climate, minerals, water resources; Cultural factors – infrastructure – technology tradition, political, social, education 5.6 Global warming and Kyoto Protocol, Oil Crisis and its impact on Business 5.7 Problems related to water resources 5.8 Types of pollution –Air, Water, Noise - Effects and causes of pollution 5.9 Remedial measures to control pollution 5.10 Interrelationship between industrialization and pollution	12
	Total	48

Recommended books:

1. *Population Geography* : R.C. Chandana, Lyall Book Depot/ Kalyani Publishers (2006)
2. *Population Geography*: Qazi, S. Shah, Shargi Qazi APH Publishing Corp. New Delhi
3. *Environmental Geography*: Dr. Savindra Singh Prayag Pustak Bhawan
4. *Geography of India*: Majid Hussain Tata McGraw Hill
5. *Population Geography* : I Singh: Alfa Publication (2006)
6. *Business Demography and Environmental studies*-Miss Joshi Sunita, Dr.Jaybhaye Ravindra- Success Publication,Pune

Semester II
Principles of Management
Course Code – 201

Objectives:

- a) To provide conceptual knowledge to the students regarding nature, complexity and various functions of management
- b) To give historical perspective of management
- c) Students will also gain some basic knowledge on recent trends and international aspects of management

	Contents	No. of Lectures
Unit 1	Nature of Management 1.1 Meaning, Definition, Nature, Importance & Functions 1.2 Management an Art, Science & Profession-Management as social System 1.3 Concept of Management-Administration-Organization-Universality of management	08
Unit 2	Evolution of management Thoughts 2.1 Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barnard & Peter Drucker to the management thought 2.2 Various approaches to management (i.e. School of management thought) Indian management Thought	10
Unit 3	Functions of Management : Part – I 3.1 Planning –Meaning –Need & Importance, types levels – advantages & limitations; Forecasting- Need & Techniques; Decision making – Types - Process of rational decision making & techniques of decision making. 3.2 Organizing – Elements of organizing & process Types of organizations, Delegation of authority – Need, difficulties in delegation – Decentralization. 3.3 Staffing – Meaning & importance	12
Unit 4	Functions of Management : Part –II 4.1 Direction - Nature – Principles	10

	Communication – Types & Importance Motivation - Importance – Theories Leadership – Meaning - Styles, qualities & functions of leaders 4.2 Controlling – Need, nature, Importance, Process & techniques 4.3 Co-ordination - Need – Importance	
Unit 5	Recent Trends in Management 5.1 Management of change 5.2 Management of Crisis 5.3 Total Quality Management 5.4 Stress Management 5.5 International Management	08
	Total	48

Recommended Books:

1. *Essential of Management - Harold Koontz and Itenz Wiebritch- McGraw-Hill International*
2. *Management Theory & Practice – J.N. Chandan*
3. *Essential of Business Administration – K. Aswathapa, Himalaya Publishing House*
4. *Principles & Practice of management – Dr. L.M. Prasad, Sultan Chand & Sons – New Delhi*
5. *Business Organization & management – Dr. Y.K. Bhushan.*
6. *Management: Concept and Strategies by J.S. Chandan, Vikas Publishing.*
7. *Principles of Management, By Tripathi, Reddy Tata McGraw Hill*
8. *Business organization and management by Talloo by Tata Mc Graw Hill*
9. *Business Environment and policy – A book on Strategic Management/ Corporate Planning By Francis Cherunilam, Himalaya Publishing House.*
10. *Business Organization & Management – C.B. Gupta*

Semester II
Principles of Marketing
Course Code: 202

Objectives:

- a. To introduce and familiarize the student's basic concepts of marketing, its general nature, scope and importance.
- b. To impart appropriate knowledge and understanding of its primary functions and applications and its gradual evolution and development.
- c. To develop basic and essential skills related to marketing.
- d. To provide a learning platform for preparing students for marketing employability opportunities essential for industries.

	Contents	No. of Lectures
Unit 1	Introduction and Functions of Marketing 1.1 Marketing – Definitions, Concept, objectives, importance and functions of marketing: on the basis of exchange, on the basis of physical supply and facilitating functions 1.2 Approaches to the study of Marketing 1.3 Relevance of Marketing in a developing economy. 1.4 Changing profile and challenges faced by a Marketing manager	08
Unit 2	Classification and types of markets 2.1 Traditional classification of marketing 2.2 Service Marketing: 7P's of services marketing, importance of services marketing, importance of service sectors 2.3 Rural Marketing: Meaning, feature & importance of rural marketing, Difficulties in rural marketing and suggestions for improvement of Rural Marketing 2.4 Retail marketing 2.5 Tele marketing 2.6 E-Marketing 2.7 Digital marketing: meaning, importance of digital marketing 2.8 Green marketing	08
Unit 3	Marketing Environment and Market Segmentation 3.1 Marketing Environment – Meaning, Internal & external factors influencing Marketing environment: political, social, economical, international, technological multi cultural environment 3.2 Market Segmentation: Meaning, Definition, Essentials of effective Market Segmentation, types of segmentation	08

Unit 4	Marketing Mix 4.1: Product mix and Price mix Meaning, scope and importance of marketing mix a. Product mix: concept of a product, product characteristics: intrinsic and extrinsic , PLC, Product simplification, product elimination, product diversification , new product development b. Price mix : meaning, element , importance of price mix , factors influencing pricing , pricing methods and recent trends 4.2 : Place mix and Promotion mix c. Place mix: meaning and concepts of channel of distribution, types of channel of distribution or intermediaries, Factors influencing selection of channels, types of distribution strategies: intensive, selective and extensive recent changes in terms of logistics and supply chain management. d. Promotion mix: meaning, elements of promotion mix: advertising: meaning, definitions, importance and limitations of advertising, types of media: outdoor, indoor, print, press, transit - merits and demerits, concept of media mix, Recent trends in promotion	16
Unit 5	Marketing Planning, Marketing Information System, Marketing Research 5.1 Marketing planning: meaning, scope, importance, essentials and steps in marketing planning ,Importance and difficulties in marketing planning 5.2 Marketing Information System: Concept, components and importance of Marketing Information System 5.3 Marketing Research – Meaning, definitions, objectives and scope of marketing research, difference between market research and marketing research, types & techniques of Marketing Research, Use of Marketing Research in management	10
	Total	48

All topics should be supported with assignments, group discussions, visits and case lets as per requirements.

Reference Books

1. *Marketing Management By Philip Kotler*
2. *Marketing Management Cravens By Hills – Woodruff*
3. *Marketing – A Managerial Introduction By Gandhi*
4. *Marketing Information System By Davis – Olsan*
5. *Consumer Behavior By Schiffman – Kanuk*
6. *Principles and practice of Marketing By John Frair.*

Semester II
PRINCIPLES OF FINANCE
Course Code – 203

Objectives -

1. To provide understanding of nature, importance, structure of finance related areas.
2. To impart knowledge regarding sources of finance for a business.

	Contents	No. of lectures
Unit 1	Introduction 1.1 Finance - Definition - Nature and scope of finance function 1.2 Financial Management - Meaning – Approaches :- Traditional , Modern 1.3 Role of finance manager.	4
Unit 2	Sources of Finance 2.1 External: - Shares, Debentures, Public Deposits, Borrowing from banks: - meaning, types, advantages and limitations of these sources. 2.2 Internal: - Reserves and surplus, Bonus shares, Retained earnings, Dividend policy; Meaning, advantages and limitations of these sources.	16
Unit 3	Capital Structure 3.1 Meaning - criteria for determining capital structure. 3.2 Factors affecting capital structure. 3.3 Capitalization:- Meaning , 3.4 Over capitalization and Under Capitalization - meaning, causes, consequences, remedies	14
Unit 4	Financial planning 4.1 Meaning and objectives 4.2 Process 4.3 Methods of forecasting 4.4 Basic considerations 4.5 Limitations.	6
Unit 5	Recent Trends in business finance:- Meaning and nature of- 5.1 Venture Capital 5.2 Leasing 5.3 Microfinance 5.4 Mutual Fund	8
	TOTAL	48

BOOKS RECOMMENDED:

1. P.V. Kulkarni - *Financial Management* - Himalaya Publishing House, Mumbai.
2. S.C. Kucchal - *Corporation Finance* - Chaitanya Publishing House, Allahabad.
3. I.M. Pandey - *Financial Management* - Vikas Publishing House.
4. R.M. Shrivastava - *Pragati Prakashan*, Meerut.
5. M.Y. Khan and P.K. Jain - *Financial Management* - Tata - McGraw Hill Publishing co. Ltd., New Delhi.
6. Prasanna Chandra - *Financial Management* - Tata - McGraw Hill Publishing co. Ltd., New Delhi.

Semester II

Basics of Cost Accounting Course Code: 204

Objectives:

1. To Impart the Knowledge of Basic cost concepts, element of cost & preparation of Cost Sheet.
2. To provide basic knowledge of important Methods of costing.

	Contents	No. of Lectures
Unit 1:	Introduction 1.1 Concept of Cost, Costing, Cost Accounting & Cost Accountancy 1.2 Limitations of Financial Accounting 1.3 Origin, Objectives and Features of Cost Accounting 1.4 Advantages and Limitations of Cost Accounting 1.5 Difference between Financial and Cost Accounting 1.6 Conceptual analysis of Cost Unit & Cost Centre	8
Unit 2:	Elements of cost and Cost Sheet 2.1 Material, Labour and other Expenses 2.2 Classification of Cost & Types of Costs 2.3 Preparation of Cost Sheet	10
Unit 3:	Overheads 3.1 Meaning and Definitions 3.2 Classification of Overheads 3.3 Collection, allocation, apportionment and reapportionment of overheads 3.4 Under and over absorption – Definition and Reasons	8
Unit 4	Methods of Costing 4.1. Contract Costing – Meaning and features of contract costing, works certified and uncertified, escalation clause, cost plus contract, work in progress, profit on incomplete contract 4.2. Process Costing - Meaning, Features of process costing, preparation of process costing including Normal and Abnormal Loss/Gains 4.3 Service costing – Meaning, Features and application, cost unit – simple and composite, Preparation of cost sheet for transport service	16
Unit 5	Cost Audit: 5.1_ Meaning , definition, objectives and scope 5.2 Advantages of Cost Audit 5.3 Difference between Financial and Cost Audit 5.4 Types of Cost Audit	6
	Total	48

Allocation of Marks:

Theory - 50%

Practical problems - 50%

Area of Practical problems:

Cost-Sheet

Contract costing

Process costing

Service costing

Books Recommended: -

1. *Advanced cost Accounting by S.P.Jain and Narong.*
2. *Cost Accounting by S.N.Maheshwari*
3. *Cost Accounting by Ratnam.*
4. *Practice in Advanced Costing and Management Accounting by Prof. Subhash Jagtap*
5. *Cost Accounting – Bhatta HSM, Himalaya Publication*
6. *Cost Accounting – Prabhu Dev , Himalaya Publication*
7. *Advanced Cost Accounting – Made Gowda, Himalaya Publication*
8. *Cost Accounting Principles and Practice by M.N.Arora*

Semester II
Business Statistics
Course code 205

Objectives:

1. To understand the basics of statistics - concept of population and sample & to use frequency distribution to make decision.
2. To understand and to calculate various types of averages and variation.
3. To understand Correlation and use of regression analysis to estimate the relationship between two variables and its applications.
4. To understand the concept - Time Series and its applications in business.
5. To understand the concept - Index numbers and applications in business.
6. To inculcate the research culture among students.

	Contents	No. of Lectures
Unit 1	Population and Sample: 1.1 Definition of Statistics, Scope of Statistics in Economics, Management Sciences and Industry. Concept of population and sample with illustration. 1.2 Methods of Sampling – SRSWR, SRSWOR, Stratified, Systematic. (Description of sampling procedures only). Data Condensation and graphical Methods: Raw data, attributes and variables, classification, frequency distribution, cumulative frequency distributions. 1.3 Graphs - Histogram, Frequency polygon. Diagrams - Multiple bar, Pie, Subdivided bar.	08
Unit 2	Measures of Central Tendency & Dispersion: 2.1 Criteria for good measures of central tendency 2.2 Arithmetic mean, Median and Mode for grouped and ungrouped data, combined mean. 2.3 Concept of dispersion, Absolute and relative measure of dispersion, Range, Variance, Standard deviation, Coefficient of variation, Quartile Deviation, Coefficient of Quartile deviation.	11
Unit 3	Correlation and Regression (for ungrouped data): 3.1 Concept of correlation, positive & negative correlation 3.2 Scatter Diagram, Karl Pearson's Coefficient of correlation 3.3 Meaning of regression, Two regression equations, Regression coefficients and properties (Statements Only).	10
Unit 4	Time Series:	14

	4.1 Definitions and Utility of Time Series Analysis; Components of Time Series: Secular Trend, Seasonal Variation, and Cyclic Variation, Irregular or Erratic Variations. 4.2 Measurement of Trend: Freehand or Graphic Method, Method of Semi-averages, Moving Average Method, Method of Least Squares. 4.3 Measurement of Seasonal Variations: Method of Seasonal Averages, Ratio – to – trend Method, Moving Average method, Link Relative Method. (Only Application, No Proof required.)	
Unit 5	Index Numbers: 5.1 Important definitions of Index Numbers 5.2 Characteristics of Index Numbers, Uses of Index Numbers, Types of Index Numbers: Price Index, Quantity Index, Value Index, numerical problems 5.3 Problems in the construction of Index Numbers; Methods of constructing Index Numbers. (Only Application, No Proof required.)	05
	Total	48

Recommended Books:

1. S.C. Gupta – *Fundamentals of Statistics* - Sultan chand & Sons, Delhi.
2. D.N. Elhance – *Fundamentals of Statistics* – Kitab Mahal, Allahabad.
3. *Business Statistics* by N. D. Vohra – Tata Mc Graw Hill
4. *Fundamentals of Mathematical Statistics* by V.K. Kapoor -Sultan Chand & Sons, Delhi.

Semester II

Business Informatics

Course Code – 206

Objectives:

1. To know the basics of Computer
2. To understand the basics of networking
3. To know the basics of internet
4. To know the basics of databases

	Contents	No. of Lectures
Unit 1	Introduction to Computers 1.1 Introduction 1.2 Characteristics of Computers 1.3 Block diagram of computer 1.4 Booting Process 1.5 Types of Programming Languages 1.5.1 Machine Languages 1.5.2 Assembly Languages 1.5.3 High Level Languages 1.6 Data Organization 1.6.1 Drives 1.6.2 Files 1.6.3 Directories 1.7 Storage Devices 1.7.1 Primary Memory 1.7.1.1 RAM 1.7.1.2 ROM 1.7.2 Secondary Storage Devices - FD, CD, HDD, Pen drive 1.8 I/O Devices 1.8.1 Monitor and types of monitor 1.8.2 Printer and types of printer 1.8.3 Scanners 1.8.4 Digitizers 1.8.5 Plotters 1.9 Number Systems 1.9.1 Introduction to Binary, Octal, Hexadecimal system 1.9.2 Conversion 1.9.3 Simple Addition, Subtraction, Multiplication, Division	10
Unit 2	Operating System and Services in O.S. 2.1 Definition of operating system 2.2 Services provided by OS 2.3 Types of O.S. 2.4 Features of Windows and Linux 2.5 Files and Directories	8

	2.6 Internal and External Commands of DOS 2.7 Batch Files	
Unit 3	Editors and Word Processors 3.1 Basic Concepts 3.2 Examples : MS-Word2007 3.3 Introduction to desktop publishing Spreadsheets and Database packages 3.4 Purpose 3.5 MS-Excel2007 3.6 Creation of table in MS-Access2007 3.7 MS –PowerPoint2007	9
Unit 4	Introduction to Networking 4.1 Basics of Computer Networks 4.2 Definition 4.2.1 Goals 4.2.2 Applications 4.2.3 Components 4.3 Topology 4.3.1 Types of Topology 4.4 Types of Networks 4.4.1 (LAN, MAN, WAN) 4.5 Modes of Communication : 4.5.1 (Simplex 4.5.2 Half Duplex 4.5.3 Full Duplex) 4.6 Transmission media 4.6.1 Twisted pair 4.6.2 Coaxial cable 4.6.3 Fiber optic cable 4.7 Protocols and purpose 4.8 Network Connectivity Devices 4.8.1 Hubs 4.8.2 Repeaters 4.8.3 Bridges 4.8.4 Switches 4.8.5 Gateways Internet Basics 4.9 Concept of Internet, Intranet and Extranet 4.10 Web Client 4.11 Web Server 4.12 WWW 4.13 Search Engine 4.14 Internet Service Providers(ISP)	15
Unit 5	Introduction To R.D.B.M.S 5.1 Advantages and Limitations 5.2 Normalization 5.3 Entity Relationships	6

	5.4 Use Of simple SQL Commands involving both single table and joins.	
	Total	48

Reference Books:

1. *Fundamental of Computers – By V. Rajaraman (Prentice Hall)*
2. *Fundamental of Computers – By P. K. Sinha (B.P.B publication)*
3. *Computer Applications in Management- By Niranjana Shrivastava (Dreamtech Press)*
4. *MS- Office 2000(For Windows) – By Steve Sagman*
5. *Data Communications & Networking- Behrouz Ferouzan (III Edition)*

First Year Bachelor of Business Administration (F.Y. BBA)

Pattern of Question papers (w.e.f. A.Y. 2013-2014)

Following subjects have been identified as theory papers in First Year B.B. A. which will have uniform question paper format as given under:

Semester I:

- 1) 101 - Business Organization and Systems
- 2) 102 - Business Communication Skills
- 3) 104 - Business Economics (Micro)
- 4) 106 - Business Demography and Environmental Studies

Semester II:

- 1) 201 – Principles of Management
- 2) 202 – Principles of Marketing
- 3) 203 – Principles of Finance

Question paper pattern for following Practical Subjects is given separately:

Semester I:

- 1) 103 – Business Accounting
- 2) 105 – Business Mathematics

Semester II:

- 1) 204 – Basics of Cost Accounting
- 2) 205 – Business Statistics
- 3) 206 – Business Informatics

First Year Bachelor of Business Administration (F.Y. B.B.A.)

Pattern of Question paper of Theory papers

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat and well labeled diagrams wherever necessary.

Q.1) Theory question (15)

OR

Theory Question

Q.2) Theory question (15)

OR

Theory Question

Q.3) Theory question (15)

OR

Theory Question

Q.4) Theory question (15)

OR

Theory Question

Q.5) Write Short Notes (Any **four** out of **six**) (20)

Bachelor of Business Administration (B.B.A.) Semester I

Pattern of Question paper of Business Accounting

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1.	Objective Type Questions (True or False, Fill in the Blanks, Match the pairs)	12
Q2.	Write short notes on (Any three out of five)	12
Q3.	Practical Problem	20
Q4.	Practical Problem	18

OR

	Practical Problem	
Q5.	Practical Problem	18

OR

Practical Problem

First Year Bachelor of Business Administration (F.Y. B.B.A.)

Pattern of Question paper of Business Mathematics and Business Statistics

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. All questions carry equal marks.
3. Use of simple electronic calculator is allowed.

Q.1) Answer the following (any four out of six)

Q.2) Answer the following (any four out of six)

Q.3) Answer the following (any four out of six)

Q.4) Answer the following (any four out of six)

Q.5) Answer the following (any two out of six)

Bachelor of Business Administration (B.B.A.) Semester II

Pattern of Question paper of Basics of Cost Accounting

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1. Objective Type Questions 10
(True or False, Fill in the Blanks, Match the pairs)

Q2. Theory Question 15

OR

Theory Question

Q3. Write short notes on (Any three out of five) 15

Q4. Practical Problem 16

Q5. a) Practical Problem 12

b) Practical Problem 12

OR

Practical Problem

Bachelor of Business Administration (B.B.A.) Semester II

Pattern of Question paper of Business Informatics

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. All questions carry equal marks.
3. Use of calculator is allowed.

Q.1) Answer the following (any eight out of ten) Small Answer questions

Q.2) Attempt any four out of five Questions

Q.3) Attempt any four out of five Questions

Q.4) Attempt any four out of five Questions

Q.5) Attempt any two out of three Questions

UNIVERSITY OF PUNE

Master of Commerce (M.Com.) Semester Pattern with Credit System Revised with effect from June 2013

Preamble for Choice Based Credit System

Since liberalization the socio-political-economic scenario is changing very fast. There is a significant transformation in term educational expectation and aspiration of the learner. The educational system also is witnessing many changes and challenges due to technological growth and changes in the Government policies. Education is no longer a concern of students but it has become a matter of social and economic importance. The changes at the global level has influence the educational system, structure and expectation of the users.

University education needs to take contingency of all these changes and restructure itself to stand in a competitive dynamic environment. Professional stream of learning like Commerce have to be properly upgraded to accommodate challenges of change, expectation of employers' and to offer global opportunities to the learners. From this point of view the course structure of post-graduate programme in Commerce needs to be structured. It has to be according to expectations of the learners, employers and the society. The learning inputs have to be more update, skilled based and with appropriate applications. The course programme should consider desire aptitude, attitude and acumen of the learner.

From this point of view University of Pune has introduced Choice Base Credit System of course structure. This system shall offer a flexible user friendly, opportunity to the learner, will broader the horizon of Commerce education and will give a fair chance to every single learner to exhibit his talent, acquired skills and enhance his personality. It will further enhance his opportunity of global mobility, to acquire different knowledge inputs from different global institutes.

1. Objectives :

- a. To equip and train Post Graduate students to accept the challenges of Business World by providing opportunities for study and analysis of advanced Commercial and business methods and processes.
- b. To develop independent logical thinking and facilitate personality development.
- c. To equip the students for seeking suitable careers in management and entrepreneurship.
- d. To study by students methods of Data collection and their interpretations.
- e. To develop among students Communication, Study and Analytical skills.

2. Duration :

The M.Com. Course will be of Two Years duration consisting of Two part. i.e. Part I and Part II. Each part is having Two Semesters. Thus the M.Com. Course is of Four Semesters. For each Semester there will be Four Papers of 100 marks each. The M.Com. Degree will be of 1600 marks in aggregate.

3. Duration and Structure of Programme:

The M.Com (Semester pattern with Credit System) degree Programme shall be of 2 years' duration divided into two parts, Part I and Part II, and 4 semesters.

4. Eligibility :

The student who has passed any Bachelors degree of this University or any other recognized University shall be held eligible to be admitted to M.Com. Course.

5. Course Structure:

The M.Com. degree course will be of two year duration consisting of four semesters and of minimum 64 credits as below:

Sr. No.	Semester	Total Credits
1	Semester I	16
2	Semester II	16
3	Semester III	16
4	Semester IV	16
	Grand Total	64

Four credits for project work at 4th Semester (This will include credits for fieldwork, data presentation and report writing)

In each Semester, there will be four papers of 100 marks each out of which 50 marks will be for Internal Assessment (attendance, home assignments, class tests, long term papers, classroom presentation and 50 marks for University Examination. Thus M.Com. degree examination, four Semesters shall be of 1600 marks and of minimum 64 credits altogether. The following shall be the course structure.

6. The Scheme of Papers: The following will be the Scheme of papers:

The List of Courses Semester I

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester I	Core Compulsory	101	Management Accounting	04	04	03	50	50	100
		102	Strategic Management	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	<i>To choose any one Group of the following</i>							
		Group A (Advanced Accounting & Taxation)							
		103	Advanced Accounting	04	04	03	50	50	100
		104	Income Tax	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		105	Information system and E-Commerce Practices	04	04	03	50	50	100
		106	Intellectual Property Laws	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		107	Advanced Cost Accounting	04	04	03	50	50	100
		108	Costing Technique and Responsibility Accounting	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		109	Co-operative Movement in India	04	04	03	50	50	100
		110	Organization of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		111	Organized Trades and Markets	04	04	03	50	50	100
		112	Business Environment and Policy	04	04	03	50	50	100
		Group F (Business Administration)							
		113	Production and Operation Management	04	04	03	50	50	100
		114	Financial Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		115	Legal Framework of Banking	04	04	03	50	50	100
		116	Central Banking	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		117	Marketing Techniques	04	04	03	50	50	100
		118	Consumer Behaviour	04	04	03	50	50	100

Semester II

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester II	Core Compulsory	201	Financial Analysis and Control/ Principals of Financial Accounting	04	04	03	50	50	100
		202	Industrial Economics/ Economic Environment/Business Statistics/ Quantitative application	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		203	Specialized Areas in Accounting	04	04	03	50	50	100
		204	Business Tax Assessment & Planning	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		205	E- Security & Cyber Laws	04	04	03	50	50	100
		206	Laws Regulating to Copyrights & Design	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		207	Application Cost Accounting	04	04	03	50	50	100
		208	Cost Control & Cost System	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		209	International Co-operative Movement	04	04	03	50	50	100
		210	Management of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		211	Modern Business Practices	04	04	03	50	50	100
		212	Business Environment Analysis	04	04	03	50	50	100
		Group F (Business Administration)							
		213	Business Ethics and Professional Values	04	04	03	50	50	100
		214	Elements of Knowledge Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		215	Banking Law & Practices	04	04	03	50	50	100
		216	Monetary Policy	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		217	Customer Relationship Management & Retailing	04	04	03	50	50	100
		218	Services Marketing	04	04	03	50	50	100

Semester III

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester III	Core Compulsory	301	Business Finance/ Financial System	04	04	03	50	50	100
		302	Research Methodology for Business	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		303	Advanced Auditing	04	04	03	50	50	100
		304	Specialized Auditing	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		305	Laws Relating to International Business	04	04	03	50	50	100
		306	WTO – Norms & Practices	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		307	Cost Audit	04	04	03	50	50	100
		308	Management Audit	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		309	Co-operative Credit System	04	04	03	50	50	100
		310	Co-operative Banking System	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		311	Entrepreneurial Behaviour	04	04	03	50	50	100
		312	Entrepreneurship	04	04	03	50	50	100
		Group F (Business Administration)							
		313	Human Resource Management	04	04	03	50	50	100
		314	Organizational Behaviour	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		315	Foreign Exchange	04	04	03	50	50	100
		316	International Finance	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		317	International Marketing	04	04	03	50	50	100
		318	Marketing Research	04	04	03	50	50	100

Semester IV

Semester	Subject Type	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester IV	Core Compulsory	401	Capital Market and Financial Services/ Portfolio Management	04	04	03	50	50	100
		402	Industrial Economic Environment/ Operations Research	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		403	Recent Advances in Accounting, Taxation, Taxation and Auditing	04	04	03	50	50	100
		404	Project Work/ Case Studies	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		405	Recent Advances in Commercial Laws and Practices	04	04	03	50	50	100
		406	Project Work/Case Studies	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		407	Recent Advances in Cost Auditing and Cost System	04	04	03	50	50	100
		408	Project Work/Case Studies	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		409	Recent Advances in Co-operative and Rural Development	04	04	03	50	50	100
		410	Project Work/Case Studies	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		411	Recent Advances in Business Practices and Environment	04	04	03	50	50	100
		412	Project Work/Case Studies	04	04	03	50	50	100
		Group F (Business Administration)							
		413	Recent Advances in Business Administration	04	04	03	50	50	100
		414	Project Work/Case Studies	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		415	Recent Advances in Banking and Finance	04	04	03	50	50	100
		416	Project Work/Case Studies	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		417	Recent Advances in Marketing	04	04	03	50	50	100
		418	Project Work/Case Studies	04	04	03	50	50	100

7. Scheme of Examination:

The examination of regular students of M.Com. degree course of the University of Pune admitted in the academic session 2013-14 and after shall be based on:

- (a) Semester Examination
- (b) Continuous Assessment
- (c) Choice Based Credit System, and
- (d) Semester Grade Point Average and Cumulative Grade Point Average System

For each paper of 100 marks, there will be an Internal Assessment (1A) of 50 marks and the University Examination (UE) of 50 marks/ 3 hours duration at the end of each semester. A candidate who will secure at least 40% marks allotted to each paper will be given 4 credits. A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment for each paper will be 50 marks which will be carried out by the department during the term. The Internal Assessment may be in the forms of written test, seminars, term papers, presentations, assignments, orals or any such others. The distribution of internal assessment marks shall be as follows:

Midterm Test	20
Presentation/Role Play	10
Case studies/ Group Discussion	10
Quiz / Home Assignment	10
Total	50

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A student cannot register for the third semester, if she/he fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters.

8. Research project work:

There will be a Research Project to be prepared by a student during the fourth semester. The objective of the project work is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work is to be undertaken under guidance of a teacher allotted to a student by the department.

Division of marks	Marks	
A. Synopsis with working bibliography (Internal Assessment)	40 marks	50 marks
Viva Voce (Internal Assessment)	10 marks	
B. A full project Report (Minimum 50-80 pages) (Internal & External Assessment)	40 marks	50 marks
Viva Voce (Internal & External Assessment)	10 marks	

As the Research Project is based on the self study done by the candidate and evaluated for 100 marks altogether, 04 credits will be awarded to a successful candidate in this subject. The project may be evaluated by two examiners one internal and one external, selected from the panel of PG examiners of the University. The Viva voce must be conducted by the teachers selected out of the panel of PG examiners maintained by the University.

The candidates have to submit the project 15 days before the commencement of the fourth semester university examination. The project report shall be type-written and submitted in duplicate. A candidate who fails to submit the project may resubmit the same in the subsequent semester examination for evaluation. The project work activities must be duly supported by documentary evidence to be endorsed by the Head or Guide.

9. Standard of passing:

A candidate shall be declared to have passed in the paper provided he/she has secured minimum GP of 4.5 in the UNIVERSITY EXAMINATION and GRADE POINT AVERAGE of 4.0 in aggregate of UNIVERSITY GRADE and INTERNAL ASSESSMENT taken together.

10. Classification of successful candidates:

Candidates who secured not less than 60% of aggregate marks (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) in the whole examination shall be declared to have passed the examination in the first class. All other successful candidates shall be declared to have passed in second class. Candidates who obtain 70% of the marks in the aggregate (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) shall be deemed to have passed the examination in first class with distinction.

A student who passess in all the courses will be declared to have passed the M.Com. degree with the following honours.

CGPA in (4.00, 4.99)	- Pass Class
CGPA in (5.00, 5.49)	- Second Class
CGPA in (5.50, 5.99)	- Higher Second Class
CGPA in (6.00, 7.99)	- First Class
CGPA in (8.00, 10.00)	- First Class with Distinction

11. Scheme of Credits:

Sixty (60) hours of teaching will lead to three credits (which mean four hours per week teaching in one semester) and long term paper as well as presentation will carry one credit. Each semester shall have 16 credits.

12. Structure of Transcript:

At the end of each semester, student will be given a transcript showing the performance and result in each course. The transcript shows, for each course the title of the course, credit values, grade in UNIVERSITY EXAMINATION , grade in INTERNAL ASSESSMENT , grade point index, result as pass or fail. Also, the semester grade point average (SGPA) and cumulative grade point average (CPGA) will be shown. Further the equivalent percentage of marks corresponding to SGPA or CGPA to equivalent percentage is given by:

$$\text{Equivalent percentage marks} = \begin{cases} 10 \times \text{CGPA} & \text{if CGPA /SGPA is in [4.00, 6.00]} \\ 05 \times \text{CGPA} + 30 & \text{if CGPA /SGPA is in [6.00, 9.00]} \\ 25 \times \text{CGPA} - 150 & \text{if CGPA /SGPA is in [9.00, 10.00]} \end{cases}$$

Marks	Grade	Grade Point
100 to 75	O : Outstanding	06
74 to 65	A : Very Good	05
64 to 55	B : Good	04
54 to 50	C : Average	03
49 to 45	D : Satisfactory	02
44 to 40	E : Pass	01
39 to 0	F : Fail	00

(C) GPA	Grade
05.00 – 6.00	O
04.50 – 04.99	A
03.50 – 04.49	B
02.50 – 03.49	C
01.50 – 02.49	D
00.50 – 01.49	E
00.00 – 00.49	F

13. Distribution of Periods:

There shall be 60 periods for each subject to cover the entire teaching of 4 credits. This will be distributed as follows:

Particulars	Periods
Teaching session per programme	48
Assignment/ Test	04
Role play/ Group Discussion	04
Case studies and presentation	04
Total	60

14. Standard of Passing.

- A. Regular students: - A candidate is required to obtain 40% marks in each of course in both Mid Semesters and Semester end. It means passing separately at Mid-Semester and semester Examinations is compulsory.

15. Award of Class.

- a. The class in respect of M.Com. Examination will be awarded on the basis of aggregate marks obtained by the candidates in all the sixteen papers at the Semester I, II, III, and IV together.
The Award of class shall be as under:-

- b. Improvement: - A candidate having passed M.Com. Examination will be allowed to improve the performance. The same is termed as 'Class Improvement Scheme' under which improvement of performance shall be allowed only at the Semester end Examination.
- c. A candidate after passing M.Com. Examination will be allowed to appear in the additional Special Subject after keeping necessary terms in the concerned special subject only, for which a passing certificate will be issued.

16. Medium of Instruction :

The use of Marathi is allowed for writing answers in the examination except for following courses:

- Management Accounting
- Financial Analysis & Control
- Business Statistics,
- Advanced Accounting and Taxation
- Advanced Cost Accounting and Cost Systems.

17. A student (Regular / External) will be admitted to Revised M. Com. Course with effect from June 2013. For the students who have completed the terms for the First Year as per Old Course will be admitted to the Second Year as per Old Course M. Com. The examination as per Old Course will be held simultaneously for three years from April / May 2014.

18. Qualification of the Teachers :

The Teachers recognized to teach the subjects as per Old Course shall be deemed to be recognized in the corresponding equivalent subjects under Revised Course.

In case of: A) Business Statistics, B) Industrial Economics, C) Co-operation and Rural Development, D) Advanced Banking and Finance and E) Research Methodology and Project Work- Paper-IV of each Special Subject, the following qualifications be made applicable.

- A. Business Statistics :** M.Com, M.Phil with Statistics or Research Methodology as one of the Papers at M.Com /B.Com /M. Phil examination with 5 years degree teaching experience or M.A./M.Sc. With Statistics having 5 years degree teaching experience.
- B. Industrial Economics:** M.Com., M. Phil with Business Economics/Economics of Industries or Economics as one of the papers at B. Com/ M.Com Examination with 5 years degree teaching experience or M.A. Economics with 5 years degree teaching experience.
- C. Co-operation and Rural Development:** M. Com, M. Phil. With 5 years degree teaching experience or M.A. Economics (with Co-operation Rural Economics)
- D. Advanced Banking and Finance:** M. Com., M. Phil., with Banking as one of the papers at B.Com/M.Com examination 5 years degree teaching experience.
- E. Research Methodology and Project Work:** M.Com. M.A (Eco.) M.Phil./Ph.D. with 5 years degree teaching experience.
- F.** Similarly all the changes in qualification as per U.G.C norms and guidelines shall also be applicable as and when the changes come into force (If applicable)

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M.Com. Part I Semester I
Compulsory Paper
Subject Name -: Management Accounting
Course Code -: 101.

Objective -: The objective of the course is to enable students to acquire sound Knowledge of concepts, methods and techniques of management accounting and to make the students develop competence with their usage in managerial decision making and control.

Unit No.	Topic	Lectures
1.	BASIC CONCEPTS: Management Accounting- Meaning and Definition, Characteristics, Objectives, scope and functions of Management Accounting Financial Accounting, Cost Accounting and Management Accounting Tools and Techniques of Management Accounting - Advantages and Limitations of Management Accounting - Installation of Management Accounting System-Management Accountant : functions and duties - Essential qualities.	06
2.	FINANCIAL STATEMENT ANALYSIS: Introduction - objectives of analysis of financial statement-tools of financial statement analysis - Multi - step income statement, Horizontal analysis, Commonsized analysis, Trend analysis, Analytical Balance Sheet.	04
3.	RATIO ANALYSIS: Ratio Analysis-Meaning and rationale, advantages and limitations. Types of Ratios -: Liquidity Ratios, Solvency Ratios, Profitability Ratios, Efficiency Ratios, Integrated Ratios.	08
4.	FUND FLOW AND CASH FLOW STATEMENT: A. Meaning of Fund flow statement -Uses of fund flow statement, Funds Flow Statement and Income Statement. Preparation of Funds Flow Statement. B. Meaning of Cash flow statement - Preparation of Cash Flow Statement. Difference between Cash Flow Analysis and Funds Flow Analysis. Utility of Cash flow Analysis. Limitations of Cash Flow Analysis.	12
5.	WORKING CAPITAL MANAGEMENT: Concept and definition of working capital - Determination of Working capital - Assessment of Working Capital needs - Study of components of working capital, such as cash management, accounts receivable management and inventory management.	12
6.	RESPONSIBILITY ACCOUNTING: Meaning, objectives and structure of Responsibility Accounting as a divisional performance measurement. Types of Responsibility Centers: Cost/Expense Centers, Profit Centers, Investment Centers.	06
Total		

Recommended Books
1. R. N. Anthony , G. A. Walsh: Management Accounting 2. M. Y. Khan, K. P. Jain: Management Accounting 3. I. M. Pandey: Management Accounting (Vikas) 4. J. Betty: Management Accounting 5. Sr. K. Paul: Management Accounting 6. Dr. Jawaharlal: Management Accounting 7. Dr. Kishor Jagtap: Management Accounting (Success Publication) 8. S. N. Maheshwari: Principles of Management Accounting 9. Ravi M. Kishore: Financial Management (Taxman, New Delhi) 10. Richard M. Lynch and Robert Williamson: Accounting for Management Planning & Control. 11. Ravi Kishor: Advanced Management Accounting (Taxman)

M.Com. Part I Semester I
Compulsory Paper
Subject Name -: Strategic Management
Course Code -: 102.

Unit No.	Topic	Peroids
1.	Nature and Scope of Strategic Management: Characteristics, Dimensions – Approaches to Strategic Decision Making, Strategic Management Process – Components of Strategic Management Model, - Policy & Strategic Management, Strategic role of Board of Directors and Top Management, Strategic Implications of Social and Ethical Issues.	06
2.	Strategy Formulation and Strategic Analysis: Company's Goals, Mission and Social Responsibility, Vision – Objectives Analysis of Board Environment – External Environment Factors Economic, Social, Political, Ecological, International, Industrial – Competitive Forces and Strategy, Industry Analysis (Michael Porter's Model) Analysis of Strategic advantage, - Resource Audit, Value Chain Analysis, Core Competencies, SWOT Analysis, Analysis of Stakeholders Expectations.	06
3.	Strategic Planning: Conceptual Understanding of Strategic Plan, - Meaning, Stages (Steps), Alternatives, Advantages and Disadvantages of Strategic Planning, How to make it effective?.	10
4.	Strategic Choices/Options: Generating Strategic Alternatives, Strategic Options at Corporate (Company) Level – Stability, Growth and Defensive Strategies, External Growth Strategies – Mergers, Acquisition, Joint Ventures and Strategic Alliance, Evaluation of Strategic Alternatives, - Product Port Folio Models, Selection of Suitable Corporate Strategy.	06
5.	Strategy Implementation: Implementation Issues, Planning and Allocating Resources, – Financing Planning, Manpower Planning, Organizational Structures, - Factors affecting choice of structure, Degree of Flexibility and Autonomy.	06
6.	Functional Strategy: - Marketing Strategy – Nature, Significance, Formulating Marketing Strategy - Production Strategy – Need, Formulation of Production of Strategy for an organization. - Research and Development (R&D) Strategy –Need, Formulating R and D Strategy - Human Resource (HR) Strategy – Acquisition of Human Resources, motivation and maintenance of HR - Financial Strategy – Need, Financial Objectives, Making Strategic Financial Decisions - Logistics Strategy	08
7.	Strategic Review: Evaluating the Strategic Performance – Criteria and Problems –Concepts of Corporate Restructuring, Business Process Reengineering, Benchmarking, TQM, Six Sigma	08
Total		

Recommended Books

1. From Strategic Planning to Management -By Ansoff M.Igor, R. P. Declorch, R. I. Hayes (Willey 1976)
2. Cases in Strategic Management – By Buddhiraja S. B. and M. B. Athreya (TMH Publishing Company, New Delhi, 1996)
3. Business Policy:Strategic Planning and Management, By Ghosh P. K.8th Edition Sultan Chand and Sons, New Delhi
4. Strategic Management -Formulation, Implementation and Control By John A PearceII, Richard B. Robinson Jr. 9th Edition (The Mc-Graw Hill Companies)
5. Management Policy and Strategic Management (Concepts, Skills and Practices) By R. M. Srivastava, Himalya Publishing House
6. Contemporary Strategy Analysis By Grant Robert M. 2nd Edition Blackwell Publisher (USA)
7. Strategic Management of Organizations and Stakeholders –Concepts and Cases By Harrison and St. John, South western College Publishing, Ohio, USA-1998
8. Strategic Management By Hunger, J. David and Thomas Wheelar, 6th Edition, Addision Wesley Longman Inc., USA
9. Strategic Management Concepts and Cases By J. Thomson, Athur and M. J. Strickland – III, McGraw Hill 2001
10. Strategic Management -By Miller A , McGraw Hill 1998
11. Strategic Management -By Hitt MA et.al, South Western, 2001
12. Essence of Strategic Management –By Bowman, Cliff, Prentice Hall N. J.

M.Com. Part I Semester I**Advanced Accounting and Taxation Special Paper I.****Subject Title :- Advanced Accounting.****Course Code :- 103****Objective :-**

- i. To lay a theoretical foundation of Accounting and Accounting Standards.
- ii. To gain ability to solve problems relating to Company Accounts, Valuations and special types of situations.

UNIT	TOPIC	No. of Lecturers in hours
I	BASIC CONCEPTS: Conceptual framework of Accounting - Accounting environment - Concept of accounting theory - Role of accounting theory - Classification of accounting theory - Approaches to accounting theory - Accounting Standards - Generally Accepted Accounting Principles - Selection of Accounting Principles - Professional Development of Accounting in India. Introduction to IFRS & IND-AS.	08
II	COSOLID IDAT ED FINANCIAL STATEMENTS: Consolidated Accounts of Holding and subsidiary Companies Consolidation - Inter Company transactions - Issue of Bonus Shares - Revaluation of Fixed Assets - Debentures and Preference Shares of subsidiary Company- Dividend - (Holding company with two subsidiaries only to be studied). AS.21.	10
III	LIQUIDATION OF COMPANY: Preparation of Statement of affairs including deficiency /surplus account.	04
IV	VALUATION OF SHARES AND GOODWILL: A. Valuation of Shares - Need for valuation - Methods of valuation of shares- Net Asserts method, Dividend yield method, Earning yield method, Return on Capital method, Price/Earning method and Fair value method & DCF Method (Discounted Cash Flow Method). B. Valuation of Goodwill - Need for valuation - Methods of valuing Goodwill - Number of Years purchase of average profits method, Capitalization method - Annuity method - Super profits method.	10
V	LEASE ACCOUNTING: Concept of Leasing: Important Steps in Leasing. Advantages and disadvantages of Leasing. Types of Leasing - Finance Lease - Operating Lease. Accounting treatment of Finance Lease and of Operating Lease. Sale and Leaseback.	08
VI	BRANCH ACCOUNTS: Branch Accounts: Independent Branches- Accounting at Head Office- Accounting at Branch- Some Special Transactions. Foreign Branches- Rules of converting Trial Balance of the foreign Branch in Head Office Currency	08
	TOTAL-	48

Notes :

1. Theory questions will carry 20% marks.
2. Practical problems will carry 80% marks.
3. Accounting standards relevant to the topics to be studied.

List of Books Recommended for Study

1. Shukla and Grewal: Advanced Accounts. (S. Chand & Co Ltd. New Delhi)
2. Jain and Narang: Advanced Accounts.(Kalyani Publishers, Ludhiana)
3. Sr. K. Paul: Accountancy, Volume-I and II.(New Central Book Agency, Kolkata)
4. R. K. Lele and Jawaharlal: Accounting Theory (Himalaya Publishers)
5. Dr. L. S. Porwal: Accounting Theory (Tata McGraw Hill).
6. Robert Anthony, D.F.Hawkins & K.A. Merchant: Accounting Text & Cases (Tata McGraw Hill).
7. Dr.S.N. Maheshwari: Corporate Accounting (Viakas Publishing House Pvt. Ltd. New Delhi)
8. Dr.Ashok Sehgal & Dr.Deepak Sehgal: Advanced Accounting (Taxmann, New Delhi).

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Quizzes	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester I
Advanced Accounting and Taxation Special Paper II.
Subject Title :- Income Tax.
Course Code :- 104

Objective :-

- i. To gain knowledge of the provisions of Income - tax including Rules pertaining there to, relating to the following topics.
- ii. To develop ability to calculate taxable Income of 'Individual', 'Hindu Undivided Family' and 'Firm' assesses.

INCOME TAX ACT, 1961

UNIT	TOPIC	No. of Lecturers in hours
I	CONCEPTS AND DEFINITION History of Income Tax in India - Introduction to DTC - Fundamental Concepts and definitions under Income Tax Act, 1961 - Rates of taxes - Basis of charge - Residential status and scope of total income -Income Exempt from tax - Capital & Revenue	06
II	HEADS OF INCOME: SALARIES & HOUSE PROPERTY: A. Salaries: Chargeability -Allowances and Taxability - Perquisites - Valuation of perquisites - Provident Funds - Deduction from salaries (Theory & Advanced problems). B. Income from House Property: Annual Value-Self occupied property and let out property -deemed to be let out property - Permissible deductions. (Theory & Advanced problems).	08
III	HEADS OF INCOME : BUSINESS & PROFESSION: Profits & Gains of Business or Profession: Meaning of Business Profession and Vocation-deductions expressly allowanced Depreciation -Specific disallowances - Method of accounting - Maintenance of Books of Account - Audit of Accounts [Theory & Advanced Problems]	10
IV	HEADS OF INCOME : CAPITAL GAINS & OTHER SOURCES: A. Capital Gains: Meaning, Types and Exemptions B. Income from Other Sources: Chargeability - Deductions - Amounts not deductible.(Theory & Advanced Problems)	08
V	COMPUTATION OF TAXABLE INCOME: Clubbing of income - Set off and carry forward of losses - Deductions from Gross Total Income - Computation of Taxable Income of an Individuals and Hindu Undivided Families. (Theory & Advanced Problems)	10
VI	ASSESSMENT OF FIRMS AND THEIR PARTNERS : (Theory & Advanced Problems)	06
	TOTAL-	48

Notes:

1. Amendments made prior to commencement of Academic Year in the relevant act should be considered & studied.
2. The breakup of questions in the Examination will be as under:
 - a. Theory questions will carry 30% marks.
 - b. Problems will carry 70% marks.

List of Books Recommended for Study	
1. Dr. Vinod Singhania: Direct Taxes, Law and Practice, Taxman Publication, New Delhi 2. Dr. Bhagawati Prasad: Direct Taxes 3. Girish Ahuja and Ravi Gupta: Direct Taxes, Bharat Law House, New Delhi. 4. T. N. Manoharan: Hand Book of Income Tax Laws 5. B.B.Lal & N.Vashisht: Direct Taxes (Pearson)	

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Quizzes	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester I
Commercial Laws and Practices Special Paper I.
Subject Title :- Information Systems and E-Commerce Practices
Course Code :- 105

Objective :-

1. To get acquainted with the concepts and application of Information Systems used in Modern Businesses.
2. To impart knowledge about E-Commerce and familiarize students with E-commerce Modern Applications.

Unit No.	Name of the Unit / Topic	Periods
1.	Introduction to Information Systems System Concepts, Definition of a system, Basic Components of a system, Elements and types of a systems, General Model of a system, The model of a Business system. Information systems supporting major business functions. Four major types of systems – Transaction Processing Systems, Management Information systems, Decision Support Systems and Executive Support systems	10
2.	Introduction to E-Commerce Meaning and Definition of E-commerce, Benefits of E-Commerce to Businesses, Consumers and Society, Limitations of E-Commerce, Drivers of E-Commerce. Categories of e-Commerce- B2B, B2C, C2C, B2G and G2B. B2B applications, B2C applications and C2C applications.	10
3.	Inter organizational Information Systems and Internet, Intranet and Extranet Introduction, Role, benefits and structure of Inter organizational systems. Introduction to Electronic Data Interchange (EDI), Definition, benefits of EDI. EDI transactions and EDI Applications. Electronic Fund transfer. Introduction to Internet, Definition of Internet, Components of Internet, Services offered by Internet. Introduction to Intranet, Definition, advantages and disadvantages of intranet. Introduction to extranet and definition and applications of Extranet.	18
4.	E-Commerce Supporting functions Purchase and sale Procedures, Supply Chain management, Value Chains in E-Commerce. Electronic Payment Systems, Authentication of payment, Mode of Payments E-Commerce Security. Security Requirements. Security Mechanisms-Encryption, Digital Signature, E-Certificate, Secure electronic transaction protocol.	10
	Total	48

[Note: Recent amendments in the Acts and relevant Landmark cases decided by courts are expected to be studied]

Books Recommended

1. E-commerce – Devid Whiteley- McGraw Hill
2. E-commerce – P.Joseph- PHI
3. E-commerce – The cutting edge of business – K.Bajaj and Nog TMH
4. System Analysis, Design and Introduction to Software Engineering – S.Parthasarathy, B.W.Khalkar
5. Text book on Intellectual property rights – N.K. Acharya, Asia Law House
6. Guide to Cyber Laws – B y Rohmay D. Ryder[Wadhwa, Nagpur]
7. Cyber Laws – Justice Yatindra Singh, Universal Law Publishing Co.

M.Com. Part I Semester I
Commercial Laws and Practices Special Paper II.
Subject Title :- Intellectual Property Laws: Patents, Trade Marks & Biodiversity
Course Code :- 106

Objective :-

1. To make the students familiar with the concept of patents, trademarks, biodiversity;
2. To get the students acquainted with the regulatory regime concerning patents, trademarks, biodiversity ;
3. To make the students realize the commercial significance of patents, trademarks, biodiversity as Intellectual Property and understand the scheme of its protection.

Unit No.	Title & Contents of the Topic	No. of Periods
1	Intellectual Property – Origin, concept, Commercial/cultural dimensions, types/forms (Intellectual Property Rights, IPR) International regulatory regime for IPR (references to International legal Instruments viz. WTO,WIPO, GATT, TRIPS Paris Convention, PCT, Budapest Treaty...)	6
2	Patents —Definition, concept , types of patents, patentable & non- patentable inventions, Applications for patents, complete procedure for obtaining patents. (Chapters 1 to 8 of Patents Act,1970 as amended), Patents of Additions, surrender & revocation of patents.	8
	Working of Patents , Compulsory licenses and revocation, use of patents for government purposes and acquisition of patents, Infringement of patents, (acts of Infringement & defenses) reliefs for Infringement (suits), appeals, Offenses & penalties [Chapters 16 to 20 of Patents Act,1970 as amended]	8
	Patents Offices, establishment, Controller of Patents (functions and powers) Patent Agents, , International arrangement [Chapters 14 & 21, 22 of the Act], Issues and concerns in patent regime	4
3	Trade Marks -- Definition, concept , types of Trade Marks, Registration of Trade Marks [Procedure, duration , effect] Appellate Board [Establishment, composition, qualifications , procedure and powers, disposal of appeals]	8
	Assignments and Transmission of Trade Marks, Provisions relating to collective & certification Trade Marks, textile goods, Infringement of Trade Marks and remedies, Offenses (acts of violations, defenses) & Penalties	6
4	Biodiversity Act, 2002 —Important relevant definitions of the terms like Biodiversity, Biological Resources, Benefit Claims, Commercial Utilization, Fair & Equitable Benefit Sharing, Sustainable Use—Regulation of Access to Biodiversity [Ss 3 to 7], Functions & Powers of National Biodiversity Authority & State Biodiversity Board [Ss 18 to 25]	8

[Note: Recent amendments in the Acts and relevant Landmark cases decided by courts are expected to be studied]

Books Recommended
1. Intellectual Property Law – P. Narayan, Eastern Law House. 2. Text book on Intellectual Property Rights. – N.K. Acharya , Asia Law House, Hyderabad. 3. Law Relating to Intellectual Property – Dr. B.L. Waderha, Universal Law Publishing Co. 4. Intellectual Property Rights, (2011), - Dr. Sreenivasulu N. S., Regal Publications, New Delhi – 7. 5. Intellectual Property Law in India (2006) – Justice P. S. Narayana, Goigia Law Agency, Hyderabad. 6. Universal’s “Intellectual Property Laws” (Bare Acts) Universal Law Publishing Co. Pvt. Ltd. 7. Law of Intellectual Property - Dr. S. R. Mynei – Asia Law House, Hyderabad (2011). 8. Intellectual Property Rights – Heritage, Science & Society Under International Treaties, A. Subbian Deep & Deep Publications Pvt. Ltd., New Delhi (2007) 9. Intellectual Property Laws—Bextly & Sherman, Asia Law House

M.Com. Part I Semester I
Advanced Cost Accounting and Cost System Special Paper I.
Subject Title -: Advanced Cost Accounting.
Course Code -: 107

Objectives:

1. To acquaint the students with the significance of Cost Accounting in Global Competitive environment.
2. To enable students to learn application of different methods of costing in Manufacturing and Service Industry.

Unit No	Name of the Topic	Periods
1	Nature and Scope of Cost Accounting: a. Introduction, Meaning, Definition and Objectives of Cost Accounting, Cost Centre and Cost unit. b. Elements of Cost: Material, Labour and Overheads. Material: Concept, Procurement of Material, concept of Landed cost of material and major currencies (Dollar, Euro, and Pound). c. Storage and Inventory Control Techniques Perpetual Inventory system, ABC Analysis, Inventory Turnover ratios, Just In Time, Economic Ordering Quantity.	12
2	Labour: a. Meaning, Definition and significance of Labour. b. Classification of Labour, Principles and Methods of Remuneration, Performance linked Incentives. c. Accounting of Labour cost, Job Evaluation and Merit Rating.	12
3	Overheads: a. Meaning, Classification, Allocation, Apportionment and Absorption of Overheads. b. Accounting of Overheads:	12
4	Methods of Costing: a. Job costing, Batch Costing and Contract Costing. b. Process costing c. Operating costing (Hospitals, Educational Institutes, Hotels and logistics and Warehouse.)	12

Note:

The breakup of marks in the Examination will be as follows:

- a. 50 % of marks for Theory & 50 % of marks for Practical.
- b. Area of practical problems:
 - Inventory turnover ratio, EOQ.
 - Methods of Remuneration, Time rate, Piece rate, group bonus scheme, Performance linked incentives.
 - Primary and Secondary Distribution of Overheads (Repeated distribution method only).
 - Contract Costing, Process costing and Operating Costing.
- c. Study of Cost Accounting standards: CAS 3 (Revised), CAS 6 and CAS 7.

References:

1. Ravi Kishor: Advanced cost Accounting and cost systems, Taxman Allied services Pvt Ltd, New Delhi.
2. N.K. Prasad: Principles and Practice of Cost Accounting, Syndicate Pvt Ltd, Calcutta.
3. Prof. Subhas: Practice in Advanced costing and Management, Nirali Prakashan, Pune.
4. Ravi Kishor: Students guide to Cost Accounting, Taxman's allied services, New Delhi.
5. M. N Arora: Cost Accounting Principles and Practices, Vikas Publishing House, New Delhi.
6. S. N Maheshwari, Cost Accounting Theory and Problems, Mittal shree Mahvir Book Dept, New Delhi.
7. Website: www.myicwai.com.
8. Advanced Cost Accounting and Cost Systems -: Ravi Kishor, P.V. Ratlam, M.L.Basu

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Industrial Visits	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester I
Advanced Cost Accounting and Cost System Special Paper II.
Subject Title :- Costing Techniques and Responsibility Accounting.
Course Code :- 108

Objectives:

- 1) To equip the students for designing and implementing cost control, cost reduction programme and different cost system.
- 2) Relevant Cost Accounting Standard are to be studied
- 3) Level of knowledge –Advanced Techniques of Costing

UNIT NO.	NAME OF THE TOPIC	PERIODS
1	Budgeting & Budgetary Control Types of Budget, All Functional Budget & Master Budget, Key and limiting factor, fixed and flexible, cash budget, Zero base Budget [ZBB]	12
2	Standard Costing – Concept of Standard costs, Setting up of Standards: Variance analysis-Material Labour, Overhead, Sales and profit.	12
3	Uniform Costing & Inter Firm Comparison Reasons for differences in Cost and Costing Practices. The application of Uniform Costing, Advantages and limitations of Uniform Costing. Inter firm comparison Meaning, Advantages and Disadvantages	12
4	Responsibility Accounting and Reporting Definition, Meaning, Principles, controllable and Non-controllable costs. Centers of control, cost Centers, Revenue Center, Responsibility Center, Profit Center and Performance Measurement of Business Center. Reporting to different levels of Management.	12
	Total	48

Note: - 50% Marks for Theory and 50% Marks for Practical Problems.

Areas of Practical Problems (Advanced)

- 1) Budgetary Control
- 2) Standard Costing
- 3) Performance Measurement of Business Center
- 4) Simple Problem of Responsibility Accounting

References:

1. Ravi Kishor: Advanced cost Accounting and cost systems, Taxman Allied services Pvt Ltd, New Delhi.
2. N.K. Prasad: Principles and Practice of Cost Accounting, Syndicate Pvt Ltd, Calcutta.
3. Prof. Subhas: Practice in Advanced costing and Management, Nirali Prakashan, Pune.
4. Ravi Kishor: Students guide to Cost Accounting, Taxman's allied services, New Delhi.
5. M. N Arora: Cost Accounting Principles and Practices, Vikas Publishing House, New Delhi.
6. S. N Maheshwari, Cost Accounting Theory and Problems, Mittal shree Mahvir Book Dept, New Delhi.
7. Website: www.myicwai.com.
8. Advanced Cost Accounting and Cost Systems -: Ravi Kishor, P.V. Ratlam, M.L.Basu

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Industrial Visits	04
2	Assignments	04
3	Class room tests	04
Total		12 hours

M.Com. Part I Semester I
Co-operation and Rural Development Special Paper I.
Subject Title :- Co-operative Movement In India
Course Code :- 109

Objectives:

1. To acquaint the students with the Co-operative Movement.
2. To develop the capability of students for knowing different types of Co-operatives.
3. To aware the role of State and Central Govt. in development of co-operative sector.
4. To give basic knowledge about formation of Co-operative society and its administration.

Unit No.	Name of the Topic	Periods
1	Co-operative Movement in India: Evolution of Co-operative Movement in India- Pre and Post Independence Period – Role of Co-operatives in Globalised Economy.	12
2	Co-operative Legislation in India: Study of Maharashtra State Co-operative Societies Act 1960 and rules 1961 with updated amendments regarding :- a. Registration b. Members and their Rights. c. Properties and Funds d. Management. e. Audit Enquiry Inspection & Supervision. f. Settlement of Disputes. g. Liquidation h. Appeal Revision & Reviews.	12
3	Organizational setup of Co-operatives Departments (a) State Level (b) Divisional Level (c) District Level (d) Rights, Duties and Responsibilities of Registrar of Co-operative Societies	12
4	Reports of Various Committees and Institutional Support to Co-operatives: (a) All India Rural Credit Survey Committee (AIRCS), Rural Credit Review , Report Committee on Inauguration of Co-operative Credit CRAFTICAD , Report of Vaidyanthan Committee, Report of Narsimham Committee (b)NABARD & NCDC support to Co-operatives.	12
TOTAL		48

List of Books Recommended for Study

1. G.S. Kamat: New Dimensions of Co-operative Management
2. G.S. Kamat: Cases in Co-operative Management
3. K.K.Taimani: Co-operative Organisation and Management
4. I L O: Co-operative Management and Administration
5. B.C. Mehta: Consumer Co-operation in India
Prof L.P. Wakale and Dr. G.H.Barhate: Sahakari Vikas- Sheth Publishing Mumbai

M.Com. Part I Semester I
Co-operation and Rural Development Special Paper II.
Subject Title :- Organization of Co-operative Business
Course Code :- 110

Objectives:

1. To acquaint the students with the Co-operative movement.
2. To develop the capability of students for knowing different types of Co-operatives.
3. To aware the role of state and central Govt. in development of co-operative sector.

Unit No.	Name of the Topic	Periods
1	Introduction: Principles of Co-operation and Management and their Integration in Cooperatives, Professionalization of Cooperative Management.	12
2	Organization of Co-operatives: Organization Structure of Co-operatives-Organization Chart for Large Scale Co-operative business, Banking Units – Communication and Leadership in Cooperative Organization – Federal Structure of Co-operative Organization – Control over Co-operative Audit and Taxation.	12
3	Co-operatives Education and Training : Importance, Need, Role of Institutions in the Co-operative Training Vaikuntbhai Mehata National Co-operative Institute , Importance of Job Oriented Co-operative Training – National Co-operative Union of India, National Education Centre for Co-operative – National Council for Co-operative Training – State Co-operative Union – District Co-operative Union	12
4	Special Study of Co-operatives in Maharashtra: a) Co-operative Sugar Factory- Growth role of Co-op. Sugar Factory in Rural Development- b) Dairy Co-operatives progress and problems. c) Housing Co-operatives. d) Agricultural and Non-agricultural Credit Co-op. Societies.	12
	TOTAL	48

List of Books Recommended for Study
1. G.S. Kamat: New Dimensions of Co-operative Management 2. G.S. Kamat: Cases in Co-operative Management 3. K.K.Taimani: Co-operative Organisation and Management 4. I L O: Co-operative Management and Administration 5. B.C. Mehta: Consumer Co-operation in India 6. Prof L.P. Wakale and Dr. G.H.Barhate: Sahakari Vikas- Sheth Publishing Mumbai

M.Com. Part I Semester I
Business Practices and Environment Special Paper I.
Subject Title :- Organized Trades and Markets
Course Code :- 111

Unit No.	Name of the Topic	Periods
1	Organized Trade & Markets - Introduction , Meaning and importance - Features of Organized Commodity Markets and Regulated Markets Concept & Objectives of Business - Nature and scope of Business in the modern context – Study of various policies with illustrations - Product buying, selling price and Credit policies.	12
2	Service Sector: - Meaning, Characteristics, types of services, Role, importance and development of Service Sector in India - Business Practices with reference to E-Commerce.	12
3	State in Trade:- FDI – Meaning, importance & objectives, role of FDI in retail trade with illustrations. Arguments for and against FDI. Concept of State Trading - Arguments for and against State Trading - Role of State Trading Corporation (STC) - State and privatization of trading Activities. Mall administration & organization – Super Markets.	12
4	Co-operative Marketing - objectives — Need - features - structure - Functions – Advantages and Role of co-operative marketing , with illustrations in rural areas - Direct Marketing for farmers, Self Help Group, rural development policy, Central Mall, Reliance Mart, Innovative Marketing practices.	12

Recommended Books:-

1. Principles of Business, Acharya, Govekar, A.R.Sheth & Co. Organization
2. Principles and Practice of Mamoria Joshi Kitab Mahal Marketing
3. Regulated Markets W.R.Natu
4. Marketing CO-operative, G.S.Kamat, Way Maharashtra State Co-op Union
5. Future Trading and Control Ram Desai
6. Bombay Money Market, H. parekh
7. Commodity Marketing and, P.L.Gadgil, Shubhada Saraswat Distributed Trade
8. Business Environment Text & Cases by Francis Cherybilam
9. Financial Derivatives & Risk Management by O. P. Agarwal.

M.Com. Part I Semester I
Business Practices and Environment Special Paper I.
Subject Title :- Business Environment and Policy.
Course Code :- 112

Unit No.	Name of the Topic	Periods
1	Business Environment - Meaning, Nature , Importance and scope of Environment – Types of Environment, various aspects of Environment - Business Environment with reference to India.	12
2	Problems of growth of Business Economy – Unemployment, Poverty, regional imbalance. Social injustice, Inflation, Parallel economy, Lack of technical knowledge and information. Opportunities in Environment.	12
3	Pollution – Meaning, Problems of pollution - Types of pollution- Water, Air and Noise- Regulatory mechanism & laws, sources and effects, various policies of Government, Go Green Movement	12
4	Globalization & its impact, Meaning, objectives, importance & scope of Globalization Effect & challenges of Globalization Review of two decades of Globalization	12

Recommended Books

Global Economy and Business Environment Francis Cheranilan Himalaya publishing house Text & Cases (Edn 2001)
Business Environment Chllaaghan, Elliaon Edward Arnold
Economic Environment of Business SYBA k Misha, Puri Himalaya publishing house
Indian Business through ages F1CCI Oxford University Press
Business Environment Text & Cases by Francis Cherubilam Environmental Pollution & Health by V. K. Ahluwalia.

M.Com. Part I Semester I
Business Administration Special Paper I.
Subject Title -: Production and Operations Management
Course Code -: 113

	No. of Lectures	Credit 04
1. Introduction to Production & Operations Management Meaning & Functions, Types of Production Systems Mass Production/Flow line, Continuous, Intermittent, Batch production, Job Lots etc, Service Systems, - Recent trends in production and service system Plant layout – Objectives, basic principles, types, Safety considerations and environmental aspects.	12	01
2. Product Design and Development Product Design – Meaning – Responsibility, factors, determining the design characteristics of good design, Production Department Stages of Product Design, Factor responsible for product development, tools of product development, product planning, standardization, simplification and diversification. Techniques of Product Development.	12	01
3. Production Planning & Control Production Planning and Control – Meaning, objectives, important procedures, Production Planning, Routing, Scheduling, ERP integrated system Dispatch, follow up, production control -meaning, objectives – factors – factors affecting production control, problems and cases	12	01
4. Quality Management and Productivity Meaning, measurement, techniques, factors affecting productivity measures to boost productivity – ISO 9000 to ISO -4000 – role of NPC Effects of liberalization & globalization on operations management Problems of rationalization, automation, and computerization. Preventive Maintenance, Inspection and Quality Control, Kizen five s'-GMP (Good Manufacturing Practices) Quality Circles, TQM	12	01
	48	04
List of Books Recommended: -		
1. Production and operation Management – By B. S. Goel (Pragati Prakashan) 2. Production and Operations Management – By S. N. Chary (Tata Mcgraw Hill) 3. Modern Production and Operation Management –By Elword Buffa 4. Production Planning and Inventory Control –By Magee Budman (Tata Mc Graw Hill) 5. ISO 9000 – A manual for TQM – By Suresh D. Saurabh (S. Chand Publication) 6. Essentials of Business Administration By K. A. Shantappa 7. A Key of Production Management – By Kalyani Publication, Lundhiyana		

M.Com. Part I Semester I
Business Administration Special Paper II.
Subject Title :- Financial management
Course Code :- 114

	No of Lectures	Credit 04
1. Introduction Meaning & definition of Financial Management, Role of Finance Manager, Goals of Financial Management, Financial systems (in India) – Financial Assets, Financial Markets, Financial Intermediaries, Regulatory infrastructure (RBI, SEBI), Trends in Indian Financial System	12	01
2. Investment Decisions Capital Expenditure Decisions, Capital budgeting-purpose, process, types of capital investment decisions, capital budgeting techniques, capital rationing, Investment Decision Methods – Average Rate of Return (ARR), Pay Back, Internal Rate of Return (IRR), Present Value Approach	12	01
3. Financial Statements and Financial Analysis Financial Statements – Concept, their anatomy, Balance Sheet and its utility, Income Statement and its utility, limitation of financial statements. Financial Analysis –Types of analysis, utility, Techniques of Financial Analysis _ Ratio Analysis & Fund Flow Analysis	12	01
4. Management of Working Capital Nature of working capital, understanding working capital management- its significance –circular flow concept, Factors affecting working capital requirements Financing of working capital. Inventory management & Receivable management.	12	01
	48	04
List of Books recommended for Studies: - 1. Dr. Prassanna Chandra – Financial Management Theory & Practice published by McGraw Hill 6th Edition 2. Financial Management and Policy – By Dr. R. M. Shrivastava, Himalaya Publishing House 3. Indian Financial System – Bharati Pathak Dorling Kindersley (India) Pvt. Ltd. 4. Business Finance – S. C. Kuchal 5. Financial Management – I. M Pandey 6. Financial Management – Study material by Alpha group ICFAI Hyderabad 7. Financial Management – Dr. P. V. Kulkarni 8. Fundamentals of Financial Management By Horne, Wachowicz Jr. Bhaduri Published by Pearson Education 12th Edition		

M.Com. Part I Semester I
Advanced Banking & Finance Special Paper I.
Subject Title -: Legal Framework of Banking.
Course Code -: 115

Objectives:

1. To acquaint the students with legal framework in which the Indian banking is working today.
2. To make the students aware about the latest developments in the field of banking law.
3. To enable the students to understand modern banking practices.
4. To enable the students to establish a link between the legal provisions and the practical aspects of banking.

1. Banking Regulation Act, 1949

12

Provisions relating to: Definition (Sec -5) Business of banking companies (Sec-6) Restrictions on business of banking companies (Sec -8, 19 and 20) Powers of the RBI (Sec -21, 35 and 36 to 36 AD) Winding up of a banking company (Part III and III-A of the Act) Applicability of the Act to Co-operative banks (Sec- 56), Amendments of BRA 1949 up to Dec. 2012

2. The Negotiable Instrument Act, 1881

12

Provisions relating to: Definition of negotiable Instrument (Sec- 13), Promissory note (Sec -4), Bill of exchange (Sec -5), and Cheque (Sec -6), Comparative Study of Negotiable Instruments Parties to negotiable instrument (Section -7), Holder (Sec -8), Holder in due course (Sec -9), Payment in due course (Sec -10), Negotiation (Sec -14), Endorsement (Sec -15), Dishonor of Negotiable Instruments (Sec -91-92), Noting and Protest (Sec -99-104-A), Penalties in case of dishonor of certain cheques for insufficiency of funds in the account (sections 138 to 147), As Amendments of Negotiable Instrument Act up to 2002

3. A. The Reserve Bank of India Act, 1934

12

Provisions relating to: Incorporation, Capital management and Business (Sec 3 to 19) Central Banking functions ((Sec -20 to 45): Regulatory and Supervisory Collection and furnishing of credit information (45 A to 45 G) Penalties (Sec 58 B to 58 -G), Changing role of the RBI.

B. The Foreign exchange Management Act, 1999

Provisions relating to: Preliminary (Sec 1-2), Regulation and management of foreign exchange (Sec 3 to 9) Authorized person (Section 10 to 12) Contravention and penalties (Section 13 to 15) Adjudication and appeal (Sections 16 to 21 and sections 34-35) Directorate of enforcement (section 36 to 38).

4. Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002

12

Provisions relating to: Preliminary (Section 1 and 2) Regulation of securitisation and reconstruction of financial assets and financial institutions (Section 3 to 12 A) Enforcement of security interest (Section 13 to 19) Central registry (Section 20 to 26) Offences and penalties (Section 27 to 30) Miscellaneous (Section 31 to 41) Relevant amendments between 2004 and 2008

TOTAL 48

List of Books Recommended for Study

1. Tannan's: Banking – Law & Practice.
2. Banking: Law & Practice – P.N. Varshaney.
3. Management of Banking & Financial Services – Justine Paul and Pamalata Suresh.
4. Legal and Regulatory Aspects of Banking– Published by Indian Institute of Banking & Finance.
5. All relevant & recent Bare Acts.

M.Com. Part I Semester I
Advanced Banking & Finance Special Paper II.
Subject Title -: Central Banking
Course Code -: 116

Objectives:

1. To study the functions of central bank
2. To understand monetary policy and its instruments

1. Evolution of central banking **08**

Origin and evolution of central banking.
Need and Rationale of central bank.
Evolution of Reserve Bank of India (R.B.I.)

2. Functions of Reserve Bank of India **12**

A. The Reserve Bank as currency authority:

□ Issue of currency notes, Asset banking for note- issue, Distribution of currency, Currency chests, Recent developments in currency management.

B. The Reserve Bank as banker to Government:

Maintenance of Government accounts, Banker to the Central Government and the State Governments, Management of public debt

C. RBI as a Banker Bank: Controller of Credit, Lender of Last Resort

D. RBI as a Custodian/Manager of Foreign Reserves

E. Promotional Functions of RBI

3. Regulation and supervision of Reserve Bank over Commercial banks. **10**

Regulation and supervision over commercial banks:
Licensing of banks, Opening of new banks, Branch Licensing, Foreign banks, Cash reserves and liquid assets, Prudential norms, capital and reserves, Control over methods of operation

4. Para banking activities **10**

Control over management, Annual accounts and audit, □ Subsidiaries of commercial banks,
□ Credit Information Bureau of India Ltd. (CIBIL) Bank Assurance, □ Inspection of banks: Board for Financial Supervision (BFS) and system of inspection.

5. Non-banking financial companies (NBFCs) **08**

Regulatory framework for NBFCs:
Measures for supervision over NBFCs.

List of Books Recommended for Study

- 1) Monetary & Financial Sector Reforms in India – Y. Venugopal Reddy.
- 2) Govt. of India- Economic Survey
- 3) R.B.I.: Functions and Working – R.B.I. Publication.
- 4) R.B.I. Bulletins.
- 5) R.B.I. Annual Reports.
- 6) Trends & Progress of Banking in India- R.B.I. Annual

M.Com. Part I Semester I
Advanced Marketing Special Paper I.
Subject Title :- Marketing Techniques
Course Code :- 117

Objectives :

To study and critically analyze the basic concepts & techniques of Marketing.

Unit No.	Name of the Topic	Periods
1	Marketing an Introduction: Meaning definition Elements. Objectives Importance Advantages and limitations Evolution and Scope Approaches to the study of Marketing/ Marketing Concepts- Production, Product, Selling, Marketing and Holistic Marketing Concept	08
2	Marketing Organisation and Environment Meaning Definition need and importance of a Marketing Organisation, Different types of Marketing Organisations Marketing Environment: Meaning and Definition, Internal and external environmental factors impacting the marketing environment	08
3	- Product Mix— Meaning and Definition of Marketing Mix Concept of Product, Product Lines, Product line length, depth, width. Product Mix Width. Product Simplification diversification and elimination Product Management: New product development and Product Life Cycle Brand Managent: concept definition and history of brand/branding Brand Creation, Rebranding, Brand Positioning, Brand Equity Brand Contract, Brand Factory Labelling	08
4.	Price and Place Mix Price—definition and elements of price mix. Need, importance and objectives of pricing. Factors influencing pricing. Pricing Strategies. Place – Types of Distribution Channels and factors affecting selection of channel.	08
5	Promotion Mix/ Marketing Communication Elements of Promotion Mix—Advertising- Advertising – Setting the advertising objectives – Role of advertising, advertising media – advertising bud get – evaluating advertising effectiveness – profile of advertising agencies in India. Recent trends in modern advertising – Evaluating marketing communication programs Personal Selling – concept and importance, process of personal selling. Understanding and dealing with different types of customers. Sales Promotion: Meaning, Objectives and importance . Tools or techniques of sales promotion. Public Relations—Concept, history and tools of public relations. P.R agencies in Inda. Public Relations Society of India E- Marketing Promotion – E mails, different types of Web advertising, blogspots Online Sponsorships.	08

6	People Process and Physical Evidence -- People as a part of Marketing Mix, customer interaction, customer service Process as part of the Marketing Mix, Physical evidence/ Packaging	08
Total		48

Books Recommended	
1. Philips Kotlers – Marketing Management 2. Marketing Management Cravens – Hills – Woodruff 3. Marketing – A Managerial Introduction – Gandhi 4. Marketing Information System – Davis – Olsan 5. Consumer Behavior – Schiffman – Kanuk 6. Principles and Practice of Marketing – John Frair	

M.Com. Part I Semester I
Advanced Marketing Special Paper II.
Subject Title -: Consumer Behavior.
Course Code -: 118

Objective :

To impart knowledge regarding marketing management techniques and process; to develop understanding of the marketing functions techniques and strategies

Unit No.	Name of the Topic	Periods
1	Introduction to Consumer Behaviour and Market Segmentation: Meaning and Definition. Nature Scope and Application of Consumer Behaviour . Difference between consumer and customer. Market Segmentation: Meaning and definition, Market Criteria for effective Segmentation, Process/ Stages of Market Segmentation , Bases of Segmentation,	08
2	Consumer Perception: Definition of Perception, Elements of Perception, Perception Process, Importance of Perception Perception & Brand. Consumer Perception of Risks.	08
3	Consumer Learning and Memory Meaning Definition and elements of Learning Types of Learned Behaviour Behavioural Theory of Learning General Characteristics of Learning Memory Defined Advertising/Marketing Application	08
4	Personality and Self Concept Personality Defined Theories of Personality Measurement of Personality Self- Concept Defined How Self Concept Develop Brand Personality and Marketing Application	08
5	Motivation and Involvement Concept of Motivation and Motives Theory of Motivation Classifications of Motives Role of Motives Motives Arousal Definition of Involvement Dimensions of Involvement Types of Involvement and Marketing Implications	08
6	Attitude Formation and Change Definition of Attitude Attitude Function Characteristics of Attitude	08

	Sources of Attitude Development Structure Models of Attitudes Strategies for Changing Attitudes and Intentions	
TOTAL		48

Books Recommended

1. Consumer Behavior – Hawkins, Best, Coney – TMH, 9/e, 2004
2. Consumer Behaviour – Concepts Applications & Cases – M S Raju & Dominique Xardel
3. Consumer Behavior – Leon Schiffman, Leslie Lazar Kanuk – Pearson / PHI, 8/e
4. Consumer Behavior In Indian Perspective – Suja Nair – Himalaya Publishers
5. Customer Behavior – A Managerial Perspective – Sheth, Mittal – Thomson,
6. Cross cultural marketing – Robert Rugimbana and Sonny Nwankwo
7. Customer Relationship Management – Peeru Ahamed & Sagadevan – Vikas Publishing
8. Consumer Behaviour- Walker
9. Consumer behaviour- Loudon, Delebeta
10. Consumer Behavior - J.Paul Peter
11. Consumer Behaviour – Concepts Applications & Cases – M S Raju & Dominique Xardel.

UNIVERSITY OF PUNE

Master of Commerce (M.Com.) Semester Pattern with Credit System Revised with effect from June 2013

Preamble for Choice Based Credit System

Since liberalization the socio-political-economic scenario is changing very fast. There is a significant transformation in term educational expectation and aspiration of the learner. The educational system also is witnessing many changes and challenges due to technological growth and changes in the Government policies. Education is no longer a concern of students but it has become a matter of social and economic importance. The changes at the global level has influence the educational system, structure and expectation of the users.

University education needs to take contingency of all these changes and restructure itself to stand in a competitive dynamic environment. Professional stream of learning like Commerce have to be properly upgraded to accommodate challenges of change, expectation of employers' and to offer global opportunities to the learners. From this point of view the course structure of post-graduate programme in Commerce needs to be structured. It has to be according to expectations of the learners, employers and the society. The learning inputs have to be more update, skilled based and with appropriate applications. The course programme should consider desire aptitude, attitude and acumen of the learner.

From this point of view University of Pune has introduced Choice Base Credit System of course structure. This system shall offer a flexible user friendly, opportunity to the learner, will broaden the horizon of Commerce education and will give a fair chance to every single learner to exhibit his talent, acquired skills and enhance his personality. It will further enhance his opportunity of global mobility, to acquire different knowledge inputs from different global institutes.

1. Objectives :

- a. To equip and train Post Graduate students to accept the challenges of Business World by providing opportunities for study and analysis of advanced Commercial and business methods and processes.
- b. To develop independent logical thinking and facilitate personality development.
- c. To equip the students for seeking suitable careers in management and entrepreneurship.
- d. To study by students methods of Data collection and their interpretations.
- e. To develop among students Communication, Study and Analytical skills.

2. Duration :

The M.Com. Course will be of Two Years duration consisting of Two part. i.e. Part I and Part II. Each part is having Two Semesters. Thus the M.Com. Course is of Four Semesters. For each Semester there will be Four Papers of 100 marks each. The M.Com. Degree will be of 1600 marks in aggregate.

3. Duration and Structure of Programme:

The M.Com (Semester pattern with Credit System) degree Programme shall be of 2 years' duration divided into two parts, Part I and Part II, and 4 semesters.

4. Eligibility :

The student who has passed any Bachelors degree of this University or any other recognized University shall be held eligible to be admitted to M.Com. Course.

5. Course Structure:

The M.Com. degree course will be of two year duration consisting of four semesters and of minimum 64 credits as below:

Sr. No.	Semester	Total Credits
1	Semester I	16
2	Semester II	16
3	Semester III	16
4	Semester IV	16
	Grand Total	64

Four credits for project work at 4th Semester (This will include credits for fieldwork, data presentation and report writing)

In each Semester, there will be four papers of 100 marks each out of which 50 marks will be for Internal Assessment (attendance, home assignments, class tests, long term papers, classroom presentation and 50 marks for University Examination. Thus M.Com. degree examination, four Semesters shall be of 1600 marks and of minimum 64 credits altogether. The following shall be the course structure.

6. The Scheme of Papers: The following will be the Scheme of papers:

The List of Courses Semester I

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester I	Core Compulsory	101	Management Accounting	04	04	03	50	50	100
		102	Strategic Management	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	<i>To choose any one Group of the following</i>							
		Group A (Advanced Accounting & Taxation)							
		103	Advanced Accounting	04	04	03	50	50	100
		104	Income Tax	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		105	Information system and E-Commerce Practices	04	04	03	50	50	100
		106	Intellectual Property Laws	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		107	Advanced Cost Accounting	04	04	03	50	50	100
		108	Costing Technique and Responsibility Accounting	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		109	Co-operative Movement in India	04	04	03	50	50	100
		110	Organization of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		111	Organized Trades and Markets	04	04	03	50	50	100
		112	Business Environment and Policy	04	04	03	50	50	100
		Group F (Business Administration)							
		113	Production and Operation Management	04	04	03	50	50	100
		114	Financial Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		115	Legal Framework of Banking	04	04	03	50	50	100
		116	Central Banking	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		117	Marketing Techniques	04	04	03	50	50	100
		118	Consumer Behaviour	04	04	03	50	50	100

Semester II

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester II	Core Compulsory	201	Financial Analysis and Control/ Principals of Financial Accounting	04	04	03	50	50	100
		202	Industrial Economics/ Economic Environment/Business Statistics/ Quantitative application	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		203	Specialized Areas in Accounting	04	04	03	50	50	100
		204	Business Tax Assessment & Planning	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		205	E- Security & Cyber Laws	04	04	03	50	50	100
		206	Laws Regulating to Copyrights & Design	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		207	Application Cost Accounting	04	04	03	50	50	100
		208	Cost Control & Cost System	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		209	International Co-operative Movement	04	04	03	50	50	100
		210	Management of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		211	Modern Business Practices	04	04	03	50	50	100
		212	Business Environment Analysis	04	04	03	50	50	100
		Group F (Business Administration)							
		213	Business Ethics and Professional Values	04	04	03	50	50	100
		214	Elements of Knowledge Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		215	Banking Law & Practices	04	04	03	50	50	100
		216	Monetary Policy	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		217	Customer Relationship Management & Retailing	04	04	03	50	50	100
		218	Services Marketing	04	04	03	50	50	100

Semester III

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester III	Core Compulsory	301	Business Finance/ Financial System	04	04	03	50	50	100
		302	Research Methodology for Business	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		303	Advanced Auditing	04	04	03	50	50	100
		304	Specialized Auditing	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		305	Laws Relating to International Business	04	04	03	50	50	100
		306	WTO – Norms & Practices	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		307	Cost Audit	04	04	03	50	50	100
		308	Management Audit	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		309	Co-operative Credit System	04	04	03	50	50	100
		310	Co-operative Banking System	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		311	Entrepreneurial Behaviour	04	04	03	50	50	100
		312	Entrepreneurship	04	04	03	50	50	100
		Group F (Business Administration)							
		313	Human Resource Management	04	04	03	50	50	100
		314	Organizational Behaviour	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		315	Foreign Exchange	04	04	03	50	50	100
		316	International Finance	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		317	International Marketing	04	04	03	50	50	100
		318	Marketing Research	04	04	03	50	50	100

Semester IV

Semester	Subject Type	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester IV	Core Compulsory	401	Capital Market and Financial Services/ Portfolio Management	04	04	03	50	50	100
		402	Industrial Economic Environment/ Operations Research	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		403	Recent Advances in Accounting, Taxation, Taxation and Auditing	04	04	03	50	50	100
		404	Project Work/ Case Studies	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		405	Recent Advances in Commercial Laws and Practices	04	04	03	50	50	100
		406	Project Work/Case Studies	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		407	Recent Advances in Cost Auditing and Cost System	04	04	03	50	50	100
		408	Project Work/Case Studies	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		409	Recent Advances in Co-operative and Rural Development	04	04	03	50	50	100
		410	Project Work/Case Studies	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		411	Recent Advances in Business Practices and Environment	04	04	03	50	50	100
		412	Project Work/Case Studies	04	04	03	50	50	100
		Group F (Business Administration)							
		413	Recent Advances in Business Administration	04	04	03	50	50	100
		414	Project Work/Case Studies	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		415	Recent Advances in Banking and Finance	04	04	03	50	50	100
		416	Project Work/Case Studies	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		417	Recent Advances in Marketing	04	04	03	50	50	100
		418	Project Work/Case Studies	04	04	03	50	50	100

7. Scheme of Examination:

The examination of regular students of M.Com. degree course of the University of Pune admitted in the academic session 2013-14 and after shall be based on:

- (a) Semester Examination
- (b) Continuous Assessment
- (c) Choice Based Credit System, and
- (d) Semester Grade Point Average and Cumulative Grade Point Average System

For each paper of 100 marks, there will be an Internal Assessment (1A) of 50 marks and the University Examination (UE) of 50 marks/ 3 hours duration at the end of each semester. A candidate who will secure at least 40% marks allotted to each paper will be given 4 credits. A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment for each paper will be 50 marks which will be carried out by the department during the term. The Internal Assessment may be in the forms of written test, seminars, term papers, presentations, assignments, orals or any such others. The distribution of internal assessment marks shall be as follows:

Midterm Test	20
Presentation/Role Play	10
Case studies/ Group Discussion	10
Quiz / Home Assignment	10
Total	50

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A student cannot register for the third semester, if she/he fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters.

8. Research project work:

There will be a Research Project to be prepared by a student during the fourth semester. The objective of the project work is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work is to be undertaken under guidance of a teacher allotted to a student by the department.

Division of marks	Marks	
A. Synopsis with working bibliography (Internal Assessment)	40 marks	50 marks
Viva Voce (Internal Assessment)	10 marks	
B. A full project Report (Minimum 50-80 pages) (Internal & External Assessment)	40 marks	50 marks
Viva Voce (Internal & External Assessment)	10 marks	

As the Research Project is based on the self study done by the candidate and evaluated for 100 marks altogether, 04 credits will be awarded to a successful candidate in this subject. The project may be evaluated by two examiners one internal and one external, selected from the panel of PG examiners of the University. The Viva voce must be conducted by the teachers selected out of the panel of PG examiners maintained by the University.

The candidates have to submit the project 15 days before the commencement of the fourth semester university examination. The project report shall be type-written and submitted in duplicate. A candidate who fails to submit the project may resubmit the same in the subsequent semester examination for evaluation. The project work activities must be duly supported by documentary evidence to be endorsed by the Head or Guide.

9. Standard of passing:

A candidate shall be declared to have passed in the paper provided he/she has secured minimum GP of 4.5 in the UNIVERSITY EXAMINATION and GRADE POINT AVERAGE of 4.0 in aggregate of UNIVERSITY GRADE and INTERNAL ASSESSMENT taken together.

10. Classification of successful candidates:

Candidates who secured not less than 60% of aggregate marks (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) in the whole examination shall be declared to have passed the examination in the first class. All other successful candidates shall be declared to have passed in second class. Candidates who obtain 70% of the marks in the aggregate (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) shall be deemed to have passed the examination in first class with distinction.

A student who passess in all the courses will be declared to have passed the M.Com. degree with the following honours.

CGPA in (4.00, 4.99)	- Pass Class
CGPA in (5.00, 5.49)	- Second Class
CGPA in (5.50, 5.99)	- Higher Second Class
CGPA in (6.00, 7.99)	- First Class
CGPA in (8.00, 10.00)	- First Class with Distinction

11. Scheme of Credits:

Sixty (60) hours of teaching will lead to three credits (which mean four hours per week teaching in one semester) and long term paper as well as presentation will carry one credit. Each semester shall have 16 credits.

12. Structure of Transcript:

At the end of each semester, student will be given a transcript showing the performance and result in each course. The transcript shows, for each course the title of the course, credit values, grade in UNIVERSITY EXAMINATION , grade in INTERNAL ASSESSMENT , grade point index, result as pass or fail. Also, the semester grade point average (SGPA) and cumulative grade point average (CPGA) will be shown. Further the equivalent percentage of marks corresponding to SGPA or CGPA to equivalent percentage is given by:

$$\text{Equivalent percentage marks} = \begin{cases} 10 \times \text{CGPA} & \text{if CGPA /SGPA is in [4.00, 6.00]} \\ 05 \times \text{CGPA} + 30 & \text{if CGPA /SGPA is in [6.00, 9.00]} \\ 25 \times \text{CGPA} - 150 & \text{if CGPA /SGPA is in [9.00, 10.00]} \end{cases}$$

Marks	Grade	Grade Point
100 to 75	O : Outstanding	06
74 to 65	A : Very Good	05
64 to 55	B : Good	04
54 to 50	C : Average	03
49 to 45	D : Satisfactory	02
44 to 40	E : Pass	01
39 to 0	F : Fail	00

(C) GPA	Grade
05.00 – 6.00	O
04.50 – 04.99	A
03.50 – 04.49	B
02.50 – 03.49	C
01.50 – 02.49	D
00.50 – 01.49	E
00.00 – 00.49	F

13. Distribution of Periods:

There shall be 60 periods for each subject to cover the entire teaching of 4 credits. This will be distributed as follows:

Particulars	Periods
Teaching session per programme	48
Assignment/ Test	04
Role play/ Group Discussion	04
Case studies and presentation	04
Total	60

14. Standard of Passing.

- A. Regular students: - A candidate is required to obtain 40% marks in each of course in both Mid Semesters and Semester end. It means passing separately at Mid-Semester and semester Examinations is compulsory.

15. Award of Class.

- a. The class in respect of M.Com. Examination will be awarded on the basis of aggregate marks obtained by the candidates in all the sixteen papers at the Semester I, II, III, and IV together.
The Award of class shall be as under:-
- b. Improvement: - A candidate having passed M.Com. Examination will be allowed to improve the performance. The same is termed as 'Class Improvement Scheme' under which improvement of performance shall be allowed only at the Semester end Examination.
- c. A candidate after passing M.Com. Examination will be allowed to appear in the additional Special Subject after keeping necessary terms in the concerned special subject only, for which a passing certificate will be issued.

16. Medium of Instruction :

The use of Marathi is allowed for writing answers in the examination except for following courses:

- Management Accounting
- Financial Analysis & Control
- Business Statistics,
- Advanced Accounting and Taxation
- Advanced Cost Accounting and Cost Systems.

17. A student (Regular / External) will be admitted to Revised M. Com. Course with effect from June 2013. For the students who have completed the terms for the First Year as per Old Course will be admitted to the Second Year as per Old Course M. Com. The examination as per Old Course will be held simultaneously for three years from April / May 2014.

18. Qualification of the Teachers :

The Teachers recognized to teach the subjects as per Old Course shall be deemed to be recognized in the corresponding equivalent subjects under Revised Course.

In case of: A) Business Statistics, B) Industrial Economics, C) Co-operation and Rural Development, D) Advanced Banking and Finance and E) Research Methodology and Project Work- Paper-IV of each Special Subject, the following qualifications be made applicable.

- A. Business Statistics :** M.Com, M.Phil with Statistics or Research Methodology as one of the Papers at M.Com /B.Com /M. Phil examination with 5 years degree teaching experience or M.A./M.Sc. With Statistics having 5 years degree teaching experience.
- B. Industrial Economics:** M.Com., M. Phil with Business Economics/Economics of Industries or Economics as one of the papers at B. Com/ M.Com Examination with 5 years degree teaching experience or M.A. Economics with 5 years degree teaching experience.
- C. Co-operation and Rural Development:** M. Com, M. Phil. With 5 years degree teaching experience or M.A. Economics (with Co-operation Rural Economics)
- D. Advanced Banking and Finance:** M. Com., M. Phil., with Banking as one of the papers at B.Com/M.Com examination 5 years degree teaching experience.
- E. Research Methodology and Project Work:** M.Com. M.A (Eco.) M.Phil./Ph.D. with 5 years degree teaching experience.
- F.** Similarly all the changes in qualification as per U.G.C norms and guidelines shall also be applicable as and when the changes come into force (If applicable)

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M.Com. Part I Semester II
Compulsory Paper
Subject Name -: Financial Analysis & Control.
Course Code -: 201.

Objective -: The objective of the course is to enable students to acquire sound knowledge of concepts, methods and techniques of management accounting and to make the students develop competence with their usage in managerial decision making and control.

UNIT	TOPIC	No. of Lectures in hours
I	LONG TERM INVESTMENT DECISIONS: Capital budgeting - Meaning- Importance - Evaluation technique and methods - Pay back, rate of Return, Discounted Pay Back Period- Discounted Cash flow - Net present value - Internal Rate of Return, Modified Internal Rate of Return- Profitability Index. Relationship between risk and returns.	10
II	COST OF CAPITAL: Meaning - Definition and assumptions - Explicit and implicit cost - Measurement of specific cost - Cost of debt - Preference Shares - Equity shares - Retained earnings - Weighted average cost of capital	10
III	MARGINAL COSTING: Meaning of Marginal Cost and Marginal Costing, advantages, limitations. Fixed and Variable cost, Contribution, Break-even analysis, Profit volume ratio, Limiting factor.	08
IV	SHORT RUN MANAGERIAL DECISION ANALYSIS: Introduction-Analytical Framework. Decision Situations:- Sales Volume related Decisions-Sale or further process-Make or buy - Product Line/divisions/departments - Short run use of scarce resources - Operate or shut down.	08
V	BUDGET AND BUDGETARY CONTROL: Meaning, Definition and scope of budget and budgetary control- Types of budgets - Financial budget - Master budget, Flexible budget - Capital budget.	06
VI	STANDARD COSTING: Concept, Advantages; Types of Standards-Variance analysis: Materials, Labour, Overhead - Managerial uses of Variances	06
TOTAL -		48

List of Books Recommended for Study:-

1. R. N. Anthony , G. A. Walsh: Management Accounting
2. M. Y. Khan. K. P. Jain: Management Accounting
3. I. M. Pandey: Management Accounting (Vikas)
4. J. Betty: Management Accounting
5. Dr. Kishor N. Jagtap: Management Accounting (Success)
6. Sr. K. Paul: Management Accounting
7. Dr. Jawaharlal: Management Accounting

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Quizzes	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester II**Optional Paper****Subject Name :- Industrial Economics****Course Code :- 202 - A.****Objectives:**

- 1) To study the basic concepts of Industrial Economics.
- 2) To study the significance and problems of Industrialization.
- 3) To study the impact of Industrialization on Indian Economy.

Chapter No.	Particulars	Total Lectures (48)
1.	Introduction 1.1 Meaning, Definition, Nature, Scope and Limitations of Industrial Economics. 1.2 Need and Significance of Industrial Economics. 1.3 Relationship between Industrial Development and Economic Development.	8
2.	Industrial Location. 2.1 Meaning of Industrial Location. 2.2 Factors Influencing Industrial Location. 2.3 Alfred Weber's Theory of Location. 2.4 Sargent Florences Theory of Location. 2.5 August Losch's Theory of Location.	8
3.	Industrial Productivity. 3.1 Meaning, Definition and Measurement of Industrial Productivity. 3.2 Factors Influencing Industrial Productivity. 3.3 Industrial Productivity. 3.4 Measures adopted by the Indian Government to Improve Industrial Productivity.	8
4.	Industrial Efficiency and Profitability. 4.1 Meaning, Definition and Measurement of Industrial Efficiency. 4.2 Factors affecting Industrial Efficiency. 4.3 Measures adopted by Indian Government, Industries and other agencies to Improve Industrial Efficiency. 4.4 Meaning, Definition and Measurement of Industrial Profitability.	8
5.	Industrial Profile and Problems. 5.1 Structure and Organisation of Large Industries in India. 5.2 Private Sector Enterprises: Role, Functions and Problems. 5.3 Public Sector Enterprises: Role, Functions and Problems. 5.4 Disinvestment Policies. 5.5 Micro, Small and Medium Enterprises (MSME) Role and Problems.	8
6.	Industrial Imbalance. 6.1 Meaning of Industrial Imbalance. 6.2 Causes and Effects of Industrial Imbalances. 6.3 Measures adopted by the Indian Government to reduce Industrial Imbalance 6.4 Regional Industrial imbalance - Special focus on Maharashtra	8

Recommended Books

1. S.C. Kuchal – Industrial Economy of India.
 2. D.R. Gadgil – Industrial Evolution in India, Oxford. 1948
 3. K.V. Sivayya and V.B.M.Das – Indian Industrial Economy, Chand and Co. Ltd. New Delhi 1999 Publishing House.
 4. S.C. Kuchal – Major Industries in India, Chaitanya Publishing House, Allahabad.
 5. Bagchi and banerjee : change and choice in Indian industry, centre for studies in social science in culcatta.
 6. A. Donald Hay Dereck, Mouris : Industrial Economics : Theory and Evidence, Oxford
 7. K.N.Prasad : Indian Economy Since Independence.
 8. Solman Fabucant : A premier on Productivity, Prentice Hall.
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- i. www.newagepublishers.com/samplechapter/000386.pdf
 - ii. www.indecon.com/
 - iii. Www.tudyingeconomics.ac.uk/industrial-economics
 - iv. http://en.wikipedia.org/wiki/Industrial_economics
 - v. <http://encyclopedia2.thefreedictionary.com/Industrial+Economics>
 - vi. <http://studyingeconomics.ac.uk/industrial-economics/>
 - vii. www.aiu.edu/publications/student/.../industrial%20economics.html
 - viii. www.investopedia.com/terms/i/industrial-organization.asp

Suggested format of Continuous assessment along with allocation of Periods

Sr.No.	Assessment Chart	Periods Alloted
1.	Tests	3
2.	Quizzes	3
3.	Presentation Seminars	3
4.	Assignments	3

M.Com. Part I Semester II**Optional Paper****Subject Name :- Business Statistics.****Course Code :- 202 - B.**

1.	Theory of Probability Distributions: Discrete and Continuous 1.1 Random Variables, discrete random variable, continuous random Variable 1.2 Probability distribution and probability mass function (p. m .f.) of discrete random variable, Probability density function(p.d.f.) of continuous random variable 1.3 Expected value, variance and standard deviation 1.4 Numerical Problems on finding p.m.f/p.d.f, expected value and variance.	10
2.	Standard Probability Distributions 2.1 Binomial Distribution : p. m. f., mean and variance. 2.2 Poisson Distribution : p. m. f., mean and variance 2.3 Normal Distribution : p. m. f., mean, variance, properties 2.4 Limiting relations between these distributions 2.5 Numerical problems to calculate probabilities, mean and variance	14
3.	Estimation of Parameters of Distribution 3.1 Parameter and Statistic 3.2 Unbiased estimator 3.3 Confidence interval (around unbiased estimator) 3.4 Examples and Problems	8
4.	Tests of Hypothesis 3.1 Hypothesis, null and alternative hypothesis, two types of errors, test statistic, critical region acceptance region, level of significance, p-value 3.2 Chi square test for goodness of fit 3.3 Chi square test for independence of two attributes 3.4 Small sample Test for the mean a) One sample test b) Two sample test c) Pair t – test 3.5 Large sample tests for population mean and population proportion 3.1.1 Test for the mean a) one sample b) two samples 3.1.2 Test for the proportion a) one sample b) two samples 3.6 Numerical Problems	16
Recommended Books : 1. Schaum's outline series of Probability By Seymour Lipschutz 2. Probability and Statistics : R Walpole, S myers and K Ye 3. Fundamentals of Mathematical Statistics :S.C. Gupta and V.K. Kapoor 4. Fundamentals of Applied Statistics : S.C. Gupta		

M.Com. Part I Semester II
Advanced Accounting and Taxation Special Paper III
Subject Title :- Specialized Areas in Accounting.
Course Code :- 203

Objective :-

1. To develop competency of students to solve problems relating Special areas in accounting including accounting for Services Sector.
2. To understanding of Financial Reporting Practices.
3. To familiarize the student with procedure of accounting for Taxation.

UNIT	TOPIC	No. of Lectures in hours
I	ACCOUNTING FOR CONSTRUCTION CONTRACTS: Introduction - Accounting Treatment - Percentage of Completion Method, Completed Contract Method. Provision for foreseeable losses-Principles to be followed while taking credit for profit on incomplete contracts, valuation & disclosure of Work-in-progress, escalation clause, preparation of contract accounts.AS7	08
II	ACCOUNTING FOR CORPORATE RESTRUTURING: Amalgamation - Absorption - External reconstruction, (Advanced problems only) - Internal Reconstruction - reparation of Scheme of Internal Reconstruction.	08
III	FUND BASED ACCOUNTING: Introduction - Special Features of Accounting for Educational Institutions, Accounting for Government Grants as per guidance notes issued by the ICAI.	08
IV	SERVICES SECTOR ACCOUNTING: A. Hotel accounting - introduction - visitors' ledger. B. Hospital accounting - Introduction- capital and revenue expenditure OPD & IPD Register. C. Transport Undertaking - Introduction - preparation of final Accounts - Accounting o f Roadways Preparation of final accounts - Log Book.	08
V	CORPORATE FINANCIAL REPORTING: Issues and problems with reference to published financial statements of Companies. Financial Reporting in respect of Mutual Funds, Non Banking Financial Companies, Merchant Bankers, Stock Brokers	08
VI	ACCOUNTING FOR CORPORATE TAXATION: A. Accounting for Income Tax: Provision for Taxation - Advance Tax- Completion of Assessment - Corporate Dividend Tax-Tax Deducted at Source Deferred Tax as per AS.22. B. Accounting treatment of Excise Duty and CENVAT: Accounting at the time of payment of Excise Duty, Cenvat Credit availed and utilized for input and Final Product and Capital Goods. C. Accounting of State Level Value Added Tax. (VAT): VAT Credit in	08

	case of Inputs/Supplies, Capital Goods. Accounting for Liabilities adjusted from VAT credit receivable balance- Inputs and / or Capital Goods. D. Accounting under Service Tax. Basics of Service Tax-Accounting Groups and Accounting Heads-Accounting Entries at raising Invoice and receipt of payment.- Booking of expenses and making payment. (practical problems on journal entries on above transactions))	
TOTAL -		48

Notes:

1. Theory questions will carry 20% marks.
2. Practical problems will carry 80% marks.
3. Relevant Accounting standards to be studied under each topic

List of Books Recommended for Study :

1. Shukla and Grewal: Advanced Accounts. (S. Chand & Co. Ltd. New Delhi)
2. Jain and Narang: Advanced Accounts.(Kalyani Publishers, Ludhiana)
3. Sr. K. Paul: Accountancy, Volume-I and II.(New Central Book Agency, Kolkata)
4. R. K. Lele and Jawaharlal: Accounting Theory (Himalaya Publishers)
5. Dr. L. S. Porwal: Accounting Theory (Tata McGraw Hill).
6. Robert Anthony, D.F.Hawkins & K.A. Merchant: Accounting Text & Cases (Tata McGrawHill).
7. Dr. S. N. Maheshwari: Corporate Accounting (Viakas Publishing House Pvt. Ltd. New Delhi)
8. Dr.Ashok Sehgal & Dr .Deepak Sehgal: Advanced Accounting (Taxmann, New Delhi).
9. Guidance Notes issued by Institute of Chartered Accountants of India. on :
 - a. Accounting for State level Value Added Tax :
 - b. Accounting for Fringe Benefits Tax :
 - c. Accounting for Corporate Dividend Tax:
 - d. Accounting Treatment for Excise Duty:
10. Taxmann's Journal on Service Tax : Volume 10.Part 7. (2007): Accounting under Service Tax by Pravin Dhandharia
11. Relevant guidance notes issued by the ICAI.

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Quizzes	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester II
Advanced Accounting and Taxation Special Paper IV
Subject Title :- Business Tax Assessment & Planning
Course Code :- 204

Objective :-

1. To provide understanding of Direct Taxes including Rules pertaining thereto and their application to different business situations.
2. To understand principles underlying the Service Tax.
3. To understand basic concepts of VAT, Excise Duty and Customs Duty.

UNIT	TOPIC	No. of Lectures in hours
I	ASSESSMENT OF VARIOUS ENTITIES: 1. Assessment of Companies 2. Assessment of Co-operative Societies 3. Assessment of Charitable Trusts (Theory & Problems)	08
II	MISCELLANEOUS: Income Tax authorities, Return of Income, Procedure for Assessment - Types of assessment, Appeals and Revision, Deduction of Tax at Source - Advance payment of Tax - Deduction and Collection of Tax At Source-Interest and penalties, Offences and Prosecutions - Refund of Tax-Transfer Pricing (Domestic & International Transactions) (Theory & simple problems on TDS, Advance Tax & Interest Calculation)	08
III	TAX PLANNING: Meaning of tax planning and management, tax evasion and tax avoidance-Nature and scope of tax planning and management in the corporate sector- Justification of corporate tax planning and management. Tax Planning considerations in relation to Business.(Theory)	08
IV	WEALTH TAX: Scheme of Wealth Tax - Incidence of Wealth Tax - Assets to be included in Net Wealth - Exempted Assets - Valuation of Assets and Wealth Tax Liability - Assessment and Penalties. (Theory & Problems)	06
V	BASICS OF INDIRECT TAXES: A] SERVICE TAX: Service Tax: Applicability and Services covered - Valuation of taxable services for service tax- Payment of Service Tax - Registration - Furnishing of Return - Maintenance of Record - Other obligations (Theory and Problems) B] VAT: The Basic concept of VAT-how VAT operates-merits & demerits of VAT-a brief overview of state level VAT in India. (VAT is not to be studied with reference to any particular State VAT Law.) (Theory Only)	18

	C] EXCISE DUTY: - Basics of Central Excise Duty – Conditions for imposition - Person liable - Rates of excise duty - Goods and Excisable goods - Manufacturer, Production and Manufacturer- Classification of goods. (Theory) D] CUSTOMS DUTY: Introduction to Customs Duty – Valuation - Customs Procedures - Classification for Customs and Rate of Customs Duty. (Theory)	
TOTAL -		48

Notes:

1. Amendments made prior to commencement of Academic Year in the relevant act should be considered.
2. Theory questions will carry 50% marks.
3. Problems will carry 50% marks

Scheme of Marking for Semester II will be as under:-

- a. Income Tax- 70 Marks
- b. Wealth Tax- 10 Marks
- c. Indirect Taxes -20 Marks
 - i- Service Tax
 - ii- VAT
 - iii- Excise Duty
 - iv- Customs Duty

List of Books Recommended for Study:

1. Dr. Vinod Singhania: Direct Taxes, Law and Practice, Taxman Publication, New Delhi.
2. Dr. Bhagawati Prasad: Direct Taxes
3. Girish Ahuja and Ravi Gupta: Direct Taxes, Bharat Law House, New Delhi.
4. T. N. Manoharan: Hand Book of Income Tax Laws
5. B.B. Lal & N.Vashisht: Direct Taxes (Pearson)
6. S. S. Gupta: Service Tax (Taxman Publications, New Delhi)
7. R. Mohan Lavis: Service Tax (Bharat Publishers, New Delhi)
8. V.S. Datey: Indirect Taxes, Law and Practice (Taxman Publications, New Delhi)

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Quizzes	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester II
Commercial Laws and Practices Special Paper III.
Subject Title :- E-Security and Cyber Laws
Course Code :- 205

Objective :-

1. To make the students aware of the cyber wrongs/crimes;
2. To impart knowledge of e-security and Internet Security amongst students
3. To make student familiar with various provisions of cyber Laws and I.T. Acts.
4. To get the students acquainted with the regulatory regime in computer field/e-business.

Unit No.	Name of the Unit / Topic	Periods
1.	Introduction to Computer crimes. Computer Crimes. Types of Computer crimes, Specific Threats, Attacks on Computer Systems, Major types of Security Problems / Common threats, Computer Frauds and abuse techniques. Characteristics and types of computer frauds. Preventing Computer Frauds and Ethical Considerations. System Vulnerability and abuse – Internet Vulnerability. Protecting Information systems from potential threats. E-Commerce security issues. Risk Involved in E-Commerce. Protecting E-Commerce System.	15
2.	E-Security Introduction to E-Security and Security Requirements. Types of Intruders, attacking methods, Hackers and Crackers. Computer Viruses, Spam, Denial of services. Security Policy, Secure E-Transactions. Types of Information Systems Controls- General Controls – Physical Controls, Access Controls, Biometric Controls, data Security Controls and Application Controls. Security Tools and Methods- Password, Authentication, Access Control, Encryption, Firewall, Antivirus Software, Digital Identity and digital Signature, Certificate Certificates. Secure Socket Layer and Secure Electronic Transaction Protocols.	15
3.	Cyber Laws --- Introduction to Cyber Laws—Meaning & scope of Cyber Laws, online contracts, & requirements & legal aspects of e-contracts (offer and acceptance in e-form), Cyber Laws & legal issues (cyber jurisprudence, & sovereignty, net neutrality, freedom of speech in cyber space, governance) Information Technology Act – 2002 Part-I Digital Signature-definition ,meaning, functions, procedure, E- Governance (Ss. 4 to 9), E- Records (Ss 11 to 16), Controller of Certifying Authority (powers, functions u/s 17 to 20), Digital Signature Certificates --License to issue Digital Signature Certificates, (suspension, revocation etc.--Ss.21 to 26), Duties of Certifying Authority (Ss.30 to 34), Provisions relating to Digital Signature Certificates (Ss. 35 to 39), Duties of subscriber(Ss.	10
4.	Information Technology Act – 2002 Part-II Penalties for Cyber Wrongs and Adjudication (Ss. 43 to 47) , Cyber Regulation Appellate Tribunal (Procedure and Powers(Ss.48 to 51, 57 to 64) Cyber Crimes/Offences & punishment (u/s 65 to 79), offences by companies(S.85) Amendments effected in IPC 1860, Indian Evidence Act, 1872, Bankers Books Evidence Act, 1891, Reserve Bank of India Act, 1934 pursuant to Ss. 91 to 94 of ITA, 2000.	08
	Total	48

[Note: Recent amendments in the Acts and relevant Landmark cases decided by courts are expected to be studied]

Books Recommended:

1. E-COMMERCE and ITS APPLICATIONS – Dr. U. S. Pandey, Rahul Srivastava and Saurabh Shukla. S. Chand & Company, New Delhi
2. Management Information and Control Systems – Dr. Sushila Madan, TAXMANN’S.
3. Electronic Commerce from Vision to Fulfillment _ Elias M. Awad, Pearson Education.
4. Text book on Intellectual property rights – N.K. Acharya, Asia Law House.
5. Law of Information Technology (Cyber Law) – D. P. Mittal, TAXMANN’S
6. Guide to Cyber Laws – B y Rohnay D. Ryder[Wadhwa, Nagpur]
7. 6.. Cyber Laws – Justice Yatindra Singh, Universal Law Publishing Co.
8. Law of Information Technology—D.P. Mittal
9. Cyber Laws—Krishnakumar
10. 9 Encyclopedia of Cyber Laws—Sujeet Kumar
11. Handbook of Cyber Laws---Vakul Sharma

M.Com. Part I Semester II
Commercial Laws and Practices Special Paper IV.
Subject Title :- Law Relating to Copyright and Designs.
Course Code :- 206

Objective :-

1. To understand the nature and scope of Intellectual Property laws
2. To get acquainted with various provisions of Intellectual property laws
3. To make the student familiar to Intellectual Property laws and their relevance in the changing business environment.

Unit No.	Name of the Topic	Periods
1.(a)	The Copyright Act, 1957:- Introduction and Evolution of the Law on Copy Right – Meaning, Scope and Characteristics of Copyright – Object of Copyright – Works in which Copyright Subsists – Qualification for Copyright Subsistence – Author and Ownership of Copyright and Rights of the Owner – International Copyright (Ss – 40-43)	10
1.(b)	Copyright (Procedure):- Term of Copyright (Sections 22 to 29, 37(2), 38(2) – Assignment/ License of Copyright (Sections 18 to 21, 30 To 32) – Registration of Copyright (Section 44 to 50-A along with rule 16 of chapter VI of Copyright Rules, 1958)	06
1.(c)	Copyright (Infringement and Regulatory Authorities):- Infringement of Copyright - acts which Constitute Infringement, acts not Constituting Infringement etc. (Section 51 to 53 A) – Offence and Penalties, Copyright Societies (Functions and Rights)	08
2	The Designs Act-2000: - Industrial Designs: Introduction and Meaning – Registerability of a Design, who can file an Application for Registration of a Design (Section 3 to 10) – Copyright in Registered Designs (Sections 11 to 20) – Infringement (Piracy) of Copyright in Design (Sec. 22) – Defenses which may be set up by the Defendant.	08
3	The Geographical Indications of Goods (Registration and Protection), Act, 1999: - Geographical Indications: Introduction, Meaning and Content – Procedure for Registrations – Duration, Renewal, Restoration (Section 11 to 18) – Rights Conferred by Registration – Infringement and its Remedies (Section 20-24) – Penalties for Infringement (Section 37 to 54) – Authorities: Registrar , Appellate Board – Certificate of Validity – Powers of Central Government.	08
4	Protection of Plant Varieties and Farmers Rights Act-2001:- Introduction Objective and Scope of the PPVFR Act, 2001 - Definitions [Plant, Propagating Material, Seed, Germ Plasma, Plant Variety, New Plant Variety, Farmer Etc.] Procedure of Registration, Who may apply? - What can be registered? – What Cannot be Registered - Acceptances and Opposition of Application – Rights and Privileges of Breeders and Researchers – Compulsory License – Period of Validity of Registration – Surrender and Revocation of Certificate – Infringement of Rights and its Remedies - Offences and Penalties – Authorities for Administration	08
	Total Period	48

[Note: Recent amendments in the Acts and relevant Landmark cases decided by courts are expected to be studied]

Books Recommended
1. Intellectual Property Law – P. Narayan, Eastern Law House. 2. Text book on Intellectual Property Rights. – N.K. Acharya , Asia Law House, Hyderabad. 3. Law Relating to Intellectual Property – Dr. B.L. Waderha, Universal Law Publishing Co. 4. Intellectual Property Rights, (2011), - Dr. Sreenivasulu N. S., Regal Publications, New Delhi – 7. 5. Intellectual Property Law in India (2006) – Justice P. S. Narayana, Goigia Law Agency, Hyderabad. 6. Universal’s “Intellectual Property Laws” (Bare Acts) Universal Law Publishing Co. Pvt. Ltd. 7. Law of Intellectual Property - Dr. S. R. Mynei – Asia Law House, Hyderabad (2011). 8. Intellectual Property Rights – Heritage, Science & Society Under International Treaties, A. Subbian Deep & Deep Publications Pvt. Ltd., New Delhi (2007)

M.Com. Part I Semester II
Advanced Cost Accounting and Cost System Special Paper III.
Subject Title :- Application of Cost Accounting.
Course Code :- 207

Objectives:

1. To provide knowledge on advanced cost accounting practices.
2. Relevant Cost Accounting Standard are to be studied.

Unit No.	Name of the Topic	Periods
1.	Cost Book Keeping and Reconciliation between Cost and Cost financial Accounts – Book - keeping, Cost Ledgers, interlocking and integral Accounts. Reconciliation of Cost and Financial Accounts, Reasons, needs, Methods.	12
2.	Product Life Cycle Costing: Introduction, Product Life cycle, Phases and Characteristics of Product Life Cycle, Stages of Product Life Cycle, Product Life Cycle Costing Features and benefits of Product Life Cycle Costing.	12.
3.	Value Chain Analysis Introduction - Definition – Role of Management Accountant – Value Chain Analysis – approach for assessing competitive advantages – value chain analysis v/s conventional management accounting.	12.
4.	Productivity & Concept and Measurement i) Productivity Meaning, Measurement of Material, Labour, Capital and Management Productivity. Productivity V/s Efficiency. Capacity - Theoretical, Practical and idle capacity, Capacity utilization and effect of same on cost. ii) Concept and Measurement Measures to improve productivity - Technical, Financial, Operational Measures. Restructuring of activities - Business Process Re-engineering elementary knowledge. Human aspect of productivity.	12.
	Total	48

Note: 50% Marks for Theory and 50% Marks for practical problems. Areas of Practical Problems :

1. Reconciliation of Cost and Financial Profit
2. Measurement of Productivity.

References:

1. Ravi Kishor: Advanced cost Accounting and cost systems, Taxman Allied services Pvt Ltd, New Delhi.
2. N.K. Prasad: Principles and Practice of Cost Accounting, Syndicate Pvt Ltd, Calcutta.
3. Prof. Subhas: Practice in Advanced costing and Management, Nirali Prakashan, Pune.
4. Ravi Kishor: Students guide to Cost Accounting, Taxman's allied services, New Delhi.
5. M. N Arora: Cost Accounting Principles and Practices, Vikas Publishing House, New Delhi.
6. S. N Maheshwari, Cost Accounting Theory and Problems, Mittal shree Mahvir Book Dept, New Delhi.
7. Website: www.myicwai.com.
8. Advanced Cost Accounting and Cost Systems -: Ravi Kishor, P.V. Ratlam, M.L.Basu

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Industrial Visits	04
2	Assignments	04
3	Class room tests	04
Total		12 hours

M.Com. Part I, Semester II
Advanced Cost Accounting and Cost System Special Paper IV.
Subject Title :- Cost Control and Cost System.
Course Code :- 208

Objectives:

1. To equip the students for designing and implementing cost control, cost reduction programme and different cost systems.
2. Relevant Cost Accounting Standards are to be studied.

Unit No.	Name of the topic	Periods
1	Marginal Costing, Cost – Volume – Profit Analysis And Differential Costing :- Marginal Costing- Meaning –Concept of Variability of Cost, Contribution P/V Ratio, Break :- Even – Analysis, Margin of Safety Cost- Volume, Profit Analysis – Procedure And Practical, Application. Differential Costing, Differential Costs, Differential Cost Analysis, Features of Differential Costing, Practical Application.	12
2	Pricing Decision: - Introduction – Pricing of Finished Product- Theory of Price – Pricing Policy – Principles of Product of Pricing – New Product Pricing – Pareto Analysis.	10
3	Cost Control and Cost Reduction :- Introduction, Process of Cost Control and Cost Reduction, Cost Reduction Programme and its Implementation – Methods and Techniques Costing System Design and Installation :- Study of Production Process, Objective. Selection of Methods of Costing, Creating Cost Center And Cost Codes – Deciding Basis of Apportionment of Various Overheads, Deciding Methods of Absorption. Fixing Responsibility And Designing Suitable MIS. Designing And Installing Cost System In Computer Environment	20
4	Value Analysis and Value Engineering :- Just-In-Time [JIT], Activity Based Costing (ABC)	06

Note: 50% Marks for Theory and 50% Marks for practical Problems.

Areas of Practical Problems:

- 1) Marginal Costing- Application oriented
 - 2) Pricing Decisions
- Level of knowledge will be advance and Practices

References:

1. Ravi Kishor: Advanced cost Accounting and cost systems, Taxman Allied services Pvt Ltd, New Delhi.
2. N.K. Prasad: Principles and Practice of Cost Accounting, Syndicate Pvt Ltd, Calcutta.
3. Prof. Subhas: Practice in Advanced costing and Management, Nirali Prakashan, Pune.
4. Ravi Kishor: Students guide to Cost Accounting, Taxman's allied services, New Delhi.
5. M. N Arora: Cost Accounting Principles and Practices, Vikas Publishing House, New Delhi.
6. S. N Maheshwari, Cost Accounting Theory and Problems, Mittal shree Mahvir Book Dept, New Delhi.
7. Website: www.mycicwai.com.
8. Advanced Cost Accounting and Cost Systems -: Ravi Kishor, P.V. Ratlam, M.L.Basu

List of Learning Activities and Allocation of Periods

Sr. No.	Activities	Learning Hours
1	Industrial Visits	4
2	Assignments	4
3	Class room tests	4
Total		12 hours

M.Com. Part I Semester II
Co-operation and Rural Development Special Paper III.
Subject Title -: International Co-operative Movement.
Course Code -: 209

Objectives:

1. To acquaint the students with the Co-operative Movement.
2. To develop the capability of students for knowing different types of Co-operatives.

Unit No.	Name of the Topic	Periods
1.	Introduction: Origin and Growth of Co-operative Movement in the World- Cooperation in the post industrial revolution of Great Britain	12
2.	Co-operation in Social and Economic Systems: Co-operation in Capitalistic Systems- Co-operation in Socialistic System-Cooperation in Mixed Economy- International Cooperation. The International Cooperation Alliance (ICA)	12
3.	Co-operative Movement in the world: Co-operative Movement in the UK,USA,USSR. China, Japan and Israel.	12
4.	Role of Co-operative Movement in Global Economy: Impacts, Problems and Suggestions.	12
	TOTAL	48

List of Books Recommended for Study	
1.	G.S. Kamat: New Dimensions of Co-operative Management
2.	G.S. Kamat: Cases in Co-operative Management
3.	K.K.Taimani: Co-operative Organisation and Management
4.	I L O: Co-operative Management and Administration
5.	B.C. Mehta: Consumer Co-operation in India
6.	Prof L.P. Wakale and Dr. G.H.Barhate: Sahakari Vikas- Sheth Publishing Mumbai

M.Com. Part I Semester II
Co-operation and Rural Development Special Paper IV.
Subject Title :- Management of Co-operative Business
Course Code :- 210

Objectives:

1. To acquaint the students with the co-operative movement.
2. To develop the capability of students for knowing different types of Co-operatives.
3. To aware the role of state and central Govt. in development of co-operative sector.
4. To give basic knowledge about administration and management of Co-operatives.

Unit No.	Name of the Topic	Periods
1.	Co-operative Business Promotion: Problems of Economic and commercial viability-Services to members: Role of Co-operative department- Criteria for appraising performance of Co-operative Business: Organizational, Operational and financial-social responsibilities of Co-operative business- Industrial relation in Cooperative business.	12
2.	Business Policies and Practices (Managerial Evaluation) in following: 1. Sugar Co-operatives 2. Dairy Co-operatives 3. Credit Co-operatives 4. State Co-operative Bank 5. District Co-operative Bank 6. Primary Agricultural Credit Societies	12
3.	Success stories of Co-operative Institutions: • Anand Dairy Co-operatives Gujrat • Warana Co-operatives Organization, Warnanagar • Shamrao Viithal Co-operative Bank. • Gokul Sahakari Sangh, Kolhapur	12
4.	Problems of Co-operatives: a) Sugar Industry b) Agricultural and Non-agriculture Credit Co-operative. c) Dairy Co-operative d) Co-operative Banking	12
	TOTAL	48

List of Books Recommended for Study
1. G.S. Kamat: New Dimensions of Co-operative Management 2. G.S. Kamat: Cases in Co-operative Management 3. K.K.Taimani: Co-operative Organisation and Management 4. I L O: Co-operative Management and Administration 5. B.C. Mehta: Consumer Co-operation in India 6. Prof L.P. Wakale and Dr. G.H.Barhate: Sahakari Vikas- Sheth Publishing Mumbai

M.Com. Part I Semester II
Business Practices and Environment Special Paper III.
Subject Title :- Modern Business Practices
Course Code :- 211

Objective: To improve knowledge and understanding of students about chambers of commerce and trade, Associations, Public enterprises, Public utilities and Agri. business.

Unit No.	Name of the Topic	Periods
1	Organizations – Introduction, Importance, Objectives and functions of (1) Maharashtra Chamber of Commerce, Industries and Agricultural and their local branches (2) Maratha Chamber of Commerce, Industries & Agriculture (3) Indian Merchants Chamber. (4) Nagar Chamber of Commerce (Deccan) (5) Federation of Indian Chamber of Commerce and Industries (FICCI) (6) Confederation of Indian Industries (CII)	12
2	Public Enterprises and Public Utilities :- Objectives, functions and Organization of public Enterprises and Public Utilities - Management practices of Public enterprises in India - Efficiency – Autonomy and control of public Enterprises - Recent practices and policies in public Enterprises and Public Utilities- Before LPG & after LPG	12
3	Agricultural Business Practices :- Characteristics of Agricultural Business - Nature of Indian Agriculture – Government policies related to agricultural business - Problems and prospects of Agricultural Business - Agricultural Taxation policy. Agricultural products and Farms Services :- Nature and disposal of Agricultural by e-products - Farm waste - cost of recycling of farm waste.	12
4	Scheme of support for Women Entrepreneur in Maharashtra Maharashtra Rural Credit Programme: (1) Swarna Jayanti Gram Swarozgar Yojana (SJGSRY) (2) Swayamsidha Programe (3) Ramai Mahila Shakshamikaran (4) Rashtriya Sam Vikas Yojana (RSVY) (5) Krushi Saptak Yojana (6) Tribal Development Project (TDP) (7) Tejaswini Rural Women Empowerment Programme (8) Rajarshree Shahu Maharaj Swayamrozgar Yojana. Minority Women Empowerment Programme Mahila swavalamban nidhi (MSN) Problems of Small Scale Industries.	12

Recommended Books for study

1. Principles of Business Organization Acharya Govekar A.R , Sheth and Co
2. Principles of Practice of Marketing Mamoria, Joshi Kitab Mahal
3. Regulated Markets W. R. Natu
4. Marketing Co-Operative Way G.S. Kamat Maharastra state Co-op Union
5. Future Trading and Control Ram Desai
6. Bombay Money Market H.T.Y.B.A Parekh
7. Commodity Marketing and P.L. Gadgil Shubhada Sarswat, Distributive Trade Punc
8. Environment & Development : China & India

M.Com. Part I Semester II
Business Practices and Environment Special Paper IV
Subject Title :- Business Environment Analysis.
Course Code :- 212

Unit No.	Name of the Topic	Periods
1	Indian Industrial Environment - Growth of industries in public & private sectors in India, Co-operative sector in India - small and cottage industries. mergers and acquisitions. Foreign investment - Foreign Technology and MNCs Global Environment - Natural Social, Cultural, Demographic and Technological environment and its impact on World Trade.	12
2	Financial Environment of Business - Indian Money Market - Growth of capital Market in India - Financial Institutions - Role of Public, Private, and Co-operative Banks - Role of foreign banks and non Banking Institutions. Security Market :- Meaning, function, structure, constitution & management of Security Market.	12
3	Environmental Analysis- Meaning and importance - Techniques of Analysis, Verbal and Written Information, Search and scanning, Spying, Forecasting, Limitations of these techniques, Competitions analysis – Rivalry Amongst existing firms, threat of new entrants, treat of substitutes – Bargaining power of suppliers and buyers.	12
4	Selected Biography of Reliance Group of Industries Chordiya, Pravin Masale, Big Bazar founder Bhavarlal Jain	12

Recommended books for study

Global Economy and Business Francis Cheranilan Himalaya publishing house
Environment Text & Cases (Edn 2001)
Business Environment Chllaaghan, ELlison Edward Arnold
Economic Environment SYBA K Misha, Puri Himalaya publishing house of Business
Indian Business trough ages F1CCI Oxford University Press

Recommended Journals/Periodicals

1. Arth Vijnyan 2. The Economic Times 3. Economic and Political Weekly, ode: 203

M.Com. Part I Semester II
Business Administration Special Paper III.
Subject Title :- Business Ethics and Professional Values
Course Code :- 213

	No. of Lectures	Credit 04
Unit I Introduction Nature , concept and definition of term Business Ethics , Profession and Values, Indian Ethos, Ethics and Values – Work Ethos – Importance of Human Values. Guidelines of Socio Ethical System at General Level. Meaning of Social Ethics, Issues related to Socio Ethics Factors affecting Social Ethics.	12	01
Unit II –Indian Ethical Practices in A) Marketing and Advertising : B) Copy rights and Patents C) Employment D) Gender Discrimination E) Accounting Disclosures	12	01
Unit III Dilemmatic situations in Professional Ethics, Code of Ethics and conduct 1. Corporate Governance 2. Corporate Social Responsibility 3. Corporate Citizenship	12	01
Unit- IV Indian Approach to Business Ethics Gandhian Approach in Management and Trusteeship Gandhi's Doctrine of Satya and Ahinsa , Concept , importance and relevance of trusteeship Principle in Modern Business, Emergence of new values in Indian Industries after economic reforms of 1991.	12	01
	48	04
Books Recommended Reference Books 1.Wg- Cdr – B.R.Chavala , Swastik Publishers . 2.Management by Values 3.S.K.Chakraborti , Oxford University Press 4FOUNDATIONS to Managerial Work – Contribution from Indian Thought – S. K.Chakraborti , Himalaya Publications 5.A Study in Business Ethics Rituparna Raj 6.Ethics in Management S.A. Sherlekar , Himalaya Publication 7. Business Ethics and Corporate Governance S. K. Bhatia		

M.Com. Part I Semester II
Business Administration Special Paper IV.
Subject Title :- Elements of Knowledge Management
Course Code :- 214

	No. of Lectures	Credit 04
1. Introduction to Knowledge Management Process Knowledge management :- an integrated approach Meaning knowledge management, Difference between data, information, knowledge and wisdom, Early forms of Knowledge Management and Evolution of Knowledge Management	12	01
2. Organizational Learning Individual learning, Team learning, Drives of organizational learning, Organizational learning frameworks, Knowledge acquisition, Information distribution, Information interpretation, Organizational memory, Unlearning, Organizational routines	12	01
3. Knowledge Management Tools & Change Management Organizing knowledge tools, Capturing knowledge tools Evaluating knowledge sharing knowledge, Storing and presenting knowledge, The nature of change, Personal response to change, welcome and resistance, Leadership and, Change management strategies, Gaining commitment for change, Reward and recognition. Cultural change management, Politics of change	12	01
4. Knowledge Management Culture Understanding of organizational culture and climate Norms, artifacts and symbols, Value, beliefs, attitudes and assumption, Typologies of organizational culture, Measuring organizational cultural creating knowledge –sharing cultural stickiness.	12	01
	4	04

Books Recommended

Sr.No.	Author	Title	Publisher
01	Elias Award and Hassan Gazai	Knowledge Management	Pearson
02	Arpita Gopal and Chandranii Singh	E-world Emerging Education Pvt. Ltd.	
03	Amrit Tiwan	Knowledge Management Toolkit	Pearson Education Pvt.Ltd.
04	Bukowitz W R Williams R.I.	Knowledge Management Field Work	London Pearson Education
05	Egaallo C F	Building the Knowledge Management Network	Wiley Dream tech India Ltd
06	Pettigrew A , Whipp R	Change Management for Competitive Success	Infinity Books

M.Com. Part I Semester II
Advanced Banking & Finance Special Paper III
Subject Title :- Banking Law & Practices
Course Code :- 215

- 1. Introduction to Prevention of Money Laundering Act, 2002 :-** **12**
Provisions relating to: Preliminary (Section 1 and 2) Offence of money laundering (Section 3 and 4) Attachment, adjudication and confiscation (Section 5 and 11) Obligation of banking companies, financial institutions and intermediaries (Section 12 and 15) Summons, searches and seizures (Section 16 and 24) The RBI guidelines, Money Laundering Act Post 2002
- 2. Banker customer relationship :-** **12**
Definition of a banker and a customer Banker customer relationship as debtor-creditor, agent-principal and trustee-beneficiary Features of the relationship Banker's duty of secrecy of customers' accounts: Credit Information Bureau of India limited Right of set off, Garnishee order, Law of limitation, Termination of relationship, Role of Banking Ombudsman Customer's service: Goiporia Committee Norms, Damodaran Committee Recommendations
- 3. Asset - Liability Management :-** **12**
Definition of assets and liabilities, Asset liability mismatches on the grounds of locations, maturity, return and currency Risks while managing the assets and liabilities: Liquidity risk, Interest rate risk, Pre-mature withdrawal and pre-payment risk, Price Risk, Foreign exchange and sector based risk, Strategies to manage these risks, RBI guidelines for asset and liability management. Management of loan portfolio with special reference to Non Performing Assets (NPAs): Definition of NPA, Income Recognition and Asset Classification Norms (IRAC Norms) Strategic approach in reduction of nonperforming assets Management of investment Portfolio- Regulatory aspects, Overview of Basel I and II
- 4. Hi-tech banking and Mergers and Acquisition in banking sector :-** **12**
Role and uses of Technology up gradation- Impact of Technology on Banks-Protecting the confidentiality and secrecy of data, Meaning of Merger and Acquisition: Recent cases of mergers and acquisition in Banking sector of India - Consolidation of Banks.

TOTAL 48

List of Books and Journals

1. Tannan's 'Banking', Law and Practice in India Banking
2. P.N. Varshney, Banking: Law and Practice
3. Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services
4. All relevant and recent Bare Acts, Indian Institute of Bankers: Laws and Practices relating to banking
5. All journals published by Indian Institute of Banking and Finance
6. Indian Banking Associations Bulletin
7. RBI Bulletin
8. Indian Institute of Banking and Finance, Principles and Practices of Banking, Macmillan Publisher India Ltd.

M.Com. Part I Semester II
Advanced Banking & Finance Special Paper IV
Subject Title -: Monetary Policy
Course Code -: 216

- 1. Money supply measures :-** **10**
Money supply measures of the Reserve Bank of India
Concept of High powered money
Recommendations of the Working Group on 'Money Supply :
Analytics and methodology of compilation (Chairman : Dr. Y.V.Reddy), 1998
□ □ □ Money supply and price stability.
- 2. Monetary management** **10**
Objectives of monetary policy: Price stability, Generation of employment, Exchange Rate Stability, Balanced growth etc., conflict between objectives.
- 3. A) Instruments of monetary policy :-** **10**
-Mechanism and effectiveness of following instruments.
i) Quantitative Instruments: Variations in Bank Rate, Open Market Operations and Variable Reserve Ratio
ii) Qualitative Instruments: Margin Requirements, Credit Rationing, Moral Suasion, Direct Action, Publicity
B) A review of monetary policy of the Reserve Bank of India in the last five Years - Recent policy changes announced by the R.B.I.
- 4. Development and promotional role of the Reserve Bank of India in Financial Inclusion and its implications.** **10**
1. R.B.I. and rural credit: priority sector advance, regional rural banks, development of Farm sector and non-farm sector.
2. R.B.I. and industrial finance: establishment of institutional, lending policy for Commercial banks, coordination between term lending institutions, bridge loans, Rehabilitation of sick industrial units.
3. R.B.I. and export credit: pre-shipment credit, post-shipment credit, measures to Promote Exports.

TOTAL 48

Recommended books/ Journals

1. Reserve Bank of India functions and working (latest edn.) R.B.I.
2. Monetary Economics for India, Dr. Narendra Jadhav
3. Central Banking for emerging market economies, A. Vasudevan
4. Monetary and Financial Sector Reforms in India: A central banker's perspective, Dr. Y.V. Reddy
5. Indian Economy: Essays on money and finance, Dr. C.Rangarajan.
6. Reserve Bank of India Bulletin
7. Annual Report on Trend and Progress of Banking in India

M.Com. Part I Semester II
Advanced Marketing Special Paper III
Subject Title :- Customer Relationship Management & Retailing
Course Code :- 217

Objectives : To impart knowledge regarding customer relationship management, & retailing techniques, process and tools and develop an understanding of the CRM & retailing functions techniques and strategies

Unit No.	Name of Topic	Periods
1	CRM An Introduction: Evolution of Relationship as a Marketing tool, Emergence of CRM Practice/ Factors responsible for the growth of CRM . CRM Cycle, Importance of CRM	08
2.	Emerging CRM Customer Retention Management, Reasons for Customer Switching and Strategies for Retention Customer Recall Management, Customer Recall Strategies CRM a Cost benefit analysis. CRM Benefit, CRM Cost and CRM Value	08
3	CRM and I.T eCRM an I.T Tool, e CRM in Business, Features of e- CRM Technologies of E CRM Important CRM Softwares—Oracle, Clarify, People Soft and My Sap CRM. Applications of e CRM	08
4.	Latest Development in CRM : Changing Roles of CRM , Customer Experience Management, Customer Profitability, Customer Classification based on Profitability, Customer Profitability as a strategic Management Tool, Customer Profitability and company Value, Customer Experience Management and Customer Profitability Management, Customer Lifetime Value	08
5	CRM Implementation Issues Challenges of CRM Implementation, Essentials of CRM Principle, Customer Satisfaction, Importance of Customer Satisfaction, Customer Expectation, Customer Perception	08
6	People factor in CRM— Customer Centric Organisational Structure Employee Organisation Relationship Employee Customer Orientation	08
	Total	48

Books Recommended

1. Strategic Marketing Management - David Aaker
2. Customer Relationship Management – Jaddish Seth, Parvaityar, Shainesh
3. Handbook of Relationship Marketing – Jagdish Sheth, Atul Parvatiyar
4. Leading Through Relationship Marketing – Richard Batterley
5. Relationship Marketing – S. Shajahan
6. Customer Relationship Management – Jagdish Seth., Atul Parvatiyar, G. Shainesh
7. Retail Management – Gibson Vedamani
8. Channel Management & Retail Marketing – Meenal Dhotre
9. Retail Marketing Management – David Gilbert
10. Retailing Management – Swapna Pradhan
11. Retail Management – Ron Hasty & James Rear don
12. Retail Marketing Management – Swapna Pradhan

M.Com. Part I Semester II
Advanced Marketing Special Paper IV.
Subject Title :- Services Marketing
Course Code :- 218

Objective :

To impart knowledge regarding services marketing, process and tools and develop understanding of the services marketing functions techniques and strategies

Unit No.	Name of Topic	Periods
1	Introduction: Definition and character of Services. Origin of Services Marketing. Types of Services./ Classification of Services. Difference between goods and services . Reasons for growth of Service Sector	08
2	Understanding Customer Needs related to services, , The Purchase Process for Services , The Service Offering , How Customers Evaluate Service Performances Understanding Customer Behaviour at Different Points in the Service Experience ,Customer Expectations in Services Customer Perceptions in Services	08
3	Product Mix and Services Marketing , Price Mix and Services Marketing . Physical Distribution/ Place Mix and Services Marketing.	08
4	Physical Evidence and Services Marketing , People and Services Marketing , Process and Services Marketing. Use of Marketing by service firms, Problems and Strategies in Services Marketing, The Financial and Economic Impact of Service	08
5	Organising for Service Leadership -- Service Leadership , Inter functional Conflict , Ensuring that Service Encounters are Customer-Oriented Listening to Customers through Research	08
6	CRM and Services CRM practices in Indian Service Businesses: Banking and Finance: recent customer service initiatives in the Banking Industry, Customer involvement in Banking, Customer centric communication in banks. Hospitality Industry: Customer Centric initiatives by Hotels , Customer Issues in hospitality industry, Aviation Industry: Customer Service initiatives by aviation sector	08
Total		48

Books Recommended
1. Services Marketing - Zeithaml & Bitner 2. Services Marketing: Integrating Customer Focus Across the Firm – Valarie A. Zeithaml 3. Services Marketing - Christopher Lovelock 4. Service Marketing - Rampal & Gupta 5. Essence of Services Marketing - Ardian Payne 6. Services Marketing - S.M.Jha 7. Services Marketing - Helen Woodruffe

University of Pune

Three Year B. Sc. Degree Course in

BIOTECHNOLOGY

F.Y.B.Sc. BIOTECHNOLOGY

Syllabus

(To be implemented from Academic Year 2013-14)

Preamble:

Biotechnology, being one of the youngest branch of Life Science, has expanded and established as advanced interdisciplinary applied science. The study of Life itself is at the core of it and the interdisciplinary networking potential of biotechnology has given it a separate status in fundamental research as well as in modern industrial enterprise. Global and local focus has slowly shifted to not only current “Century of Knowledge” but also on to technology development and application in life sciences. In the milieu of research and industrialization for economic development and social change, biotechnology is an ideal platform to work.

The interdisciplinary nature of biotechnology integrates living systems including animal, plant and microbes and their studies from molecular biology to cell biology, from biochemistry to biophysics, from genetic engineering to stem cell research, from bioinformatics to genomics-proteomics, from environmental biology to biodiversity, from microbiology to bioprocess engineering, from bioremediation to material transformation and so on. The relevance and application of these studies on living organisms and their bioprocesses is extensively covered in this field with the help of technology. Green revolution and white revolution was possible in India thanks to the deeper and intrinsic understanding of biotechnology.

Economic and social renaissance is staged on biotechnology especially, since it’s biomedical and cutting edge technological applications are tremendously powerful in shaping this century and exciting future.

Biotechnologists are always in demand as an efficient work force in fundamental research and industries. Education and research sectors require such interdisciplinary trained workforce to develop future generations of science leaders. Career opportunities for graduate students are created and expanding at the biotechnology parks and in manufacturing industries, teaching, research institutes and IT industry.

Introduction:

The syllabi till today had been sufficient to cater to the needs of students for building up their careers in industry and research. However, with the changing scenario at local and global level, we feel that the syllabus orientation should be altered to keep pace with developments in the education and industrial sector. The need of the hour is to design appropriate syllabi that emphasize on teaching of

technological as well as the economical aspects of modern biology. Theory supplemented with extensive practical skill sets will help a graduate student to avail the opportunities in the applied fields (research, industry or institutions) , without any additional training. Thus, the university / college itself will be developing the trained and skilled man-power.

Biotechnology being an interdisciplinary subject, this restructured syllabus will combine the principles of physical, chemical and biological sciences along with developing advanced technology.

Biotechnology curricula are operated at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart primarily basic knowledge of the respective subject from all possible angles while postgraduate syllabus emphasizes on more applied courses. In addition, students are to be trained to apply this knowledge particularly in day-to-day applications of biotechnology and to get a glimpse of research.

Objectives to be achieved:

- To introduce the concepts in various allied subjects
- To enrich students' knowledge
- To help the students to build interdisciplinary approach
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help students build-up a progressive and successful career

Eligibility

1. First Year B.Sc.:

Higher Secondary School Certificate (10+2) or its equivalent Examination with English and Biology; and two of the science subjects such as Physics, Chemistry, Mathematics, Biotechnology.

2. Second Year B.Sc.:

Students are not directly admitted to second year of B.Sc. for Biotechnology course. Those who complete first year biotechnology course are promoted to second year.

3. Third Year B. Sc.:

Students are not directly admitted to third year of B.Sc. for Biotechnology course. Those who complete first year Biotechnology course and completed Second year examination with due A.T.K.T are promoted to Third year B.Sc. course

Reservation and relaxation will be as per the Government rules.

Standard of Passing

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 marks must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 40% marks in each course of each semester. (Minimum 40% must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 in each course. (Minimum 40% marks must be obtained in the University Examination.)

Award of Class

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the Principle subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

A.T.K.T. Rules

While going from F. Y. B. Sc. to S. Y. B. Sc. at least 8 courses (out of total 12) should be cleared; **however all F. Y. B. Sc. courses should be cleared while going to T. Y. B. Sc.**

While going from S. Y. B. Sc. to T. Y. B. Sc., at least 12 courses (out of 21) should be cleared (Practical Course at S. Y. B. Sc. will be equivalent to 2 courses).

Equivalence of Previous Syllabus

No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus ??.

External Students

There shall be no external students.

University Terms

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.

Course Structure:

Duration: The duration of B.Sc. (Biotechnology) Degree Program shall be three years.

Medium of Instruction: The medium of instruction for the course shall be English.

To accommodate more advanced topics in the syllabi, it is necessary to build the basic science knowledge at the level of first year of students those who have chosen the Biotechnology discipline. Curricula of courses of state and central boards of higher secondary level were reviewed to avoid repetitions of introductory subjects.

At **first year of under-graduation**, students will be given the basic information that includes – all basic science subjects like chemistry, physics, plant and animal sciences, microbiology, computer, statistics and mathematics. Relevant experimentation on these topics are included in practical course which include study of all forms of life, plants, animals and microorganisms for their morphological and structural characterization. Practical exercises include chemical and biochemical analysis. Students will also learn biostatistic principles and use of computers for data analysis and interpretation. In practical course, students will be trained in preparing **laboratory manuals**, standard operating practices and log books.

At **second year under-graduation**, students will be introduced to different areas necessary to form the basis of biotechnology like genetics, immunology, molecular biology, cell biology, animal and plant development, environmental biotechnology. They will also be introduced to scientific writing and communication skills. The relevant practicals are included to enrich their knowledge.

At **third year under-graduation**, six theory papers are divided into two semesters which deal with broad applied areas of Biotechnology .

F. Y. B. Sc. Biotechnology

Course Code	Theory/ Practical	Marks	Lecture/ Practical per year
Bb- 101 Fundamentals of Chemistry	Theory	100	90L
Bb- 102 Fundamentals of Physics	Theory	100	90L
Bb- 103 Basics of plant and animal sciences	Theory	100	90L
Bb- 104 Mathematics & Statistical Methods for Biologists	Theory	100	90L
Bb- 105 Fundamentals of Biological Chemistry	Theory	100	90L
Bb- 106 Biophysics & Instrumentation	Theory	100	90L
Bb- 107 Microbiology	Theory	100	90L
Bb- 108 Computers and applications	Theory	100	90L
Bb- 109 Practicals in Chemistry & Biochemistry	Practical	100	30P
Bb- 110 Techniques in Physics, Biophysics & Instrumentation	Practical	100	30P
Bb- 111 Laboratory Exercises in Biosciences	Practical	100	30P
Bb- 112 Quantitative Methods in Biology	Practical	100	30P

Examination Pattern

Theory paper:	University Examination – 80 marks (at the end 2 nd term) Internal Examination – 20 marks
Practical course:	University Examination – 80 marks (at the end of 2 nd term) Internal Examination – 20 marks

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 line and based on entire syllabus, all compulsory questions
Question 2 and 3	4 out of 6– short answer type questions; answerable in 6 – 8 lines, each of 4 marks
Question 4	2 out of 4 – long answer type questions; answerable in 15-20 lines, Each 8 marks
Question 5	1 out of 2 – long answer type questions; answerable in 20-25 lines, Each 16 marks

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. There shall be 20 questions, each question of 0.5 marks.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of minimum 4 hours duration. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments. Certified journal is compulsory to appear for practical examination. There shall be two experts and two examiners per batch for the practical examination.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

S. Y. B. Sc. Biotechnology

Course Code	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb- 211 A Genetics & B Immunology	Theory	75 25	45L 15L
Bb- 212 Cell Biology	Theory	100	60L
Bb- 213 Environmental Biology and Biotechnology	Theory	100	60L
Bb- 214 Practicals in Environmental Biotechnology	Practical	100	30P
Bb- 215 Practicals in Cell Biology & Genetics	Practical	100	30P
Semester II			
Bb- 221 Molecular biology	Theory	100	60L
Bb- 222 Animal and Plant development	Theory	100	60L
Bb- 223 Scientific writing and communication	Theory	50	30L
Bb- 224 Metabolic Pathways	Theory	50	30L
Bb- 225 Practicals in Molecular biology	Practical	100	30P
Bb- 226 Practicals in Developmental biology	Practical	100	30P

Examination Pattern

- Theory paper: University Examination – 20/40/60/80 marks (at the end of each semester)
Internal Examination – 5/10/15/20 marks
- Practical course: University Examination – 80 marks (at the end of each semester)
Internal Examination – 20 marks

Theory examination will be of two/three hours duration for theory course.

The pattern of question papers for 80 marks shall be:

- Question 1 10 sub-questions, each of 2marks; short answers based on entire syllabus, all compulsory
- Question 2 and 3 3 out of 4 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
- Question 4 and 5 1 out of 2 sub-questions, each of 15 marks; long answer type questions; answerable in 20 – 25 lines

The pattern of question papers for 60 marks shall be:

- Question 1 10 sub-questions, each of 2marks; short answers based on entire syllabus, all compulsory
- Question 2 and 3 3 out of 4 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
- Question 4 1 out of 2 sub-questions, each of 10 marks; long answer type questions; answerable in 15 – 20 lines

The pattern of question papers for 40 marks shall be:

Question 1	5 sub-questions, each of 2 marks; short answers based on entire syllabus, all compulsory
Question 2	4 out of 6 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
Question 3	1 out of 2 sub-questions, each of 10 marks; long answer type questions; answerable in 15 – 20 lines

The pattern of question papers for 20 marks shall be:

Question 1	5 sub-questions, each of 2marks; short answers based on entire syllabus, all compulsory
Question 2	2 out of 4 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10/20 marks each semester. The written test shall comprise of objective type questions– Multiple Types Questions, True/False, computational problems with minimum calculations etc. Different sets of question papers may be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical

Examination:

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

T. Y. B. Sc. Biotechnology

Course Code	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb- 331 Microbial Biotechnology	Theory	100	60L
Bb-332 Plant and animal tissue culture	Theory	100	60L
Bb- 333 Biodiversity & Systematics	Theory	100	60L
Bb-334 Tissue culture techniques	Practical	100	30P
Bb- 335 a Practicals in Microbial biotechnology b Practicals in Field studies and report writing	Practical	75 25	24P 06P
Semester II			
Bb-341 Large scale Manufacturing process	Theory	100	60L
Bb- 342 Biochemical and biophysical techniques	Theory	100	60L
Bb- 343 Recombinant DNA Technology	Theory	100	60L
Bb -344 Techniques in Genetic Engineering	Practical	100	30P
Bb- 345 a Practicals of large scale manufacturing process b Practicals in biochemical and Biophysical techniques	Practical	50 50	15P 15P

Examination Pattern:

80% of total marks for University examination and 20% of total marks for Internal Examination for both, theory and Practical, courses.

Theory examination will be of two hours duration for each theory course.

The pattern of question papers for 80 marks shall be:

- Question 1 10 sub-questions, each of 2marks; short answers based on entire syllabus, all compulsory
- Question 2 and 3 3 out of 4 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
- Question 4 and 5 1 out of 2 sub-questions, each of 15 marks; long answer type questions; answerable in 20 – 25 lines

The pattern of question papers for 40 marks shall be:

- Question 1 5 sub-questions, each of 2 marks; short answers based on entire syllabus, all compulsory
- Question 2 4 out of 6 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
- Question 3 1 out of 2 sub-questions, each of 10 marks; long answer type questions; answerable in 15 – 20 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each semester. The written test shall

comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. Different sets of question papers may be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical Examination: Practical examination will be of minimum 6 hours duration, carried over on three subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments per practical course. Certified journals are compulsory for appearing for practical examination. There shall be two experts for each practical course and two examiners per batch; one of the examiners will be external.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the

Eligibility criteria for appointment of teachers in biotechnology:

Minimum postgraduate degree in Microbiology/Zoology/Botany/Health Science/Environmental Science/ Biotechnology/Biochemistry or other equivalent branch of Life Science and qualified as per UGC regulations.

For subjects other than Life Sciences , appropriate faculty inputs from respective Departments may be sought or if required independent faculty members may be appointed as per the UGC rules.

Course structure: First Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Bb- 101 Fundamentals of Chemistry	Theory	100	90L
Bb- 102 Fundamentals of Physics	Theory	100	90L
Bb- 103 Basics of plant and animal sciences	Theory	100	90L
Bb- 104 Mathematics & Statistical Methods for Biologists	Theory	100	90L
Bb- 105 Fundamentals of Biological Chemistry	Theory	100	90L
Bb- 106 Biophysics & Instrumentation	Theory	100	90L
Bb- 107 Microbiology	Theory	100	90L
Bb- 108 Computers and application	Theory	100	90L
Bb- 109 Practicals in Chemistry and Biochemistry	Practical	100	30 P
Bb- 110 Practicals in Physics, Biophysics and Instrumentation	Practical	100	30 P
Bb- 111 Practicals in Biosciences	Practical	100	30 P
Bb- 112 Quantitative Methods in Biology	Practical	100	30 P

Course structure: Second Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb- 211 A Genetics & B Immunology	Theory	75 25	45L 15L
Bb- 212 Cell Biology	Theory	100	60L
Bb- 213 Environmental Biology and Biotechnology	Theory	100	60L
Bb- 214 Practicals in Environmental Biotechnology	Practical	100	30P
Bb- 215 Practicals in Cell Biology & Genetics	Practical	100	30P
Semester II			
Bb- 221 Molecular biology	Theory	100	60L
Bb- 222 Animal and Plant development	Theory	100	60
Bb- 223 Scientific writing and communication	Theory	50	30L
Bb- 224 Metabolic Pathways	Theory	50	30L
Bb- 225 Practicals in Molecular biology	Practical	100	30 P
Bb-226 Practicals in Developmental biology	Practical	100	30 P

Course structure: Third Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb-331 Microbial Biotechnology	Theory	100	60L
Bb-332 Plant and animal tissue culture	Theory	100	60L
Bb- 333 Biodiversity & Systematics	Theory	100	60L
Bb-334 Practicals in Tissue culture	Practical	100	30P
Bb- 335 A Practicals in Microbial biotechnology B Practicals in Field studies and report writing	Practical	75 25	30P
Semester II			
Bb-341 Large scale Manufacturing process	Theory	100	60L
Bb- 342 Biochemical and biophysical techniques	Theory	100	60L
Bb- 343 Practicals in Recombinant DNA Technology	Theory	100	60L
Bb -344 Techniques in Genetic Engineering	Practical	100	30P
Bb- 345 A Practicals of large scale manufacturing process B Practicals in biochemical and Biophysical techniques	Practical	50 50	30P

Bb-101 Fundamentals of Chemistry (90L)

Sr. No.	Topic	Lecture
1	Gaseous State: Kinetic theory of gases, and deviation of kinetic gas equation, Deduction of gas laws such as Boyle's law, Charles's law, Graham's law of diffusion. Avogadro's principle, velocity of gas molecules, kinetic energy of translational motion. Dalton's law of partial pressure.	3
2	Chemical Kinetics – Order-molecularity. First and second order-nth order rate equation, temp dependence of rate of reactions, collision theory.	7
3	Colligative properties; lowering of vapour pressure of solvent, elevation of boiling point, freezing point lowering of solutions, Osmosis and osmotic pressure, relation of osmotic and vapour pressure, Van't Hoff equation for osmotic pressure. Electrolytes, Arrhenius theory for dissociation of electrolytes, Debye Huckel theory of inter-	10
4	Phase Rule: Gibbs phase rule, One component/two component systems, determination of solid liquid equilibrium, determination of nature of solid phases, Classification of two-component solid-liquid equilibrium, simple eutectic diagram.	13
5	Ionic equilibrium: Electrolytic conductance, Faraday's Law of electrolysis, transference and transference numbers, variation of conductance with concentration, effect on infinite dilution and other factors on conductance, inter- ionic attraction theory of conductance, conductometric titration, activity coefficients and their determination, Debye-Huckel theory of activity coefficients, ionization constants of weak acids and bases, pH, buffers, solubility products, salt effects and solubility.	12
6	Principles of electrochemistry: EMF and its measurements, single electrode potentials, calculation of single electrode potentials, thermodynamics of electrode potentials, classification of electrodes, amalgam, gas, metal/insoluble salt and oxidation- reduction electrodes, electrochemical cells, the junction potentials, solubility product and EMF potentiometric determination of pH, potentiometric titrations.	18

7	Basics of stereochemistry:	12
	1. Representation of molecules a. Projection formulae. b. Sawhaorse Newman, Fisher formula 2. Conformation isomerism a. Conformation of isomersb. 'C'rotation about C-C bond, b. Propane, Ethane, Butane. c. Relative stability 3. Optical Isomerism a. Optical isomers b. Isomeric number and tetrahedral carbon atom c. Reduction of optical activity d. Plane of activity –simple plane, Centre of symmetry, Alternating axes of symmetry, Properties, Racemic modification 4. Geometrical isomerism a. Open chain molecule b. Condition of geometric isomer c. Cis-trans and E-Z nomenclature]	
8	Chemical bonding-various theories, covalent, hydrogen bonding and other weak interactions Atomic chemistry-electromagnetism. Principles of oxidation-reduction	6
9	Basics in organic chemistry- Nomenclature, Hydrocarbons, alcohols, amines, alkyl indices Conformation of alkanes; alkyl halides, alcohols, ethers, amines Cycloalkanes. Oxidations, reductions, eliminations, addition and substitution reactions Synthesis of small molecules Quantitative structure-activity relationships (QSAR)	9

Reference Books:

1. University General Chemistry , 1st edition (2000), C.N. R. Rao, Macmillan Publishers, India ,
2. Principles of Physical Chemistry, 4th edition (1965), S.H. Maron and C.F. Prutton, Collier Macmillan Ltd
3. The elements of Physical Chemistry, 5th edition (2009), Atkins P, de Paula J , W. H. Freeman Publication, USA
4. An Introduction to Electrochemistry , edition reprint, 2011, Samuel Glasstone, BiblioBazaar, USA
5. Physical Chemistry for biological sciences, 1st edition, (2005), Chang R., University Science Books, USA
6. Physical Chemistry, 1st edition, (2003) David Ball, Thoson Learning, USA.

7. Essentials of Physical Chemistry, 24th edition, (2000), B S Bahl, G D Tuli, Arun Bahl, S. Chand Limited, India.
8. Concise Inorganic Chemistry . 5th edition (2008), Author: J. D. Lee, John Wiley & Sons, USA.
9. Organic Chemistry, 6th edition, (1992), Morrison Robert Thornton, Pearson Publication, Dorling Kindersley (India Pvt. Ltd.)
10. Guide book to Mechanism in Organic Chemistry by Peter Sykes, 6th edition, (1996), Prentice Hall, India.

Bb-102 Fundamentals of Physics (90L)

Sr. No.	Topic	Lectures
1	Interrelationship between Physics and Life sciences	2
2	Measurements: Physical quantities, standards and units: Length: radius of proton to size to astronomical distances. Mass: atomic mass unit to mass of earth. Time: time for fast elementary particle to pass through nucleus to age of earth. Electric current. Thermodynamic temperature. Amount of substance. Luminous intensity. International systems and units: Units for measuring physical quantities and their inter-conversion.	6
3	Elasticity: Stress and strain in solids, Hook's law, Stress-strain curves, Limit of elasticity. Relevance of elasticity to life sciences	3
4	Fluid Statics: Fluids: Definition, Pressure and Density. The variation of pressure in a fluid at rest. Pascal's Principle. Measurement of pressure. Various units of pressure and their inter-conversion.	6
5	Fluid Dynamics (Viscosity): Streamline and turbulent flow (definition and explanation). Equation of continuity. Flow of liquids through capillaries. Poiseulles equation: Derivations and physical significance. Reynolds number: Physical significance. Concept of pressure energy. Bernoulli's theorem and its applications- Venturi meter and Pitot's tube. Viscosity estimation by Oswald's viscometer. Relevance to life sciences.	10
6	Surface tension: Surface tension and surface energy: Definition, concept and derivation. Capillary action. Angle of contact. Wettability. Temperature dependence of surface tension. Relevance to life sciences and applications.	8
7	Sound Waves : Types of waves (Longitudinal and transverse wave). Principles of superposition. Audible, ultrasonic and infrasonic waves. Vibrating systems and source of sound. Beats. The Doppler effect. Applications in life sciences.	10
8	Heat: A form of energy. Quantity of heat and specific heat. Molar heat capacity of solid. Concept of temperature. Thermal equilibrium – zeroth law of thermodynamics. Measuring temperature. International practical temperature scale.	5
9	Thermodynamics and real gases: Mechanical equivalent of heat. Heat and work. First law of thermodynamics: Mathematical form and limitations, applications. Indicator diagram and concept of cyclic process. Second law of thermodynamics. Concept of entropy with examples. Carnot cycle and its efficiency: Four steps involved, Efficiency. Van der Waals equation of state, Critical constants. Liquefaction of gases: Concepts used in refrigerator.	10
10	Refrigeration: Introduction to refrigeration principle: Difference between Heat Engine and Refrigerator with the help of Carnot cycle. Adiabatic and isothermal process. Coefficient of performance. Conditions for good refrigerant.	6
11	Optics: Properties of light: Reflection, refraction, dispersion, diffraction, Interference and Polarization. Concept of polarization. Lasers: Stimulated emissions, Optical pumping, Concept of population inversion, Laser action. Applications of Laser.	8

12	Charge and Matter: Electromagnetism – preview, Electric charge. Conductor, Semiconductor and Insulator. Coulomb’s law. Charge is quantized. Charge and matter. Charge is conserved. Electricity with minimum 3 examples.	8
13	Magnetism: The magnetic field. The definition of B. Poles and dipoles. Gauss’ law of magnetism. Magnetism of earth. Paramagnetism. Diamagnetism. Ferromagnetism. Nuclear magnetism. Biomagnetism with minimum 3 examples.	8

Reference Books :

1. Fundamentals of Physics. 9th edition. (2010). David Halliday, Robert Resnick, Jearl Walker John Wiley & Sons, USA.
2. Perspectives of modern physics. Digitized edition (2007) Arthur Beiser, Mc Graw Hill, USA
3. Heat and thermodynamics. 7th edition (1996). Zemansky Mark. Mc Graw Hill, USA
4. Fundamentals of optics. 3rd edition digitized (2009) Francis Arthur Jenkins, Harvey Elliott White. Mc Graw Hill, USA
5. Solar Energy- Principles of thermal collection and storage. 3rd edition (2008) Suhas Sukhatme and J P Nayak. Tata Mc Graw Hill, India.
6. Digital principles and applications 2nd edition (1975) Donald Leach, Albert Malvino, Tata Mc Graw Hill, USA
7. Introduction to atomic spectra. (1934) H.E. White, Mc Graw Hill, USA

Note: Students have learned most of the topics from this course at 10+2 level, but they need better understanding to apply or realize the relevance of these concepts with life, which is necessary while learning biotechnology. Teacher must highlight and emphasize the applications or relevance of Physics concepts in life science.

Bb- 103 Basics of Plant and animal sciences (90L)

Sr. No.	Topic	Lectures
	Plant Sciences	
1	Plant as a life form- General & Unique features of plants as a category of living organisms	1
	Introduction to plant groups and their characters with respect to increasing complexity in organization of plant body (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms with one example each) (Excluding plant taxonomy)	6
2	Major aspects of plant sciences a) Structural Morphology of vegetative and reproductive plant organs Plant cell biology – Unique features of a plant cell, Cell wall Anatomy – Internal organization of vegetative and reproductive plant organs (leaf, shoot, root and flower) b) Functional i) Permeability Diffusion – Definition, significance, mechanism, laws and factors affecting diffusion Osmosis – Definition, mechanism, significance, osmotic pressure (OP), types of osmosis – endosmosis, exosmosis, turgor pressure (TP) and wall pressure (WP), relation between OP, DPD (Suction pressure) and TP ii) Absorption and adsorption of water Ascent of sap – Introduction and mechanism (Capillarity, Imbibition, Atmospheric pressure and Cohesion-tension) iii) Major pathways in plant metabolism- photosynthesis and respiration iv) Nutrition: Essential nutrients for growth and development of plants and their roles v) Photo-biology: Metabolism, movement and photo-morphogenesis (vegetative) vi) Introduction to physiology of flowering: a) photoperiodism and b) vernalisation vii) Plant growth regulators and their role	 2 2 5 2 2 4 2 2 4 4 3 2 4

	Animal Sciences	
Sr. No.	Topic	Lecture
1	Introduction to Kingdom Animalia,- Outline classification of non-chordates and chordates with representative examples. Animal Tissues (Histology)-Introduction and Types with examples Animal Physiology 1.Blood pigments: Role in oxygen transport, Oxygen dissociation curves and their physiological significances, Transport of CO₂ 2.Chemical communication: Various types of communication systems with an emphasis on endocrine hormones and their action (Pituitary and Adrenal glands) 3. Neuroanatomy and Neurophysiology 4. Type Study : Chordate : Frog / Toad (Anatomy and Physiology : Circulatory System (Heart, Arterial, Venous and Portal Systems), Lymphatic system, Nervous System (CNS, PNS, ANS), and Sense Organs , Musculoskeletal System , Urinogenital System, Endocrine and Reproductive system 5. Type Study : Non-chordate Honeybee: <i>Apis sp.</i> (Morphology , Mouthparts, Sting Apparatus, Structure of Head , Social Organization , Communication in Bees, Apiculture	4 6 8 5 8 4
2	Parasitology 1.Study of <i>Plasmodium sp.</i> 2. Study of <i>Fasciola hepatica</i> 3. Study of <i>Taenia sp.</i>	5
3	Economic Zoology 1. Vermiculture 3. Aquaculture 4. Sericulture	5

Reference books:

1. Jordan, E.L. and Verma P.S. 1978, (i) Chordate Zoology S. Chand & Company Ltd. Ram Nagar. New Delhi.
2. Jordan, E.L. and Verma P.S. 1978 (ii) Invertebrate Zoology. S. Chand & Company Ltd. Ram Nagar. New Delhi.
3. Modern Text Book of Zoology: Invertebrates., R.L.Kotpal. Publisher, Rastogi Publications, 2012.
4. Economic Zoology, Shukla & Upadhyaya, 4th Edition., Rastogi Publications, 2009.
5. Modern Parasitology: A Textbook of Parasitology, 2nd edition, (1993) F. E. G. Cox, Wiley & Sons, USA
6. Sericulture: www.csb.gov.in/publications/books by Central Silk Board, Ministry of Textiles - Govt of India
7. Devlin R.M. (1983) - Fundamentals of Plant Physiology (Mac. Millan, New York)
8. Dutta A.C. (2000) A Classbook of Botany (Oxford University Press, UK)
9. Kumar H.D. (1999) Biodiversity and sustainable conservation (Oxford & IBH, New Delhi)
10. An introduction to embryophyta, 5th edition (1972), Parihar N.S. (Central Book Depot, New Delhi)
11. Lawrence G.H. (2012) Taxonomy of vascular plants (Scientific Publ,)
12. Esau K. (1977) Anatomy of seed plants (Wiley, USA)
13. Cutler, Botha & Stevenson (2007) Plant anatomy: an applied approach (Blackwell Sci, USA)
14. Ganguli, Das Dutta (2011) – College Botany Vol I, II and III (New Central Book Agency, Kolkata)

Bb- 104 Mathematics and Statistical Methods for Biologists (90L)

Sr.No.	Topic	Lectures
	First Term – Mathematics	(45L)
1	Pre-requisites: Sets, Number system (in brief) Matrices: Definition, types of matrices, addition, multiplication of matrices, inverse of a matrix Limits, differentiation, integration Graphs of standard functions:- X , X^2 , X^3 , $1/X$, $\log_a X$, e^X	3
2	Complex numbers :- addition, subtraction, multiplication, division, De-Moivre's theorem, finding roots of polynomial equation	5
3	Sequences and series :- definition of convergent, divergent and oscillatory sequence. Following results without proof. (i) A monotonic increasing sequence bounded above is convergent. (ii) Geometric sequence $\{a_n\}$ is convergent if $-1 < r < 1$ Definition of convergent, divergent, oscillatory series Convergence of i) geometric series, ii) P-series (without proof) Tests of convergence i) comparison test, ii) D'Alembert's ratio test (limit form), iii) Cauchy's root test (limit form)	10
4	Partial Differentiation :- Maxima and minima (up to 2 variables) Rules of partial differentiation Higher order partial derivatives	3
5	Differential equations:- Homogeneous and non-homogeneous differential equations, exact d.e. (including integrating factor). Linear differential equation. Applications to growth and decay, law of cooling	6
6	Matrices and system of linear equations, row echelon form, rank of a matrix, homogeneous and non-homogeneous systems $AX = B$, consistency, gaussian elimination method.	6
7	Vector spaces :- $\mathbb{R}^n$ and $M_{m \times n}(\mathbb{R})$, subspace of a vector space, linear dependence of vectors, eigenvalues and eigenvectors, diagonalization	12

	Second Term – Statistics	(45L)
1	Introduction to statistics with scope in biosciences (examples) Statistics as statistical data : various types of data (Raw data, grouped data) Representation of data using frequency distribution diagram (Simple/Multiple/Subdivided bar diagram, Pie diagram), Graphs (Histogram, polygon, curve) Stem and leaf diagram	3
2	Population, sample, sampling methods (SRS, Stratified sampling)	1
3	Descriptive statistics a)Measure of central tendency Mean (Definition & simple problems) Medion, Quarliles (Definition, Graphical calculation) Box Plot Mode (Definition, graphical calculation) Situations where one is preferred over others b)Measures of dispersion: Variance (Definition, simple problems) Standard deviation Coefficient of variance c)Skewness (Definition, types of skewness and graphical representation, no formula, and real life example) d)Kurtosis (Definition, types of Kurtosis, graphical representation, no formula, and real life example)	8
4	Probability a)Classical definition and its limitations, axiomatic approach (laws of problem only statement and no proof) b)Independence and conditional problem (real life examples in biology)	2
5	Standard probability distribution a)Binomial (Definition, biological example, additive property (only statement), simple examples b)Poisson (Definition, biological example, additive property (only statement), simple examples c)Namal (Definition, biological example, linear property (only statement, simple examples (using statistical tables), central limit theorem Concept of random variable p.m.f of discrete r.v. probability distribution	8
6	Inferential statistics a)Hypothesis- definition, types (One tailed, two tailed) b)Sampling distribution and errors c)Types of errors (Type I, II)	2

7	Testing of hypothesis (two tailed only) a) For mean (one population) Mean (2 populations- dependent and independent) b) For variance (one population) Variance (2 populations) c) Chi-square test for 1) fitting of distribution 2) Independence of attributes	12
8	ANOVA 1) one way, 2) two way followed by t test (pairwise)	6
9	Correlation (Definition, types of correlation with simple biological problems) Scatter diagram Covariance Multiple correlation (definition, formula when matrix is given) Partial correlation (definition, formula when matrix is given)	3

Reference Books:

1. R.G. Bartle and D.R. Sherbert 2nd edition, (1992), Introduction to real analysis, John Wiley, USA
2. Introductory biostatistics. 1st edition. (2003), Chap T. Le. John Wiley, USA
3. High YieldTM Biostatistics. (2001) Antony N Glaser. Lippincott Williams and Wilkins, USA
4. Introduction to Mathematics for Life Scientists. 3rd edition (1979). Edward Batschalet, Springer,
5. Mathematics for the Biological Sciences. Illustrated edition (1979) J.C. Acharya and R. Lardner, Prentice Hall, USA

Bb-105 Fundamentals of Biological Chemistry (90L)

Sr. No.	Topic	Lecture
1	Configuration and Information in 3D structure of biomolecules: Stereochemistry, chiral interaction, enantiomers etc. Interaction between biomolecules, stereospecificity Types of bonds in biomolecule[Covalent (glycoside, peptide, phosphodiester), ionic, hydrogen, Van der waals, hydrophobic, co-ordinate)] their formation and interaction	8
2	pH, pKa, concept of a buffer, biological buffers, ionisation, concept of osmosis: hypo- and hypertonic solution, Interaction of biological molecules in water, water as a reactant	7
3	Physical Foundation of biotechnology system: Dynamic steady state Energy transfer, entropy, enthalpy, free energy change Oxidation-reduction reaction, activation energy of a reaction, ionization state, intramolecular reaction [with reference to metabolic (catabolic, anabolic) and role of energy]	8
4	Basic biomolecules: Carbohydrates: Introduction, biological importance. Definition, Classification,{glyceraldehydes, Simple Aldose, Simple Ketoses, D-glucose, Conformation of D-glucose} Monosaccharides other than glucose, glycosidic bond, disaccharides, polysaccharides [starch, glycogen] peptidoglycan, proteoglycan matrix.	12
5	Lipids:- Introduction, classes, fatty acids [physical and chemical properties] simple lipids, complex lipids. Steroid lipids, structural, storage lipids. Uses as-signal, cofactor, pigment.	10
6	Protein :- Amino acids: Structure and properties of amino acids. Acid base behavior/ amino acid analysis/ reactions/ Zwitter ions/ classification. Structure-peptide bond, -S-S inter, intra Primary structure, Secondary structure, Tertiary structure - interaction [Myoglobin structure as an example], Quaternary structure - interaction in peptide Hb Protein sequencing - Sanger, Edman's method. Different types of Proteins in the living system ,	15
7	Enzymes: Basic concept, active site, energy of activation. Transition state hypothesis, Lock and key hypothesis, induced fit hypothesis. Allosteric enzymes, Enzyme inhibition, classification.	12
8	Co-enzymes and vitamins: Thiamine, riboflavin, niacin, PLP, Lipoic acid, Pantothenate, Folic acid, Cyanocobalamine	8
9	Nucleic acids: Nucleosides, nucleotides, Polynucleotide, DNA and RNA, Forces stabilizing nucleic acid structure.	10

Reference Books:

1. Outlines of Biochemistry: 5th Edition, (2009), Erice Conn & Paul Stumpf ; John Wiley and Sons, USA
2. Fundamentals of Biochemistry. 3rd Edition, (2008), Donald Voet & Judith Voet , John Wiley and Sons, Inc. USA
3. Principles of Biochemistry, 4th edition (1997), Jeffory Zubey, McGraw-Hill College, USA
4. Biochemistry: 7th Edition, (2012), Jeremy Berg, Lubert Stryer, W.H.Freeman and company, NY
5. Lehninger , Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.
6. Biochemistry. 5th Edition, (copu right 2013), Reginald Garrett and Charles Grisham, Brook/Cole, Cengage Learning, Boston, USA.
7. An Introduction to Practical Biochemistry.3rd Edition, (2001), David Plummer, Tata McGraw Hill Edu.Pvt.Ltd. New Delhi, India
8. Biochemical Methods.1st , (1995), S.Sadashivam, A.Manickam, New Age International Publishers, India

Bb-106 Biophysics and Instrumentation (90L)

Sr. No.	Topic	Lecture
	First Term	
1	Atomic structure: Historical background upto Bohr model. Significance of second and third postulate of Bohr's model. Derivation of radius and energy value. Quantization of energy levels. Using Rydberg's constant, Atomic spectra is signature of the element. Bohr – Sommerfeld model. Vector atom model. Quantum numbers. Selection rules. Pauli's exclusion principle. Emission spectra with respect to Na atoms to understand selection rules.	12
2	Spectroscopy: Definition. Electromagnetic wave. Electromagnetic spectrum. Applications of each region of electromagnetic spectrum for spectroscopy. Introduction to molecular energy levels. Excitation. Absorption. Emission. Rotational spectra. Energy levels of rigid diatomic molecules. Electron spectroscopy. UV-visible spectroscopy. Principle, construction and working of colorimeter, Spectrophotometer, Fluorometer. Application to biomolecules (proteins, DNA, Hb, chlorophyll).	17
3	Radioactivity: Nucleus. Properties. Nuclear forces. Nuclear models (liquid drop and shell model). Radioactive nucleus. Revision of nuclear radiations and their properties - alpha, beta and gamma. Half life, physical and biological handling and standardization of alpha and beta emitting isotopes. Radioimmunoassay. Radiopharmaceuticals and their uptake. Production of radionuclides. Measurement of radiation - Dosimetry and detectors. Principle, construction and working of – GM counter. Scintillation Counter (Solid and liquid).	16
	Second Term	
4	Cell membrane: Organization of plasma membrane. Mass transport. Diffusion- basics. Passive and active transport. Membrane potential, Nernst equation. Passive electrical properties of cell (capacitance, resistance). Active electrical properties. Electrical model (equivalent) of cell membrane. Depolarization, hyperpolarization of membrane (neuronal). Generation of action potential. Types of biopotentials. Biopotential measurement instrument	10
5	Thermoregulation: Thermometric properties and types of thermometers (clinical, thermocouple, bimetallic, platinum resistance, thermistor - thermometers). Body temperature and its regulation.	7
6	Bioinstruments: Concepts- Analytical techniques, analyte, method, procedure and protocol. Principle construction, working and applications for analysis of biomolecules of following instruments. pH meter, Centrifuge (RCF, sedimentation concept), different types of centrifuges. Mass spectroscopy (Bainbridge mass spectrometer). Atomic absorption spectrometer (AAS).	15
7	Microscopes: Concepts - Resolving power. Chromatic and achromatic aberrations. Construction and working principles of the following microscopes– Stereozoom (Dissecting), Compound, bright and Dark field, Inverted, Phase contrast, Fluorescence. Electron microscopes: TEM and SEM.	13

Reference Books:

1. Biophysics, an introduction. 1st edition. (2002) Cotteril R. John Willey and Sons Ltd., USA
2. Biophysics. 1st edition (2002), Pattabhi V and Gautham N. Kluwer Academic Publisher, USA.
3. Textbook of optics and atomic physics, 8th edition (1989) P.P. Khandelwal, Himlaya Publishing House, India.
4. Instrumentation measurements and analysis – 2nd edition (2003). Nakra and Choudhari, Tata Mc Graw Hill, India.
5. Nuclear Physics: An Introduction. 2nd edition (2011). S. B. Patel. Anshan Publication, India

Bb- 107 Microbiology (90L)

Sr. No.	Topic	Lecture
1	Introduction to Microbial World: Biocomplexity of Microorganisms. Important developments leading to major discoveries. Path breaking discoveries. Product Development (18th – 20th Century including pre golden, golden and post golden era)	7
2	Outline Classification: of all 5 major groups of microorganisms. Prokaryotic and Eukaryotic. Bacteria, Fungi, Cyanobacteria and viruses. Life cycle, nutrition and growth	15
3	Prokaryotic Cell structure : Function and ultra-structure of - cell wall (Gram positive and negative) , plasma membrane, flagella, pili, endospore, capsule, nucleic acid.	15
4	Handling of microorganisms and biosafety measures:	3
5	Microscopy: Wet mount and dry mount. Staining Techniques - Definitions: Classification of stains, Stain(Basic and Acidic), Fixative, Mordant, Decoloriser, Accentuator Principles of staining techniques for following (Monochrome, Negative, Differential (Gram, Acid fast, Blood staining), Special staining- Spore, flagella, cell wall, nucleic acid, capsule)- Theory of staining..	12
6	Basic Considerations – Nutritional, Hydrogen ion concentration, Temperature and Oxygen. Nutritional classification of bacteria Design of media: Types of media and Composition Cultivation – <i>In vitro</i> (Streak plate method) - Concept of Pure culture, co-culture and Mixed culture, Colony characteristics and Biofilm formation. Preservation and Maintenance methods for microbial cultures.	12
7	Sterilization : Physical Agents - Heat, Radiation, Filtration Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, Heavy metals, Alcohol, Dyes, and Detergents, Ethylene oxide	8
8	Microbial Growth: Growth curve, introduction to kinetics of growth, generation time, growth rate. Reproduction in microorganisms : Binary Fission, Asexual, Sexual, Lytic, Lysogenic Cycle. Cell Enumeration and quantification of Growth Total Count- Breeds count, Direct microscopic count, haemocytometer, turbidity. Viable Count- Spread plate, pour plate method.	11
9	Microbial interaction: Microbe-Plant, Microbe-Animal, Microbe-Microbe interaction	7

Reference Books:

1. Microbiology–6th Edition (2006), Pelczar M.J., Chan E.C.S., Krieg N.R., The McGraw Hill Companies Inc. NY
2. General Microbiology - Stanier R.Y., 5th edition, (1987)Macmillan Publication, UK.
3. Prescott's Microbiology, 8th edition (2010), Joanne M Willey, Joanne Willey, Linda Sherwood, Linda M Sherwood, Christopher J Woolverton, Chris Woolverton, McGrawHil Science Engineering, USA

Bb-108 Computers and Applications (90L)

Sr. No.	Topic	Lecture
	First Term	
1	History: Evolution, Generations of computers (I, II, III, IV, V) Classification of computers (mainframes, mini computers, microcomputers, special purpose) Comparison with respect to memory, power, cost and size ch, Real-Time, Online, Offline	3
2	Introduction to computers: Overview and functions of a computer system Input and output devices Storage devices: Hard disk, Diskette, Magnetic tape, RAID, ZIP devices, Digital tape, CD-ROM, DVD (capacity and access time)	5
3	Modern computers: The workstation, The Minicomputer, Mainframe Computers, Parallel processing Computer & The Super Computer	3
4	Introduction to operating systems: Operating System concept, Windows 98/XP and later versions, Windows server NT/2000, Unix/Linux & servers	10
5	Data processing & presentation: Introduction MS office (Word, Excel & Power Point)	16
6	Computer viruses: An overview of Computer viruses What is a virus ? Virus symptoms, How do they get transmitted ? What are the dangers ? General Precautions	3
	Second Term	
7	Computer Networking: Introduction to networking: various terminologies Associated hardware devices, gadgets (Router, Switch) tools, services, and resources Network Topologies and Protocols, LAN, WAN and MAN World Wide Web (WWW) Network security: fire walls	10
8	Internet searches: Search engines: Google, Yahoo . Concepts in text-based searching Searching Medline, PubMed, bibliographic databases	15

9	Algorithms, Flowcharts & Programming concepts: Algorithms: Concepts & definitions Converting algorithms to flowchart Coding: flowcharts to programs	12
10	Databases Introduction & need of databases Types of databases Basic concepts in: • Data Abstraction • Data Models - o Instances & Schemes - o E-R Model (Entity and entity sets; Relations and relationship sets; E-R diagrams; Reducing E-R Diagrams to tables) Network Data Model: Basic concepts Hierarchical Data Model: Basic concepts Multimedia Databases: Basic concepts and Applications Indexing and Hashing - o B+ Tree indexed files - o B Tree indexed files - o Static Hash functions - o Dynamic Hash functions Text Databases Introduction & Overview of Biological databases	13

Reference Books:

1. Computer Fundamentals , 4th edition (2004) P.K. Sinha, BPB publication, India
2. Computer Networks. 4th edition (2008). Tanenbaum. Pearson Education, India
3. Introduction To Database Management Systems, 1st edition, (2004), Atul Kahate, Pearson education, India

Bb-109 Practicals in Chemistry & Biochemistry (30P)

Sr. No.	Topic	Practicals (30P)
	First term	
1	Safety Measures and practices in chemistry laboratory	1
2	Determination of gas constant	1
3	Crystal models	1
4	Freezing point depression	1
5	Thermochemistry	2
6	Determination of an order of reaction	1
7	Acid-base titrations	1
8	Molarity , molality , normality	2
9	Unit volume & weight measurements	2
10	pH measurement	1
11	Optical activity of a chemical compound by polarimeter	1
12	Conductometry	1
	Second Term	
1	Reagent Preparation & biochemical calculations.	2
2	Spot test for carbohydrates & amino acids	2
3	Isolation of starch from potato	1
4	Isolation of protein from plant source	2
5	Isolation of oil from plant source	2
6	Estimation of protein by Biuret method	1
7	Estimation of protein by Lowry method	1
8	Thin layer chromatography for lipids	1
9	Saponification of fats	1
10	Enzyme assay (amylase)	1
11	Estimation of Reducing sugar by DNSA method	1

Bb-110 Practicals in Physics, Biophysics & Instrumentation (30P)

Sr. No.	Topic	Practical (30P)
	First Term	
1	Flat spiral spring : Y & n	2
2	Y of a rectangular thin bar by bending	1
3	Viscosity measurement using Ostwalds viscometer (for known and unknown viscosity)	2
4	Surface-tension measurement: Using Jaeger's method/, soap bubble method	3
5	Temperature measurement: using thermocouple, RTD	2
6	Beer and Lambert's Law – Components and working of Colorimeter, Spectrophotometer	2
7	Absorption spectrum of protein	1
8	Working and components of various types of Centrifuges	1
9	Working of a G.M. counter	2
10	Absorption spectra of dsDNA and ssDNA melting	2
11	To find out isoelectric point of amino acids	2
	Second Term	
1	Functioning and Standardization of pH meter	1
2	Study of electronic components (resistance capacitance)	1
3	Microscopy – Components and working of Bright field compound microscope	2
4	Working of Electronic Balance for micro measurements	1

Bb-111 Practicals in Biosciences (30P)

Sr. No.	Topic	Practical (30P)
	First Term	
1	Study of one example each of the following: algae, fungi, bryophytes, pteridophytes, gymnosperms, angiosperms	2
2	Study of different parts of plants: Anatomy of root, stem and leaf of a monocotyledon and a dicotyledon.	2
3	Study of plant cell types using squash techniques and Maceration.	1
4	Determination of Diffusion Pressure Deficit using potato tubers.	1
5	Determination of rate of respiration	1
6	Study the process of Osmosis and Turgor pressure	1
7	Introduction to Microbiology Laboratory	1
8	Aseptic Transfer Techniques	1
9	Observation of microorganisms a) Wet mount b) Monochrome staining c) Gram staining d) Spore staining e) Fungal staining	4
	Second Term	
	Preparations of media for bacterial/fungal culture	1
1	Isolation of bacteria by Streak Plate Technique	1
2	Enumeration techniques a) Pour plate method b) Spread plate method c) Cell count by Neubauer's Chamber d) Plaque Count	3
3	Enrichment techniques Winogradsky's Column	1

4	Observation of motility a) Hanging drop technique b) Craigie's tube method c) Swarming growth	3
5	Wet mount of freshwater sample	1
6	Study of <i>Paramecium</i> ,: a) Morphology, b) Reproduction	1
7	Study of <i>Drosophila</i> – characters, sexual dimorphism – eye & wing mutations	1
8	Establishment and Maintenance of <i>Drosophila</i> culture Dissection & Preparation of temporary mounts of <i>Drosophila developmental stages (Egg, larva and pupa).</i>	2
9	Study of <i>Plasmodium</i> sps., <i>Fasciola</i> sp.	1
10	Dissection of Honey Bee , Mounting of Mouth parts, pollen basket, Antenna Cleaner, Sting Apparatus, Cornea , legs and wings	1

Bb-112 Quantitative Methods in Biology (30P)

Sr. No.	Topic	Practical (30P)
	First Term	
1	Biological data analysis using mathematical and statistical methods	4
2	Computer – Getting familiar with the hardware, booting & operating	1
3	Getting started: Hands-on experience (Tutors are recommended)	1
4	Tutorials operating systems: DOS, Windows 98/XP and later versions, UNIX	4
5	File handling: copy, rename, delete, type Directory structure: make, rename, move directory	2
6	Scanning for viruses & using anti-virus programs	1
7	Word Processing (Microsoft Word): Creating, Saving & Operating a document, Editing, Inserting, Deleting, Formatting, Moving & Copying Text, Find & Replace, Spell Checker & Grammar Checker, Document Enhancement (Borders, Shading, Header, Footer), Printing document (Page layout, Margins), Introduction to the use of Wizards & Templates, Working with Graphics (Word Art), Working with Tables & Charts, Inserting Files (Pictures, Databases, Spreadsheets)	2
	Second Term	
2	Use of internet – Downloading & Installing software/plugin-ins on Windows 98/XP and later versions(Acrobat Reader, Post Scripts Viewer, etc.)	4
3	Searching/Surfing on the WWW	2
4	Spreadsheet Applications (Microsoft Excel): Worksheet Basics: Entering information in a Worksheet, Saving & Opening a Worksheet, Editing, Copying & Moving data, Inserting, Deleting & Moving Columns & Rows, Clearing	5
5	Database Applications (Microsoft Access): Fields, Records, Files, Organization of Files, Access Modes; Updating Records, Querying, Reports, Forms & subforms	2
6	Usage of multimedia – Creation of Computer Presentations with graphics (Microsoft Power Point): Creation of slides, Rapid Presentation design using wizards	2

University of Pune
Three Year B. Sc. Degree Course in
Botany

Principal Dr. Balkrishna N. Zaware
Chairman,
Board of Studies in Botany
University of Pune, Pune 411 007.

1) Title of the Course : B. Sc. Botany

F. Y. B. Sc. Botany

(To be implemented from Academic Year 2013-14)

2) Preamble:

The well organized curricula including basic as well as advanced concepts in the plant sciences from first year to the third year shall inspire the students for pursuing higher studies in Botany and for becoming an enterprenur and also enanble students to get employed in the Botany subject based indutries.

3) Introduction:

At **first year of under-graduation** the topics related to the fundamentals of Botany, including exposure to diversity in plant groups and industries related to plant sciences are covered. The practical course is aimed to equipe the students with skills required for plant identification, description, classification and also applications of these plants in various industries.

At **second year under-graduation:** The level of the theory and practical courses shall be one step ahead of the first year B.Sc. courses based on content of first year shall be introduced.

At **third year under-graduation:**Theory papers in each semester shall deal with the further detailed studies of the various plant groups and other branches of Botany such as Plant Genetics, Plant Physiology, Molecular biology etc. The students will also learn about use of Statastics in the plant sciences which will be helpful to students during research in the Botany subject.

Objectives:

- To provide thorough knowledge about various plant groups from primitive to highly evolved
- To make the students aware of applications of different plants in various industries
- To highlight the potential of these studies to become an enterpruner
- To equippe the students with skills related to laboratory as well as field based studies
- To make the students aware about conservation and sustainable use of plants
- To creat foundation for further studies in Botany
- To address the socio-economical challenges related to plant sciences

- To facilitate students for taking up and shaping a successful career in Botany

4) Eligibility:

- 1 **First Year B.Sc. :** A student who has passed the Higher Secondary School Certificate (10+2) Science stream with Biology or its equivalent examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc. :** Keeping terms of First Year of B. Sc. with Botany as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B.Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Botany as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Botany

Pattern of Examination: Annual

Theory courses	Botany Theory Paper I : Annual
	Botany Theory Paper II : Annual
Practical Course	Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I BO 111 (First term)	Plant Diversity	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I BO 111 (Second term)	Plant Morphology and Anatomy	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II BO 112 (First term)	Industrial Botany I	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II BO 112 (Second term)	Industrial Botany II	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III BO 113 (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3	4 out of 6 - short answer type questions; answerable in 8 – 10 lines
Question 4	2 out of 4 – Descriptive answer type questions, answerable in 15 – 20 lines
Question 5	1 out of 2 – Descriptive answer type questions, answerable in 35 – 40 lines

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks in each term. The written test shall comprise objective type questions – Multiple Type Questions, True / False, Definitions, Answer in one or two line questions. There shall be 20 questions.

Practical: Regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Botany

Pattern of examination: Semester

Theory courses BO 211 and BO 212: Semester

BO 221 and BO 222: Semester

Practical Course: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
BO 211	Theory Paper I	Four lectures/Week (Total 48 per semester)	04	16	20 *
BO 212	Theory Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
BO 221	Theory Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
BO 222	Theory Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40**

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

****Subject to compulsory passing in external examination and getting minimum 40 marks out of 100**

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests.
4. Internal marks for Practical Course should be a regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks as follows: The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10-15 lines	5 marks each
Question 4	1 out of 2 sub-questions, each of 10 marks; long answer type questions (20-25lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Botany

Pattern of examination: Semester

Theory courses:

(Sem III: BO 331 – BO 336) : Semester

(Sem IV: BO 341 – BO 346) : Semester

Practical Course:

(BO 347 – BO 349) : Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
BO 331	Paper I	48	4	16	20*
BO 332	Paper II	48	4	16	20*
BO 333	Paper III	48	4	16	20*
BO 334	Paper IV	48	4	16	20*
BO 335	Paper V	48	4	16	20*
BO 336	Paper VI	48	4	16	20*
SEM IV					
BO 341	Paper I	48	4	16	20*
BO 342	Paper II	48	4	16	20*
BO 343	Paper III	48	4	16	20*
BO 344	Paper IV	48	4	16	20*
BO 345	Paper V	48	4	16	20*
BO 346	Paper VI	48	4	16	20*
Practical Papers					
BO 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers be given on the basis of internal assessment tests.
4. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines	5 marks each
Question 4	2 out of 3 sub-questions, each of 10 marks; long answer type questions (20 – 25 lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F. Y. B. Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III,

papers shall be set by the University of Pune and assessment done at the respective colleges.

S. Y. B. Sc. and T. Y. B. Sc.: For theory papers for each semester and also for the annual practical examination, question papers shall be set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5 G) Verification and Revaluation Rules:

As per university Statutes and Rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Botany Degree Program shall be three years.

a) Compulsory Papers:

F. Y. B. Sc.: 2 Theory + 1 Practical (Annual)

S. Y. B. Sc.: 2 Theory per semester + 1 Practical (Annual)

T. Y. B. Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F. Y. B. Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S. Y. / T. Y. - B. Sc. Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F. Y. / S. Y. / T. Y. - B. Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Plant Diversity	BO 111: Plant Diversity, Plant Morphology and Anatomy
Paper II: Plant Resources -Utiliation and Management	BO 112: Industrial Botany
Paper III: Practical	BO 113: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Botany or equivalent master degree in science with class/grades and NET/SET/Ph.D. as per prevailing University/Government /UGC rules.

UNIVERSITY OF PUNE
BOARD OF STUDIES IN BOTANY
Proposed Revised Syllabus for F. Y. B. Sc. (Botany)
To be implemented from June, 2013
F. Y. B. Sc. (Botany) New Syllabus

1. Fundamentals of Botany: PAPER – I

Term- I: Plant Diversity

2. Botany Theory Paper II

Term I – Industrial Botany

3. Fundamentals of Botany: PAPER - I

Term- II: Morphology and Anatomy

4. Botany Theory Paper II

Term- II – Industrial Botany

**5. F. Y. B. Sc. Botany Practical Paper - III based on Theory Paper I
and Paper II**

UNIVERSITY OF PUNE
BOARD OF STUDIES IN BOTANY
Proposed Revised Syllabus for F. Y. B.Sc. (Botany)
To be implemented from June, 2013

PAPER – I
FUNDAMENTALS OF BOTANY
Term – I: Plant Diversity (36 Lectures)

1. **Introduction:** General outline of plant kingdom, Introduction to plant diversity with reference to following groups:-
Cryptogams: Thallophyta (Algae, Fungi, Lichens, And Bacteria), Bryophyta and Pteridophyta, Phanerogams: Gymnosperms and Angiosperms. **3L**
2. **Algae:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Spirogyra*. **6L**
3. **Fungi:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Cystopus (Albugo)*. **5L**
4. **Lichens:** General characters, Nature of Association, Types of Lichens on the basis of thallus morphology, Economic importance of lichens. **3L**
5. **Bryophytes:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Riccia*. **5L**
6. **Pteridophytes:** General characters, Outline classification according to G.M. Smith (1955) up to classes with reasons. Life cycle of *Nephrolepis*. **6L**
7. **Gymnosperms:** General characters, Outline classification according to Chamberlain (1934) up to classes with reasons. Life cycle of *Cycas*. **5L**
8. **Angiosperms:** General characters, Causes of evolutionary success of Angiosperms, comparative account of monocotyledons and dicotyledons. **3L**
(Note: Development of sex organs not expected, for all the above mentioned life cycles)

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PAPER – I
FUNDAMENTALS OF BOTANY
Term – II: Morphology and Anatomy (36 Lectures)

- 1. Morphology:** **4L**
 - 1.1: Introduction, Definition and Scope.
 - 1.2: Descriptive and Interpretative.
 - 1.3: Importance in identification, nomenclature, classification, phylogeny and Plant breeding.
- 2. Morphology of Vegetative Parts:** **8L**
 - 2.1: **Root:** Types of roots, Modifications of roots: Epiphytic, Respiratory (Pneumatophores), Parasitic and Storage roots (conical, fusiform and napiform) with examples; functions of root.
 - 2.2: **Stem:** Modifications of Stem: Phylloclade, Runner, Stolon, Suckers, Offsets, Rhizome, Corm, Tuber and Bulb with examples. Functions of stem.
 - 2.3: **Leaf:** Parts of typical leaf: petiole, lamina; leaf margins and apices. Types of leaves: simple, compound, venation, phyllotaxy. Modifications: tendrils, spines, scale leaves, phyllode, reproductive and trap leaves (mechanism of trapping in *Nepenthes* only) with examples. Functions of leaf.
- 3. Morphology of Reproductive Parts:** **10L**
 - 3.1: **Inflorescence:** Types of inflorescence: Racemose (raceme, spike, corymb, umbel, catkin, spadix and capitulum), Cymose (solitary, monochasial, dichasial, polychasial), Special types (Verticillaster, Cyathium, and Hypanthodium) Significance.
 - 3.2: **Flower:** Parts of typical flower, Types of flower (complete, incomplete), symmetry of flower and insertion of floral whorls. Floral whorls: Calyx, corolla, perianth, aestivation, modifications of calyx (pappus, petaloid, spurred), forms of corolla: polypetalous (cruciform and papilionaceous) gamopetalous (infundibuliform, bilabiate), Androecium: structure of stamen, fixation of anthers, cohesion and adhesion; Gynoecium: structure of carpel. Types of placentations.
 - 3.3: **Fruit:** Types of fruits: Simple and dry: Achene, Cypsela, Legume, Follicle and Capsule, Fleshy: Drupe, berry, Hesperidium and pepo. Aggregate: Etaerio of berries and Etaerio of follicles. Multiple fruits: Syconus and Sorosis.
 - 3.4: **Seed:** Parts, types, structural modifications for seed dispersal.
- 4. Anatomy:** **2L**

Introduction, Definition, Importance in taxonomy, physiology, ecological interpretations, pharmacognosy and wood identification.
- 5. Types of tissues:** Outline with brief description. **6L**
 - 5.1: **Meristmatic tissues:** - Meristem, characters and types based on origin, position and plane of division, functions.
 - 5.2: **Vascular tissues:-** Components of xylem and phloem, types of vascular bundles, functions.
 - 5.3: **Epidermal tissues:-** Epidermis, structure of typical stomata, trichomes, motor cells; functions.
 - 5.4: **Mechanical tissues:-** Collenchyma, sclerenchyma and xylem with functions.

6. Internal Organization of Primary Plant Body:

6L

6.1: Internal structure of dicotyledon and monocotyledon root.

6.2: Internal structure of dicotyledon and monocotyledon stem.

6.3: Internal structure of dicotyledon and monocotyledon leaf.

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PAPER- II

Term I – INDUSTRIAL BOTANY (36 Lectures)

- 1. Introduction to Industrial Botany** **2L**
 - 1.1 Concept of Industrial Botany.
 - 1.2 Plant resources and industries: Food, fodder, fibers, medicines, timber, dyes, gum, tannins. (Two examples of each resource and the relevant industries with which they are associated).
- 2. Floriculture Industry** **8L**
 - 2.1 Introduction to floriculture.
 - 2.2 Important floricultural crops, open cultivation practices, harvesting and marketing of Tuberose.
 - 2.3 Greenhouse technology: Concept, advantages and limitations.
 - 2.4 Cultivation practices (greenhouse technology), harvesting and marketing of Rose and *Gerbera*.
- 3. Plant Nursery Industry** **8L**
 - 3.1 Concept and types of nurseries: ornamental plant nursery, fruit plant nursery, medicinal plant nursery, vegetable plant nursery, orchid nursery, forest nursery (with reference to infrastructure required, outputs, commercial applications and profitability).
 - 3.2 Propagation methods: Seed propagation, natural vegetative propagation and artificial vegetative propagation (Cutting: Stem, Layering: Air layering, Grafting: Stone grafting and Approach grafting, Budding : T-budding).
- 4. Plant Tissue Culture Industry** **6L**
 - 4.1 Concept of tissue culture.
 - 4.2 Culture techniques: Types of explants, preparation of media, methods of sterilization, inoculation techniques, incubation and hardening.
 - 4.3 Commercial significance
- 5. Agri industries:** **8L**
 - 5.1 Organic Farming: Concept, need of organic farming, types of organic fertilizers, advantages and limitations.

5.2 Seed industries: Importance of seed industries, seed production, seed processing and seed marketing with reference to cotton. Major seed industries and corporations of India.

6. Mushroom Industries:

4L

Mushroom cultivation: Plant resources, cultivation practices of Oyster mushroom, uses of mushrooms, value added products, commercial significance.

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PAPER- II

Term- II: INDUSTRIAL BOTANY (36 Lectures)

1. Bio-fuel Industry	6L
1.1 Introduction and advantages.	
1.2 Concept of biofuel and its need.	
1.3 Plants used for biofuel production.	
1.4 Biodiesel production from Caster.	
1.5 Commercial significance.	
2 Bio-pesticide Industry	6L
2.1 Concept of bio-control; Integrated Pest Management (IPM).	
2.2 Importance of bio pesticides.	
2.3 Types of bio pesticides: Indiaractin, Azadirachtin.	
2.4 Commercial significance.	
3. Industrial Mycology	6L
3.1 Introduction	
3.2 Important genera of fungi used in various industries and their products.	
3.3 Products and applications of <i>Trichoderma</i> , <i>Penicillium</i> , <i>Aspergillus</i> and yeast.	
3.4 Commercial significance.	
4. Bio-Fertilizer Industry	6L
4.1 Bio fertilizers : concept and need	
4.2 Types of bio-fertilizers: Nitrogen fixing bio fertilizer: <i>Rhizobium</i> , Blue green algae. <i>Anabaena</i> associated with <i>Azolla</i> . Phosphate solubilizing bio-fertilizer: Bacteria and Fungi.	
4.3 Commercial significance.	
5 Fruit Processing Industry	6L
5.1 Fruit processing: concept and need	
5.2 Cold storage.	
5.3 Types of fruit processing (canned fruits, dried fruit chips, fruit pulp, squash, jam, jelly, pickle and ketchups).	
5.4 Commercial significance.	
6 Plant Pharmaceutical Industry	6L

6.1 Concept and advantages.

6.2 Types of pharmaceutical products: Churna, Asava and Arishta.

6.3 Drug plants with reference to botanical source, active principles and medicinal uses of *Adathoda zeylanica*, *Tinospora cordifolia* and *Asperagus racemosus*.

6.4 Manufacture of *Churna* (*Triphala churna*), *Arishta* (*Ashokarishta*) and *Asava* (*Kumariasava*).

6.5 Concept of nutraceuticals and cosmeceuticals.

6.6 Commercial significance of Amla and Aloe.

References:

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2. The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm, Ann Larkin Hansen, Storey Publications.
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F. Y. B.Sc. BOTANY PRACTICAL PAPER – III

Based on Theory Paper I and Paper II

1. Modifications of root and stem. 1P
2. Study of leaf (parts of leaf, types: simple and compound; sessile and petiolate; venation: parallel and reticulate) (Glossary of terminologies be given with the protocol). 1P
3. Study of Inflorescence. 1P
 - a) Racemose: Raceme, Spike, Spadix, Catkin, Umbel and Capitulum.
 - b) Cymose: Solitary cyme, Uniparous cyme: helicoid and scorpioid, Biparous cyme and Multiparous cyme.
 - c) Special type: Verticillaster, Hypanthodium and Cyathium.
4. Study of flower with respect to Calyx, Corolla and Perianth: (Glossary of terminologies is given with the protocol). 1P
5. Study of flower with respect to Androecium and Gynoecium. 1P
6. Study of fruits and seed with suitable examples. 1P

Simple fruit: fleshy – Berry and Drupe; Dry: Achene, Cypsella and Legume

Aggregate fruit: Etaerio of follicles and Etaerio of Berries.

Multiple fruit: Syconus and Sorosis.

Seed: parts of seed and types of seed (monocotyledonous dicotyledonous, albuminous, exalbuminous)
7. Study of internal primary structure of dicotyledonous root, stem and leaf. 1P

e.g. Sunflower.
8. Study of internal primary structure of monocotyledonous root, stem and leaf. 1P

e.g. Maize.
9. Study of *Spirogyra*. 1P
10. Study of *Cystopus (Albugo)* 1P
11. Study of *Riccia*. 1P
12. Study of *Nephorlepis*. 1P
13. Study of *Cycas*. 1P
14. Study of plant resources in industries: food, fodder, fiber, medicine, timber and gum (one example of each) 1P

15. Study of artificial plant propagation: 1P
Stem cutting (demonstration of three subtypes)
Air Layering, Approach grafting, and T- budding
16. Study of plant tissue culture techniques: Demonstration of various stages. 1P
17. Cultivation of Oyster mushroom and demonstration of value added mushroom products. 1P
18. Study of plant resources used in biopesticides. 1P
(Indiara, Azadiractin)
19. Study of industrially important fungi and their products. 1P
Ganoderma: *Ganoderma* tablets, *Aspergillus*: citric acid; *Yeast*: Bakery products; *Penicillium*: Penicillin and *Trichoderma*.
20. Study of types of Biofertilizers: *Rhizobium*, *Azotobacter*, BGA, *Azolla*.
Phosphate Solubilizing Bacteria. Green manure (preferably *Crotolaria*/
Gliricidia/locally available material). 1P
21. Preparation of Jam and Squash. 1P
22. A) One botanical excursion to study plant diversity.
B) Visit to one of the following industries. (Study/project report is compulsory).
1) Floriculture unit 2) Greenhouse 3) Pharmaceutical industry 4) Nursery and
5) Mushroom cultivation unit.

(Note: Visits mentioned in the practical No. 22 (A & B) are compulsory. It carries 10 marks at the time of annual practical examination.)

Structure /Pattern of syllabus- F.Y.B.Sc

1. Title of the course –

Gg- 110- Geomorphology (Paper I)

2. **Preamble of the syllabus**

- i. To introduce the students to the basic concepts in Geomorphology.
- ii To acquaint the students with the utility and applications of Geomorphology in different areas and environment.
- iii. To make the students aware of the need of protection and conservation of different landforms.

3. Introduction: Pattern –**Annual(20 marks internal & 80 marks University)**

4. Eligibility- **12th pass Science**

5. Examination-

A. Pattern of examination-

i (Internal exam of 10 marks per term and University exam),

ii. Pattern of question paper:

Term end paper of 20 marks converted to 10 marks for each term

Annual exam of 80 marks

Internal Exam per term 10 Marks = Total 20 marks for two terms

University Exam- 80 Marks

B. Standard of passing- Internal -08- University -32= annual marks 40

C. ATKT rules- No

D. Award of class- F.Y.B.Sc. Pass

E. External students- No

F. Setting of question papers/ pattern of question paper

Internal Exam- 20 Marks = (converted to 20 marks) (1st & 2nd term)

Question 1: Multiple choice for 5 marks (5)

Question 2: True or false (5) for 5 marks

Question 3: Definitions (5) 5 marks

Question 4: Answers in two lines (2) for 5 marks

University Exam- 80 Marks =

Question 1. Answers in 20 words- 16 marks (8 out of 10)

Question 2. Answers in 50 words -16marks (any4 out of 6)

Question 3. Answers in 150 words- 16 marks (any 4 out of 6)

Question 4. Answers in 300 words- 16 marks (any 2 out of 4)

Question 5. Answers in 500 words- 16 marks (any 1 out of 2)

G. Verification / Revaluation- Yes

6. Structure of the course

a. Compulsory paper- **F.Y.B.Sc. General**

b. Optional paper- **No**

c. Question paper and papers etc- **One**

d. Medium of instructions- **English**

7. Equivalence of previous syllabus along with propose syllabus- **yes**

8. University terms: **Annual pattern**

9. Subject wise detail syllabus – **As per attached sheets**

10. Recommended books- **Mentioned in syllabus**

11. Qualification of teacher- **M.A./M.Sc(Geography), as per UGC and University norms**

Equivalence of Syllabus in Geography (F.Y.B.Sc.) effective from June 2013

Old Syllabus June 2008		New Syllabus June 2013	
Gg-110	Physical Geography (Paper I)	Gg-110	Geomorphology (Paper I)
Gg-120	Geography of Atmosphere and Hydrosphere (Paper II)	Gg-120	Climatology and Oceanography(Paper II)
Gg-101	Techniques in Physical Geography (Paper III)	Gg-101	Techniques in Physical Geography (paper III)

Revised Syllabus (from June 2013)

F. Y. B. Sc. Geography

Course No. Gg. 110: Paper I

Title of the Course: Geomorphology

Objectives:

1. To introduce the students to the basic concepts in geomorphology.
2. To acquaint the students with the utility and applications of geomorphology in different areas and environment.
3. To make the students aware of the need of protection and conservation of different landforms.

Section I			
Unit No.	Unit	Sub Unit	No.of periods
1	Introduction to Geomorphology	a. Introduction to Physical Geography and its branches b. Geomorphology – Definition, Nature and Scope c. Geological Time Scale	10
2	The Earth	a. Interior of the Earth- Structure and Composition b. Origin of Continents and Ocean basins i. Theory of Isostasy ii. Wegener's Continental Drift Theory iii. Theory of Plate Tectonics	10
3	Crustal Movements	a. Internal movements – slow and rapid b. Folds – Types of folds c. Faults – Types and associated landforms	10
4	Diastrophic Movements	a. Earthquakes- causes and effects, major earthquake regions of the world, Seismic waves. b. Volcanism- processes and effects of volcanism, types of volcanoes and associated landforms	10
SECTION II			
5	Rocks and Minerals	a. Rocks – Classification of rocks on the basis of formation, Characteristics of igneous, sedimentary and metamorphic rock with Indian examples b. Difference between Minerals and Rocks c. Minerals- Metallic and Non-metallic	08
6	Weathering and Mass Movement	a. Weathering- meaning, mechanical, chemical and biological weathering b. Mass movement- meaning and types	08

7	Geomorphic Agents & Its threefold work- I	Erosional, transportational, and depositional work of the following agents:	06
		a. River - Mechanism of river erosion, erosional and depositional landforms. Davisian cycle of erosion. b. Sea waves - Mechanism of sea wave erosion, breaking of waves, swash, backwash, erosional and depositional landforms.	06
8	Geomorphic Agents & Its threefold work- II	a. Wind : Mechanism of wind erosion, erosional and depositional landforms.	06
		b. Glaciers : Mechanism of glacial erosion, erosional and depositional landforms of valley and mountain glaciers.	06

Reference books:

- Ahirrao, W.R., Alizad, S.S. and Dhapte, C.S., 1998. Morphology and Landscape, Nirali Prakashan, Pune
- Bloom, A.L., 1998. Geomorphology. A Systematic Analysis of Late Cenozoic Landforms. Pearson Education (Singapore) Pte. Ltd.
- Christopher son, R.W. 2000, Geo-systems, Prentice Hall, INC. USA.
- Hamblin, W.K., 1989. The Earth's Dynamic Systems, Macmillan Publishing Company, New York.
- Husain, M., 2001. Fundamentals of Physical Geography, Rawat Publication, Jaipur.
- Kale, V.S. and Gupta, A., 2001. Introduction to Geomorphology, Orient Longman, Calcutta.
- Monkhouse, F.J., 1996. Principles of Physical Geography, Hodder and Stoughton, London.
- Robinson, H., 1969. Morphology and Landscape, University Tutorial Press Ltd, London.
- Siddhartha, K., 2001. The Earth's Dynamic Surface, Kisalaya Publications Pvt. Ltd, New Delhi. 5
- Singh, S., 1998. Geomorphology, Prayag Pustak Bhavan, Allahabad.
- Small, R.J., 1970. Study of Landforms, University Press, Cambridge.
- Sparks, Geomorphology.
- Strahler, A.A. and Strahler, A. N., 2002. Physical Geography: Science and Systems of the Human Environment, John Wiley & Sons, INC.
- Strahler, A.H. and Strahler, A. N., 1992. Modern Physical Geography, John Wiley & Sons, INC.
- Strahler, A.N., 1965. Introduction to Physical Geography, John Wiley & Sons, INC.
- Thornbury, Geomorphology.

Structure /Pattern of syllabus- F.Y.B.Sc

1. Title of the course –

Gg- 120- Climatology and Oceanography (Paper II)

2. **Preamble of the syllabus**

- i. To introduce the students to the basic principles and concepts in climatology and oceanography.
- ii To acquaint the students with the applications of climatology and oceanography in different areas and environment.
- iii. To make the students aware of the planet earth and thereby and enrich the student's life

3. Introduction: Pattern –**Annual(20 marks internal & 80 marks University)**

4. Eligibility- **12th pass Science**

5. Examination-

A. Pattern of examination-

i (Internal exam of 10 marks per term and University exam),

ii. Pattern of question paper:

Term end paper of 20 marks converted to 10 marks for each term

Annual exam of 80 marks

Internal Exam per term 10 Marks = Total 20 marks for two terms

University Exam- 80 Marks

B. Standard of passing- Internal -08- University -32= annual marks 40

C. ATKT rules- No

D. Award of class- F.Y.B.Sc. Pass

E. External students- No

F. Setting of question papers/ pattern of question paper

Internal Exam- 20 Marks = (converted to 20 marks) (1st & 2nd term)

Question 1: Multiple choice for 5 marks (5)

Question 2: True or false (5) for 5 marks

Question 3: Definitions (5) 5 marks

Question 4: Answers in two lines (2) for 5 marks

University Exam- 80 Marks =

Question 1. Answers in 20 words- 16 marks (8 out of 10)

Question 2. Answers in 50 words -16marks (any4 out of 6)

Question 3. Answers in 150 words- 16 marks (any 4 out of 6)

Question 4. Answers in 300 words- 16 marks (any 2 out of 4)

Question 5. Answers in 500 words- 16 marks (any 1 out of 2)

G. Verification / Revaluation- Yes

6. Structure of the course

a. Compulsory paper- F.Y.B.Sc. General

b. Optional paper- No

c. Question paper and papers etc -One

d. Medium of instructions- English

7. Equivalence of previous syllabus along with propose syllabus- **yes**

8. University terms: **Annual pattern**

9. Subject wise detail syllabus – **As per attached sheets**

10. Recommended books- **Mentioned in syllabus**

11. Qualification of teacher- **M.A./M.Sc(Geography), as per UGC and University norms**

Equivalence of Syllabus in Geography (F.Y.B.Sc.) effective from June 2013

Old Syllabus June 2008		New Syllabus June 2013	
Gg-110	Physical Geography (Paper I)	Gg-110	Geomorphology (Paper I)
Gg-120	Geography of Atmosphere and Hydrosphere (Paper II)	Gg-120	Climatology and Oceanography(Paper II)
Gg-101	Techniques in Physical Geography (Paper III)	Gg-101	Techniques in Physical Geography (paper III)

F. Y. B. Sc. (Geography)
Course No. Gg. 120: Paper II

Title of the Course: Climatology and Oceanography

Objectives:

1. To introduce the students to the basic principles and concepts in Climatology and Oceanography.
2. To acquaint the students with the applications of Climatology and Oceanography in different areas and environment.
3. To make the students aware of the Planet Earth and thereby to enrich the student's life.

Section I - Climatology			
Unit No.	Unit	Sub Unit	No. of periods
1	Introduction to Climatology	a. Definition, nature and scope b. Importance of Climatology in modern times. c.. Weather and climate, elements of weather and climate d.. Composition and structure of the atmosphere e. Hydrological cycle	08 08
2	Insolation	a. Heat budget of the Earth. b. Factors affecting horizontal distribution of temperature. c. Vertical distribution of temperature- Inversion of temperature, lapse rate and its types. d. Global warming.	08
3	Atmospheric Pressure and Wind System	a Vertical and horizontal distribution of pressure. b Formation of pressure system belts and their relation with winds. c Concept of pressure gradient. d Type of winds- planetary wind, periodic winds (monsoon winds), local winds (land and sea breezes, mountain and valley winds). e. Introduction to El Niño and La Niña	11
4	Atmospheric Moisture and Precipitation	a. Forms of precipitation- rain, snow, dew, hail and fog. b. Types of clouds.	05

Section II - Oceanography			
5	Oceanography and Submarine Relief	a. Definition, nature and scope. b. Importance of the study of oceanography in modern times. c. General idea of ocean relief. d. Relief of Atlantic, Pacific and Indian oceans.	08 08
6	Types of Coasts	a. Types- Half Nehrung, Fiord, Dalmatian, Ria coasts. b. Submerged and emerged coast.	04
7	Properties of Ocean Water	a. Properties of ocean water- temperature, density. b. Salinity- meaning and causes. c. Salinity of oceans, seas, and lakes with examples.	10
8	Movements of Ocean Water	a. Waves- Characteristics of sea waves, wave refraction, tsunamis. b. Ocean currents- meaning, causes, types. c. Ocean currents of Atlantic, Pacific and Indian Oceans d. Effects of ocean currents. e. Tides- meaning, causes, types. f. Equilibrium theory of tides.	10

Reference books:

Critchfield, H.J., 1997. General Climatology, Prentice Hall of India Pvt. Ltd, New Delhi. Dasgupta, A. and Kapoor, A.N., Principles of Physical Geography.

Grald, S., General Oceanography.

Ttrewartha, G., Introduction to Weather and Climate. King, C.A.M., Oceanography for Geographers.

Lake, P., Physical Geography.

Lutgens, F.K. and Tarbuck, E.J., 2007. The Atmosphere, Pearson Prentice Hall, New Jersey. Pirie, R.G., Oceanography (Contemporary).

Ross, D.A., 1988. Introduction to Oceanography. Prentice Hall, New Jersey. Sharma, R.C. and Vatel. M., Oceanography for Geographers.

Strahler, A.A. and Strahler, A. N., 2002. Physical Geography: Science and Systems of the Human Environment, John Wiley and Sons, INC. Strahler, A.H. and Strahler, A. N., 1992. Modern Physical Geography, John Wiley and Sons, INC.

Strahler, A.N., 1965. Introduction to Physical Geography, John Wiley and Sons, INC. Various websites of internet.

Structure /Pattern of Syllabus- F.Y.B.Sc.

1. Title of the course –

Gg- 101- Techniques in Physical Geography - (Paper III)

2. **Preamble of the syllabus**

- i. To acquire the knowledge various techniques in physical geography
 - ii. To enable the students to use techniques of specific maps and their geographical interpretation.
 - iii. To acquaint the students with the weather instruments and their utility and applications in geographical phenomena
- Batches of 15 students, each and 4 periods per batch

3. Introduction: Pattern –**Annual (20 marks internal & 80 marks University)**

4. Eligibility- **12th pass Science**

5. Examination-

- A. Pattern of examination-

i (Internal term end and University exam),

ii. Pattern of question paper:

Internal Exam: 20 marks

External Exam: 80 marks

Both the exams should be conducted at the end of second term.

Internal Exam: 20 Marks

University Exam: 80 Marks

B. Standard of passing- Internal -08- University -32= annual marks 40

C. ATKT rules- No

D. Award of class- F.Y.B.Sc. Pass

E. External students- No

F. Setting of question papers/ pattern of question paper

G. Pattern of question paper:

Term end paper of 20 marks converted to 10 marks for each term

Annual exam of 80 marks

Internal Exam per term 10 Marks = Total 20 marks for two terms

University Exam- 80 Marks

Internal Exam- 20 Marks = (converted to 20 marks)

University Exam- 80 Marks =

(According to the Skelton of the syllabus)

H. Verification / Revaluation- **No**

6. Structure of the course

a. Compulsory paper- **F.Y.B.Sc. Practical**

b. Optional paper- **No**

c. Question paper and papers etc: **YES**

d. Medium of instructions- **English**

7. Equivalence of previous syllabus along with propose syllabus- **yes**

8. University terms: **Annual pattern**

9. Subject wise detail syllabus – **As per attached sheets**

10. Recommended books- **Mentioned in syllabus**

11. Qualification of teacher- **M.A./M.Sc(Geography), as per UGC and University norms**

Equivalence of Syllabus in Geography (F.Y.B.Sc.) effective from June 2013

Old Syllabus June 2008		New Syllabus June 2013	
Gg-110	Physical Geography (Paper I)	Gg-110	Geomorphology (Paper I)
Gg-120	Geography of Atmosphere and Hydrosphere (Paper II)	Gg-120	Climatology and Oceanography(Paper II)
Gg-101	Techniques in Physical Geography (Paper III)	Gg-101	Techniques in Physical Geography (paper III)

UNIVERSITY OF PUNE
F. Y. B. Sc. (Geography)
Course No. Gg. 101: Paper III
Title of the Course: Techniques in Physical Geography

Objectives:

1. To acquire the knowledge of various techniques in Physical Geography.
8. To enable the student to use techniques of specific maps and their geographical interpretation.
9. To acquaint the students with the weather instruments and their utility and applications in geographical phenomena.

* **Batch of 15 students each & 4 periods per batch**

Section I -			
Unit No.	Unit	Sub Unit	No. of periods
1	Maps	a. Definition, elements of map, scale, direction, projection, Conventional signs and symbols.	08
2	Map Scales	a. Definition and types- Verbal Scale (VS), Representative Fraction (RF), Graphical Scale b. Conversion of scale- VS into RF and RF into VS (Minimum 4 examples each) c. Exercise on simple graphical scale (Minimum 4 exercises)	08
3	Relief	I. Methods of relief representation. a. Qualitative- Hachures, hill shading, layer tint b. Quantitative- contours, form lines, spot height, bench mark, triangulation station c. Representation of following features by contours- uniform slope, concave slope, convex slope, terraced slope, conical hill, plateau, ridge, saddle, V-shaped valley, U-shaped valley, waterfall, gorge, spur, cliff.	08
4	SOI Toposheets	a. Introduction to toposheets, Types of Toposheet/Indexing of toposheets i 1: 1000000 Series Sheet ii 1:250000 Series Sheet iii 1: 100000 Series Sheet iv 1:50000 Series Sheet v 1:25000 Series Sheet b. Marginal Information, Grid Reference, Conventional Signs and Symbols	08
5	Profile	a. Cross profile, longitudinal profile, intervisibility.	05

6	Toposheet Reading	a. At least one from the following regions- mountain plateau, plain. b. One day field excursion for orientation of Toposheet, observation of landforms, identification of landforms and preparation of brief report.	08
		SECTION II	
7	Weather Maps	a. Introduction to weather maps. b. India Meteorological Department (IMD) weather symbols. c. Use of satellite images in weather forecasting.	08
8	Isobaric Patterns	a. Drawing of isobaric patterns and associated weather- cyclone, anticyclone, ridge, trough, wedge, secondary depression, col.	08
9	Weather Instruments	a. Measurement of temperature i. Simple thermometer ii. Maximum and minimum thermometer iii. Thermograph (Mechanism and functioning) b. Measurement of humidity i. Hygrometer ii. Hygrograph (Mechanism and functioning) c. Measurement of precipitation i. Rain gauge (Mechanism and functioning) d. Measurement of air pressure i. Aneroid barometer ii. Barograph	12
10	Weather Map Reading	a. Reading of weather map of three seasons i. Summer ii. Monsoon iii. winter (Satellite images indicating weather phenomena should be shown).	12
11	Compilation of Information	a. Information should be compiled regarding weather forecasting. b. Compilation of weather information and its presentation (Should be compiled from daily news papers, television, internet, etc. and preparation of brief report). c. One day visit to nearby weather station	05

* The student will maintain a journal for all the practicals and it will be certified by the concerned teacher and Head.

Reference books:

- Singh, G., 2005. Map work and practical geography. Vikas Publishing House Pvt. Ltd., New Delhi
- Singh, R.L., and Dutt, P.K., 1968. Elements of practical geography, Students' Friends, Allahabad
- Singh, L.R. and Singh, R., 1973. Map work and practical geography, Central Book Allahabad
- Siddhartha, K., 2006. Geography through maps, Kisalaya Publications Pvt. Ltd, Delhi
- Ramamurthy, K., 1982. Map Interpretation, Rex Printers, Madras.
- Monkhouse, F.J. and Wilkinson, H.R., 1971. Maps and Diagrams. Methuen and Co. Ltd., London.
- K. Singh, R.L., 2005. Elements of Practical Geography. Kalyani Publishers, New Delhi. India.
- Steers, J.A., 1970. An Introduction to Study of Map Projections. University of London Press Ltd., London.
- Various websites of internet.

UNIVERSITY OF PUNE, PUNE.

Syllabus for F.Y.B.Sc

Subject: MATHEMATICS

(With effect from June 2013)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June, 2013. Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of F.Y.B.Sc. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: 12th science with mathematics or equivalent examination.

Structure of the course:

Sr. No.	Paper	Theory	Oral	Internal	Total
1	MT 101 (Algebra and Geometry)	80 Marks	-	20 Marks	100 Marks
2	MT 102 (Calculus and Differential equations)	80 Marks	-	20 Marks	100 Marks
3	MT 103 (Mathematics Practicals)	72 Marks	08 Marks	20 Marks	100 Marks

All 3 above courses are compulsory.

Medium of Instruction: English

Examination:

A) Pattern of examination: Annual.

B) Standard of passing : 40 Marks out of 100 marks for each papers.

But for MT 101 and MT 102 for passing a student should obtain minimum 32 marks out of 80 in the theory examination and overall total marks for theory and internal should be minimum 40.

C)Pattern of question papers: For MT 101 and MT 102

Q1. Attempt any 08 out of 10 questions each of 02 marks. [16 Marks]
(05 questions from each term)

Q2. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term I)

Q.3. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term I)

Q4. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term II)

Q.5. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term II)

The pattern of question paper for MT 103 is given in the detailed syllabus.

D) External Students: Not allowed.

E)Verification/Revaluation: Allowed for MT 101,MT 102.

Equivalence of Previous syllabus along with new syllabus:

Sr.No	New Courses	Old Courses
1	MT 101 (Algebra and Geometry)	Paper I (Algebra and Geometry)
2	MT 102 (Calculus and Differential equations)	Paper II (Calculus)
3	MT 103 (Mathematics Practicals)	Paper III (Mathematics Practicals)

Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules)

Details of Syllabus:

MT 101: Algebra & Geometry

FIRST TERM (Algebra)

Unit 01: Integers

15 Lectures

1.1 Well Ordering Principle for $\mathbb{N}$. Principle of Mathematical induction (strong form).

1.2 Divisibility in $\mathbb{Z}$: Definition and elementary properties. Division Algorithm, Euclidean Algorithm (Without proof) G.C.D. and L.C.M of integers, Relatively prime integers, Definition Prime numbers, Euclid's lemma, Basic properties of G.C.D., G.C.D of any two integers a and b if it exists is unique and can be expressed in the form $ax + by$, where $x, y \in \mathbb{Z}$.

1.3 Equivalence Relations, Equivalences classes, properties of Equivalences classes, Definition of partition, every partition gives an equivalence relation and vice-versa, Definition of Congruence, Congruence as equivalence relation on $\mathbb{Z}$, Residue classes, Partition of $\mathbb{Z}$, Addition modulo n , Multiplication modulo n .

Unit 02: Polynomials

6 Lectures

2.1 Definition of polynomial, Degree of polynomial, Algebra of polynomials, Division algorithm (without proof). G.C.D of two polynomials (without proof).

2.2 Remainder Theorem, Factor Theorem.

2.3 Relation between the roots and the coefficients of a polynomial, Examples.

Unit 03: Matrices and System of linear equations.

15 Lectures

3.1 Matrices, Echelon and Reduced echelon form of a matrix, Reduction of matrix to its echelon form, Definition of rank of a matrix by using echelon form.

3.2 System of linear equations, Matrix form of system of linear equations, Homogeneous and non-homogeneous system of linear equations, Gauss Elimination and Gauss Jordan Method.

3.3 Consistency of a system of linear equations, condition of consistency (without proof).

3.4 Eigen values, Eigen vectors, characteristic equation of a matrix of order up to 3×3

3.5 Statement of Cayley Hamilton theorem and its use to find the inverse of a matrix.

SECOND TERM (Geometry)

Unit 04: Analytical Geometry of two dimensions:

10 Lectures

4.1) Change of axes, Translation and rotation.

4.2) Conic Section: General equation of second degree in x and y . Centre of conic, Nature of conic, Reduction to standard form.

Unit 05: Planes in 3-dimension:

6 Lectures

Revision: Equations of the first degree in x, y, z , Transformation to the normal form, determination of plane under given conditions, Equations of the plane through three given points.

5.1 Systems of planes, two sides of a plane.

5.2 Length of the perpendicular from a point to a plane, bisectors of angles between two planes.

5.3 Joint equation of two planes, Angle between planes.

Unit 06: Lines in 3-dimension:

6 Lectures

Revision: Equations of a line, equations of a straight line in terms of its direction cosines and the co-ordinates of a point on it, equations of a line through two points, Symmetrical and unsymmetrical forms of the equations of a line. transformation of the equations of a line to the symmetrical form. Angle between a line and a plane.

6.1 The condition that a given line may lie in a given plane, the condition that two given lines are coplanar.

6.2 Number of arbitrary constants in the equations of a straight line, sets of conditions which determine a line.

6.3 The shortest distance between two lines, the length and equations of the line of shortest distance between two straight lines, length of perpendicular from a given point to a given line.

Unit 07: Sphere

8 Lectures

7.1 Definition and equation of the sphere in various forms.

7.2 Plane section of a sphere, intersection of two spheres.

7.3 Equation of a circle, sphere through a given circle, intersection of a sphere and a line.

7.4 Equation of a tangent plane.

Unit 08: Cones and Cylinders:**6 Lectures****8.1** Definition of cone and cylinder.**8.2** Equation of cone and cylinder with vertex at origin and (α, β, γ) .**8.3** The right circular cone, equation of a right circular cone.**8.4** The right circular cylinder, equation of a right circular cylinder.

Text Book: Text book of Algebra & Geometry, Prepared by B.O.S. in Mathematics,
University of Pune, Pune.(2013).

Reference Books:

1. Shantinayakan: Analytical Solid Geometry, S. Chand and Company Ltd, New Delhi, 1998.
2. David Burton, Elementary Number Theory, Tata McGraw Hill, Indian Edition.
3. H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed Wiley, (1994).
4. P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd. 1999.
5. K.B.Datta, Matrix and Linear Algebra, Prentice hall of India Pvt.Ltd, New Delhi 2000.

MT 102: Calculus and Differential Equations**FIRST TERM (Calculus)****Unit 1. The Real Numbers :****8 Lectures**

- 1.1 Algebraic properties of $\mathbb{R}$,
- 1.2 Order properties of $\mathbb{R}$, intervals in $\mathbb{R}$, neighborhoods and deleted neighborhoods of a real number, bounded subsets of $\mathbb{R}$.
- 1.3 The Completeness Property of $\mathbb{R}$, denseness of $\mathbb{Q}$ in $\mathbb{R}$.

Unit 2. Limit and Continuity**10 Lectures**

- 2.1 $\epsilon - \delta$ definition of limit of a function, Basic properties of limits.
- 2.2 Continuity of function at a point, Types of discontinuity.
- 2.3 Continuous functions on intervals.
- 2.4 Properties of continuous functions on closed and bounded interval.
(i) Boundedness. (ii) Attains its bounds. (iii) Intermediate value theorem

Unit 3. Differentiation

18 Lectures

- 3.1 Definition of derivative of a real valued function at a point, notion of differentiability, geometric interpretation of a derivative of a real valued function at a point.
- 3.2 Differentiability of a function over an interval.
- 3.3 Statement of rules of differentiability, chain rule of finding derivative of composite of differentiable functions (without proof), derivative of an inverse function.
- 3.4. Mean Value Theorems: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem
- 3.5 Indeterminate forms. L-Hospitals rule.
- 3.6 Higher order derivatives, examples, Leibnitz Theorem and its applications
- 3.7 Taylor's and Maclaurin's Theorem with Lagrange's form of remainder (without proof), Examples with assuming convergence of series.

SECOND TERM (Differential Equations)

Unit 4. Integration

08 Lectures

- 4.1 Integration of rational function by using partial fraction.
- 4.2 Integration of some irrational functions:

i) $\int (ax + b)^{\frac{1}{n}} dx$ where n is a positive integer, ii) $\int \frac{Ax + B}{\sqrt{ax^2 + bx + c}} dx$
iii) $\int (Ax + B)\sqrt{ax^2 + bx + c} dx$

- 4.3 Reduction formula

i) $\int \frac{x^n}{\sqrt{ax^2 + bx + c}} dx$ ii) $\int \frac{dx}{(x^2 + a^2)^n}$, n is a positive integer iii) $\int (x^2 + a^2)^{n/2} dx$
iv) $\int_0^{\pi/2} \sin^n x dx$ v) $\int_0^{\pi/2} \cos^n x dx$

Unit 5. Differential Equations of first order and first degree:

16 Lectures

- 5.1 Introduction to function of two, three variables, homogenous functions, Partial derivatives.
- 5.2 Differential equations, General solution of Differential equations.
- 5.3 Methods of finding solution of Differential equations of first order and first degree, Variable separable form, Homogenous Differential equations, Differential equations reducible to homogeneous form. Exact Differential equations. Differential equations reducible to exact Differential equations, Integrating factors, Linear Differential equations. Bernoulli's Differential equations.

Unit 6. Application of Differential Equations :**06 Lectures**

- 6.1 Orthogonal trajectories.
- 6.2 Kirchhoff's law of electrical circuit (RC & LR Circuit)

Unit 7. Methods of finding general solution of Differential Equations of first order and higher degree:**06 Lectures**

- 7.1 Equations solvable for p .
- 7.2 Equations solvable for x .
- 7.3 Equations solvable for y .
- 7.4 Equation in Clairaut's form.

Text Book: Text book of Calculus and Differential Equations, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

1. Introduction to Real Analysis by Robert G. Bartle and Donald R. Sherbert, Third Edition, John Wiley and Sons, 2002
2. Integral Calculus, Shantinayakan, S.K.Mittal, S. Chand and Co. Publication 2006.
3. R.Courant and F.John, Introduction to Calculus and Analysis, Vol. 1, Reprint of the first Ed., Springer-Verlag, New York, 1999.
4. Principles of Mathematical Analysis, W. Rudin, Third Edition, McGrawHill, 1976
5. Elementary Differential Equations, Macmillan Publication, by Rainville and Bedient.
6. Ordinary and partial Differential equations, M.D. Raisingania, S. Chand and Company, 2009.

MT 103: Mathematics Practical

(Practicals based on the applications of articles in MT 101 and MT 102)

List of Practicals:**TERM I**

1. Integers.
2. Partition and residue class in $\mathbb{Z}$.
3. Polynomials.
4. Solution of system of linear equations.
5. Eigen values and Eigen vectors.
6. Miscellaneous.
7. Real numbers.
8. Limit and Continuity
9. Differentiation.
10. Application of differentiation
11. Integration..
12. Drawing graphs of elementary functions

TERM II

13. Changes of axes and conic section.
14. Planes in three dimensions.
15. Lines in three dimensions.
16. Sphere.
17. Cone and Cylinder.
18. Miscellaneous.
19. Preliminaries of differential equation.
20. Solution of differential equation of first order and first degree-I
21. Solution of differential equation of first order and first degree-II
22. Application of differential equation.
23. Differential equation of first order and higher degree.
24. Miscellaneous.

Modalities For Conducting The Practical and The Practical Examination

- 1) There will be one 3 hour practical session for each batch of 15 students per week
 - 2) A question bank consisting of 100 problems in all for the whole year, distributed in four Sections: 50 questions for each term (25 questions on MT 101 and 25 on MT 102) will be the course work for this paper. Question Bank will be prepared by the individual subject teacher and the problems included should be changed every year, based on the list of practicals given above. The question bank of each year should be preserved by the subject teachers, which can be reviewed by the L.I.C. members visiting college.
 - 3) The College will conduct the Practical Examination at least 15 days before the commencement of the Main Theory Examination. The practical examination will consist of written examination of 72 marks and oral examination of 08 marks.
 - 4) There will be no external examiner, the practical exam will be of the duration of 3 hours.
 - 5) The subject teacher will set a question paper based on pattern as follows:
 - Q1.** (a) Any 1 out of 2 worth 8 marks on MT101 (first term).
(b) Any 1 out of 2 worth 8 marks on MT 102. (first term).
 - Q2*.** Any 5 out of 7 each of 4 marks on MT 101.
 - Q3*.** Any 5 out of 7 each of 4 marks on MT 102..
 - Q4.** (a) Any 1 out of 2 of 10 marks on MT 101(second term).
(b) Any 1 out of 2 worth 10 marks on MT 102 (second term).
- (*In Q2 and Q3, there will be 3 questions from first term and 4 questions from the second term or vice-versa)
- 6) Each student will maintain a journal to be provided by the college.

7) The internal 20 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.

8) It is recommended that concept may be illustrated using computer software and graphing calculators wherever possible.

9) The subject teachers can include computer practicals based on use of free mathematical software's like Scilab, Maxima, mu-pad, etc. for solving problems in the miscellaneous practical mentioned above.

10) Study tours may be arranged at places having important mathematical institutes or historical places.

11) **Special Instruction:** Before starting each practical necessary introduction, basic definitions, intuitive inspiring ideas and prerequisites must be discussed.

University of Pune

Three Year B. Sc. Degree Course in

MICROBIOLOGY

Syllabus

(To be implemented from Academic Year 2013-14)

Preamble:

Microbiology is a branch of science that studies “Life” taking an example of microorganisms such as bacteria, protozoa, algae, fungi, bacteria, viruses, etc. These studies integrate cytology, physiology, ecology, genetics and molecular biology, evolution, taxonomy and systematics with a focus on microorganisms; in particular bacteria. The relevance and applications of these microorganisms to the surrounding environment including human life and Mother Nature becomes part of this branch. Since inception of this branch of science, Microbiology has remained a field of actively research and ever expanding in all possible directions; broadly categorized as pure and applied science. Different branches of Pure Microbiology based on taxonomy are Bacteriology, Mycology, Protozoology and Parasitology, Phycology and Virology; with considerable overlap between these specific branches over each other and also with other disciplines of life sciences, like Biochemistry, Botany, Zoology, Cell Biology, Biotechnology, Nanotechnology, Bioinformatics, etc. Areas in the applied Microbial Sciences can be identified as: Medical, Pharmaceutical, Industrial (Fermentation, Pollution Control), Air, Water, Food and Dairy, Agriculture (Plant Pathology and Soil Microbiology), Veterinary, Environmental (Ecology, Geomicrobiology); and the technological aspects of these areas.

Knowledge of different aspects of Microbiology has become crucial and indispensable to everyone in the society. Study of microbes has become an integral part of education and human progress. Building a foundation and a sound knowledge-base of Microbiological principles among the future citizens of the country will lead to an educated, intellectual and scientifically advanced society. Microbiological tools have been extensively used to study different life processes and are cutting edge technologies. There is a continual demand for microbiologists in the work force – education, industry and research. Career opportunities for the graduate students are available in manufacturing industry and research institutes at technical level.

Introduction:

The syllabi till today had been sufficient to cater for the needs of students for building up their careers in industry and research. However, with the changing scenario at local and global level, we feel that the syllabus orientation should be altered to keep pace with developments in the education sector. The need of the hour is proper syllabi that emphasize on teaching of technological as well as the administrative aspects of modern biology. Theory supplemented with extensive laboratory expertise will help these students, to avail these opportunities. Both these aspects i.e. theory and more of practical needs to stressed, such that a graduate student can start work directly in applied fields (industry or institutions), without any additional training.

Thus, the university / college itself will be developing the trained and skilled man-power. We even find a lack of trained teachers who can share their experiences on different aspects in microbiology. And we plan to restructure the syllabus in this viewpoint. The restructured syllabus will combine the principles of chemistry and biological sciences (molecular and cell biology, genetics, immunology and analytical tools) with technological disciplines to produce goods and services and for environmental management.

Microbiology curricula are operated at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart basic knowledge of the respective subject from all possible angles. In addition, students are to be trained to apply this knowledge particularly in day-to-day applications of Microbiology and to get a glimpse of research.

Objectives to be achieved:

- To enrich students' knowledge and train them in the pure microbial sciences
- To introduce the concepts of application and research in Microbiology
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help students build-up a progressive and successful career

Eligibility

1. First Year B.Sc.:

- a. Higher Secondary School Certificate (10+2) or its equivalent Examination with English and Biology; and two of the science subjects such as Physics, Chemistry, Mathematics, Geography, Geology, etc. OR
- b. Three Years Diploma in Pharmacy Course of Board of Technical Education conducted by Government of Maharashtra or its equivalent. OR
- c. Higher Secondary School Certificate (10+2) Examination with English and vocational subject of + 2 level (MCVC) - Medical Lab. Technician (Subject Code = P1/P2/P3)

2. Second Year B.Sc.:

Keeping terms of First Year of B. Sc. with Microbiology as one of the subjects. In addition to the above qualification students who have passed the Diploma course in Pharmacy are eligible however such cases should be approved by equivalence committee of Faculty of Science of the University of Pune.

3. Third Year B. Sc.:

Student shall clear all First Year B. Sc. Microbiology courses and satisfactorily keeping terms of Second Year of B. Sc. with Microbiology as one of the subjects.

Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune.

Reservation and relaxation will be as per the Government rules.

Standard of Passing

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Theory Examination.)

- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Examination.)

Award of Class

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the Principle subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

ATKT Rules

While going from F. Y. B. Sc. to S. Y. B. Sc. at least 8 courses (out of total 12) should be cleared; however all F. Y. B. Sc. courses should be cleared while going to T. Y. B. Sc.

While going from S. Y. B. Sc. to T. Y. B. Sc., at least 12 courses (out of 20) should be cleared (Practical Course at S. Y. B. Sc. will be equivalent to 2 courses).

Equivalence of Previous Syllabus

No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus.

External Students

There shall be no external students.

University Terms

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.

Course Structure:

Duration: The duration of B.Sc. (Microbiology) Degree Program shall be three years.

Medium of Instruction: The medium of instruction for the course shall be English.

To accommodate more advanced topics in the syllabi, it is necessary to understand the base science knowledge level of the students that have chosen the Microbiology discipline. Curricula of courses of state and central boards of higher secondary level were reviewed to avoid repetitions of introductory cell biology.

At **first year of under-graduation**, students will be given the basic information that includes – characteristics of microbial world. The microorganisms will be studied for morphological, structural characterization, isolations techniques from natural and extreme environments and their prominent features. The methodology for observation i.e. different microscopy techniques, staining techniques and nutritional requirements will be taught in detail; including these aspects at laboratory level as well. Introduction to biochemical characterization of components of micro-organism e.g. proteins, lipids, nucleic acids and carbohydrates and instrumental techniques to estimate these components qualitatively and quantitatively from micro-organisms or other natural sources will be the focus for second theory paper. Relevant experimentation on these topics will be included in practical course. In practical course, students will be trained in preparing laboratory manuals, standard operating practices and log books.

At **second year under-graduation**, principles of taxonomy and classification of major groups of microorganisms can be studied in one of the papers. This paper will also include the physiological studies on these groups of micro-organisms. Second paper will deal with Air and Water Microbiology; role of micro-organisms in environment in regards to pollution and biodegradation; water and sewage treatment. Practical for the second year students will be less defined i.e. kept more flexible, designed to evolve project themes on environment, agriculture and pollution aspects and acquiring laboratory related skills. Practical at this level will also include application of biostatistics principles and computers for data analysis and interpretation, and introduction to scientific writing and report preparation. These aspects can be practiced better while carrying out the mini-projects.

At **third year under-graduation**, six theory papers deal with broad applied areas of microbiology that are interactive with higher living forms. Five such areas are – medical microbiology, microbial physiology, microbial (prokaryotic and eukaryotic) genetics, immunology and immunopathology, fermentation technology. The sixth course will be Applied Microbiology that will include – Dairy Microbiology, Food Microbiology, Fermentation Technology, Agriculture Biotechnology, Fungal Biotechnology, etc. The practical at third year will be planed more intensively, with exposure to applied fields.

F. Y. B. Sc. Microbiology

Paper	Course Title	Marks	Lectures
Paper - I	Introduction to Microbiology	100	Three Periods/Week per Paper (Total 36/Paper per Term)
Paper - II	Basic Techniques in Microbiology	100	
Practical Course	Practical Course	100	*Four Hours / Week (Total 96 – Term I & II)
*Practical to be conducted as two hours each day on two consecutive days / Batch			

Examination Pattern

Theory paper:	University Examination – 80 marks (at the end 2 nd term) Internal Examination – 20 marks
Practical course:	University Examination – 80 marks (at the end of 2 nd term) Internal Examination – 20 marks

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 line and based on entire syllabus
Question 2 and 3	4 out of 6– short answer type questions; answerable in 6 – 8 lines
Question 4	2 out of 4 – long answer type questions; answerable in 12 – 16 lines
Question 5	1 out of 2 –essay / long answer type question; answerable in 25 – 30 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. There shall be 20 questions, each question of 0.5 marks.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of minimum 4 hours duration, carried over on two subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments. Certified journal is compulsory to appear for practical examination. There shall be two experts and two examiners per batch for the practical examination.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

S. Y. B. Sc. Microbiology

	Paper	Course Title	Marks	Lectures
Semester I	MB - 211	Bacterial Systematics and Physiology	50	Four Periods/Week per Paper (Total 48/Paper per Semester)
	MB - 212	Microbial Genetics	50	
Semester II	MB – 221	Analytical Microbiology	50	
	MB - 222	Air and Water Microbiology	50	
Semester I & II	Practical Course	Practical Course	100	*Four Hours / Week (Total 96 – Semester I & II)
*Practical to be conducted as two hours each day on two consecutive days / Batch				

Examination Pattern

Theory paper:	University Examination – 40 marks (at the end of each semester)
	Internal Examination – 10 marks
Practical course:	University Examination – 80 marks (at the end of 2 nd semester)
	Internal Examination – 20 marks

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks; objective type and based on entire syllabus
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
Question 4	1 out of 2 – long answer type questions; answerable in 20 – 25 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each semester. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. Different sets of question papers may be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical Examination: Practical examination will be of minimum 4 hours duration, carried over on two subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments. Certified journal is compulsory for appearing for practical examination. There shall be two experts and two examiners per batch for the practical examination. One of the examiners will be external.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

T. Y. B. Sc. Microbiology

Theory Papers

	Paper	Paper Title	Marks	Lecturers
Semester III	MB 331	Medical Microbiology – I	50	Four Periods/Week per Paper (Total 48/Paper per Semester)
	MB 332	Genetics & Molecular Biology - I	50	
	MB 333	Enzymology	50	
	MB 334	Immunology -I	50	
	MB 335	Fermentation Technology -I	50	
	MB 336	Applied Microbiology - I	50	
Semester IV	MB 341	Medical Microbiology - II	50	
	MB 342	Genetics & Molecular Biology - II	50	
	MB 343	Metabolism	50	
	MB 344	Immunology -II	50	
	MB 345	Fermentation Technology -II	50	
	MB 346	Applied Microbiology - II	50	

Practical Courses

	Course	Course title	Marks	
Semester III & IV	MB 347	Practical course – I Applied Microbiology	100	*Four Hours / Week per course (Total 96/Course per Semester)
	MB 348	Practical course – II Biochemistry & Molecular Biology	100	
	MB 349	Practical course – III Diagnostic Microbiology & Immunology	100	
*Practical to be conducted as four hours each day on three consecutive days / Batch				

Examination Pattern

Theory paper:	University Examination – 40 marks (at the end of each semester) Internal Examination – 10 marks
Practical course:	University Examination – 80 marks (at the end of 2 nd semester) Internal Examination – 20 marks

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks; objective type and based on entire syllabus
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines
Question 4	1 out of 2 – long answer type questions; answerable in 20 – 25 lines

Internal examination: Internal assessment of the student by respective teacher will be comprehensive and continuous, based on written test, 10 marks each semester. The written test shall comprise of objective type questions – Multiple Types Questions, True / False, Definitions, Tricky computational problems with minimum calculations. Different sets of question papers may

be given in the same class-room. There shall be 20 questions to be answered in 40 minutes, each question of 1mark.

Practical Examination: Practical examination will be of minimum 6 hours duration, carried over on three subsequent days. There shall be 10 marks for laboratory log book and journal, 10 marks for viva-voce and minimum three experiments per practical course. Certified journals are compulsory for appearing for practical examination. There shall be two experts for each practical course and two examiners per batch; one of the examiners will be external.

Setting question papers: Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject.

Qualification of Teachers:

With minimum undergraduate and postgraduate degree in Microbiology (B. Sc. and M. Sc. Microbiology) and qualified as per UGC regulations.

F. Y. B. Sc. MICROBIOLOGY

THEORY PAPER I: INTRODUCTION TO MICROBIOLOGY

Paper I: Term I

Sr. No.	Topic	Lectures
1.	Frontiers of Microbiology	2
2.	A. History of Microbiology I. Discovery of microscope II. Micrographia of Anton von Leeuwenhoek and Robert Hooke III. Abiogenesis v/s biogenesis • Aristotle's notion about spontaneous generation • Redi's experiment • Louis Pasteur's & Tyndall's experiments	6
	B. Development of Microbiology in 19th century I. Observations and role of microorganisms in transformation of organic matter. • Germ theory of fermentation • Discovery of anaerobic life & physiological significance of fermentation II. Discovery of microbes as pathogens • Surgical antiseptics • Germ theory of disease – Koch's postulates & River's postulates	4
	C. Developments in 20th and 21st Centuries with respect to: • Vaccination and Chemotherapy • Contributions of Nobel Laureates in Immunology, Molecular Biology & Biotechnology	4
3.	Morphological and differentiating characters of microorganisms: • Bacteria • Rickettsia • Protozoa • Algae • Fungi (Molds and Yeasts) • Viruses, viroids and prions Principles in classification of Bacteria (Introduction to Bergey's Manual of Determinative and Systemic Bacteriology) and viruses (ICTV)	12
4.	Applications of Microbiology: i. Significance of normal flora and probiotics in human health ii. Microbes as Biofertilizers and Biocontrol Agents (e.g. Nitrogen fixers, Phosphate Solubilizers and <i>Bacillus thuringensis</i>)	4

Paper I: Term II

Sr. No.	Topic	Lectures
5.	I. Covalent and non-covalent bonding in biomolecules II. Concepts of pH and redox potential	4
	Chemistry of Biomolecules - Carbohydrates (Starch, Glycogen, Cellulose, Peptidoglycan) - Lipids (Triglycerides and phospholipids) - Structural and Functional Proteins (Hemoglobin, Immunoglobulin; flagellin and cytoskeletal proteins in bacterial cell) - Nucleic acids (DNA and RNA)	16
6.	Bacterial Cytology Studies on structure, chemical composition and functions of the following components in bacterial cell: - Cell wall - Cell membrane - Endospore - Capsule - Flagella - Fimbriae and Pili - Ribosomes - Chromosomal & extra-chromosomal material - Cell inclusions (Gas vesicles, carboxysomes, PHB granules, metachromatic granules and glycogen bodies)	16

THEORY PAPER II: BASIC TECHNIQUES IN MICROBIOLOGY

Paper II: Term I

Sr. No.	Topic	Lectures
1.	a. Units of measurement. Modern SI units (Length, volume, Weight) b. Microscopy : - Bright field microscopy: Structure, working of and ray diagram of a compound light microscope; Concepts of magnification, numerical aperture and resolving power. - Types, ray diagram and functions of – condensers, eye-pieces and objectives - Aberrations in lenses - spherical, chromatic, comma and astigmatism - Principles, construction, working and applications of: - Dark field microscopy - Fluorescence microscopy - Confocal microscopy	12

2.	Staining Techniques : - Definitions of Stain; Types of stains (Basic and Acidic), - Properties and role of Fixatives, Mordants, Decolorisers and Accentuators - Principles of staining techniques for following: i. Monochrome staining and Negative (Relief) staining ii. Differential staining - Gram staining and Acid fast staining	8
3.	Sterilization and Disinfection	
	1. Physical Agents - Heat, Radiation, Filtration	6
	2. Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, Heavy metals, Alcohol, Dyes, Detergents and Ethylene oxide.	10
	3. Characteristics of an ideal disinfectant	
	4. Checking of Efficiency of Sterilization – Biological and Chemical Indicators	
	5. Checking of Efficiency of Disinfection - Phenol Coefficient	

Paper II: Term II

Sr. No.	Topic	Lectures
4.	Cultivation of Microorganisms	
	1. Nutritional requirements and nutritional classification	3
	2. Design and preparation of media – Common ingredients of media and types of media	3
	3. Methods for cultivating photosynthetic, extremophilic and chemolithotrophic bacteria.	4
	4. Concept of Pure Culture, Enrichment, Isolation and Preservation techniques. Maintenance of bacterial and fungal cultures	6
	5. Culture collection centers and their role. Requirements and guidelines of National Biodiversity Board for Culture collection centers	2
5.	Bacterial Growth	
	Growth Kinetics and growth curve; definitions of Generation time, Growth rate and specific growth rate	4
	Methods of enumeration: - Microscopic methods (Direct Microscopic Count, Counting cells using Neubauer, Petroff and Hausser's chambers) - Plate counts (Total Viable Count) - Estimation of Biomass (Dry mass, Cell volume) - Chemical methods (Cell Carbon and Nitrogen estimation) - Turbidometric methods (Nephelometry)	6
	Factors affecting bacterial growth (pH, Temperature, Solute Concentration (Salt and Sugar) and Heavy metals	4
	Diauxic growth	1
	Synchronous culture	3

Practical Course (Term I & II)

BASED ON THEORY PAPER I & II		(96)
Expt. No.	Topic	Hours
1-2	Preparation of Standard Operating Procedures (SOPs) for common microbiology laboratory instruments e.g. Incubator, Hot Air Oven, Autoclave, Colorimeter, pH Meter, Distillation Unit, Chemical Balance, Laminar air flow hood, Clinical Centrifuge	2
3	Construction (mechanical and optical), working and care of bright field microscope	1
4	Observation of microorganisms using bright field microscope - Bacteria, Protozoa, Molds and Yeasts, Algae – from natural habitat	1
5-7	Observation of microorganisms using staining techniques: a. Monochrome staining and b. Negative /Relief staining (Capsule staining) c. Gram staining of bacteria	3
8-9	Observation of motility in bacteria using: a. Hanging drop method and Cragie's tube method b. Swarming growth methods	2
10	Enumeration of yeast cells using a counting chamber	1
11-12	Cultivation of microorganisms: a. Preparation of simple laboratory nutrient media (solid and liquid) and using them to cultivate bacteria. b. Observation of the growth of cultures and reporting of colony and cultural characteristics (Nutrient and MacConkey's agar)	2
13	Isolation of bacteria by streak plate technique	1
14-15	Enumeration of bacteria from fermented food / soil / water by: a. Spread plate method b. Pour plate method	2
16	Aseptic transfer techniques (slant to slant, broth to broth, broth to agar and Agar to Agar)	1
17	Preservation of cultures on slants, soil and on grain surfaces; revival of these cultures and lyophilized cultures.	1
18	Checking sterilization efficiency of autoclave using a biological indicator (<i>B. stearothermophilus</i>)	1
19	Demonstration of checking of efficacy of chemical disinfectant: Phenol Coefficient Rideal Walker method)	1
20	Preparation of Winogradsky column and observation of different types of microorganisms using bright filed microscope.	1
21-22	Study of normal flora of skin: a. Cultivating and observing different morphoforms of bacteria from skin b. Study of effect of washing skin with soap and disinfectant on it's microflora	2
23-24	a. To study the effect of different parameters on growth of <i>E. coli</i> : pH, temperature, sodium chloride concentration b. Study of Oligodynamic action of heavy metal	2

Recommended Books:

1. Daniel Lim, Microbiology, 2nd Edition; McGraw-Hill Publication
2. Ingraham J. L. and Ingraham C.A. (2004). Introduction to Microbiology. 3rd Edition. Thomson Brooks / Cole.
3. Madigan M.T., Martinko J.M. (2006). Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
4. Michael J Pelczar, JR. E.C.S. Chan, Noel R. Krieg. (1993) Microbiology, 5th Edition, Tata MacGraw Hill Press.
5. Prescott L.M., Harley J.P., and Klein D.A. (2005). Microbiology, 6th Edition. MacGraw Hill Companies Inc.
6. Prescott, Lancing. M., John, P. Harley and Donald, A. Klein (2006) Microbiology, 6th Edition, McGraw Hill Higher Education
7. Willey J. M., Sherwood L. M. and Woolverton C. J. (2013) Prescott's Microbiology, 8th Edition, McGraw-Hill Higher Education
8. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Hill Publishing Co.
9. Stanier R.Y., Adelberg E.A. and Ingraham J.L. (1987) General Microbiology, 5th Edition. Macmillan Press Ltd.
10. Tortora G.J., Funke B.R., Case C.L. (2006). Microbiology: An Introduction. 8th Edition. Pearson Education Inc
11. Wilson K. and Walker J.M. (2005) Principles and Techniques of Biochemistry and Molecular Biology. 6th Edition. Cambridge University Press.
12. Hans G. Schlegel (1993) General Microbiology, 8th Edition, Cambridge University Press
13. David T. Plummer (1993) An Introduction To Practical Biochemistry, 3rd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi

Faculty of Science

Revised Syllabus

For

B. Sc.
(Physics)

From Academic Year 2013-2014

Structure of Syllabus

UNIVERSITY OF PUNE

Proposed Structure of B.Sc. (Physics) Syllabus

1) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in Physics and for becoming an entrepreneur.

Objectives:

- To provide in depth knowledge of scientific and technological aspects of Physics
- To familiarize with current and recent scientific and technological developments
- To enrich knowledge through problem solving, hand on activities, study visits, projects etc.
- To train students in skills related to research, education, industry, and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Physics

2) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Physics as one of the subjects. Other students if they fulfil the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Physics as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

F.Y. B. Sc.

(From Academic Year 2013-2014)

(To be implemented from Academic Year 2013-14)

Paper	Title
Paper I	Section I (For Term 1): Mechanics
	Section II (For Term 2): Heat and Thermodynamics
Paper II	Section I (For Term 1): Physics Principles and Applications
	Section II (For Term 2): Electromagnetism
Paper III	(For Term1 and Term 2): Practical

For each theory course: 36 Lectures per term/2 Credits per term

For practical course: 20 practicals/4Credits

S. Y. B. Sc.
(Semester Pattern)
(From Academic Year 2014-2015)

Semester I

Paper	Title
Paper I (PHY211)	Mathematical Methods in Physics I
Paper II (PHY 212)	Electronics I /Instrumentation

Semester II

Paper	Title
Paper I (PHY221)	Oscillations, Waves and Sound
Paper II (PHY 222)	Optics

Practical Course (Annual)

Paper III (PHY 223) (Annual)	Practical

T. Y. B. Sc. (Physics)
(Semester Pattern)

(From Academic Year 2015-2016)

Theory Courses (Semester)	
Semester III	Semester IV
PH331: Mathematical Methods in Physics II	PH341: Solid State Physics
PH332: Classical Electrodynamics	PH342: Quantum Mechanics
PH333: Classical Mechanics	PH343: Thermodynamics and Statistical Physics
PH334: Atomic and Molecular Physics	PH344: Nuclear Physics
PH335: Computational Physics	PH345: Electronics II /Advanced Electronics

PH336: Elective I (Select any One)	PH346: Elective II (Select any One)
A: Astronomy and Astrophysics	F: Renewable Energy Sources
B: Elements of Materials Science	G: Physics of Nano materials
C: Motion Picture Physics	H: Microcontrollers
D: Biophysics	I: Electro Acoustics and Entertainment Electronics
E: Medical Electronics	J: Lasers
	K: Methods of Experimental Physics
Practical Courses (Annual)	
PH347: Laboratory Course I	
Phy348: Laboratory Course II	
PH349: Laboratory Course III (Project)	

Examination:

A) Pattern of Examination:

i) **F. Y. B. Sc.**

- (a) There shall be university examination at the end of the academic year for 80 marks for each theory paper.
- (b) 20 marks for each paper are allotted to the comprehensive internal assessment of the student by the respective teacher, teaching the course. The teacher shall evaluate the performance of the student for 10 marks in each term; on the basis of written tests. Ordinarily written tests shall consist of (i) multiple choice questions, (ii) True/False, (iii) basic definitions, (iv) tricky computational problems involving minimal calculations. Student is asked to answer 20 questions in 40 minutes. Each question will be of $\frac{1}{2}$ marks. In the same classroom setup, different set of equivalent sets of question papers may be experimented. It will be preferred to have two such tests in each term, per course (one at the middle of the term and one at the end of the term) and average (or best of the two tests) be considered as internal marks out of 10 for that term. Internal Test shall cover the entire syllabus. If teacher prefers to have one test only, it shall be at the end of the term covering the entire syllabus).
- (c) Practical examination be conducted by respective colleges at the end of the academic year 80 marks be assigned to practicals and 20 marks for internal examination, journal attendance (Journal 10 marks, Oral 10 marks).

ii) S. Y. B. Sc. and T. Y. B. Sc.

- (a) There shall be university examination at the end of semester for 40 marks for each theory paper.
- (b) 10 marks for each paper are allotted to the comprehensive internal assessment of the student by the respective teacher, teaching the course. Pattern of internal assessment shall be on the lines of F.Y.B. Sc.
- (c) University Practical examination be conducted at the end of the academic year 80 marks be assigned to practicals and 20 marks for internal examination, journal attendance (Journal 10 marks, Oral 10 marks).

For practical examination:

- (1) At least one examiner should be external
- (2) Certified journals be compulsory
- (3) There shall be two experts for all subjects.
- (4) (a) At T. Y. B. Sc. level, it is preferred to have project work in lieu of one of the practical course.
(b) Blue print for Model Question Paper: Each Board of Studies shall frame at least 5 sets of model theory papers and 10 sets of model question set for internal assessment.

II) Pattern of the Question paper:

For theory paper (University examination) shall be as follows.

F. Y. B. Sc. (80 Marks) (Time Allotted: 3 hrs)

- Q1. 16 marks for 8 sub-questions, each sub-question for two marks. Sub-questions shall be answerable in two to four lines and shall be based on complete syllabus.
- Q2. and Q3. Student shall attempt four out of six questions. Each short answer type question shall carry four marks and be answerable in 6 to 8 lines.
- Q4. Student shall attempt 2 out of 4 long answer type questions. Each question will be for 8 marks and be answerable in 12 to 16 lines.
- Q5. Long easy type question for 16 marks. Student shall attempt one out of two questions.

OR

- Q5. Shall be on the pattern of question 4.
(Question paper of a particular course should contain minimum of 30% weightage to problems)

S. Y. B. Sc. and T. Y. B. Sc. (Theory) University Question Paper Pattern:
(40 marks, Time allotted: 2 hrs)

- Q1. 10 sub-question each for 1 mark. Sub-questions be answerable within 2 to 4 lines and shall be based on complete syllabus. All sub-questions are compulsory.
- Q2 and Q3: (10 Marks for each questions) Three sub questions. Students have to attempt any two questions.
- Q4. Long Essay type question for 8 marks and one question of two marks.

B) Standard of Passing: 40 % marks

C) ATKT Rules

- (i) Students shall clear 8 heads of passing (out of 12 such heads) while going from F. Y. B. Sc. to S.Y.B.Sc. However he must pass in all F. Y. B. Sc. subjects while going to T. Y. B. Sc.

- (ii) Student shall clear 12 heads of passing (out of 20 such heads) while going from S. Y. B. Sc. to T. Y. B. Sc. (Practical course of S. Y. B. Sc. will be equivalent to 2 heads of passing)
- D) Award of Class: As per University norms.
- E) External Students: Not applicable
- F) Setting of question paper/Pattern of Question paper: As mentioned above
- 6) Structure of the Course:
 - a) Compulsory paper: a) At F.Y.B.Sc. and S.Y.B.Sc. all papers are compulsory and at T.Y.B.Sc. 8 papers are compulsory and one paper is optional.
 - b) Optional papers: At T.Y.B.Sc. one paper per semester is optional.
 - c) Question papers and papers etc.: As mentioned above
 - d) Medium of Instructions: English
- 7) Equivalence of previous syllabus along with propose syllabus: The papers are similar so no equivalence is required at B. Sc. level.
- 8) University terms: 6 terms
- 9) Subject-wise detailed syllabus: Attached with this format.
- 10) Recommended books: Given in the syllabus at the end of each course.
- 11) Qualification of teachers: As per UGC regulations.

**F. Y. B. Sc.
Term -I**

Physics Paper I: Section I: Mechanics

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. Demonstrate an understanding of Newton's laws and applying them in calculations of the motion of simple systems.
2. Use the free body diagrams to analyse the forces on the object.
3. Understand the concepts of energy, work, power, the concepts of conservation of energy and be able to perform calculations using them.
4. Understand the concepts of elasticity and be able to perform calculations using them.
5. Understand the concepts of surface tension and viscosity and be able to perform calculations using them.
6. Use of Bernoulli's theorem in real life problems.
7. Demonstrate quantitative problem solving skills in all the topics covered.

Syllabus:

1. Newton's laws of motion

(6 Lectures)

- 1.1 Newton's First and Second Law and their explanation
- 1.2 Working with Newton's First and Second Law
- 1.3 Newton's Third Law of motion and its explanation
- 1.4 Various types of forces in nature (explanation) and concept of field
- 1.5 Frame of reference (Inertial, Non-inertial)
- 1.6 Pseudo Forces (e.g. Centrifugal Force)

2. Work and Energy

(8 Lectures)

- 2.1 Kinetic Energy
- 2.2 Work and Work-Energy Theorem
- 2.3 Calculation of Work done with
 - i) Constant Force
 - ii) Variable ForceIllustration
- 2.4 Conservative and Non-conservative Forces
- 2.5 Potential energy and conservation of Mechanical energy
- 2.6 Change in potential energy in rigid body motion
Mass-energy equivalence

3. Elasticity

(8 Lectures)

- 3.1 Hook's law and coefficient of elasticity
- 3.2 Young's modulus, Bulk modulus and Modulus of rigidity
- 3.3 Work done during longitudinal strain, volume strain, and shearing strain
- 3.4 Poisson's ratio
- 3.5 Relation between three elastic moduli (Y , η , K)
- 3.6 Determination of Y of rectangular thin bar loaded at the centre
- 3.7 Torsional oscillations
Torsional rigidity of a wire, to determine η by torsional oscillations

4. Surface Tension

(5 Lectures)

- 4.1 Surface Tension, Angle of Contact, Capillary Rise Method
- 4.2 Rise of liquid in a conical capillary tube
- 4.3 Energy required to raise a liquid in capillary tube

- 4.4 Factors affecting surface tension
- 4.5 Jeager's Method for Determination of surface tension
- 4.6 Applications of Surface Tension

5. Viscosity and Fluid Mechanics

(9 Lectures)

- 5.1 Concept of Viscous Forces and Viscosity
- 5.2 Pressure in a fluid and buoyancy
- 5.3 Pascal's law
- 5.4 Atmospheric Pressure and Barometer
- 5.5 Pressure difference and Buoyant Force in accelerating fluids
- 5.6 Steady and Turbulent Flow, Reynolds's number
- 5.8 Equation of continuity
- 5.9 Bernoulli's Principle
- 5.10 Application of Bernoulli's equation
 - i) Speed of Efflux
 - ii) Ventury meter
 - iii) Aspirator Pump
 - iv) Change of plane of motion of a spinning ball.

Reference Books:

1. University Physics: Sears and Zeemansky, XIth edition, Pearson education
2. Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers
3. Problems in Physics: P.K. Srivastava, Wiley Eastern Ltd.
4. Applied Fluid Mechanics: Mott Robert, Pearson Benjamin Cummir, VI Edition, Pearson Education/Prentice Hall International, New Delhi
5. Properties of Matter: D. S. Mathur, Shamlal Chritable Trust New Delhi
6. Mechanics: D.S Mathur, S Chand and Company New Delhi-5.

F. Y. B. Sc.
Term –II

Physics Paper I: Section II: Heat and Thermodynamics

Lectures: 36

Credits: 2

Learning Outcomes:

After successfully completing this course, the student will be able to do the following:

1. Describe the properties of and relationships between the thermodynamic properties of a pure substance.
2. Describe the ideal gas equation and its limitations.
3. Describe the real gas equation.
4. Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process.
5. Analyse the heat engines and calculate thermal efficiency.
6. Analyze the refrigerators, heat pumps and calculate coefficient of performance.
7. Understand property 'entropy' and derive some thermo dynamical relations using entropy concept.
8. Understand the types of thermometers and their usage.

Syllabus

1. Equation of state (8 lectures)

- 1.1 Equations of state
- 1.2 Andrew's experiment
- 1.3 Amagat's experiment
- 1.4 Van der Waals' equation of state
- 1.5 Critical constants
- 1.6 Reduced equation of state
- 1.7 Joule-Thomson porous plug experiment

2. Concepts of Thermodynamics (8 lectures)

- 2.1 Thermodynamic state of a system and Zeroth law of Thermodynamics
- 2.2 Thermodynamic Equilibrium
- 2.3 Adiabatic and isothermal changes
- 2.4 Work done during isothermal changes
- 2.5 Adiabatic relations for perfect gas
- 2.6 Work done during adiabatic change
- 2.7 Indicator Diagram
- 2.8 First law of Thermodynamics
- 2.9 Reversible and Irreversible processes

3. Applied Thermodynamics (8 lectures)

- 3.1 Conversion of Heat into Work and its converse
- 3.2 Carnot's Cycle and Carnot's Heat Engine and its efficiency
- 3.3 Second law of Thermodynamics
- 3.4 Concept of Entropy
- 3.5 Temperature-Entropy Diagram
- 3.6 T-dS Equation
- 3.7 Clausius-Clapeyron Latent heat equations

4. Heat Transfer Mechanisms (8 lectures)

- 4.1 Heat Engines
 - i. Otto cycle and its efficiency
 - ii. Diesel cycle and its efficiency

4.2 Refrigerators:

- i. General Principle and Coefficient of performance of refrigerator
- ii. The Carnot Refrigerator
- iii. Simple structure of vapour compression refrigerator

4.3 Air conditioning: principle and its applications

5. Thermometry

(4 lectures)

5.1 Temperature Scales: Centigrade, Fahrenheit and Kelvin scale

5.2 Principle, construction and working of following thermometers

- i. Liquid and Gas Thermometers
- ii. Resistive Type Thermometer
- iii. Thermocouple as thermometer
- iv. Pyre heliometer

Reference Books:

1. Physics: 4th Edition, Volume I, Resnick/Halliday/Krane JOHN WILEY & SONS (SEA) PTE LTD
2. Concept of Physics: H.C. Verma, Bharati Bhavan Publishers
3. Heat and Thermodynamics: Brijlal, N. Subrahmanyam, S. Chand & Company Ltd, New Delhi
4. Heat and Thermodynamics: Mark. W. Zemansky, Richard H. Dittman, Seventh Edition, McGraw-Hill International Editions
5. Thermodynamics and Statistical Physics: J.K. Sharma, K.K. Sarkar, Himalaya Publishing House
6. Thermal Physics (Heat & Thermodynamics): A.B. Gupta, H.P. Roy Books and Allied (P) Ltd, Calcutta.

F. Y. B. Sc.

Term I

Physics Paper II: Section I: Physics Principles and Applications

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. To demonstrate an understanding of electromagnetic waves and its spectrum.
2. Understand the types and sources of electromagnetic waves and applications.
3. To understand the general structure of atom, spectrum of hydrogen atom.
4. To understand the atomic excitation and LASER principles.
5. To understand the bonding mechanism in molecules and rotational and vibrational energy levels of diatomic molecules.
6. To demonstrate quantitative problem solving skills in all the topics covered.

Syllabus:

1. Physics of Atoms (12 Lectures)

1. The concept of atom (Atomic Models: Thompson and Rutherford)
2. Atomic Spectra
3. Bohr Theory
4. Hydrogen atom Spectra
5. Frank Hertz experiment
6. The LASER
Absorption, Spontaneous Emission, and Stimulated Emission, Population Inversion and Laser Action, Applications of Lasers

2. Physics of Molecules (10 Lectures)

1. Bonding Mechanisms: A Survey
 - i. Ionic Bonds
 - ii. Covalent Bonds
 - iii. Van der Waals Bonds
 - iv. The Hydrogen Bond
 - v. Metallic Bond
2. Variation of potential energy with inter-atomic distance
3. Concept of Rotational and vibrational energy levels of diatomic molecule

3. Electromagnetic Waves (14 Lectures)

1. Historical Perspective of Electromagnetic Waves
2. Production of electromagnetic waves : Hertz experiment
3. Electromagnetic spectrum
4. Planck hypothesis of photons (Concept only)
5. Sources of electromagnetic waves : Radio waves, Microwaves, Infrared, Visible light, Ultraviolet, X-rays, Gamma rays
6. Applications
 - i. microwave oven
 - ii. RADAR
 - iii. Pyro electric thermometer
 - iv. X-ray radiography and CT Scan
 - v. Solar cell

References

1. Concepts of Modern Physics: A Beiser (6th ed., McGraw Hill, 2003
2. Modern Physics: Raymond A. Serway, Clement J. Moses, Curt A. Moyer
3. Sears and Zemansky's University Physics: H.D. Young R. A. Freedman, Sandin (11th Ed. Pearson Education)
4. Nanotechnology : Principles and Practices: S. K. Kulkarni, Capital Publishing Company.

**F. Y. B. Sc.
Term II**

Physics Paper II: Section II: Electromagnetics

Lectures: 36

Credits: 2

Learning Outcomes:

On successful completion of this course students will be able to do the following:

1. Demonstrate an understanding of the electric force, field and potential, and related concepts, for stationary charges.
2. Calculate electrostatic field and potential of simple charge distributions using Coulomb's law and Gauss's law.
3. Demonstrate an understanding of the dielectric and effect on dielectric due to electric field.
4. Demonstrate an understanding of the magnetic field for steady currents using Biot-Savart and Ampere's laws.
5. Demonstrate an understanding of magnetization of materials.
6. Demonstrate quantitative problem solving skills in all the topics covered.

Syllabus

1. Electrostatics

(9 Lectures)

1. Revision of Coulomb's law
2. Superposition principle
3. Electric field due to an electric dipole, line and disc
4. Revision of Gauss's law
5. Coulomb's law from Gauss's law
6. Gauss's law applications in Cylindrical, planar and spherical symmetry

2. Dielectrics

(9 Lectures)

1. Electric Dipole
2. Electric dipole and dipole moment
3. Electric potential and intensity at any point due to dipole
4. Torque on a dipole placed in an electric field
5. Polar and non-polar molecules
6. Electric polarization of dielectric material
7. Gauss' law in dielectric
8. Electric vectors and relation between them

3. Magneto statics

(9 Lectures)

1. Revision of Biot-Savart's law with examples
2. Amperes' law, e.g. Solenoid and Toroid
3. Gauss law for magnetism

4. Magnetic properties of materials

(9 Lectures)

1. Magnetic materials and Bohr magneton
2. Magnetization (M), magnetic intensity (H), magnetic induction (B), magnetic susceptibility and permeability
3. Relation between B, M and H
4. Hysteresis

References:

1. Fundamentals of Physics: 8th Edition, Halliday Resnik and Walker
2. Electromagnetics: B. B. Laud

**F. Y. B. Sc.
Term I and II**

Physics paper III: Practical

Total Practicals: 20

Credits: 4

Learning Outcomes:

After successfully completing this laboratory course, the students will be able to do the following:

1. Acquire technical and manipulative skills in using laboratory equipment, tools, and materials.
2. Demonstrate an ability to collect data through observation and/or experimentation and interpreting data.
3. Demonstrate an understanding of laboratory procedures including safety, and scientific methods.
4. Demonstrate a deeper understanding of abstract concepts and theories gained by experiencing and visualizing them as authentic phenomena.
5. Acquire the complementary skills of collaborative learning and teamwork in laboratory settings.

Syllabus:

1. Mechanics

1. Range and Least Count of Instruments, Measurements using various instruments and error analysis (Vernier caliper, screw gauge, travelling microscope, spectrometer etc.)
2. Determination MI of disc using ring
3. MI of Flywheel
4. Determination of coefficient of viscosity by Poiseulli's method
5. Determination of γ and n by flat spiral spring
6. Determination of γ by bending
7. Surface Tension by Jeager's method.

2. Heat and Thermodynamics

1. Interpretation of isothermal and adiabatic curves on PV diagrams (Theoretical). Theoretical study of Carnot's cycle by drawing graphs of isothermal and adiabatic curves.
2. Temperature coefficient of resistance
3. Study of thermocouple and determination of inversion temperature
4. Thermal conductivity by Lee's method
5. Specific heat of graphite

3. Light

1. Study of spectrometer and determination of angle of prism
2. Spectrometer calibration. Determination of refractive indices of different colours and plotting the graph of refractive index vs wavelength.
3. Study of total internal reflection using LASER
4. Study of polarization of light by reflection
5. Determination of wavelength of LASER light by plane diffraction grating or cylindrical obstacle.

4. Electricity and magnetism

1. Charging and discharging of a capacitor

2. Study of LR circuit
3. Study of LCR series circuit
4. Study of Kirchhoff's laws
5. Diode characteristics
6. Study of millimetres (all AC, DC ranges, Least Count)
7. Determination of frequency of AC mains

Students have to perform minimum three experiments from each section and total sixteen experiments. Students can perform any two experiments from Computer Aided experiments in place of any two experiments in above four sections.

Additional Activities

1. Demonstrations (Any four demonstrations equivalent to two experiments)
 1. Magnet –magnet interaction
 2. Collision by using balls
 3. Study of Signal generator using CRO (Sine, square wave signal, measurement of AC voltage, frequency)
 4. Demonstration of action potential
 5. Measurement of sound pressure level
2. Computer aided demonstrations (Using computer simulations or animations) (Any two demonstrations equivalent to two experiments)
 1. Coulomb's law
 2. Vectors : visualization of vectors
 3. Bohr's model
 4. Carnot engine, diesel engine
 5. Graphs and their slopes, and Kinematics graphs (using computer simulations)
3. Mini projects/Hand on activities (Any one equivalent to two experiments)
 1. Students should collect the information of at least five Physicists with their work.
 2. Students should carry out mini projects
4. Study tour (Equivalent to two experiments)
Students participated in study tour must submit a study tour report.

Students have to perform at least two additional activities out of four activities in addition to sixteen experiments mentioned above. Total Laboratory work with additional activities should be equivalent to twenty experiments.

University of Pune
Three Year B. Sc. Degree Course in
Zoology

Principal Dr. D. K. Mhaske
Chairman,
Board of Studies in Zoology
University of Pune, Pune 411 007.

1) Title of the Course : B. Sc. Zoology

F. Y. B. Sc. Zoology

(To be implemented from Academic Year 2013-14)

2) Preamble:

The well organized curricula including basic as well as advanced concepts in the Zoology from first year to the third year shall inspire the students for pursuing higher studies in Zoology and for becoming an entrepreneur and also enable students to get employed in the Biological research Institutes, Industries, Educational Institutes and in the various concerning departments of State and Central Government based on subject Zoology.

3) Introduction:

At **first year of under-graduation** the topics related to the fundamentals of zoology, including exposure to diversity in animal groups and industries based on the zoological areas are covered. The practical course is aimed to equipped the students with skills required for animal identification, morphological, anatomical, technical description, classification and also applications of zoology in the various industries.

At **second year under-graduation:** The level of the theory and practical courses shall be one step ahead of the first year B.Sc. courses based on content of first year shall be introduced.

At **third year under-graduation:** Theory and practical courses in each semester shall deal with the further detailed studies of the various disciplines of the zoology subject and other branches of zoology such as Genetics, Animal Physiology, Molecular biology, Biochemistry, Microtechnique, Nonchordate and Chordate, Developmental Biology, Histology. Cell Biology, Biodiversity, Public health and hygiene, Pathology, Entomology, Biotechnology, etc. The students will also learn about use of various technical skills in the biological sciences to be helpful during research in the zoology subject.

Objectives:

- To provide thorough knowledge about various animal sciences from primitive to highly evolved animal groups
- To make the students aware of applications of Zoology subject in various industries

- To highlight the potential of various branches to become an entrepreneur
- To equipped the students with skills related to laboratory as well as field based studies
- To make the students aware about conservation and sustainable use of biodiversity
- To inculcates interest and foundation for further studies in Zoology
- To address the socio-economical challenges related to animal sciences
- To facilitate students for taking up and shaping a successful career in Zoology

4) Eligibility:

- 1 **First Year B.Sc. :** A student who has passed the Higher Secondary School Certificate (10+2) Science stream with Biology or its equivalent examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc. :** Keeping terms of First Year of B. Sc. with zoology as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B.Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with zoology as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Zoology

Pattern of Examination: Annual

Theory courses	Zoology Theory Paper I : Annual
	Zoology Theory Paper II : Annual

Practical Course	Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I ZY-101 (First term)	Animal Systematics and Diversity -I	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I ZY-101 (Second term)	Animal Systematics and Diversity -II	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II ZY-102 (First term)	Fundamentals of Cell Biology	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II ZY-102 (Second term)	Genetics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III ZY-103 (First & Second Term)	Practical	9 Practicals of 4 lectures in each term (18 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3	4 out of 6 - short answer type questions; answerable in 8 – 10 lines
Question 4	2 out of 4 – Descriptive answer type questions, answerable in 15 – 20 lines
Question 5	1 out of 2 – Descriptive answer type questions, answerable in 35 – 40 lines

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks in each term. The written test shall comprise objective type questions – Multiple Type Questions, True / False, Definitions, Answer in one or two line questions. There shall be 20 questions.

Practical: Regular assessment of each practical for 20 marks each: Marks for journal: 10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Zoology

Pattern of examination: Semester

Theory courses ZY- 211 and ZY- 212: Semester

ZY-211 and ZY-212: Semester

Practical Course: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
ZY- 211	Animal Systematics and Diversity -III	Four lectures/Week (Total 48 per semester)	04	16	20 *
ZY- 212	Applied Zoology I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-211	Animal Systematics and Diversity -IV	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-212	Applied Zoology II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
ZY-223 (Semester- I and II)	Paper III Practical course	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40**

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests.
4. Internal marks for Practical Course should be a regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying equal marks as follows: The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10-15 lines	5 marks each
Question 4	1 out of 2 sub-questions, each of 10 marks; long answer type questions (20-25lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Zoology

Pattern of examination: Semester

Theory courses:

(Sem III: ZY-331 to ZY-336) : Semester

(Sem IV: ZY- 341 to ZY-346) : Semester

Practical Course:(ZY-347-349) : Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
ZY-331	Animal Systematics and Diversity V	48	4	16	20*
ZY-332	Mammalian Histology	48	4	16	20*
ZY-333	Biological Chemistry	48	4	16	20*
ZY-334	Environmental Biology and Toxicology	48	4	16	20*
ZY-335	Parasitology	48	4	16	20*
ZY-336	General Pathology or Cell Biology	48	4	16	20*
SEM IV					
ZY-341	Biological Techniques	48	4	16	20*
ZY-342	Mammalian Physiology and Endocrinology	48	4	16	20*
ZY-343	Genetics and Molecular Biology	48	4	16	20*
ZY-344	Organic Evolution	48	4	16	20*
ZY- 345	General Embryology	48	4	16	20*
ZY-346	Public Health and Hygiene or Medical Entomology	48	4	16	20*

Practical Papers					
BO 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
BO 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

**Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers be given on the basis of internal assessment tests.
4. Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks based on entire syllabus	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 10 – 15 lines	5 marks each
Question 4	2 out of 3 sub-questions, each of 10 marks; long answer type questions (20 – 25 lines)	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question. There shall be 20 questions.

Practicals: Regular assessment as described earlier (regular assessment of each practical for 20 marks each: Marks for journal:10, Marks for attendance: 05, Marks experimental skills: 03, Practical Work Book: 02)

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of more than 4 hours duration. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students:

There shall be no external students.

5 F) Setting of question papers:

F. Y. B. Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

S. Y. B. Sc. and T. Y. B. Sc.: For theory papers for each semester and also for the annual practical examination, question papers shall be set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5 G) Verification and Revaluation Rules:

As per University Statutes and Rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Zoology Degree Program shall be three years.

a) Compulsory Papers:

F. Y. B. Sc.: 2 Theory + 1 Practical (Annual)

S. Y. B. Sc.: 2 Theory per semester + 1 Practical (Annual)

T. Y. B. Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F. Y. B. Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S. Y. / T. Y. - B. Sc. Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F. Y. / S. Y. / T. Y. - B. Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

- c) **Medium of Instruction:** The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Nonchordates and Chordates	Animal Systematics and Diversity –I and II
Paper II: Genetics and Parasitology	Fundamentals of Cell Biology and Genetics
Paper III: Practical course	Paper III: Practical course

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Zoology or equivalent master degree in science with class/grades and NET/SET/Ph.D. as per prevailing University/Government /UGC rules.

UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
Proposed Revised Syllabus for F. Y. B. Sc. (Zoology)
To be implemented from June, 2013
F. Y. B. Sc. (Zoology) New Syllabus

1. Zoology: Paper- I

Term- I: Animal Systematics and Diversity –I

2. Zoology Theory Paper II

Term I: Fundamentals of Cell Biology

3. Zoology: Paper- I

Term- II: Animal Systematics and Diversity – II

4. Zoology: Paper- II

Term- II: Genetics

**5. F. Y. B. Sc. Zoology Practical Paper - III based on Theory Paper I
and Paper II**

UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
COURSE STRUCTURE OF UNDERGRADUATE CLASSES
(To be implemented from June 2013)

Class: F.Y. B. Sc.

Paper	Course No.	Term I	Term II
I	ZY 101	Animal Systematics and Diversity -I	Animal Systematics and Diversity –II
II	ZY 102	Fundamentals of Cell Biology	Genetics
III	ZY 103	Practical course	

Class: S.Y. B. Sc.

Paper	Course No.	Semester I	Course No.	Semester II
I	ZY.211	Animal Systematics and Diversity -III	ZY. 221	Animal Systematics and Diversity –IV
II	ZY.212	Applied Zoology I	ZY.222	Applied Zoology II
III	ZY.223	Practical course		

Class: T.Y. B. Sc.

Paper	Course	Semester III	Course	Semester IV
I	ZY.331	Animal Systematics and Diversity V	ZY.341	Biological Techniques
II	ZY.332	Mammalian Histology	ZY.342	Mammalian Physiology and Endocrinology
III	ZY.333	Biological Chemistry	ZY.343	Genetics and Molecular Biology
IV	ZY.334	Environmental Biology and Toxicology	ZY.344	Organic Evolution
V	ZY.335	Parasitology	ZY.345	General Embryology
VI	ZY.336	General Pathology or Cell Biology	ZY.346	Public Health and Hygiene or Medical Entomology
VII	ZY.347	Practicals corresponding to ZY 331, ZY 332, ZY 341 & ZY 342		
VIII	ZY.348	Practicals corresponding to ZY 333, ZY 334, ZY 343 & ZY 344		
IX	ZY.349	Practicals corresponding to ZY 335, ZY 336, ZY 345 & ZY 346		

Prin. (Dr) D. K. Mhaske
Chairman, B.O.S. in Zoology
University of Pune

University of Pune

Draft of Syllabus to be implemented from June 2013

F. Y. B. Sc. Zoology

Paper 1- ZY-101:	First term:	Animal Systematics and Diversity - I
	Second term:	Animal Systematics and Diversity - II
Paper II- ZY-102:	First term:	Fundamentals of Cell Biology
	Second term:	Genetics
Paper III ZY-103:		Practical course

PAPER I: FIRST TERM

ZY-101: ANIMAL SYSTEMATICS AND DIVERSITY -I

- 1. Principles of classification:** **4**
 - 1.1 Systematics-Linnaean hierarchy (Phylum, Class, Order, Family, Genus and Species)
 - 1.2 Binomial nomenclature
 - 1.3 Five kingdom classification system
- 2. Salient features and classification upto classes of the following:** (any two examples from each class) **8**
 - 2.1 Protozoa
 - 2.2 Porifera
 - 2.3 Coelenterata
 - 2.4 Platyhelminthes
 - 2.5 Aschehelminthes
 - 2.6 Annelida
- 3. Study of *Paramoecium* :** **8**
 - 3.1 Systematic position, Habit and habitat
 - 3.2 Structure, nutrition, excretion and reproduction (binary fission and conjugation)
- 4. Study of Earthworm :** **16**
 - 4.1 Systematic position, Habit and habitat
 - 4.2 External characters
 - 4.3 Digestive system
 - 4.4 Circulatory system
 - 4.5 Excretory system
 - 4.6 Reproductive system
 - 4.7 Nervous system and sense organs
 - 4.8 Economic importance

PAPER –I: SECOND TERM

ZY-101: ANIMAL SYSTEMATICS AND DIVERSITY – II

1. Salient features and classification upto order with one example of the following:

6

1.1 Hemichordata

1.2 Urochordata

1.3 Cephalochordata

2. Salient features of following classes with two examples of each

4

2.1 Pisces- Cartilaginous and Bony fishes

2.2 Amphibia- Apoda, Urodela and Anura

3. Study of Frog:

20

3.1 Systematic position, Habit and habitat

3.2 External characters and sexual dimorphism

3.3 Digestive system, food, feeding and physiology of digestion

3.4 Circulatory system (lymphatic system not expected)

3.5 Central Nervous system

3.6 Sense organs

3.7 Reproductive systems (male & female)

4. General topics:

6

4.1 Migration in fishes

4.2 Neoteny in amphibia

4.3 Parental care in amphibia

PAPER II-FIRST TERM

ZY 102: FUNDAMENTALS OF CELL BIOLOGY

1. Introduction to cell biology:	4
1.1 Definition and scope	
1.2 Stains: Principle and composition of vital stains, cytoplasmic stains and nuclear stains with two examples of each	
2. Structure of prokaryotic (<i>E.coli</i>) and eukaryotic (Plant and Animal) cell	3
3. Structure and function of cell membrane:	6
3.1 Chemical composition	
3.2 Fluid mosaic model	
3.3 Functions of plasma membrane	
4. Composition of Cytoplasm	1
5. Study of following cell organelles with respect to structure and functions in brief:	10
5.1 Endoplasmic reticulum	
5.2 Golgi complex	
5.3 Lysosomes, peroxisomes and glyoxysomes	
5.4 Ribosomes	
5.5 Mitochondria	
6. Nucleus:	5
6.1 Shape, size, number and position	
6.2 Ultrastructure of nuclear envelope and pore complex	
6.3 Functions	
7. Cell division and their significance:	7
7.1 Cell cycle in brief	
7.2 Mitosis	
7.3 Meiosis	

PAPER II-SECOND TERM

ZY 102: GENETICS

1. Introduction to genetics:	4
1.1 Mendelian inheritance: laws of heredity and their practical application	
1.2 Test cross and Back cross	
2. Gene Interaction:	5
2.1 Concept of gene interaction, co-dominance and incomplete dominance	
2.2 Complementary factors (9:7)	
2.3 Supplementary Factors (9: 3:4)	
2.4 Inhibitory factors (13:3)	
2.5 Duplicate dominant factors (15:1)	
3. Lethal genes in <i>Mus musculus</i>	1
4. Multiple Alleles:	4
4.1 Concept, characteristics and importance of multiples alleles, ABO & Rh-blood group system and it's medicolegal importance.	
4.2 Concept of polygenic inheritance with reference to skin color in man	
5. Chromosomes:	5
5.1 Introduction to morphology and composition	
5.2 Classification based on the centromeric position	
5.3 Types of chromosome (autosomes and sex chromosome)	
5.2 Chromosomal aberrations: structural changes	
6. Sex-determination:	5
6.1 Introduction	
6.2 Chromosomal theory of sex determination (XX-XY, ZZ-ZW, XX-XO and Haploid-Diploid method)	
6.3 Parthenogenesis and Gynandromorphism	
7. Human genetics:	4
7.1 Study of human karyotype	
7.2 Syndromes:	
a) Autosomal-Down's (Mongolism), Patau's, Edward's and Cri-du-chat	

b) Sex chromosomal abnormalities in man: Klinefelter's and Turner's syndrome

7.3 Inborn errors of metabolism: albinism, phenylketonuria and alkaptonuria

8. Sex linked inheritance in human: 3

8.1 Colorblindness, haemophilia and hypertrichosis

9. Cytoplasmic inheritance: 1

9.1 Kappa particles in *Paramecium*

10. Application of genetics: 4

10.1 Genetic counseling.

10.2 Concept of genetic Engineering

10.3 Eugenics

ZY-103 PRACTICAL COURSE

- Practical 1. To study the classification with reasons of the following (D)
Phylum Protozoa- *Amoeba*, *Euglena* and *Volvox*
Phylum Porifera- *Sycon*, *Hyalonema* and *Euspogia*
- Practical 2. To study the classification with reasons of the following (D)
Phylum Coelenterata- *Hydra*, *Physalia* and any one coral
Phylum Platyhelminthes- Tapeworm, Planeria and Liverfluke
- Practical 3. To study the classification with reasons of the following (D)
Phylum Aschelminthes- *Ascaris*
Phylum Annelida- *Tubifex*, Leech and *Neries*
- Practical 4. Culturing of *Paramoecium* (E)
- Practical 5. Study of live *Paramoecium* (E)
- Practical 6. Study of external characters, binary fission & conjugation
in *Paramoecium* (D)
- Practical 7. Study of external characters and digestive system of Earthworm (E)
- Practical 8. Study of reproductive (male and female) system of Earthworm (E)
- Practical 9. Study of nervous system of Earthworm (E)
- Practical 10. Earthworm mounting- septal nephridia, setae and spermatheca (E)
- Practical 11. Study of prokaryotic and eukaryotic cell with the help of suitable
material (D)
- Practical 12. Study of temporary preparation of different mitotic stages
from onion root tip cells (E)
- Practical 13. To study the classification with reasons of the following (D)
Hemichordata- *Balanoglossus*
Urochordata- *Doliolum/ Salpa*
Cephalochordata- *Amphioxus*
- Practical 14. To study the classification with reasons of the following (D)
Cartilaginous fishes- any two
Bony fishes- any two
Amphibia- any three

- Practical 15. Study of external characters, sexual dimorphism and digestive system of Frog with the help of model/ charts (D)
- Practical 16. Study of brain of Frog with the help of model/ chart (D)
- Practical 17. Study of monohybrid ratio and dihybrid ratio by providing hypothetical data and deducing applicability of Mendelian laws (three examples of each ratio) (E)
- Practical 18. Preparation of culture media and maintenance of *Drosophila* culture (E)
- Practical 19. Study of *Drosophila*: External characters and sexual dimorphism (D)
- Practical 20. Study of *Drosophila* mutants (any two eye and any two wing mutant) (D)
- Practical 21. Study of genetic traits in human beings (tongue rolling, widow's peak, ear lobes, color blindness and PTC tasters/ nontasters) (E)
- Practical 22. Study of normal human karyotype from metaphase chromosomal spread picture (E)
- Practical 23. Study of blood groups in human (ABO and Rh) (E)
- Practical 24. Study of any 3- cell organelles from electron micrographs (D)
- Practical 25. Compulsory visit to vermiculture unit/biodiversity spot/ZSI/large water body (E)

Note: Minimum 18 practical are to be performed by the students.

REFERENCE BOOKS FOR F. Y. B. SC. ZOOLOGY

1. The Frog-its reproduction and development -By Robert Rugh,Tata McGraw Hill Edition,New Delhi
2. Biology of Animals By Ganguly,BB.,Sinha,A.K.,Adhikari,S.,New Central Book Agency,Kolkata
3. Arthropod Phylogeny By Gupta,A.P.,Van Nostrand Co.,New York
4. Introduction to Amphibia By Bhamrah,MS.,Juneja,K.,Amol Publication,Delhi
5. Life of Vertebrates By Young,JZ., III Edition,Clarendon Press,London
6. General Zoology By Goodnight and others IBH Publishing Co.
7. Life of Invertebrates By Prasad,ASN,Vikas Publishing House,New Delhi
8. Textbook of Vertebrate Zoology By Prasad,SN.,Kashyap,V.,New Age India Publishers,New Delhi
9. Modern Textbook of Zoology,Vertebrates By Kotpal,RL.,Rastogi and Co. Meerut
10. Phylum Protozoa to Echinodermata (series) By Kotpal,RL.,Rastogi and Co. Meerut
11. Animal Diversity By Kershaw,DR., Redwood Burn Ltd.,Trowbridge
12. Textbook of Zoology By Parkar J. and Haswell,W.,ELBS Edition
13. Textbook of Zoology By Vidyarthi, Agrasia Publishers, Agra
14. Chordate zoology By Jorden EL.,and Verma PS.,S.Chand and Co.,New Delhi
15. Functional Organization of chordates (part I and II) By Nigam HC. And Sobti,R., S.Chand and Co.,New Delhi
16. Invertebrate zoology By Barnes,Saunders College Publishing Co.,Philadelphia,USA,1987
17. Genetics By Verma,PS. And Agrawal, VK., S.Chand and Co.,New Delhi
18. Principle of Genetics By Sinnott,Dunn and Dobzhansky, Tata McGraw Hill Edition,New Delhi
19. Genetics By Gupta, PK., Rastogi Publication, Meerut
20. Genetics By Sarin,C., Tata McGraw Hill,New Delhi
21. Principles of Genetics By Gardner,EJ.,Simmons,MJ. And Snustad,DP. John Wiley and Sons
22. Cytology and Genetics By Dyanasagar VR., Tata McGraw Hill Pub. Co.Ltd.,New Delhi

23. Cell and Molecular Biology By De Robertis,EDP. And De Robertis EME,Molt
Saunders Inc.
24. Cell Biology By Powar,CB,Himalaya Publication House
25. Cell and Molecular Biology By Dupraw I, Academic Press, New York
26. Cell Biology By avers,CJ.,Addison Wesley Pub. Co. New York and London
27. Cell and Molecular Biology By Carp,G.,John Waley, USA
28. Cell Biology By David,E.,Sadava Johnes and Bartlett Publication,London
29. Cell Structure and Function By Lowey,AG. and Siekevitz,JR.,Menninger and
Gallew,JAN.,Saunder College Publication,Philadelphia

University of Pune

**Three Year B. Sc. Degree Course in
Chemistry**

Title of the Course : B. Sc. Chemistry

F.Y.B.Sc. Chemistry

(To be implemented from Academic Year 2013-14)

AIMS AND OBJECTIVES

- F.Y. B. Sc. Chemistry syllabus has been revised as per BCUD directives.
- The content of the syllabus have been framed as per UGC norms.
- The students are expected to understand the fundamentals, principles, mathematical concepts and recent developments in the subject area.
- The practical course is in relevance to the theory courses to improve the understanding of the concepts.
- It would help in development of practical skills of the students.
- It is expected to inspire and boost interest of the students towards chemistry as the main subject.
- It would enable to develop interdisciplinary approach of the subjects for students opting for specialization in other subjects at latter stages of graduation.

2) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in various disciplines of Chemistry such as Physical, Inorganic, Organic, Analytical, Drug and Biochemistry. This curriculum also enable student to shoulder the responsibility as Chemist in chemical industry.

3) Introduction:

At **first year of under-graduation** The basic topics related to the fundamentals of chemistry covered. Since chemistry is an experimental subject, practical courses is intended to achieve the basic skills required for understanding the concepts and authenticating the basic laws and principles of Chemistry.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. For the development of vertical growth in the subject, advanced level topics are introduced so as to make the student mature enough to pursue the carrer in Chemistry.

At **third year under-graduation**: Theory papers in each semester deal with the further detailed studies of the various branches of Chemistry as well as some specialized topics like Industrial and Environmental Chemistry. Such a designing of course structure enables the student to understand fundamental as well as applied components that are pertinent to Chemistry. Also, practical courses are framed towards development of synthetic as well as analytical skills that are essential for academic and professional life.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of Chemistry
- To familiarize with current and recent developments in Chemistry
- To enrich knowledge through programmes such as industrial visits, projects etc.
- To train students in skills related to Chemistry for academic and industrial requirement.
- To creat foundation for research and development in Chemistry
- To develop analytical abilities for independent thinking
- To help students build-up a progressive and successful career in Chemistry

4) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Chemistry as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.
- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Chemistry as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Chemistry

Pattern of Examination: Annual

Theory courses C-1: Chemistry Paper I: Annual
 C-2: Chemistry Paper II: Annual

Practical Course C-3: Chemistry Paper III: Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Paper-I (First term)	Physical and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Paper -I (Second term)	Physical and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)			

Paper - II (First term)	Organic and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Paper -II (Second term)	Organic and Inorganic Chemistry	Three lectures/Week (Total 36 lectures per term)			
Paper -III (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 and 4	4 out of 6– short answer type questions; answerable in 8 – 10 lines
Question 5	4 out of 6 – problem type question; answerable in numerical or analytical fashion

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.

Practical: one internal assessment test + marks for journals + attendance + activity.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)

- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed.

5 D)Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Chemistry Degree Program shall be three years.

a) Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 1 Practical (Annual)

b) Question Papers :

F.Y.B.Sc.Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

F.Y. B.Sc.Practical Paper:

University Examination	– 80 marks (at the end of 2 nd term)
Internal Examination	– 20 marks

c) **Medium of Instruction:** The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Physical and Inorganic Chemistry	Paper I: Physical and Inorganic Chemistry
Paper II: Organic and Inorganic Chemistry	Paper II: Organic and Inorganic Chemistry
PaperIII: Practical	PaperIII: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Chemistry or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

Chemistry Paper - I
Physical and Inorganic Chemistry
Term - I

Chapter 1	States of Matter	08
Chapter 2	Surface Chemistry	08
Chapter 3	Chemical Mathematics	08
Chapter 4	Mole Concept, Stoichiometric and Numerical, Oxidation- reduction	12

Term - II

Chapter 4	Atomic Structure	12
Chapter 5	Chemical Thermodynamics	12
Chapter 6	Chemical Bonding	12

Chemistry Paper - II

Organic and Inorganic Chemistry

Term - I

Chapter 1	Chemical Bonding in Organic Molecules	12
Chapter 2	Chemistry of Hydrocarbons	12
Chapter 3	Chemistry of s-block elements	12

Term - II

Chapter 4	Chemistry of Functional Groups	12
Chapter 5	Stereochemistry	12
Chapter 6	Chemistry of p-block elements	12

Chemistry Paper - III

Practical Course

1. Physical Chemistry : 7 experiments
2. Inorganic Chemistry: 7 experiments
3. Organic Chemistry : 7 experiments

PAPER - I: PHYSICAL & INORGANIC CHEMISTRY

TERM - I

Chapter 1: States of Matter

(08)

Introduction: States of matter and their properties.

Gaseous states: Significance of ideal and kinetic gas equation (no derivation), Real gases- Compressibility factor, van der Waal's equation of state, Isotherms of CO₂, critical constants, correlation between critical constants and van der Waal's constants.

Liquid state – Properties of liquids , Comparison between gaseous and solid state – Experimental determination of vapor pressure by isoteniscopic method and viscosity by Ostwald method, liquid crystals and their applications.

Aims & Objectives:

- I) This topic makes understanding of behavior of gases, ideal gas as a model system and its extension to real gases. The dependence of physical state on pressure, volume and temperature is being realized.
- II) The existence of liquid state, comparison of its properties with other states is to be perceived. Liquid crystal are essentials in all common and research devices and instruments hence they are introduced briefly.
- III) Student should be able to solve problems regarding van der Waal's and Critical constant and regarding P-V-T relations.
- IV)

Chapter 2: Surface Chemistry

(08)

Adsorption: Types of adsorption, adsorption isotherms, Freundlich isotherm, Langmuir isotherm, adsorption of gases on solids, adsorption of solutes on solids, applications of adsorption,

Catalysis : Phenomena of catalysis, types of catalysis-homogeneous and heterogeneous catalysis, gaseous reactions on solid surfaces.

Colloids: Definition and classification, preparation of emulsions, gels and sols, properties of suspensoids.

Aims & Objectives:

Theoretical basis of adsorption phenomena is integrated. Understanding dynamic nature of surface and its applications in catalysis and in dispersed phases will lead to new area of nanoscience.

Chapter 3: Chemical Mathematics

(08)

Functions and variables: Variables as function , variables used in chemistry

Derivative: Rules of differentiation, examples on derivatives of algebraic, logarithmic and exponential functions, partial differentiation, conditions for maxima and minima, problems related to chemistry,

Integration: Rules of integration (algebraic, exponential and logarithmic functions), Integration –definite and indefinite, problems related to chemistry.

Graph: Plotting graphs of linear, exponential and logarithmic functions and their characteristics, sketching of s and p orbitals.

Aims & Objectives:

Mathematical background required for derivations, depictions and problem solving. This chapter strengthens these aspects.

Chapter 4: Mole Concept and Oxidation-reduction

(12)

Mole concept-Determination of mol. Weight by gram molecular volume relationship, problems based on mole concept. Methods of expressing concentrations, strength, normality, molarity, molality, %w/v, %v/v, ppm, standardization of solutions, primary & secondary standard substances, Preparation of standard solution of acids & bases, problems related to acid base titrations only.

Oxidation & reduction-Definitions to related terms like oxidation, reduction, oxidizing agent, reducing agent, oxidation number, Balancing of redox reactions using oxidation number method & ion electron method, problems based one equivalent weight of oxidant & reductants.

Ref: 8, 9, 10 & 11

Aims and objectives-

Students should know

- 1) Mole concept
- 2) GMV relationship
- 3) Student should be able to solve problems based on GMV relationship.
- 4) Normality, Molarity, Normal solution, Molar solution, equivalent weight, ppm, %w/v, %v/v & related problems.
- 5) Standard solution, primary & secondary standard substances, standerdisation of solution & related problems.
- 6) Understand the concept of oxidation & reduction, oxidizing agent, reducing agent, redox reaction, oxidation number, Balance the equation by ion electron method & oxidation number method.
- 8) Calculation of Equivalent weight of oxidant & reductant.

Term - II

Chapter 4: Atomic Structure

(12)

Introduction, atomic spectrum of hydrogen, Bohr model of hydrogen atom-derivation of atomic radius and energy, energy level diagram of hydrogen atom, Failure of Classical mechanics- black body radiation, photoelectric effect, electron diffraction, atomic spectra, quantization of energy, de Broglie's hypothesis, Heisenberg's uncertainty principle (without proof), wave equation, time independent Schrödinger equation, hydrogen atom (expressions only), wave functions for s and p atomic orbitals,

Aims & Objective

Atom being most important micro particle in construction of matter, modern developments of its structure is presented. The quantization of energy and duality of matter in this context is elaborated. Schrodinger equation is the basis of quantum chemistry that has been introduced for simplest system hydrogen atom.

Chapter 5: Chemical Thermodynamics

(12)

Introduction, first law of thermodynamics and its limitations, Carnot cycle and efficiency, Entropy and second law of thermodynamics, entropy as a state function, Entropy change in isolated system, reversible and irreversible process, entropy change in ideal gases – isothermal, isobaric, isochoric processes, entropy change in physical transitions, entropy change in chemical reactions, statistical definition of entropy, absolute entropy, third law of thermodynamics

Aims & Objectives:

Natural changes are understood with the help of second and third laws of thermodynamics. These laws are presented with the help of state function entropy. Entropy changes in various processes and under various conditions have been discussed.

Chemical bonding

(12)

Attainment of stable configuration, Types of bonds ionic, covalent, co-ordinate & metallic, Types of overlaps: s-s, p-p, s-p, p-d, d-d and their examples, Formation of sigma & pi bonds, Theories of bonding- a) valence bond theory, b) Heitler London theory and c) Pauling Slater theory, Concept of hybridization: Definition & need of hybridization, steps involved in hybridization: explanation of covalency of atoms in the moles based on hybridization, types of hybridization involving s, p, & d orbitals.

Applications of hybridization geometries of molecules like

- i) BeH_2 ii) BF_3 iii) $[\text{MnCl}_4]^{2-}$ iv) $[\text{Ni}(\text{CN})_4]^{2-}$ v) $\text{Fe}(\text{CO})_5$
vi) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ vii) IF_7

VSEPR theory: Assumptions, need of theory, application of theory to explain geometry of irregular molecules

i) ClF_3 ii) Cl_2O iii) BrF_5 iii) TeCl_4 iv) XeO_3 v) XeOF_4

Ref. 12, 13, 14 & 15

Aims and objectives:

Student should understand:

1. Basic principle of overlapping of atomic orbital with specific shapes and sizes
2. Fundamental concepts of theories of overlapping of atomic orbitals
3. Concept of hybridization and differentiation with overlap
4. Concept of different types valence shell electron pairs and their contribution in bonding
5. Application of non-bonded lone pairs in shape of molecule
6. Basic understanding of geometry and effect of lone pairs with examples

References books for Physical Chemistry

1. Physical Chemistry-P.W. Atkins ELBS, 5th edition
2. Principles of Physical Chemistry By S. H. Maron and C. F. Prutton ,4th edition
3. Physical Chemistry by S. Glasstone.
4. Physical Chemistry – Silbey Alberty, Bawendi, Wielely India .
5. Quantum Chemistry – I. Levine, Fifth edition, Prentice Hall-1999
6. Essentials of Physical Chemistry – Bahl, Tuli., S. Chand and Company Ltd.
7. Physical Chemistry of Surfaces – A. W. Adamson, John Wiley and sons , 5th edition.
8. Mathematical preparation of Physical Chemistry by F. Daniel, Mc Graw Hill Publication

PAPER - II: ORGANIC & INORGANIC CHEMISTRY

TERM - I

Chapter1: Chemical Bonding, structure and reactivity of Organic Molecules (14)

Covalent bond, Hybridization - sp , sp^2 and sp^3 hybridization, Bond length, Bond angle, Bond energy, Inter and Intra molecular forces and their effects, Drawing organic molecules, zig-zag structures, Lewis structure and formal charge, Arrow pushing concept, Structural effects - Inductive effect, Steric effect, Resonance effect, Hyper-conjugation, Tautomerism, Applications of structural effects - Strength of acids and bases, pK_a and pK_b values of common organic acids and bases.

Ref. 1, 2, 3 & 4

Covalent bond, Hybridization - sp , sp^2 and sp^3 hybridization, Bond length, Bond angle, Bond energy, Inter and Intra molecular forces and their effects

Ref. 2: Pages 9 - 17, 20 - 29

Drawing organic molecules, zig-zag structures, Lewis structure and formal charge

Ref. 1: Pages 31 - 36, 116 - 127

Arrow pushing concept, Structural effects - Inductive effect, Steric effect, Resonance effect, Hyper-conjugation, Tautomerism, Applications of structural effects - Strength of acids and bases, pK_a and pK_b values of common organic acids and bases

Ref. 1: Relevant Pages between 181 - 201

Ref. 2: Pages 33 - 35, 200, 406 - 407

Ref. 3: Pages 20 - 28

Aims and Objectives:-

The student is expected to know:

1. The fundamental concepts which govern the structure, bonding, properties and reactivities of organic molecules such as covalent character, hybridization, bond angles, bond energies, bond polarities and shapes of molecules.
2. Drawing of organic molecules and arrow pushing concept.
3. Acid-base theories, pK_a / pK_b values for common organic acids and bases and factors affecting strength of acids and bases.
4. Structural effects and their applications in determining strength of acids and bases.

Chapter 2: Chemistry of Hydrocarbons (10)

Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions of-Alkanes, alkenes, alkynes and introduction to homocyclic and polycyclic aromatic hydrocarbons (benzene, naphthalene, anthracene), Huckel's rule of aromaticity.

Ref. 1, 2, 3 & 4

Alkanes - Introduction, Nomenclature, Physical properties, Preparations, Reactions of alkanes, Analysis of Alkanes

Ref. 2: Sec. 2.1 – 2.3, Sec. 3.6 – 3.12, Sec. 3.15 – 3.17, Sec. 3.18, 3.19, 3.30, 3.32, Sec. 3.34

Pages: 39 – 41, 86 – 94, 97 – 106, 118, 120, 122

Alkenes - Introduction, higher alkenes, Nomenclature, Physical properties, Preparations, Reactions of alkenes, Analysis of Alkenes

Ref. 2: Sec. 8.7 to 8.9, 8.11 to 8.13, Sec. 9.1, 9.2, 9.27

Pages: 282 – 285, 287 – 293, 309, 317 – 323, 360 - 362

Dienes - Structure & Properties, Conjugated dienes, Reactions of dienes, Analysis of dienes

Ref. 2: Sec. 11.17, 11.19, 11.21, 11.22, 11.26

Pages: 409 – 417, 421, 422

Alkynes: Introduction, Nomenclature, Physical properties, Preparation, Reactions & analysis of alkynes

Ref. 2: Sec. 12.1 - 12.8, 12.14

Pages: 425 – 434, 440

Introduction to homocyclic and polycyclic aromatic hydrocarbons (benzene, naphthalene, anthracene), Huckel's rule of aromaticity, Reactions of benzene, Naphthalene and Anthracene – Sulphonation, Nitration, Halogenation, Friedle Craft reactions

Ref. 2: Sec. 14.1 - 14.5, 14.10, 14.11, 14.12, Relevant pages from 15.1 – 15.21

Pages: 493 – 499, 504, 508 – 511, Relevant pages from 517 - 546

Aims and Objectives:-

The student is expected to know

1. The common and IUPAC names of alkanes, alkenes, alkynes and homocyclic, polycyclic aromatic hydrocarbons.
2. Methods of preparation and chemical reactions of alkanes, alkenes, alkynes and homocyclic, polycyclic aromatic hydrocarbons.
3. Application of Huckel's rule to different organic compounds to find out aromatic /non aromatic characters.
- 4.

Chapter 3: Chemistry of s-block Elements

(12)

Recapitulation of periodic table, special position of hydrogen in the long form of the periodic table, properties of s-block elements w.r.t. electronic configuration, extraction, trends and properties, Introduction to crown ethers and cryptans, separation of s-block elements using crown ethers, Compounds of s-block elements: oxides, hydroxides, peroxides, superoxides, Application of s-block elements in industrial, biological and agricultural fields.

Ref. 6 & 9

Aims and objectives:

Student should learn

1. Skeleton of long form of periodic table
2. Quantum numbers
3. Shells, sub-shells, types of orbital and their shapes
4. Aufbau, Paulin's exclusion principle and Hund's rule
5. Block, group, periodic law and periodicity
6. Name, symbol, electronic configuration, trends and properties
7. Crown ether and cryptans
8. Separation of s-block elements with crown ethers
9. Compounds of s-block elements: oxides, hydroxides, peroxides and superoxides
10. Application of s-block elements: Industrial, biological and agricultural field

TERM - II

Chapter 4: Chemistry of functional groups

(14)

Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions of: Alkyl halides, alcohols, phenols, ethers, aldehydes, ketones, carboxylic acids, amines.

Ref. 1, 2, 3 & 4

Alkyl halides: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of alkyl halides

Ref. 2: 5.3 – 5.7, 5.24

Pages: 167 – 174, 211

Alcohols: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of alcohols

Ref. 2: 6.1 – 6.5, 6.10, 6.11, 6.22

Pages: 211 – 218, 222 – 226, 243 – 244

Ethers: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of ethers

Ref. 2: 6.16 – 6.21, 6.23

Pages: 237 – 242, 244 - 245

Aldehydes and ketones: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of aldehydes and ketones

Ref. 2: 18.1 – 18.7, 18.20

Pages: 657 – 675, 697

Carboxylic acids: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of carboxylic acids

Ref. 2: 19.1 – 19.4, 19.6, 19.9, 19.21

Pages: 713 – 722, 725 – 728, 744 - 745

Amines: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of amines

Ref. 2: 22.1 – 22.5, 22.8, 23.1 – 23.3, 23.12, 23.19

Pages: 821 – 825, 828 – 830, 845 – 849, 866 – 869, 876 - 877

Phenols: Introduction, Nomenclature, Physical properties, General methods for preparation, Chemical reactions, Analysis of phenols

Ref. 2: 24.1 – 24.3, 24.7, 24.8, 24.16

Pages: 889 – 893, 898 – 902, 912

Aims and Objectives:-

The student is expected to know

1. Structure, nomenclature, preparation and reactions of organic compounds.
2. The characteristic reactions of each functional group which can be used to identify and distinguish that compound from other compounds.
3. Predict the conversion of one functional group into other functional group involving one or more number of steps.
4. Conversion of the given compound into other compound containing more or less number of carbon atoms.
5. Prediction of possible products when reactants are given. In case there are more than one possible products, identify the major and minor products.
6. Suggest the possible reagents to bring about the given conversion.

Chapter 5: Stereochemistry

(10)

Concept of isomerism, types of isomers, representation of organic molecules (Projection formulae), conformational isomerism in alkanes (Ethane, propane and n-butane) with energy profile diagrams, Geometrical isomerism - Definition, conditions for geometrical isomers, physical and chemical properties, E/Z nomenclature of geometrical isomers, Optical isomers – Isomer number and tetrahedral carbon atom, chirality, optical isomerism with one asymmetric carbon atom, specific rotation, enantiomerism, R/S nomenclature

Ref. 1, 2, 3, 4, 11 and 12

Ref. 2: Relevant pages from Sec. 3.2 – 3.5, Sec.4.1 – 4.20, Sec. 8.6

Ref. 4: Relevant pages from Sec. 12.1 – 12.2 (Pages 318 – 321)

Ref. 11: Relevant pages from Sec. 1.1 – 1.3, 1.5 – 1.6, 1.8, 1.10 (Pages 1 – 51)

Aims and Objectives:-

The student is expected to know

1. Concept of isomerism, types of isomers and representation of organic molecules.
2. Conformational isomerism in alkanes with energy profile diagram.
3. Concept of geometrical isomerism with E/Z nomenclature.
4. Understanding of optical activity, isomer number, tetrahedral carbon atom, concept of chirality, enantiomerism, R/S nomenclature for single chiral centre.

Ref. 1, 2, 3 & 4

Chapter 6: Chemistry of p-block elements

(12)

Position of elements in periodic table, electronic configuration of elements trends in properties like atomic size, ionization potential, electronegativity, electron affinity, reactivity, oxidation states, anomalous behaviour of first member of each group.

Structure and properties of:

1. Borate
2. Halides of aluminum
3. Allotropes of carbon
4. Classification of silicates
5. Oxyacids of phosphorous and sulphur
6. Inter-halogen compounds

Ref. 6 – 359 to 633 (relevant pages)

A student know

- i) To write electronic configuration of any element.
- ii) To give reasons for anomalous behavior of first element of IIIA to VII A groups with other elements in the same group.
- iii) To know the exact position p-block elements in the long form of the periodic table.
- iv) To know the allotropes of carbon.
- v) Basic compounds of boron, aluminum, silicon
- vi) Concept of oxyanions, different than mineral acids, oxyacids of phosphorous & sulphur
- vii) Overlapping of atomic orbitals of halogens, interhalogen compounds

References

1. Organic Chemistry-Clayden, Oxford Uni. Press

2. Organic Chemistry-Morrison and Boyd, 6th Edn.
3. A guide book to Mechanism in Organic Chemistry-Peter Syke, 6th Edn.
4. Stereochemistry of Organic Compounds-Eliel Tata Mc Graw Hill 1989
5. Principles of Physical Chemistry by S.H. Marron & C.F. Pruton, 4th Edn.
6. Concise Inorganic Chemistry-J.D. Lee, 2nd Edition-Relevant pages.
7. Concept & model of Inorganic Chemistry-Douglas Mc Doniels, 3rd Edn.
8. New guide to Modern Valance Theory-G.I. Brown, 3rd Edn.
9. Inorganic Chemistry-James Hughey
10. General Chemistry - Raymand Chang

F.Y.B. Sc.
Chemistry Paper - III
Practical Course

1. Physical Chemistry :	7 experiments
2. Inorganic Chemistry:	7 experiments
3. Organic Chemistry :	7 experiments

Physical Chemistry (minimum 7 experiments)

1. A) Preparation of lyphophyllic and lypophobic sols, B) purification of prepared sols by hydrolysis
2. To study the role of emulsifying agents in stabilizing the emulsion of different oils
3. Sketch the polar plots of s and p orbitals.
4. Plot the graph of following functions using excel a) exponential function b) logarithmic function c) linear functions
5. To determine the gas constant R in different units by eudiometer method.
6. To determine relative viscosity of given organic liquids by viscometer. (four liquids)
7. Investigate the adsorption of acetic acid by activated charcoal and test the validity of Freundlich /Langmuir adsorption isotherm.
8. To determine ΔH and ΔS for the following chemical reactions
 - i) $\text{Zn(s)} + \text{CuSO}_4 \text{ (aq)} \rightarrow \text{Cu(s)} + \text{ZnSO}_4 \text{ (aq)}$
 - ii) $3\text{Mg(s)} + 2\text{FeCl}_3 \text{ (aq)} \rightarrow 2\text{Fe(s)} + 3\text{MgCl}_2 \text{ (aq)}$

Inorganic Chemistry (minimum 7 experiments)

A. Compulsory experiments

9. Determination of hardness of water from a given sample of water by EDTA method.
10. Analysis of alkali mixture by volumetric method.

B. Any Three Inorganic qualitative analyses without phosphate and borate removal.

- 11) Mixture-1 (water soluble)
- 12) Mixture-2 (water insoluble)
- 13) Mixture-3 (water insoluble)

C-Any one of the following

- 14) To standardize NaOH solution & hence find the strength of given HCl solution.

15) To standardize KMnO_4 soln. & hence find strength of the given solution

D Any One of the following:

16) Estimation of % purity of a given sample of sodium chloride.

17) Analysis of brass

Organic Chemistry (Minimum 7 experiments)

18. Techniques (**any two**) - To be carried out on micro-scale

- i. Thin layer chromatography
- ii. Crystallization with M.P. and % yield of purified compound
- iii. Distillation with B.P. and % yield of purified compound
- iv. Sublimation with M.P. and % yield of purified compound

19. Estimations (**any one**)

- i. To determine amount of acetic acid in commercial vinegar
- ii. To determine amount of aspirin in APC tablets

20. Organic qualitative analysis of single organic compound at least one belonging from each type (**any four**)

Type, Preliminary tests, elements, functional group, physical constants

- a. Benzoic acid, Salicylic acid, Cinnamic acid, Phthalic acid, oxalic acid
 - b. β -Naphthol, α -naphthol
 - c. Aniline, N,N-Dimethyl aniline
 - d. Naphthalene, Thiourea, Urea, m-Dinitrobenzene, chloroform, ethyl methyl ketone, ethyl acetate, chlorobenzene
-

Pattern for F.Y.B.Sc. Practical Examination

Sr. No.	Experiment	Marks
1	Physical chemistry OR Inorganic Volumetric OR Organic Estimation	35
2	Inorganic Qualitative Analysis OR Organic Qualitative Analysis and Technique	35
3	Oral	10
4	Internal marks for Journal and Oral	20

Note:-

1. At the time of Practical examination in a batch 50 % students must be given Physical Experiments.
3. For Organic Qualitative Analysis 20 marks & for technique 15 marks.
4. For Volumetric Analysis students must prepare standard solutions.
5. External printed material or practical book/ text book is allowed during the practical examination.

University of Pune

**Three Year B. Sc. Degree Course in
Electronic Science**

1) Title of the Course : B. Sc. Electronic Science

F.Y.B.Sc. Electronic Science Syllabus (To be implemented from Academic Year 2013-14)

2) Preamble:

The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in Electronics and for becoming an enterprenur.

3) Introduction:

At **first year of under-graduation** The basic topics related to the fundamentals of electronics are covered. Since electronics is very close to technological advancements, the practical course is intended to achieve the basic skills required for circuit building and testing.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Analog and digital circuit design concepts will be introduced at this stage.

At **third year under-graduation**: Theory papers in each semester deal with the further detailed studies of the branches of Electronics. The first two practical courses shall be based on the theory courses. Third practical course is project course in which student can independently think and carry out the project work.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of electronics
- To familiarize with current and recent technological developments
- To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to electronics industry and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Electronics

4) Eligibility:

- 1 **First Year B.Sc.:** Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.
- 2 **Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with Electronic Science as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.

- 3 **Third Year B. Sc.:** Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with Electronic Science as one of the subjects.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Electronic Science

Pattern of Examination: Annual

Theory courses (EL-101): Annual

(EL-102): Annual

Practical Course (EL-103): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I (EL-101) (First term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I (EL-101) (Second term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II (EL-102) (First term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II (EL-102) (Second term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III (EL-103) (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks

3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 and 4	4 out of 6– short answer type questions; answerable in 8 – 10 lines
Question 5	4 out of 6 – problem type question; answerable in numerical or analytical fashion or circuit/logic diagrams

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.
Practical: one internal assessment test + marks for journals + attendance + activity.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Electronic Science

Pattern of examination: Semester

Theory courses (SemI: EL211 and EL212): Semester
(Sem II: EL221 and EL222): Semester

Practical Course (EL223): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (EL 211)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *

Theory Paper II (EL 212)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (EL 221)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (EL 222)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (EL 223) (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	4 sub-questions, each of 1 marks and 4 sub-questions, each of 2 marks on entire syllabus	12 marks
Question 2 and 3	2 out of 3 sub-questions, each of 4 marks; short answer type questions; answerable in 8–10 lines	8 marks each
Question 4	2 out of 3 sub-questions, each of 6 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	12 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: one internal assessment test + practical journal + attendance + activity

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Electronic Science

Pattern of examination: Semester

Theory courses:

(Sem III: EL331-EL336): Semester

(Sem IV: EL341-EL346): Semester

Practical Course:

(EL347-EL349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
EL-331	Paper I	48	4	16	20*
EL-332	Paper II	48	4	16	20*
EL-333	Paper III	48	4	16	20*
EL-334	Paper IV	48	4	16	20*
EL-335	Paper V	48	4	16	20*
EL-336	Paper VI	48	4	16	20*
SEM IV					
EL-341	Paper I	48	4	16	20*
EL-342	Paper II	48	4	16	20*
EL-343	Paper III	48	4	16	20*
EL-344	Paper IV	48	4	16	20*
EL-345	Paper V	48	4	16	20*
EL-346	Paper VI	48	4	16	20*
Practical Papers					
EL 347 (Semester III & IV)	Practical Paper I	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **
EL 348 (Semester III & IV)	Practical Paper II	12 Practicals of 4 lectures in each	08	32	40 **

		Semester (24 / year)			
EL 349 (Semester III & IV)	Project Practical Paper III	12 Practicals of 4 lectures in each Semester (24 / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	4 sub-questions, each of 1 marks and 4 sub-questions, each of 2 marks; on entire syllabus	12 marks
Question 2 and 3	2 out of 3 sub-questions, each of 4 marks; short answer type questions; answerable in 8–10 lines	8 marks each
Question 4	2 out of 3 sub-questions, each of 6 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	12 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)

- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 20) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III, papers shall be set by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Electronic Science Degree Program shall be three years.

a) Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 1 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 1 Practical (Annual)

T.Y.B.Sc.: 5 Theory per semester + 3 Practical (Annual)

b) Optional Papers:

One theory out of two optional papers per semester for third year only

c) Question Papers :**F.Y.B.Sc.Theory paper:**

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

d) Medium of Instruction: The medium of instruction for the course shall be English.**7) Equivalence of Previous Syllabus:**

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Principles of Analog Electronics	EL-101: Principles of Analog Electronics
Paper II: Principles of Digital Electronics	EL-102: Principles of Digital Electronics
PaperIII: Practical	EL-103: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Electronic Science or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

F.Y. B. Sc. Electronic Science

Paper I

EL-101: Principles of Analog Electronics

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To study characteristic features of semiconductor devices
4. To study elementary electronic circuits and applications
5. To understand basics of operational amplifiers.

Term I

Unit 1: Passive Components (12)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries.

Unit 2: Basic Electrical Circuits and Circuit Theorems (14)

Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) and sinusoidal ac source (amplitude, wavelength, period, frequency, phase angle), Network terminology, Ohm's law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (numerical problems with maximum two meshes), Charging-discharging of capacitor, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter

Unit 3: Semiconductor Diodes and Circuits (10)

Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, optocoupler, varactor diode, solar cell, clipper and clamper circuits Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply

Term II

Unit 4: Bipolar Junction Transistor and Circuits (14)

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications. Concept of amplification, voltage and current amplifier. Transistor amplifier configurations - CB, CC and CE, biasing circuits - voltage divider, collector feedback bias and emitter feedback bias, DC load line (CE), Q point and factors affecting the stability, transistor as a switch, concept of

class A, B and class C amplifiers, emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth

Unit-5:UJT,FETs and Applications (10)

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of:Uni-Junction Transistor (UJT),Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT

Applications: JFET as voltage variable resistor, MOSFET as a switch

Unit 6: Operational Amplifier (12)

Symbol, block diagram, Opamp characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741

Opamp as inverting and non-inverting amplifier, voltage follower, adder, subtractor
Opamp as a comparator and Schmitt trigger

Text/ Reference Books:

1. Basic Electronics:Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles:Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principles of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.
6. A First Course in Electronics: Khan Anwar, K.K.Day, PHI learning Pvt.Ltd.
7. Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill.
8. Electronic Devices and circuits: A. Motorshed, Prentice Hall of India.
9. Basic Electronic Devices and Circuits: R.Y.Borse, 1st Edition 2012, Adhyayan Publishers and Distributors, New Delhi.

Paper II

EL-102: Principles of Digital Electronics

Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, boolean algebra and k-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits
5. To study comparative aspects of logic families.

Term I

Unit 1: Number Systems and Logic Gates (12)

Introduction to decimal, Binary and hexadecimal number systems and their inter-conversions,Signed and fractional binary number representations, BCD, Excess-3 and Graycodes, Alphanumeric representation in ASCII codes.

Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.

Unit 2: Boolean Algebra and Karnaugh maps (12)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, DeMorgan's theorem, Universal gates.

Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 3 variables).

Unit 3: Arithmetic Circuits (12)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU.

Term II

Unit 4: Combinational Circuits (14)

Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoder.

Unit 5: Sequential Circuits (14)

Flip flops : RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T.

Counters: Ripple Binary counter, up down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams.

Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register and Applications.

Unit 6: Logic Families (8)

Introduction to Integrated circuit technologies TTL, ECL, CMOS

IC parameters: Logic levels, switching speed, propagation delay, power dissipation, noise margins and fanout of TTL and CMOS.

TTL NAND & NOT gate, Open collector gates, Wired OR operation. CMOS - NOT, NAND, NOR gate, precautions while handling CMOS gates, tri-state logic.

Text/ Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Paper III

EL-103: Practical Course

- 1 The practical course consists of 20 experiments.
- 2 Any two of the following activities with proper documentation will be considered as equivalent of 4 experiments weightage in term work.
 - i. Preparatory experiments
 - ii. Hobby projects
 - iii. Internet browsing
 - iv. industrial visit / live work experience
 - v. PCB Making
 - vi. Market Survey of Electronic Systems
 - vii. Circuit Simulations and CAD tools
 - viii. Study Tour and its report writing

These will be evaluated in an oral examination for 20% marks at internal and term end examination.

3. All the students are required to complete a minimum of 16 experiments (four from each group) from the following list.

Group A Any Four

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator .
6. Study of solar cell.

Group B Any four

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Design, build and test Low pass and High pass RC filters.
4. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
5. Study of amplification action of BJT.
6. Study of potential divider biasing of BJT and its use in DC motor driving.
7. Build and test Inverting and non inverting amplifier using OPAMP.
8. Build and test adder and subtractor circuits using OPAMP.
9. Study of clipping and clamping circuits.

Group C Any Four

* Minimum Two experiments may be carriedout with CMOS ICs

1. Basic Logic gates using Diodes and transistors
2. Interconversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter

5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC

Group D Any Four

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
4. Build and Test 3X4 matrix Keyboard Encoder
5. Build and Test a Debounce switch using NAND or NOR gate IC
6. Build and Test Diode matrix ROM
7. Study of Four bit Universal Adder/Subtractor / ALU

Preparatory Experiments

1. Identification of Components / Tools
 - Minimum 10 different types of components must be given
 - Identification based on visual inspection / data sheets be carried out
2. Use of Multimeters (Analog and Digital)
 - Measurement of AC/DC voltage and Current – on different ranges
 - Measurement of R & C
 - Testing of Diodes & Transistors
 - Measurement of h_{fe}
 - Use of Multimeter in measurement of Variation of Resistance of LDR.
 - Thermister
3. Study of Signal Generator/CRO
 - Understand how to use Signal Generator/CRO
 - Study of front panel controls
 - Measurement of amplitude and frequency of Sine/Square waveform
 - Measurement of Phase with the help of RC circuit
 - Demonstration of Lissajous figures
 - Demonstrate the use of Component testing facility

Hobby Project Examples

Build and Test gadgets like

- Water level Indicator
 - Photo relay / smoke detector
 - Burglar Alarm
 - Fan regulator
 - Logic Probe
 - Experiments with some software's like PSPICE / LTSPICE
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UNIVERSITY OF PUNE, PUNE.
Syllabus for F.Y.B.Sc(Computer Science)
Subject: MATHEMATICS
(With effect from June 2013)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June,2013. Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of F.Y.B.Sc. (Computer Science) Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles ,methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling ,solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills , creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays ,state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: 12th science with mathematics or equivalent examination.

Structure of the course:

Sr.No.	Paper	Theory	Oral	Internal	Total
1	MTC 101 (Discrete Mathematics)	80 Marks	-	20 Marks	100 Marks
2	MTC 102 (Algebra and Calculus)	80 Marks	-	20 Marks	100 Marks
3	MTC 103 (Mathematics Practicals)	72 Marks	08 Marks	20 Marks	100 Marks

All 3 above courses are compulsory.

Medium of Instruction: English

Examination:

A) Pattern of examination: Annual.

B) Standard of passing : 40 Marks out of 100 marks for each papers.

But for MT 101 and MT 102 for passing a student should obtain minimum 32 marks out of 80 in the theory examination and overall total marks for theory and internal should be minimum 40.

C)Pattern of question papers: For MTC 101 and MTC 102

Q1. Attempt any 08 out of 10 questions each of 02 marks. [16 Marks]
(05 questions from each term)

Q2. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term I)

Q.3. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term I)

Q4. Attempt any 04 out of 06 questions each of 04 marks. [16 Marks].
(Based on term II)

Q.5. Attempt any 02 out of 03 questions each of 08 marks. [16 Marks].
(Based on term II)

The pattern of question paper for MTC 103 is given in the detailed syllabus.

D) External Students: Not allowed.

E)Verifation/Revaluation: Allowed for MTC 101,MTC 102.

Equivalence of Previous syllabus along with new syllabus:

Sr.No	New Courses	Old Courses
1	MTC 101 (Discrete Mathematics)	Paper I (Discrete Mathematics)
2	MTC 102 (Algebra and Calculus)	Paper II (Algebra and Calculus)
3	MTC 103 (Mathematics Practicals)	Paper III (Mathematics Practicals)

Qualifications for Teacher

M.Sc. Mathematics (with NET /SET as per existing rules

Details of Syllabus

MTC 101: Discrete Mathematics

First Term

Unit 1: Logic

07 Lectures

- 1.1 Revision : Propositional Logic, Propositional Equivalences.
- 1.2 Predicates and Quantifiers : Predicate, n -Place Predicate or n -ary Predicate, Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains, Logical Equivalences involving Quantifiers.
- 1.3 Rules of Inference : Argument in propositional Logic, Validity Argument(Direct and Indirect methods) Rules of Inference for Propositional Logic, Building Arguments.

Unit 2 : Lattices and Boolean Algebra

10 Lectures

- 2.1 Poset, Hasse diagram.
- 2.2 Lattices, Complemented lattice, Bounded lattice and Distributive lattice.
- 2.3 Boolean Functions : Introduction, Boolean variable, Boolean Function of degree n , Boolean identities, Definition of Boolean Algebra.
- 2.4 Representation of Boolean Functions : Minterm, Maxterm Disjunctive normal form, Conjunctive normal Form.

Unit 3 : Counting Principles

10 Lectures

- 3.1 Cardinality of Set : Cardinality of a finite set.
- 3.2 Basics of Counting : The Product Rule, The Sum Rule, The Inclusion-Exclusion Principle.
- 3.3 The Pigeonhole Principle: Statement, The Generalized Pigeonhole Principle, Its Applications.
- 3.4 Generalized Permutations and Combinations : Permutation and Combination with Repetitions, Permutations with Indistinguishable Objects, Distributing objects into boxes : Distinguishable objects and distinguishable boxes, Indistinguishable objects and distinguishable boxes, Distinguishable objects and Indistinguishable boxes, Indistinguishable objects and Indistinguishable boxes

Unit 4 : Recurrence Relations

9 Lectures

- 4.1 Recurrence Relations : Introduction, Formation.
- 4.2 Linear Recurrence Relations with constant coefficients.
- 4.3 Homogeneous Solutions.
- 4.4 Particular Solutions.
- 4.5 Total Solutions.

Second Term

Unit 5 : Graphs

06 Lectures

- 5.1 Definition, Elementary terminologies and results, Graphs as Models.
- 5.2 Special types of graphs.
- 5.3 Isomorphism.
- 5.4 Adjacency and Incidence Matrix of a Graph.

Unit 6 : Operations on Graphs

04 Lectures

- 6.1 Subgraphs, induced subgraphs, Vertex deletion, Edge deletion.
- 6.2 Complement of a graph and self-complementary graphs.
- 6.3 Union, Intersection and Product of graphs.
- 6.4 Fusion of vertices.

Unit 7 : Connected Graphs.

09 Lectures

- 7.1 Walk, Trail, Path, Cycle : Definitions and elementary properties.
- 7.2 Connected Graphs : definition and properties.
- 7.3 Distance between two vertices, eccentricity, center, radius and diameter of a graph.
- 7.4 Isthmus, Cutvertex : Definition and properties.
- 7.5 Cutset, edge-connectivity, vertex connectivity.
- 7.6 Weighted Graph and Dijkstra's Algorithm.

Unit 8 : Eulerian and Hamiltonian Graphs

05 Lectures

- 8.1 Seven Bridge Problem, Eulerian Graph : Definition and Examples, Necessary and Sufficient condition.
- 8.2 Fleury's Algorithm.
- 8.3 Hamiltonian Graphs : Definition and Examples, Necessary Condition.
- 8.4 Introduction of Chinese Postman Problem and Travelling Salesman Problem.

Unit 9 : Trees

06 Lectures

- 9.1 Definition, Properties of trees.
- 9.2 Center of a tree.
- 9.3 Binary Tree : Definition and properties.
- 9.4 Tree Traversal : Ordered rooted Tree, Preorder traversal, inorder traversal and postorder traversal, Prefix Notation.
- 9.5 Spanning Tree : Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm.

Unit 10 : Directed Graphs

06 Lectures

- 10.1** Definition, Examples Elementary Terminologies and properties.
- 10.2** Special Types of Digraphs.
- 10.3** Connectedness of digraphs.
- 10.4** Network and Flows : definition and examples.

Text Book: Text book of Discrete Mathematics, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Kenneth Rosen, Discrete Mathematics and It's Applications (Tata McGraw Hill)
- 2) C. L. Liu ,Elements of Discrete Mathematics, (Tata McGraw Hill)
- 3) John Clark and Derek Holton, A First Look at Graph Theory (Allied Publishers)
- 4) Narsingh Deo, Graph Theory with Applications to Computer Science and Engineering, (Prentice Hall).

MTC 102: Algebra and Calculus

First Term: (Algebra)

Unit 1: Relations and functions

11 Lectures

- 1.1** Ordered pairs, Cartesian product of Sets.
- 1.2** Relations, types of relations, equivalence relations. Partial orderings.
- 1.3** Equivalence Class, properties and partition of a set.
- 1.4** Transitive closure and Warshall's Algorithm.
- 1.5** Digraphs of relations, matrix representation and composition of relations.
- 1.6** Definition of function as relation, types of functions (one-one, onto and bijective)

Unit 2: Binary Operations and Groups.

9 Lectures

- 2.1** Definition of binary operation, examples, properties of binary operations.
- 2.2** Definition of Monoid, semigroup, examples.

2.3 Definition of group and examples, finite and infinite groups, permutation groups, subgroups, Cyclic groups.

Unit 3: Divisibility in Integers

16 Lectures

3.1 Well ordering principle

3.2 First and second Principle of Mathematical Induction, Examples

3.3 Division Algorithm (without proof)

3.4 Divisibility and its properties, prime numbers.

3.5 Definition G.C.D and L.C.M., Expressing G.C.D. of two integers as a linear combination of the two integers.

3.6 Euclidean Algorithm (Without proof).

3.7 Relatively prime integers, Euclid's Lemma and its generalization.

3.8 Congruence relations and its properties, Residue Classes: Definition, Examples, addition and multiplication modulo n and composition tables

3.9 Euler's and Fermat's Theorems. (Without proof). Examples

Second Term: (Calculus)

Unit 4: Continuity and Differentiability

12 Lectures

4.1 Continuity and Properties of continuous functions defined on $[a, b]$ (Without proof) and examples.

4.2 Differentiability

4.3 Theorem – Differentiability implies continuity but not conversely. Left hand derivative and Right hand derivative.

4.4 Intermediate value theorem (without proof).

4.5 Rolle's theorem (with proof and geometric interpretation)

4.6 Lagrange's Mean Value Theorem (with proof and geometric interpretation)

4.7 Cauchy's Mean Value Theorem (with proof), Verification and Application.

4.8 L' Hospital's Rule (without proof)

Unit 5: Successive Differentiation

05 Lectures

5.1 The n^{th} derivatives of standard functions.

5.2 Leibnitz's Theorem (with proof).

Unit 6: Taylor's and Maclaurin's Theorems

05 Lectures

6.1 Taylor's and Maclaurin's Theorems with Lagrange's and Cauchy's form of remainders (without proof).

6.2 Taylor's and Maclaurin's Series.

Unit 7 : Matrices and System of Linear Equations

14 Lectures

7.1 Revision: Elementary operations on matrices.

7.2 Echelon form of matrix

7.3 System of linear equations: Gauss Elimination Method, Gauss –Jordan Elimination Method, L.U. Decomposition Method

7.4 Rank of matrix, Row rank, Column rank

Text Book: Text book of Algebra and Calculus, Prepared by B.O.S. in Mathematics, University of Pune, Pune.(2013).

Reference Books:

- 1) Discrete Mathematics Structure – Bernard Kolman, Robert Busby, Sharon Cutler Ross, Nadeem-ur-Rehman, Pearson Education, 5th Edition
- 2) Elements of Discrete Mathematics – C.L.Liu (Tata McGraw Hill)
- 3) Calculus and Analytical Geometry- Thomas Finny
- 4) J.B. Fraleigh, A. First Course in Abstract Algebra, Third Ed., Narosa, New Delhi, 1990
- 5) H. Anton and C. Rorres, Elementary Linear Algebra with Applications, Seventh Ed., Wiley, (1994).

MTC 103: Mathematics Practicals

(Practicals based on the applications of articles in MTC 101 and MTC 102)

List of Practicals:

TERM I

1. Logic
 2. Lattices
 3. Boolean Algebra .
 4. Counting Principles.
 5. Recurrence Relations
 6. Miscellaneous.
 7. Relations and functions.
 8. Binary Operations
 9. Groups
 10. Divisibility in Integers I
 11. Divisibility in Integers II.
 12. Miscellaneous.
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TERM II

13. Graphs and Operations on Graphs.
14. Connected Graphs.
15. Eulerian and Hamiltonian Graphs.
16. Trees
17. Directed Graphs.
18. Miscellaneous.
19. Continuity and Differentiability.
20. Mean value theorems and L'Hospital rule.
21. Successive Differentiation.
22. Taylor's and Maclaurin's Theorems.
23. Matrices and System of Linear Equations.
24. Miscellaneous.

Modalities For Conducting The Practical and The Practical Examination

- 1) There will be one 3 hour practical session for each batch of 15 students per week.
- 2) A question bank consisting of 100 problems in all for the whole year, distributed in four Sections: 50 questions for each term (25 questions on MT 101 and 25 on MT 102) will be the course work for this paper. Question Bank will be prepared by the individual subject teacher and the problems included should be changed every year, based on the list of practicals given above. The question bank of each year should be preserved by the subject teachers, which can be reviewed by the L.I.C. members visiting college.

3) The College will conduct the Practical Examination at least 15 days before the commencement of the Main Theory Examination. The practical examination will consist of written examination of 72 marks and oral examination of 08 marks.

4) There will be no external examiner; the practical exam will be of the duration of 3 hours.

5) The subject teacher will set a question paper based on pattern as follows:

- Q1.** (a) Any 1 out of 2 worth 8 marks on MTC101 (first term).
(b) Any 1 out of 2 worth 8 marks on MTC 102(First term).
- Q2*.** Any 5 out of 7 each of 4 marks on MTC 101.
- Q3*.** Any 5 out of 7 each of 4 marks on MTC 102.
- Q4.** (a) Any 1 out of 2 of 10 marks on MTC 101(second term).
(b) Any 1 out of 2 worth 10 marks on MTC 102(second term).

(*In Q2 and Q3, there will be 3 questions from first term and 4 questions from the second term or vice-versa.)

6) Each student will maintain a journal to be provided by the college.

7) The internal 20 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.

8) It is recommended that concept may be illustrated using computer software and graphing calculators wherever possible.

8) The subject teachers must include computer practicals based on use of free mathematical software's like Scilab, Maxima, mu-pad, etc. for solving problems in the miscellaneous practical mentioned above.

10) **Special Instruction:** Before starting each practical necessary introduction, basic definitions, intuitive inspiring ideas and prerequisites must be discussed.

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University of Pune
STATISTICS
For First Year B. Sc. (Computer Science) Degree Course
(Formerly known as B. C. S. Course)
Syllabus
(To be implemented from Academic Year 2013-14)
Submitted by: Board of Studies, Statistics

1) Title of the Course: First Year B. Sc. (Computer Science)

- 2) Preamble:** Statistics is a branch of science that can be applied practically in every walk of life. Statistics deals with any decision making activity in which there is certain degree of uncertainty and Statistics helps in taking decisions in an objective and rational way. The student of Statistics can study it purely theoretically which is usually done in research activity or it can be studied as a systematic collection of tools and techniques to be applied in solving a problem in real life.

In last 5 to 7 years, computers are playing very crucial role in the society. The use of computers has horizontally spread and also penetrated vertically in the society. It has become a part and parcel of common man. Thus there is a huge demand for computer education.

The University of Pune had done a pioneering work in this area and Three year degree course B. Sc. (Computer Science) of University of Pune (formerly known as B.C.S.) is very popular among the student community and I. T. Industry. This course covers various subjects which are required directly or indirectly for becoming computer professional. Statistics is one such important subject which is required and is extensively used in a vast spectrum of computer based applications. Data Mining and Warehousing, Theoretical Computer Science, Reliability of a computer Programme or Software, Machine Learning, Artificial Intelligence, Pattern Recognition, Digital Image Processing, Embedded Systems are just few applications to name where Statistics can be extensively used.

- 3) Introduction:** The syllabus of Statistics for First Year of this course covers basic concepts and terminology in Statistics and covers basic tools and methods required for data analysis. The teachers teaching this syllabus and students should give emphasis on understanding the concepts and ability to apply statistical tools and techniques and not on the theoretical discussion. It is

expected that at the end of the course, a student should be well equipped to learn and apply acquired techniques in computer based applications.

4) Eligibility: 12th Science with Mathematics

Students admitted to F.Y.B.Sc.(C.S.) will be taking this as one of the compulsory course. Admissions to F.Y.B.Sc.(C.S.) will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5) Examination:

A) Pattern of examination and of question paper:

For Theory Papers (For Paper I and II):

Internal examination - 20 marks (10 marks for each semester)

Objective type/ short answer questions with maximum 2 marks for each question.

University Examination - 80 marks at the end of the year.

5 questions carrying 16 marks each.

Q1: Attempt all of the following: (2 marks each) (8 sub questions)

Q2, Q3, Q4, Q5: Attempt any four of the following (4 marks each) (any 4 out of 5 or out of 6)

For Practical paper in Statistics (Paper III):

Internal Evaluation of 20 marks -

(i) Statistics Journal & Attendance – 10 marks

(ii) Project Evaluation – 5 marks

(iii) Viva – 5 marks

External Examination of 80 marks – Total Duration 3 hours

(i) Questions based upon spreadsheet – 3 questions (1 question on diagrams) each of 10 marks should be asked. Total Duration – 1 hour, Total marks – 30.

(ii) Questions to be solved manually using scientific calculator – to solve any two questions out of 3 questions of 25 marks each. Total Duration – 2 hours, Total marks – 50.

B) Standard of Passing: In order to pass in the first year theory and practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Theory Examination.)

C) ATKT Rules: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.

D) Award of Class: Not applicable, since Statistics is one of the compulsory courses taken at F.Y. level.

E) External Students: There shall be no external students.

F) Pattern of question paper: As specified in A)

G) Verification/Revaluation: As per the University rules

6) Structure of the Course:

F. Y. B. Sc.(C.S.) Statistics

Paper	Course Title	Marks	Lectures
Paper - I	Statistical Methods I	100	Three Hours/Week per Paper (Total 36/Paper per term)
Paper - II	Statistical Methods II	100	
Practical Course	Practical Course	100	Three Hours / Week

Medium of Instruction: The medium of instruction for the course shall be English

7) Equivalence of Previous Syllabus: No equivalence required at F. Y. B. Sc. level, the course titles are same as previous syllabus.

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Course wise Detail Syllabus

Detailed Syllabus for Statistics Paper I (Statistical Methods I)

1.	Data condensation and Graphical methods 1.1 Raw data, attributes and variables, discrete and continuous variables. 1.2 Presentation of data using frequency distribution and cumulative frequency distribution. (Construction of frequency is not expected) 1.3 Graphical Presentation of frequency distribution –histogram, stem and leaf chart, less than and more than type ogive curves. 1.4 Numerical problems related to real life situations.	5

2.	Review/Revision of Descriptive Statistics 2.1 Measures of Central tendency: Mean, Mode, Median. Examples where each one of these is most appropriate. 2.2 Partition values: Quartiles, Box-Plot. 2.3 Measures of Dispersion: Variance, Standard Deviation, Coefficient of Variation. (Section 2.1 to 2.3 should be covered for raw data, ungrouped frequency distribution and exclusive type grouped frequency distribution)	7
3.	Moments 3.1 Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments). 3.2 Relation between raw and central moments upto fourth order. 3.3 Numerical problems related to real life situations.	3
4.	Measures of Skewness and Kurtosis 4.1 Concept of symmetric frequency distribution, skewness, positive and negative skewness. 4.2 Measures of skewness-Pearson's measure, Bowley's measure, β_1, γ_1 . 4.3 Kurtosis of a frequency distribution, measure of kurtosis(β_2, γ_2) based upon moments, type of kurtosis: leptokurtic, platykurtic and mesokurtic. 4.5 Numerical problems related to real life situations.	4
5.	Discrete Random variable 5.1 Definition of random variable and discrete random variable. 5.2 Definition of probability mass function, distribution function and its properties. 5.3 Definition of expectation and variance, theorem on expectation. 5.4 Determination of median and mode using p.m.f. 5.5 Numerical problems related to real life situations.	8
6.	Standard Discrete Distributions 6.1 Discrete Uniform Distribution: definition, mean, variance. 6.2 Bernoulli Distribution: definition, mean, variance, additive property. 6.3 Binomial Distribution: definition, mean, variance, additive property. 6.4 Geometric Distribution (p.m.f $p(x) = pq^x$, $x = 0, 1, 2, \dots$): definition, mean, variance. 6.5 Poisson Distribution: definition, mean, variance, mode, additive property, limiting case of $B(n, p)$ 6.6 Illustration of real life situations. 6.7 Numerical problems related to real life situations.	15
7.	Correlation (for bivariate raw data) 7.1 Bivariate data, Scatter diagram. 7.2 Correlation, Positive Correlation, Negative Correlation, Zero Correlation 7.3 Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$), interpretation of r , Coefficient of determination (r^2), Auto-correlation upto lags 2. 7.4 Numerical Problems.	6

8	Regression (for ungrouped data) 8.1 Regression: illustrations, appropriate situations for regression and correlation. 8.2 Linear Regression. 8.3 Fitting of straight line using least square method. 8.4 Properties of regression coefficients: $b_{xy} \cdot b_{yx} = r^2$, $b_{yx} \cdot b_{xy} < 1$, $b_{yx} = r(\sigma_y/\sigma_x)$ and $b_{xy} = r(\sigma_x/\sigma_y)$ 8.5 Non Linear regression models: second degree curve, growth curve models. i) $Y = ae^{bx}$ ii) $Y = ab^x$ iii) $Y = aX^b$ iv) logistic model $Y = k / (1 + e^{a+bx})$ 8.6 Residual plot, mean residual sum of squares (m. s. s) 8.7 Numerical problems related to real life situations.	9
9	Multiple and Partial Correlation and Regression (for trivariate data) 9.1 Yule's notation and concept of multiple regression. 9.2 Fitting of multiple regression plane. 9.3 Partial regression coefficient, interpretation. 9.4 Multiple correlation coefficient, concept, definition, computation and interpretation. 9.5 Partial correlation coefficient, concept, definition, computation and interpretation.	8
10	Time Series 10.1 Meaning and Utility. 10.2 Components of Time Series. 10.3 Additive and Multiplicative models. 10.4 Methods of estimating trend: moving average method, least squares method and exponential smoothing method. 10.5 Elimination of trend using additive and multiplicative models. 10.6 Simple time series models: AR (1), AR (2). 10.7 Numerical problems related to real life situations.	7
	Syllabus for 1 st term is upto Binomial Distribution in Topic 6.	

Detailed Syllabus for Statistics Paper II (Statistical Methods II)

1	Detailed Review / Revision of Theory of Probability 1.1 Counting Principles, Permutation, and Combination. 1.2 Deterministic and non-determination models. 1.3 Random Experiment, Sample Spaces (finite and countably infinite) 1.4 Events: types of events, Operations on events. 1.5 Probability - classical definition, probability models, axioms of probability, probability of an event. 1.6 Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 1.7 Numerical problems related to real life situations.	5

2	Advanced Theory of Probability 2.1 Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B) = P(A) \cdot P(B A)$ 2.2 Bayes' theorem (without proof) 2.3 Concept of Posterior probability, problems on posterior probability. 2.4 Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative. 2.5 Concept and definition of independence of two events. 2.6 Numerical problems related to real life situations.	12
3	Continuous Random Variable 3.1 Definition of continuous random variable (r. v.), 3.2 Probability density function (p.d.f.), 3.3 Cumulative distribution function (c.d.f.), its properties. 3.4 Calculation of mean, mode, median, variance, standard deviation for continuous r. v. 3.5 Numerical problems related to real life situations.	6
4	Standard Continuous Probability Distributions 4.1 Uniform Distribution: statement of p.d.f., mean, variance, nature of probability curve. 4.2 Exponential Distribution: statement of p.d.f. of the form, $f(x) = (1/\theta) e^{(-x/\theta)}$, mean, variance, nature of probability curve, lack of memory property. 4.3 Normal Distribution: statement of p.d.f., identification of parameters, nature of probability density curve, standard normal distribution, symmetry, distribution of $aX+b$, $aX+bY+c$ where X and Y are independent normal variables, computations of probabilities using normal probability table, normal approximation to binomial and Poisson distribution, central limit theorem (statement only), normal probability plot. 4.4 Pareto Distribution: p.d.f. of the form $f(x) = \frac{\alpha}{x^{\alpha+1}}$, $x \geq 1, \alpha > 0$, mean, variance, applications. 4.5 Numerical problems related to real life situations.	13
	End of First term.	
5	Concepts and definitions related to testing of hypothesis 5.1 Definitions: population, statistic, SRSWR, SRSWOR, random sample from a probability distribution, parameter, statistic, standard error of estimator. 5.2 Concept of null hypothesis and alternative hypothesis, critical region, level of significance, type I and type II error, one sided and two sided tests, p-value.	5

6	Large Sample Tests 6.1 $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0, \mu < \mu_0, \mu > \mu_0$ (One sided and two sided tests) 6.2 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests) 6.3 $H_0: P = P_0$ Vs $H_1: P \neq P_0, P < P_0, P > P_0$ (One sided and two sided tests) 6.4 $H_0: P_1 = P_2$ Vs $H_1: P_1 \neq P_2, P_1 < P_2, P_1 > P_2$ (One sided and two sided tests) 6.5 Numerical problems related to real life situations.	7
7	Tests based on t-distribution 7.1 $H_0: \mu = \mu_0$ Vs $H_1: \mu \neq \mu_0, \mu < \mu_0, \mu > \mu_0$ (One sided and two sided tests) 7.2 $H_0: \mu_1 = \mu_2$ Vs $H_1: \mu_1 \neq \mu_2, \mu_1 < \mu_2, \mu_1 > \mu_2$ (One sided and two sided tests) 7.3 Paired t-test. 7.4 Test of significance of correlation coefficient for bivariate raw data. 7.5 Test of significance of regression coefficients for bivariate raw data. 7.6 Numerical problems related to real life situations.	8
8	Test based on Chi-square distribution 8.1 Chi square test for goodness of fit 8.2 Test for independence of attributes (m X n contingency table) 8.3 Test for significance of variation for a population. 8.4 Numerical problems related to real life situations.	3
9	Non parametric tests 9.1 Run test 9.2 Sign test. 9.3 Kolmogrov - Smirnov test 9.4 Mann – Whitney test 9.5 Numerical problems related to real life situations.	6
10	Simulation 10.1 Introduction to Simulation, merits and demerits and pitfall. 10.2 Pseudo-random number generator ,requisites of a good random number generator, Testing these requirements by using various test of hypothesis using Run test, goodness of fit test, Sign test etc. 10.3 Model Sampling from uniform and exponential distribution. 10.4 Model sampling from Normal distribution using Box-Muller transformation. 10.5 Numerical problems related to real life situations.	7

Detailed Syllabus for Statistics Paper III (Practical)

A) Practicals to be done manually using scientific calculator

1	Measures of Central Tendency and Dispersion.
2	Problems on simple probability, conditional probability, Baye's theorem and independence of events.
3	Measures of skewness and kurtosis

4	Correlation and Linear Regression Analysis. (for bivariate raw data)
5	Fitting of second degree and exponential type models. (for bivariate raw data)
6	Multiple and Partial Correlation and Regression Analysis. (for trivariate data) + Using spreadsheet with use of readymade function.
7	Time Series (Moving Average and Fitting of AR(1) and AR(2) models).
8	Fitting of Binomial and Poisson distributions.
9	Fitting of Normal Distribution.
10	Model Sampling from Simple Continuous Distributions
11	Large Sample Tests.
12	Tests based upon t distribution.
13	Tests based upon chi square distribution.
14	Non parametric tests.

B) Practicals to be done using any spreadsheet (like MS-Excel in MS-Windows or Open-Office in Linux etc.)

1	Diagrammatic Representation and Descriptive Statistics for raw data
2	For a bivariate raw data, fitting various models and finding the “best fit”. (3 problems to be solved in a slot)
3	Fitting of Geometric Distribution and Normal Distribution
4	Using random numbers, drawing of a sample from exponential distribution, normal distribution (Box Muller Transformation) etc.

C) Project –

Project is compulsory which is equivalent to 2 practicals.

Project will carry 5 marks as part of internal evaluation.

One project should be given to one practical batch of students.

The formal project report should be prepared by each student and it must be attached in Statistics journal.

10) Recommended books

Author Name	Year of Publication	Title	Publisher
Medhi J.	1992	Statistical Methods (An Introductory Text)	New Age International
Freund J.E.	2005	Modern Elementary Statistics	Pearson Publication
Trivedi K.S.	2001	Probability, Statistics, Design of Experiments and Queuing Theory with Applications of Computer Science	Prentice Hall of India, New Delhi

Gupta S. C. and Kapoor V. K.	1987	Fundamentals of Applied Statistics (3rd Edition)	S. Chand and Sons, New Delhi.
Ross S. M.	2006	A First Course In Probability 6th Edition	Pearson publication
Law A. M. and Kelton W. D.	2007	Simulation Modelling and Analysis	Tata McGraw Hill
Box G. E. P. and Jenkins G. M.	2008	Time Series Analysis, 4 th edition	Wiley
Brockwell P. J. and Davis R. A.	2006	Time Series Methods	Springer
Snedecor G. W. Cochran W. G.	1989	Statistical Methods	John Wiley & sons
Kulkarni M.B., Ghatpande S.B., Gore S.D.	1999	Common Statistical Tests	Satyajeet Prakashan, Pune
Kulkarni M.B., Ghatpande S.B.	2007	Introduction to Discrete Probability and Probability Distributions	SIPF Academy
Sarma K.V.S.	2001	Statistics Made Simple. Do it Yourself on P.C.	Prentice Hall

11) Qualification of Teacher: As per the University rules

University of Pune

Three Year B. Sc. Degree Course in Computer Science

Subject : Electronics

1) Title of the Course :

F.Y.B.Sc.Electronics of Computer Science

(To be implemented from Academic Year 2013-14)

2) Preamble:

The systematic and planned curricula for first year and second year electronics shall motivate and encourage the students for pursuing higher studies in Electronics and computer and for becoming an enterprenur.

3) Introduction:

At **first year of under-graduation**: The basic topics related to the fundamentals of electronics are covered. Since electronics is an inherent part of technological advancements, the practical course is intended to achieve the basic skills required for circuit building and testing.

At **second year under-graduation**: The level of the theory and practical courses shall be one step ahead of the first year B.Sc. Courses based on content of first year shall be introduced. Analog and digital circuit design concepts will be introduced at this stage.

Objectives:

- To provide indepth knowledge of scientific and technological aspects of electronics
- To familiarize with current and recent technological developments
- To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to electronics industry and market.
- To create foundation for research and development in Electronics
- To develop analytical abilities towards real world problems
- To help students build-up a progressive and successful career in Electronics

4) Eligibility:

1 First Year B.Sc.:

Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

2 Second Year B.Sc.:

Keeping terms of First Year of B.Sc. Computer Science, with electronics as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B.Sc. Computer Science Subject : Electronics

Pattern of Examination: Annual

Theory courses (ELC-101 and ELC-102) : Annual

Practical Course (ELC-103) : Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Theory Paper I (ELC-101) (First term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper I (ELC-101) (Second term)	Principles of Analog Electronics	Three lectures/Week (Total 36 lectures per term)			
Theory Paper II (ELC-102) (First term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)	08	32	40 *
Theory Paper II (ELC-102) (Second term)	Principles of Digital Electronics	Three lectures/Week (Total 36 lectures per term)			
Practical Paper III (ELC-103) (First & Second Term)	Practical	10 Practicals of 4 lectures in each term (20 practicals / year)	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2 and 3 and 4	4 out of 6– short answer type questions, each of 4 marks; answerable in 8 – 10 lines
Question 5	2 out of 3 – long answer type questions; 8 marks each; answerable in analytical fashion or circuit/logic diagrams

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions. For practicals: one internal assessment test + marks for journals + attendance + hobby project - tour report etc.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 6 hours duration (2-Sessions). Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B.Sc. Computer Science

Subject : Electronics

Pattern of examination: Semester

Theory courses (SemI: ELC 211 and ELC 212): Semester
(Sem II: ELC 221 and ELC 222): Semester

Practical Course (ELC 223): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (ELC 211)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 212)	Paper II	Four lectures/Week	04	16	20 *

		(Total 48 per Semester)			
Theory Paper I (ELC 221)	Paper I	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (ELC 222)	Paper II	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper III (ELC 223) (First & Second Semester)	Paper III	12 Practicals of 4 lectures in each Semester (24 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals) = 300 marks
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on internal assessment tests + journals + attendance + study visit reports/ market survey/hobby projects etc.

Theory examination will be of two hours duration for each theory course. There shall be 4 questions each carrying marks as per the table. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 marks	10 marks
Question 2 and 3	2 out of 3 sub-questions, each of 5 marks; short answer type questions; answerable in 8 – 10 lines	10 marks each
Question 4	2 out of 3 sub-questions, each of 5 marks; long answer type questions (12-16 lines), problems, circuit/logic diagrams and designs	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions. For practicals: one internal assessment test + marks for journals + attendance + visit report.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 6 hours (2-Sessions) duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 12) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

5 D) External Students: There shall be no external students.

5 E) Setting Question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Paper III papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5F) Verification and Revaluation Rules:

As per university Statutes and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. (Computer Science) Degree Program shall be three years. Electronics is offered at first and second year.

a) Compulsory Papers : All Theory and Practical Papers

b) Optional Papers : Nil

c) Question Papers :

F.Y.B.Sc.

Theory paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y.B.Sc.

Theory paper: University Examination – 40 marks (at the end of each semester)

Internal Examination – 10 marks

Practical Paper: University Examination – 80 marks (at the end of 2nd semester)

Internal Examination – 20 marks

d) Medium of Instruction: The medium of instruction for the course shall be English.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Electronic Devices, circuits and computer peripherals	ELC-101: Principles of Analog Electronics
Paper II: Fundamentals of Digital Electronics	ELC-102: Principles of Digital Electronics
Paper III: Practical	ELC-103: Practical

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Electronic Science or equivalent master degree in science with class/grades and NET/SET as per prevailing University /Government /UGC rules.

10) Detail Syllabus with Recommended Books:

Electronics Subject of F.Y. B.Sc.Computer Science

Paper I

ELC-101: Principles of Analog Electronics

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To study characteristic features of semiconductor devices
4. To study elementary electronic circuits and applications
5. To understand basics of operational amplifiers.

Term I

Unit 1: Passive Components

(12)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Connectors, Switches, Fuses, Relays, Batteries.

Unit 2: Basic Electrical Circuits and Circuit Theorems

(14)

Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) and sinusoidal ac source (amplitude, wavelength, period, frequency, phase angle), Network terminology, Ohm's law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, concept of black box, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (numerical problems with maximum two meshes), Charging-discharging of capacitor, AC applied to R, C and L, concept of impedance, LCR series resonant circuit, concept of phase difference, RC low pass and high pass filter

Unit 3: Semiconductor Diodes and Circuits

(10)

Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications: diode, zener diode, light emitting diode, photo diode, optocoupler, varactor diode, solar cell, clipper and clamper circuits Rectifiers (half and full wave), rectifier with capacitor-filter, Zener regulator, Block diagram of power supply

Term II

Unit 4: Bipolar Junction Transistor and Circuits

(14)

Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications, Concept of amplification, voltage and current amplifier, Transistor amplifier configurations - CB, CC and CE, biasing circuits- voltage divider, collector feedback bias and emitter feedback bias, DC load line (CE), Q point and factors affecting the stability, transistor as a switch, concept of class A, B

and class C amplifiers, emitter follower amplifier, Single stage RC coupled CE amplifier, concept of frequency response and bandwidth

Unit-5:UJT,FETs and Applications (10)

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT), Junction Field Effect Transistor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT

Applications: JFET as voltage variable resistor, MOSFET as a switch

Unit 6: Operational Amplifier (12)

Symbol, block diagram, Opamp characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741

Opamp as inverting and non-inverting amplifier, voltage follower, adder, subtractor

Opamp as a comparator and Schmitt trigger

Text/ Reference Books:

1. Basic Electronics:Bernard Grob, McGraw Hill Publication, 8th Revised Edition, 2010
2. Electronic Principles:Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principles of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.
6. A First Course in Electronics: Khan Anwar, K.K.Day, PHI learning Pvt.Ltd.
7. Electronic Devices and Circuits: Bolyestad, Tata McGraw Hill.
8. Electronic Devices and circuits: A. Motorshed, Prentice Hall of India.
9. Basic Electronic Devices and Circuits: R.Y.Borse, 1st Edition 2012, Adhyayan Publishers and Distributors, New Delhi.

Paper II

ELC-102: Principles of Digital Electronics

Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits
5. To study comparative aspects of logic families.

Term I

Unit 1: Number Systems and Logic Gates (12)

Introduction to decimal, Binary and hexadecimal number systems and their inter-conversions, Signed and fractional binary number representations, BCD, Excess-3 and Graycodes, Alphanumeric representation in ASCII codes.

Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.

Unit 2: Boolean Algebra and Karnaugh maps (12)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, DeMorgan's theorem, Universal gates.

Min terms, Max terms, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 3 variables).

Unit 3: Arithmetic Circuits (12)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU.

Term II

Unit 4: Combinational Circuits (14)

Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder, BCD to seven segment decoder.

Unit 5: Sequential Circuits (14)

Flip flops :RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T.

Counters: Ripple Binary counter, up down counter, concept of modulus counters, Decade counter, Counters for high-speed applications (Synchronous counters) with timing diagrams.

Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, universal 4-bit shift register and Applications.

Unit 6: Logic Families (8)

Introduction to Integrated circuit technologies TTL, ECL, CMOS

IC parameters: Logic levels, switching speed, propagation delay, power dissipation, noise margins and fanout of TTL and CMOS.

TTL NAND & NOT gate, Open collector gates, Wired OR operation. CMOS - NOT, NAND, NOR gate, precautions while handling CMOS gates, tri-state logic.

Text/ Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Paper III

ELC-103: Practical Course

- 1 The practical course consists of 20 experiments.
- 2 Any two of the following activities with proper documentation will be considered as equivalent of 4 experiments weightage in term work.
 - i. Preparatory experiments
 - ii. Hobby projects
 - iii. Internet browsing
 - iv. industrial visit / live work experience
 - v. PCB Making
 - vi. Market Survey of Electronic Systems
 - vii. Circuit Simulations and CAD toolsThese will be evaluated in an oral examination for 20% marks at internal and term end examination.

3. All the students are required to complete a minimum of 16 experiments (four from each group) from the following list.

Group A Any Four

1. Study of forward and Reverse biased characteristics of PN Junction Diode
2. Study of breakdown characteristics and voltage regulation action of Zener diode
3. Study of output characteristics of Bipolar Junction Transistor in CE mode
4. Study of output and transfer characteristics JFET/MOSFET
5. Study of I-V characteristics of UJT and Demonstration of UJT based relaxation oscillator .
6. Study of solar cell.

Group B Any four

1. Verification of network theorems: KCL / KVL, Thevenin, Norton.
2. Verification of network theorems: Maximum Power Transfer, Superposition theorem.
3. Design, build and test Low pass and High pass RC filters.
4. Study of low voltage Half-wave, Full-wave and Bridge rectifier circuits.
5. Study of amplification action of BJT.
6. Study of potential divider biasing of BJT and its use in DC motor driving.
7. Build and test Inverting and non inverting amplifier using OPAMP.
8. Build and test adder and subtractor circuits using OPAMP.
9. Study of clipping and clamping circuits.

Group C Any Four

* Minimum Two experiments may be carriedout with CMOS ICs

1. Basic Logic gates using Diodes and transistors
2. Interconversions and realizations of logic expressions using ICs
3. Study of RS, JK and D flip flops using NAND gates
4. Study of Up/Down Counter
5. Study of decade counter IC circuit configurations
6. Study of 4-bit Shift register IC

Group D Any Four

1. Build and Test 4 bit parity checker/ generator using X-OR gate IC
2. Build and Test Half Adder, Full Adder and Subtractor using basic gate
3. Build and Test 2:1 Multiplexer and 1:2 Demultiplexer using gates
4. Build and Test 3X4 matrix Keyboard Encoder
5. Build and Test a Debounce switch using NAND or NOR gate IC
6. Build and Test Diode matrix ROM
7. Study of Four bit Universal Adder/Subtractor / ALU

Preparatory Experiments

1. Identification of Components / Tools
 - Minimum 10 different types of components must be given
 - Identification based on visual inspection / data sheets be carried out
2. Use of Multimeters (Analog and Digital)
 - Measurement of AC/DC voltage and Current – on different ranges
 - Measurement of R & C
 - Testing of Diodes & Transistors
 - Measurement of h_{fe}
 - Use of Multimeter in measurement of Variation of Resistance of LDR.
 - Thermister
3. Study of Signal Generator/CRO
 - Understand how to use Signal Generator/CRO
 - Study of front panel controls
 - Measurement of amplitude and frequency of Sine/Square waveform
 - Measurement of Phase with the help of RC circuit
 - Demonstration of Lissajous figures
 - Demonstrate the use of Component testing facility

Hobby Project Examples

Build and Test gadgets like

- Water level Indicator
 - Photo relay / smoke detector
 - Burglar Alarm
 - Fan regulator
 - Logic Probe
 - Experiments with some software's like PSPICE / LTSPICE
-

University of Pune

**Three Year Degree Course in
B. Sc. Computer Science**

1) Title of the Course : B. Sc. Computer Science

F.Y.B.Sc. Computer Science Syllabus (To be implemented from Academic Year 2013-14)

2) Preamble:

B. Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

3) Introduction:

At **first year of under-graduation** basic foundation of two important skills required for software development is laid. A course in programming and a course in database fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming.

Alongwith Computer Science two theory and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.

At **second year under-graduation**: The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Databases and preliminary software engineering form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using software engineering principles to solve a real world problem. Simultaneously two theory and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.

At **third year under-graduation**: Six theory papers in each semester and practical courses cover the entire spectrum of topics necessary to build knowledge base and requisite skill set. Third practical course also includes project work which gives students hands on experience in solving a real world problem.

Objectives:

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

4) Eligibility:

Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:**First Year B. Sc. Computer Science****Subject : Computer Science**

Pattern of Examination: Annual

Theory courses (CS-101): Annual

(CS-102): Annual

Practical Course (CS-103): Annual

(CS-104): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Computer Science Paper I (CS-101)	Problem Solving Using Computers and 'C' Programmin g	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al of Databases	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Practical Paper I (CS-103)	Computer Science Practical Paper I	25 Practical slots of 4 lectures each	08	32	40 *
Computer Science Practical Paper II (CS-104)	Computer Science Practical Paper II	25 Practical slots of 4 lectures each	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practical)+ Grade(practical) = 300 marks +Grade
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on continuous assessment of lab work.
4. In case of Computer Science Practical Paper II, marks out of 100 will be converted to grades

Marks	Grade
75 and above	O

65 and above	A
55 and above	B
50 and above	C
45 and above	D
40 and above	E
Below 40 (indicates Failure)	F

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 ,4 and 5	4 out of 5/6– short answer type questions; answerable in 8 – 10 lines ; mix of theory and problems

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.

Practical: Continuous assessment of Lab work and mini project.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 3 hours duration for each practical course. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-211:Data Structures using 'C'	CS-221:Object Oriented Concepts using C++
2	Computer Science Paper II	CS-212: Relational Database Management System	CS-222:Software Engineering
3	Computer Science Paper III	CS-223:Data structures Practicals and C++ Practicals	
4	Computer Science Paper IV	CS-224:Database Practicals & Mini Project using Software Engineering techniques	

5	Mathematics Paper I	MT-211:Mathematics Paper I-Sem I	MT-221:Mathematics Paper I-Sem II
6	Mathematics Paper II	MT-212:Mathematics Paper II-Sem I	MT-222:Mathematics Paper II-Sem II
7	Mathematics Paper III	MT-223:Practical Course in Mathematics	
8	Electronics Paper I	EL-211:Electronics Paper I-Sem I	EL-221:Electronics Paper I-Sem II
9	Electronics Paper II	EL-212:Electronics Paper II-Sem I	EL-222:Electronics Paper II-Sem II
10	Electronics Paper III	EL-223:Practical Course in Electronics	
11	English	EN-211:Technical English-Sem I	EN-221:Technical English – Sem II

Pattern of examination: Semester

Theory courses (Sem I: CS-211 and CS212): Semester
 (Sem II: CS-221 and CS-222): Semester
 Practical Course (CS-223 and CS-224): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (CS- 211)	Data Structures using 'C'	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 212)	Relational Database Management System	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (CS 221)	Object Oriented Concepts using C++	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 222)	Software Engineering	Four lectures/Week (Total 48 per Semester)	04	16	20 *

		Semester)			
Practical paper I (CS 223) (First & Second Semester)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **
Practical paper II (CS 223) (First & Second Semester)	Database Practicals & Mini Project using Software Engineeri ng technique s	Practicals of 4 lectures each 25 practicals / year)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals)+Grade(practical) = 300 marks+Grade
3. Internal marks for theory papers given on the basis of Continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Electronic Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-331: System Programming	CS-341: Operating System
2	Computer Science Paper II	CS-332: Theoretical Computer Science	CS-342: Compiler Construction
3	Computer Science Paper III	CS-333: Computer Networks-I	CS-343: Computer Networks-II
4	Computer Science Paper IV	CS-334: Internet Programming- I	CS-344: Internet Programming- II
5	Computer Science Paper V	CS-335: Programming in Java-I	CS-345: Programming in Java-II
6	Computer Science Paper VI	CS-336: Object Oriented Software Engineering	CS-346: Computer Graphics
7	Computer Science Paper VII	CS-347: Practicals Based on CS-331 and CS-341 – Sem I & Sem II	
8	Computer Science Paper VIII	CS-348: Practicals Based on CS-335 and CS-344 – Sem I & Sem II and Computer Graphics using Java	
9	Computer Science Paper IX	CS-349: Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	

Subject : Computer Science

Pattern of examination: Semester

Theory courses:

(Sem III: CS-331-CS-336): Semester (Sem IV: CS-341-CS-346): Semester

Practical Course:

(CS-347-CS-349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
CS-331	System Programmin g	48	4	16	20*

CS-332	Theoretical Computer Science	48	4	16	20*
CS-333	Computer Networks-I	48	4	16	20*
CS-334	Internet Programming- I	48	4	16	20*
CS-335	Programming in Java-I	48	4	16	20*
CS-336	Object Oriented Software Engineering	48	4	16	20*
SEM IV					
CS-341	Operating System	48	4	16	20*
CS-342	Compiler Construction	48	4	16	20*
CS-343	Computer Networks-II	48	4	16	20*
CS-344	Internet Programming- I	48	4	16	20*
CS-345	Programming in Java-I	48	4	16	20*
CS-346	Computer Graphics	48	4	16	20*
Practical Papers					
CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	25 practicals/ year	08	32	40 **
CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and Cs-344 – Sem I & Sem II and Computer Graphics using Java	25 practicals/ year	08	32	40 **

CS 349 (Semester III & IV)	CS- 349:Practic als Based on CS-334 and CS-344 – Sem I & Sem II and Project	25 practicals/ year	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 and 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester.

(Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)

- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D)Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.:For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :**F.Y.B.Sc.Theory paper:**

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be English.**7) Equivalence of Previous Syllabus:**

Old Course (2008 Pattern)	New Course (2013 Pattern)
Paper I: Introduction to Computers and 'C' Programming	CS-101:Problem Solving Using Computers and 'C' Programming
Paper II: File Organization and Fundamental of Databases	CS 102:File Organization and Fundamental of Databases
Paper III: Computer Science Practical paper I	CS-103: Computer Science Practical paper I
Paper IV: Computer Science Practical paper II	CS-104: Computer Science Practical paper II

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers:M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

Title : Problem Solving Using Computers and 'C' Programming

Objective :-

- i) To develop Problem Solving abilities using computers
- ii) To teach basic principles of programming
- iii) To develop skills for writing programs using 'C'

Syllabus**Chapter 1 Problem Solving using Computers [8]**

- 1.1 Problem-Solving
- 1.2 Writing Simple Algorithms
- 1.3 Algorithms
- 1.4 Flowcharts

Chapter 2 Programming Languages as Tools [3]

- 2.1 Machine language R6(1.5,1.6)
- 2.2 Assembly language
- 2.3 High level languages
- 2.4 Compilers and Interpreters

Chapter 3 Introduction to C [2]

- 3.1 History R3(2-1), R6(1.1)
- 3.2 Structure of a C program R3(2-2), R6(1.8)
- 3.3 Functions as building blocks R3(4-1,4-2)
- 3.4 Application Areas
- 3.5 C Program development life cycle R6(1.10)
- 3.6 Sample programs

Chapter 4 C Tokens [12]

- 4.1 Keywords R6 (Ch 2, 3)
- 4.2 Identifiers
- 4.3 Variables
- 4.4 Constants – character, integer, float, string, escape sequences
- 4.5 Data types – built-in and user defined
- 4.6 Operators and Expressions Operator types (arithmetic, relational, logical, assignment, bitwise, conditional , other operators) , precedence and associativity rules.
- 4.7 Simple programs using printf and scanf

Chapter 5 Input and Output [3]

- 5.1 Character input and output R6(4.2 - 4.5)
- 5.2 String input and output
- 5.3 Formatted input and output

Chapter 6 Control Structures [10]

- 6.1 Decision making structures If, if-else, switch R3(5-2, 5-3), R6(5.2 - 5.8)
- 6.2 Loop Control structures While, do-while, for R6 (Ch 8)
- 6.3 Nested structures
- 6.4 break and continue

Chapter 7 Functions in C**[8]**

- 7.1 What is a function R3(4-2, 4-4)
- 7.2 Advantages of Functions
- 7.3 Standard library functions R3(5-4)
- 7.4 User defined functions :Declaration, definition, function call, parameter passing (by value), return keyword, R6 (Ch 9)
- 7.5 Scope of variables, storage classes
- 7.6 Recursion R3 (6-9)

Chapter 8 Arrays**[8]**

- 8.1 Array declaration, initialization R6(Ch 7)
- 8.2 Types – one, two and multidimensional “
- 8.3 Passing arrays to functions R3(8-3), R6(9.17)

Chapter 9 Pointers**[6]**

- 9.1 Pointer declaration, initialization R6(11.1 - 11.14)
- 9.2 Dereferencing pointers
- 9.3 Pointer arithmetic
- 9.4 Pointer to pointer
- 9.5 Arrays and pointers
- 9.6 Functions and pointers – passing pointers to functions, function returning pointers
- 9.7 Dynamic memory allocation R6(13.1-13.6)

Chapter 10 Strings**[6]**

- 10.1 Declaration and initialization, format specifiers R6(Ch 8)
- 10.2 Standard library functions
- 10.3 Strings and pointers
- 10.4 Array of strings
- 10.5 Command Line Arguments R3(Appendix I1-I2)

Chapter 11 Structures and Unions**[6]**

- 11.1 Creating structures R6(Ch 10)
- 11.2 Accessing structure members (dot Operator)
- 11.3 Structure initialization
- 11.4 Array of structures
- 11.5 Passing structures to functions
- 11.6 Nested structures
- 11.7 Pointers and structures
- 11.8 Unions
- 11.9 Difference between structures and unions

Chapter 12 File Handling**[6]**

- 12.1 Streams R3(7-1, 7-2)
- 12.2 Types of Files
- 12.3 Operations on files R6(12.1- 12.4), 12.6, 12.7
- 12.4 Random access to files

Chapter 13 C Preprocessor**[2]**

- 13.1 Format of Preprocessor directive R6(14.1 - 14.3)
 13.2 File Inclusion directive
 13.3 Macro substitution, nested macro, argumented macro

References

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
2. How to Solve it by Computer, R.G. Dromey, ISBN:9788131705629, Pearson Education
3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
4. Using The GNU Compiler Collection, Richard M. Stallman;The GCC Developer Community Pothi.com
5. Using the Gnu Compiler Collection, Richard M. Stallman, Gcc Developer community ISBN:9781441412768,Createspace
6. Programming in ANSI C, E. Balaguruswamy,ISBN:9781259004612,Tata McGraw Hill Publishing Co.Ltd.-New Delhi

Computer Science: Paper – II : File Organization and Fundamental of Databases

Title : File Organization and Fundamental of Databases

Objective :-

- i) To understand data processing using computers
- ii) To teach basic organization of data using files
- iii) To understand creations, manipulation and querying of data in databases

Syllabus

Chapter 1 File Organization R3
[6]

- 1.1 Introduction
- 1.2 Physical / logical files
- 1.3 Types of file organization (heap,sorted, indexed,hashed)
- 1.4 Choosing a file organization

Chapter 2 Introduction of DBMS R1(Ch 1) [6]

- 2.1 Overview
- 2.2 File system Vs DBMS
- 2.3 Describing & storing data (Data models (relational,hierarchical, network))
- 2.4 Levels of abstraction
- 2.5 Data independence
- 2.6 Structure of DBMS
- 2.7 Users of DBMS
- 2.8 Advantages of DBMS

Chapter 3 Conceptual Design (E-R model) R1(Ch 2), R3, R4 **[15]**

- 3.1 Overview of DB design
- 3.2 ER data model (entities , attributes, entity sets, relations, relationship sets)
- 3.3 Additional constraints (Key constraints, Mapping constraints, Strong & Weak entities, aggregation / generalization)
- 3.4 Conceptual design using ER modelling (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER)
- 3.5 Case studies

Chapter 4 Relational data model R1(Ch 3) **[6]**

- 4.1 Structure of Relational Databases (concepts of a table, a row, a relation, a Tuple and a key in a relational database)
- 4.2 Conversion of ER to Relational model
- 4.3 Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint)

Chapter 5 Relational algebra R1(Ch 3) **[7]**

- 5.1 Preliminaries
- 5.2 Relational algebra (selection, projection, set operations, renaming joins, division)

Chapter 6 SQL R1(Ch 4) **[20]**

- 6.1 Introduction
- 6.2 Basic structure
- 6.3 Set operations
- 6.4 Aggregate functions
- 6.5 Null values
- 6.6 Nested Subqueries
- 6.7 Modifications to Database
- 6.8 DDL commands with examples
- 6.9 SQL mechanisms for joining relations (inner joins, outer joins and their types)
- 6.10 Examples on SQL (case studies)

7 Relational Database Design R1(ch 7) **[20]**

- 7.1 Pitfalls in Relational-Database Design (undesirable properties of a RDB design like repetition, inability to represent certain information),
- 7.2 Functional dependencies (Basic concepts, F+, Closure of an Attribute set, Concept of a Super Key and a primary key)

- (Algorithm to derive a Primary Key for a relation)
- 7.3 Concept of Decomposition
- 7.4 Desirable Properties of Decomposition (Lossless join & Dependency preservation)
- 7.5 Concept of Normalization
- 7.6 Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF
- 7.7 Examples on Normalization

References

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan,
ISBN:9780071289597,Tata McGraw-Hill Education
2. Database Management Systems ,Raghu Ramakrishnan,ISBN:9780071254342,
Mcgraw-hill higher Education
3. Database Management Systems,Raghu Ramakrishnan and Johannes Gehrke,
McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, Ramez Elmasri,
ISBN:9780132144988,
PEARSON HIGHER EDUCATION
5. Beginning Databases with PostgreSQL: From Novice to Professional,
Richard Stones,
Neil Matthew, ISBN:9781590594780, Apress
6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical PostgreSQL (B/CD),John Worsley, Joshua Drake,
ISBN:9788173663925
Shroff/O'reilly
8. Practical Postgresql , By Joshua D. Drake, John C Worsley (**O'Reilly publications**)
9. "An introduction to Database systems", Bipin C Desai, Galgotia Publications

Important to Note: It is absolutely necessary and essential that all the practicals for Paper III and Paper IV be conducted on Open Source Operating System like Linux. All the practicals related to C needs to be conducted using GCC compiler.

Paper III – Computer Science Practical Paper I

Title : Basic 'C' Programming and Database Handling practicals

Objective :-

- i) Design and implement a 'C' programs for simple problems
- ii) Understand appropriate use of data types and array structures
- iii) Understand use of appropriate control structures

Syllabus

1. Initial 3 practical slots (12 lectures) should be used for teaching basic operating systems commands and use of editors

2. Last 2 slots (8 lectures) are to be used for revision
3. Remaining 80 lectures are to be utilised for the following 20 Assignments

Computer Science : Paper III : Basic 'C' Programming and Database Handling practicals[#]		
No	Topic	Lectures
1	Assignment to demonstrate use of data types, simple operators (expressions)	4
2	Assignment to demonstrate decision making statements (if and if-else, nested structures)	4
3	Assignment to demonstrate decision making statements (switch case)	4
4	Assignment to demonstrate use of simple loops	4
5	Assignment to demonstrate use of nested loops	4
6	Assignment to demonstrate menu driven programs.	4
7	Assignment to demonstrate writing C programs in modular way (use of user defined functions)	4
8	Assignment to demonstrate recursive functions.	4
9	Assignment to demonstrate use of arrays (1-d arrays) and functions	4
10	Assignment to demonstrate use of multidimensional array(2-d arrays) and functions	4
11	Assignment to create simple tables , with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)	4
12	Assignment to create more than one table, with referential integrity constraint, PK constraint.	4
13	Assignment to create one or more tables with following constraints, in addition to the first two constraints (PK & FK) a. Check constraint b. Unique constraint c. Not null constraint	4
14	Assignment to drop a table from the database, to alter the schema of a table in the Database.	4
15	Assignment to insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)	4

16	Assignment to query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]	4
17	Assignment to query table, using set operations (union, intersect)	4
18	Assignments to query tables using nested queries	4
19	Assignment to query tables , using nested queries (use of 'Except', exists, not exists clauses	4
20	Assignment related to small case studies (Each case study will involve creating tables with specified constraints, inserting records to it & writing queries for extracting records from these tables)	4

Paper IV – Computer Science Practical Paper II[#]

Title : HTML5 programming and Advanced 'C' Programming practicals

Objective :-

- i) Understanding basic HTML designing
- ii) Writing C programs using complex data structures such as pointers, structures etc.

Syllabus

1. Initial 3 practical slots (8 lectures) should be used for teaching basic internet usage including use of browsers
2. Last 2 slots (8 lectures) are to be used for revision
- 3. Remaining 80 lectures are to be utilised for the following 20 Assignments**

Computer Science : Paper IV : HTML 5 programming and Advanced 'C' Programming practicals		
No	Topic	Lectures
1	Creating simple HTML pages (use of different tags for changing fonts, foreground and background colors etc.))	4
2	HTML programming (use of lists, tables)	4
3	HTML programming using frames	4
4	HTML programming using hyperlinks	4
5	HTML programming (Creation of forms)	4

6	HTML programming – Case Study 1	4
7	HTML programming – Case Study 1	4
8	HTML programming – Case Study 1	4
9	Assignment to demonstrate use of pointers	4
10	Assignment to demonstrate concept of strings (string & pointers)	4
11	Assignment to demonstrate array of strings.	4
12	Assignment to demonstrate use of bitwise operators.	4
13	Assignment to demonstrate structures (using array and functions)	4
14	Assignment to demonstrate structures and unions	4
15	Assignment to demonstrate command line arguments and preprocessor directives	4
16	Assignment to demonstrate file handling (text files)	4
17	Assignment to demonstrate file handling (binary files and random access to files)	4
18	C Programming – Case study 1	4
19	C Programming – Case study 2	4
20	C programming – Case Study 3	4

#The Lab Hand Book will define in detail the contents and provide guidelines for each practical Assignment.

University of Pune

Revised Structure & Syllabi for Three Year Degree Programme of Bachelor of Computer Applications (B.C.A.)

1. The title of the programme will be Bachelor of Computer Application (B.C.A.) under Commerce Faculty.

The revised program will be introduced for -

- a) F.Y.B.C.A. from the academic year 2013-14
- b) S.Y.B.C.A. from the academic year 2014-15
- c) T.Y.B.C.A. from the academic year 2015-16

2. Objectives : The objectives of the Programme shall be to provide sound academic base from which an advanced career in Computer Application can be developed. Conceptual grounding in computer usage as well as its practical business application will be provided.

3. Eligibility for admission : In order to be eligible for admission to Bachelor of Computer Applications a candidate must have passed.

- a. HSC (10+2) from any stream with English as passing Subject with minimum 40% marks in aggregate.
- b. Two years Diploma in Pharmacy Course of Board of Technical Education, conducted by Government of Maharashtra or its equivalent.
- c. Three Year Diploma Course (after S.S.C. i.e. 10th Standard), of Board of Technical Education conducted by Government of Maharashtra or its equivalent.
- d. MCVC
- e. Every eligible candidate has to pass Common Entrance Test to be conducted by the respective Institute/College.

4. Duration : The duration of the B.C.A. Degree Program shall be three years divided into six semesters.

5. The scheme of Examinations :

The BCA Examination will be of 3600 marks as given Below

I)

- a) F.Y.B.C.A. (Sem I + Sem II) : 1200 marks
- b) S.Y.B.C.A. (Sem III + Sem IV) : 1200 marks
- c) T.Y.B.C.A. (Sem V + Sem VI) : 1200 marks

II) For Theory Paper There Will Be 80:20 Pattern 80 Marks : University Exam
20 Marks : Internal Exam

For Practical And Project Examination Sem I to VI : 100 marks

Sem I, II, III, IV, V, VI : External Assessment

6. The Standard of Passing and Award of Class

In order to pass in the examination the candidate has to obtain 40 marks out of 100. (Min 32 marks must be obtained in University Examination .

The class will be awarded on the basis of aggregate marks obtained by the candidate for all three years examinations .

The award of class will be as follows :

Aggregate Percentage of Marks		Class
(i)	Aggregate 70% and above	 First Class with Distinction.
(ii)	Aggregate 60% and above but less than 70%	 First Class
(iii)	Aggregate 55% and more but less than 60%	 Higher Second Class
(iv)	Aggregate 50% and more but less than 55%.	 Second Class.
(v)	Aggregate 40% and more but less than 50%	 Pass Class.
(vi)	Below 40%	 Fail.

7. RULES OF A.T.K.T.

a) A student shall be allowed to keep term for the Second Year, if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subjects of the First year examination, which consist of First & Second Semester.

b) A student shall be allowed to keep term for the Third year, if he/she has no backlog of first Year & if he/she has a backlog of not more than three theory & one practical or four theory heads of total number of subject of the Second Year examination which consist of Third & Fourth Semester.

8. The Medium of Instruction and Examination (Written and Viva) shall be English.

9. The Semester wise Structure of the programme shall be as follows :

Syllabus structure for the course of **Bachelor of Computer Application [BCA]**

[Under the Faculty of Commerce]

Course Structure

Semester – I (w.e.f A.Y. 2013-14)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
101	Modern Operating Environment & MS Office	20	80	100	4	-
102	Financial Accounting	20	80	100	4	
103	Programming Principal & Algorithms	20	80	100	4	
104	Business Communication	20	80	100	4	
105	Principles of Management	20	80	100	4	
106	Laboratory Course – I [Based on Paper No. 101 & 102]	-	100	100	-	4
Total		100	500	600	20	4

Semester – II (w.e.f A.Y. 2013-14)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
201	Procedure Oriented Programming using C	20	80	100	4	-
202	Data Base Management System	20	80	100	4	
203	Organizational Behavior	20	80	100	4	
204	Computer Applications in Statistics	20	80	100	4	
205	E-Commerce Concepts	20	80	100	4	
206	Laboratory Course – II [Based on Paper No. 201 & 202]	-	100	100	-	4
Total		100	500	600	20	4

Semester – III (w.e.f A.Y. 2014-15)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
301	Relational Database Management Systems	20	80	100	4	-
302	Data Structures using C	20	80	100	4	
303	Operating System Concepts	20	80	100	4	
304	Business Mathematics	20	80	100	4	
305	Software Engineering	20	80	100	4	
306	Laboratory Course – III [Based on Paper No. 301 and 302]	-	100	100	-	4
Total		100	500	600	20	4

Semester – IV (w.e.f A.Y. 2014-15)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
401	OOP's using C++	20	80	100	4	-
402	Programming in Visual Basic	20	80	100	4	-
403	Computer Networking	20	80	100	4	-
404	Enterprise Resource Planning	20	80	100	4	-
405	Human Resource Management	20	80	100	4	-
406	Laboratory Course – IV [Based on Paper No. 401 & 402]	-	100	100	-	4
Total		100	500	600	20	4

Semester - V(w.e.f A.Y. 2015-16)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
501	Java Programming	20	80	100	4	-
502	Web Technologies	20	80	100	4	
503	Dot Net Programming	20	80	100	4	
504	Object Oriented Software Engg.	20	80	100	4	
505	Software Project – I [Based on C++ / VB Technology]	-	100	100	-	4
506	Laboratory Course – V [Based on Paper No. 501 & 502]	-	100	100	-	4
Total		80	520	600	16	8

Semester – VI (w.e.f A.Y. 2015-16)

Paper No.	Name of the subject	Marks			No. of sessions per week	
		Int.	Uni.	Total	Th.	Pract.
601	Advanced Web Technologies	20	80	100	4	-
602	Advanced Java	20	80	100	4	
603	Recent Trends in IT	20	80	100	4	
604	Software Testing	20	80	100	4	
605	Software Project – II [Java / Dot net Technology]	-	100	100	-	4
606	Laboratory Course – VI [Based on Paper No. 601 & 602]	-	100	100	-	4
Total		80	520	600	16	8

Equivalence Scheme

Sr.No	Old Course		New Course	
	Sub Code	Title of Subject	Sub Code	Title of Subject
01	101	Business Communication	104	Business Communication
02	102	Principles of Management	105	Principles of Management
03	103	Programming Principles and Algorithms	103	Programming Principles & Algorithms
04	104	Computer Fundamental and Office Automation	101	Modern Operating Environment & MS Office
05	105	Business Accounting	102	Financial Accounting
06	106	Computer Laboratory and Practical Work (OA+PPA)	106	Laboratory Course – I [Based on Paper No.101 & 102]
07	201	Organizational Behavior	203	Organizational Behavior
08	202	Elements of Statistics	204	Computer Application in Statistics
09	203	‘C’ Programming	201	Procedure Oriented Programming Using C
10	204	File Structure and Database Concepts	202	Database Management System
11	205	Cost Accounting	205	E-Commerce Concepts
12	206	Computer Laboratory and Practical Work (c programming + DBMS)	206	Laboratory Course - II [Based on Paper No.201 & 202]
13	301	Numerical Methods	304	Business Mathematics
14	302	Data Structure using C	302	Data Structure using C
15	303	Software Engineering	305	Software Engineering
16	304	Management Accounting	303	Operating System Concepts
17	305	RDBMS	301	Relational Database Management System
18	306	Computer Laboratory and RDBMS)	306	Laboratory Course – III [Based on Paper No.301 and 302]
19	401	Networking	403	Computer Networking
20	402	Visual Basic	402	Programming in Visual Basic
21	403	Inventory Management (SAD)	404	Enterprise Resource Planning
22	404	Human Resource Management	405	Human Resource Management
23	405	Object Oriented Programming using C++	401	Object Oriented Programming using C++
24	406	Computer Laboratory and Practical Work (VB + C++)	406	Laboratory Course – IV [Based on Paper No. 401 & 402]
25	501	.NET Frameworks	503	Dot Net Programming
26	502	Internet Programming and Cyber Law	502	Web Technologies
27	503	Principals of Marketing	504	Object Oriented Software

				Engineering
28	504	Core Java	501	Java Programming
29	505	Project work (VB)	505	Software Project- [Based on C++/VB Technology]
30	506	Computer Laboratory and Practical Work (.NET + Core Java)	506	Laboratory Course – V [Based on Paper No. 501 & 502]
31	601	E-Commerce	604	Software Testing
32	602	Multimedia Systems	603	Recent Trends in IT
33	603	Introduction to SysPro And Operating Systems	601	Advanced Web Technology
34	604	Advance Java	602	Advance Java
35	605	Project Work (Banking & Finance , Cost Analysis , Financial Analysis ,Payroll , EDP ,ERP etc.)	605	Software Project – II [Java/ Dot net Technology]
36	606	Computer Laboratory and Practical Work (Multimedia + Advanced Java)	606	Laboratory Course – VI [Based on Paper No. 601 & 602]

B.C.A. Semester I
Subject Name :- Modern Operating Environment And MS Office
Course Code :- 101

Chapter No.	Topic Name	No. Of Lectures
1	Introduction to computer : Computer Characteristics, Concept of Hardware, Software , Evolution of computer and Generations, Types of computer – Analog & Digital computers, Hybrid computers, General purpose & Special Purpose Computer, Limitations of Computer Applications of Computer in Various fields.	6
2	Structure and Working of Computer : Functional Block diagram of computer. CPU, ALU, Memory Unit, Bus structure of Digital Computer - Address, data and control bus.	4
3	Input /Output Devices : Input device – Keyboard, Mouse, Scanner, MICR, OMR. Output devices – VDU, Printers – Dot Matrix, Daisy- wheel, Inkjet, Laser, Line printers and Plotters.	5
4	Computer Memory : Memory Concept , Memory cell, memory organization, Semiconductor memory- RAM, ROM, PROM, EPROM, Secondary Storage devices - Magnetic tape, Magnetic Disk (floppy disk & Hard disk.), Compact Disk.	6
5	Computer Language and Software : Algorithm, flowcharts, Machine language, Assembly language, High Level language, Assembler, Compiler, Interpreter. Characteristics of good Language. Software - System and application software.	5
6	Operating System : Operating system, Evolution of operating system. Function of operating system. Types of operating systems. Detailed study of Windows Operating System. Introduction and features of LINUX OS.	6
7	Networking : Concept, Basic elements of a Communication System, Data transmission media, Topologies, LAN, MAN, WAN, Internet	3
8	MS-OFFICE : Introduction to Ms-office, Components and features. MS-Word – Creating letter, table , fonts , page layout document formatting spell check, print preview, template, colour, mail merge, auto text, inserting picture , word art. MS-EXCEL – Introduction to Excel , Sorting , Queries, Graphs , Scientific functions. Power Point :- Introduction to Power Point Creation of Slides , Inserting pictures , Preparing slide show with animation. MS-ACCESS - Creation and Manipulation of Files.	12

Books Recommended:-

- 1) Computer Fundamentals by P.K. Sinha & Priti Sinha, 3rd edition, BPB pub.
- 2) Computers Today by S. Basandra Galgotia Pub.
- 3) Microsoft Office 2000 by Vipra Computers, Vipra Printers Pvt. Ltd.
- 4) Advanced Microsoft Office 2000 by Meredith Flynn, Nita Rutkosky, BPB Pub
- 5) using Microsoft office 2007 by Ed Bott ,Woody Leonhard , Pearson publication
- 6) using Microsoft office 2010 by , Pearson publication

B.C.A. Semester I
Subject Name :- Financial Accounting
Course Code :- 102

Objectives:

1. To enable the students to acquire sound knowledge of basic concepts of accounting
2. To impart basic accounting knowledge
3. To impart the knowledge about recording of transactions and preparation of final accounts
4. To acquaint the students about accounting software packages

	Contents	No. of lectures
Unit 1	Introduction: Financial Accounting- Definition, Scope, Objectives & Limitations Distinction between Accounting & Book Keeping, Branches of Accounting	06
Unit 2	Conceptual Frame work: Accounting Concepts, Principles & Conventions Accounting Standards - Concept, objectives, benefits, Overview of Accounting Standards in India. Accounting Policies, Accounting as a measurement Discipline, Valuation Principles, Accounting Estimates	06
Unit 3	Recording of Transactions: Voucher system; Accounting Process, Journals, Ledger, Cash Book , subsidiary books , Trial Balance. Depreciation: Meaning , Need, Importance & Methods (WDV & SLM)	16
Unit 4	Preparation of Final Accounts: Preparation of Trading Account, Profit & Loss Account & Balance Sheet of Sole Proprietary Business.	10
Unit 5	Introduction to Company Final Accounts: Important provisions of Companies Act 1956 in respect of preparation of final Accounts. Understanding the final accounts of a Company	04
Unit 6	Accounting in Computerized Environment: Computers and Financial Application Introduction to Accounting Software Package - Tally 9.0 An overview of Computerized Accounting systems - Salient Features and significance , Generating Accounting Reports,	06
Total		48

Recommended Books :

1. Fundamentals of Accounting & Financial Analysis: By Anil Chowdhry (Pearson Education)
2. Financial accounting: By Jane Reimers (Pearson Education)
3. Accounting Made Easy By Rajesh Agarwal & R Srinivasan (Tata McGraw –Hill)
4. Financial Accounting For Management: By Amrish Gupta (Pearson Education)
5. Financial Accounting For Management: By Dr. S. N. Maheshwari (Vikas Publishing)
6. Advanced Accounts – M.C. Shukla and S P Grewal (S.Chand & Co., New Delhi)

B.C.A. Semester I
Subject Name -: Principles of Programming and Algorithms
Course Code -: 103

Pre requisite: Basic Mathematics

Objectives: To develop Analytical / Logical Thinking and Problem Solving capabilities

Ch.1 Introduction [5]

- 1.1 Concept: problem solving, algorithm
- 1.2 Program development cycle
- 1.3 Characteristics of an algorithm
- 1.4 Time complexity: Big-Oh notation
- 1.5 Flowcharts
- 1.6 Simple Examples: Algorithms and flowcharts

Ch. 2 Simple Arithmetic Problems [13]

- 2.1 Addition / Multiplication of integers
- 2.2 Determining if a number is +ve / -ve / even / odd
- 2.3 Maximum of 2 numbers, 3 numbers
- 2.4 Sum of first n numbers, given n numbers
- 2.5 Integer division, Digit reversing, Table generation for n, ab
- 2.6 Factorial, sine series, cosine series, nCr , Pascal Triangle
- 2.7 Prime number, Factors of a number
- 2.8 Other problems such as Perfect number, GCD of 2 numbers etc
(Write algorithms and draw flowcharts)

Ch. 3 Recursion [8]

- 3.1 Concept
- 3.2 Multiplication
- 3.3 Factorial
- 3.4 Ackerman function
- 3.5 Fibonacci series
- 3.6 Permutation Generation

Ch. 4 Algorithms using arrays [8]

- 4.1 Maximum and minimum of array, reversing elements of an array
- 4.2 Mean and Median of n numbers
- 4.3 Row major and Column major form of array representation
- 4.4 Matrices: Addition, Multiplication, Transpose, Symmetry, upper/lower triangular

Ch. 5 Sorting and Searching [13]

- 5.1 Insertion sort
- 5.2 Bubble sort
- 5.3 Selection sort

5.4 Quick sort (Recursive)

5.5 Merge sort

5.6 Radix Sort

5.7 Bucket Sort

5.8 Counting Sort

5.9 Sequential and Binary search

(Performance Analysis for space requirement and speed using Big-Oh notation is essential)

Reference Books:

1. How to solve it by Computer – R. G. Dromy

2. Fundamentals of Data Structures – Horowitz and Sahani

3. Introduction to algorithms – Cormen, Leiserson, Rivest, Stein

B.C.A. Semester I
Subject Name -: Business Communication
Course Code -: 104

Objectives:

1. To understand the concept, process and importance of communication.
2. To develop an integrative approach where reading, writing, presentation skills are used together to enhance the students' ability to communicate and write effectively.
3. To create awareness among students about Methods and Media of communication.
4. To make students familiar with information technology and improve job seeking skills.

	Contents	No. of Lectures
Unit 1	Introduction to Communication 1.1 Meaning 1.2 Definition 1.3 Objective, Process, importance. 1.4 Principles of effective communication 1.5 Barriers to Communication and its types 1.6 Overcoming Barriers.	08
Unit 2	Methods of Communication 2.1 Verbal Communication 2.1.1 – Written Communication-Advantages & Limitations (Letters, Memo, Agenda, Notice & Reports) 2.2.2 Oral Communication) -Advantages & Limitations (Personal & Telephonic) 2.2 Non-Verbal Communication -Advantages & Limitations 2.2.1 Silence 2.2.2 Body Language 2.2.3 Signs & Symbols 2.3 Grapevine	10
Unit 3	Oral Communication 3.1 Meaning, Nature, Scope 3.2, Principles of Effective Oral Communication 3.3 Techniques of Effective Speaking 3.4. The Art of Listening, 3.5 Principles of Good Listening- Barriers to Listening	08
Unit 4	Business Correspondence 4.1 Need, Functions of Business Correspondence 4.2 Components and layout of Business letter, 4.3 Drafting of letters: Enquiry, order , Complaints and follow up , Sales, Circulars. 4.4 Email etiquette	08
Unit 5	Information Technology for Communication Introduction, Advantages and Limitations of – Telex, Telegram, Fax, Voice Mail, Teleconferencing, Video Conferencing, Internet and Social Media Sites, E-communication at work place.	08
Unit 6	Job Seeking Skills 6.1 Job application letter 6.2 Curriculum Vitae	06

	6.3 Group Discussion 6.4 Interview Skills 6.5 Presentation Skills	
	Total	48

Recommended Books:

1. Business Communication (Principles, Methods and Techniques) Nirmal Singh Deep & Deep Publications Pvt. Ltd, New Delhi.
2. Essentials of Business Communication Rajendra Pal & J. S. Korlhalli Sultan Chand & Sons, New Delhi.
3. Media and Communication Management – C.S.Raydu Himalaya Publishing House, Mumbai.
4. Professional Communication- Aruna Koneru- Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
5. Creating a Successful CV - Siman Howard - Dorling Kindersley.
6. Business Communication – Dr.Anjali Kalkar, Ashapak G.Nadaf , Tech- Max Publication, Pune
7. Effective Documentation and Presentation- Urmila Rai & S.M. Rai – Himalaya Publishing House, Mumbai.
8. Principles Practices of Business Communication – Aspi Doctor & Rhoda Doctor – Sheth Publishers Pvt. Ltd.
9. Business Communication – Concepts, Cases and Applications – P.D. Chaturvedi, Mukesh Chaturvedi, 2nd Edition (2013)

B.C.A. Semester I
Subject Name -: Principles of Management
Course Code -: 105

Objectives:

1. To provide the fundamental knowledge about working of business organization.
2. To make students well acquainted with management process , functions and principles.
3. To make the students familiar with recent trends in management.

	Contents	No. of Lectures
Unit 1	Nature of Management 1. Meaning, Definition, Nature, Importance & Functions 2. Management an Art, Science & Profession-Management as social System 3. Concept of Management-Administration-Organization-Universality of management	08
Unit 2	Evolution of management Thoughts 2.1 Contribution of F.W.Taylor, Henri Fayol, Elton Mayo	08
Unit 3	Functions of Management : Part – I 3.1 Planning –Meaning –Need & Importance, types levels –advantages & limitations; 3.2 Forecasting- Need & Techniques; 3.3 Decision making – Types - Process of rational decision making & techniques of decision making. 3.4 Organizing – Elements of organizing & process Types of organizations, 3.5 Delegation of authority – Need, difficulties in delegation – Decentralization. 3.6 Staffing – Meaning & importance	08
Unit 4	Functions of Management : Part –II 4.1 Direction - Nature – Principles 4.2 Motivation - Importance – Theories 4.3 Leadership – Meaning - qualities of effective Leadership & functions of leader 4.4 Co-ordination - Need – Importance 4.5 Controlling – Need, nature, Importance, Process & techniques	08
Unit 5	Strategic Management 5.1 Definition, 5.2 Classes of Decisions 5.3 Levels of Decisions 5.4 Strategy 5.5 Role of Strategic Management and its benefits 5.6 Strategic Management in India	08
Unit 6	Recent Trends in Management 6.1 Management of change 6.2 Disaster Management 6.3 Total Quality Management 6.4 Stress Management 6.5 Social Responsibility of management	08
	Total	48

Recommended Books:

- i. Essential of Management - Harold Koontz and Itenz Wiebritch- McGraw-Hill International
- ii. Management Theory & Practice – J.N. Chandan
- iii. Essential of Business Administration – K. Aswathapa, Himalaya Publishing House
- iv. Principles & Practice of management – Dr. L.M. Prasad, Sultan Chand & Sons – New Delhi
- v. Business Organization & management – Dr. Y.K. Bhushan.
- vi. Management: Concept and Strategies by J.S. Chandan, Vikas Publishing.
- vii. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
- viii. Business organization and management by Talloo by Tata Mc Graw Hill
- ix. Business Environment and policy – A book on Strategic Management/ Corporate Planning
By Francis Cherunilam, Himalaya Publishing House.
- x. Business Organization & Management – C.B. Gupta
- xi. Dictionary of Commerce & Management -- J.L. Hanson

B.C.A. Semester II**Subject Name -: Procedure Oriented Programming using C****Course Code -: 201**

Chapter No.	Topics	No. of Lectures	Ref. Book
1	Introduction to C language 1.1 History 1.2 Basic structure of C Programming 1.3 Language fundamentals 1.3.1 Character set, tokens 1.3.2 Keywords and identifiers 1.3.3 Variables and data types 1.4 Operators 1.4.1 Types of operators 1.4.2 Precedence and associativity 1.4.3 Expression	4	Book 1, 2
2	Managing I/O operations 2.1 Console based I/O and related built-in I/O functions 2.1.1 printf(), scanf() 2.1.2 getch(), getchar() 2.2 Formatted input and formatted output	2	Book 1, 2
3	Decision Making and looping 3.1 Introduction 3.2 Decision making structure 3.2.1 If statement 3.2.2 If-else statement 3.2.3 Nested if-else statement 3.2.4 Conditional operator 3.2.5 Switch statement 3.3 Loop control structures 3.3.1 while loop 3.3.2 Do-while loop 3.3.3 For loop 3.3.4 Nested for loop 3.4 Jump statements 3.4.1 break 3.4.2 continue 3.4.3 goto 3.4.4 exit	6	Book 1, 2
4	Functions and pointers 4.1 Introduction 4.1.1 Purpose of function 4.1.2 Function definition 4.1.3 Function declaration 4.1.4 Function call 4.2 Types of functions	12	Book 1, 2,3

	4.3 Call by value and call by reference 4.4 Storage classes 4.5 Recursion 4.6 Introduction to pointer 4.6.1 Definition 4.6.2 Declaration 4.6.3 Initialization 4.7 Indirection operator and address of operator 4.8 Pointer arithmetic 4.9 Dynamic memory allocation 4.10 Functions and pointers		
5	Arrays and Strings 5.1 Introduction to one-dimensional Array 5.1.1 Definition 5.1.2 Declaration 5.1.3 Initialization 5.2 Accessing and displaying array elements 5.3 Arrays and functions 5.4 Introduction to two-dimensional Array 5.4.1 Definition 5.4.2 Declaration 5.4.3 Initialization 5.5 Accessing and displaying array elements 5.6 Introductions to Strings 5.6.1 Definition 5.6.2 Declaration 5.6.3 Initialization 5.7 Standard library functions 5.8 Implementations without standard library functions.	8	Book 1, 2
6	Structures and union 6.1 Introduction to structure 6.1.1 Definition 6.1.2 Declaration 6.1.3 Accessing members 6.2 structure operations 6.3 nested structure 6.4 Introduction to union 6.4.1 Definition 6.4.2 Declaration 6.5 Differentiate between structure and union	5	Book 1, 2
7	C Preprocessor 7.1 Definition of preprocessor 7.2 Macro substitution directory 7.3 File inclusion directory 7.4 Conditional compilation	2	Book 1, 2
8	File handling 8.1 Definitions of files 8.2 File opening modes 8.3 Standard functions	9	Book 1, 2

	8.4 Random access to files		
	8.5 Command line argument		
Total		48	

Reference Book :-

- 1) Let us C –Yashwant Kanetkar, BPB publication.
- 2) Programming in C - Balguruswamy, Tata McGraw-Hill publication.
- 3) Pointers in C - Yashwant Kanetkar, BPB publication.
- 4) C programming by Dr.Vishal Lichade dreamtech press

B.C.A. Semester II
Subject Name -: Database Management Systems
Course Code -: 202

Sr. No.	Chapter No.	Name of Chapter and Contents	No. of Lect.	Reference
1	1	File Structure and Organization 1.1 Introduction 1.2 Logical and Physical Files 1.2.1 File 1.2.2 File Structure 1.2.3 Logical and Physical Files Definitions 1.3 Basic File Operations 1.3.1 Opening Files 1.3.2 Closing Files 1.3.3 Reading and Writing 1.3.4 Seeking 1.4 File Organization 1.4.1 Field and Record structure in file 1.4.2 Record Types 1.4.3 Types of file organization 1.4.3.1 Sequential 1.4.3.2 Indexed 1.4.3.3 Hashed 1.5 Indexing 1.5.1 What is an Index? 1.5.2 When to use Indexes? 1.5.3 Types of Index 1.5.3.1 Dense Index 1.5.3.2 Sparse Index	6	1
2	2	Database Management System 2.1 Introduction 2.2 Basic Concept and Definitions 2.2.1 Data and Information 2.2.2 Data Vs Information 2.2.3 Data Dictionary 2.2.4 Data Item or Field 2.2.5 Record 2.3 Definition of DBMS 2.4 Applications of DBMS 2.5 File processing system Vs DBMS 2.6 Advantages and Disadvantages of DBMS 2.7 Users of DBMS 2.7.1 Database Designers 2.7.2 Application programmer 2.7.3 Sophisticated Users 2.7.4 End Users 2.8 Views of Data 2.9 Data Models	14	1

		2.9.1 Object Based Logical Model a. Object Oriented Data Model b. Entity Relationship Data Model 2.9.2 Record Base Logical Model a. Relational Model b. Network Model c. Hierarchical Model 2.10 Entity Relationship Diagram (ERD) 2.11 Extended features of ERD 2.12 Overall System structure		
3	3	Relational Model 3.1 Introduction 3.2 Terms a. Relation b. Tuple c. Attribute d. Cordinality e. Degree of relationship set f. Domain 3.3 Keys 3.3.1 Super Key 3.3.2 Candidate Key 3.3.3 Primary Key 3.3.4 Foreign Key 3.4 Relational Algebra Operations a. Select b. Project c. Union d. Difference e. Intersection f. Cartesian Product g. Natural Join	8	1
4	4	SQL (Structured Query Language) 4.1 Introduction 4.2 History Of SQL 4.3 Basic Structure 4.4 DDL Commands 4.5 DML Commands 4.6 Simple Queries 4.7 Nested Queries 4.8 Aggregate Functions	12	2
5	5	Relational Database Design 5.1 Introduction 5.2 Anomalies of un normalized database 5.3 Normalization 5.4 Normal Form 5.4.1 1 NF 5.4.2 2 NF 5.4.3 3 NF	5	1

		5.4.3.4 BCNF		

References:

- 1) Database System Concepts By Henry korth and A. Silberschatz
- 2) SQL, PL/SQL The Programming Language Oracle :- Ivan Bayross, BPB Publication.
- 3) Database Systems Concepts, Designs and Application by Shio Kumar Singh, Pearson
- 4) Introduction to SQL by Reck F. van der Lans by Pearson
- 5) Modern Database Management by Jeffery A Hoffer , V.Ramesh, Heikki Topi , Pearson
- 6) Database Management Systems by Debabrata Sahoo ,Tata Macgraw Hill

B.C.A. Semester II
Subject Name -: Organizational Behavior
Course Code -: 203

Objectives:

- 1) To equip the students to understand the impact that individual, group & structures have on their behavior within the organizations.
- 2) To help them enhance and apply the knowledge they have received for the betterment of the organization.

	Contents	No. of Lectures
Unit 1	Fundamentals of Organizational Behavior Definition, Nature, Scope, and Goals of Organizational Behavior Fundamental Concepts of Organizational Behavior Models of Organizational Behavior Emerging aspects of Organizational Behavior: TQM, Managing Cultural Diversity, Quality Circles & Total Employee involvement	08
Unit 2	2. Attitude Values and Motivation Effects of employee attitudes Personal and Organizational Values Nature and Importance of Motivation, Motivation Process - Motivation Model Theories of Work Motivation: (a) Maslow's Need Hierarchy Theory, (b) McGregor's Theory 'X' and Theory 'Y' (c) Herzberg's Two factor theory of Motivation	08
Unit 3	3. Personality Definition of Personality, Determinants of Personality Theories of Personality – Trait theory : The Big Five Model Type Theory : Myers- Briggs Type Personality Self Theory : Locus of Control	08
Unit 4	4. Work Stress Meaning and definition of Stress, Sources of Stress: Individual Level, Organizational Level, Type A and Type B Assessment of Personality Causes of stress in organization Effect of Stress – Physiological Effect, Psychological Effect, Behavioral Impact Stress Management – Individual Strategies, Organizational Strategies	08
Unit 5	Conflict in Organizations Concept of Conflict, Process of Conflict Types of Conflict – Intrapersonal, interpersonal, intergroup, organizational, Johari Window Effects of Conflict, Conflict management Strategies	08
Unit 6	6. Group Behavior and Change in Organization Nature of Group, Types of Groups Team Building & Effective Teamwork Goals of Organizational Change, resistance to change, Overcoming resistance to change.	08

Books Recommended:-

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J. W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th Edition (2007)
3. Organizational Behavior - By Fred Luthans - McGRAW – HILL
4. Organizational Behavior - By **Super Robbins**
5. Organizational Behavior - Anjali Ghanekar - Everest Publishing House
6. Organizational Behavior Fundamentals, Realities and Challenges By Detra Nelson, James Campbell Quick Thomson Publications
7. Organizational Behavior through Indian Philosophy By M.N. Mishra, Himalaya Publication House
8. Organizational Behavior - Stephen P. Robbins, Timothy A. Judge, Seema Sanghi - Pearson Prentice Hall

B.C.A. Semester II
Subject Name -: Elements of Statistics
Course Code -: 204

Objectives:

1. To understand the power of excel spreadsheet in computing summary statistics.
2. To understand the concept of various measures of central tendency and variation and their importance in business.
3. To understand the concept of probability, probability distributions and simulations in business world and decision making.

Unit 1. Introduction to statistical functions of Excel (12)

Concept of population and sample, Qualitative and Quantitative variables, Raw data, Basic Spreadsheet concept, data entry and its summary statistics using excel functions, preparation of grouped and ungrouped frequency distribution using excel, creating bar charts and pie chart, frequency curves and ogive curves.

(There will be no theory question on above chapter separate practical exam of 20 marks of one hour should be conducted on it)

Unit 2. Methods of counting (06)

Fundamental principals of counting

Permutations and combination of n dissimilar objects taken r at a time, example and problems.

Unit 3. Elements of Probability Theory (12)

Random experiments, all possible outcomes (sample space), events, algebra of events.

Classical definition of probability, addition theorem of probability(without proof), Independence of events, Simple numerical problems.

Unit 4. Standard Discrete Distributions (08)

Discrete Uniform : Probability distribution, cumulative probability distribution, mean, variance (without proof)

Bernoulli : Probability function, Mean and variance

Binomial : Probability distribution, cumulative probability distribution, mean, variance(without proof)

Examples and problems.

Unit 5: Simulation Techniques (10)

Random Number Generator

Model sampling from discrete uniform and binomial distributions

Monte Carlo Simulation examples and problems.

Total lectures: 48

B.C.A. Semester II
Subject Name :- E-Commerce Concepts
Course Code :- 205

Sr. No	Chapter No.	Name Of Chapter and Contents	No. of Lectures	Reference Book no.
1	1	Introduction to Electronic Commerce 1.1 What is E-Commerce (Introduction and Definition) 1.2 Main activities E-Commerce 1.3 Goals of E-Commerce 1.4 Technical Components of E-commerce 1.5 Functions of E-commerce 1.6 Advantages and Disadvantages of E-commerce 1.7 Scope of E-commerce 1.8 Electronic commerce Applications 1.9 Electronic commerce and Electronic Business (C2C)(2G , G2G , B2G , B2P,B2A,P2P, B2A, C2A, B2B,B2C)	6	4
2	2	Building own website 2.1 Reasons for building own website 2.2 Benefits of website 2.3 Bandwidth requirements 2.4 Cost , Time , Reach 2.5 Registering a Domain Name 2.6 Web promotion 2.7 Target email , Banner Exchange , Shopping Bots	7	4
3	3	Internet and Extranet 3.1 Definition of Internet 3.2 Adv and Dis adv of the Internet 3.3 Component of a Intranet Information technology structure 3.4 Development of a Intranet 3.5 Extranet and Intranet Difference 3.6 Role of Intranet in B2B Application	5	4
4	4	Electronic payment System 4.1 Introduction 4.2 Types of Electronic payment system 4.3 Payment types 4.4 Traditional payment 4.5 Value exchange system 4.6 Credit card system 4.7 Electronic funds transfer 4.8 Paperless bill 4.9 Modern payment cash 4.10 Electronic cash	6	1,2
5	5	Technology Solution 5.1 Protecting Internet Communications 5.2 Encryption 5.3 Symmetric Key Encryption 5.4 Public key Encryption	6	1,2

		5.5 Public Key Encryption using digital signatures 5.6 Digital Envelopes 5.7 Digital Certificates 5.8 Limitations to Encryption solutions.		
6	6	E-com Security 6.1 E-commerce security environment 6.2 Security threats in E-com environment 6.3 Malicious code and unwanted programs 6.4 Phishing and identity theft 6.5 Hacking and cyber vandalism 6.6 Credit card fraud/Theft 6.7 Spoofing 6.8 Denial of service(DOS) 6.9 Distributed denial of service(dDOS)	6	1,2

References :

1. E-Commerce- Kenneth C.Laudon and Carol Guercio Traver
2. E-Commerce by --Kamlesh K Bajaj and Debjani Nag
3. Internet marketing and E-commerce-Ward Hanson and Kirthi Kalyanam
4. E-Commerce Concepts , Models , Strategies by -- G.S.V Murthy
5. Electronic Commerce by --Gary P. Schneider

University of Pune

Two Year M.Sc. Degree Course in Computer Science

M.Sc. Computer Science

**(Credit and Semester based Syllabus for affiliated colleges to be implemented
from Academic Year 2013-14)**

1) Title of the Course:

M.Sc. (Computer Science)

2) Preamble of the Syllabus:

This syllabus is the extension of the existing syllabus which is currently being taught to M.Sc. (Computer Science) of University of Pune for the last few years, but modified to be placed within the credit based system to be implemented from the academic year 2013-2014. However, there are few changes incorporated in the existing syllabus.

It is believed that the proposed changes as part of the credit based system will bring a qualitative change in the way M.Sc. (Computer Science) is taught, which will offer a more enriched learning experience. It aims to provide technology-oriented students with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society.

The syllabus is about developing skills to learn new technology, grasping the concepts and issues behind its use and the use of computers.

3) Introduction:

Salient Features of the Credit System:

1. Master's degree in Computer Science would be of 100 credits, where one credit course of theory will be of one clock hour per week running for 15 weeks and one credit for project course will consist of 15 of laboratory hours. Thus, each credit will be equivalent to 15 hours.
2. Student will have to take admission and complete at least 75 credits incorporated in the syllabus structure of Computer Science. The remaining 25 credits can be chosen from courses offered by the other Departments subjects (other than Computer Science courses) of the College with credit system structure.
3. Every student shall complete 100 credits in a minimum of four semesters. All Semesters will have 25 credits each.
4. The student will be declared as failed if s/he does not pass in all credits within a total period of four years. After that such students will have to seek fresh admission as per admission rules prevailing at that time.

5. Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination will be prepared and duly notified before commencement of each semester every year.
6. Project course should not be greater than 10% of the total credits of the degree course. Project course is equivalent to 10 credits.

Instructions for the Students

The students seeking admission to M.Sc. Computer Science course is hereby informed that they are supposed to adhere to the following rules:

1. A minimum of 75 % attendance for lectures / practical is the pre-requisite for grant of term.
2. There shall be tutorial / practical / surprise test / home assignment / referencing of research papers / seminar / industrial visits as a part of internal assessment in each semester. The students are supposed to attend all the tests. The students should note that re-test will not be given to the student absent for the test/s.
3. The students opting for dissertation course shall follow the rules framed for the same.

4) Eligibility:

The candidate should have a B.Sc. degree with Computer Science as principal subject.

Admission : Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the government rules.

5) Examination

[A] Pattern of Examination

Evaluation of Students:

- 1) The In-semester and End-Semester examinations will be of 50 marks each.
- 2) Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.
- 3) A student cannot register for third semester if s/he fails to complete the 50% credits of the total expected within two semesters.
- 4) Internal marks will not change. Student cannot repeat internal assessment. If student misses internal assessment examination, s/he will have second chance with the permission of the concerned teacher. But it will not be right of the student. It will be

the discretion of the concerned teacher and internal departmental assessment committee.

- 5) There shall be revaluation of answer script of end semester examination, but not of internal assessment papers.
- 6) Internal assessment answer scripts may be shown to the concerned student but not end semester answer script.

i. **Continuous Assessment:** Internal assessment for each course would be continuous and dates for each tutorials/practical tests will be pre-notified in the time table for teaching or placed separately as a part of time table. Department / College Internal Assessment Committee will coordinate this activity

a) **Theory Courses:** Conducting written tests should not be encouraged. More focus should be on non-written tests. Students should be encouraged to conduct various academic activities. A teacher must select a variety of the procedures for internal assessment suggested as follows.

- a) Mid-term test
- b) On-line test
- c) Open book test (concerned teacher will decide the allowed books)
- d) Tutorial
- e) Surprise test
- f) Oral
- g) Theory Assignments
- h) Review of Research paper
- i) Seminar presentation
- j) Journal/Lecture/Library notes
- k) Group Discussion
- l) Programming Assignments

Student has to preserve the documentation of the internal assessment except midterm test answer script. It is the responsibility of the student to preserve the documents.

Project Courses : The Project can be platform, Language and technology independent. Project will be evaluated by project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation.

ii. **University Examination :** End-Semester examination for 50 marks per course would be held as per the scheduled given by University of Pune..

[B] Standard of Passing

Student has to obtain 40% marks in the combined examination of In-Semester and End-Semester assessment with minimum passing of 30% passing in both assessments separately.

[C] ATKT Rules

A student cannot register for third semester if s/he fails to complete the 50% credits of the total credits expected to be ordinarily completed within two semesters.

[D] Award of Class

Grades will be awarded from grade point average (GPA) of the credits.

GPA Rules:

1. The formula for GPA will be based on Weighted Average. The final GPA will not be printed unless a student passes courses equivalent to minimum 100 credit hours (Science). Total credits hours means the sum of credit hours of the courses which a student has passed.
2. A seven point grade system [guided by the Government of Maharashtra Resolution No. NGO – 1298 / [4619] / UNI 4 dt. December 11, 1999 and University regulations] will be followed. The corresponding grade table is attached herewith.
3. If the GPA is higher than the indicated upper limit in the third decimal digit then the student be awarded higher final grade (e.g. a student getting GPA of 4.492 may be awarded 'A')
4. For Semester I, II, III examinations, only the grade points will be awarded for each subject. Final GPA along with final grade will be awarded only at the end of IV semester. There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. The revaluation result will be adopted if there is a change of at least 10% marks and in the grade of the course.
5. After the declaration of result, for the improvement of Grade, the student can reappear for the examination of 30 credits worth theory courses.
6. Grade improvement programme will be implemented at the end of the academic year. A student can opt for grade improvement programme only after the declaration of final semester examination i.e. at the end of next academic year after passing M.Sc. (Computer Science) examination and within two years of completion of M.Sc. (Computer Science). A student can appear for grade improvement programme only once.

Grade and Grade Point Average			Final Grade Points	
Marks	Obtained Grade	Grade Points	Grade Points	Final Grade
100 – 75	‘O’ Outstanding	06	5.00 – 6.00	O
74 – 65	‘A’ Very Good	05	4.50 – 4.99	A
64 – 55	‘B’ Good	04	3.50 – 4.49	B
54 – 50	‘C’ Average	03	2.50 – 3.49	C
49 – 45	‘D’ Satisfactory	02	1.50 – 2.49	D
44 – 40	‘E’ Pass	01	0.50 – 1.49	E
39 and less	‘F’ Fail	00	0.00 – 0.49	F

Common Formula for Grade Point Average (GPA):

$$\text{GPA} = \frac{\text{Total of Grade Points earned} \times \text{Credit hours for each course}}{\text{Total Credit hours}}$$

B Grade is equivalent to at least 55% of the marks

[E] External Students: There shall be no external students.

[F] Setting of Question Paper / Pattern of Question Paper

For core (compulsory) theory courses end semester question papers set by the University of Pune and centralized assessment for theory papers done as per the University guidelines.

[G] Verification / Revaluation

There is also a provision for verification and revaluation. In case of verification, the existing rules will be applicable. There shall be revaluation of end semester examination, but not of internal assessment.

6) Structure of Course

- Duration : The entire Programme is a Two year and four semester full time Programme.
- No of Courses : For first three semesters there will be Five courses. The fourth semester will be Industrial Training/Institutional Project and two theory courses.

Year/ Semester	Subject	Paper	Title of Paper	Credit	% of Assessment		
					IA	UE	Total
I Year Sem-I	Core	CS-101	Principles of Programming Languages	5	50	50	100
	Core	CS-102	Advanced Networking	5	50	50	100
	Core	CS-103	Distributed Database Concepts	5	50	50	100
	Core	CS-104	Design and Analysis of Algorithms	5	50	50	100
	Core	CS-105	Network Programming	5	50	50	100

Minimum Credit : 25 Maximum Credit : 25. Core Subject is compulsory . IA :- Internal Assessment, UE :- University Examination

Year/ Semester	Subject	Paper	Title of Paper	Hours/ Weak	Credit	% of Assessment		
						IA	UE	Total
I Year Sem-II	Core	CS-201	Digital Image Processing	4	5	50	50	100
	Core	CS-202	Advanced Operating Systems	4	5	50	50	100
	Core	CS-203	Data Mining and Data Warehousing	4	5	50	50	100
	Core	CS-204	Project	4	5	50	50	100
	Elective	CS-205	Programming With DOT NET	4	5	50	50	100
	Elective	CS-206	Artificial Intelligence	4	5	50	50	100
	Elective	CS-207	Advance Design and Analysis of Algorithms	4	5	50	50	100

Minimum Credit : 25 Maximum Credit : 30. Core Subject is compulsory. From elective courses student can select one course for minimum credit and two for maximum credit. IA :- Internal Assessment, UE :- University Examination

Year/ Semester	Subject	Paper	Title of Paper	Credit	% of Assessment		
					IA	UE	Total
II Year Sem-III	Core	CS-301	Software Metrics & Project Management	5	50	50	100
	Core	CS-302	Mobile Computing	5	50	50	100
	Core	CS-303	Soft Computing	5	50	50	100
	Elective	CS-304	Project	5	50	50	100
	Elective	CS-305	Web Services	5	50	50	100
	Elective	CS-306	Database and System Administrator	5	50	50	100
	Elective	CS-307	Functional Programming	5	50	50	100
	Elective	CS-308	Business Intelligence	5	50	50	100

Minimum Credit : 25 Maximum Credit : 35, Core Subject is compulsory, From elective courses student can select two course for minimum credit and four for maximum credit. IA :- Internal Assessment, UE :- University Examination

Year/ Semester	Subject	Paper	Title of Paper	Credit	% of Assessment		
					IA	UE	Total
II Year Sem-IV	Core	CS-401	Industrial Training /Institutional project	15	50	50	100
	Elective	CS-402	Parallel Computing	5	50	50	100
	Elective	CS-403	Embedded System	5	50	50	100
	Elective	CS-404	Software Quality Assurance	5	50	50	100
	Elective	CS-405	Modeling and Simulation	5	50	50	100

Core Subject is compulsory. If student had completed 85 credit within three semesters then no need to select any elective course otherwise student should select appropriate number of elective courses to minimum complete 100 credits.

IA :- Internal Assessment, UE :- University Examination

7) Equivalence of Previous Syllabus:

Not Applicable

8) University Terms:

9) Qualification of Teacher:

10) Detail Syllabus with Recommended Books

M.Sc. (Computer Science)

First Year Semester 1

CS-101(New): Principles of Programming Languages

[Total Lectures: 48 Hours]

Course Prerequisites:

It is assumed that student learning this course have the following background:

- Experience with an OOP language (such as Java or C++)
- Experience with a procedural language (such as C)
- Working knowledge of C, C++, and Java programming.
- Basic algorithms and data structure concepts.

Why to study this course?

- To allow Informed Design Decisions
- Gives insight when debugging
- Permits effective use of compilers/linkers interpreters and language oriented tools.
- Helps to understand how language features work.
- Learn features, emulate missing features.
- Develop a greater understanding of the issues involved in programming language design and implementation
- Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms
- Implement several programs in languages other than the one emphasized in the core curriculum (Java/C++)
- Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing
- Develop thorough understanding of the compilation process
- To introduce several different paradigms of programming
- To gain experience with these paradigms by using example programming languages
- To understand concepts of syntax, translation, abstraction, and implementation

Course Objectives:

- This course will prepare you to think about programming languages analytically:
 - Separate syntax from semantics
 - Compare programming language designs
 - Learn new languages more quickly
 - Use standard vocabulary when discussing languages
 - Understand basic language implementation techniques
- This course focuses on both:
 - Theory is covered by the textbook readings, lectures, and on the tests
 - Implementation is covered by the homework assignments

Unit 1. Introduction [T1 chap. 1] [2]

- The Art of Language Design [T1 1.1]
- The Programming Language Spectrum [T1 1.2]
- Why Study Programming Languages? [T1 1.3]
- Compilation and Interpretation [T1 1.4]
- Programming Environments [T1 1.5]

Unit 2. Non-Imperative Programming Models: Functional, Logic Languages

[Text books 3, 4]

[10]

Common LISP

- Basic LISP Primitives (FIRST, REST, SETF, CONS, APPEND, LIST, NTHCDR, BUTLAST, LAST, LENGTH, REVERSE, ASSOC)
- Procedure definition and binding, DEFUN, LET
- Predicates and Conditional, EQUAL, EQ, EQL, =, MEMBER, LISTP, ATOM, NUMBERP, SYMBOLP, NIL, NULL, IF, WHEN, UNLESS, COND, CASE
- Procedure Abstraction and Recursion

[T 4]

Turbo Prolog

Introduction, facts, Objects and Predicates, Variables, Using Rules, Controlling execution fail and cut predicates

[T3 chapter 1 through 9 except chapter 2]

Unit 3. Names, Scopes, and Bindings [T1 chap.3]

[5]

The Notion of Binding Time [T1 chap.3.1]

Object Lifetime and Storage Management : [T1 chap. 3.2]

Static Allocation, Stack-Based Allocation, Heap-Based Allocation, Garbage Collection

Scope Rules T1 chap. 3.3]

Static Scoping, Nested Subroutines, Declaration Order, Dynamic Scoping

The meaning of Names in a Scope [T1 chap. 3.5]

Aliases, Overloading, Polymorphism and Related Concepts

The Binding of Referencing Environments [T1 chap. 3.6]

Subroutine Closures, First-Class Values and Unlimited Extent, Object Closures

Macro Expansion [T1 chap. 3.7]

Unit 4. Control Flow [T1 chap.6] [5]

Expression Evaluation [T1 6.1]

Precedence and Associativity, Assignments, Initialization, Ordering Within Expressions, Short-Circuit Evaluation

Structured and Unstructured Flow [T1 6.2]

Structured Alternatives to goto

Sequencing [T1 6.3]

Selection [T1 6.4]

Short-Circuited Conditions, Case/Switch Statements

Iteration [T1 6.5]

Enumeration-Controlled Loops, Combination Loops, Iterators, Logically Controlled Loops

Recursion [T1 6.6]

Iteration and Recursion, Applicative- and Normal-Order Evaluation

Unit 5. Data Types [T2 chap.6]

[8]

Introduction T2 6.1]

Primitive Data Types [T2 6.2]

Numeric Types [T2 6.2.1]

Integer [T2 6.2.1.1]

Floating point [T2 6.2.1.2]

- Complex [T2 6.2.1.3]
- Decimal [T2 6.2.1.4]
- Boolean Types [T2 6.2.2]
- Character Types [T2 6.2.3]
- Character String Types [T2 6.3]
 - Design Issues [T2 6.3.1]
 - Strings and Their Operations [T2 6.3.2]
 - String Length Operations [T2 6.3.3]
 - Evaluation [T2 6.3.4]
 - Implementation of Character String Types [T2 6.3.5]
- User defined Ordinal types [T2 6.4]
 - Enumeration types [T2 6.4.1]
 - Designs
 - Evaluation
 - Subrange types [T2 6.4.2]
 - Ada's design
 - Evaluation
 - Implementation of user defined ordinal types [T2 6.4.3]
- Array types [T2 6.5]
 - Design issues [T2 6.5.1]
 - Arrays and indices [T2 6.5.2]
 - Subscript bindings and array categories [T2 6.5.3]
 - Heterogeneous arrays [T2 6.5.4]
 - Array initialization [T2 6.5.5]
 - Array operations [T2 6.5.6]
 - Rectangular and Jagged arrays [T2 6.5.7]
 - Slices [T2 6.5.8]
 - Evaluation [T2 6.5.9]
 - Implementation of Array Types [T2 6.5.10]
- Associative Arrays [T2 6.6]
 - Structure and operations [T2 6.6.1]
 - Implementing associative arrays [T2 6.6.2]
- Record types [T2 6.7]
 - Definitions of records [T2 6.7.1]
 - References to record fields [T2 6.7.2]
 - Operations on records [T2 6.7.3]
 - Evaluation [T2 6.7.4]
 - Implementation of Record types [T2 6.7.5]
- Union Types [T2 6.8]
 - Design issues [T2 6.8.1]
 - Discriminated versus Free unions [T2 6.8.2]
 - Evaluation [T2 6.8.4]
 - Implementation of Union types [T2 6.8.5]
- Pointer and Reference Types [T2 6.9]
 - Design issues [T2 6.9.1]
 - Pointer operations [T2 6.9.2]
 - Pointer problems [T2 6.9.3]

- Dangling pointers
- Lost heap dynamic variables
- Pointers in C and C++ [T2 6.9.5]
- Reference types [T2 6.9.6]
- Evaluation [T2 6.9.7]
- Implementation of pointer and reference types [T2 6.9.8]
 - Representation of pointers and references
 - Solution to dangling pointer problem
- Heap management

Unit 6. Subroutines and Control Abstraction [T2 chap.9,10] [5]

- Fundamentals of Subprograms [T2 9.2 (excluding 9.2.4)]
- 1Design Issues for subprograms [T2 9.3]
- Local Referencing Environments [T2 9.4]
- Parameter-Passing Methods [T2 9.5]
- Parameters That are Subprograms [T2 9.6]
- Overloaded Subprograms [T2 9.7]
- Generic Subroutines [T2 9.8]
 - Generic Functions in C++ [T2 9.8.2]
 - Generic Methods in Java [T2 9.8.3]
- Design Issues for Functions [T2 9.9]
- User-Defined Overloaded Operators [T2 9.10]
- Coroutines [T2 9.10]
- The General Semantics of Calls and Returns [T2 10.1]
- Implementing “Simple” Subprograms [T2 10.2]
- Implementing Subprograms with Stack-Dynamic Local Variables [T2 10.3]
- Nested Subprograms [T2 10.4]
- Blocks [T2 10.5]
- Implementing Dynamic Scoping [T2 10.6]

Unit 7. Data Abstraction and Object Orientation [T1 chap.9] [8]

- Object-Oriented Programming [T1 9.1]
- Encapsulation and Inheritance [T1 9.2]
 - Modules, Classes, Nesting (Inner Classes), Type Extensions, Extending without Inheritance
- Initialization and Finalization [T1 9.3]
 - Choosing a Constructor, References and Values, Execution Order, Garbage Collection
- Dynamic Method Binding [T1 9.4]
 - Virtual- and Non-Virtual Methods, Abstract Classes, Member Lookup, Polymorphism, Object Closures
- Multiple Inheritance [T1 9.5]
 - Semantic Ambiguities, Replicated Inheritance, Shared Inheritance, Mix-In Inheritance

Unit 8. Concurrency [T2 chap. 13] [5]

- Introduction
 - Multiprocessor Architecture [T2 13.1.1]
 - Categories of concurrency [T2 13.1.2]
 - Motivations for studying concurrency [T2 13.1.3]

- Introduction to Subprogram-level concurrency
 - Fundamental concepts [T2 13.2.1]
 - Language Design for concurrency. [T2 13.2.2]
 - Design Issues [T2 13.2.3]
- Semaphores
 - Introduction [T2 13.3.1]
 - Cooperation synchronization [T2 13.3.2]
 - Competition Synchronization [T2 13.3.3]
 - Evaluation [T2 13.3.4]
- Monitors
 - Introduction [T2 13.4.1]
 - Cooperation synchronization [T2 13.4.2]
 - Competition Synchronization [T2 13.4.3]
 - Evaluation [T2 13.4.4]
- Message Passing
 - Introduction [T2 13.5.1]
 - The concept of Synchronous Message Passing [T2 13.5.2]
- Java Threads
 - The **Thread** class [T2 13.7.1]
 - Priorities [T2 13.7.2]
 - Competition Synchronization [T2 13.7.3]
 - Cooperation Synchronization [T2 13.7.4]
 - Evaluation [T2 13.4.5]

Text Books:

T1. Scott Programming Language Pragmatics, 3e(With CD) ISBN 9788131222560
Kaufmann Publishers, An Imprint of Elsevier, USA

T2. Concepts of Programming Languages, Eighth Edition by Robert W. Sebesta,
Pearson Education.

T3. Introduction to Turbo Prolog by Carl Townsend

T4. LISP 3rd edition by Patrick Henry Winston & Berthold Klaus Paul Horn (BPB)

Additional Reading:

Programming Languages: Principles and Paradigms, M. Gabbrielli, S. Martini, Springer,
ISBN: 9781848829138

CS102 (New) - Advanced Networking

Unit 1. Review of Basic Concepts	[3]
TCP/IP Protocol Suite [T1 2.3]	
Underlying Technologies : LAN (802.3) T 1 3.1	
Wireless Lans (802.11) T 1 3.2	
Point-to-point WANS T 1 3.3	
Switched WANS T 1 3.4	
Unit 2. The Internet Layer Protocols	[4]
Review of IPv4 Protocol T 1 7.1,7.2,7.3,7.4,7.5	
IPv6 T 1 27.1,27.2	
Transition from IPv4 to IPv6 T 1 27.3	
ICMPv4 T 1 9.1,9.2,9.3,9.4	
ICMPv6 T 1 28.1,28.2,28.3,28.4	
Unit 3. Routing Protocols	[6]
Forwarding T 1 6.2	
Structure of a Router T 1 6.3	
Routing Tables T 1 11.1	
Intra – And Inter-Domain Routing T 1 11.2	
Distance Vector Routing T 1 11.3	
RIP T 1 11.4	
OSPF T 1 11.6	
BGP T 1 11.8	
Multicast Routing T 1 .4	
Unit 4. The Transport Layer	[6]
The Transport Service T 2 6.1	
Elements of Transport Protocols T 2 6.2	
UDP T 2 6.4.1	
TCP T 2 6.5.1 to 6.5.9	
Unit 5. Multimedia	[3]
Digitizing Audio and Video T 1 25.2	
Streaming stored Audio / Video T 1 25.4	
Streaming Live Audio / Video T 1 25.5	
Real-Time Interactive Audio / Video T 1 25.6	
RTP T 1 25.7	
RTCP T 1 25.8	
Voice Over IP T 1 25.9	
Unit 6. Introduction To Security	[2]
The need for Security T 3 1.2	
Security Approaches T 3 1.3	
Principles of Security T 3 1.4	
Types of Attacks T 3 1.5	
Unit 7. Cryptography: Concepts and Techniques	[3]
Introduction T 3 2.1	
Plain Text and Cipher Text T 3 2.2	
Substitution Techniques T 3 2.3.1,2.3.2,2.3.3,2.3.7	
Transposition Techniques T 3 2.4.1,2.4.2,2.4.3	
Symmetric and Asymmetric key cryptography	T 3 2.6.1,2.6.2

Unit 8. Symmetric Key Algorithms	[3]
Algorithms types and modes T 3 3.2.1,3.2.2	
DES T 3 3.4	
Unit 9. Asymmetric key Algorithms	[2]
RSA T 3 4.4	
Symmetric and Asymmetric key Cryptography T 3 4.5	
Digital Signatures T 3 4.6.1,4.6.2	
Unit 10. Digital Certificates	[2]
Introduction T 3 5.1	
Digital Certificates T 3 5.2	
Unit 11. Internet Security Protocols	[10]
Secure Socket Layer T 3 6.3	
TLS T 3 6.4	
SHTTP T 3 6.5	
TSP T 3 6.6	
SET T 3 6.7	
SSL Verses SET T 3 6.8	
3-D Secure Protocol T 3 6.9	
Electronic Money T 3 6.10	
Email Security T 3 6.11	
Firewalls T 3 9.3	
IP Security T 3 9.4	
VPN T 3 9.5	
Unit 12. User Authentication	[4]
Passwords T 3 7.3	
Certificate-based Authentication T 3 7.5	
Kerberos T 3 7.7	
Security Handshake Pitfalls T 3 7.9	

Text Books:

T1 : TCP / IP Protocol Suite Fourth Edition – Behrouz A. Forouzan

T2 : Computer Networks Fourth Edition – Andrew Tanenbaum

T3 : Cryptography and Network Security Second Edition – Atul Kahate

Supplementary but very useful references/texts: (Few of the references below contain latest research and trends related to Networks and Security and are useful for seminar/ presentations by the students.)

1. Computer Network Security, Kizza, Springer, 9780387204734
2. Guide to Computer Network Security, Kizza, Springer, 978-1-84800-916-5
3. Network Security, Harrington, Elsevier, ISBN 9788131202166
4. Douglas E. Comer, Internetworking with TCP/IP, Vol. 1, Principles, Protocols and Architecture Fifth Edition, Prentice Hall, 2000, ISBN 0-13-018380-6.
5. William Stallings, Data and Computer Communications , Seventh Edition, Pearson Education
6. Douglas E. Comer, Internetworking with TCP/IP, Vol. 2, Design, Implementation and Internals, Prentice Hall Publisher.

7. Internetworking with TCP/IP, Vol. 3, Client-server Programming and Applications by Douglas E. Comer, Prentice Hall Publisher. (Excellent reference for distributed programming over TCP/IP networks)
8. Richard Stevens, TCP/IP Illustrated, Vol. 1, by, Addison Wesley (A very practical book with lots of useful network diagnostic tools and programs.)
9. Craig Hunt, TCP/IP Network Administration O'Reilly & Associates, Inc. (A must for network and system administrators dealing with internetworking.)
10. L. Peterson and B. Davie. Morgan , Computer Networks: A Systems Approach by Kaufmann Publishers Inc., ISBN 9788131210451
11. J. Kurose, K. Ross ``Computer Networking: A Top-Down Approach Featuring the Internet" Addison-Wesley, '00
12. William Stallings," Cryptography And Network Security" Prentice Hall /Pearson Education

Guidelines to paper setters:

Frame formats of protocols are not expected

Problems should be asked on Routing Protocols , TCP, Cryptography, RSA

CS-103(New): Distributed Database Concepts

Pre-requisites: Students should be well-versed with the basic and advanced concepts of RDBMS

Objectives:

Main objective is to understand the principles and foundations of distributed databases. This course addresses architecture, design issues, integrity control, query processing and optimization, transactions, and concurrency control & distributed transaction reliability.

Unit 1. Distributed databases: An overview [2]

- 1.1 Features of distributed Vs centralized databases Chapter 1 from Book 2
- 1.2 Why DDB? DDBMS
- 1.3 Promises / problem areas in implementing a DDB Section 1.3,1.5 from Book 1

Unit 2. DDBMS Architecture [4]

- 2.1 DBMS Standardization Chapter 4 from Book 1
- 2.2 Architectural models for DDBMS
- 2.3 DDBMS architecture
- 2.4 Distributed catalog management Section 21.8 from Book 3

Unit 3. Distributed database design [10]

- 3.1 Alternative design strategies Chapter 5 from book 1
- 3.2 Distributed design issues
- 3.3 Concepts of join graphs Section 4.2.1.2 from book 2
- 3.4 Fragmentation and allocation Chapter 5 from Book1

Unit 4. Overview of Query processing [4]

- 4.1 Query processing problems
- 4.2 Objectives of query processing Chapter 7 from book 1
- 4.3 Complexity of relational algebra operators
- 4.4 Characterization of query processors
- 4.5 Layers of query processing

Unit 5. Query decomposition & data localization [2]

- 5.1 Query decomposition
- Chapter 5.2 Localization of distributed data 8 from book 1

Unit 6. Optimization of distributed queries [10]

- 6.1 Query optimization
- Centralized query optimization Join ordering in Chapter 9 from book1
- fragment queries. Distributed query optimization algorithms
- 6.2 Centralized query optimization
- 6.3 Join ordering in fragment queries
- 6.4 Distributed query optimization algorithms

Unit 7. Management of distributed transactions [2]

- 7.1 Framework for transaction management Chapter 7 from book 2
- 7.2 Supporting atomicity of distributed transactions
- 7.3 Concurrency control of distributed transactions
- 7.4 Architectural aspects of distributed transactions

Unit 8. Concurrency control [6]

- 8.1 Foundations of distributed concurrency control Chapter 8 from book 2
- 8.2 Distributed deadlocks

- 8.3 Concurrency control based on timestamps
- 8.4 Optimistic methods for distributed concurrency control

Unit 9. Distributed DBMS reliability

[8]

- 9.1 Reliability concepts & measures
- 9.2 Failures & fault tolerance in distributed systems from book 1
- 9.3 Failures in DDBMS
- 9.4 Local reliability protocols
- 9.5 Distributed reliability protocols
- 9.6 Dealing with site failures
- 9.7 Network partitioning

Reference Books:

1. Principles of Distributed Database Systems; 2nd Edition By M. Tamer Ozsu and Patrick Valduriez Publishers: Pearson Education Asia ISBN: 81-7808-375-2
2. Distributed Database; Principles & Systems By Stefano Ceri and Giuseppe Pelagatti Publications: McGraw-Hill International Editions ISBN: 0-07-010829-3
3. Database systems (2nd edition) By Raghuramakrishnan and Johannes

CS-104(New): Design and Analysis of Algorithms

Prerequisites

- Basic algorithms and data structure concepts.
- Basic programming concepts

Objectives

This course will prepare students in

- Basic Algorithm Analysis techniques and understand the use of asymptotic notation
- Understand different design strategies
- Understand the use of data structures in improving algorithm performance
- Understand classical problem and solutions
- Learn a variety of useful algorithms
- Understand classification of problems

Unit 1. Analysis

Algorithm definition, space complexity, time complexity, worst case –best case –average case complexity, asymptotic notation, sorting algorithms (insertion sort, heap sort) , sorting in linear time, searching algorithms, recursive algorithms (Tower of Hanoi , Permutations).

[T1 1.1 , 1.2, 1.3]

[6]

Unit 2. Design strategies

Divide and conquer-control abstraction, binary search, merge sort, Quick sort, Strassen's matrix multiplication

[T1 3.1, 3.2, 3.4,3.5,3.7]

[6]

Unit 3. Greedy method- knapsack problem, job sequencing with deadlines, minimum-cost spanning trees, Kruskal and Prim's algorithm, optimal storage on tapes, optimal merge patterns, Huffman coding

[T1 4.1, 4.2, 4.4, 4.5, 4.6,4.7, 4.8]

[8]

Unit 4. Dynamic programming- matrix chain multiplication, . single source shortest paths, Dijkstra's algorithm, Bellman- ford algorithm , all pairs shortest path, longest common subsequence, string editing, 0/1 knapsack problem, Traveling salesperson problem.

[T1 5.1, 5.3, 5.6, 5.7, 5.9]

[8]

Unit 5. Decrease and conquer: - DFS and BFS, Topological sorting, connected components

[T6.1, 6.2, 6.3, 6.4]

[6]

Unit 6. Backtracking: General method, 8 Queen's problem, Sum of subsets problem, graph coloring problem, Hamiltonian cycle

[T1 7.1 , 7.2, 7.3, 7.4, 7.5]

[4]

Unit 7. Branch and Bound Technique : FIFO, LIFO, LCBB, TSP problem, 0/1 knapsack problem

[T1 8.1.1, 8.2, 8.3]

[4]

Unit 8. Transform and conquer:- Horner's Rule and Binary Exponentiation – Problem Reduction –

[T1 9.1, 9.2 ,9.3]

[4]

Unit 9. Problem classification

Nondeterministic algorithm, The class of P, NP, NP-hard and NP- Complete problems, significance of Cook's theorem

[T1 11.1]

[2]

Text Books

T1. Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, Computer Algorithms, Galgotia.

T2 T. Cormen, C. Leiserson, & R. Rivest, Algorithms, MIT Press, 1990

References Texts

- 1) A. Aho, J. Hopcroft, & J. Ullman, The Design and Analysis of Computer Algorithms,

M.Sc.(CS) syllabus for affiliated colleges

Addison Wesley, 1974

- 2) Donald Knuth, The Art of Computer Programming (3 vols., various editions, 1973-81),
Addison Wesley
- 3) The Algorithm Manual, Steven Skiena, Springer ISBN:9788184898651
- 4) Graphs, Networks and Algorithms, Jungnickel, Springer, ISBN: 3540219056

CS-105 (New) : Network Programming

Prerequisites:

- Working Knowledge of C
- Basic Understanding of Networking Concepts
- User Level Knowledge of Linux

Syllabus:

[Total Lectures: 48]

UNIT 1: Introduction

[2]

- A Simple Daytime Client, Protocol Independence, Error Handling: Wrapper Functions, A Simple Daytime Server [Book-1]

UNIT 2: Sockets Introduction

[6]

- Socket Address Structures, Value-Result Arguments, Byte Ordering Functions, Byte Manipulation Functions, inet_aton, inet_addr, and inet_ntoa Functions, inet_pton and inet_ntop Functions, sock_ntop and Related Functions, readn, writen, and readline Functions, isfdtype Function [Book-1]
- What is a Socket?, Using Sockets [Book-2]

UNIT 3: Elementary TCP Sockets

[4]

- socket Function, connect Function, bind Function, listen Function, accept Function, fork and exec Functions, Concurrent Servers, close Function, getsockname and getpeername Functions [Book-1]

UNIT 4: TCP Client-Server Example

[6]

- TCP Echo Server: main Function, TCP Echo Server: str_echo Function, TCP Echo Client: main Function, TCP Echo Client: str_cli Function, Normal Startup, Normal Termination, Connection Abort before accept Returns, Termination of Server Process, SIGPIPE Signal, Crashing of Server Host, Crashing and Rebooting of Server Host, Shutdown of Server Host [Book-1]

UNIT 5: I/O Multiplexing: The select and poll Functions

[6]

- I/O Models, select Function, str_cli Function (Revisited), Batch Input, shutdown Function, str_cli Function (Revisited Again), TCP Echo Server (Revisited), pselect Function, poll Function, TCP Echo Server (Revisited Again) [Book-1]

UNIT 6: Socket Options

[4]

- getsockopt and setsockopt Functions, Checking If an Option Is Supported and Obtaining the Default, Socket States, Generic Socket Options, IPv4 Socket Options, ICMPv6 Socket Option, IPv6 Socket Options, TCP Socket Options [Book-1]

UNIT 7: Elementary UDP Sockets**[8]**

- recvfrom and sendto Functions, UDP Echo Server: main Function, UDP Echo Server: dg_echo Function, UDP Echo Client: main Function, UDP Echo Client: dg_cli Function, Lost Datagrams, Verifying Received Response, Server Not Running, Summary of UDP example, connect Function with UDP, dg_cli Function (Revisited), Lack of Flow Control with UDP, Determining Outgoing Interface with UDP, TCP and UDP Echo Server Using select [Book-1]
- User Datagram Protocol, File Transfer, Error Handling [Book-2]

UNIT 8: Protocols, Sessions, State, and Implementing Custom Protocols**[4]**

- State vs. Stateless, Methods for Maintaining State, What Is a Protocol?, Designing a Custom Protocol, Our Chat Protocol, Protocol Registration [Book-2]

UNIT 9: Elementary Name, Address Conversions and design decisions**[8]**

- Domain Name System, gethostbyname Function, RES_USE_INET6 Resolver Option, gethostbyname2 Function and IPv6 Support, gethostbyaddr Function, uname Function, gethostname Function, getservbyname and getservbyport Functions [Book-1]
- TCP vs. UDP, Application Protocol Choices, Client-Server Architecture, Client-Side Considerations, Server-Side Considerations [Book-2]

References:

T1: Unix Network Programming, Volume 1: The Sockets Networking API, 3/E by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, PHI

T2: The Definitive Guide to Linux Network Programming by KEIR DAVIS, JOHN W. TURNER, AND NATHAN YOCOM, Apress.

M.Sc.

(Computer Science)

First Year Semester 2

CS-201: Digital Image Processing

Syllabus:

[Total Lectures: 48]

UNIT 1. Introduction

[3]

- What is Digital Image Processing?
- The origins of Digital Image Processing
- Examples of Fields that use Digital Image Processing
 - Gamma-Ray Imaging
 - X-Ray Imaging
 - Imaging in the Ultraviolet Band
 - Imaging in the Visible and Infrared Bands
 - Imaging in the Microwave Band
 - Imaging in the Radio Band
- Fundamental steps in Digital Image Processing
- Components of an Image Processing System

UNIT 2. Digital Image Fundamentals

[6]

- Elements of Visual Perception
- Light and the Electromagnetic Spectrum
- Image sensing and Acquisition
- Image Sampling and Quantization
- Some Basic Relationships between Pixels
- An Introduction to the Mathematical Tools Used in Digital Image Processing
 - Array versus Matrix Operations
 - Linear versus Nonlinear Operations
 - Arithmetic Operations
 - Set and Logical Operations

UNIT 3. Intensity Transformation and Spatial Filtering

[7]

- Background
- Some Basic Intensity Transformation Functions
- Histogram Processing
 - Histogram Equalization
 - Histogram Matching (Specification)
 - Local Histogram Processing
- Fundamentals of Spatial Filtering
- Smoothing Spatial Filters
- Sharpening Spatial Filters
- Combining Spatial Enhancement Methods

UNIT 4. Filtering in the Frequency Domain

[10]

- Background
- Preliminary Concepts
- Sampling and the Fourier Transform of Sampled Functions
- The Discrete Fourier Transform (DFT) of One variable
- Extension to Functions of Two Variables

- Some Properties of the 2-D Discrete Fourier Transform
- The Basics of Filtering in the Frequency Domain
- Image Smoothing Using Frequency Domain Filters
- Image Sharpening Using Frequency Domain Filters
- Selective Filtering

UNIT 5. Image Restoration and Reconstruction

[6]

- A Model of the Image Degradation / Restoration Process
- Noise Models
- Restoration in the Presence of Noise Only- Spatial Filtering
- Periodic Noise Reduction by Frequency Domain Filtering
 - Bandreject Filters
 - Bandpass Filters
 - Notch Filters
- Estimating the Degradation Function
- Inverse Filtering
- Minimum Mean Square Error(Wiener) Filtering
- Geometric Mean Filter

UNIT 6. Morphological Image Processing

[5]

- Preliminaries
- Erosion and Dilation
- Opening and Closing
- The Hit-or-Miss Transformation
- Some Basic Morphological Algorithms
 - Boundary Extraction
 - Hole Filling
 - Extraction of Connected Components
 - Convex Hull
 - Thinning
 - Thickening
 - Skeletons
 - Pruning
 - Morphological Reconstruction

UNIT 7. Image Segmentation

[7]

- Fundamentals
- Point, Line, and Edge Detection
 - Background
 - Detection of Isolated Points
 - Line Detection
 - Edge Models
 - Basic Edge Detection
 - Edge Linking and Boundary Detection
- Thresholding
 - Foundation
 - Basic Global Thresholding
 - Optimum Global Thresholding Using Otsu's Method

- Using Image Smoothing to Improve Global Thresholding
- Using Edges to Improve Global Thresholding
- Region-Based Segmentation

UNIT 8. Representation and Description

[4]

- Representation
 - Boundary (Border) Following
 - Chain Codes
 - Polygonal Approximations Using Minimum-Perimeter Polygons
 - Other Polygonal Approximation Approaches
 - Signatures
 - Boundary Segments
 - Skeletons
- Boundary Descriptors
 - Some Simple Descriptors
 - Shape Numbers
 - Fourier Descriptors
- Regional Descriptors
 - Some Simple Descriptors
 - Topological Descriptors
 - Texture

Text Book:

1. Gonzalez, R. C. and Woods, R. E. [2002/2008], Digital Image Processing, 3rd ed., Prentice Hall

Reference Books:

1. Sonka, M., Hlavac, V., Boyle, R. [1999]. Image Processing, Analysis and Machine Vision (2nd edition), PWS Publishing, or (3rd edition) Thompson Engineering, 2007
2. Gonzalez, R. C., Woods, R. E., and Eddins, S. L. [2009]. Digital Image Processing Using MATLAB, 2nd ed., Gatesmark Publishing, Knoxville, TN.
3. Anil K. Jain [2001], Fundamentals of digital image processing (2nd Edition), Prentice-Hall, NJ
4. William K. Pratt [2001], Digital Image Processing (3rd Edition), , John Wiley & Sons, NY
5. Burger, Wilhelm and Burge, Mark J. [2008]. Digital Image Processing: An Algorithmic Introduction Using Java, Springer
6. Digital Image Analysis (With CD-ROM), Kropatsch, Springer, ISBN 978038795066
7. Digital Image Processing, 6e (With CD), Jähne, Springer, ISBN:978-3-540-24035-8 2

CS-202(New): Advanced Operating Systems

Prerequisites:

- Working knowledge of C programming.
- Basic Computer Architecture concepts.
- Basic algorithms and data structure concepts.

Course Objectives:

This course teaches Advanced Operating Systems Concepts using Unix/Linux and Windows as representative examples. This course strikes a delicate balance between theory (covered in TextBook-2, 3) and practical applications (covered in TextBook-1, 4). In fact, most Units start with the theory and then switches focus on how the concepts are implemented in a C program. This course describes the programming interface to the Unix/Linux system - the system call interface. It is intended for anyone writing C programs that run under Unix/Linux. Finally, it concludes with an overview of Windows Threads Management. This course provides an understanding of the functions of Operating Systems. It also provides provide an insight into functional modules of Operating Systems. It discusses the concepts underlying in the design and implementation of Operating Systems.

Syllabus:

Unit 1. Introduction to UNIX/Linux Kernel

[03]

- System Structure, User Perspective, Assumptions about Hardware, Architecture of UNIX Operating System (TextBook-3: Chapter Topics: 1.2, 1.3, 1.5, 2.1)
- Concepts of Linux Programming- Files and the Filesystem, Processes, Users and Groups, Permissions, Signals, Interprocess Communication (TextBook-1: Chapter 1- relevant topics)

Unit 2. File and Directory I/O

[13]

- Buffer headers, structure of the buffer pool, scenarios for retrieval of a buffer, reading and writing disk blocks, inodes, structure of regular file, open, read, write, lseek, close, pipes, dup (TextBook- 3: Chapter Topics: 3.1-3.4, 4.1, 4.2, 5.1-5.3, 5.5-5.7, 5.12, 5.13)
- open, creat, file sharing, atomic operations, dup2, sync, fsync, and fdatasync, fcntl, /dev/fd, stat, fstat, lstat, file types, Set-User-ID and Set-Group-ID, file access permissions, ownership of new files and directories, access function, umask function, chmod and fchmod, sticky bit, chown, fchown, and lchown, file size, file truncation, file systems, link, unlink, remove, and rename functions, symbolic links, symlink and readlink functions, file times, utime, mkdir and rmdir, reading directories, chdir, fchdir, and getcwd, device special files (TextBook-4: Chapter Topics: 3.3, 3.4, 3.10-3.14, 3.16, 4.2-4.23)
- Scatter/Gather I/O, Mapping Files into Memory, Advice for Normal File I/O, I/O Schedulers and I/O Performance, Directories, Copying and Moving files, Device Nodes, Out-of-Band Communication (TextBook-1: Chapters: 4 and 7-relevant topics)

Unit 3. Process Environment, Process Control and Process Relationships

[14]

- Process states and transitions, layout of system memory, the context of a process, saving the context of a process, sleep, process creation, signals, process termination, awaiting process termination, invoking other programs, the user id of a process, changing the size of the process, The Shell, Process Scheduling (TextBook-3: Chapter Topics: 6.1-6.4, 6.6, 7.1-7.8, 8.1)
- Process termination, environment list, memory layout of a C program, shared libraries, environment variables, setjmp and longjmp, getrlimit and setrlimit, process identifiers, fork, vfork, exit, wait and waitpid, waitid, wait3 and wait4, race conditions, exec, changing user IDs and group IDs, system function, user identification, process times (TextBook-4: Chapter Topics: 7.3, 7.5-7.7, 7.9-7.11, 8.2-8.11, 8.13, 8.15, 8.16)
- The Process ID, Running a New Process, Terminating a Process, Waiting for Terminated Child Processes, Users and Groups, Daemons, Process Scheduling, Yielding the Processor, Process Priorities, Processor Affinity (TextBook-1: Chapter 5 and 6 [Relevant Topics])

Unit 4. Memory Management

[06]

- The Process Address Space, Allocating Dynamic Memory, Managing Data Segment, Anonymous Memory Mappings, Advanced Memory Allocation, Debugging Memory Allocations, Stack-Based Allocations, Choosing a Memory Allocation Mechanism, Manipulating Memory, Locking Memory, Opportunistic Allocation (TextBook-1: Chapter 8)
- Swapping, Demand Paging (TextBook-3: Chapter Topics: 9.1, 9.2)

Unit 5. Signal Handling

[06]

- Signal concepts, signal function, unreliable signals, interrupted system calls, reentrant functions, SIGCLD semantics, reliable-signal technology, kill and raise, alarm and pause, signal sets, sigprocmask, sigpending, sigsetjmp and siglongjmp, sigsuspend, abort, system function revisited, sleep (TextBook-4: Topics: 10.2-10.13, 10.15-10.19)
- Signal Concepts, Basic Signal Management, Sending a Signal, Reentrancy, Signal Sets, Blocking Signals, Advanced Signal Management, Sending a Signal with a Payload (TextBook-1: Chapter 9)

Unit 6. Windows Thread Management (TextBook-2: Chapter 5 [relevant topics])

[06]

- Thread Internals
 - Data Structures, Kernel Variables, Performance Counters, Relevant Functions, Birth of a Thread Examining Thread Activity : Limitations on Protected Process Threads, Worker Factories (Thread Pools)
- Thread Scheduling
 - Overview of Windows Scheduling, Priority Levels, Windows Scheduling APIs, Relevant Tools, Real-Time Priorities, Thread States, Dispatcher Database, Quantum, Scheduling Scenarios, Context Switching, Idle Thread, Priority Boosts

Recommended Text:

1. Linux System Programming, O'Reilly, by Robert Love.
2. Windows Internals, Microsoft Press, by Mark E. Russinovich and David A. Solomon.
3. The Design of the UNIX Operating System, PHI, by Maurice J. Bach.
4. Advanced Programming in the UNIX Environment, Addison-Wesley, by Richard Stevens.

CS-203(New): Data Mining and Data Warehousing

Unit 1. Introduction to Data Mining [4]

- Basic Data Mining Tasks
- DM versus Knowledge Discovery in Databases
- Data Mining Issues
- Data Mining Metrics
- Social Implications of Data Mining
- Overview of Applications of Data Mining

Unit 2. Introduction to Data Warehousing [4]

- Architecture of DW
- OLAP and Data Cubes
- Dimensional Data Modeling-star, snowflake schemas
- Data Preprocessing – Need, Data Cleaning, Data Integration & Transformation, Data Reduction
- Machine Learning
- Pattern Matching

Unit 3. Data Mining Techniques [4]

- Frequent item-sets and Association rule mining: Apriori algorithm, Use of sampling for frequent item-set, FP tree algorithm
- Graph Mining: Frequent sub-graph mining, Tree mining, Sequence Mining

Unit 4. Classification & Prediction [16]

- Decision tree learning: [3 hrs]
Construction, performance, attribute selection
Issues: Over-fitting, tree pruning methods, missing values, continuous classes
Classification and Regression Trees (CART)
- Bayesian Classification: [6 hrs]
- Bayes Theorem, Naïve Bayes classifier,
- Bayesian Networks
- Inference
- Parameter and structure learning
- Linear classifiers [4 hrs]
- Least squares, logistic, perceptron and SVM classifiers
- Prediction [3 hrs]
- Linear regression
- Non-linear regression

Unit 5 Accuracy Measures [4]

Precision, recall, F-measure, confusion matrix, cross-validation, bootstrap

Unit 6. Software for data mining and applications of data mining [4]

R, Weka, Sample applications of data mining

Unit 7. Clustering [4]

- k-means

- Expectation Maximization (EM) algorithm
- Hierarchical clustering, Correlation clustering

Unit 8. **Brief overview of advanced techniques**

[4]

- Active learning
- Reinforcement learning
- Text mining
- Graphical models
- Web Mining

Reference Books:

1. Data Mining: Concepts and Techniques, Han, Elsevier ISBN:9789380931913/9788131205358
2. Margaret H. Dunham, S. Sridhar, Data Mining – Introductory and Advanced Topics, Pearson Education
3. Tom Mitchell, —Machine Learning||, McGraw-Hill, 1997
4. R.O. Duda, P.E. Hart, D.G. Stork. Pattern Classification. Second edition. John Wiley and Sons, 2000.
5. Christopher M. Bishop, —Pattern Recognition and Machine Learning||, Springer 2006
6. Raghu Ramkrishnan, Johannes Gehrke, Database Management Systems, Second Edition, McGraw Hill International
7. Ian H.Witten, Eibe Frank Data Mining: Practical Machine Learning Tools and Techniques, Elsevier/(Morgan Kauffman), ISBN:9789380501864
8. [Research-Papers]: Some of the relevant research papers that contain recent results and developments in data mining field

CS-204 Project

The Project can be platform, Language and technology independent. Project will be evaluated by project guide. Assessment will be done weekly in the respective batch. Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation and demonstration.

You should fill your status of the project work on the progress report and get the Signature of project guide regularly. Progress report should sharply focus how much time you have spent on specific task. (The format of progress report is given as follow.) You should keep all signed progress report. Project will not be accepted if progress report is not submitted and all responsibility remains with student.

Project Progress Report

Roll No & Name of the student	
Title of the Project	
Project guide Name	

SN	From Date	To Date	Details of Project work	Project guide sign (with date)

Head,
Deptt. of Computer Science

- You should prepare design document using SE/UML techniques depends on your project
- **Project Report Content should as follow :**
 1. College certificate
 2. Acknowledgement
 3. Problem Definition
 4. Existing System and need for the new system
 5. Scope of the work
 6. Feasibility study (Including H/W & S/W setup requirements)
 7. Requirement Analysis (including fact finding methods used)
 8. E-R diagrams
 9. Decision trees/Decision tables
 10. Normalized Database Design & Data Dictionary.
 11. Data flow Diagrams (if applicable)
 12. Use-case Diagrams
 13. Class Diagrams
 14. Object Diagrams
 15. Sequence Diagrams
 16. Collaboration Diagram
 17. Activity Diagram
 18. State Chart (if applicable)
 19. Component Diagram
 20. Deployment Diagram (if applicable)
 21. Use interface design
 - Menus
 - Input Screens using sample data
 - Reports, Graphs using sample data
 22. Testing & Implementation plan (Should contain testing strategies, techniques used & implementation approach used.)
 23. User manual

24. Drawbacks, Limitations & Proposed enhancement
25. Abbreviations used (if any)
26. Bibliography/Reference (Including book titles, authors name, editions, publications, etc)

About project Report: -

The report should be typed on A4 size, executive bond paper for the final submission. The report should be in the good quality Rexene bound. We suggest, using one-and-half spaced printing, Times New Roman 12 font sizes for the normal text, 14-16 font sizes for headings & page titles.

Number of copies:

For one project you should prepare 2 copies of the project report. One for yourself, one for college.

Elective Course [CS-205]: Programming with DOT NET

Objectives:

- To understand the DOTNET framework, C# language features and Web development using ASP.NET

Prerequisites –

- Knowledge of object-oriented programming concepts such as data abstraction, encapsulation, inheritance, and polymorphism.
- Familiarity with programming language such as C++ and/or Java.
- Knowledge of web development

Topics to be covered:

Part I : C#

Unit 1. DOTNET Framework (2)

- a. Introduction to DOTNET
- b. DOT NET class framework
- c. Common Language Runtime
 - i. Overview
 - ii. Elements of .NET application
 - iii. Memory Management
 - iv. Garbage Collector : Faster Memory allocation, Optimizations
- d. Common Language Integration
 - i. Common type system
 - ii. Reflection API
- e. User and Program Interface

Unit 2. Introduction to C# (8)

- a. Language features
 - i. Variables and Expressions, type conversion
 - ii. Flow Control
 - iii. Functions, Delegates
 - iv. Debugging and error handling, exception handling (System Defined and User Defined)
- b. Object Oriented Concepts
 - i. Defining classes, class members, Interfaces, properties
 - ii. Access modifiers, Implementation of class, interface and properties
 - iii. Concept of hiding base class methods, Overriding
 - iv. Event Handling
- c. Collections, Comparisons and Conversions
 - i. Defining and using collections, Indexers, iterators
 - ii. Type comparison, Value Comparison
 - iii. Overloading Conversion operators, as operator
- d. Generics
 - i. Using generics
 - ii. Defining Generics, generic Interfaces, Generic methods, Generic Delegate

Unit 3. Window Programming (6)

- a. Window Controls
 - i. Common Controls
 - ii. Container Controls
 - iii. Menus and Toolbars
 - iv. Printing
 - v. Dialogs
- b. Deploying Window Application
 - i. Deployment Overview
 - ii. Visual studio setup and Deployment project types
 - iii. Microsoft windows installer architecture
 - iv. Building the project : Installation

Unit 4. Data Access (6)

- a. File System Data
- b. XML
- c. Databases and ADO.NET
- d. Data Binding

Unit 5. Web Programming (6)

- a. Basic Web programming
- b. Advanced Web programming
- c. Web Services
- d. Deployment Web applications

Unit 6. .NET Assemblies (3)

- a. Components
- b. .NET Assembly features
- c. Structure of Assemblies
- d. Calling assemblies, private and shared assemblies

Unit 7. Networking (2)

- a. Networking overview
- b. Networking programming options
 - i. WebClient
 - ii. WebRequest and WebResponse
 - iii. TcpListener & TcpClient

Unit 8. Introduction to GDI+ (2)

- a. Overview of Graphical Drawing
- b. Pen Class, Brush Class, Font Class
- c. Using Images
- d. Clipping, Drawing2D, Imaging

Part II : ASP.NET

Unit 1. Introduction to ASP.NET (1)

Unit 2. Server Controls and Variables, control Structures & Functions (4)

- a. Forms, webpages, HTML forms, Webforms
- b. Request & Response in Non-ASP.NET pages
- c. Using ASP.NET Server Controls
- d. Datatypes : Numeric, text, arrays, datacollections
- e. Overview of Control structures
- f. Functions : web controls as parameters

Unit 3. Even Driven Programming and PostBack (3)

- a. HTML events
- b. ASP.NET page events
- c. ASP.NET Web control events
- d. Event driven programming and postback

Unit 4. Reading from Databases (3)

- a. Data pages
- b. ADO.NET

Unit 5. ASP.NET Server Controls (4)

- a. ASP.NET Web Controls
- b. HTML Server Controls
- c. Web Controls

Unit 6. DOTNET assemblies and Custom Controls (2)

- a. Introduction to Cookies, Sessions
- b. Session events
- c. State management Recommendations

Unit 7. Web Services (2)

- a. HTTP, XML & Web services
- b. SOAP
- c. Building ASP.NET web service
- d. Consuming a web service

Recommended Text and Reference books:

Beginning Visual C#, Wrox Publication
 Professional Visual C#, Wrox Publication
 Inside C#, by Tom Archer ISBN: 0735612889 Microsoft Press © 2001, 403 pages
 Beginning ASP.NET 3.5, Wrox Publication
 Programming ASP.NET 3.5 by Jesse Liberty, Dan Maharry, Dan Hurwitz, O'Reilly
 Illustrated C# 2008, Solis, Publication Apress, ISBN 978-81-8128-958-2
 Professional C# 4.0 and .NET 4 by Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, WROX
 Beginning C# Object-Oriented Programming By Dan Clark , Apress
 ADO.NET Examples and Best Practices for C# Programmers, By Peter D. Blackburn Apress
 Database Programming with C#, By Carsten Thomsen, Apress

Elective Course [CS-206]: Artificial Intelligence

Prerequisites –

- Concepts of Data structures and Design and Analysis of algorithms

Objectives-

- To understand and gain the knowledge of the subject

Course contents –

Unit 1. Introduction to Artificial Intelligence

- What is AI?
- Early work in AI
- AI and related fields
- AI problems and Techniques

Unit 2. Problems, Problem Spaces and Search

- Defining AI problems as a State Space Search: example
- Production Systems
- Search and Control Strategies
- Problem Characteristics
- Issues in Design of Search Programs
- Additional Problems

Unit 3. Heuristic Search Techniques

- Generate-and-test
- Hill Climbing
- Best First Search
- Problem Reduction
- Constraint Satisfaction
- Mean-Ends Analysis

Unit 4. Knowledge Representation

- Representations and Mappings
- Approaches to Knowledge Representation
- Knowledge representation method
- Propositional Logic
- Predicate logic
- Representing Simple facts in Logic
- Representing Instances and Isa relationships
- Computable Functions and Predicates
- Resolution
- Forward and backward chaining

Unit 5. Slot – and – Filler Structures

- Weak Structures
- Semantic Networks
- Frames
- Strong Structures
- Conceptual Dependencies
- Scripts

Unit 6. Game Playing

- Minimax Search Procedures
- Adding alpha-beta cutoffs
- Uncertainty Reasoning: Basic Probability Axioms, Baye's

Rule, Bayesian Classification, Certainty Factor Theory, Dempster Shafar Theory.

Unit 7. Learning

- What is learning?
- Rote Learning
- Learning by taking advice
- Learning in problem solving
- Learning from examples
- Explanation based learning

Internal evaluation

- To implement the AI concepts using programming language PROLOG.

Reference books –

1. Computational Intelligence, Eberhart, Elsevier, ISBN 9788131217832
2. Artificial Intelligence: A New Synthesis, Nilsson, Elsevier, ISBN 9788181471901
3. Artificial Intelligence, Tata McGraw Hill, 2nd Edition, by Elaine Rich and Kevin Knight
4. Introduction to Artificial Intelligence and Expert System, Prentice Hall of India Pvt. Ltd., New Delhi, 1997, 2nd Printing, by Dan Patterson.

Elective Course [CS-207]: Advance Algorithms

Unit 1 : Advanced data structures (Fibonacci heaps, splay trees, dynamic trees, B-Trees) in-memory representations and persistence of DS, Revision of Graph algorithms: Network flows (max flow and min-cost flow/circulation) **(10 Hrs)**

Unit 2 . String algorithms: **(10 Hrs)**

- 1 String searching - (Knuth–Morris–Pratt algorithm, Boyer–Moore string search algorithm, Rabin–Karp string search algorithm)
2. Suffix trees - mathematical properties of suffix trees
3. Applications of Suffix trees:
Regular expression searches using suffix trees;
Finding all maximal pairs and maximal repeats, Patricia trees

Unit 3 : Intractable problems: approximation algorithms **(14 Hrs)**

1. Steiner tree and TSP
2. Steiner forest
3. Group Steiner trees
4. Set cover via primal-dual
5. k-median on a cycle

Unit 4: Integer programming and optimization algorithms **(14 Hrs.)**

1. Formulations, complexity and relaxations
2. discrete optimization,
3. cutting plane methods,
4. enumerative and heuristic methods
5. Convex programming algorithms: ellipsoid method, interior-point methods, proximal point methods.

Preliminary reading:

- Introduction to Algorithms: by Cormen, T.H., C.E. Leiserson, R.L. Rivest, and C. Stein; MIT Press; ISBN: 9780262032933
- The Algorithm Manual, Steven Skiena, Springer ISBN:9788184898651

Reference Books:

- Theory of Linear and Integer Programming: by Schrijver; John Wiley & Sons. ISBN: 9780471982326
- Convex Optimization: by Boyd and Vandenberghe; Cambridge University Press; ISBN: 9780521833783
- Approximation Algorithms: by Vazirani; Springer-Verlag: ISBN: 9783540653677
- Advances in Steiner Trees (Combinatorial Optimization) by Ding-Zhu Du (Editor), J.M. Smith (Editor), J. Hyam Rubinstein (Editor); Springer; ISBN: 978-0792361107
- Algorithms On Strings, Trees, And Sequences; by D. Gusfield; Cambridge University Press, (ISBN 052158519)

Additional reading:

- Algorithmic Number Theory: by Bach and Shallit; MIT Press; ISBN: 9780262024051

Introduction to Cyber Security / Information Security

Syllabus for 'Introduction to Cyber Security / Information Security' program* for students of University of Pune is given below.

The program will be of 4 credits and it will be delivered in 60 clock hours**.

*: Course material for this program will be developed by CINS

**: These clock hours also includes practical sessions and demonstrations wherever required.

SR. NO.	TOPIC	HOURS	MARKS
1	Module 1: Pre-requisites in Information and Network Security	14	25
	Chapter 1: Overview of Networking Concepts	3	
	Chapter 2: Information Security Concepts	3	
	Chapter 3: Security Threats and Vulnerabilities	5	
	Chapter 4: Cryptography / Encryption	3	
2	Module 2: Security Management	13	25
	Chapter 1: Security Management Practices	7	
	Chapter 2: Security Laws and Standards	6	
3	Module 3: Information and Network Security	13	25
	Chapter 1: Access Control and Intrusion Detection	3	
	Chapter 2: Server Management and Firewalls	4	
	Chapter 3: Security for VPN and Next Generation Technologies	6	
4	Module 4: System and Application Security	20	25
	Chapter 1: Security Architectures and Models	5	
	Chapter 2: System Security	5	
	Chapter 3: OS Security	5	
	Chapter 4: Wireless Network and Security	5	

Detail Syllabus for Credit Course for University of Pune

Module 1: Pre-requisites in Information and Network Security

Chapter 1: Overview of Networking Concepts

1. Basics of Communication Systems
2. Transmission Media
3. Topology and Types of Networks
4. TCP/IP Protocol Stacks
5. Wireless Networks
6. The Internet

Chapter 2: Information Security Concepts

1. Information Security Overview: Background and Current Scenario
2. Types of Attacks
3. Goals for Security
4. E-commerce Security
5. Computer Forensics
6. Steganography

Chapter 3: Security Threats and Vulnerabilities

1. Overview of Security threats
2. Weak / Strong Passwords and Password Cracking
3. Insecure Network connections
4. Malicious Code
5. Programming Bugs

6. Cyber crime and Cyber terrorism
7. Information Warfare and Surveillance

Chapter 4: Cryptography / Encryption

1. Introduction to Cryptography / Encryption
2. Digital Signatures
3. Public Key infrastructure
4. Applications of Cryptography
5. Tools and techniques of Cryptography

Module 2: Security Management

Chapter I: Security Management Practices

1. Overview of Security Management
2. Information Classification Process
3. Security Policy
4. Risk Management
5. Security Procedures and Guidelines
6. Business Continuity and Disaster Recovery
7. Ethics and Best Practices

Chapter 2: Security Laws and Standards

1. Security Assurance
2. Security Laws
3. IPR

4. International Standards
5. Security Audit
6. SSE-CMM / COBIT etc

Module 3: Information and Network Security

Chapter 1: Access Control and Intrusion Detection

1. Overview of Identification and Authorization
2. Overview of IDS
3. Intrusion Detection Systems and Intrusion Prevention Systems

Chapter 2: Server Management and Firewalls

1. User Management
2. Overview of Firewalls
3. Types of Firewalls
4. DMZ and firewall features

Chapter 3: Security for VPN and Next Generation Technologies

1. VPN Security
2. Security in Multimedia Networks
3. Various Computing Platforms: HPC, Cluster and Computing Grids
4. Virtualization and Cloud Technology and Security

Module 4: System and Application Security

Chapter 1: Security Architectures and Models

1. Designing Secure Operating Systems
2. Controls to enforce security services
3. Information Security Models

Chapter 2: System Security

1. Desktop Security
2. email security: PGP and SMIME
3. Web Security: web authentication, SSL and SET
4. Database Security

Chapter 3: OS Security

1. OS Security Vulnerabilities, updates and patches
2. OS integrity checks
3. Anti-virus software
4. Configuring the OS for security
5. OS Security Vulnerabilities, updates and patches

Chapter 4: Wireless Networks and Security

1. Components of wireless networks
2. Security issues in wireless

The syllabus

Course I

Introduction to Human Rights and Duties

Credit: 1

I) Basic Concept

- a) Human Values- Dignity , Liberty, Equality , Justice, Unity in Diversity, Ethics and Morals
- b) Meaning and significance of Human Rights Education

II) Perspectives of Rights and Duties

- a) Rights: Inherent-Inalienable-Universal- Individual and Groups
- b) Nature and concept of Duties
- c) Interrelationship of Rights and Duties

III) Introduction to Terminology of Various Legal Instruments

- a) Meaning of Legal Instrument- Binding Nature
- b) Types of Instruments: Covenant-Charter-Declaration-Treaty-Convention-Protocol- Executive Orders and Statutes

IV) United Nations And Human Rights

- a) Brief History of Human Rights- International and National Perspectives
- b) Provision of the charters of United Nations
- c) Universal Declaration of Human Rights- Significance-Preamble
- d) Civil and Political Rights-(Art. 1-21)
- e) Economic, Social and Cultural Rights-(Art.22-28)
- f) Duties and Limitations-(Art. 29)
- g) Final Provision (Art. 30)

Course II

Human rights of vulnerable and disadvantaged groups

Credit: 1

I) General Introduction

- a) Meaning and Concept of Vulnerable and Disadvantaged
- b) Groups, Customary, Socio-Economic and Cultural Problems of
- c) Vulnerable and Disadvantaged Groups

II) Social status of women and children in International and national perspective

- a) Human Rights and Women's Rights –International and National Standards
- b) Human Rights of Children-International and National Standards

III) Status of Social and Economically Disadvantaged people

- a) Status of Indigenous People and the Role of the UN
- b) Status of SC/ST and Other Indigenous People in the Indian Scenario
- c) Human Rights of Aged and Disabled
- d) The Minorities and Human Rights

IV) Human rights of vulnerable groups

- a) Stateless Persons
- b) Sex Workers
- c) Migrant Workers
- d) HIV/AIDS Victims

Course III

Human Rights and Duties in India: Law, Policy, Society and Enforcement

Mechanism

Credit: 1

I. Human Rights in Indian Context

- a) Indian Bill of Rights And Sarvodaya
- b) Preamble- Fundamental Rights- Directive Principles-Fundamental Duties

II. Human Rights- Enforcement Mechanism

- a) Human Rights Act, 1993
- b) Judicial Organs- Supreme Court (Art 32) And High Courts(Art 226)
- c) Human Rights Commission- National and State of Maharashtra
- d) Commission of Women, children , Minority, SC/ST
- e) Survey of International Mechanism

III. Human Rights Violations and Indian Polity

- a) Inequalities in society-population-illiteracy-poverty-caste-inaccessibility of legal redress
- b) Abuse of Executive Power-Corruption-Nepotism and favoritism
- c) Human Rights and Good Governance
- d)

IV. Role of Advocacy Groups

- a) Professional Bodies: Press, Media, Role of Lawyers-Legal Aid
- b) Educational Institutions
- c) Role of Corporate Sector
- d) NGO's

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Personality Development
(Course Code –301)

Objectives:

1. To make the students aware about the dimensions and importance of effective personality.
2. To understand personality traits and formation and vital contribution in the world of business .
3. To make the students aware about the various dynamics of personality development.

Sr. No.	Topics	Number of lectures
UNIT 1	Introduction: • Meaning and Definition of Personality. • Factors affecting Personality Development: Biological, Home Environment and Parents, School Environment and Teachers, Peer Group, Sibling Relationships and Mass Media, Cultural Factors, Spiritual Factors, Public Relations.	5
UNIT 2	Personality Traits. • Meaning and Definition: Personality Traits. • Developing Positive Personality Traits: Attitude: Factors that determine Attitude, Benefits of Positive Attitude and Consequences of negative attitude, steps to build positive attitude. • Personality habits: Meaning and concept of habits. • Developing effective Habits: Behaviour and Character. Being Proactive/Creative and Innovative Beginning with the end in mind Putting first things first with determination, discipline, clarity and concentration. Thinking Big and Winning Through: Action, Active, Facing Challenges, striving for	10

	success. Apologizing, Appreciating, Accepting feedback. Aiming high, enthusiasm, team building, setting goals, zeal and passion building. (Practical Examples of the above)	
UNIT 3	Pillars of personality development: • Introspection: Meaning and importance, Views about Introspection, Self Introspection Skills. • Self Assessment: Meaning, importance, types and self assessment for students. • Self Appraisal: Meaning, importance, tips for self appraisal. • Self Development: Meaning, process of self development, Self Development Techniques, Use of self Development, Individual Development Plan. • Self Introduction: Meaning, tips for effective self introduction, Self Acceptance, Awareness, Self Knowledge, belief, confidence, criticism and self examination. • Defining Success: Real or Imaginative, obstacles to success, factors and qualities that make person successful. • Concept of Failure: Reasons for failure. • Personal SWOT analysis & STAR analysis. (One or two caselets on the above topic)	15
Unit 4	Self Esteem: • Self Concept: Meaning, definition and development • Self Esteem: concept, significance of Self esteem, types (positive, negative), characteristics of people of high and low Self esteem, steps for enhancing positive Self esteem. • Sigmund Freud ID, EGO and SUPER EGO Concepts. • Ego Management, What ego mismanagement can do. • Managing Egoistic insults (One or two case lets on the above topic)	8

Unit 5	Personality Formation Structure: • Mind mapping. • Competency mapping. • Developing interpersonal and group skills. • Building positive relationships. • Strategies of gaining power and influence. • Enhancing personality through effective communication. • Intentional Communication. • Intentional Listening. • Effective Speech: Writing and delivering and successful negotiation. • Understanding body language, projecting positive body language. • Manners and etiquettes. • Proper dressing for varied occasions. (One or two case lets on the above topic)	10
	Total	48

Recommended Books:

1. Seven Habits Of Highly Effective People – Stephen Covey
2. You Can Win – Shiv Khera
3. Three Basic Managerial Skills For All – Hall Of India Pvt Ltd New Delhi
4. Hurlock Elizabeth B Personality Development Tata Mcgraw Hill New Delhi
5. Understanding Psychology: By Robert S Feldman. (Tata McGraw Hill Publishing)
6. Personality Development and Career management: By R.M.Onkar (S Chand Publications)
7. Social Psychology: By Robert S Feldman. (Tata McGraw Hill Publishing)
8. Mcgrath Eh Basics Management Skills For All Printish Hall Of India Pvt Ltd New Delhi
9. Wehtlel David A and Kin S Kemerron – Developing Managerial Skills – Pearson Education New Delhi.
10. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi.
11. Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep & Deep Publications Pvt. Ltd., New Delhi
12. Effective Business Communication – H.Murphy.

University of Pune
(Pattern – 2013) w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Business Ethics
(Course Code –302)

Objectives:

1. To impart knowledge of Business Ethics to the students.
2. To promote Ethical Practices in the Business.
3. To develop Ethical and Value Based thought process among the future manager's entrepreneurs.

Sr. No	Topics	Number of lectures
Unit 1.	Introduction to Ethics : • Meaning and Nature of Ethics. • Moral and Ethics. • Importance of Ethics. • Types of Ethics. • Causes of Unethical behavior.	08
Unit 2.	Area of Business Ethics : • Meaning , Nature and Importance of Business Ethics. • Types of Business Ethics. • Factors influencing business ethics. • Corporate Ethics – ethical behavior & audit of ethical behavior. • Individual ethics, Professional Ethics. • Gandhian Philosophy of ethical behaviour. • Social Audit.	10
Unit 3	Business Ethics in Global Economy : • Concept of Globalization. • Global Business Network. • Relationship among Business, Business Ethics and Business Development. • Developing Business ethics in Global Economy. • Marketing ethics in foreign trade. • Role of Business Ethics in a developing civilized society.	13

Unit 4	Moral Issues in Business : • Concept of Corporate Social Responsibility. • Relationship between C.S.R. and Business Ethics. • Justice & Economic system ethics relating to environment protection. • Business Ethics and Environment Protection. • Business Ethics and Consumer Protection. • Business Ethics and Social Justice. • Arguments for and against Corporate Social Responsibility.	10
Unit 5.	Functional Ethics: • Meaning of Functional Ethics. • Types of Ethics according to Functions of Business, (Marketing, HRM, Purchase, Selling & Distribution). • Patents ,Copy-rights, Intellectual Property Rights, Trade Marks and Business Ethics. • Ethical Challenges for managers in the 21st Century	07
	Total	48

Recommended Books:

1. Business Ethics - GautamPherwani
2. Business Ethics - RituPamraj
3. Business Ethics - Prof. Agalgatti
4. Business Ethics - Manuel G Velasquez
5. Business Ethics - O.C.Ferrell, John Paul Fraedrich,Lindaferrell

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM – III

Subject: Human Resource Management and Organizational Behavior
(Course Code - 303)

Objectives:

1. To introduce to the students the functional department of human resource management and acquaint them with planning, its different functions in an organization.
2. To introduce the human resource processes that are concerned with planning, motivating and developing suitable employees for the benefit of the organization.

Sr. No.	Topics	No. of Lectures
UNIT 1	Introduction to Human Resource Management: • Definition and concept of human resource / personnel management. • History of Human Resource Management. • Importance of human resource management. • Functions of human resource management. • Organization of HRM- ➤ Personnel department in Line organization. ➤ Personnel department in Functional Organization. ➤ Personnel department in Line and staff Organization. • Role of personnel manager ➤ Administrative Role ➤ Operational Role ➤ Strategic Role • Challenges before human resource management.	08
UNIT 2	Human Resources Planning: • Definition and objectives of Human Resource planning. • Process of Human Resource planning. • Factors influencing estimation of Human Resources. • Concept of Recruitment-Recruitment policy-Sources of Recruitment- Methods of Recruitment, Traditional Vs Modern Recruiting methods. • Concept of Selection , importance of selection and procedure, Standards for Selection Test. • Distinguish between Recruitment and Selection. • Case study on Human Resource Planning.	09

UNIT 3	Training and Development: • Meaning and Definition ➤ Needs-Objectives- ➤ Importance of Training- ➤ Training Methods ➤ Evaluation of Training Programme ➤ Methods of Evaluation. • Concept of Management Development ➤ Management Development Process and methods. ➤ Evaluation of Management Development Programme. • Distinguish between training and Development. • Case Study on Training Development.	09
UNIT 4	Performance Appraisal & Wage and Salary Administration: Part A : Performance Appraisal ➤ Concept and objectives of performance Appraisal. ➤ Process of Performance Appraisal. ➤ Performance Appraisal Methods. ➤ 360 degree Feedback System. ➤ Factors effecting for a sound Performance Appraisal policy. ➤ Problems with Performance Appraisal. ➤ Challenges in Performance Management. ➤ Case study on Performance Appraisal. Part B : Wage and Salary Administration ➤ Methods of Wage Payments. ➤ Employee Remuneration Factors. ➤ Determining the level of remuneration. ➤ Profit sharing-Fringe Benefits and Employee services-Wages & Salary Administration. ➤ Case study on Wage and Salary Administration.	14
UNIT 5	Introduction to Organizational Behaviour: • Meaning- Definition- Scope- Disciplines Contributing to Organizational Behaviour. • Emerging aspects of Organization Behaviour. • Challenges and Opportunities for Organization Behaviour. • Organization Behaviour across cultures. • Models and Approaches of Organizational Behaviour. • Organization Changes and Development. • Nature of Change – Levels of Change, Types of Change, Resistance to Change. • Cases of Organizational Behaviour.	8
	TOTAL	48

Recommended Books:

1. P. C. Pardeshi - Human Resource Management.
2. C. B. Mamoria - Personnel Management
3. K. Ashwathappa - Organisational Behaviour
4. K. Ashwathappa - Human Resource Management.
5. V.S. P. Rao- Human Resource Management. Texts and cases
6. L.M. Prasad- Human Resource Management

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Management Accounting
(Course Code - 304)

Objectives:

1. To impart basic knowledge of Management Accounting.
2. To know the implications of various financial ratios in decision making.
3. To study the significance of working capital in business.
4. To understand the concept of budgetary control and its application in business.
5. To develop the calculating ability of various techniques of management accounting.

Sr. No.	Topics	No. of Lectures
UNIT 1	Introduction: • Management Accounting – Definition, Objectives, Scope, Functions, Advantages, Limitations, Distinction between, Financial Accounting and Management Accounting, Distinction between Cost Accounting and Management Accounting. • Strategic Management Accounting.	10
UNIT 2	Analysis and Interpretation of Financial Statement: • Methods of Analysis, Comparative Statements, Common Size Statement, Trend Percentage or Trend Ratio (Horizontal Analysis), Ratios, Fund Flow Statement • Ratio Analysis: Meaning of Ratio, Necessity and Advantages of Ratio Analysis, Interpretation of Ratios. • Types of Ratio: i) Liquidity Ratios ii) Leverage Ratios iii) Activity Ratios iv) Profitability Ratios <i>(Problems on following ratios only :-</i> Gross Profit , Net Profit , Operating Expenses , Current Ratio, Quick Ratio, Stock Turnover	12

	Ratio, Debtors Turnover Ratio, Debt Equity Ratio, Return on Investment Ratio, Interest Coverage Ratio.)	
UNIT 3	Fund Flow Statement and Cash Flow Statement: Meaning of Fund Flow Statement, Working Capital, Causes of changes in working Capital, Proforma of Sources and Application of Funds, Proforma of Adjusted Profit and Loss Account , Proforma of Cash Flow Statement.	8
UNIT 4	Working Capital: Meaning, Objective and Importance, Factors determining requirement of Working Capital, Sources of Working Capital, Problems on computation of Working Capital.	10
UNIT 5	Budget and Budgetary Control Meaning , Definition, Nature of Budget and Budgetary Control, Types of Budget - as per time and Function, Objective of Budget and Budgetary Control, Limitations of Budget and Budgetary Control, Steps in Budgetary Control.	8
	TOTAL	48

(Problem Area: Ratio Analysis, Working Capital and Cash Budget.)

Recommended Books:

1. R. N. Anthony, G. A. Walsh:: Management Accounting
2. M. Y. Khan, K. P. Jain:: Management Accounting I. M. Pandey::Management Accounting (Vikas)
3. J. Betty: Management Accounting
4. Sr. K. Paul: Management Accounting
5. Dr. Jawaharlal:: Management Accounting
6. Man Mohan Goyal: Management Accounting
7. S. N. Maheshwari:: Principles of Management Accounting
8. R. K. Sharma and Shashi K. Gupta: Management Accounting
9. Richard M. Lynch and Robert Williamson: Accounting for Management Planning and Control
10. Horngren: Introduction to Management Accounting (Pearson)

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III

Subject: Business Economics (Macro)

(Course Code - 305)

Objectives:

1. To study the behavior of working of the economy as a whole.
2. To develop an analytical framework to understand the inter-linkages among the crucial macroeconomic variables.
3. To apply economic reasoning to problems of business and public policy.

Sr. No	Topics	Number of lectures
Unit 1	Introduction: • Definition and Nature of Macroeconomics. • Scope, Importance and Limitations.	6
Unit 2	National Income Accounting: • National Income Aggregates (GDP, GNP etc. at market price and factor cost). • Approaches to measuring national income. • Nominal and real measures of national income.	8
Unit 3	Theory of Income and Employment: • Say's Law of Markets. • Consumption Function. • Saving Function. • Investment Function. • Aggregate Expenditure Function. • Keynes' Theory of Income and Employment. • Concept of underemployment equilibrium.	12
Unit 4	Business Cycle, Inflation and Deflation: • Nature and characteristics of Business Cycle. • Phases of Business Cycle. • Inflation – Meaning, Types, Causes and control. • Concept of Deflation.	11
Unit 5	Macro Economic Policies: • Creation of Credit • Monetary Policy, Fiscal Policy. • Supply side Economics – An introduction.	11
	Total	48

Recommended Books:

- 1) Ackley G. – Macro Economics: Theory and Policy, Macmillan Publishing Company, NewYork. 1978
- 2) Ahuja H.L. – Macro Economics: Theory and Policy, S. Chand & Co. Ltd. New Delhi.2006
- 3) Gupta S.B. – Monetary Economics, S. Chand & Co. Ltd. New Delhi.2002
- 4) Shapiro E. – Macro Economic Analysis, Galgotia Publications, New Delhi. 1996 5th Ed.
- 5) Jhingan M. L. – Macro Economic Theory: Vrinda Publications, New Delhi. 2006
- 6) William Branson – Macro Economics: Theory and Policy.1988 2nd Edn.
- 7) J. Harvey and H. Johnson – Introduction to Macro Economics
- 8) D. N. Dwivedi – Macro Economics – Tata McGraw Hill, New Delhi-2006

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A. SEM – III BBA

Subject: IT in Management
(Course Code - 306)

Objectives:

1. To understand the role of IT in Management.
2. To understand the basics of operating systems.
3. To know the current happenings.

Chapter No.	Topic Name	No. Of Lectures
Unit 1	Managing Hardware and Software Assets: • Computer Hardware and Information Technology Infrastructure. • Categories of Computers and Computer System. • Types of Software's. • Managing Hardware and Software Assets.	8
Unit 2	Managing Data Resources: • Organizing Data in a Traditional File Environment. • The Database Approach to Data Management. • Creating a Database Environment. • Database Trends.	6
Unit 3	Networking: • Concept, Basic elements of a Communication System, Data transmission media, Topologies, LAN, MAN, WAN, Internet. Current Trends in IT management: • Use of Social Networks in Business. • Use of ICT enabled application in Business. (design a case study to understand the requirement of IT infrastructure in management of business)	12
Unit 4	The Internet and The New Information Technology Infrastructure : • The IT infrastructure for the Digital Firm. • The Internet : The IT infrastructure for the Digital Firm. • The World Wide Web. • Management Issues and Decisions.	12

Unit 5	Understanding the Business values of System and Managing Change: - Understanding the Business Values of Information System. - The Importance of Change Management in Information System Success and Failure. - Managing Implementations.	10
	Total	48

Books Recommended:-

- 1) Computer Fundamentals by P.K. Sinha & Priti Sinha, 3rd edition, BPB pub.
- 2) Computers Today by S. Basandra Galgotia Pub.
- 3) Microsoft Office 2000 by Vipra Computers, Vipra Printers Pvt. Ltd.
- 4) Advanced Microsoft Office 2000 by Meredith Flynn, Nita Rutkosky, BPB Pub
- 5) using Microsoft office 2007 by Ed Bott, Woody Leonhard, Pearson publication
- 6) using Microsoft office 2010 by, Pearson publication
- 7) Managing Information System – W.S. Jawadekar
- 8) Managing Information System – Kenneth C. Laudon & Jane P. Laudon
- 9) Information Technology – Williams / Tata McGraw H
- 10) Management Information System : Kenneth C. Laudon, Jane P Laudon

University of Pune
(Pattern – 2013) w.e.f. 2014-2015
B.B.A. SEM – IV

Subject: Production & Operations Management
(Course Code - 401)

Objectives:

1. To provide goods and services at the right time, at the right place at the right manufacturing cost of the right quality.
2. To understand manufacturing technology and its role in developing business strategy.
3. To identify the role of operation function.
4. To understand the external and internal effects of five operation performance objectives

Sr. No	Topics	Number of Lectures
UNIT 1	Introduction: • Meaning, Nature and Scope of Production Management, Historical Development of Production Management, Objectives of Production Management, Functions of Production Management, Qualities of Production Manager, Responsibilities of Production Manager • Plant Location: Importance and Factors responsible for Plant Location Decision • Classification or Types of Production System: Job Shop Production, Batch Intermittent Production, Continuous Production and Cellular Production • Plant Layout: Definition, Objectives and Types, Factors influencing Plant Layout	10
UNIT 2	Product Design and Product Development: • Definition of Product Design, Factors affecting Product Design, Product Policy of an Organisation. • Product Development: Meaning of Product Development, Relationship between research, development and design, Stages of Product Development, Techniques or Tools of Product Development, Factors responsible for Product Development.	8
UNIT 3	Production Planning and Control: • Meaning, Nature, Objectives, Functions, Importance and	6

	Problems of Production Planning and Control. • Production Procedure, Factors determining Production Planning and Control, Techniques or Tools of Production Planning and Control.	
UNIT 4	Productivity and Ergonomics: • Productivity: Concept and Definition of Productivity, Importance of Productivity, Measurement of Productivity and Productivity Measurement Models, Techniques of Productivity Improvement, Factors influencing Productivity. • Ergonomics: Introduction and Definition of Ergonomics, Objectives of Ergonomics, Components of Ergonomics.	8
Unit 5	Quality Management: • Six Sigma: Introduction & Meaning, Benefits, Steps in implementing Six Sigma. • Kaizen: Introduction & Meaning, Principles, Procedure for Implementation, Benefits and Reasons for failure. • Just-In-Time (JIT): Introduction & Meaning, Objectives, Benefits, Methodology in implementation of JIT, Basic Elements of JIT, Enabling JIT to Occur. • Quality Circle (QC): Introduction & Meaning, Objectives, Benefits, Limitations, Organisation for Quality Circles, Causes of Quality Circle Failure. • Total Quality Management (TQM): Introduction & Definition, Major Ingredients in TQM, Principles of TQM, Need & Importance of TQM, Limitations of TQM, Dimensions or Characteristics of TQM, TQM Models, Key Issues for achieving TQM Objectives. • ISO 9000: Introduction & Meaning, ISO Standards for Quality System, Factors for selecting an ISO Model, Clauses in ISO, Essential Steps in implementing an ISO.	16
	Total	48

Recommended Books:

1. Production and operations management -K.Aswathappa K. ShridharaBhat
2. Production and operations management -L.C.Jhamb
3. Plant Layout and Material Handling - James Apple & John Wileysons
4. Production & Operations Management - R S Goel
5. A Key to Production Management - KalyaniPublicaion, Ludhiyana
6. Production & Operation Management - S N Chavy, TMH Delhi
7. Modern Production and Operation Management - Elwood S Butta
8. Production and operations management - Ajay Garg

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

B.B.A.SEM-IV
Subject :Industrial Relations and Labour Law
(Course Code - 402)

Objectives:

1. To impart the students with the knowledge about complexities between labour and management relationships.
2. To make the students aware about mechanisms of Industrial Dispute and friendly interventions to deal with employee-employer problems.
3. To impart the students with the knowledge of laws & how law affects the industry & labour.

Sr. No	Topics	No of Lectures
Unit 1	Introduction to Industrial Relations: • Meaning, definition, importance, scope of Industrial Relations and factors in Industrial Relations • Approaches towards the study of Industrial Relations (Psychological Approach , Sociological Approach, Socio Ethical Approach, Gandhian Approach, Industrial Relations Approach and HR Approach) • Evolution of Industrial Relations • Trade Unions: concept, functions, TU Movement in India	04
Unit 2	Industrial Disputes, Collective Bargaining & Workers Participation in Management: • Meaning, definition & Causes of Industrial Disputes • Model Grievance Procedure • Types of Conflict Resolution: Negotiation, Investigation, Mediation, Conciliation, arbitration & Adjudication.	12

	Works Committee, Conciliation Officer, Board of Conciliation, Court of Enquiry, Labour Court, Industrial Tribunal & National Tribunal. • Collective Bargaining – Meaning, Characteristics, Importance, Process, Pre-requisites and Types. • Employee Engagement: Concept, Importance & Employee Engagement in India. • Workers Participation in Management(WPM): Meaning, Pre-Requisites, Advantages & Disadvantages, Levels and Types Labor Laws.	
Unit 3	The Industrial Disputes Act,1946 & The Factories ACT 1948: The Industrial Disputes Act,1946 - • Definitions, Authorities under the Act, Power & Duties of Authorities, Strike & lockout, Lay-off ,retrenchment, closure and dismissal, Grievance Redressal Machinery, Penalties The Factories Act, 1948 - • Definitions, Authorities, Provisions regarding Safety, Provisions regarding Health, Provisions regarding Welfare, Provisions regarding Leave with Wages, Provisions regarding Working hours of adults, Penalties.	12
Unit 4	The Payment of Wages Act, 1936 & The Minimum Wages Act ,1948: The Payment of Wages Act, 1936 - • Definitions, Provisions, Penalties. The Minimum Wages Act ,1948 - • Definitions, Provisions, Penalties.	10
Unit 5	Trade Union Laws: • The Trade Union Act 1926: Definitions, authorities and all provisions. • Maharashtra Recognition of Trade Union and Prevention of	10

	Unfair Labour practices Act, 1971: Definition, authorities and all provisions under the Act.	
	Total Lectures	48

Recommended Books :

1. Dynamics of IR – Mamoria, Mamoria and Gankar
2. Industrial Relations -Arun Monappa
3. Personnel and HRM- P Subbarao
4. Industrial & Labour Laws -S.P.Jain
5. Industrial Law - P.L. Malik
6. Bare Acts.

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM-IV

Subject: Business Taxation
(Course Code - 403)

Objectives:

1. To understand the basic concepts and definitions under the Income Tax Act, 1961.
2. To update the students with latest development in the subject of taxation.
3. To Acquire knowledge about Computation of Income under different heads of Income of Income Tax Act, 1961.
4. To acquire knowledge about the submission of Income Tax Return, Advance Tax, Tax deducted at Source, Tax Collection Authorities.
5. To prepare students Competent enough to take up to employment in Tax planner.
6. To develop ability to calculate taxable income of firms, co-operative societies and charitable trust.

Sr.No	Topics	Number of Lectures
Unit 1	Income Tax Act -1961(Meaning,Concepts and Definitions) • History of Income Tax in India, • Fundamental concepts and definitions under Income Tax Act 1961, • canons of Taxation, • objective of Income Tax, • Taxation structure in India, • Concept and definitions- Income Person,Assessee, Assessment year, Previous year, Residential Status of an Assessee.	12
Unit 2	Computation of Taxable Income under the different heads of Income: a) Income From Salary : Salient features, meaning of salary, allowances and tax Liability- Perquisites and their Valuation- Deduction from salary. (Theory and Problems)	12

	b) Income from House Property : Basis of Chargeability-Annual Value- Self occupied and let out property- Deductions allowed. (Theory and Problems). c) Profits and Gains of Business and Profession : Definitions, Deductions expressly allowed and disallowed (Theory and Problems). Chargeability- Meaning and concept of Short term and long term capital gains-permissible deductions (Theory and problems). d) Income from Other Sources Chargeability- Meaning and concept –Inclusion and deduction.(Theory only).	
Unit 3	Computation of Total Taxable Income of an Individual: Meaning and concept, Gross Total Income - deduction u/s-80 and Tax Liability for respective Assessment year.	12
Unit 4	Miscellaneous: Tax deducted at source, Return of Income, Advance payment of Tax, methods of payment of Tax, forms of Returns, Refund of Tax. (Theory only)	06
Unit 5	Assessment of various Entities: (TheoryOnly) - Assessment of firms and their partners. - Assessment of co-operative societies. - Assessment of charitable trust.	06
	Total	48

Notes:

1. Amendments made prior to commencement of Academic Year in the above act should be considered.
2. Theory questions will carry 50% marks.
3. Problems will carry 50 % marks.

Recommended books:

1. Indian Income Tax Act--H.C.Malhotra
2. Practical Approach to Income Tax-- Dr.GirishAhujaandDr. Ravi Gupta.
3. Income Tax Act –R. N. Lakhotia
4. Students guide to Income Tax.--Dr.VinodSinghnia./ Dr. Monica Singhnia.
5. Income Tax.--Dr.GirishAhuja and Dr.RaviGupta , -Bharat Prakashan.
6. Indian Income Tax Act.--Dr.VinodSinghnia.
7. Hand Book of Income Tax Law.-- T. N. Manoharam.
8. Direct Tax—B.B. Lal and N. Vashisht.

University of Pune
(Pattern-2013) w.e.f 2014-2015

B. B. A. SEM – IV

Subject: International Business
(Course Code - 404)

Objectives:

1. To acquaint the students with emerging issues in international business.
2. To study the impact of international business environment on foreign market operations.
3. To understand the importance of foreign trade for Indian economy.

Sr. No.	Topics	Number of lectures
Unit 1	Introduction: • Nature. • Theories of International Trade • Ricardo's Theory • Heckscher- Ohlin Theory.	10
Unit 2	Multinational Enterprises: • Meaning of International Corporations. • Role and importance of Multi-national Corporations in international business.	6
Unit 3	International Finance: • Meaning of Exchange Rate. • Determination of Exchange rate – Fixed, Flexible and Managed. • Concept of Spot rate, Forward rate and Futures • Balance of Trade and Balance of Payments • International Monetary Fund (IMF) – Objectives and Functions. • World Bank - Objectives and Functions	14
Unit 4	Regional Economic Grouping: • Evolution, structure and functions of WTO • European Union (EU) • North American Free Trade Agreement (NAFTA) • Association of South East Asian Nations (ASEAN) • South Asian Association for Regional Cooperation (SAARC)	8

Unit 5	India's Foreign Trade: - Composition and Direction of India's Foreign Trade since 2000 - Case studies in International Business with reference to Indian Economy on - a. International Marketing b. International Finance c. International Human Resource Management	10
	Total	48

Recommended Books:

1. International Economics – Miltiades Chacholiades, Mc-Graw Hill Publishing Co, New York. 1990.
2. International Economics – W. Charles Sawyer and Richard L. Sprinkle, Prentice Hall of India Pvt. Ltd. Delhi. 2003
3. International Economics – M. L. Jhingan, Vrinda Publications, Delhi.2006.
4. International Business – Competing in the Global Market Place – Charles Hill, ArunKumarJain, Tata McGraw Hill, New Delhi. 2008.
5. International Economics -Francis Cherunilam.
6. International Business - K Aswathappa,TataMcGraw Hill

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM – IV

Subject: Management Information System
(Course Code - 405)

Objectives:

1. To understand the concepts of Information System
2. To study the concepts of system analysis and design
3. To understand the issues in MIS

Sr. No	Topics	No. of Lectures
Unit 1	Management Information Systems: • Need, Purpose and Objectives, Contemporary Approaches to Management Information Systems (MIS), Information as a strategic Resource, Use of information for competitive Advantage, Management Information Systems as an instrument for the organizational change .	10
Unit 2	Information, Management and Decision Making: • Models of Decision Making, Classical, Administrative and Herbert Simon's Models Attributes of information and its relevance to Decision Making, Types of information.	10
Unit 3	Systems Analysis and Design: • Systems Development Life Cycle, Alternative System Building Approaches, Prototyping model Spiral model, Rapid Development Tools, CASE Tools.	10
Unit 4	Decision Support Systems: • Group Decision Support Systems, Executive Information Systems, Executive Support Systems, Expert Systems and Knowledge Based Expert Systems, Artificial Intelligence.	09
Unit 5	Management Issues in MIS: • Information Security and Control, Quality Assurance, Ethical and Social Dimensions, Intellectual Property Rights as related to IT Services /IT Products Managing Global Information Systems.	09
	Total	48

Reference Books:-

1. Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems, Jawadekar, Tata McGraw Hill.
3. Management Information Systems, Davis and Olson, Tata McGraw Hill.
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall.
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia.
6. Management Information Systems, Schulthesis, Tata McGraw Hill.
7. Management Information Systems - Sadagopan, Prentice Hall.
8. Management Information Systems - Jayant Oke.

University of Pune
(Pattern – 2013)w.e.f. 2014-2015

BBA SEM - IV

Subject: Business Exposure
(Course Code - 406)

Objectives:

1. To develop the understanding of the student with a realistic and practical perception of the industry its layout, procedures, processes, organization structure
2. The objective of the Industrial Visit is to help students gain firsthand information regarding the functioning of the Industry which presents the students with opportunities to plan, organize and engage in active learning experiences both inside and outside the classroom

Guidelines for subject teachers for preparing students for the visit:

The preparation should be such so as to guide students towards recognizing the important elements in an industrial visit and provide support materials necessary to increase the effectiveness of this experience

1. Draw up a questionnaire so that a student may ask during the actual visit:

Questionnaire for the process:

- Devising the questionnaire:
- Class brainstorming
- Dividing the class into groups
- Assign a section of the process to each group
- Each group draws up a set of questions
- Compile final questionnaire
- Issue final questionnaire

Content of the questionnaire:

- Considerations of the location of the industry
- Explore the processes running in organization
- Investigate policies and Procedures
- Explore the compliance of policies and Procedures
- Analyze the economics of the process
- Investigate the health and safety considerations
- Investigate the skills and expertise of the workforce

- Investigate the career opportunities
- Investigate the environmental considerations
- Examine the quality control in the process

2. Assign roles to particular students

3. Appropriate clothing for the day

The Outcome of the visit should enable the students to:

1. Understand the industry process
2. Experience actual chemistry and human interactions at the industry
3. Become aware of the roles of different people the organization
4. Become aware of career opportunities
5. Recognize the need for health and safety in the workplace
6. Focus students on specific aspects of their studies

Ancillary investigations by students

1. Health and safety aspects
2. Environmental aspects
3. Waste management aspects
4. Career identification and planning

Post-visit activities by students

1. Write a full report on visit
2. Prepare presentations on ancillary investigations
3. Thank to the company in writing

Report by students

1. Aims and objectives
2. Report on the industrial process
3. Conclusion and recommendations

Evaluation by the teacher

1. What have the students got out of the visit?
2. Deficiencies of the visit
3. How could the visit be improved in next time?

Assessment:

The division of marks will be as under:

- a. Scrutiny of reports by the teacher: 50 Marks.
- b. Viva based on field visits: 50 Marks.

Each student shall visit four industries

Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Theory and Practical Subjects for Semester III, IV

Theory Subject for Semester -III :

1. 301 - Personality Development
2. 302 - Business Ethics
3. 303 - Human Resource Management and Organization Behaviour
4. 305 - Business Economics
5. 306 - IT in Management

Theory Subject for Semester – IV :

1. 401 - Production and Operations Management
2. 402 - Industrial Relations and Labor Law
3. 404 - International business
4. 405 - Management Information System

Practical Subject for Semester – III :

1. 304 - Management Accounting

Practical Subject for Semester – IV :

1. 403 - Business Taxation

Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Theory Papers w.e.f.2014-2015

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1) Theory Question(15 marks)

OR

Theory Question

Q.2) Theory Question (15 marks)

OR

Theory Question

Q.3) Theory Question (15 marks)

OR

Theory Question

Q.4) Theory Question (15 marks)

OR

Theory Question

Q.5) Write Short Note (any 4 out of 6) (20 marks)

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Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Practical Paper w.e.f.2014-2015

Subject : Management Accounting (304)

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Q.1) Theory Question (16 marks)

OR

Theory Question

Q.2) Practical Problem(16 marks)

OR

Theory Question

Q.3) Practical Problem (16 marks)

OR

Theory Question

Q.4) Practical Problem (Compulsory) (16 marks)

Q.5) Write Short Note (any 4 out of 6) (16 marks)

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Second Year Bachelor of Business Administration (S.Y.B.B.A.)

Pattern of Question Paper of Practical Paper w.e.f.2014-2015

Subject : Business Taxation (403)

Time : 3 Hours

Total Marks 80

Instructions :

1. All questions are compulsory.
2. Figures to the right indicate full marks.

Total Marks 80

Q.1) Theory Question (16 marks)

OR

Theory Question

Q.2) Theory Question (16 marks)

OR

Theory Question

Q.3) A) Short Notes (any 2 out of 4) (08 marks)

B) Practical Problem (08 marks)

Q.4) Practical Problem (12 marks)

OR

Practical Problem

Q.5) Practical Problem (Compulsory) (20 marks)

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Revised Syllabi for Three - Year Integrated B.Com. Degree course (From June 2013)

1) INTRODUCTION

The revised syllabi for B.Com Degree Course will be introduced in the following order.

i)	First Year B.Com.	2013-2014
ii)	Second Year B.Com.	2014-2015
iii)	Third Year B.Com.	2015-2016

The B.Com. Degree Course (Revised Structure) will consist of three Years. The first year annual examination will be held at the end of the first year. The Second Year annual examination will be held at the end of the second year. The Third annual examination shall be held at the end of the third year.

2) ELIGIBILITY

1. No Candidates shall be admitted to enter the First Year of the B.Com. Degree Course (Revised Structure) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Board or equivalent or University with English as a passing subject.
2. No candidate shall be admitted to the annual examination of the First year B.Com. (Revised Structure) unless he/ she has satisfactorily kept two terms for the course at the college at the college affiliated to this University.
3. No candidate shall be admitted to the annual examination of the Second Year unless he/she has kept two terms satisfactorily for the course at the college affiliated to this University.
4. No candidate shall be admitted to the Third year of the B.Com. Degree Course (Revised Structure) unless he/she has passed in all the papers at the First Year B.Com. Examination and has passed in all the papers at the first Year B.Com. Examination and has satisfactorily kept terms for the second year and also two terms for the third year of B.Com. satisfactorily in a college affiliated to this University.

3) A.T.K.T. Rules :

As far as A.T.K.T. is concerned, a student who fails in two theories and one practical head of passing at F.Y.B.Com may be admitted to S.Y.B.Com. likewise a student who fails in the two theory and one practical head of passing at S.Y.B.Com may be admitted to T.Y.B.Com. But a student passing S.Y.B.Com but fails in any subject at F.Y.B.Com cannot be admitted to T.Y.B.Com.

4) (A) Revised Structure of B.Com. Course.

F.Y.B.Com. w.e.f. 2013-14	
Sr. No.	Compulsory / Main Subjects
101	Compulsory English
102	Financial Accounting
103	Business Economics (Micro)
104 (A)	Business Mathematics and Statistics
	or
104 (B)	Computer Concepts and Applications
105	Optional Group (Any one of the following) a) Organizational Skill Development. b) Banking & Finance c) Commercial Geography d) Defense Organization and Management in India e) Co-Operation. f) Managerial Economics
106	Optional Group (Any one of the following) a) Essentials of E-Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection & Business Ethics. e) Business Environment & Entrepreneurship f) Foundation Course in Commerce
107	(Any one of the language from the following groups) Modern Indian Languages (M.I.L.) -: Compulsory English / Marathi / Hindi / Gujarathi / Sindhi / Urdu / Persian. Modern European Languages (M.E.L.) -: French / German. Ancient Indian Languages (A.I.L.) -: Sanskrit. Arabic.

S.Y.B.Com. w.e.f. 2014-15	
Sr. No.	Compulsory / Main Subjects
201	Business Communication.
202	Corporate Accounting.
203	Business Economics (Macro)
204	Business Management
205	Elements of Company Law
206	Special Subject – Paper I (Any one of the following) a) Business Administration b) Banking & Finance. c) Business Laws & Practices.

	d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

T.Y. B.Com. w.e.f. 2015-16	
Sr. No.	Compulsory / Main Subjects
301	Business Regulatory Framework (Mercantile Law)
302	Advanced Accounting.
303 (A)	Indian & Global Economic Development
	Or
303 (B)	International Economics
304	Auditing & Taxation
305	Special Subject – Paper II (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.
306	Special Subject – Paper III (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

B) Subjects Carrying Practical's

There will be practical examination for the F.Y.B.Com. for the subject Financial Accounting. There will be practical and practical examinations for the special subjects at S.Y.B.Com. and T.Y.B.Com. levels. There will be Practical for the S.Y.B.Com level Compulsory subject Business Communication & for T.Y.B.Com Auditing & Taxation.

(C) A Student must offer the same Special Subject at T.Y.B.Com. which he has offered at S.Y.B.Com.

(D) In an exceptional cases, a student may change the subject chosen by him at second year during the first term of the third year provided he keeps the additional terms of the new subject at S.Y.B.Com.

4. EXTERNAL CANDIDATES

- 1) The student who has registered his name as the external student will appear at the annual examination.
- 2) The result of external student will be declared on the basis of Annual Examination of 80 marks for practical subjects by converting the same out of 100.
- 3) No foreign student shall be allowed to register as an External Student.

5. MEDIUM OF INSTRUCTION.

Medium of instruction for B.Com. degree course shall be either Marathi or English except languages.

The Medium of instructions for Business Communication (S.Y.B.Com) shall be English only.

6. WORKLOAD

The present norms of workload of lectures, tutorials and practicals per subject in respect of B.Com. Course shall continue.

7. UNIVERSITY TERMS

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. The terms can be kept only by duly admitted students. The present relevant ordinances pertaining to grant of terms will be applicable.

8. VERIFICATION AND REVALUATION

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. EQUIVALENCE AND TRANSITORY PROVISION

The University will conduct examination of old course for next three academic years from the date of implementation of new course.

The candidate of old course will be given three chances to clear his subjects as per the old course and thereafter he will have to appear for the subjects under new course as per the equivalence given to old course.

10. RESTRUCTURING OF COURSES

This new revised structure shall be made applicable to the colleges implementing 'Restructured Programme' at the undergraduate level from June, 2004. The existing pattern of 'C', 'D', and 'E' Components shall be continued.

The Colleges under the Restructured Programme which has revised their structure in the light of the "2008 Pattern" shall be introduced with effect from academic year 2010-11.

11. SETTING OF QUESTION PAPERS

1. A candidate shall have the option of answering the question in any of the subjects either in Marathi or English except in languages.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have combination of long and short answer type question. As far as possible short answer type questions should not exceed 15 to 20 percent.
5. There shall be no overall option in the question paper, instead, there shall be internal options (such as either/ or and three short answers out of five etc.).
6. In case of question paper under the Special Subject (Paper No. III) one question carrying 10 marks will be set on current knowledge in relating subject in the academic year.

S.Y. B.Com.
Compulsory Paper
Subject Name -: Business Communication.
Course Code -: 201.

Objectives of the Course:

1. To understand the concept, process and importance of communication.
2. To develop awareness regarding new trends in business communication.
3. To provide knowledge of various media of communication.
4. To develop business communication skills through the application and exercises.

Medium of Instruction : English

Unit No.	TERM: I	Periods
1	Introduction of Business Communication: Introduction, Meaning, Definition, Features, Process of Communication, Principles, Importance, Barriers to Communication & Remedies.	12
2	Methods and Channels of Communication: Methods of Communication-Merits and Demerits&Channels of Communication in the Organisation and their Types, Merits & Demerits	10
3	Soft Skills: Meaning, Definition, Importance of Soft Skills Elements of Soft Skills: 1) Grooming Manners and Etiquettes 2) Effective Speaking 3) Interview Skills 4) Listening 5) Group Discussion 6) Oral Presentation	16
4	Business Letters: Meaning, Importance, Qualities or Essentials, Physical Appearance, and Layout of Business Letter	10
	Total Periods	48
	TERM: II	
5	Types and Drafting of Business Letters: 1) Enquiry Letters 2) Replies to Enquiry Letters 3) Order Letters 4) Credit and Status Enquiries 5) Sales Letters 6) Complaint Letters 7) Collection Letters 8) Circular Letters	16
6	Job Application Letters: Meaning, Types & Drafting of Job Application Letters, Bio-Data/Resume	08

	/Curriculum Vitae	
7	Internal and other Correspondence: 1) Office Memo (Memorandums) 2) Office Orders 3) Office Circulars 4) Form Memos or Letters 5) Press Releases	12
8	New Technologies in Business Communication: Internet: Email, Websites, Electronic Clearance System, Writing a Blog Social Media Network: Twitter, Facebook, LinkedIn, YouTube, Cellular Phone, WhatsApp Voice Mail Short Messaging Services Video Conferencing Mobile	12
	Total Periods	48

Recommended Books:

1. Asha Kaul (1999), "Business Communication", Prentice Hall of India, New Delhi.
2. Chaturvedi P. D. & Chaturvedi Mukesh (2012), "Managerial Communication", Pearson, Delhi.
3. Madhukar R. K. (2005), "Business Communication", Vikas Publishing House Pvt. Ltd., New Delhi.
4. Mamoria C. B. & Gankar S. V. (2008), "Personnel Management", Himalaya Publishing House, Mumbai.
5. Nawal Mallika (2012), "Business Communication", Cengage Learning, Delhi.
6. Rajendra Pal & Korlahalli (2007), "Essentials of Business Communication", Sultan Chand & Sons, New Delhi.
7. Sharma R. C. & Krishan Mohan, "Business Correspondence & Report Writing", Tata McGraw Hill Publishing Co. Ltd.
8. Sinha K. K. (2003), "Business Communication", Galgotia Publishing Company, New Delhi.
9. Sinha K. K. (2008), "Business Communication", Galgotia Publishing Company, New Delhi.
10. Vasishth Neeru & Rajput Namita (2006), "Business Communication", Kitab Mahal, Allahabad.

Assessment Pattern

Internal Assessment (Term End Examination)	:	20 Marks
Practical Examination	:	20 Marks
Annual Examination	:	<u>60 Marks</u>
Total Marks	:	<u>100 Marks</u>

Question Paper Pattern

Term End Examination

Q. 1: Answers in 20 Words: (Attempt any Seven) (Total 10 Questions)	:	14 Marks
Q. 2: Answer in 50 Words: (Attempt any Two) (Total 4 Questions)	:	08 Marks
Q. 3: Answer in 100 Words (Attempt any Three) (Total 5 Questions)	:	18 Marks
Q. 4: Answer in 500 Words (Attempt any One) (Total 2 Questions)	:	20 Marks

Annual Examination:

Q. 1: Term I Syllabus OR Q. 1: Term I Syllabus	:	16 Marks
Q. 2: Term I Syllabus OR Q. 2: Term I Syllabus	:	16 Marks
Q. 3: A: Term I Syllabus OR Q. 3: A: Term I Syllabus	:	08 Marks
Q. 3: B: Term II Syllabus OR Q. 3: B: Term II Syllabus	:	08 Marks
Q. 4: Term II Syllabus OR Q. 4: Term II Syllabus	:	16 Marks
Q. 5: Short Notes (Attempt any Four) (Total 6 Short Notes on Term II Syllabus)	:	16 Marks

Guidelines for completion of Practicals:

- 1) At least Four Practicals should be completed during the academic year by students in consultation with subject teacher.
- 2) Practical should be based on visit as well as library assignments.
- 3) A subject teacher has special privileges to make the allotment of practical topics.
- 4) Students should discuss with the subject teacher at the time of selection of practical topics.
- 5) If a student fails to complete minimum number of practicals, then the student shall not be eligible for appearing at the practical examination.

List of suggested Topics for Practicals:

Sr. No.	Topics
1	Analysis of Case Studies on Business Communication
2	Analysis of Posters/Pictures (Non-Verbal)
3	Barriers to Communication through Case Studies
4	Barriers to Listening through attending seminars/conferences/public meetings.
5	Drafting of Unsolicited/Solicited Job Application Letter with Bio-Data/Resume/CV
6	Collection & Drafting of various Business Letters
7	Group Discussions
8	Class Room Presentations on various Topics
9	Interview Skills
10	Use of Technology in Communication
11	Drafting of Memos
12	Drafting of Press Releases/Notes
13	Drafting of Office Orders
14	Drafting of Office Circulars
15	Any other topics to be suggested by the Subject Teachers

S.Y. B.Com.
Compulsory Paper
Subject Name :- Corporate Accounting
Course Code :- 202

Objectives:-

To enable the students to develop awareness about Corporate Accounting in conformity with the provisions of Companies Act and Accounting as per Indian Accounting Standards.

1. To make aware the students about the conceptual aspect of corporate accounting
2. To enable the students to develop skills for Computerized Accounting
3. To enable the students to develop skills about accounting standards

Term – I

Unit	Topic and Contents	No. of Lectures
1.	Accounting Standards:- Detailed Study of Accounting Standards 5, 6, 10, 14, 21 with Practical Examples numerical case studies, Application nature.	08
2.	Company Final Accounts:- Preparation of Final Accounts- Forms and contents as per Provisions of Companies Act (As Amendment upto the beginning of the relevant academic year) As per Revised Schedule- VI	14
3.	Company Liquidation Accounts:- Meaning of Liquidation- Modes of winding up – (a) Preparation of Liquidator final statement of Account (b) Preparation of Statement of Affairs and Deficiency Account.	12
4.	Computerized Accounting Practices:- Conceptual background - (a) Inventory Accounting (b) Payroll Accounting (c) MIS Reports including Demonstration and Hands Experience.	14
Total		48

Term – II

Unit	Topic and Contents	No. of Lectures
5.	Accounting for Amalgamation, Absorption and External Reconstruction of Companies:- Meaning- Vendor and Purchasing Companies- Purchase Consideration- Accounting entries- and Preparation of Balance Sheet after Amalgamation, Absorption and External Reconstruction.	14
6.	Accounting for Internal Reconstruction:- Meaning- Alteration of Share Capital, Reduction of Share Capital-Accounting Entries and preparation of Balance Sheet After Internal Reconstruction	10
7.	Holding Company Account:-	14

	Preparation of consolidated Balance sheet of Holding Company with one subsidiary only. Adjustment of inter company transactions, unrealized profit of stock.	
8.	Valuations of Shares:- Concept of Valuation, Need for Valuation, Special Factors affecting Valuation of Shares, Methods of Valuation - (a) Net Assets Method, (b) Yield Basis Method, (c) Fair Value Method.	10
	Total	48

Notes:-

- Question Paper for Termend and Annual Examination should consist of :
Theory Questions : - 30%
Problems :- 70%
- In the Question Paper of Annual Examination, the weightage to the syllabus should be as follows:
 - 40% on the total syllabus of the First Term.
 - 60% on the total syllabus of the Second Term.
- Colleges are required to use only licensed copy of software.

Recommended Books:-

- Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd.)
- Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers)
- Advanced Accountancy: By R.L.Gupta & M. Radhaswamy (Sultan Chand & Sons)
- Company Accounts: By S.P. Jain & K.L. Narang
- Advanced Accounts: By Paul Sr.
- Corporate Accounting: By Dr. S. N. Maheshwari & S.K. Maheshwari
- Corporate Accounting: By Mukharji & Hanif
- Corporate Accounting: By Dr. K. N. Jagtap, Dr. S. D. Zagade, Dr. H. M. Jare
- Accounting Standard: By D. S. Rawat.
- Accounting Standards –as issued by Institute of Chartered Accountants of India.

Journals:-

- The Chartered Accountant : Journal of the Institute of Chartered Accountants of India.
- The Accounting World : ICFAI Hyderabad
- Journal of Accounting & Finance : Accounting Research Association of Jaipur.

S.Y. B.Com.
Compulsory Paper
Subject Name -: Business Economics (Macro)
Course Code -: 203

Objectives:

1. The objective of the course is to familiarize the students the basic concept of Macro Economics and application.
2. To Study the behavior of the economy as a whole.
3. To Study the relationship among broad aggregates.
4. To apply economic reasoning to problems of the economy.

Term – I		
Sr. No	Topic	No. of Lectures
UNIT- 1	<u>Basic Concepts of macro Economics</u> 1.1 Meaning of Macro Economics 1.2 Nature and Scope of Macro Economics 1.3 Significance and limitations of Macro Economics 1.4 Difference between Micro and Macro Economics	08
UNIT- 2	<u>National Income</u> 2.1 Meaning & Importance of National Income 2.2 Concept - a) Gross National Product (GNP) b) Net National Product (NNP) c) Income at Factor cost or National Income at Factor Prices d) Per Capita Income e) Personal Income (PI) f) Disposable Income(DI) 2.3 Measurement of National Income – Circular Flow of Income-Two sector model 2.4 Difficulties in Measurement of National Income	14
UNIT- 3	<u>Money</u> 3.1 Meaning and functions of Money 3.2 Demand for Money – Classical and Keynesian Approach 3.3 Supply of Money a) Role of Central Bank – Credit Control- Quantitative and Qualitative b) Reserve Bank of India's New Money Measures 3.4 Role of Commercial Banks – Process of Multiple Credit Creation and its limitations	12
UNIT- 4	<u>Value of Money</u> 4.1 Meaning & Concept of Value of Money 4.2 Quantity Theory of Money 4.3 Cash Balance approach – Cambridge Equation - Pigou, Marshall, Keynes 4.4 Milton Friedman's Approach 4.5 Difference between Quantity Theory and Cash Balance Approach	14

	Theory	
	Term - II	
UNIT- 5	<u>Inflation and Deflation</u> 5.1 Inflation and Deflation – Meaning, Causes and effects 5.2 Demand Pull and cost Push inflation 5.3 Inflationary Gap 5.4 Philips Curve – Supply side Economics 5.5 Stagflation	10
UNIT- 6	<u>Trade Cycle -</u> 6.1 Meaning, Definition and features of Trade Cycle 6.2 Phases of Trade Cycle 6.3 Policy for control of Trade Cycle – Monetary and Fiscal Measures	12
UNIT- 7	<u>Theories of Output and Employment</u> 7.1 Classical Theories of Employment – Says , Pigoue , Fisher 7.2 Keynesian Criticism on Classical Theories of Employment 7.3 Keynesian Theory of Employment	12
UNIT-8	<u>Public Finance</u> 8.1 Meaning, Nature and Scope of Public Finance 8.2 Principle of Maximum Social advantage-Dr. Dalton’s Approach 8.3 Public Revenue and Expenditure 8.4 Types of Taxation 8.5 Principles of Taxation 8.6 Effects of Taxation 8.7 Causes of increasing Public Expenditure	14

Basic Reading List

1. Ackey, G (1976) Macro Economics Theory and Policy, Macmillan Publishing Company, New York
2. Ahuja H. L. (2002) Macroeconomics Theory and Policy, Chand and Co. Ltd New Delhi.
3. D’souza Errol (2008) Macroeconomics : Person Publication, New Delhi.
4. Gupta S.B. (1994) Monetary Economics, S. Chand and Co. Delhi
5. Jingan M.L. (2002) Macro Economic Theory, Vrinda Publication, Delhi
6. Vaish M. C. (2002) Macro Economic Theory, Vikas Publishing House, N. Delhi
7. Shapiro E (1996) Macro Economic Analysis; Galgotia Publication, New Delhi

ADDITIONAL READING LIST

1. Dillard, D. (1960), The Economics of John Maynard Keynes, Crossby Lockwood and Sons, London.
2. Day A.C.L. (1960) Outline of Monetary Economics, Oxford University Press, Oxford
3. Higgins, B. (1963), Economic Development: Principles, Problems and Policies, Central Book Depot, Allahbad.
4. Keynes, J.M. (1936), The General Theory of Employment, Interest and Money, Macmillan, London.
5. Kindleberger, C.P. (1958), Economic Development, McGraw-Hill Book Company, New York.
6. Lucas, R. (1981), Studies in Business Cycle Theory, MIT Press, Cambridge, Massachusetts.

S.Y. B.Com.
Compulsory Paper
Subject Name -: Business Management
Course Code -: 204

Objective:

1. To provide basic knowledge & understanding about business management concept.
2. To provide an understanding about various functions of management.

UNIT NO	CHAPTER	PERIODS
	TERM-I	
Unit –I	OVERVIEW OF MANAGEMENT Meaning, Definition, Management: Is it Science, Art or profession? Characteristics of Professional Management. The need of Management Study. Process of Management, Level Of Management, Managerial Skills, Challenges before management , Brief Review of Management Thought with reference to FW Taylor & Henry Fayol	12
Unit –II	PLANNING & DECISION MAKING. Planning-Meaning, Definition, Nature, Importance, Forms, Types Of Planning, Steps in Planning, Limitations Of Planning. Forecasting-Meaning & Techniques. Decision Making- Meaning, Types Of Decisions & Steps In Decision Making.	12
Unit III	ORGANIZATION & STAFFING Meaning, Process & Principles, Departmentalization, Organization Structure, Authority and Responsibility, Delegation of authority, Difficulties in delegation of Authority, Centralization verses Decentralization, Team Work. Staffing-Meaning, Need & Importance of Staffing, Recruitment-Sources and Methods of Recruitment.	12
Unit IV	DIRECTION & COMMUNICATION Direction- Meaning, Elements, Principles, Techniques & importance.. Communication-Meaning, Types, Process of Communication & importance of effective Communication. Barriers to Communication.	12
	Total	48
	TERM-II	
UNIT-V	MOTIVATION Meaning, importance, Theories of motivation, Maslow's Need Hierarchy Theory, Herzberg's Two factors Theory, Douglas Mc Gregor's Theory of X & Y & Ouchi' Theory Z. McClelland's Theory.	12
UNIT-VI	LEADERSHIP Meaning, Importance, Qualities & Functions of a Leader, Leadership Styles for Effective Management .Contribution of Mahatma Gandhi, Dr. Babasaheb Ambedkar & Pandit Jawaharlal Neharu	12

Unit- VII	CO-ORDINATION AND CONTROL Meaning and Need , Techniques of establishing Co-ordination, difficulties in establishing co-ordination, Control-Need, steps in the process of control & Techniques.	12
Unit-VIII	RECENT TRENDS IN BUSINESS MANAGEMENT Business Ethics, Corporate Social Responsibility, Corporate Governance, Disaster Management, Management of Change	12
	Total	48

Recommended Books:

1. Principles of Management - Koontz & O'Donnel
2. The Management Process - R S Davar
3. Essentials of Management - Koontz & O' Donnel Tralel McGraw Hill Publishing House
4. Business Administration - Mritunjoy Banerjee
5. Principles & Practice - T N Chhabra, Dhanapat Rai & Co.of Management.
6. Management – LM .Prasad.
7. Super Highway: Bill Gates Foundation
8. Makers of Modern India - NBT Publishers
9. Indian Business leaders

S.Y. B.Com.
Compulsory Paper
Subject Name -: Elements of Company Law.
Course Code -: 205

Objectives:

- 1) To impart students with the knowledge of fundamentals of Company Law.
- 2) To update the knowledge of provisions of the Companies Act of 2013.
- 3) To apprise the students of new concepts involving in company law regime.
- 4) To acquaint the students with the duties and responsibilities of Key Managerial Personnel.
- 5) To impart students the provisions and procedures under company law.

	Term – I	
Sr. No.	Topic	Lectures
Unit 1	Introduction to the New Act & Concept of Companies: 1.1. Background and Salient Features of the Act of 2013, Overview of the changes introduced by the Act of 2013; 1.2. Nature and types of Companies, Definitions and important features of a Company- Distinction between a company and a partnership - Lifting or Piercing the Corporate Veil 1.3. Types of Companies based on various criteria including one man company, dormant company, sick and small company, associate company. 1.4. Distinction between private and public company (Advantages, Disadvantages and privileges of both the companies) - Conversion of a private company into a public company - Conversion of a public company into a private company.	13
Unit 2	Formation and Incorporation of a Company: 2.1. Stages in the Formation and Incorporation. 2.1.1. Promotion: Meaning of the term ‘Promoter’ / Promoter Group - Legal Position of Promoters, Pre-incorporation contracts. 2.1.2. Registration/ Incorporation of a company : - Procedure, Documents to be filed with ROC. Certificate of Incorporation- Effects of Certificate of Registration. 2.1.3. Floatation/ Raising of capital. 2.1.4. Commencement of business.	8
Unit 3	Documents relating to Incorporation and Raising of Capital: 3.1 Memorandum of Association: Meaning and importance- Form and contents- Alteration of memorandum. 3.2 Articles of Association: Meaning- Relationship of and distinction between Memorandum of association and Articles of association- Contents and form of Articles- Alteration of articles- Doctrine of constructive notice- Doctrine of Indoor Management. 3.3 Prospectus: Meaning and Definition- Contents- Abridged form of	07

	prospectus- Statutory requirements in relation to prospectus- Deemed prospectus- Shelf prospectus - Statement in lieu of prospectus- Mis-statement in a prospectus and Liabilities for Mis-statement.	
Unit 4	Capital of the Company 4.1 Various Modes for Raising of Share Capital including private placement, public issue, rights issue, bonus shares. 4.2 ESOS, Sweat Equity Shares, Buy-back of shares. 4.3 Allotment of Shares: Meaning- - Statutory provisions for allotment, improper and irregular allotment- Consequences of irregular allotment. 4.4 Calls On Shares: Meaning- Requisites of a valid call, Calls in advance 4.5 Share Certificates: Meaning, Provisions regarding issue of share certificates - Duplicate Share Certificate. 4.6 Share Capital – Meaning, Structure (Kinds) – Concept of Securities – Definition, Nature and Kinds of Shares.	14
Unit 5	Forfeiture, Surrender & Transfer of Shares 5.1 Forfeiture and Surrender of Shares: Meaning of forfeiture of shares: - Conditions/Rules of valid forfeiture- Effect of forfeiture- Re-issue of forfeited shares- Annulment of forfeiture- 5.2 Surrender of shares 5.3 Transfer and transmission of shares - meaning and procedure distinction between transfer and transmission 5.4 Nomination of shares	6
	Term – II	
Sr. No.	TOPIC	Lectures
Unit 6	E-Governance and E-Filing: 6.1 Introduction- Meaning of E-Governance 6.2 Advantages of E-Governance, 6.3 Basic understanding of MCA Portal 6.4 E-filing (Ss. 397 to 402), DIN-Directors Identification Number (Ss. 153-159)	06
Unit 7	Management of Company: 7.1 Board of Directors: Definition, Powers, Restrictions, Prohibition on Board. (Ss. 179 to 183) 7.2 Director: Meaning and Legal position of directors. 7.3 Types of Directors – Types including Executive, Non-Executive, Independent, Additional, Alternate, Interested, Nominee Director, Related Party Transactions (Ss. 188) 7.4 Appointment of Directors, Qualifications and Disqualifications. 7.5 Powers, Duties, Liabilities of Directors, Remedies for Breach of Duties. 7.6 Loans to Directors (S. 185), Remuneration of Directors	10
Unit 8	Key Managerial Personnel (KMP) 8.1 Meaning, Definition and Appointments of Managing Director,	10

	Whole Time Director, Manager, Company Secretary Term of office/ Tenure of appointment, Remuneration – 8.2 Distinction between Managing Director, Manager and Whole Time Director - Role (Powers, Functions of above KMP) 8.3 Corporate Social Responsibility (CSR) [U/S 135] – Concept who is Accountable, CSR Committee, Activities under CSR, 8.4 Role of Board of Directors. 8.5 Prevention of Oppression and Mismanagement (Ss. 241 to 246)	
Unit 9	Company Meetings: 9.1 Board Meeting – Meaning and Kinds 9.2 Conduct of Meetings - Formalities of valid meeting [Provisions regarding agenda, notice, quorum, proxies, voting, resolutions (procedure and kinds) minutes, filing of resolutions, Virtual Meeting] 9.3 Meeting of Share Holders General Body Meetings, Types of Meetings A. Annual General Meeting (AGM), Ss. 96 to 99 B. Extraordinary General Meeting (EOGM) – S. 100 9.4 Provisions regarding convening, constitution, conducting of General Meetings contained in Ss. 101 to 114	12
Unit 10	10.1 Revival and Re-habilitation of Sick Companies (S. 253-269) 10.2 Compromises, Arrangements and Amalgamation: Concept and Purposes of Compromises, Arrangements, Amalgamation, Reconstruction – Fine distinction between these terms.: 10.3 Winding –up: Meaning of winding-up, Dissolution of company, Conceptual understanding of winding-up by the Tribunal, Compulsory winding-up, Members’ voluntary winding-up, Creditors’ voluntary winding-up	10

Recommended Books
1) Bharat’s – Companies Act, 2013 with comments, Edited by: Ravi Puliani, Advocate Mahesh Puliani, Bharat Law House Pvt. Ltd., New Delhi, 19th Edition, 2013. 2) Introduction to Company Law, Karn Gupta, Publication: LexisNexis, 2013, Gurgaon, Haryana, India. 3) The Companies Act, 2013. With notes to Legislative Clauses. 2014 Edition. Corporate Professionals – where excellence is Law, CCH – a Wolters Kluwer business. Wolters Kluwer (India) Pvt. Ltd., DLF – Cyber City, Gurgaon, Haryana (India) 4) Insights into the New Company Law – PrachiManekar LexisNexis, Gurgaon, Haryana, India, 2013. 5) Taxman’s, Company Law Ready Reckoner, V.S. Datey, Printed at – Tan Prints (India) Pvt. Ltd. Jhajjar, Haryana, India., 13th September, 2013. 6) Analysis of Companies Act, 2013, Corporate Professionals – where excellence is Law., CCH – a Wolterskluwer business., Corporate Professionals India Pvt. Ltd., New Delhi, India., Published by – Wolters Kluwer (India) Pvt. Ltd., 2013.

S.Y. B.Com.

Business Administration Special Paper I

Subject Name :- Business Administration

Course Code :- 206 – A.

Objectives:

1. To provide basic knowledge about various forms of business organizations
2. To acquaint the students about business environment and its implications thereon.
3. To aware them with the recent trends in business

UNIT NO	CHAPTER	PERIODS
	TERM-I	
UNIT-I	BUSINESS ADMINISTRATION CONCEPTS Business - Definition, Characteristics, scope & Objectives of business- Economic & Social perspectives . Commerce- Meaning, Concept. Trade & Aids to trade- Meaning & Definition of the Terms: Administration, Management and Organization. Functions of Administration	12
UNIT-II	FORMS OF BUSINESS ORGANIZATION Sole Proprietorship, Partnership Firm, Limited Liability Partnership, Joint Ventures, Joint Stock Company, Co-operative Society- features, Merits & Limitations. Non Profit joint Stock Company under section 25 of the Companies Act Suitability of a form of organization- Factors determining the suitability of form of Organisation	12
UNIT III	BUSINESS ENVIRONMENT Meaning, Constituents of business environment-Economic, International, Social, Legal, Cultural, Educational, Political, Technological & Natural. Interaction of business & environmental forces. Social Responsibilities	12
UNIT IV	BUSINESS PROMOTION Business Unit- Promotion: Concept of promotion, stages in business promotion, Factors affecting location & Size, Present trends in location, size of business unit. Role of Govt in the promotion of SEZ	12
	Total	48
	TERM-II	
UNIT- V	LEGAL ASPECTS Compliance of legal requirements in promoting business unit, Licensing, Registration, Filing returns & other documents. Important legal provisions governing promotion & establishment of unit.	12
UNIT-VI	PRODUCTIVITY Meaning, Importance & measurement of productivity. Factors affecting productivity, techniques, Measures to boost productivity, Role of National Productivity Council- Product Quality Control ISO-9000, 14000, Quality Circles	12
UNIT-VII	RECENT TRENDS IN BUSINESS MANAGEMENT Liberalisation, Privatization, Globalization -meaning, concept –implications & consequences, SEZ, BPO, KPO and LPO .Public Private Partnership .MKCL	12

UNIT-VIII	INDUSTRIAL SICKNESS Meaning, definition, symptoms, causes & Consequences of industrial sickness. Role of Government in prevention of industrial sickness. Role of BIFR.	12
	Total	48

Recommended Books
1. Modern Business Organization & Management N. Mishra Allied Publishers – Bombay 2. Essentials of Business Administration K. Aswathappa – Himalaya Publications 3. Business Administration :S.C.Saxena – Sahitya Bhavan Agra 4. The Administrative Process :Stephen Robbins - 5. Business Organization 6. Industrial Administration & Management: J Batty McDonald 7. MKCL annual Report

S.Y. B.Com.

Banking & Finance Special Paper I

Subject Name -: Indian Banking System - I

Course Code -: 206 – B.

Objectives:

- 1.To create the awareness among the students of Indian banking system.
- 2.To enables students to understand the reforms and other developments in the Indian Banking
- 3.To provide students insight into the functions and role of Reserve Bank of India.

Term – I		
Sr. No	Topic	No. of Lectures
UNIT 1	Structure and Role of Indian Banking System: Structure of Indian Banking System Central bank - Commercial banks - Cooperative banks – Developmental Banks- Regional Rural Banks - Local Area Banks Difference between scheduled and non scheduled bank Role of banking system in the economic growth and development	12
UNIT 2	Private sector banks: A) Private sector banks in India: Their progress and performance after Banking Sector Reforms B) Foreign banks in India: Their problems and prospects of Foreign Banks Regulation of Foreign banks in India	12
UNIT 3	Nationalized banks: Social control over banks, Nationalization of banks - Arguments for and against nationalization, Objectives of nationalization, Progress of nationalized banks pertaining to branch expansion, deposit mobilization, credit development and priority sector lending: Lead Bank Scheme,	12
UNIT 4	State Bank of India Evolution of State Bank of India, organization and management of State Bank of India, Subsidiary Banks to State Bank of India. Role of State Bank of India : As an agent of the RBI, as a commercial bank, its role in industrial finance, in foreign exchange business, in agricultural finance and rural development, and in assisting weaker Sections of the Society Merger of SBI Subsidiaries.	12
	Total Period	48
Term II		
UNIT 5	Regional Rural Banks and National Bank for Agricultural and Rural Development (NABARD) : A) Reasons for establishment of Regional Rural Banks (RRBs), Meaning of RRBs, Difference between RRBs and Commercial banks, Objectives of RRBs, Organization and Management of RRBs, Functions of RRBs, Progress, performance and problems of RRBs, Consolidation of RRB`s B) National Bank for Agricultural and Rural Development (NABARD): Objectives, Functions and Performance	12
UNIT 6	Cooperative Credit System :	12

	A) Principles of cooperation, Evolution of cooperative credit system. Meaning, objectives, organization, functions, progress and problems of: 1. Primary Agricultural Cooperative Credit societies, 2. District Central Cooperative banks, 3. State Cooperative Banks B) Urban Cooperative Credit Societies C) Urban Cooperative Banks	
UNIT 7	Reserve Bank of India (RBI) : Evolution of the Reserve Bank of India, Organization and Management of the RBI A) Functions of the RBI: Issue and Management of currency Banker to the government Bankers' bank: lender of the last resort, central clearance Supervision of banking system, controller of credit-Qualitative and Quantitative methods of credit control, Custodian of foreign exchange reserves Collections and furnishing of credit information Agricultural finance, Export finance, Industrial finance B) Changing role of RBI: Promotional role, Development role & Super regulation work.	12
UNIT 8	Banking Sector Reforms: Rationale and objectives of reforms, Problems of nationalized banks A) Recommendations of the Narasimham Committee (I) Reforms of the committee pertaining to- Deregulation of interest rate, CRR (Cash Reserve Ratio), SLR (Statutory Liquidity Ratio), CD Ratio- Credit Deposit Ratio Interest rate structure, Directed credit programme, Income recognition, Asset classification, Capital adequacy norms, Provisioning, Redefining of the NPAs Management of Non Performing Assets (NPAs), Debt Recovery Tribunals, B) Recommendations of the Narasimham Committee (II) Consolidation of banking system, Directed credit programme, Revision in the Capital adequacy C) Financial Inclusion: Role of Micro Finance – Development of Self Help Groups	12
	Total Period	48

Recommended Books:

1. Functions and Working of the RBI: Reserve Bank of India Publications.
2. Financial Sector Reforms and India's Economic Development: N.A.Majumdar
3. Central Banking and Economic Development: Vasant Desai
4. Monetary Economics: S.B. Gupta
5. Banking in India - S. Panandikar
6. Banking: S.N. Maheshwari
7. Report on Trends and Progress of Banking in India: Reserve Bank of India Publication.
8. Indian Banking System (भारतीय बैंक व्यवसाय प्रणाली) - Prin. Dr. B. R. Sangle
9. Indian Banking System (भारतीय बैंक व्यवसाय प्रणाली) - Prin. Dr. B. R. Sangle,
Dr. Murtadak, Dr.M. U. Mulani, Dr. T. N. Salve
10. Annual Reports of Banks
11. Indian banking system - Dr. Rita Swami
12. Indian Banking System - Dr. B.R. Sangle, Dr. G.T. Sangle, Dr. Kayande Patil and
Prof. N.C. Pawar
13. Indian Banking System - Prof. S.V. Joshi, Dr. C.P. Rodrigues and Prof. Azhar Khan

S.Y. B.Com.
Business Laws & Practices Special Paper I
Subject Name -: Business Laws & Practices.
Course Code -: 206 – C.

Objectives –

- 1) To impart the students with the knowledge and understanding important Business Laws.
- 2) To acquaint the students with Laws of Insurance, Life Insurance, Marine Insurance, Fire and other insurance.

Sr. No.	Topic	No. of Lectures
Term – I		
Unit - 1	The Maharashtra Agricultural Produce Marketing (Regulation) Act, 1963 –	12
	Background, Meaning, Definition –	
	Agricultural Produce, Agriculturist, Broker, Buyer, bye-laws, Commission Agent, Director, Coolee, Local Authority, Market Area, Market Committee, Processor, Secretary, Retail sales, State Marketing Board. Agriculture Produce, Marketing (Clause 6 to 10). State Agricultural Produce Marketing Board (Clause 39 A to 39 O) Amalgamation of division of market committees office and servants of market committee.	
Unit - 2	The Law of Insurance -	12
	Introduction, Meaning & Characteristics of Insurance, Importance of Insurance, Basic Principles of General Insurance, Contract of Insurance, Type of Insurance. Basic Terms – Insured, Insurer, Premium, Policy subject matter of Insurance, Claim, Proposal. Insurance Interest. Double Insurance and Reinsurance.	
Unit - 3	Life Insurance -	12
	Meaning, Definition of Life Insurance, Features of Life Insurance, Importance of life Insurance. Basic Principles of Life Insurance. Advantages of Life Insurance, Type of Life Insurance Policy, Procedure of Life Insurance Policy. Settlement of Claims of Life Insurance of Policy, Nomination of Policy. LIC- Object, Constitution & Functions, Challenges before LIC, Social Responsibility of LIC.	
Unit - 4	Fire Insurance -	12
	Meaning of Fire Insurance, Definition of Fire Insurance, Types of Fire Insurance Policies, Basic Principles in Fire Insurance Policies, Settlement of Claims of Fire Insurance, Difference between Life Insurance & Fire Insurance, Private Insurance Companies in India, Social Corporate Responsibilities of Private Insurance Companies.	

Term - II		
Sr. No.	Topic	No. of Lectures
Unit - 5	Marine Insurance & Other Insurance – Meaning, Definitions, Type of Marine Insurance Policies, Terms in Marine Insurance Policy. Difference between Fire Insurance & Marine Insurance, Difference between Life Insurance & Marine Insurance. Contract of Fire Insurance, Motor Insurance Policy. Theft & Burglary Insurance Personal Accident Insurance, Rural Insurance in India.	12
Unit - 6	Maharashtra Co-operative Societies Act, 1960 Definition and Features of a Co-operative Society. Types of Co-operative Societies. Restriction on the society - Registration, Cancellation of Registration and De-registration of a Society. Bye Laws and Amendments of bye-laws.	12
Unit - 7	The Industrial Dispute Act, 1947 (Section 1 to 7, 22 to 29) Introduction and Definitions, Machinery for Settlement of Disputes, Strikes, Lockout, Layoff, Retrenchment, Closure and Re-starting of Undertaking.	12
Unit - 8	Partnership Act, 1952 • Meaning of Partnership, Features of Partnership • Registration & Formation of Partnership. • Kinds of Partners. • Rights, Duties and Liabilities of a Partner. • Reconstitution of Partnership Firm. • Incoming Partners. • Outing Partners. • Dissolution of a Partnership Firm.	12

Recommended Books		
References –		
1. Labour and Industrial Laws	-	M.N. Mishra central Publications, Allahabad
2. Business Laws	-	Kuchhal M.C.
3. Industrial Law	-	P.L. Malir
4. Business Law	-	Avtar Singh
5. Mercantile Law	-	P.L. Ma...
6. Business Law	-	S.D. Geet and M.S. Patil

S.Y. B.Com.
Co-operation and Rural Development Special Paper I
Subject Name -: Co-operation and Rural Development.
Course Code -: 206 – D.

Objectives:-

1. To acquaint students with the Concept of Co-operation.
2. To acquaint students with Co-operative legislation.
3. To create awareness regarding the role of State Govt. in development of Co-operative sector in Maharashtra.
4. To acquaint students with the role of Social reformers in rural development .
5. To understand the role of “Panchayat Raj “ in rural development.
6. To make the students aware about Globalization and its effects on rural development

Sr. No.	Topic	No- of Lectures
Unit 1	Co-operative Legislation in India 1.1 History of Co-operative Legislation 1.2 Co-operative Societies Act-1904, Objectives and Features 1.3 Co-operative Societies Act-1912, Objectives and Features 1.4 Bombay Provisional Co-operative Societies Act 1925, Main Provisions 1.5 Benefits of Co-operative Legislations	12
Unit 2	Multi-state Co-operative Societies Act 2.1 History, need and objectives 2.2 Registration of Societies 2.3 Bye- laws of Co-operative societies 2.4 Management of Co-operative Societies 2.5 Role of Central Registrar	12
Unit 3	Maharashtra State Co-operative Societies Act 1960 3.1 Maharashtra Co-operative Societies Act 1960 amended up to August 2013 –Provisions regarding a) Registration of Co-operative Societies b) Membership of Co-operative Societies c) Privileges and Duties of Co-operative Societies d) Management of Co-operative Societies e) Supervision of Co-operative Societies f) Audit of Co-operative Societies g) Role of Registrar for Co-operative Societies o f Maharashtra State	12
Unit 4	Functions, Progress and Problems of Co-operatives 4.1 Agriculture Credit through Co-operatives a) Primary Agriculture Credit Societies(PACS) b) District Central Co-operative Banks c) State Co-operative Bank 4.2 Co-operative Sugar Factories 4.3 Dairy Co-operatives 4.4 Non Agricultural Credit Co-operatives 4.5 Urban Co-operative Banks 4.6 Housing Co-operative Societies 4.7 Consumer Co-operatives	12

Term – II		
Unit 5	Rural Development 5.1 Definition, Meaning, Scope and Objectives 5.2 Significance of Rural Development 5.3 Role of Co-operative movement in Rural Development of Maharashtra 5.4 Approaches of Rural Development a) Individual Approaches b) Group Approaches c) Mass Approach	12
Unit 6	Role of Social Reformers in Rural Development . (Thought & Work) 6.1 Mahatma Jotiba Phule 6.2 Chhatrapati Shahu Maharaj 6.3 Mahatma Gandhi. 6.4 Dr. Babasaheb Ambedkar. 6.5 Karmaveer Bhaurao Patil 6.6 Dr. Dhananjayrao Gadgil. 6.7 Dr. Panjabrao Deshmukh	12
Unit 7	Rural Development and Panchayat Raj System 7.1 Concept and Structure of Panchayat Raj 7.2 Importance of Panchayat Raj System 7.3 Important Provisions of Panchayat Raj Act 7.4 Effects of Panchayat Raj System on Rural Development 7.5 Limitations of Panchyat Raj	12
Unit 8	a) Rural Development through Peoples Participation 8.1 Concept of Peoples Participation 8.2 Importance of Peoples Participation 8.3 Mahatma Gandhi National Rural Employment Guarantee Scheme 8.4 Development Strategy of Model Villages	06
	b) Globalization and Rural Development 8.5 Concept of Globalization 8.6 Merits and Demerits of Globalization 8.7 Opportunities of Globalization for Rural Development 8.8 Effects of Globalization on Rural Development	06

Recommended Books :

- 1) G.S.Kamat –Cases in Co-operative management.
- 2) K.K.Taimani- Co-operative Organization and Management.
- 3) G.S.Kamat – New Dimensions of Co-operative Management.
- 4) Vasant Desai – Fundamentals of Rural Development.
- 5) V.M.Dandekar and Rath – Poverty in India.
- 6) Dr. P.R.Dubhashi – Rural Development and Administration in India.
- 7) V.Reddy – Rural Development in India.
- 8) S.K. Gopal – Co-operative Farming in India.
- 9) B. Mukharji – Community Development.
- 10) I.C.A State and C-operative Movement.

S.Y. B.Com.

Cost and Works Accounting Special Paper I

Subject Name -: Cost and Works Accounting.

Course Code -: 206 – E.

Objectives:

To Impart The Knowledge Of:

1. Basic Cost concepts.
2. Elements of cost.
3. Ascertainment of Material and Labour Cost.

SR. NO.	TOPIC	LECTURES
Unit 1	Basics Of Cost Accounting	
1.1	Concept of Cost, Costing, Cost Accounting and Cost	16
1.2	Accountancy.	
1.3	Limitations of Financial Accounting.	
1.4	Origin of Costing.	
1.5	Objectives of Costing.	
1.6	Advantages & Limitations of Costing.	
1.7	Difference Between Financial Accounting and Cost Accounting. Cost Units and Cost Center.	
Unit 2	Elements Of Cost	
2.1	Material, Labour and other Expenses.	16
2.2	Classification of Costs.	
2.3	Preparation of Cost Sheet, Quotation, Tenders.	
Unit 3	Material Control	
3.1	Need and Essentials of Material Control.	16
3.2	Functions of Purchase Department.	
3.3	Purchase Procedure.	
3.4	Purchase Documentation.	
3.5	Stock Levels.	
3.6	Economic Order Quantity. (EOQ)	

Term – II

SR.NO.	TOPIC	LECTURES
Unit 4	Material Accounting	
4.1	Stores Location and Layout.	16
4.2	Types of Stores Organization.	
4.3	Classification and Codification of Material.	
4.4	<u>Stores and Material Records –</u> Bin Card, & Store Ledger etc.	
4.5	<u>Issue of Material and Pricing Methods of Issue of Material:-</u> (a) FIFO. (b) LIFO. (c) Simple Average Methods. (d) Weighted Average Methods.	
4.6	Stock valuation, Use of computer in store Accounting.	

Unit 5	Inventory Control	
5.1	Stock Taking, Periodic and Perpetual Method.	08
5.2	ABC Analysis.	
5.3	Inventory Ratios.	
Unit 6	Labour Cost, Remuneration And Incentives	
6.1	Records & Methods Of Time Keeping and Time Booking Study of New Methods.	12
6.2	<u>Methods Of Remuneration-</u> ❖ Time Rate System, ❖ Piece Rate system, ❖ Taylor's Differential Piece rate System.	
6.3	<u>Incentive Plan-</u> Halsay Premium Plan,	
6.4	❖ Rowan Premium Plan. ❖ Group Bonus Schemes.	
Unit 7	Other Aspects Of Labour	
7.1	Labour Turnover.	10
7.2	Job Analysis & Job Evaluation Key.	
7.3	Merit Rating.	
Unit 8	Direct Cost	
8.1	Concept and Illustrations.	02
		Total 48

Note-

Allocation of Marks

50% for Theory

50% for Practical Problem.

❖ **Teaching Methodology**

1. Class Room Lectures.
2. Guest Lectures.
3. Visit to Industries.
4. Group Discussion.
5. Collection of Records & Documents.

❖ **Recommended Books :**

1. S.P. Lyengar - Cost Accounting Principles and Practice, Sultan Chand , & Sons Accounting Taxman's, New Delhi.
2. M.N. Arora - Cost Accounting Principles and Practice Vikas Publishing House Pvt.Ltd. New Delhi.
3. S.N. Maheshwari and S.N.Mittal- Cost Accounting, Theory and Problems, Mahavir book Depot, New Delhi.

4. B.L. Lall and G.L. Sharma - Theory and Techniques of Cost Accounting. Himalaya Publishing House, New Delhi.
5. V.K. Saxena and Vashista - Cost Accounting – Text book. Sultan Chand and Sons – New Delhi
6. V.K. Saxena and Vashista - Cost Audit and Management Audit. Sultan Chand and Sons – New Delhi
7. Jain and Narang - Cost Accounting Principles and Practice. Kalyani Publishers
8. N.K. Prasad - Principles and Practice of Cost Accounting Book Syndicate Pvt. Ltd., Calcutta.
9. N.K. Prasad - Advanced Cost Accounting Syndicate Pvt Ltd., Calcutta.
10. R.K. Motwani - Practical Costing. Pointer Publisher, Jaipur
11. R.S.N. Pillai and V. Bhagavati - Cost Accounting.
12. Horne, Fraser and Datar - Cost Accounting and Managerial Emphasis.
13. Cost Accounting - Bhatta HSM, Himalaya Publication
14. Cost Accounting - Prabhu Dev, Himalaya Publication
15. Advanced Cost Accounting - Made Gowda, Himalaya Publication

Journals -

1. Cost Accounting Standards - The ICWA of India, Calcutta
2. Management Accountant - The ICWA of India, Calcutta

Website - icwajournal@hotmail.com

CD: -On Cost-Sheet Prepared by Asian Center for Research and Training, Pune.
Trimurti, 27B, Damle Complex, Hanuman Nagar, Senapati Bapat Road, Pune-16
director_acrtpune@yahoo.co.in

S.Y. B.Com.
Business Statistics Special Paper I
Subject Name :- Business Statistics.
Course Code :- 206 – F.

Objectives:

1. To understand and Master the concepts, techniques & applications of Statistical Methods and Operations Research.
2. To develop the skills of solving real life problems using Statistical Methods.
3. To make students to understand the art of applying statistical techniques to solve some real life problems.
4. To gain knowledge of Statistical Computations.

Sr. No.	Topic	No. of Lectures
Unit 1	Theory of Attributes (up to order three only): Introduction Classification, Notation, dichotomy, types of classes, Order of a class, dot operator to find relation between class frequency (up to order three, Fundamental set of class frequencies, Consistency up to three attributes, Independent and Association of two attributes, Yule's Coefficient of association, example and problems.	14
Unit 2	Multiple Regression, Multiple and Partial Correlation: Introduction, Multiple Regression, Statement of equation of plane of regression of X_1 on X_2 and X_3 , Standard Error of Estimate, Partial and Multiple Correlation, Advantages and limitations of multiple Correlation Analysis. example and problems	16
Unit 3	Vital Statistics : Introduction, Methods of collecting vital Statistics, Mortality rates : CDR, ASDR, STDR (direct method), Fertility rates: CBR, ASFR, TFR, GFR Population Growth rate: GRR and NRR, example and problems	10
Unit 4	Life Tables: Introduction, Construction of life table, functions (l_x , L_x , p_x , q_x , e_x , T_x) and their interpretation, Expectation of life, example and problems.	08
Term 2		
Unit 5	Time Series: Introduction, Definition, Components of Time Series, The Trend, Seasonal variation , Cyclical variation, Irregular variation, Methods of estimating Trends, Moving averages (with periods 3,4,5), Fitting of trend line and second degree curve, Exponential smoothing, Example and problems	14

Unit 6	Simplex Method: Definition of Linear programming problem , Canonical and standard form duality relation between primal and dual, example and problems on simplex method two iterations only, meaning of unbounded solution, basic feasible solution, alternate solution, degenerate solution	14
Unit 7	Transportation Problem (T.P). / optimization (only minimization): Introduction, balanced and unbalanced TP, Initial Basic Feasible Solution IBFS using NWCR, MMM, VAM, Optimal solution using MODI method. Example and problems.	14
Unit 8	Assignment Problem (A.P): Introduction, concept minimization and maximization, Hungarian method example and problems	06

Recommended Books :

1. S.P Gupta - Statistical Methods
2. S.C. Gupta - Fundamentals of Statistics
3. J.S Chandran - Statistics for Business and Economics
4. Dr. A.B. Rao - Quantitative Techniques for Business
5. Business Statistics - S. C. Gupta, Gupta Indra
6. Operation Research - V. K. Kapoor
7. Statistical Methods - S. P. Gupta

S.Y. B.Com.
Business Entrepreneurship Special Paper I
Subject Name -: Business Entrepreneurship.
Course Code -: 206 – G.

Objectives:

1. To create entrepreneurial awareness among the students.
2. To provide the conceptual background of types & patterns of Entrepreneurship
3. To develop Entrepreneurial competencies among students.

Term – I		
Sr.No.	Topic	No. of Lectures
<u>UNIT1</u>	<u>Entrepreneur & Entrepreneurship</u> Definition, meaning - functions of an entrepreneur - Need & importance of Entrepreneurship - Problem of unemployment - importance of wealth creation - Enterprise v/s Entrepreneurship - Self-employment v/s Entrepreneurship - Entrepreneurial Competencies - Behavioral pattern of an Entrepreneur - Entrepreneurial Motives - David C. McClelland's Theory of Need for Achievement & Kakinada Experiment	12
<u>UNIT2</u>	<u>Study of Biographies of Entrepreneurs (Co-operatives sector)</u> 1. Dr. Vitthalrao Vikhe Patil, Pravranagar 2. Karamveer Bhaurao Patil, Satara 3. Shree. Bhausahab Hire, Nashik 4. Sahkar Maharshi Bhausahab Santuji Thorat, Sangamner 5. Shree Ratnappa Kumbhar, Sangali 6. Shree Dhanjajrao Gadgil, Pune	12
<u>UNIT3</u>	<u>Creativity & Innovation</u> Creativity – meaning - Creativity Process - Techniques & tools of creativity Innovation: Meaning - Sources of innovation – Peter Drucker's Principles of innovation - Do's & Don'ts of innovation	12
<u>UNIT4</u>	Business Ethics & Social Responsibility of Business Business goals - Social responsibility - Business Ethics – Social responsibility towards their stakeholders: Investors – Owners – employees - Govt. & Society at large - Leadership by Example - Code of ethics - Ethical structure - Social Audit Brief introduction to corporate Governance	12

Term – II		
Sr. No.	Topic	No. of Lectures
<u>UNIT1</u>	Group Entrepreneurship Concept - meaning & significance - Individual Entrepreneurship v/s Group Entrepreneurship - Advantages & disadvantages of Group Entrepreneurship Self-Help group - Definition - meaning & Evolution - Nature - scope of – SHG - Administration functions & operation SHG's - Do's & Don'ts with suitable illustration of Self-Help group	12
<u>UNIT2</u>	Various Entrepreneurial opportunities - Role of service sector in national Economy Types of service ventures, Service - industry management, Success	12

	factors in service ventures - Opportunities to service industry in rural & urban areas Distinction between service industry & manufacturing industries.	
UNIT3	Franchising – Definition - meaning & Types - Advantages to the franchisee & franchisor - Franchisee Relationship Steps in starting franchisee - Cautions in franchising - Business process outsourcing	12
UNIT4	Challenges in Entrepreneurship Development Challenges-Social, Cultural, Educational, political, economical, International situation, Cross Cultural aspects Measures & Challenges of globalization & entrepreneurship development in India	12

Recommended Books :

1. Desai Vasant - “Dynamics of Entrepreneurial Development & Management”, Himalaya Publication House.
2. Hisrich Robert D. & Michael, ‘Entrepreneurship’, Tata McGraw Hill Publishing Company, New Delhi.
3. Chary S.N. “Business Guru speak”, Macmillan Business Books 2002
4. Drucker Peter-Innovation & Entrepreneurship Heinemann London (1985)
5. Piramal Gita-Business Legends – Penguin Book India (p.)Ltd.1998.
6. Gupta & Shrinivasan ‘Entrepreneurial Development’, Sultan Chand & Co.
7. Pandit Shrinivas- Thought Leaders- Tata McGraw Hill Publishing Company.
8. Devkar Yogiraj -‘Udyojakata’ Continental Publication,Pune.
9. Piramal Gita-‘Business Maharaje’ Tra.Ashok Jain,Mehata Publishing House,Pune.
10. Amrutghatha, Amey Prakashan, Pune. (Autobiography of Bhausaheb Thorat)
11. Amrutmanthan , Amey Prakashan, Pune. (Autobiography of Bhausaheb Thorat)

Journals :

1. ‘Journal of Entrepreneurship’, Entrepreneurship Development Institute of India,Ahmedabad.
2. Mahratta Chamber of Commerce, Industries & Agriculture, Pune’s Magazine – “Sampada”.
3. MCED’s –“Udyojak”.
4. “Vanijya Vishwa” ,The Poona Merchant Chamber’s Magazine.

VCD’s on ‘Entrepreneurship’ & ‘Motivation’ Produced by Asian Centre for Research & Training ‘Trimurti’,27/B,’Damle Bunglow’,Hanumannagar, Senapati Bapat Road,Pune 411016.

Email: director_acrt@yahoo.co.in,acrtpune@gmail.com

[www.http://sites.google.com/site/acrtpune](http://sites.google.com/site/acrtpune).

Practical’s : At least 4 practical’s should be completed during the academic year.

1. Interview with entrepreneur.
2. Case study of each entrepreneurs mentioned in syllabus (5).
3. Social Responsibility of business.
4. Visit to industry.
5. Social audit.
6. Business Ethics.
7. S H G
8. Group entrepreneurship.
9. Franchising.
10. Information about service industry.

S.Y. B.Com.

Marketing Management Special Paper I

Subject Name :- Marketing Management.

Course Code :- 206 – H.

Objectives:-

- To orient the students recent trends in marketing management
- To create awareness about marketing of eco friendly products in the society through students
- To inculcate knowledge of various aspects of marketing management through practical approach
- To acquaint the students with the use of E-Commerce in competitive environment
- To help the students understand the influences of marketing management on consumer behavior

FIRST TERM

Unit No.	Unit Details	Lectures
1.	Elements of Marketing Management: Meaning, Nature and Scope of Marketing Management - Components of Marketing Management - Marketing Management Philosophy - Marketing Characteristics in Indian context - Marketing Management process - Marketing Planning.	16
2.	Current Marketing Environment in India : A) with special reference to Liberalization, Globalization and Privatization-economic environment- demographic- technological - natural - political - socio cultural. B) Change in market practices- global marketing- case studies	10
3.	Marketing Communications – Meaning, Definition and objectives - Marketing Communication Mix- Traditional Media-New Age Media-Marketing Communication through product cues – Different forms of appeal for communication.	12
4.	Services Marketing :- Unique features of Services - classification of services – Growth of Services: The global and the Indian scene- new generation services – tasks involved in services marketing.	10

SECOND TERM

Unit No.	Unit Details	Lectures
5.	E- Marketing:- Meaning, Definition and utility of e-marketing. Advantages, limitations and challenges before e – marketing. Online and Offline marketing, Present status of e-marketing in India, Scope for e -marketing in Indian scenario – online marketing strategies	14
6.	Rural Marketing:- Introduction – basic features – contemporary rural marketing environment-problems, challenges and marketing strategies – present status of rural marketing in India.	12
7.	Green Marketing:- Meaning, Definition and Importance - Role of Marketing Manager in Green Marketing- Marketing mix of green marketing – principles of success of green	12

	products – case studies.	
8.	Consumer Behavior and Buying decision process: Definition- consumer behavior and marketing – factors influencing consumer behavior and buying decision- various buying motives – stages involved in buying decision	10

Suggested references Books

1. Marketing Management – Philip Kotler
2. Marketing Management – Rajan Saxena (Latest Edition)
3. Marketing Management, Indian context – global prespective -Ramaswami Namakumari
4. Marketing Management – Pankaj Madan & Hemraj Verma Amit Mittal
5. Marketing Management (Text and Cases) - Rajagopal
6. Marketing Concepts and Cases – Michael J. Etzel, Bruce J. Walkar, Willam J. Stanton, Ajay Pandit
7. Introduction to e- Commerce- Nidhi Dhawan
8. Electronic Commerce –Bharat Bhaskar
9. Retailing and E-tailing - S.L.Gupta, Mittal & Nayyar
10. E- Commerce: Fundamentals and Applications- Henry Chan, Lee
11. Marketing in the new global order: challenges and opportunities –Tapan Panda and Navin Donthu

S.Y. B.Com.
Special Paper I
Subject Name -: Agricultural and Industrial Economics.
Course Code -: 206 – I.

Objectives:

1. To study the basic concepts of Agricultural and Industrial Economics.
2. To understand the working of the Agricultural and industrial sector.

Term-I		
Sr. No.	Topic	No. of Lectures
Unit-1	<u>Basic Concept of Agricultural Economics</u> 1.1 Definition , Nature and scope of Agricultural Economics 1.2 Importance of Agriculture in Indian Economy	08
Unit-2	<u>Role of Agriculture</u> 2.1 Role of Agriculture in Economic Development 2.2 Peculiarities of Agriculture as Sector of Economy. 2.3 Nature of risk and uncertainly in Agriculture. 2.4 Measures to control risk and uncertainly	10
Unit-3	<u>Organization of Agricultural Production</u> 3.1 Concept of forming firm 3.2 Farm Management inputs and outputs 3.3 Size of the farm small versus large.	10
Unit-4	<u>Demand for Agricultural Product</u> 4.1 Nature of demand for agricultural product 4.2 Different purposes of demand 4.3 Factor affecting demand for agricultural product 4.4 Pattern and trend of demand main agricultural product	10
Unit-5	<u>Supply of Agricultural Product</u> 5.1 Nature of supply of agricultural product 5.2 Factors affecting supply (Technology, Fertilizers, Irrigation etc.) 5.3 Supply during short and long period.	10
<u>Term-II</u>		
Unit-6	<u>Introduction of Industrial Economics</u> 6.1 Definition , meaning, nature, scope and importance of Industrial Economics. 6.2 Scope and significance of Industrial Economics 6.3 The concept of plant, firm and industry.	8

Unit-7	<u>Organization of Industrial Production</u> 7.1 Traditional and modern approach to the theory of firm 7.3 Optimum size of firm 7.3 Factors affecting optimum size of firm	10
Unit-8	<u>Location of Industry</u> 8.1 Theories of location of industries-Weber and Sergeant Florence 8.2 Factors affecting location of industries	10
Unit-9	<u>Diversification and combination</u> 9.1 Meaning of diversification of Industry 9.2 Types of diversification of firm 9.3 Industrial Integration 9.4 Combination of Industries 9.5 Industrial Monopoly – Causes and affects 9.6 Survival of small firm in modern economy	10
Unit-10	<u>Industrial Productivity and Efficiency</u> 10.1 Industrial productivity – meaning 10.2 Factors affecting industrial productivity 10.3 Industrial efficacy – Economic and Non-Economic aspect	10

Recommended Books :

1. Agricultural Economics and Indian Agriculture: Dr. S.S. Chinna – Kalyani Publishes – Ludhiana – New Delhi.
2. Agricultural Problems in India – C.B.Mammoria 1976.
3. Hey D.A. and D.J.Morris – Industrial Economics and Organization: Theory and Evidence.
4. S.C.Kuchal – Industrial Economy of India, 1981.
5. Cherunillam International Economics 1999, Tata McGraw Hill Co.Ltd.
6. Dutt and Sundharam – Indian Economy, S.C.Chand & Co. 2008.

S.Y. B.Com.
Special Paper I
Subject Name -: Defense Budgeting, Finance & Management.
Course Code -: 206 – J.

Objective: To acquaint the students with the economic and financial aspects of Defence.

Term – I		
Sr. No.	Topic	No. of Lectures
UNIT 1	Defence as an Economic Problem a) Silent Features of India Economy b) Relationship between defence and Economy c) Defence as an Economic Problem – Meaning and Importance	12
UNIT 2	Peace Time Economy a) Aims and Objectives b) Merits and Demerits c) Pre-war preparation d) Mobilization of resource for defence	12
UNIT 3	War–time Economy a) Aims and Objectives b) Merits and Demerits c) Techniques of controlling inflation and rationing Methods of war finance	12
UNIT 4	Defence production in India a) Role in Defence Production Public Sector Undertaking b) Role of private sector in Defence production c) Role of Foreign Collaboration d) Role of Defence Research and Development Organization e) Self Reliance Programme & Transfer of Technology	12
Term – II		
Sr. No.	Topic	No. of Lectures
UNIT 5	Defence planning in India a) Meaning and Importance of Defence Planning b) Meaning and programming c) Definition of Budget and Budgeting d) Types of Budgeting e) Importance of Zero Base Budgeting	12

UNIT 6	Defence Expenditure a) Productivity or Non-Productivity b) More or Less Analysis c) Causes of Increasing Defence Expenditure d) Impact of Decreased Expenditure on Armed Forces	24
UNIT 7	Factors determining the size of Defence Expenditure a) External and Internal Security Threat Perception b) Political Ideology c) Leadership d) National Power/Capability etc.	12
UNIT 8	Analysis of India's Defence Expenditure a) Phase I – 1947-1962 b) Phase II – 1962-1971 c) Phase III – 1971-1990 d) Phase IV – 1990 to present day	12

Recommended Books :

1. Agrwal, Rajesh K., Defence Production & Development (New Delhi: Gulab Vazirani for Arnold – Heinemann Publisher, 1978)
2. Deger, S. & Sen, S., Military Expenditure in the Third World Countries: The Economic Effects (London: Routledge & Kegan Paul, 1986)
3. Dutta, Meena & Sharma Jai Narain., Defence Economics (New Delhi: Deep & Deep Publication)
4. Ghosh, Ameya, India's Defence Budget & Expenditure Management in a Wider Context (New Delhi: Lancer Publishers & Spantech, 1996)
5. Kennedy, Gavin, Defence Economics (London: Gerald Duckworth and Co. Ltd., 1983)
6. Hitch, Charles J., and Mcken, Ronald N. The Economics of Defence in the Nuclear Age (Combridge, Mass: Havard University Press, 1960)
7. Khanna, D. D. and Mehrotra, P. N. Defence Versus Development: A case study of India, (New Delhi: Indus Publication Company, 1993)'
8. Nada, Ravi, National Security Perspective Policy and Planning (New Delhi: Lancer Books, 1991)
9. Subramanyam, K., India's Security Perspective, Policy and Planning (New Delhi: Lancer Books, 1991)
10. Thomas, Raju, G. C., The Defence of India: A Budgetary Perspective of Strategu and Politics (Meerut: The Macmillan Company of India Limited, 1978)
11. Thomas, Raju G. C., Indian Security Policy (Princeton, New Jersey: University Press, 1986)

S.Y. B.Com.
Special Paper I
Subject Name -: Insurance Transport and Clearance
Course Code -: 206 – K.

Objectives:

- 1) To acquaint the students with basic concepts in insurance and tourism.
- 2) To develop a right understanding to study various facets of insurance and tourism.
- 3) To aware about the Role and importance of insurance and tourism business

Term-1		
Sr. No.	Topic	No. of Lecturers
Topic -1	Basic principles of insurance, Working of Life Insurance business, Organizational structure of Life Insurance business, Life Insurance scenario in India.	10
Topic-2	Types of life insurance policies- whole life, endowment, money back, group insurance, unit linked insurance policy, pension plan. Role of insurance agent, field officer, surveyor, assessor and responsibilities of insurer.	10
Topic-3	Principles of General Insurance, Comparison between General and Life Insurance. Study and scope of General Insurance in India. Introduction to the marketing of General Insurance business in India. Insurance contribution to Gross Domestic Product (GDP).	10
Topic-4	Role of General Insurance Company of India (GIC). Types of General Insurance- Fire, Marine, Motor, Personal Accident, Health, Engineering, Crop etc. Study of various policies and insurance cover , study of risk factors, insurance claims.	10
Topic-5	Regulations of insurance business in India, Insurance Regulatory Development Authority (IRDA) Economical Growth and Employment Development in Insurance Sector. Opportunities and challenges before Indian Insurance business, Career in insurance business.	08
Term-II		
Sr. No.	Topic	No. of Lecturers
Topic -1	Tourism-Types of tourists, tourism, recreation and leisure and study of tourism activities. Inter regional and intra regional tourism. Potential areas of tourism development and need for tourism planning, Govt. policies for Tourism Development.	10

Topic-2	Forms of Tourism- Religious, ethnical, geographical, educational, health, sports, heritage, historical, hill region and coastal region. Potential areas for tourism development- Health, Agro & Sport tourism.	10
Topic-3	Tour operators- their responsibilities, planning of tour- pre tour and post tour activities. Essentials of tour planning tour packages- types of tours, group tours, packages, travel agency resources, time table, calendars, study of local weather conditions. Carrier in tourism industry.	10
Topic-4	Tourism Accommodation- significance and types of accommodation - Hotels holiday homes, resorts, cottages, tent houses, dharamshalas. Hotel meal plans, rates, rooms category, locations and reservations. Current trends in Tourism industry.	10
Topic-5	Impact of tourism on -Economy- environment, social and cultural aspects of the society. Current scenario of Tourism in India. Opportunities and challenges before Indian Tourism.	08

Recommended books and reports

1. Insurance- Principles and Practices- M.N. Mishra, Dr. S.B. Mishra (S. Chand)
 2. Insurance- Principles and Practices- Vinayakan, N.M. Radhaswamy & V. Vasudevan.
 3. Life Insurance in India- G.R. Desai
 4. Insurance Theory and Practice-Nalini Prava Tripathy, Prabir Pal (PHI Publication)
 5. General Insurance- Principles and Practice- by P. Mitra, Academic Publication
 6. Life Insurance in India- by Suryapal Singh, Sahitya Bhavan Publication
 7. IRDA -Annual Reports & Journal.
 8. LIC council reports.
 9. Annual Reports of LIC of India.
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1. Tourism Promotion and Development- G.S. Batra & R.C. Agarwal
 2. Tourism Industry in India- Dr. M. Selvam.
 3. Tourism Development in India- A Satish Babu
 4. Geography of Transport in India- Dr. B.C. Vaidya, Concept Publication, New Delhi.
 5. Tourism Development in India- By S.J. Srivastava.

S.Y. B.Com.
Computer Programming and Application Special Paper I
Subject Name -: Computer Programming and Application.
Course Code -: 206 – L.
(First Term) (VB Script)

Objective:

- To learn to use VBScript, transform Web pages from static text and images into functional, interactive, and dynamic e-commerce tools.
- To embed VBScript code in an HTML document.
- To use VBScript operators; write code that makes decisions based on existing conditions, using control structures and loops.
- To enable communication with a Web page visitor using Message and Input boxes.
- To use the DOM to control the layout of HTML pages, add effects, and get information from users.

Sr. No.	Topic Name	No. of Lectures
<u>Unit 1</u>	<u>Introduction To VBScript</u> 1.1VBScript and the Web 1.1.1 VBScript's Popularity 1.1.2 VBScript Defined 1.1.3 Platform or Host Dependence 1.1.4 Scripting Languages 1.2VBScript Basics 1.2.1 Embedding VBScript in HTML 1.2.2 VBScript to Display Information 1.2.3 Hiding VBScript from Older Browsers 1.2.4 Code Documentation and Formatting	06
<u>Unit 2</u>	<u>Variables ,Arrays, and VBScript Operators</u> 2.1 Variables, Subtypes, and Constants 2.1.1 Variables Defined, Declared 2.1.2 Variants and Subtypes 2.1.3 Assigning Values to Variables 2.1.4 Determining Variant Subtype 2.1.5 Data Subtype Conversion 2.1.6 Numeric and Literal Constants 2.2 Arrays 2.2.1 Groups of Similar Variables 2.2.2 One-Dimensional Arrays 2.2.3 Multi-Dimensional Arrays 2.3 VBScript Operators 2.3.1 VBScript Operators 2.3.2 Arithmetic Operator Precedence 2.3.3 Comparison Operators 2.3.4 Logic Operators 2.3.5 String Concatenation	14

	2.4 Program Control and Structure 2.4.1 Control Statements 2.4.2 Four Control Structures 2.4.3 Using Loops	
<u>Unit 3</u>	<u>VBScript Procedures and Control Structures</u> 3.1 VBScript Procedures 3.1.1 Procedures 3.1.2 Subroutine Procedures 3.1.3 Scope of Variables 3.1.4 Function Procedures 3.1.5 Randomize and RND 3.2 Strings and Numbers 3.2.1 Strings 3.2.2 Formatting Numbers 3.3 Message and Input Boxes 3.3.1 Message Box 3.3.2 Input Boxes 3.4 Dates and Times 3.4.1 Dates and Times 3.4.2 Splitting Up Dates and Times 3.4.3 Page Updates	10
<u>Unit 4</u>	<u>Handling Documents and Events</u> 4.1 The Document Object Model 4.1.1 What Does VBScript Manipulate? 4.1.2 History and Background of the DOM 4.1.3 Properties, Methods, Events and Collections 4.1.4 Internet Explorer 5.x DOM 4.2 Event Handlers 4.2.1 Top-Down vs. Event-Driven Programming 4.2.2 Mouse Events 4.2.3 Keyboard Events 4.2.4 Validation and Error Handling	10
<u>Unit 5</u>	<u>Working With Database</u> 5.1 Basic Database Connectivity (MS Access or MySQL) 5.1.1 Introduction to Basic Queries with Select, Insert, Update, Delete commands 5.1.2 Send and Retrieve Data through Forms	08

Books:

- VBScript Programmer's Reference-Third Edition by Adrian Kingsley-Hughes, Kathie Kingsley-Hughes and Daniel Read
ISBN-13 9788126514915, WROX-Wiley
- Microsoft VBScript: Step by Step Paperback by Bargain Price
- VBScript in a Nutshell, 2nd Edition, Paul Lomax, Matt Childs, Ron Petrusha, ISBN-13: 978-0596004880, Publication- O'Reilly Media

(Second Term) (RDBMS)

Objective:

You will learn how to create and access data using Structured Query Language (SQL), the programming language used by most relational database management systems.

<u>Sr. No.</u>	<u>Topic Name</u>	<u>No. of Lectures</u>
<u>Unit 1</u>	<u>Structured Query Language – I</u> 1.1 Introduction 1.2 What is RDBMS? 1.3 Introduction to SQL 1.4 SQL Language Elements 1.5 Classification of SQL commands 1.7 Creating and Managing Tables 1.8 Applying Constraints	10
<u>Unit 2</u>	<u>Structured Query Language – II</u> 2.1 Introduction 2.2 Basic Data Retrieval 2.2.1 Column Aliases 2.2.2 Duplicate Rows 2.3 Restricting and Sorting Data 2.4 Dual Table 2.5 Single Row Functions 2.5.1 Numeric Functions 2.5.2 Character Functions 2.5.3 Date Time Functions 2.5.4 Conversion Functions 2.6 Joins	10
<u>Unit 3</u>	<u>Advanced Queries And Database Objects</u> 3.1 Introduction 3.2 Aggregate Functions 3.3 Group by Having Clause 3.3.1 Comparing Having clause and where clause 3.4 Creating Other Database Objects 3.4.1 Views 3.4.2 Indexes 3.4.3 Sequences 3.4.4 Synonyms 3.5 Sub queries 3.5.1 Sub query in DDL and DML commands	10
<u>Unit 4</u>	<u>Security Privileges, SET Operators & Datetime Functions</u> 4.1 Introduction 4.2 Enhancements to GROUP BY function 4.2.1 ROLLUP Operator	10

	4.2.2 CUBE Operator 4.2.3 GROUPING Function 4.3 SET OPERATORS 4.3.1 INTERSECT Operator 4.3.2 UNION Operator 4.3.3 UNION ALL Operator 4.3.4 MINUS Operator 4.4 DATETIME FUNCTIONS 4.4.1 Parsing Date and Time 4.5 Controlling User Access 4.5.1 System privileges 4.5.2 Object Privileges 4.5.3 What a user can grant? 4.5.4 GRANT/REVOKE PRIVILEGES	
<u>Unit 5</u>	<u>Advanced Subqueries</u> 5.1 Introduction 5.2 Multiple Column Subqueries 5.2.1 Coding Subqueries in the FROM clause 5.3 Scalar Subqueries 5.4 Correlated Subquery 5.5 WITH clause 5.5.1 Functions of the WITH clause 5.6 Hierarchical Queries	08

Books:

- SQL: THE COMPLETE REFERENCE 3rd Edition Author: James Groff, Paul Weinberg, Andy Oppel
Tata Mc-graw Hill Publishing Co.ltd.-New Delhi ISBN : 9781259003882
- SQL, PL/SQL: The Programming Language Of Oracle (With CD-ROM) 4th Revised Edition Author: Ivan Bayross BPB PUBLICATIONS
ISBN-13 9788176569644
- Oracle Database 11G: The Complete Refere 1st Edition Author: KEVIN LONEY , Tata Mcgraw Hill Education Private Limited
ISBN-13 9780070140790
- MySQL, The Complete Reference By Vikram Vaswani, ISBN 0-07-222477-0, Tata McGraw Hill
- The Complete Reference in Microsoft Access 2007, Andersen, ISBN13: 9780070222854
- Learning MySQL by O'reilly, Seyed M.M Tahaghogi, Hugh E. Williams, Oreilly Media

UNIVERSITY OF PUNE

Master of Commerce (M.Com.) Semester Pattern with Credit System Revised with effect from June 2013

Preamble for Choice Based Credit System

Since liberalization the socio-political-economic scenario is changing very fast. There is a significant transformation in term educational expectation and aspiration of the learner. The educational system also is witnessing many changes and challenges due to technological growth and changes in the Government policies. Education is no longer a concern of students but it has become a matter of social and economic importance. The changes at the global level has influence the educational system, structure and expectation of the users.

University education needs to take contingency of all these changes and restructure itself to stand in a competitive dynamic environment. Professional stream of learning like Commerce have to be properly upgraded to accommodate challenges of change, expectation of employers' and to offer global opportunities to the learners. From this point of view the course structure of post-graduate programme in Commerce needs to be structured. It has to be according to expectations of the learners, employers and the society. The learning inputs have to be more update, skilled based and with appropriate applications. The course programme should consider desire aptitude, attitude and acumen of the learner.

From this point of view University of Pune has introduced Choice Base Credit System of course structure. This system shall offer a flexible user friendly, opportunity to the learner, will broaden the horizon of Commerce education and will give a fair chance to every single learner to exhibit his talent, acquired skills and enhance his personality. It will further enhance his opportunity of global mobility, to acquire different knowledge inputs from different global institutes.

1. Objectives :

- a. To equip and train Post Graduate students to accept the challenges of Business World by providing opportunities for study and analysis of advanced Commercial and business methods and processes.
- b. To develop independent logical thinking and facilitate personality development.
- c. To equip the students for seeking suitable careers in management and entrepreneurship.
- d. To study by students methods of Data collection and their interpretations.
- e. To develop among students Communication, Study and Analytical skills.

2. Duration :

The M.Com. Course will be of Two Years duration consisting of Two part. i.e. Part I and Part II. Each part is having Two Semesters. Thus the M.Com. Course is of Four Semesters. For each Semester there will be Four Papers of 100 marks each. The M.Com. Degree will be of 1600 marks in aggregate.

3. Duration and Structure of Programme:

The M.Com (Semester pattern with Credit System) degree Programme shall be of 2 years' duration divided into two parts, Part I and Part II, and 4 semesters.

4. Eligibility :

The student who has passed any Bachelors degree of this University or any other recognized University shall be held eligible to be admitted to M.Com. Course.

5. Course Structure:

The M.Com. degree course will be of two year duration consisting of four semesters and of minimum 64 credits as below:

Sr. No.	Semester	Total Credits
1	Semester I	16
2	Semester II	16
3	Semester III	16
4	Semester IV	16
	Grand Total	64

Four credits for project work at 4th Semester (This will include credits for fieldwork, data presentation and report writing)

In each Semester, there will be four papers of 100 marks each out of which 50 marks will be for Internal Assessment (attendance, home assignments, class tests, long term papers, classroom presentation and 50 marks for University Examination. Thus M.Com. degree examination, four Semesters shall be of 1600 marks and of minimum 64 credits altogether. The following shall be the course structure.

6. The Scheme of Papers: The following will be the Scheme of papers:

The List of Courses Semester I

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester I	Core Compulsory	101	Management Accounting	04	04	03	50	50	100
		102	Strategic Management	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	<i>To choose any one Group of the following</i>							
		Group A (Advanced Accounting & Taxation)							
		103	Advanced Accounting	04	04	03	50	50	100
		104	Income Tax	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		105	Information system and E-Commerce Practices	04	04	03	50	50	100
		106	Intellectual Property Laws	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		107	Advanced Cost Accounting	04	04	03	50	50	100
		108	Costing Technique and Responsibility Accounting	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		109	Co-operative Movement in India	04	04	03	50	50	100
		110	Organization of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		111	Organized Trades and Markets	04	04	03	50	50	100
		112	Business Environment and Policy	04	04	03	50	50	100
		Group F (Business Administration)							
		113	Production and Operation Management	04	04	03	50	50	100
		114	Financial Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		115	Legal Framework of Banking	04	04	03	50	50	100
		116	Central Banking	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		117	Marketing Techniques	04	04	03	50	50	100
		118	Consumer Behaviour	04	04	03	50	50	100

Semester II

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester II	Core Compulsory	201	Financial Analysis and Control/ Principals of Financial Accounting	04	04	03	50	50	100
		202	Industrial Economics/ Economic Environment/Business Statistics/ Quantitative application	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		203	Specialized Areas in Accounting	04	04	03	50	50	100
		204	Business Tax Assessment & Planning	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		205	E- Security & Cyber Laws	04	04	03	50	50	100
		206	Laws Regulating to Copyrights & Design	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		207	Application Cost Accounting	04	04	03	50	50	100
		208	Cost Control & Cost System	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		209	International Co-operative Movement	04	04	03	50	50	100
		210	Management of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		211	Modern Business Practices	04	04	03	50	50	100
		212	Business Environment Analysis	04	04	03	50	50	100
		Group F (Business Administration)							
		213	Business Ethics and Professional Values	04	04	03	50	50	100
		214	Elements of Knowledge Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		215	Banking Law & Practices	04	04	03	50	50	100
		216	Monetary Policy	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		217	Customer Relationship Management & Retailing	04	04	03	50	50	100
		218	Services Marketing	04	04	03	50	50	100

Semester III

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester III	Core Compulsory	301	Business Finance	04	04	03	50	50	100
		302	Research Methodology for Business	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		303	Advanced Auditing	04	04	03	50	50	100
		304	Specialized Areas in Auditing	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		305	Laws Relating to International Business	04	04	03	50	50	100
		306	World Trade Organization – Norms & Practices	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		307	Cost Audit	04	04	03	50	50	100
		308	Management Audit	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		309	Co-operative Credit System	04	04	03	50	50	100
		310	Co-operative and Rural Banking System	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		311	Entrepreneurial Behaviour	04	04	03	50	50	100
		312	Entrepreneurship Development Pattern	04	04	03	50	50	100
		Group F (Business Administration)							
		313	Human Resource Management	04	04	03	50	50	100
		314	Organizational Behaviour	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		315	Foreign Exchange	04	04	03	50	50	100
		316	International Finance	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		317	International Marketing	04	04	03	50	50	100
		318	Marketing Research	04	04	03	50	50	100

Semester IV

Semester	Subject Type	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester IV	Core Compulsory	401	Capital Market and Financial Services	04	04	03	50	50	100
		402	A. Industrial Economic Environment Or B. Operations Research	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		403	Recent Advances in Accounting, Taxation and Auditing	04	04	03	50	50	100
		404	Project Work/ Case Studies	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		405	Recent Advances in Commercial Laws and Practices	04	04	03	50	50	100
		406	Project Work/Case Studies	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		407	Recent Advances in Cost Auditing and Cost System	04	04	03	50	50	100
		408	Project Work/Case Studies	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		409	Recent Trade in Co-operative and Rural Development	04	04	03	50	50	100
		410	Project Work / Case Studies	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		411	Recent Advances in Business Practices and Environment	04	04	03	50	50	100
		412	Project Work/Case Studies	04	04	03	50	50	100
		Group F (Business Administration)							
		413	Recent Advances in Business Administration	04	04	03	50	50	100
		414	Project Work/Case Studies	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		415	Recent Advances in Banking and Finance	04	04	03	50	50	100
		416	Project Work/Case Studies	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		417	Recent Advances in Marketing	04	04	03	50	50	100
		418	Project Work/Case Studies	04	04	03	50	50	100

7. Scheme of Examination:

The examination of regular students of M.Com. degree course of the University of Pune admitted in the academic session 2013-14 and after shall be based on:

- (a) Semester Examination
- (b) Continuous Assessment
- (c) Choice Based Credit System, and
- (d) Semester Grade Point Average and Cumulative Grade Point Average System

For each paper of 100 marks, there will be an Internal Assessment (1A) of 50 marks and the University Examination (UE) of 50 marks/ 3 hours duration at the end of each semester. A candidate who will secure at least 40% marks allotted to each paper will be given 4 credits. A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment for each paper will be 50 marks which will be carried out by the department during the term. The Internal Assessment may be in the forms of written test, seminars, term papers, presentations, assignments, orals or any such others. The distribution of internal assessment marks shall be as follows:

Midterm Test	20
Presentation/Role Play	10
Case studies/ Group Discussion	10
Quiz / Home Assignment	10
Total	50

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A student cannot register for the third semester, if she/he fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters.

8. Research project work:

There will be a Research Project to be prepared by a student during the fourth semester. The objective of the project work is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work is to be undertaken under guidance of a teacher allotted to a student by the department.

Division of marks	Marks	
A. Synopsis with working bibliography (Internal Assessment)	40 marks	50 marks
Viva Voce (Internal Assessment)	10 marks	
B. A full project Report (Minimum 50-80 pages) (Internal & External Assessment)	40 marks	50 marks
Viva Voce (Internal & External Assessment)	10 marks	

As the Research Project is based on the self study done by the candidate and evaluated for 100 marks altogether, 04 credits will be awarded to a successful candidate in this subject. The project may be evaluated by two examiners one internal and one external, selected from the panel of PG examiners of the University. The Viva voce must be conducted by the teachers selected out of the panel of PG examiners maintained by the University.

The candidates have to submit the project 15 days before the commencement of the fourth semester university examination. The project report shall be type-written and submitted in duplicate. A candidate who fails to submit the project may resubmit the same in the subsequent semester examination for evaluation. The project work activities must be duly supported by documentary evidence to be endorsed by the Head or Guide.

9. Standard of passing:

A candidate shall be declared to have passed in the paper provided he/she has secured minimum GP of 4.5 in the UNIVERSITY EXAMINATION and GRADE POINT AVERAGE of 4.0 in aggregate of UNIVERSITY GRADE and INTERNAL ASSESSMENT taken together.

10. Classification of successful candidates:

Candidates who secured not less than 60% of aggregate marks (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) in the whole examination shall be declared to have passed the examination in the first class. All other successful candidates shall be declared to have passed in second class. Candidates who obtain 70% of the marks in the aggregate (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) shall be deemed to have passed the examination in first class with distinction.

A student who passess in all the courses will be declared to have passed the M.Com. degree with the following honours.

CGPA in (4.00, 4.99)	- Pass Class
CGPA in (5.00, 5.49)	- Second Class
CGPA in (5.50, 5.99)	- Higher Second Class
CGPA in (6.00, 7.99)	- First Class
CGPA in (8.00, 10.00)	- First Class with Distinction

11. Scheme of Credits:

Sixty (60) hours of teaching will lead to three credits (which mean four hours per week teaching in one semester) and long term paper as well as presentation will carry one credit. Each semester shall have 16 credits.

12. Structure of Transcript:

At the end of each semester, student will be given a transcript showing the performance and result in each course. The transcript shows, for each course the title of the course, credit values, grade in UNIVERSITY EXAMINATION , grade in INTERNAL ASSESSMENT , grade point index, result as pass or fail. Also, the semester grade point average (SGPA) and cumulative grade point average (CPGA) will be shown. Further the equivalent percentage of marks corresponding to SGPA or CGPA to equivalent percentage is given by:

$$\text{Equivalent percentage marks} = \begin{cases} 10 \times \text{CGPA} & \text{if CGPA /SGPA is in [4.00, 6.00]} \\ 05 \times \text{CGPA} + 30 & \text{if CGPA /SGPA is in [6.00, 9.00]} \\ 25 \times \text{CGPA} - 150 & \text{if CGPA /SGPA is in [9.00, 10.00]} \end{cases}$$

Marks	Grade	Grade Point
100 to 75	O : Outstanding	06
74 to 65	A : Very Good	05
64 to 55	B : Good	04
54 to 50	C : Average	03
49 to 45	D : Satisfactory	02
44 to 40	E : Pass	01
39 to 0	F : Fail	00

(C) GPA	Grade
05.00 – 6.00	O
04.50 – 04.99	A
03.50 – 04.49	B
02.50 – 03.49	C
01.50 – 02.49	D
00.50 – 01.49	E
00.00 – 00.49	F

13. Distribution of Periods:

There shall be 60 periods for each subject to cover the entire teaching of 4 credits. This will be distributed as follows:

Particulars	Periods
Teaching session per programme	48
Assignment/ Test	04
Role play/ Group Discussion	04
Case studies and presentation	04
Total	60

14. Standard of Passing.

- A. Regular students: - A candidate is required to obtain 40% marks in each of course in both Mid Semesters and Semester end. It means passing separately at Mid-Semester and semester Examinations is compulsory.

15. Award of Class.

- a. The class in respect of M.Com. Examination will be awarded on the basis of aggregate marks obtained by the candidates in all the sixteen papers at the Semester I, II, III, and IV together.
The Award of class shall be as under:-

- b. Improvement: - A candidate having passed M.Com. Examination will be allowed to improve the performance. The same is termed as 'Class Improvement Scheme' under which improvement of performance shall be allowed only at the Semester end Examination.
- c. A candidate after passing M.Com. Examination will be allowed to appear in the additional Special Subject after keeping necessary terms in the concerned special subject only, for which a passing certificate will be issued.

16. Medium of Instruction :

The use of Marathi is allowed for writing answers in the examination except for following courses:

- Management Accounting
- Financial Analysis & Control
- Business Statistics,
- Advanced Accounting and Taxation
- Advanced Cost Accounting and Cost Systems.

17. A student (Regular / External) will be admitted to Revised M. Com. Course with effect from June 2013. For the students who have completed the terms for the First Year as per Old Course will be admitted to the Second Year as per Old Course M. Com. The examination as per Old Course will be held simultaneously for three years from April / May 2014.

18. Qualification of the Teachers :

The Teachers recognized to teach the subjects as per Old Course shall be deemed to be recognized in the corresponding equivalent subjects under Revised Course.

In case of: A) Business Statistics, B) Industrial Economics, C) Co-operation and Rural Development, D) Advanced Banking and Finance and E) Research Methodology and Project Work- Paper-IV of each Special Subject, the following qualifications be made applicable.

- A. Business Statistics :** M.Com, M.Phil with Statistics or Research Methodology as one of the Papers at M.Com /B.Com /M. Phil examination with 5 years degree teaching experience or M.A./M.Sc. With Statistics having 5 years degree teaching experience.
- B. Industrial Economics:** M.Com., M. Phil with Business Economics/Economics of Industries or Economics as one of the papers at B. Com/ M.Com Examination with 5 years degree teaching experience or M.A. Economics with 5 years degree teaching experience.
- C. Co-operation and Rural Development:** M. Com, M. Phil. With 5 years degree teaching experience or M.A. Economics (with Co-operation Rural Economics)
- D. Advanced Banking and Finance:** M. Com., M. Phil., with Banking as one of the papers at B.Com/M.Com examination 5 years degree teaching experience.
- E. Research Methodology and Project Work:** M.Com. M.A (Eco.) M.Phil./Ph.D. with 5 years degree teaching experience.
- F.** Similarly all the changes in qualification as per U.G.C norms and guidelines shall also be applicable as and when the changes come into force (If applicable)

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M.Com. Part II Semester III

Compulsory Paper

Subject Name :- Business Finance.

Course Code :- 301.

(w.e.f. Academic Year: 2014-15)

Objective: To enable students to acquire sound knowledge of concepts, nature and structure of business finance.

Unit No.	Topic	Periods
1	A. Business Finance: Meaning, objective, scope and importance B. Time value of Money Need, Importance, Future value, Present value through discounted cash flow technique	10
2	Strategic financial planning: Meaning - objective, assumptions, steps in financial planning - estimating financial requirements - limitations of financial planning - capitalization – over capitalization - under capitalization, estimating financial needs and sources of finance.	12
3	Corporate securities and sources of long term finance: A. Ownership securities - equity shares: characteristics, advantage and disadvantages, preference shares: characteristics, advantage and disadvantages, Companies Act (Amendment) 2013 B. Creditor's securities- debentures: characteristics-classification- procedure of issuing debentures and Bonds. C. The dividend decision: Background of dividend policy, measures of dividend policy, dividend yield and dividend payout.	14
4	Short term finance and working capital Characteristics of short term finance – short term needs sources of short term financing – trade creditors, bank credit, bank financing of account receivables, working capital - advantages and disadvantages of short term financing.	12
	Total	48

Recommended Books

1. P.V.Kulkarni: Business finance, Himalaya Publishing House
2. S.C.Kuchal: Corporate Finance, Chaitanya Publishing House, Allahabad
3. Prasana Chandra: Financial Management: Theory and Practice
4. William L. Maggiuson, Scott B. Smart, Lawrence J. Gitman : Principles of corporate finance, Cengage Learning Private Limited, Dehli
5. Aswath Damodaram: Corporate Finance: Theory and Practice, Wiley International

M.Com. Part II Semester III
Compulsory Paper
Subject Name -: Research Methodology for Business.
Course Code -: 302.
(w.e.f. Academic Year: 2014-15)
(Board of Studies in Business Practice)

Objectives:

1. To acquaint the students with the areas of Business Research Activities.
2. To enhance capabilities of students to conduct the research in the field of business and social sciences.
3. To enable students, in developing the most appropriate methodology for their research studies.
4. To make them familiar with the art of using different research methods and techniques.

Unit No.	Topics	Periods
1	Introduction to Business Research: Introduction. Definition, Objectives, Significance & Types of Research, Criteria of research, Features of a Good Research , Steps in Research Process, Research Methods versus Methodology	12
2	Formulation of the Research Problem, Development of the Research Hypotheses, Research Design& Sampling: Research Problem: Defining the Research Problem, Techniques involved in Defining Research Problem. Hypotheses: Meaning, Definition & Types of Hypothesis, Formulation of the Hypotheses, Methods of testing Hypothesis Research Design: Meaning, Nature & Classification of Research Design, Need for Research Design, Phases/Steps in Research Design Sampling: Meaning & definition of Sampling, Key terms in Sampling, Types of Sampling, Probability & Non-probability	12
3	Data Collection, Measurement & Scaling, Processing of Data: Sources of Data Collection: Primary Data: Methods of Data Collection, Merits & Demerits Secondary Data: Internal & External Sources of Data Collection Measurement& Scaling: Meaning & Types of Measurement Scale, Classification of Scales Processing of Data: Editing, Coding, Classification & Tabulation. Analysis & Interpretation of Data: Types of Analysis-Univariate, Bivariate and Multivariate Analysis of Data	12
4	Research Report and Mode of Citation & Bibliography: Research Report: Importance of Report Writing, Types of Research Reports, Structure or Layout of Research Report Mode of Citation & Bibliography: Author, Date, System, Footnote or Endnote System, Use of Notes. Position of Notes, Citing for the first time, Subsequent Citings, List of Abbreviation used in Citation, Mode of preparing a Bibliography, Classification of Entries, Bibliography Entries compared with Footnotes, Examples of Bibliography Entries	12
Total		48

Books Recommended:

1. Alan Bryman & Emma Bell (2008), Business Research Methods, Oxford University Press, New York.
2. Anil Kumar Gupta (2011), Research Methodology-Methods & Techniques, Vayu Education of India, New Delhi.
3. Anwarul Yaqin (2011), Legal Research and Writing Methods, LexisNexis Butterworths Wadhwa, Nagpur.
4. C. R. Kothari (2008), Research Methodology-Methods & Techniques, New Age International Publishers, New Delhi.
5. Deepak Chawla & Neena Sondhi (2011), Research Methodology-Concepts and Cases, Vikas Publishing House Pvt. Ltd., New Delhi.
6. Dipak Kumar Bhattacharyya (2013), Research Methodology, Excel Books, New Delhi.
7. Donald R. Cooper & Pamela S. Schindler (1999), Business Research Methods, Tata McGraw-Hill Edition, New Delhi.
8. P. L. Bhandarkar, T. S. Wilkison & D. K. Laldas (1993), Methodology & Techniques of Social Research, Himalaya Publishing House, Mumbai.
9. Pradeep Aaglave (2000). Sanshodhan Padhatishastra Va Tante, Vidhya Prakashan, Nagpur.
10. Ram Ahuja (2003), Research Methods, Rawat Publications, Jaipur.
11. Russell K.. Schutt (2006), Investigating the Social World-The Process and Practice of Research, Sage Publication, New Delhi.

M.Com. Part II Semester III
Advanced Accounting and Taxation Special Paper V.
Subject Title :- Advanced Auditing.
Course Code :- 303
(w.e.f. Academic Year: 2014-15)

Level of Knowledge - Expert Knowledge

Objective: To impart knowledge and develop understanding of methods of auditing and their application.

UNIT	TOPIC	No. of Lectures in hours
I	Introduction: Auditing concepts. Basic principles governing an audit - Relationship of auditing with other disciplines - Audit Programme - Vouching - Verification and Valuation.	08
II	Standards on Auditing: Overview of Standard setting process - Role of Auditing and Assurance Standard and Auditing and Assurance Standard Board in India. Brief study of Standards on Auditing issued by the ICAI.	08
III	Internal Control: Significance of Internal control. Evaluation of internal control procedures - Techniques including questionnaire- flowchart - Review of internal control.	08
IV	Audit of Limited Companies: Preliminaries to the audit of limited company - Audit of share capital transactions - Debentures and other transactions - Audit report with special reference to CARO 2003 - Profit and divisible profit - Dividends - Investigation.	08
V	Audit Committee and Corporate Governance: Corporate Governance: Introduction-Verification of Compliance of Corporate Governance. Audit Committee: Constitution - Powers of Audit Committee - CEO/CFO Certification to Board - Report on Corporate Governance.	08
VI	Audit under Computerized Information System (CIS) Environment: Special aspects of CIS Audit Environment - Need for review of internal control - Use of Computers for Audit purposes - Audit tools - Test packs - Computerized audit programme.	08
TOTAL -		48

List of Books Recommended for Study:-

1. Spicer and Peglar : Practical Auditing.
2. Kamal Gupta : Contemporary Auditing.
3. R.C. Saxena : Auditing.
4. Basu : Auditing.
5. Jagadish Prasad : Auditing : Principles.

List of Learning Activities and allocation of periods:-

Sr. No.	Activities	Learning Hours
1	Quizzes/ Seminars/Presentations	04
2	Assignments/ Tutorials	04
3	Class Room Tests	04
	Total	12

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M.Com. Part II Semester III**Advanced Accounting and Taxation Special Paper VI.****Subject Title :- Specialized Areas in Auditing.****Course Code :- 304****(w.e.f. Academic Year: 2014-15)****Level of Knowledge - Expert Knowledge****Objective:** To impart knowledge and develop understanding of methods of audit in Specialized areas.

UNIT	TOPIC	No. of Lectures in hours
I	Audit Under Tax Laws: Tax Audit U/s 44 AB of Income Tax Act, 1961-Form 3 CA, 3 CB and 3 CD - Audit under VAT Law - Steps to be taken by Auditor - Audit under Excise Law - Excise Audit 2000 - Audit Procedure.	04
II	Internal Audit: Nature, Scope and Purpose of Internal Audit - Review of Internal Control - Areas of Internal Audit - Purchase, sale, cash, bank transactions - Internal Audit Report.	06
III	Audit of Banks: Salient features of enactments affecting Banks - Bank Audit, its approach- Steps in Bank Audit - Checking of Assets and Liabilities - Scrutiny of Profit & Loss items - Audit Report of Banks - Long Form Audit Report	08
IV	Audit of Cooperative Societies: Provisions of Maharashtra State Co-operative Societies Act 2013 and Multistate Co-operative Societies Act 2002. Special features of Audit of Co- operative Societies. Audit of) Co-operative Consumers Stores, 2) Salary earners Co-operative Society 3) Co-operative Housing Societies, 4) Urban Co- operative Credit Society. Audit Report of Co-operative Societies	08
V	Audit of Specialized Units: Special features of audit of Educational Institutions, Hotel, Club, Hospital, Charitable Trusts.	10
VI	Government System of Audit: Funds maintained by Government for meeting expenditure and receipts- Structure of financial administration in India-Objects of Government audit- Role of Comptroller and Auditor General of India-Audit of receipt, expenditure, sanctions, Public Accounts Committee-Audit of Public Sector Undertaking-Audit of Local bodies.	12
TOTAL -		48

List of Books Recommended for Study:-

1. Kamal Gupta : Contemporary Auditing.
2. R.C. Saxena : Auditing.
3. Basu : Auditing.
4. B.N. Tondon : A Handbook of Practical Auditing.
5. Anil Roy Chaudhari : Modern Internal Auditing.
6. V.S. Agarwal : Internal Auditing.
7. George Koshi : Tax Audit Manual.
8. The Institute of Chartered Accountants of India : Guidance note on Tax Audit U/s 44 AB of the Income Tax Act.

List of Learning Activities and allocation of periods:-

Sr. No	Activities	Learning Hours
1	Quizzes/ Seminars/Presentations	04
2	Assignments/ Tutorials	04
3	Class Room Tests	04
	Total	12

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M.Com. Part II Semester III
Commercial Laws and Practices Special Paper V.
Subject Title :- Laws Relating to International Business
Course Code :- 305
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To acquaint the students with basic principles of International Trade, Theories of International Trade and Dispute resolution mechanism.
2. To study the impact of international business environment on foreign market operations and India's response to these developments.

Unit No.	Topic	Periods
1)	International Law: Meaning, Scope, Objectives, Nature and Development of International Law, Sources and Evidences of International Law, Codification of International Law, India and International Law, Distinction between Public International Law and Private International Law International Business: Meaning, Objectives and Nature, - Trans-National Corporations: Their rights, duties and Responsibilities under International Law - Charter on Economic Rights and Duties of States (ERDS)	12
2)	International Trade: Origin and nature of International Trade, International Trade Theories: Adam Smiths' Theory of Absolute Difference in Cost, David Ricardo's Comparative Cost Theory, Heckscher Ohlin's Theory of International Trade, Advantages and Disadvantages or Problems of International Trade, Free Trade (<i>Laissez – faire</i> policy), Protectionism, Tariff barriers, Impact of tariff, Non-Tariff barriers (NTB), Balance of Payments in International Trade (Provisions of the GATT, 1994), Role of National and International Law in International Trade, Role of the United Nations in International Trade Law through the United Nations Commission for International Trade Law (UNCITRACL): (i) International Sale of Goods and related transactions (ii) International Transport of Goods (iii) Construction Contracts (iv) International Payments (v) Brussels convention, 1968	14
3)	International Business Law:Environmental issues and India's Foreign Trade - (i) Environment Protection- Norms of International Environment Law – United Nations Conference – Stockholm, Nairobi Conference 1980 - Kyoto Protocol - Carbon Credit - Clean Development Mechanism - India's Response:Environment Impact Assessment Under Indian Environment Protection Act. (ii) India's Foreign Trade Policy:Objectives,Strategies and its Legal	12

	Dimensions, Provisions regarding Imports-Exports	
4)	International Commercial Dispute Resolution Mechanism: • International Commercial Arbitration & Conciliation under UNCITRAL- Model Law • International Court of Justice and its Jurisdiction • Enforcement of Foreign Awards in India.	10
	Total	48

Recommended Books:

- 1) Arunkumar Jain, "International Business - Competing in the Global Market", Place-Charles Hill, Tata McGraw Hill, New Delhi.
- 2) M.L.Jhingan, "International Economics", Vrinda Publications, Delhi.
- 3) Malcolm N. Shaw, "International Law", Cambridge University Press, New Delhi, (2007).
- 4) V. K. Bhalla, S. Shiva Ramu, "International Business, Environment and Management", Anmol Publication Pvt. Ltd., New Delhi. (2010).
- 5) Dr. Ram Singh, "International trade operations", Excel Books, New Delhi, (2009).
- 6) Francis Cherunilam, "International Trade and Export Management", Himalaya Publishing House, Mumbai, (2000).
- 7) Dr. S. P. Gupta, "International Law and Human Rights", Allahabad Law Agency, Haryana, (2009).
- 8) Dr. S. R. Myneni, "International Trade Law", Allahabad Law Agency, Haryana (2008).
- 9) Indira Carr, "International Trade Law", Routledge, Abingdon, Oxon, (2014).
- 10) Macmillan, "International Banking Legal & Regulatory Aspects", Macmillan India Ltd., Daryaganj, New Delhi, (2007).
- 11) Judith Evans, "Law of International Trade", Old Baile Press, London, (2001).
- 12) Rajendra P. Maheshwari, "International Business", International Book House Pvt. Ltd., New Delhi, (2011).
- 13) Dr. S. K. Kapoor, "International Law and Human Rights", Central Law Agency, Allahabad, (2004).
- 14) K. C. Johsi, "International Law & Human Rights", Eastern Book Company, Lucknow, (2006).

M.Com. Part II Semester III
Commercial Laws and Practices Special Paper VI.
Subject Title -: World Trade Organisation Norms and Practices
Course Code -: 306
(w.e.f. Academic Year: 2014-15)

Objective:

To understand purpose and scope of GATT & WTO and to study their legal framework and disputes settlement mechanism.

Unit No.	Topic	Periods
1)	Introduction to WTO: Historical Background International Economic Relations before and after Second World War, Havana charter for International Trade Organizations (ITO), GATT to WTO – A Historical Overview: Protectionism, Formation of GATT, Objectives and Relevance of GATT at present, GATT Tariff Negotiations (from Geneva to Doha and beyond)	12
2)	World Trade Organization(WTO): Basic Principles of the WTO Trading System, the Objectives, Functions and structure of WTO – Decision making- The WTO Agreement – Membership, Accession and withdrawals, current status of individual accession, WTO and Global Economic Policy making, Achievements of WTO.	12
3)	Legal Framework of General Agreement on Tariffs and Trade (GATT) 1994: Preamble – General -Most favored Nation Treatment – (Art. – I) Schedules of concessions (Art. – II) National Treatment on International Taxation and Regulations (Art. – III), Special provisions relating to cinematograph films (Art.-IV), Freedom of Transit (Art.-V) Anti-dumping Agreement (Art. – VI) WTO Agreement on Agriculture – WTO Agreement on Textile and Clothing – WTO General Agreement on Trade in Service (GATS) – WTO– International Trade and Human Rights – Trade and Environmental issues in the WTO – Developing Countries and WTO - India's Responses to WTO	12
4)	The WTO Disputes Settlement Mechanism: Elements of disputes settlement - Dispute Settlement Body - Procedure of disputes settlement - Appeals - Good offices, conciliation and mediation - The establishment of panels -Terms of reference of Panels, composition, functions and responsibility of panels – Adoption of Panel Reports – Implementation of Rulings.	12
	Total	48

Recommended Books:

1. R. K. Rangachari, WTO, Its Benefits, Misunderstandings, Agreements, Policies for the developing countries, Palak Publication, Mumbai.
2. Francis Cherunilam, International Trade and export Management, Himalaya Publishing House.
3. Autar Krishen Kaul, "Guide to the WTO & GATT", Satyam Law International, New Delhi, 4th edition (2013).
4. Hema Garg, "WTO and Regionalism in World Trade", New Century Publications, New Delhi, (2004)
5. Arun Goyal, Noor Mohd, "WTO in the New Millennium", Academy of Business Studies, New Delhi.
6. K. D. Raja, "WTO Agreement on Anti-Dumping A GATT / WTO and Indian Jurisprudence", Kluwer Law International, New Delhi. (2008).
7. Jayanta Bagchi, "World Trade Organisation – An Indian Perspective" Eastern Law House, New Delhi (2008).
8. Vibha Mathur, "WTO and India" New Century Publications, New Delhi, (2005).
9. Amrita Shahabadi, "World Trade Organisation", APH Publishing Corporation, New Delhi, (2007)
10. Anne O. Krueger, "The WTO – as an International Organisation, Oxford University Press, New Delhi (1998).
11. T. K. Bhaumik, "The WTO – A Discordant Orchestra" Sage Publications, New Delhi, (2006)
12. Bernard Hoekman, Aaditya Mattoo & Philip English, "Development, Trade, and the WTO" The World Bank, Washington, D.C., Atlantic Publishers & Distributors, New Delhi (2005)
13. Dr. S. R. Myneni, "World Trade Organisation", Asia Law House, Hyderabad (2012).
14. Palle Krishna Rao, "WTO Text & Cases", Excel Books, New Delhi (2005).

M.Com. Part II Semester III
Advanced Cost Accounting and Cost System Special Paper V.
Subject Title :- Cost Audit
Course Code :- 307

(w.e.f. Academic Year: 2014-15)

Objective :- To provide adequate knowledge on Cost Audit Practices.

Level of Knowledge – Advanced.

2014-15

Unit No.	TOPIC	Periods
Topic I	Introduction Meaning, Definitions, Objectives & Scope of Cost Audit, Advantages of Cost Audit the concepts of Efficiency Audit, Proprietary Audit, Social Audit, System Audit.	08
2.	Cost Auditor Qualifications, Disqualifications, Appointment, Remuneration & Removal of Cost Auditor, Status, Relationship with financial Auditor – Rights, Duties, Responsibilities & Liabilities of Cost Auditor under Company Act 2013. Cost & Works Accountants Act. 1959, & other Statutes as amended from time to time.	08
3.	Cost Audit – Planning & Execution Familiarization with the Industry, The production process, system & procedure, List of Records Preparation of the Cost Audit Programme, Verification of Cost Records, Evaluation of Internal Control System, Audit Notes & Working Papers, Cost Audit in Electronic Data Processing Environment.	10
4.	Cost Audit Report Detail contents of the Report, Distinction between ‘Notes’ & Qualification to the Report, Cost Auditor’s observation & conclusions. Study of Cost Records and cost Audit Rules u/s 148 of the Company Act 2013.	12
5.	Numerical Problems on Cost Audit Calculation of prices to be quoted, Valuation of Closing Stock of Raw material, W.I.P., Finished Goods, Scrap, Power Cost, Calculation of different ratios, suggestions for improvements, Element wise Contribution to the Variation of profits, Costing & financial profit & Loss Accounting, Reconciliation between cost profit and financial profit.	10
Total		48

Note – 1. All the amendments made to the respective Laws before one year Of the examination should be considered.

2. 80% marks for Theory and 20% marks for Practical Problems.

Area of the Practical Problems – Numerical Problems on Cost Audit.

References

1. Cost Audit and Management Audit-By D.Datta Chowdhary publication central Publication Kolkatta.
2. I.C.W.A. of India's publications
 - (A) Industry wise Cost Accounting Record Rules and Cost Audit Report Rules.
 - (B) Guidelines on Cost Audit.
 - (C) Cost Audit Reports Rules.
 - (D) Cost Audit Social Objectives.
3. Cost Audit and Management Audit – By V.K. Saxena and C.D. Vashist, Sultan Chand and Sons Delhi.
4. Cost Audit & Management Audit – By N.P. Agarwal.
5. The Management Audit- By P. William, Leonar.
6. Efficiency Audit- Mohanlal Jain, Printwel Jaipur.
7. Efficiency Audit- By Laxmi Narayan – Lon gman.
8. Institute of Cost and Works Accountants of India- Cost Audit Social Objectives.
9. Laws on Cost Audit- By N. Banerjee, International Law Book Centre, Kolkatta .
10. Cost and Management Audit-By Rajnath, published by Tata MC Graw Hill.

Journal – “Management Accountant”- ICWAI, Publication.

Web Site - www.mycicwai.org/

M.Com. Part II Semester III
Advanced Cost Accounting and Cost System Special Paper VI.
Subject Title :- Management Audit.
Course Code :- 308
(w.e.f. Academic Year: 2014-15)

Objective :- To equip the students with the knowledge of the techniques and methods of planning and executing the Management Audit. Level of Knowledge: Advanced
2014-15

Unit no	Topic	Periods
1.	Management Audit Introduction – Definition - Concept of Management Audit. Difference between Financial Audit & Management Audit. Objectives, Importance & Scope of Management Audit. Relationship among different audits	08
2.	Procedure of Management Audit Preliminaries of Management Audit. Conduct & Essentials of Management Audit. Program of Management Audit.	08
3.	Evaluation of Corporate Image. Meaning & Concept of Corporate Image, Corporate Image Program. Management Audit & Corporate Image. Evaluation of corporate image, Critical Path Method (CPM), Program Evaluation and Review Techniques (PERT.)	10
4.	Different Areas of Management Audit Corporate Service Audit, Corporate Development Audit and Social Cost-Benefit analysis Evaluation of- 1. Consumer Services. 2. Research and Development. 3. Corporate culture. 4. Personnel development.	12
5.	Operational Audit Meaning & Concept of Operational Audit. Objectives, plan for Operational Audit. Approach, method, evaluation, recommendations and reporting under Operational Audit. Program for Operational Audit.	10
	Total	48

Note :-

1. All the amendments made of the respective Laws before one year of the examination should be considered.

List of books/material recommended for study:

1. Cost Audit and Management Audit-D.Dattachoudhary-Central Publication, Kolkata
2. Cost Audit and Management Audit-V.K.Saxena and C.D.Vashist-S.Chand and Company
3. Management Audit-P.William Leaner
4. Cost Audit and Management Audit-Rajnathan-Tata Mcgraw Hill Publication
5. Journal : Management Accountant-ICWAI Publication

Website -

www.myicwai.org , www.aicmas.com

M.Com. Part II Semester III
Co-operation and Rural Development Special Paper V.
Subject Title :- Co-operative Credit System
Course Code :- 309
(w.e.f. Academic Year: 2014-15)

Objective :-

1. To acquaint students with the concept of Co-operative credit system
2. To study the organizational set-up of co-operatives system
3. Creating awareness about the problems of rural credit

Course Content :

Unit No.	Topics	Periods
1	Introduction 1.1 Definition of Credit 1.2 Importance of Agricultural Credit 1.3 Features of Credit 1.4 Types of Credit 1.4.1 Short Term Credit 1.4.2 Medium Term Credit 1.4.3 Long Term Credit 1.5 Need of Institutional Credit for Agricultural Limitations of Credit System	10
2	Structure of Credit Co-operatives 2.1 Federal Credit Co-operatives 2.2 Need for the Integration of Short Term, Medium Term and Long Term Credit	04
3	Agricultural Credit Co-operatives 3.1 Agricultural Credit Co-operatives- PACS 3.2 District Central Co-operative Bank-DCC Banks 3.3 State Co-operative Banks	04
4	Non Agricultural Credit Co-operatives 4.1 Urban Co-operative Societies 4.2 Salary Earners Co-operative Credit Societies 4.3 Other Non Agricultural Credit Societies	10
5	Regional Rural Banks 5.1 Need and Objectives 5.2 Formations. 5.3 Functions 5.4 Sources of finance 5.5 Performance 5.6 Problems and prospects	12
Total Periods		48

Recommended Books

Books :

1. G.S. Kamat. - New Dimensions of Co-operative Management
2. K.K. Taimani. - Co-operative Organization and Management.
3. G.S. Kamat. - Cases in Co-operative management.
4. S.L.Goyal Principle, Problems and Prospects of co-operative administration, Sterling publishing pvt. Ltd, Jalandhar.
5. Samiuddin & Rahman – Co-operative sector in India, S.Chand & Co.
6. Kamat G.S. – New Dimension of Co-operative management, Himalaya Publishing.
7. Krihanaswami O.R. – Co-operative Audit, National council for Co-operative training, New Delhi.
8. Khandelwal M.C. - Co-operative Audit, Patiyala Pustak Bhandar, Jaipur.
9. Samiuddin – Scope & Problems of Co-operative in India, Aligarh.
10. Samiuddin – C o-operative farming & its impact on Rural Industrialization, Aligarh
11. Dutt and Somsundaram- Indian Economy

Journals :

1. Journal of Rural Development, Hyderabad (Rajendranagar)
2. Journal of co-operative perspective, Pune
3. The Indian Journal of commerce, New Delhi
4. Journal of Sahakari Maharashtra, Pune
5. Journal of Southern Economics

M.Com. Part II Semester III
Co-operation and Rural Development Special Paper VI.
Subject Title -: Co-operative and Rural Banking System
Course Code -: 310
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To understand the operational process of disbursement of loans and advances.
2. To understand the supervisory role of Maharashtra State Co-operative Bank.
3. To make students familiar with the role of NABARD and RBI.
4. To make them aware of the cooperative movement and inculcate co-operational attitude among them.

Unit No.	Name of the Topic	Periods
1	Lending Operations: 1.1 Eligibility for advances 1.2 Procedures, Types and Disbursement of Crop Loan System, Kisan Credit Card 1.3 Advances to priority sector schemes 1.4 Over Dues-follow up ,NPA Concept and Norms 1.5	12
2	Maharashtra State Co-operative Bank (Apex Bank): 2.1 Objectives 2.2 Functions and Working 2.3 Role of MSC Bank in the development of State Co-operative movement 2.4 Progress, Problems and Prospects of MSC Banks	12
3	National Bank for Agricultural and Rural Development (NABARD) 3.1 Historical background, Organization and Functions 3.2 Role of NABARD in Agricultural Finance and Rural Development of India 3.3 Procedure and norms of finance and refinance 3.4 Performance and evaluation	12
4	Institutional Support to Co-operative Credit 4.1 Role of RBI in Co-operative Credit 4.2 Funding of RBI 4.3 National Federation of State Co-operation Banks 4.4 National Federation of Agricultural and Rural Development Bank.	12
	TOTAL	48

List of Books Recommended for Study
1. G.S. Kamat: New Dimensions of Co-operative Management 2. K.K.Taimani: Co-operative Organisation and Management 3. G.S. Kamat: Cases in Co-operative Management 4. Dr.G.H.Barhate, L.P.Wakale and B.G.Sahane , Sahakar Vikas, Seth Publication, Mumbai. 5. S.L.Goyal Principle, Problems and Prospects of Co-operative administration, sterling publishing pvt. Ltd. Jalandhar. 6. Samiuddin & Rahman- Co-operative sector in India , S.Chand & co. 7. Kamat G.S. –New Dimension of Co-operative management, Himalaya Publishing 8. Krishanaswami O.R.-Co-operative Audit, National council for Co-operative training , New Delhi. 9. Khandelwal M.C. - Co-operative Audit, Patiyala Pustak Bhandar, Jaipur. 10. Samiuddin-Scope & Problems of Co-operative sector in India , Aligarh. 11. Samiuddin- Co-operative farming & its impact of Rural Industrialization, Aligarh.
Journals: 1. Journal of Rural Development, Hyderabad (Rajendranagar). 2. Journal of Co-operative perspective, Pune. 3. The Indian Journal of Commerce, New Delhi. 4. Journal of Sahakari Maharashtra, Pune.

M.Com. Part II Semester III
Business Practices and Environment Special Paper V.
Subject Title :- Entrepreneurial Behavior
Course Code :- 311
(w.e.f. Academic Year: 2014-15)

Objective :-

1. To develop understanding of entrepreneurial environment amongst the students.
2. To motivate students to inculcate in the modern values of entrepreneurship.

Unit No.	Topic	Periods
1	Entrepreneurship & Entrepreneurship training Meaning & features – Personal qualities – Studies of personal & social traits – Assessing potential entrepreneurship – tools & techniques used Behavioral tests. Entrepreneurship training Objectives & importance – Training models – Training Components – Information input & training methodologies	12
2	Development of achievement motivation Sources of development of achievement - Skills required for effective Entrepreneurship Development - entrepreneurship problems - beliefs & attitude - limitations	12
3	Promoting Entrepreneurship role - task & challenges - Need & importance of trainer - Motivator skills & qualifications required - Training the trainer - development input for trainer motivator - post training support.	12
4	Business opportunity identification - guidance - Importance & relevance of business opportunity - process of identifying & assessing business opportunity - Selection of business opportunity - new trends in the service sector - scope for entrepreneurship in the service sector - market survey tools & techniques	12

Recommended Books :

1. S.S. Nadkarni-Developing new Entrepreneurs, EDII Ahmadabad.
2. N.P. Singh - Entrepreneurs v/s Entrepreneurship Asian society for ED.
3. Desai Vasant –Dynamics of Entrepreneurial development & management, HPH
4. Khairka S.S. Entrepreneurial Development, S.Chand & Co, New Delhi.
5. Moharana Drant Desai- Entrepreneurship Development, RBSA Publishers, Jaipur.
6. Paul Jose,Kumar N.Paul T.M. Entrepreneurship Development, HPH, New Delhi.
7. Saini J.S. Rathore B.S. Entrepreneurship Theory & Practice

M.Com. Part II Semester III
Business Practices and Environment Special Paper VI.
Subject Title :- Entrepreneurship Development Pattern.
Course Code :- 312
(w.e.f. Academic Year: 2014-15)

Objective :-

1. To expose the students to the various aspects of entrepreneurship.
2. To enable the students to do SWOT analysis of entrepreneurship as career options.

Unit No.	Topic	Periods
1	Problems in Entrepreneurship Development - Dot com entrepreneurship - role of Govt. in entrepreneurship development – R & D Technology for commercialization - Science technology & entrepreneurship development.	12
2	Specialized institutions involved in entrepreneurship development - Business incubation & venture capitalists – DIC - Entrepreneurship within organization - corporate strategy entrepreneurship.	12
3	Business idea search - Project identification - project design - Network analysis - Business model PERT - Critical path method - Creativity & innovation - Meaning & importance - role in developing a new business - Creativity & problem solving - preparation of business plan.	12
4	Entrepreneurship in education - emerging trends - role in DST in promoting entrepreneurship - Preparation of Business plan - issues in project management - project direction - co-ordination & control - project cost evaluations & cost control - Interface with industrial sickness - project monitoring & MIS.	12

Recommended Books

6. S.S. Nadkarni-Developing new Entrepreneurs, EDII Ahmadabad.
7. N.P. Singh- Entrepreneurs v/s Entrepreneurship Asian society for ED.
8. Desai Vasant – Dynamics of Entrepreneurial development & management, HPH.
9. Khairka S.S. Entrepreneurial Development, S.Chand & Co, New Delhi.
10. Moharana Drant Desai- Entrepreneurship Development, RBSA Publishers, Jaipur.
11. Paul Jose, Kumar N.Paul T.M. Entrepreneurship Development, HPH, New Delhi.
12. Saini J.S. Rathore B.S. Entrepreneurship Theory & Practice

M.Com. Part II Semester III
Business Administration Special Paper V.
Subject Title :- Human Resource Management
Course Code :- 313
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To acquaint the students with in-depth knowledge of HRM.
2. To inculcate among students various practices followed by HR managers.
3. To create understanding about recent trends in HRM

UNIT NO	CHAPTER	PERIODS
UNIT-I	HUMAN RESOURCE MANAGEMENT Introduction – Meaning & Definition .Concept, Approaches, Functions, Challenges of HRM in Indian Context & in changing business scenario. H R Environment – Technology and Structure, Network Organisations, Virtual Organizations, Workforce Diversity, Demographic Changes, Entry of female employees in the workforce, Dual Career Employees, Employee leasing, Contract Labour, Global Competition, Global sourcing of Labour, WTO and Labour Standards.	12
UNIT-II	MANPOWER PLANNING & DEVELOPMENT Objectives, Estimating Manpower Requirement, Recruitment & Selection Sources of Recruitment and Process of Selection & Assessment Devices Retention of Manpower, Succession Planning. Training Process and Methodology, Need and Objectives, Training Procedure, Methods of Training and Aids, Evaluation of Training Programmes.	12
UNIT-III	Performance Appraisal and Merit Rating. Definition, Methods of Performance Appraisal, Result Based Performance Appraisal, Errors, Ethics in Performance Appraisal, 360 Degree Feedback. Merit Rating – Promotions, Transfers, Job Description, Job Evaluation, Job Enlargement, Job Enrichment, Job Rotation.	12
UNIT-IV	Retirement/Separation/Retrenchment Strategies& New Concepts in HRM Kinds of Retirement, VRS and Separation Schemes, Early Retirement Plans, Resignation, Discharge, Dismissal, Suspension, Lay off. New Concepts of Customer Service Level and Agreement, SQDCS, HR Audit, Benchmarking, Downsizing, HR Outsourcing, Assessment Centres. Building Human capital & Employee Satisfaction Survey	12
	TOTAL	48

Recommended Books :

1. Human Resource Management -Garry Dessler
2. Human Resource Management -R S Dwiwedi
3. Human Resource Management -V P Michael
4. Human Resource Management -Mirza and Saiyadin
5. Managing Human Resource -Arun Monappa
6. Strategic Human Resource Management – Charles R Green
7. Strategic Human Resource Management - Kandula
8. Strategic Human Resource Management -Jeffery B Mello
9. Personnel & Human Resource Management -Robert Mat & Jhon Jackson
10. Dynamics of Personnel Administration –Dr.Rudrabasavraj
11. Personnel & Human Resource Management –A.M Saxena
12. Manushyabal Vyavasthapan Va Audyogik Sambandha -Dr Madhavi Mitra
13. Employee First & Customer Second :Vinit Nayer

M.Com. Part II Semester III
Business Administration Special Paper VI.
Subject Title :- Organizational Behaviour
Course Code :- 314
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To make the students understand various concepts of organisation behaviour
2. To provide in depth knowledge about process of formation of group behaviour in an organization set up

UNIT NO	CHAPTER	PERIOD
UNIT-I	INTRODUCTION TO ORGANISATIONAL BEHAVIOUR Definition and Goals of Organisational Behaviour, Theoretical and Conceptual Frameworks for the Study of Organisational Behaviour. Role of Information Technology in Organisation .Impact of Globalisation on OB .Models of Organisational Behaviour – Autocratic, Custodial, Supportive, Collegial and SOBC	12
UNIT-II	ORGINSATIONAL DESIGNS , CULTURE ,PERSONALITY & ATTITUDES Horizontal Network and Virtual Designs. Definition and Characteristics of Organisational Culture .Creating and Maintaining Culture .Process of Impression Management: Personal branding, Meaning of Personality, Attributes of Personality Dimensions of Attitude, Attitude Change Jon Satisfaction, Outcomes of Job Satisfaction	12
UNIT-III	MOTIVATIONAL PROCESSES & EMOTIONAL INTELLIGENCE Types of Motives – Primary, General, Secondary Vroom's Expectancy Theory Meaning of Emotional Intelligence Emotional Intelligence in the Workplace	12
UNIT-IV	STRESS AND CONFLICT, GROUPS & TEAMS Meaning & Causes of Stress: Extra Organizational, Organizational, Group and Individual Types of Conflict: Intra individual, Interactive The Effects of Stress and Conflict Managing Stress and Conflict Concept of Work-life Balance. Types of Groups, Groups Cohesiveness. Dysfunctions of Group Types of Teams and Team Building	12
	TOTAL	48

RECOMMENDED BOOKS :

1. Organizational Behaviour -Freud Luthans
2. Human Behaviour at Work -J W Newstorm
3. Organisation Behaviour : Text and Cases -Games K, Aswathappa
4. Organisational Behaviour -Stephen Robbins
5. Organisational Behaviour -Dr Mrs Oka & Mrs Kulkarni

M.Com. Part II Semester III
Advanced Banking & Finance Special Paper V.
Subject Title -: Foreign Exchange.
Course Code -: 315
(w.e.f. Academic Year: 2014-15)

Objective -:

1. To provide an understanding of various aspects of foreign exchange market.
2. To acquaint the students with financing of foreign trade.
3. To provide an understanding of exchange rate mechanism and factors affecting exchange rates.
4. To make students aware of development in foreign exchange market.

Unit No.	Topic	Periods
1	Foreign Exchange Market: • Meaning of foreign exchange • Features of foreign exchange market. • Participants of foreign exchange market. • Spot market: features • Forward market: features • Forward market Hedging • Swap rates • Currency futures • Currency Options • Risk in Foreign Exchange Market	12
2	Foreign Exchange Market in India: • Structure and Growth of Indian foreign Exchange Market • Foreign Exchange Management Act, 2000: Origin & Scope • Authorized money changers and Authorized Dealers in Foreign Exchange. • Dealing Rooms – Concept & Importance • Types of Accounts: of Non-Resident Indians • Meaning of Non-Resident • Non-Resident (External) Account (NRE) • Non-Resident (Ordinary) Account (NRO) • Foreign currency (Non-Resident) Account (FC NR) • Resident Foreign Currency Account (RFC) • Non-Resident Non-Repatriable Account (NRNR) • Role of Reserve Bank of India in Foreign Exchange Market. • Factors Influencing foreign exchange rate	16
3	Financing of Foreign Trade: Objectives of Foreign Trade Documentation. Documents: • Letter to Credit (L/C) • Parties to L/C; operation of L/C • Types of L/C: Revocable & Irrevocable • Transferable, Back to back credits	10

	• Revolving L/C • Anticipatory L/C • Draft, Types of draft. • Mate's Receipt. Bill of lading, Invoice. Insurance policy, • Certificate of origin, consular's invoice, bill of exchange	
4	Methods of Financing Foreign Trade: Bank Credit – • Pre-shipment credit • Post-shipment credit • Medium-term credit • Credit under duty draw back scheme Export-Import Bank of India (EXIM Bank): Objectives, Functions, Performance and Role, Export Credit Guarantee Corporation (ECGC)	10
	Total	48

Recommended Books:

1. International Financial Management - V. Sharan
2. Financial Institution and Markets-a Global Perspective-Hazel J. Johnson
3. Foreign Exchange; International Finance-Risk Management-A.V. Rajwade
4. Financial Markets and Institutions- L.M. Bhole
5. International Financial Management-Eun/Resnick
6. International Financial Management, Markets, Institutions-James C. Baker-
7. Reserve Bank of India Bulletin-
8. Annual Reports of IMF, World Bank, Asian Development Bank.
9. Reports on Trends & progress of banking in India –RBI

M.Com. Part II Semester III
Advanced Banking & Finance Special Paper VI.
Subject Title :- International Finance.
Course Code :- 316
(w.e.f. Academic Year: 2014-15)

Objective :-

1. To Provide understanding of International Financial market.
2. To acquaint the students with International monetary system
3. To Provide understanding of operations of international Financial Institutions

Unit No.	Topic	Periods
1 a	International Banking: Reasons For International Banking Types of International Banking offices: Correspondent Bank Foreign Offices Subsidiary and Affiliate Banks Offshore banking Centers.	10
b	International Money Market: Euromarkets- Development of Eurodollar Market. Instruments - Euro Notes, Euro commercial Paper, Medium-term Euro Notes.	
2	International Debt and Equity Markets: International Debt Market Instruments: Procedure for Issue of – Foreign Bonds Euro Bonds Global Bonds Convertible Bonds Floating rate Notes International Equity Market Instruments: Procedure for Issue of – American Depositary Receipts (ADR) Global Depository Receipts (GDR)	12
3	New Exchange Rate Regime: Floating Rate System: Independent Float and Managed Float. Currency Pegging: Pegging to single Currency ; Pegging to basket of Currencies ‘Pegging to SDRS (Special Drawing Rights); Crawling Peg. Convertible and Non-Convertible Currency.	14
4	International Financial Institutions Origin, Objectives, Structure and Operations of: A. Bank for International Settlements (BIS) B. International Monetary Fund (IMF) C. World Bank Group: International Bank for Reconstruction and Development (IBRD); International Finance Corporation (IFC); BRICS.	12
	Total	48

Recommended Books:

1. International Financial Management - V. Sharan
2. Financial Institution and Markets - a Global Perspective - Hazel J. Johnson
3. Foreign Exchange; International Finance-Risk Management-A.V. Rajwade
4. Financial Markets and Institutions- L.M. Bhole
5. International Financial Management-Eun/Resnick
6. International Financial Management, Markets, Institutions-James C. Baker-
7. Reserve Bank of India Bulletin-
8. Annual Reports of IMF, World Bank, ADB.

M.Com. Part II Semester III
Advanced Marketing Special Paper V.
Subject Title -: International Marketing.
Course Code -: 317
(w.e.f. Academic Year: 2014-15)

Objectives

- The Course participants will become more familiar with the nature and practices of international marketing. They should feel equally confident to be able to distinguish international marketing mechanics from the domestic marketing models and approaches.
- They would be far more equipped to design and participate in designing an international marketing strategy.
- The spin-off benefits to the participants should be to develop in them a right attitude, inject enthusiasm and hone their interactive ability as they address the issues and challenges of operating in the international markets.

S.N.	New Topic	Periods
1	Introduction • Concept of International Marketing and its scope, Objectives of International Marketing. • Reason of entry in International Marketing. • Challenges and Opportunities in International Marketing.	12
2	International Marketing Environment • Macro factors (Economic, Political, Legal, Socio-Cultural & technological factors affecting international market. • Recent import and export policies & procedures.	10
3	International Marketing Mix • International Research and Segmentation • Developing Global Products and Pricing • International Promotion and Advertising • International Distribution Systems • GATT, WTO, Facilities & incentives related to export Business	12
4	Procedural Aspect Export Documentation and arranging Finance for Exports. • Processing/Manufacturing goods for Export and their inspection by Government Authorities Compulsory Quality Control and pre-shipment Inspections, Excise Clearance, Insuring goods against marine risk, Marine Insurance, Submitting documents to Bank for purchase/Collection/ Negotiation under L/C. Export Credit Limit. • Financial and fiscal incentives provided by the Government and Foreign exchange facilities by the R.B.I. and EXIM Bank. Institutional support from Government.	14
	Total	48

Recommended Books:

1. Winning The World Marketing – Bhattacharya
2. International Trade and Export Management – B.M. Wahi and A.B. Kalkundribar.
3. International Marketing Management – Varshney and Bhattacharya
4. International Marketing Export Marketing – S.Shiva R amu
5. International Marketing – S.S. Rathor, J.S. Rathor
6. Global Marketing Strategy – Douglas & Craig
7. Export Marketing – Michael Vaz
8. Export Marketing – Francis Cherunilam
9. Export Marketing – B. Bhattacharya
10. Export - What, Where & How – Parasram
11. Essentials of Export Marketing – S.A. Chunnawala

M.Com. Part II Semester III
Advanced Marketing Special Paper VI.
Subject Title :-‘Marketing Research’.
Course Code -: 318

(w.e.f. Academic Year: 2014-15)

Sr. No	New Syllabus	Lectures
1	INTRODUCTION & MARKETING RESEARCH PROCESS : A) Marketing Research- Meaning, Factors involved in Marketing Research, Types of Marketing Surveys, Role of Marketing Research in Marketing, Implications of marketing research on marketing mix(7 P's), Ethics in Marketing Research, Career in Marketing Research. B) Research Process- Formulating the Problem, finding basic research issues, Developing Hypotheses, Characteristics of a good Hypothesis, Research Methods, Research Design, Sampling, Data Collection Techniques, Data Analysis & Interpretation, Writing a Research Report.	16
2	MARKETING RESEARCH IN PRACTICE: A) Marketing Research Department's Goals- Pragmatic, Selective, and Evaluative, Marketing Decision Support System (MDSS) - Scope & Significance, Role of MDSS in Decision Making, Characteristics of a good MDSS, Components of MDSS. B) Applications of Marketing Research : Cluster analysis for identifying market segments, Conjoint analysis for Product research, Multi-dimensional scaling, Discriminate analysis and perceptual mapping for Brand positioning research, Advertising research – copy testing, media selection, media scheduling, Market and Sales Analysis, Sales forecasting – objective and subjective methods, Test marketing, Industrial versus consumer marketing research.	16
3	MARKET INFORMATION: Meaning and Importance, Sources of Collecting Marketing Information, Using Secondary Data Sources, Standardized Sources of Collecting Data- Home Audit, Mail Diary, Shop and retail audits, Readership surveys and viewer ship surveys.	08

4	THE INTERNET AND MARKETING RESEARCH TODAY: Meaning, Importance, Advantages & Disadvantages of Web Based Marketing Research, Primary & Secondary Data Collection through Internet, Reach analysis, Marketing Research in Social Media, Online Brand Perception Research, Online Targeted Advertising.	08
	Total	48

References:

1. Research for Marketing Decisions – Paul Green, Donald Tull, Gerald Albaurn
2. Marketing Research –Aakar, Kumar, Day
3. Marketing Research – Thomas C. Kinneear
4. Marketing Research – Nargundkar
5. Marketing Research – Measurement & Methods – Donald S. Tull, Del I. Hawkins
6. Marketing Research – Beri
7. Business Research Methods – Cooper.
8. Basic Marketing Research: Volume 1-Scott M. Smith Gerald S. Albaum.
9. Essentials of Marketing Research: Paurav Shukla.

UNIVERSITY OF PUNE

Master of Commerce (M.Com.) Semester Pattern with Credit System Revised with effect from June 2013

Preamble for Choice Based Credit System

Since liberalization the socio-political-economic scenario is changing very fast. There is a significant transformation in term educational expectation and aspiration of the learner. The educational system also is witnessing many changes and challenges due to technological growth and changes in the Government policies. Education is no longer a concern of students but it has become a matter of social and economic importance. The changes at the global level has influence the educational system, structure and expectation of the users.

University education needs to take contingency of all these changes and restructure itself to stand in a competitive dynamic environment. Professional stream of learning like Commerce have to be properly upgraded to accommodate challenges of change, expectation of employers' and to offer global opportunities to the learners. From this point of view the course structure of post-graduate programme in Commerce needs to be structured. It has to be according to expectations of the learners, employers and the society. The learning inputs have to be more update, skilled based and with appropriate applications. The course programme should consider desire aptitude, attitude and acumen of the learner.

From this point of view University of Pune has introduced Choice Base Credit System of course structure. This system shall offer a flexible user friendly, opportunity to the learner, will broaden the horizon of Commerce education and will give a fair chance to every single learner to exhibit his talent, acquired skills and enhance his personality. It will further enhance his opportunity of global mobility, to acquire different knowledge inputs from different global institutes.

1. Objectives :

- a. To equip and train Post Graduate students to accept the challenges of Business World by providing opportunities for study and analysis of advanced Commercial and business methods and processes.
- b. To develop independent logical thinking and facilitate personality development.
- c. To equip the students for seeking suitable careers in management and entrepreneurship.
- d. To study by students methods of Data collection and their interpretations.
- e. To develop among students Communication, Study and Analytical skills.

2. Duration :

The M.Com. Course will be of Two Years duration consisting of Two part. i.e. Part I and Part II. Each part is having Two Semesters. Thus the M.Com. Course is of Four Semesters. For each Semester there will be Four Papers of 100 marks each. The M.Com. Degree will be of 1600 marks in aggregate.

3. Duration and Structure of Programme:

The M.Com (Semester pattern with Credit System) degree Programme shall be of 2 years' duration divided into two parts, Part I and Part II, and 4 semesters.

4. Eligibility :

The student who has passed any Bachelors degree of this University or any other recognized University shall be held eligible to be admitted to M.Com. Course.

5. Course Structure:

The M.Com. degree course will be of two year duration consisting of four semesters and of minimum 64 credits as below:

Sr. No.	Semester	Total Credits
1	Semester I	16
2	Semester II	16
3	Semester III	16
4	Semester IV	16
	Grand Total	64

Four credits for project work at 4th Semester (This will include credits for fieldwork, data presentation and report writing)

In each Semester, there will be four papers of 100 marks each out of which 50 marks will be for Internal Assessment (attendance, home assignments, class tests, long term papers, classroom presentation and 50 marks for University Examination. Thus M.Com. degree examination, four Semesters shall be of 1600 marks and of minimum 64 credits altogether. The following shall be the course structure.

6. The Scheme of Papers: The following will be the Scheme of papers:

The List of Courses Semester I

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester I	Core Compulsory	101	Management Accounting	04	04	03	50	50	100
		102	Strategic Management	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	<i>To choose any one Group of the following</i>							
		Group A (Advanced Accounting & Taxation)							
		103	Advanced Accounting	04	04	03	50	50	100
		104	Income Tax	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		105	Information system and E-Commerce Practices	04	04	03	50	50	100
		106	Intellectual Property Laws	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		107	Advanced Cost Accounting	04	04	03	50	50	100
		108	Costing Technique and Responsibility Accounting	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		109	Co-operative Movement in India	04	04	03	50	50	100
		110	Organization of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		111	Organized Trades and Markets	04	04	03	50	50	100
		112	Business Environment and Policy	04	04	03	50	50	100
		Group F (Business Administration)							
		113	Production and Operation Management	04	04	03	50	50	100
		114	Financial Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		115	Legal Framework of Banking	04	04	03	50	50	100
		116	Central Banking	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		117	Marketing Techniques	04	04	03	50	50	100
		118	Consumer Behaviour	04	04	03	50	50	100

Semester II

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester II	Core Compulsory	201	Financial Analysis and Control/ Principals of Financial Accounting	04	04	03	50	50	100
		202	Industrial Economics/ Economic Environment/Business Statistics/ Quantitative application	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		203	Specialized Areas in Accounting	04	04	03	50	50	100
		204	Business Tax Assessment & Planning	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		205	E- Security & Cyber Laws	04	04	03	50	50	100
		206	Laws Regulating to Copyrights & Design	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		207	Application Cost Accounting	04	04	03	50	50	100
		208	Cost Control & Cost System	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		209	International Co-operative Movement	04	04	03	50	50	100
		210	Management of Co-operative Business	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		211	Modern Business Practices	04	04	03	50	50	100
		212	Business Environment Analysis	04	04	03	50	50	100
		Group F (Business Administration)							
		213	Business Ethics and Professional Values	04	04	03	50	50	100
		214	Elements of Knowledge Management	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		215	Banking Law & Practices	04	04	03	50	50	100
		216	Monetary Policy	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		217	Customer Relationship Management & Retailing	04	04	03	50	50	100
		218	Services Marketing	04	04	03	50	50	100

Semester III

Semester	Subject Types	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester III	Core Compulsory	301	Business Finance	04	04	03	50	50	100
		302	Research Methodology for Business	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		303	Advanced Auditing	04	04	03	50	50	100
		304	Specialized Areas in Auditing	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		305	Laws Relating to International Business	04	04	03	50	50	100
		306	World Trade Organization – Norms & Practices	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		307	Cost Audit	04	04	03	50	50	100
		308	Management Audit	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		309	Co-operative Credit System	04	04	03	50	50	100
		310	Co-operative and Rural Banking System	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		311	Entrepreneurial Behaviour	04	04	03	50	50	100
		312	Entrepreneurship Development Pattern	04	04	03	50	50	100
		Group F (Business Administration)							
		313	Human Resource Management	04	04	03	50	50	100
		314	Organizational Behaviour	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		315	Foreign Exchange	04	04	03	50	50	100
		316	International Finance	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		317	International Marketing	04	04	03	50	50	100
		318	Marketing Research	04	04	03	50	50	100

Semester IV

Semester	Subject Type	Course Code	Title of the Paper	Hrs/ Week	Credit	Exam. Hours	Maximum Marks		
Semester IV	Core Compulsory	401	Capital Market and Financial Services	04	04	03	50	50	100
		402	A. Industrial Economic Environment Or B. Operations Research	04	04	03	50	50	100
	Core Elective/ Optional Subjects/ Special Subjects	To choose any one Group of the following							
		Group A (Advanced Accounting & Taxation)							
		403	Recent Advances in Accounting, Taxation and Auditing	04	04	03	50	50	100
		404	Project Work/ Case Studies	04	04	03	50	50	100
		Group B (Commercial Laws & Practices)							
		405	Recent Advances in Commercial Laws and Practices	04	04	03	50	50	100
		406	Project Work/Case Studies	04	04	03	50	50	100
		Group C (Advanced Cost Accounting & Cost system)							
		407	Recent Advances in Cost Auditing and Cost System	04	04	03	50	50	100
		408	Project Work/Case Studies	04	04	03	50	50	100
		Group D (Co-operation & Rural Development)							
		409	Recent Trade in Co-operative and Rural Development	04	04	03	50	50	100
		410	Project Work / Case Studies	04	04	03	50	50	100
		Group E (Business Practices & Environment)							
		411	Recent Advances in Business Practices and Environment	04	04	03	50	50	100
		412	Project Work/Case Studies	04	04	03	50	50	100
		Group F (Business Administration)							
		413	Recent Advances in Business Administration	04	04	03	50	50	100
		414	Project Work/Case Studies	04	04	03	50	50	100
		Group G (Advanced Banking & Finance)							
		415	Recent Advances in Banking and Finance	04	04	03	50	50	100
		416	Project Work/Case Studies	04	04	03	50	50	100
		Group H (Advanced Marketing)							
		417	Recent Advances in Marketing	04	04	03	50	50	100
		418	Project Work/Case Studies	04	04	03	50	50	100

7. Scheme of Examination:

The examination of regular students of M.Com. degree course of the University of Pune admitted in the academic session 2013-14 and after shall be based on:

- (a) Semester Examination
- (b) Continuous Assessment
- (c) Choice Based Credit System, and
- (d) Semester Grade Point Average and Cumulative Grade Point Average System

For each paper of 100 marks, there will be an Internal Assessment (1A) of 50 marks and the University Examination (UE) of 50 marks/ 3 hours duration at the end of each semester. A candidate who will secure at least 40% marks allotted to each paper will be given 4 credits. A candidate who does not pass the examination in any subject or subjects in one semester will be permitted to appear in such failed subject or subjects along with the papers of following semesters.

The Internal Assessment for each paper will be 50 marks which will be carried out by the department during the term. The Internal Assessment may be in the forms of written test, seminars, term papers, presentations, assignments, orals or any such others. The distribution of internal assessment marks shall be as follows:

Midterm Test	20
Presentation/Role Play	10
Case studies/ Group Discussion	10
Quiz / Home Assignment	10
Total	50

There shall be four semester examinations: first semester examination at the middle of the first academic year and the second semester examination at the end of the first academic year. Similarly, the third and fourth semester examinations shall be held at the middle and the end of the second academic year, respectively.

A student cannot register for the third semester, if she/he fails to complete 50% credits of the total credits expected to be ordinarily completed within two semesters.

8. Research project work:

There will be a Research Project to be prepared by a student during the fourth semester. The objective of the project work is to introduce students to research methodology in the subject and prepare them for pursuing research in theoretical or experimental or computational areas of the subject. The project work is to be undertaken under guidance of a teacher allotted to a student by the department.

Division of marks	Marks	
A. Synopsis with working bibliography (Internal Assessment)	40 marks	50 marks
Viva Voce (Internal Assessment)	10 marks	
B. A full project Report (Minimum 50-80 pages) (Internal & External Assessment)	40 marks	50 marks
Viva Voce (Internal & External Assessment)	10 marks	

As the Research Project is based on the self study done by the candidate and evaluated for 100 marks altogether, 04 credits will be awarded to a successful candidate in this subject. The project may be evaluated by two examiners one internal and one external, selected from the panel of PG examiners of the University. The Viva voce must be conducted by the teachers selected out of the panel of PG examiners maintained by the University.

The candidates have to submit the project 15 days before the commencement of the fourth semester university examination. The project report shall be type-written and submitted in duplicate. A candidate who fails to submit the project may resubmit the same in the subsequent semester examination for evaluation. The project work activities must be duly supported by documentary evidence to be endorsed by the Head or Guide.

9. Standard of passing:

A candidate shall be declared to have passed in the paper provided he/she has secured minimum GP of 4.5 in the UNIVERSITY EXAMINATION and GRADE POINT AVERAGE of 4.0 in aggregate of UNIVERSITY GRADE and INTERNAL ASSESSMENT taken together.

10. Classification of successful candidates:

Candidates who secured not less than 60% of aggregate marks (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) in the whole examination shall be declared to have passed the examination in the first class. All other successful candidates shall be declared to have passed in second class. Candidates who obtain 70% of the marks in the aggregate (INTERNAL ASSESSMENT +UNIVERSITY EXAMINATION) shall be deemed to have passed the examination in first class with distinction.

A student who passess in all the courses will be declared to have passed the M.Com. degree with the following honours.

CGPA in (4.00, 4.99)	- Pass Class
CGPA in (5.00, 5.49)	- Second Class
CGPA in (5.50, 5.99)	- Higher Second Class
CGPA in (6.00, 7.99)	- First Class
CGPA in (8.00, 10.00)	- First Class with Distinction

11. Scheme of Credits:

Sixty (60) hours of teaching will lead to three credits (which mean four hours per week teaching in one semester) and long term paper as well as presentation will carry one credit. Each semester shall have 16 credits.

12. Structure of Transcript:

At the end of each semester, student will be given a transcript showing the performance and result in each course. The transcript shows, for each course the title of the course, credit values, grade in UNIVERSITY EXAMINATION , grade in INTERNAL ASSESSMENT , grade point index, result as pass or fail. Also, the semester grade point average (SGPA) and cumulative grade point average (CPGA) will be shown. Further the equivalent percentage of marks corresponding to SGPA or CGPA to equivalent percentage is given by:

$$\text{Equivalent percentage marks} = \begin{cases} 10 \times \text{CGPA} & \text{if CGPA /SGPA is in [4.00, 6.00]} \\ 05 \times \text{CGPA} + 30 & \text{if CGPA /SGPA is in [6.00, 9.00]} \\ 25 \times \text{CGPA} - 150 & \text{if CGPA /SGPA is in [9.00, 10.00]} \end{cases}$$

Marks	Grade	Grade Point
100 to 75	O : Outstanding	06
74 to 65	A : Very Good	05
64 to 55	B : Good	04
54 to 50	C : Average	03
49 to 45	D : Satisfactory	02
44 to 40	E : Pass	01
39 to 0	F : Fail	00

(C) GPA	Grade
05.00 – 6.00	O
04.50 – 04.99	A
03.50 – 04.49	B
02.50 – 03.49	C
01.50 – 02.49	D
00.50 – 01.49	E
00.00 – 00.49	F

13. Distribution of Periods:

There shall be 60 periods for each subject to cover the entire teaching of 4 credits. This will be distributed as follows:

Particulars	Periods
Teaching session per programme	48
Assignment/ Test	04
Role play/ Group Discussion	04
Case studies and presentation	04
Total	60

14. Standard of Passing.

- A. Regular students: - A candidate is required to obtain 40% marks in each of course in both Mid Semesters and Semester end. It means passing separately at Mid-Semester and semester Examinations is compulsory.

15. Award of Class.

- a. The class in respect of M.Com. Examination will be awarded on the basis of aggregate marks obtained by the candidates in all the sixteen papers at the Semester I, II, III, and IV together.
The Award of class shall be as under:-
- b. Improvement: - A candidate having passed M.Com. Examination will be allowed to improve the performance. The same is termed as 'Class Improvement Scheme' under which improvement of performance shall be allowed only at the Semester end Examination.
- c. A candidate after passing M.Com. Examination will be allowed to appear in the additional Special Subject after keeping necessary terms in the concerned special subject only, for which a passing certificate will be issued.

16. Medium of Instruction :

The use of Marathi is allowed for writing answers in the examination except for following courses:

- Management Accounting
- Financial Analysis & Control
- Business Statistics,
- Advanced Accounting and Taxation
- Advanced Cost Accounting and Cost Systems.

17. A student (Regular / External) will be admitted to Revised M. Com. Course with effect from June 2013. For the students who have completed the terms for the First Year as per Old Course will be admitted to the Second Year as per Old Course M. Com. The examination as per Old Course will be held simultaneously for three years from April / May 2014.

18. Qualification of the Teachers :

The Teachers recognized to teach the subjects as per Old Course shall be deemed to be recognized in the corresponding equivalent subjects under Revised Course.

In case of: A) Business Statistics, B) Industrial Economics, C) Co-operation and Rural Development, D) Advanced Banking and Finance and E) Research Methodology and Project Work- Paper-IV of each Special Subject, the following qualifications be made applicable.

- A. Business Statistics :** M.Com, M.Phil with Statistics or Research Methodology as one of the Papers at M.Com /B.Com /M. Phil examination with 5 years degree teaching experience or M.A./M.Sc. With Statistics having 5 years degree teaching experience.
- B. Industrial Economics:** M.Com., M. Phil with Business Economics/Economics of Industries or Economics as one of the papers at B. Com/ M.Com Examination with 5 years degree teaching experience or M.A. Economics with 5 years degree teaching experience.
- C. Co-operation and Rural Development:** M. Com, M. Phil. With 5 years degree teaching experience or M.A. Economics (with Co-operation Rural Economics)
- D. Advanced Banking and Finance:** M. Com., M. Phil., with Banking as one of the papers at B.Com/M.Com examination 5 years degree teaching experience.
- E. Research Methodology and Project Work:** M.Com. M.A (Eco.) M.Phil./Ph.D. with 5 years degree teaching experience.
- F.** Similarly all the changes in qualification as per U.G.C norms and guidelines shall also be applicable as and when the changes come into force (If applicable)

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M.Com. Part II Semester IV
Compulsory Paper
Subject Name -: Capital Market and Financial Services.
Course Code -: 401.
(w.e.f. Academic Year: 2014-15)

Objective:

To enable students to acquire sound knowledge, concept and structure of capital market and financial services.

Unit No.	Topic	Periods
1	Capital market: Meaning, Functions, Structure, Characteristics, Participants of capital market - Capital market instruments, Equity share, Preferences shares, Debenture, Bonds - Innovative debt instruments - Forward contracts, Futures contract - Options contract, trends in capital market.	10
2	Stock Market Stock exchange: organization-membership-governing body - Bombay stock exchange, National Stock Exchange and Over the Counter Exchange of India (OTCEI) 1. Primary market - Functions of primary market - issue mechanism, participants 2. Secondary market : Objectives, functions of secondary markets, stock broking, e-broking, depository system-functions and benefits stock market trading-derivatives trading	10
3	Financial Services Merchant banking-meaning-functions and services rendered Mutual funds: Meaning, functions-Types-Open and closed ended funds-income funds balanced fund, growth fund-index fund Portfolio management-meaning and services Credit rating-meaning and need, various credit rating agencies. Foreign Direct Investment	16
4	Securities and Exchange Board of India (SEBI) Background, Establishment, functions, powers, achievements and Regulatory aspects, recent changes & emerging trends.	12
	Total	48

Recommended Books :

1. M.Y. Khan: Indian financial system-Tata Macgraw Hill Publishing Co. Ltd.
2. Frank J.Fabozzi & Franco Modigliani : Capital markets institutions and instruments - Prentice Hall of India, New Delhi
3. Fredric Mishkin and Stanley Eakins, Financial Markets and Institutions, Pearson Prentice Hall, Boston san Francisco, New York.

M.Com. Part II Semester IV
Compulsory Paper
Subject Name -: Industrial Economic Environment.
Course Code -: 402-A
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To study the basic concepts of Industrial Finance.
2. To study the effects of New Economic Policy.
3. To study the impact of Labor reforms on Industries.

Chapter No.	Particulars	Total Lectures (48)
1.	Industrial Finance 1.1 Meaning, Concept and Functions of Industrial Finance. 1.2 Internal Sources of Industrial Finance. 1.3 External Sources of Industrial Finance – Foreign Direct Investment (FDI), Foreign Institutional Investment (FII), Non Residential Indians (NRI) as a Source of Industrial Finance	8
2.	Industrial Growth and Policy in India 2.1 Industrial Growth in India Since 1991. 2.2 New Industrial Policy 1991. 2.3 Export and Import Policy Since 1990-91. 2.4 Multi National Corporations – Performance and Problems 2.5 Special Economic Zones (SEZ) – Progress and Problems	8
3.	Effects of New Economic Policy (1991). 3.1 Liberalization – Concept & its Effects on Indian Industry. 3.2 Privatization - Concept & its Effects on Indian Industry. 3.3 Globalization - Concept & its Effects on Indian Industry.	8
4.	Industrialization and Environmental Issues. 4.1 Industrial Development & Environmental Problems. 4.2 Major Environmental Issues in the Process of Industrialization- Social Cost & Benefits (pollution, Health issues, work management etc) 4.3 Environmental Policy and Regulations.	8
5.	Information Technology (IT) Industries. 5.1 Meaning and dimensions. 5.2 Major issues in Information Technology. 5.3 Growth & Present position of IT Industries in India. 5.4 Future Prospects of IT Industry.	8

6.	Industrial Relations and Labour Reforms. 6.1 Meaning and Causes of industrial Disputes. 6.2 Machinery for Settlement of Industrial Disputes. 6.3 Labour Policy Reforms and Its Impact on Industries.	8

Recommended Books

1. S. C. Kuchal – Industrial Economy of India.
2. D. R. Gadgil – Industrial Evolution in India, Oxford.1948
3. K. V. Sivayya and V.B.M. Das – Indian Industrial Economy, Chand and Co. Ltd. New Delhi 1999
4. S. C. Kuchal – Major Industries in India, Chaitanya Publishing House, Allahabad.
5. Francis Cherunilam – Industrial Economics – Indian Perspective, Himalaya Publishing House, Mumbai.1999
6. Wadilal Dagli – A profile of Indian Industry, Vora and Co. Mumbai.
7. Dutt and Sunderam – Indian Economy, S. Chand and Co. 2008

Suggested format of Continuous assessment along with allocation of Periods

Sr. No.	Assessment Chart	Periods Alloted
1.	Tests	3
2.	Quizzes	3
3.	Presentation Seminars	3
4.	Assignments	3

M.Com. Part II Semester IV
Compulsory Paper
Subject Name -: Operation Research.
Course Code -: 402-B
(w.e.f. Academic Year: 2014-15)

Objectives :

- 1) To understand and master the concepts of Operations Research.
- 2) To inculcate an attitude of enquiry , logical thinking about Quantitative techniques.
- 3) To develop skills of facing real life problems using operational research techniques .
- 4) To prepare students to understand the art of applying Operational research techniques.
- 5) To gain knowledge of Operations research.

Unit no.	Topic	Periods
1.	Game Theory 2.1 Introduction 2.2 Characteristics of game theory 2.2 Two person zero sum game, Pay off and pay off matrix, saddle point, pure strategy, mixed strategy, value of game 2.3 Dominance Principle. 2.4 Algebraic system of solving 2X2 Game 2.5 Numerical problems	8
2.	Linear Programming Problem (L. P. P.) 3.1 Introduction, Advantages and Applications of L.P.P. 3.2 Basic Definitions and Terminology, Formulation, Canonical and Standard forms, Slack, Surplus and Artificial variables 3.3 Solution by graphical method (for problems with two variables only), 3.3 Solution by simplex method (canonical form and two iterations only) 3.4 degenerate, alternate , unbounded and Infeasible solutions 3.5 Formation of dual of a L. P. P. 3.6 Numerical problems	14
3.	Transportation Problem (T. P.) and Assignment Problem 3.1 Definition, T.P. as L.P.P., balanced and unbalanced T. P. 2.2 Methods of finding Initial Basic Feasible Solution (I. B. F. S.) a. North – West corner method b. Matrix Minima Method	14

	c. Vogel's approximation method 3.3 Optimal solution by U-V method 3.4 Maximization and degeneracy in T. P. 3.5 Definition, balanced and unbalanced A.P. 3.6 Hungarian method 3.7 Variations of A.P (maximization and restrictions) 3.5 Numerical Problems	
4.	Project Management and Sequencing 4.1 Activity, Event, Loop, Network (definition and drawing) 4.2 Critical Path Method(CPM): critical activity, critical path, float (free, independent, total) , forward pass and backward pass calculations 4.3 Programme Evolution and Review Technique PERT) : optimistic, pessimistic, most likely time estimates, expected time estimate and its variance 4.4 Numerical Problems 4.5 Assumptions in sequencing model, Basic terminology, n-jobs through two machine problems.	12

Recommended Books:

1. Operations Research : Hamdy Taha
2. Operations Research: V.K. Kapoor
3. Operations Research : Kanti Swarup, Gupta Manmohan
4. Operations Research : Varade , Joshi: Diamond publications

M.Com. Part II Semester IV
Advanced Accounting and Taxation Special Paper VII.
Subject Title :- Recent Advances in Accounting, Taxation & Auditing.
Course Code :- 403
(w.e.f. Academic Year: 2014-15)

Level of Knowledge - Basic Knowledge

Objectives:

1. To up-date the students with latest developments in the Subject
2. To inculcate the habit of referring to various periodicals and publications in the given subject, apart from text books and reference books
3. To develop the ability to read, understand, interpret and Summarize various articles from newspapers, journals etc.

Suggested Topics/Areas covering recent developments in the subject:

UNIT	TOPIC	No. of Lectures in hours
1	IFRS (International Financial Reporting Standards).	04
2	A Study of Managerial Discussion And Analysis as per Section 49 of Listing agreement.	02
3	Corporate Governance Compliance by Companies.	02
4	Accounting and Taxation aspects of Carbon Credit Trading.	02
5	Environmental Accounting.	02
6	Forensic Accounting.	02
7	Lean Accounting.	02
8	Responsibility Accounting.	02
9	ESO (Employee Stock Options) Accounting.	02
10	XBRL (Extensible Business Reporting Language).	02
11	Transfer Pricing.	02
12	Accounting for KPO (Knowledge Process Outsourcing) and BPO (Business Process Outsourcing).	02
13	Accounting for NGO Grants.	02
14	Accounting for Local Self Governments.	02
15	Introduction of accrual method for Government Accounting.	02
16	Disclosures in Financial Statements- Recent Trends.	02
17	Accounting for Human resources.	02
18	Accounting for Intellectual Property Rights.	02
19	Inflation Accounting.	02
20	A Brief Study of a) Accounting for Derivatives	02

	b) Accounting for Retirement Benefits as per AS-15.	
21	Creative Accounting.	02
22	A brief study of provisions of proposed- i) Direct Taxes Code, ii) Goods and Services Tax, iii) Companies Act, 2013 relating to Account and Audit.	02
23	Non- Financial Reporting Requirements– i) Business Responsibility Reporting, ii) Sustainability Reporting, iii) A brief Study of National Voluntary Guidelines (NVG), iv) Report on Corporate Governance.	02
TOTAL -		48

Journals suggested:-

- A) The Accounting World :- The ICFAI University Press
 B) The Chartered Accountant :- The ICAI New Delhi
 C) Management Accountant :- ICWA Kolkatta
 D) Journal of Accounting & Finance :- Accounting Research Foundation Jaipur
 E) Journal of Indian Accounting Association, Jaipur

List of Learning Activities and allocation of periods:-

Sr. No	Activities	Learning Hours
1	Quizzes/ Seminars/Presentations	04
2	Assignments/ Tutorials	04
3	Class Room Tests	04
	Total	12

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M.Com. Part II Semester IV
Advanced Accounting and Taxation Special Paper VIII.
Subject Title -: Project Work / Case Studies.
Course Code -: 404
(w.e.f. Academic Year: 2014-15 Credit System)

Project Work in Accountancy:-

A student can select any topic relating to principles practices and procedures of accounting auditing taxation and management accounting. Any topic from the syllabus of the papers studied at M Com. Part One or Part Two under special paper Accountancy & Taxation can be of a use. Pick up any unit studied and try to connect it to commercial word around e.g. in taxation a student has studied taxation of a company, then he can select a topic Tax Planning of a particular company or a study of taxation of an educational institute. On this line following areas have been listed out for project work in Accountancy.

Area of Project Work in Accounting:-

Following is the list of topics for project work in Accounting.

1. Financial statement Analysis of –
 - a. A Limited Company for 5 years
 - b. Five Companies of five different industries
 - c. Five companies of one industry e.g. Automobile ,Engineering, Textile
 - d. Five banks from Private sector/Co-op. sector
2. Study of Working Capital Management of a large Company.
3. Study of Budgetary Control System of four Companies
4. Study of Management Information System of four Companies.
5. Procedure of preparation of Consolidated Balance Sheet by Holding Company having two / three subsidiaries companies.
6. Valuation of Shares of 10 unlisted Companies.
7. A study of Amalgamation/Merger of procedure of two Companies(Accounting procedure)
8. A comparative study of Accounting System of Hotel industry – Five Star, Three star, large Hotel and small Hotel.
9. Comparative study of Accounting of Hospitals from Private sector, Trust and Small Hospital.
10. Study of Accounting for Grants to school, college, institute.
11. Application of Inflation Accounting to a large Company's Balance Sheet.
12. Human Resource Accounting for Software, Marketing, Consulting Company

13. Preparation of Value Added Statements of a Company and its comparison with Conventional Accounting Statement.
14. Preparation of Economic Value Added Statement of a Company and its comparison with Conventional Accounting Statement.
15. A study of Application of Accounting Standards of five Companies.
16. Audit planning of five firms of Auditors.
17. A study internal Audit system of four companies.
18. Tax Planning of 10 assesses
19. Tax Planning regarding purchase of House Property.
20. Tax planning of Partnership Firm/ Limited Company.
21. Taxation of Public Trust
22. A study of Perquisites and its impact on Taxable Income Employees from 10 different Companies.
23. A study of ten Export Oriented Units from Taxation point of view.
24. Financial viability of five Co-operative Sugar Factories.
25. Comparative Study of Taxable Income of Individuals and HUFF
26. Problem of units paying Service Tax
27. Accounting for Tour and Travel business.
28. Comparative Study of Housing Loan Schemes of Banks and Financial Institutions.
29. Comparative Study of Fees Structure of Non-grant and Grant In Aid Educational Institutions.
30. A survey of 20 shareholders regarding utility of Published Annual Accounts of Company.
31. Study of Investment Pattern of 20 Individuals from Taxation point of view.
32. Preparation of Project Report for Small Scale Industry, Hotel, Xeroxing business, Computer Institute, Hospital, Transport Business, Petrol Pump.
33. Ascertainment of Cost of Capital from Annual Accounts of five Companies.
34. A financial viability study of Sick Industrial Companies.
35. A study of Tax Audit Report of Non-Corporate and Corporate Assessses.
36. A study of Secretarial Audit Report of five companies.
37. A study of Cost Audit Report of two companies.
38. A study of Government system Audit of Commercial Undertaking / Local bodies.
39. Commentary on Public Accounts Committee of Central Government.

40. A comparative study of different Accounts Software e.g. Tally, SAP, ERP, Local Software etc.
41. Consolidation procedure of different units of an Educational Society.
42. A study of Significant Accounting Policies of different Companies from different Industries.
43. A study of Qualified Audit Reports of different Companies.
44. Comparative study of Advances of Credit Co-op. Societies and Urban Co-op Banks.
45. Preparation of Project Report of Agro based industries, Poultry Farming, Dairy business, Nursery, Horticulture farm.
46. A study of Vehicle Loan schemes of different Banks.
47. Excise Accounting at manufacturing unit.
48. A comparative study of NPA of Urban Co-op Banks
49. A study of Corporate Responsibility Statements of Annual Accounts of 10 Companies
50. A study of Cash Flow Statement from Annual Accounts of 10 Companies.
51. Accounting of Leasing and Finance Companies.
52. A study of Accounting of Electricity Company, (Tata Power, Ahmedabad Electricity Power Co. Ltd.)
53. An exemption under Income Tax Act, availed by 10 different assesses.
54. A comparative financial analysis of running of Luxury buses by private operators and State Transport Corporation.
55. Financial Analysis of Produce Exchanges at Taluka Level.
56. Comparative study of Annual Report of 3 Co-op Banks for the year ending 2008 - 09.
57. Comparative study of Annual Report of 3 Limited companies for the year 2008-09
58. Various Accounting Policies followed by Financial Institutions.
59. Impact of IRAC Norms of financial position of any co-operative bank over last 3 years.
60. Audit classification of a Credit Co-op. Society for last 2 years.
61. Determination of Taxable Income of a Charitable Hospital as per Section 11,12,12A & 35 of I.T. ACT.. Act. 1961.
62. Accounting Standards, their application by the limited company to its annual accounts.
63. Comparative study of effect of Depreciation Allowance on Book Profit & taxable profits of a limited company for 3 years including carried forward and set-off.
64. Analysis of any three recent cases decided by High Court.

- 65. Study of fraud cases detected by application of S.A.P.
- 66. Comparative study of Financial Statements of Educational Institutions for 2 years.
- 67. A study on E filing of Tax Returns- Income Tax, VAT, Service Tax etc.
- 68. A study of Computerized Accounting system in any business unit

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M.Com. Part II Semester IV
Commercial Laws and Practices Special Paper VII.
Subject Title -: Recent Advances in Commercial Laws & Practices
Course Code -: 405
(w.e.f. Academic Year: 2014-15)

Objective:

To acquaint the students with the Knowledge about recent changes / developments in commercial laws.

Unit No.	Topic	Periods
1)	Competition Act, 2002: Definitions, Prohibition of certain agreements, Prohibition of abuse of dominant position, Regulation of combinations (Ss. 3 to 6), Competition Commission of India. (Ss. 7 to 13) Establishment, Composition, Selection Committee for Chairperson and Members of Committee, Term of Office, Resignation, Removal, Suspension, Restrictions on employment of Chair Person and other members, Appointment, Duties of Director General etc. (Ss. 16 to 17, 41) Duties, Powers, Functions, Meetings and Orders of Commission (Ss. 18 to 20, 22, 31), Acts taking place out of India (Ss. 32) Penalties (Ss. 42 to 48) Competition Appellate Tribunal (Ss. 53A to 53U)	12
2)	Limited Liability Partnership Act, 2008: Definitions, Nature of Limited Liability Partnership (Ss. 2 to 10). Incorporation of Limited Liability Partnership. (Ss. 11 to 21). Partners and their relations (Ss. 22 to 25) Extent and Limitations of Liability of Limited Liability Partnership and Partners (Ss. 26 to 31) Contributions and Financial Disclosures (Ss. 32 to 35) Compromise, Arrangement and Reconstruction of Limited Liability Partnerships. (Ss. 60 to 62) Conversion into Limited Liability Partnership (Ss. 55 to 58) Foreign Limited Liability Partnership (Ss. 59) Winding-up and Dissolution (Ss. 63 to 65)	12
3)	Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002: Definition & Importance of Act, Regulation of Securitization and Reconstruction of Financial Assets of Banks & Financial Institutions (Ss. 7 to 12), Enforcement of Security Interest (Ss. 13 to 19) Central Registry (Ss. 20 to 26) Offences and Penalties (Ss. 27 to 30)	12
4)	The Recovery of Debts Due to Banks and Financial Institutions Act, 1993: Need & Object, Establishment of Tribunal and Appellate Tribunal – Jurisdiction, Powers and Authority of Tribunals-Procedure of Tribunals, Powers of Tribunals, Recovery of Debt Determined by Tribunal	12
Total		48

Reference Books:

1. Taxman's Corporate Law, Taxman Allied Services Pvt. Ltd., New Delhi. (Recent Edition).
2. Seth's Commentaries on Banking Regulatory Act and Allied Banking Laws, Law Publishers (India) Pvt. Ltd., Allahabad.
3. Taxman's "Banking Law and Practice in India", India Law House, New Delhi.
4. P. N. Varshney, "Banking Law and Practices", Sultan Chand & Sons, New Delhi. (2012).
5. All bare Acts of respective legislations referred in the syllabus.

M.Com. Part II Semester IV
Commercial Laws and Practices Special Paper VIII.
Subject Title -: Project Work
Course Code -: 406
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To develop research attitude in the minds of students.
2. To enrich the ability of research work among students.

Introduction and Objective:

As a partial fulfillments of University of Pune requirement for M.Com programme students have to undergo in-plant training of 6 weeks in an organization of reput assigned by the institute or accessible to student. The objective of this activity is to test student's ability to apply theoretical knowledge to practical business situation.

In the light of exposure to different functional areas and research methodology at M.Com Part-I curriculum the students have to collect the data relevant to their topic or problem, analyze the same methodologically, make intelligent observations and offer some practical suggestions. In order to complete the task following Report Contents and Chapter Scheme is suggested which can be adopted with or without modification.

Report Contents :

- A. Cover page
- B. Company Certificate
- C. Acknowledgement
- D. Declaration
- E. Executive Summary

Tentative Chapter Scheme:

- Chapter 1. Introduction to Study
- Chapter 2. Company Profile
- Chapter 3. Objective of Study
- Chapter 4. Review of literature
- Chapter 5. Research Methodology
- Chapter 6. Data analysis Interpretations
- Chapter 7. Observations and Findings
- Chapter 8. Conclusions and suggestions

M.Com. Part II Semester IV
Advanced Cost Accounting and Cost System Special Paper VII.
Subject Title :- Recent Advances in Cost Auditing and Cost System
Course Code :- 407
(w.e.f. Academic Year: 2014-15)

Objectives:

To provide knowledge on recent advances in cost accounting and cost systems.

SR. NO	TOPIC	LECTURES
1.	Cost Accounting Standards (CAS):-	08
	❖ CAS 1 to 5 and 7 (Final) and CAS -8 TO 19. (Drafts And Amendments' Subjects to Finalization from time to time) www.myicwai.org & www.acmas.com can be referred.	
2	Basic Excise Audit, VAT Audit And Productive Audit.	12
	❖ Generally Accepted Cost Accounting Principles. ❖ Scope, Of Excise Audit ,VAT Audit ❖ Procedure and Reports. ❖ Productive Audit –Meaning, Problems of Productive Audit and Means to overcome the Problems.	
3	Enterprise Resource Planning (ERP)	06
	❖ Introduction, Features and Benefits of ERP ❖ Reason for Implementation and E–Costing.	
4	Six Sigma	06
	Definitions, Importance, Scope, Benefits.	
5.	Study Of Journal –Management Accountant:	16
	By Reading of Journal of ICWAI-“ <u>Management Accountant</u> ” Issues From July to September (of the Respective Academic Year) and getting acquainted with recent changes and developments.	
		Total 48

Books Recommended :-

1. Indirect Taxes :- V.S. Datey
2. Indirect Taxes :- Ahuja.

Journals :-

Management Accountant - ICWAI, Publication

Cost Accounting Standards-Issued by ICWAI, Kolkatta

M.Com. Part II Semester IV
Advanced Cost Accounting and Cost System Special Paper VIII.
Subject Title -: Project Work / Case Studies
Course Code -: 408
(w.e.f. Academic Year: 2014-15)

Project Work Will Carry 100 Marks. For Regular Students, Project Work Is Compulsory. The Option Of Case Studies Is Only For The Students Registered As An External Student. 'Students Are Expected To Prepare The Project Report Based On The Field Work And Survey And Studying The Current Trends Under The Guidance Of Their Guide Teacher'. They Will Have To Submit The Report On 31st March Every Year. Project Viva Voce Will Be Conducted At The End Of IVth Semester But Before Theory Examination.

Guidelines Areas of Project Work

Marks: 100

Students are required to Visit a Unit in Concerned Industry and submit their report on any of the following project topics.

1. **Marginal Costing:** Techniques Based on Annual Reports of Listed Companies .To Study the Application of Marginal Costing in Taking Managerial Decision.
2. **Budgetary Control:** Study of Procedure of Audit. A Study of Budgetary Control System Established therein and used for cost Control Purpose.
3. **VAT Audit:** Visit to any Trading Concern offices Chartered Accountant and Cost Accountant, Understanding the Actual Procedure of VAT audit, its Implication & Benefits.
4. **Excise Audit:** Study of Procedure of Audit (Eligible for Excise Audit) or Office Cost Accountant, to understand the Actual Procedure of Excise audit, its Importance and Benefits.
5. **Cost Audit:** Audit Programme Understanding the Procedure of Cost Audit, Cost Accounting Record Rules of the Respective Industry and Preparation of Cost Audit Report.
6. **Process Costing:** Visit to Sugar Industry & Understanding the Use of Process Costing Method in the factory, Cost Analysis at Each Stage in Particular and Cost Analysis in General done in the Sugar Factory.
7. **Pricing Decisions:** Visit to any Industry Understanding the different Methods and Techniques used by the Concern in pricing different Products.
8. **Cost Control and Cost Reduction:** Visit to any Manufacturing Concern and Understanding the different Methods used fruitfully by the Priority in Cost Control and Cost Reduction. **ISO-Procedure.**
9. **Contract Costing:** Visit to Any Construction / Contracting firm and Understanding Ascertainment of Contract Cost, Allocation and Apportionment of different Expenses and Apportionment of profit on Incomplete Contract.

10. Costing in Service Industry: Visit to any Hotel, Airlines, Hospitals or any other Service Industry and Understanding the Costing Methods used in the Concerned Service Industry and its Utility to Ascertain the Cost of Service Rendered as well as for controlling the Cost.
11. Recent Developments in Cost Accounting.
12. Application of Activity Based Costing.
13. Study of Job Evaluation and Merit Rating in Industrial Unit:
14. Application to Agro Based Industries i.e. fishery, dairy, poultry etc.
15. Cost Reduction Program and its Implementation:
16. Study of Costing Techniques and its use in Decision Making:
17. Application of Onion – Cash Crop, Sugarcane, Cotton, Horticulture etc.
18. Study of Various Measurement Policies (Risk Management)
19. Study of minimum wages.
20. Study of fixation or fees of Professional Courses,
21. Study of Cost Associate with Finance of Any Company
22. Study of Cost Structure of Different Companies from same Industry.

M.Com. Part II Semester IV
Co-operation and Rural Development Special Paper VII.
Subject Title -: Recent Tread in Co-operative and Rural Development
Course Code -: 409
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To create awareness regarding globalization and its effects on a rural development.
2. To study and projects in the field of Co-operation and recent advances rural development.

Unit No.	Name of the Topic	Periods
1	Social & Economical Aspect: 1.1 Theory and practice of Co-operative principles. 1.2 Issue of economic viability of Co-operative institutions. 1.3 Issue of non-viability and sick co-operative units. 1.4 Social responsibility of Co-operative institutions. 1.5 Co-operative leadership in global era.	12
2	Globalization and Co-operatives : 2.1 Impact of globalization on co-operative institutions. 2.2 Challenges of global competition. 2.3 Meeting the global challenges. 2.4 New management technologies. 2.5 Quality enhancement through six Sigma.	12
3	Role of Self Help Groups in Rural Development 3.1 Formation & Organisation 3.2 SHGs an innovation for rural development. 3.3 Micro finance and SHGs. 3.4 Development of banking habits among rural people. 3.5 Rural artisans and SHGs. 3.6 Woman empowerment through SHGs. 3.7 Marketing of SHG products 3.8 Performance.	12
4	Rural distress and Government Measures. 4.1 Reports of various committees regarding farmers Suicides. 4.2 Causes of Farmer's suicides. 4.3 Short and long term Governmental measures for redressing rural distress. 4.4 Self-sustaining rural development.	12
TOTAL		48

List of Books Recommended for Study

Recommended Books, Journals & Reports

Books :

1. Krushnaswami O.R- Co-operative Audit.
2. Krushnaswami O.R- Co-operative Accounts
3. Bedi R.D. – Theory History and Practices of Co-operations.
4. Dubhashi P.R – Principles and philosophy of co- operation.
5. Dubhashi P.R-Rural development administration in India.
6. B.K.Sinha- Indian co-operation.
7. S.k.Day- power to the people.
8. Rajeshwar – community development, Panchayat raj, sahakari samaj.
9. S.K.Goyal – co-operative farming in India.

Journals:

1. Journal of Rural Development, Hyderabad (Rajendranagar)
2. Journal of co-operative perspective, Pune
3. The Indian Journal of commerce, New Delhi
4. Journal of Sahakari Maharashtra, Pune
5. Journal of Southern Economics

M.Com. Part II Semester IV
Co-operation and Rural Development Special Paper VIII.
Subject Title -: Project Work
Course Code -: 410
(w.e.f. Academic Year: 2014-15)

Objectives :

1. To develop research attitude of the students.
2. To enrich the ability of research work among the students.

Introduction & Objective :

As a partial fulfillments of University of Pune requirement for M.Com Programme students have to undergo in-plant training of 6 weeks in an organization of repute assigned by the institute or accessible to student. The objective of this activity is to test students ability to apply theoretical knowledge to practical business situation.

In the light of exposure to different functional areas and research methodology at M.Com. Part-II curriculum the students have to collect the data relevant to their topic or problem, analyze the same methodologically, make intelligent observations and offer some practical suggestions. In order to complete the task following Report Contents and Chapter Scheme is suggested which can be adopted with or without modification.

REPORT CONTENTS :

- A. Cover Page
- B. Company Certificate
- C. Guide Certificate
- D. Acknowledgement
- E. Declaration
- F. Executive Summary

TENTATIVE CHAPTER SCHEME :

- CHAPTER 1. INTRODUCTION TO STUDY
- CHAPTER 2. COMPANY PROFILE
- CHAPTER 3. OBJECTIVES OF STUDY
- CHAPTER 4. REVIEW OF LITERATURE
- CHAPTER 5. RESEARCH METHODOLOGY
- CHAPTER 6. DATA ANALYSIS AND INTERPRETATIONS
- CHAPTER 7. OBSERVATIONS AND FINDINGS
- CHAPTER 8. CONCLUSIONS AND SUGGESTIONS

M.Com. Part II Semester IV
Business Practices and Environment Special Paper VII.
Subject Title :- Recent Advances in Business Practices and Environment.
Course Code :- 411
(w.e.f. Academic Year: 2014-15)

Objective :-

To provide knowledge and understanding of recent advances in Business Practices.

Unit No.	Topic	Periods
1	Industrial, investment & infrastructure policy of Maharashtra 2006 A) Thrust Areas. 1) Agro – Tourism 2) Agro processing Policy 3) Textile Policy. 4) Retail Policy. 5) Infrastructure development Policy. 6) Cluster Approach for Development.	12
2	A) Recent Scheme of Development of micro small & medium enterprises (MSME). B) Rajeev Gandhi Udyami Mitra Scheme (RGUMI).	12
3	B) Marketing Assistance. 1) Gram Udyog Vasahats. 2) Urban Haat. C) H.R. initiatives - Labour Market Information cell (LMIC) Service training institute (STI).	12
4	Environment Audit & Corporate Governance Nature - Scope & importance – Types – Limitation - Role & implication - Transparency & corporate discloser – Nominee Direct role.	12

M.Com. Part II Semester IV
Business Practices and Environment Special Paper VIII.
Subject Title -: Project Report.
Course Code -: 412
(w.e.f. Academic Year: 2014-15)

There will be a project work carrying 100 marks for internal students only. The students will have to select a subject from any area of the syllabi for Business- Entrepreneurship. The students will have to work under the guidance of concerned subject teacher.

The project will carry total 100 marks out of which Forty marks will be allotted for Project Report and 60 marks will be allotted for Project Viva Voce to be conducted by internal teacher and external teacher (examiner) appointed by the University.

Note: The list of suggested areas for project work will be notified in due course.

Case Studies:

There will be a paper of case studies for external students. The paper will be set for 80 marks- to be converted in to 100 marks. Total 20 cases will be selected from standard book for study. In the question paper 3 cases out of 20 (twenty) cases will be covered, each carrying twenty (20) marks. One unseen case also will be covered & it will carry twenty (20) marks.

Note: The paper of case studies will be offered only by external students only.

M.Com. Part II Semester IV
Business Administration Special Paper VII.
Subject Title :- Recent Advances in Business Administration
Course Code :- 413
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To familiarise the students with the recent advancements in business administration
2. To develop an understanding about tools and their application in the business.

UNIT NO	CHAPTER	PERIODS
UNIT- I	CONTEMPORARY ISSUES IN BUSINESS ADMINISTRATION Change management – Concept, Significance. Managing change-Important feature Dimensions Approaches towards managing change Futuristic and strategic approach toward changing business environment	12
UNIT-II	APPROACHES TO QUALITY MANAGEMENT & ENTERPRISE RESOURCE PLANNING K Total Quality management Six sigma Technique feature & utility Five's system of Quality management. Concept & features of E. R. P Tools of E. R. Applying E. R. P. In business. Computers & E. R.P	12
UNIT-III	CROSS- CULTURAL MANAGEMENT SYSTEM Global management system- Concept, &Significance. Issues in cross cultural management. Acquisition & mergers- Role & importance Current Trends in acquisitions & mergers national & international scenario	12
UNIT-IV	TURN AROUND & INNOVATION MANAGEMENT Concept & Significance of turnaround management, Techniques of turnaround management, Turn around management; prerequisite for success. Take over & turn around management Restructuring & Reengineering of business Concept of innovation Advantages and Significances of Innovation Key Steps in Innovation Management Role of Government and Private Institutions in promoting innovation	12
	TOTAL	48

M.Com. Part II Semester IV
Business Administration Special Paper VIII.
Subject Title -: Project Work / Case Studies.
Course Code -: 414
(w.e.f. Academic Year: 2014-15)

Project Work for internal students(414)

There will be a project work carrying 100 marks for internal students only. The students will have to select a subject from any area of the syllabi for Business- Administration. The students will have to work under the guidance of concerned subject teacher. The project will carry total 100 marks out of which sixty marks will be allotted for Project Report and 40 marks will be allotted for Project Viva Voce to be conducted by internal teacher and external teacher (examiner) appointed by the University.

Note: The list of suggested areas for project work will be notified in due course.

Case Studies:

There will be a paper of case studies for external students. The paper will be set for 80 marks- to be converted to 100 marks. Total 20 cases will be selected from standard book for study. In the question paper 3 cases out of 20 (twenty) cases will be covered, each carrying twenty (20) marks. One unseen case also will be covered & it will carry twenty (20) marks.

Note: The paper of case studies will be offered only by external students only.

BUSINESS ADMINISTRATION – SUGGESTED TOPICS FOR PROJECT REPORT

REPORT CONTENTS:

- 1.CoverPage
- 2.CompanyCertificate
- 3.Guide Certificate
- 4.Acknowledgement
- 5.Declaration
- 6.Executive Summary

TENTATIVE CHAPTER SCHEME

CHAPTER 1. INTRODUCTION TO STUDY

CHAPTER 2. COMPANY PROFILE

CHAPTER 3. OBJECTIVES OF STUDY

CHAPTER 4. REVIEW OF LITERATURE

CHAPTER 5. RESEARCH METHODOLOGY

CHAPTER 6. DATA ANALYSIS AND INTERPRETATIONS OBSERVATIONS

CHAPTER 7. FINDINGS CONCLUSIONS AND SUGGESTIONS

TOPICS

1. A empirical study on 360 degree Performance Appraisal in a Private sector organisation.
2. To study the Job Satisfaction of lower/middle/top level management in Banks/Private/Public sector.
3. To study stress management related to work of the employees from IT Sector.
4. A Study on cross cultural management issues in an multinational company.
5. To study the ERP System of a Private/Public sector organisation.
6. A comparative study of the impact of team work in two departments of an organisation.
7. To study the overcoming of negative emotions and boosting motivation of Managers in Private/Public sector organisation.
8. To study the Emotional Intelligence amongst female employees at workplace in Private/Public sector employees.
9. To study the work-life balance of employees in an organisation.
10. To study the work culture and work ethics in an organisation.
11. To study the impact of Training of employees in an Bank/Private/Public sector organisation.
12. To study the impact and Role of Job Rotation for the Positive outcome.
13. To study the Pros and Cons of VRS to employer and employees in an organisation- A case study.
14. A study on the problems involved with the resignation of an employee to both employer and employee.
15. A study on the prospects of Manpower Planning in organisation.
16. To study the awareness and utility of HRD and HRM in an organisation.
17. A study on the problems related to job transfers of employees specially with reference to female employees.
18. An overview of ethics in Performance Appraisal in an organisation.
19. To study the HR environment of two companies.
20. To study the HR challenges in employing Generation Y.
21. To study the HR Challenges in Indian Context.
22. To study the employee retention strategies of two companies.
23. To study the impact of change management of an organisation.
24. To study the techniques of turnaround management in an organisation.
25. To study the role and impact of information technology in indigenous and multinational companies.
26. To study the financial position of a Company
27. To study the capital structure and Cost of capital of a company
28. To study the working Capital Management
29. To study the customer retention techniques adopted by Banks
30. To study the CSR practices adopted by Companies.

M.Com. Part II Semester IV
Advanced Banking & Finance Special Paper VII.
Subject Title :- Recent Advances in Banking and Finance in India.
Course Code :- 415
(w.e.f. Academic Year: 2014-15)

Objectives:

1. To enable students understand new developments in banking industry.
2. To keep the students abreast with the innovative practices introduced in day to day banking.

Unit No.	Topic	Periods
1	Recent Developments in Banking: ➤ Financial inclusion : Concept, Benefits, RBI guidelines, Economic Growth and financial inclusion, constraint. ➤ Regulation with respect to management of NPAs and Maintenance of Capital adequacy. ➤ Micro finance & role of Banks. ➤ Customer service, customer education & Customer Relationship Management. ➤ The Banking Ombudsman Scheme, 2006 ➤ Concept of CAMELS rating in banks.	12
2	Technological Developments in Banks: Delivery channels ➤ Core Banking ➤ Tele banking, Mobile banking, ➤ ATMs ➤ Internet Banking. ➤ Electronic Funds Transfer (BCS credit-debit, SWIFT, RTGS, and NEFT)	12
3	Recent Developments in Money Market: ➤ Call/ Notice / Term policy ➤ Treasury Bills ➤ Commercial paper and certificate of deposits. ➤ Collateralized borrowing and lending obligations. (CBLD) ➤ Money market mutual fund. (Repos) ➤ Repurchase obligations (Market Repo & Repo with RBI) ➤ Money market derivative.	12

4	Recent Developments in Capital Market: ➤ Recent reforms in the capital market with reference to primary market : Book building, reverse book building mechanism (75%-100%), Green shoe option, Online IPOs., Grading & IPO's ➤ Secondary market : organization, Regulation and functions of stock exchanges, listing and trading of securities, the BSE, the NSE, OTCEI, and the interconnected stock exchanges of India. The working of these stock exchanges. ➤ Changing trends in foreign institutional investments. ➤ Introduction of depositories and custodian, ➤ Options and futures trading in equity derivatives market.	12
	Total	48

Recommended Books :

1. Financial Institution and Markets - a Global Perspective - Hazel J. Johnson
2. Foreign Exchange; International Finance-Risk Management-A.V. Rajwade
3. Financial Markets and Institutions- L.M. Bhole
4. International Financial Management-Eun/Resnick
5. International Financial Management, Markets, Institutions-James C. Baker-
6. Reserve Bank of India Bulletin-
7. Annual Reports of IMF, World Bank, ADB.

M.Com. Part II Semester IV
Advanced Banking & Finance Special Paper VIII.
Subject Title :- Project Work in Banking & Finance.
Course Code :- 416
(w.e.f. Academic Year: 2014-15)

The following are the topics suggested for Project Work:-

1. A study of trends in mutual funds
2. Financial Inclusion & unskilled worker.
3. Rural Development & role of NABARD
4. A study of Bank portfolio
5. Banking Development Problems & Perspectives
6. Role of IT in Banking industry: constraints & challenges
7. A study of New Banking products
8. A study of Marketing of Banking products
9. A study of Companies (Amendment) Act 2013 with reference to Banking
10. Capital Adequacy Norms: constraints & challenges
11. Project Evaluation Tools & Techniques
12. Assessment of Financial Health through Ratio Analysis
13. Study of Bank Balance Sheet.
14. Study of Urban Co-Operative Bank.
15. Study of Non-Performing Assets.
16. Study of Capital adequacy of Public sector, Private sector and Co-Operative Banks.
17. Study of Foreign bank branch working in India.
18. Study of National securities depository and Demat Account.
19. Study of Social banking (Prime Minister Rozgar Yojana, Suwarna Jayanti Sahara Rozgar Yojana, The Urban Self employment programe.)
20. Study of Self help group in Maharashtra.
21. Study of Recent Mergers and acquisition in banks.
22. Study of Foreign institutional investments.
23. Study of Recent reforms in capital market.
24. Study of R.B.I. recent policy.
25. Study of Stock Exchange.
26. Study of Non-Banking Finance Companies.
27. Study of Role of N.G.O's.
28. Study of International Financial Institutions.
29. Study of International Investors.
30. Skill Development for unemployment Youth.
31. Study of Self Help Groups

Note:

- Clarity with respect to any topic mentioned above be given by the concerned subject teacher /guide.
- Student is required to choose one institution / scheme at a time.
- The topics mentioned are for guidelines and the concerned subject teachers have the privilege to choose and suggest any other topic other than the above

M.Com. Part II Semester IV
Advanced Marketing Special Paper VII.
Subject Title -: Recent Advances in Marketing.
Course Code -: 417
(w.e.f. Academic Year: 2014-15)

Sr. No.	New Syllabus	Lectures
1	Marketing Strategy: Meaning- Definition - types of Marketing Strategies. Elements of Marketing Strategy Process of Creating a Marketing Strategy. Global v/ s Local Marketing Strategy Factors to be taken into account while adopting a particular Marketing Strategy. Advertising and Media Planning	12
2	Sustainable Marketing Concept and Importance Sustainable Marketing and Sustainable Development, Sustainable Marketing and related ethical issues, Current examples of Corporate Sustainability endeavors.	08
3	Digital Marketing Concept and Relevance of study in modern times. Search Engine Optimisation, Search Engine Marketing. Social Media: Types of Social Media, social Media Mix, Social Media Marketing, Social Media Management , Social Media Audit E Commerce: Credit card transactions, electronic payment system, cyber cash and smart cards. A study of some e marketing websites: www.alibab.com , www.flipkart.com and www.ebay.in	14
4	Retailing – Concept, Definition and Importance . Single Brand Retail , Concept and Definition. Multi Brand Retail – Concept and Definition. History of FDI in Single Brand retail in India. History of FDI in Multi Brand Retail in India. The pros and cons of allowing FDI in Single Brand retail in India The pros and cons of allowing FDI in Multi Brand Retail in India Government of India Policy on FDI in Single Brand Retail and FDI in Multi brand retail. State of Maharashtra Policy on allowing FDI in Single Brand Retail and Multi Brand Retail	14
	Total	48

Recommended Books:

1. Integrated Marketing Communications – Kenneth Clown & Donald Bach PHI, 2002
2. Strategic Marketing Management - David Aaker
3. Marketing Strategy, 3rd Ed. - Boyd Walker, Mulli Larrech
4. Relationship Marketing -S.Shajahan
5. Customer relationship Management - Shet Parvatiyar, Shainesh
6. Retail Management – Gibson Vedamani
7. Retailing Management – Swapna Pradhan
8. Service Marketing - Rampal & Gupta
9. Essence of Services Marketing - Ardian Payne
10. Services Marketing - S.M.Jha

M.Com. Part II Semester IV
Advanced Marketing Special Paper VIII.
Subject Title -: Project Work / Case Studies.
Course Code -: 418
(w.e.f. Academic Year: 2014-15)

Objectives :

1. To develop research attitude of the students.
2. To enrich the ability of research work among the students.

Introduction & Objective :

In the light of exposure to different functional areas and research methodology at M.Com. Part-I curriculum the students have to collect the data relevant to their topic or problem, analyze the same methodologically, make intelligent observations and offer some practical suggestions. In order to complete the task following Report Contents and Chapter Scheme is suggested which can be adopted with or without modification.

REPORT CONTENTS :

- a. Cover Page
- b. Company Certificate
- c. Guide Certificate
- d. Acknowledgement
- e. Declaration
- f. Executive Summary

TENTATIVE CHAPTER SCHEME

CHAPTER 1. INTRODUCTION TO STUDY

CHAPTER 2. COMPANY PROFILE

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CHAPTER 4. REVIEW OF LITERATURE

CHAPTER 5. RESEARCH METHODOLOGY

CHAPTER 6. DATA ANALYSIS AND INTERPRETATIONS

CHAPTER 7. OBSERVATIONS AND FINDINGS

CHAPTER 8. CONCLUSIONS AND SUGGESTIONS

Note:

- 1) **This project is strictly being undertaken under the guidance and concerned teacher:**
- 2) Topics for Project are in general and student may modify or select the related subject in consultation with the teacher.

The Topics Suggested for Project Work :

- 1) A study of local market
- 2) Study advertising in local newspapers or outdoor advertising
- 3) Study of consumer satisfaction
- 4) Comparative study of buyer behaviour
- 5) Study of marketing strategies
- 6) Study of marketing of banking services
- 7) A comparative study of rural marketing versus urban marketing
- 8) Study of Customer Relationship Marketing (CRM)
- 9) An Analytical study of Marketing Mix
- 10) Study Customer Satisfaction of Product and Services
- 11) Study of Recent Trends in Marketing of any product or service
- 12) Study of Online Marketing

UNIVERSITY OF PUNE

FOR

S.Y.B. Sc. (Physics)



FROM ACADEMIC YEAR

2014-2015

Equivalence of Courses in 2013 pattern with 2008 pattern

Semester I

Paper	2008 Pattern (Old Course)	2013 Pattern (New Course)
Paper I (PHY211)	Mathematical Methods in Physics I	Mathematical Methods in Physics I
Paper II (PHY 212)	Electronics I	Electronics I
Paper II (PHY 212)	Instrumentation	Instrumentation

Semester II

Paper	2008 Pattern (Old Course)	2013 Pattern (New Course)
Paper I (PHY221)	Oscillations, Waves and Sound	Oscillations, Waves and Sound
Paper II (PHY 222)	Optics	Optics

S.Y.B. Sc. (Physics)

Semester I (Paper I)

PH211: MATHEMATICAL MEHODS IN PHYSICS

Learning Outcomes: After the completion of this course students will be able to

- Understand the complex algebra useful in physics courses
- Understand the concept of partial differentiation.
- Understand the role of partial differential equations in physics
- Understand vector algebra useful in mathematics and physics
- Understand the singular points of differential equation.

1. Complex Numbers (12)

- 1.1 Introduction to complex numbers.
- 1.2 Rectangular, polar and exponential forms of complex numbers.
- 1.3 Argand diagram
- 1.4 Algebra of complex numbers using mathematical and Argand diagram
- 1.5 De-Moivre's Theorem
- 1.6 Powers, roots and log of complex numbers.
- 1.7 Trigonometric, hyperbolic and exponential functions.
- 1.8 Applications of complex numbers to determine velocity and acceleration in curved motion
- 1.9 Problems.

2. Partial Differentiation (12)

- 2.1 Definition of partial differentiation
- 2.2 Successive differentiation
- 2.3 Total differentiation
- 2.4 Exact differential
- 2.5 Chain rule
- 2.6 Theorems of differentiation
- 2.7 Change of variables from Cartesian to polar co-ordinates.
- 2.8 Implicit and explicit functions
- 2.9 Conditions for maxima and minima (without proof)
- 2.10 Problems.

3. Vector Algebra (06)

- 3.1 Introduction to scalars and vectors:
- 3.2 dot product and cross product of two vectors and its physical significance
- 3.3 Scalar triple product and its geometrical interpretation.
- 3.4 Vector triple product and its proof.
- 3.5 Problems.

4. Vector Analysis (12)

- 4.1 Introduction
- 4.2 Scalar and vector fields
- 4.3 Differentiation of vectors with respect to scalar.
- 4.4 Vector differential operator and Laplacian operator
- 4.5 Gradient of scalar field and its physical significance.

4.6 Divergence of scalar field and its physical significance

4.7 Curl of vector field

4.8 Vector identities

a. $\nabla \times \nabla \phi = 0$

b. $\nabla \cdot (\nabla \times \mathbf{V}) = 0$

c. $\nabla \cdot (\nabla \phi) = \nabla^2 \phi$

d. $\nabla \cdot (\phi \mathbf{A}) = \nabla \phi \cdot \mathbf{A} + \phi (\nabla \cdot \mathbf{A})$

e. $\nabla \times (\phi \mathbf{A}) = \phi (\nabla \times \mathbf{A}) + (\nabla \phi) \times \mathbf{A}$

f. $\nabla \cdot (\mathbf{A} \times \mathbf{B}) = \mathbf{B} \cdot (\nabla \times \mathbf{A}) - \mathbf{A} \cdot (\nabla \times \mathbf{B})$

4.9 Problems.

5. Differential Equation

(06)

5.1 Frequently occurring partial differential equations (Cartesian coordinates)

5.2 Degree, order, linearity and homogeneity of differential equation.

5.3 Concept of Singular points. Example of singular points ($x = 0$, $x = x_0$ and $x = \infty$) of differential equation.

5.4 Problems.

Additional Activity:

Four tutorials containing 10 unsolved problems each from suggested references.

Reference Books:

1. Methods of Mathematical Physics by Laud, Takwale and Gambhir

2. Mathematical Physics by B. D. Gupta

3. Mathematical Physics by Rajput and Gupta

4. Mathematical Methods in Physical Science by Mary and Boas

5. Vector analysis by Spiegel and Murrey

6. Mathematical Methods for Physicists by Arfken and Weber, 5th Edition, Academic Press.

S.Y.B. Sc. (Physics)

Semester I (Paper II)

PH212: ELECTRONICS

Learning outcomes: On successful completion of this course the students will be able to

- Apply laws of electrical circuits to different circuits.
- Understand the relations in electricity
- Understand the properties and working of transistors.
- Understand the functions of operational amplifiers.
- Design circuits using transistors and operational amplifiers.
- Understand the Boolean algebra and logic circuits.

1. NETWORK THEOREMS (06)

- 1.1 Kirchhoff's laws (revision)
- 1.2 Voltage and Current divider circuits
- 1.3 Thevenin's theorem
- 1.4 Norton's theorem
- 1.5 Super-position theorem
- 1.6 Maximum power transfer theorem (All theorems 1.3 to 1.6 with proof)
- 1.7 Problems.

2. STUDY OF TRANSISTOR (14)

2.1) BIJUNCTION TRANSISTOR

1. Revision of bipolar junction transistor, types, symbols and basic action
2. Configurations (Common Base, Common Emitter & Common Collector)
3. Current gain factors (α & β) and their relations.
4. Input, output and transfer characteristics of CE, CB & CC configurations.
5. Biasing methods: Base bias, Emitter feedback and voltage divider
6. DC load lines (CE), Operating point (Q point)
7. Transistor as a switch
8. Problems.

2.2) UNI- JUNCTION TRANSISTOR

1. Symbol, types, construction, working principle, I-V characteristics, Specifications, Parameters of: Uni-Junction Transistor(UJT)
2. Use of UJT as a relaxation oscillator

3. OPERATIONAL AMPLIFIERS (10)

- 3.1 Introduction
- 3.2 Ideal and practical Characteristics
- 3.3 Operational amplifier: IC 741- Block diagram and Pin diagram
- 3.4 Concept of virtual ground
- 3.5 Inverting and non-inverting operational amplifiers with concept of gain.

- 3.6 Operational amplifier as an adder and subtracter.
- 3.7 Problems.

4. OSCILLATORS

(04)

- 4.1 Concept of positive and negative feedback
- 4.2 Barkhausen criteria for an oscillator
- 4.3 Construction, working and applications of Phase shift oscillator using IC-741
- 4.4 Problems.

5. POWER SUPPLY

(06)

- 5.1 Concept and working of rectifier half wave, full wave and bridge rectifier
- 5.2 Ripple voltage
- 5.3 RC filter circuit
- 5.4 Unregulated and regulated power supply
- 5.5 Concept of load and line regulation
- 5.6 Zener as regulator
- 5.7 Problems.

6. NUMBER SYSTEM AND LOGIC GATES

(08)

- 6.1 Number systems: Binary, Binary coded decimal (BCD), Octal, Hexadecimal
- 6.2 Addition and subtraction of binary numbers and binary fractions using one's and two's complement.
- 6.3 Basic logic gates (OR, AND, NOT)
- 6.4 Derived gates: NOR, NAND, EXOR, EXNOR with symbols and truth tables
- 6.5 Boolean Algebra
- 6.6 De Morgan's theorems and its verification
- 6.7 Problems.

Reference Books:

1. Electronics Principles, Malvino, 7th Edition TaTa Mc-Graw Hills.
2. Principles of Electronics, V. K. Mehta, S. Chand Publication New Delhi.
3. Op Amp and Linear integrated circuits, Ramakant Gaikwad, Prentice Hall of India Pub.
4. Integrated Circuits, Botkar, Khanna Publications, New Delhi
5. Digital Principles and Applications, Malvino and Leech Tata Mc-Graw Hills Pub

S.Y.B. Sc. (Physics)

Semester I (Paper II)

PH212: INSTRUMENTATION

(For the students who have offered Electronic Science at F. Y. B. Sc.)

Learning outcomes: After successful completion of this course the students will be able to

- Understand the functions of different instruments.
- Use different instruments for measurement of parameters.
- Design experiments using sensors.

1. Fundamentals of measurement (08)

- 1.1 Aims of measurement [Ref 1, Pages: 1-2]
- 1.2 Functional elements of typical measurement system (block diagram and its explanation) [Ref 1, Pages: 6-8]
- 1.3 Standard measurements and types of calibration methods [Ref 1, Pages: 19-27]
- 1.4 Static characteristics (accuracy, precision, sensitivity, linearity, repeatability, reproducibility, drift, hysteresis, resolution) [Ref 1, Pages: 29-33]
- 1.5 Dynamic characteristics: concepts, first and second order systems, examples of first-order resistance thermometer and thermal element, examples of second order: U-tube manometer and seismic motion [Ref 1, Pages: 81-106]
- 1.6 Errors in measurement
- 1.7 Problems.

2. Transducers (12)

- 2.1 Measurement of displacement: variable resistance, inductance and capacitance methods. Variable capacitance transducers [Ref 1, Pages: 815-825] and Piezoelectric transducers [Ref 1, Pages: 826-829]
- 2.2 Measurement of force: Load cell, column type devices, cantilever beam
- 2.3 Measurement of temperature:
 - I) Scales of temperature (Kelvin, Celsius, Fahrenheit etc.)
 - II) Methods of temperature measurement:
 - a) Non-electrical method – liquid filled thermometer, bimetallic thermometer.
 - b) Electrical method – Platinum resistance thermometer
 - c) Thermistor – PTC and NTC with characteristics
 - d) Radiation method – Type of pyrometers, selective radiation pyrometer (solar radiation) [Ref 1, Pages: 739-758, 788-793]
- 2.4 Problems.

3. Measurement of pressure, flow and magnetic field (10)

- 3.1 Unit of pressure, concept of vacuum, absolute gauge, and differential pressure
- 3.2 Elastic transducer – diaphragm, corrugated diaphragm, bellows, Bourdon tube

- 3.3 Electric type - LVDT, strain gauge
- 3.4 Pressure transducer – calibration by dead weight tester method.
- 3.5 Problems.

4. Signal conditioning and processing (12)

- 4.1 OP-AMP and its characteristics (ideal and practical), basic modes of operation
- 4.2 OP-AMP circuit used in instrumentation – inverter, adder, subtracter, multiplier, divider, integrator, differentiator, active rectifier, comparator, logarithmic convertors, current to voltage and voltage to current converters, buffer amplifier,
- 4.3 Instrumentation amplifier (three OP-AMP configuration) [Ref 1, Pages: 873-903]
- 4.4 Filters [Ref 1, Pages: 913-918]
- 4.5 Problems.

5. Display, Recorders and Activators (06)

- 5.1 Type of recorders, graphic recorders (chart and X-T recorders),
- 5.2 Oscillographic recorders [Ref 1, Pages: 1034-1040]
- 5.3 Problems.

Ref Book:

- 1. A course in Electrical and Electronic Instrumentation [19th edition, 2012], A. K. Sawhney (Dhanpat Rai & Co. Pvt. Ltd., New Delhi)

Additional Reading:

- 1. Instrumentation devices and systems :- Rangan, Sarma, Mani [Tata Mc Graw Hill]
- 2. Instrumentation Measurement and Analysis – Nakra, Choudhari [Tata Mc Graw Hill]
- 3. Electronics Instrumentation – H.S.Kalsi [Tata Mc Graw Hill]
- 4. Sensor and Transducers – Patranabis [PHI]
- 5. Fundamental of Industrial Instrumentation- Alok Barua [Wiley India]

FOR S.Y.B. Sc. (Physics)

Semester II (Paper I)

PH221: OSCILLATIONS, WAVES AND SOUND

Learning outcomes:

On completion of this course, the learner will be able to:

- Understand the physics and mathematics of oscillations.
- Solve the equations of motion for simple harmonic, damped, and forced oscillators.
- Formulate these equations and understand their physical content in a variety of applications,
- Describe oscillatory motion with graphs and equations, and use these descriptions to solve problems of oscillatory motion.
- Explain oscillation in terms of energy exchange, giving various examples.
- Solve problems relating to undamped, damped and force oscillators and superposition of oscillations.
- Understand the mathematical description of travelling and standing waves.
- Recognise the one-dimensional classical wave equation and solutions to it.
- Calculate the phase velocity of a travelling wave.
- Explain the Doppler effect, and predict in qualitative terms the frequency change that will occur for a stationary and a moving observer.
- Define the decibel scale qualitatively, and give examples of sounds at various levels.
- Explain in qualitative terms how frequency, amplitude, and wave shape affect the pitch, intensity, and quality of tones produced by musical instruments

1. Undamped Free Oscillations (09)

- 1.1 Different types of equilibria (stable, unstable, and neutral equilibrium)
- 1.2 Potential well and periodic oscillations, Approximation of a general potential well $V(x)$ to a parabola for small oscillations
- 1.3 Definition of linear and angular S.H.M.
- 1.4 Differential equation of S.H.M. and its solution (exponential form)
- 1.5 Composition of two perpendicular linear S.H.Ms. for frequencies 1:1 and 1:2 (analytical method)
- 1.6 Lissajous's figures and its uses, Applications (mechanical, electrical and optical)
- 1.7 Problems.

2. Damped Oscillations (09)

- 2.1 Introduction
- 2.2 Differential equation of damped harmonic oscillator and its solution, discussion of different cases.
- 2.3 Logarithmic decrement
- 2.4 Energy equation of damped oscillations
- 2.5 Power dissipation
- 2.6 Quality factor
- 2.7 Application: LCR series circuit
- 2.8 Problems.

3. Forced Oscillations **(10)**

- 3.1 Forced oscillation with one degree of freedom
- 3.2 Differential equation of forced oscillation and its solution (transient and steady state) Amplitude of forced oscillation
- 3.3 Resonance and its examples: mechanical (Barton's pendulum), optical (sodium vapour lamp),
- 3.4 Velocity and Amplitude resonance
- 3.5 Sharpness of resonance
- 3.6 Energy of forced oscillations
- 3.7 Power dissipation
- 3.8 Quality factor and Bandwidth
- 3.9 Application of forced oscillations
- 3.10 Equation of coupled oscillations,
- 3.11 Problems.

4. Wave Motion **(08)**

- 4.1 Differential equations of wave motion in continuous media
- 4.2 Equations for longitudinal waves and its solution (one dimension only)
- 4.3 Equation for transverse waves and its solution (one dimension only)
- 4.4 Energy density and intensity of a wave
- 4.5 Discussion of seismic waves
- 4.6 Problems.

5. Doppler Effect **(06)**

- 5.1 Explanation of Doppler effect in sound
- 5.2 Expression for apparent frequency in different cases.
- 5.3 Asymmetric nature of Doppler effect in sound
- 5.4 Doppler effect in light, symmetric nature of Doppler effect in light.
- 5.5 Applications: Red shift, Violet shift, Radar,
- 5.6 Problems.

6. Sound **(06)**

- 6.1 Definition of sound intensity, loudness, pitch, quality and timber
- 6.2 Acoustic intensity level measurement
- 6.3 Acoustic pressure and its measurement
- 6.4 Reverberation time and Reverberation of a hall
- 6.5 Sabine's formula (without derivation)
- 6.6 Stroboscope
- 6.7 Problems

Reference Books:

- 1. Waves and Oscillations, Stephenson
- 2. The physics of waves and oscillations, N. K. Bajaj, Tata McGraw- Hill, Publishing co. Ltd.
- 3. Fundamentals of vibration and waves, SPPuri, Tata McGraw-Hill Publishing co. Ltd.
- 4. A text book of sound, Subramanyam and Brijlal, Vikas Prakashan
- 5. Sound, Mee, Heinmann, Edition - London
- 6. Waves and Oscillations, R.N. Chaudhari, New age international (p) ltd.

S.Y.B. Sc. (PHYSICS)

SEMESTER II (PAPER II)

PH222: OPTICS

Learning Outcomes

This course will enable you to:

- acquire the basic concepts of wave optics
- describe how light can constructively and destructively interfere
- explain why a light beam spreads out after passing through an aperture
- summarize the polarization characteristics of electromagnetic waves
- appreciate the operation of many modern optical devices that utilize wave optics
- Understand optical phenomena such as polarisation, birefringence, interference and diffraction in terms of the wave model.
- analyse simple examples of interference and diffraction phenomena.
- be familiar with a range of equipment used in modern optics.

1. Geometrical Optics: (10)

- 1.1 Introduction
- 1.2 Lenses: thin and thick
- 1.3 Sign convention
- 1.4 Thin lenses: lens equation
- 1.5 Lens maker equation
- 1.6 Magnification of thin lens
- 1.7 Deviation by thin lens
- 1.8 Power of thin lens
- 1.9 Equivalent focal length of two thin lenses
- 1.10 Cardinal points
- 1.11 Problems.

2. Lens Aberrations (10)

Introduction
Types of aberration: Monochromatic and chromatic
Types of monochromatic aberrations and their reductions
Types of chromatic aberrations
Achromatism : lenses in contact and separated by finite distance
Problems.

3. Optical Instruments (10)

- 3.1 Introduction
- 3.2 Simple Microscope
- 3.3 Compound Microscope
- 3.4 Ramsdens eye piece
- 3.5 Huygens eye piece

3.6 Problems.

4. Interference and Diffraction

(12)

- 4.1 Revision to Interference
- 4.2 Phase change on reflection (Stokes Treatment)
- 4.3 Interference by parallel sided thin films
 - 4.3.1 Interference due to reflected light
 - 4.3.2 Interference due to refracted light
- 4.4 Interference due to Wedge Shaped thin film
- 4.5 Types Diffraction : Fresnel's diffraction and Fraunhofer's diffraction
- 4.6 Fraunhofer's diffractions at a double slit
- 4.7 Plane diffraction grating
- 4.8 Newton's Rings
- 4.9 Rayleigh's criterion for resolution
- 4.10 Problems.

5. Polarization

(06)

- 5.1 Introduction
- 5.2 Brewster's law
- 5.3 Law of Malus
- 5.4 Polarization by double refraction.
- 5.5 Nicol prism.
- 5.6 Problems.

Reference Books:

1. Optics, fourth edition, Pearson education, E. Hetch, A. R. Genesan
2. A Text book of Optics, N.Subhramanyam, Brijlal, M. N. Avadhanulu, S. Chand publication.
3. Physical Optics by A.K.Ghatak, McMillan, New Delhi
4. Fundamental of Optics, F.A.Jenkins, H.E.White, McGraw-Hill international Edition.
5. Principles of optics, D.S. Mathur, Gopal Press, Kanpur

S. Y. B. Sc. (PHYSICS)

PAPER III (SEMESTER I and II)

PH223: PRACTICAL COURSE

Learning Outcomes

- After completing this practical course students will be able to
- Use various instruments and equipment.
- Design experiments to test a hypothesis and/or determine the value of an unknown quantity.
- Investigate the theoretical background to an experiment.
- Set up experimental equipment to implement an experimental approach.
- Analyse data, plot appropriate graphs and reach conclusions from your data analysis.
- Work in a group to plan, implement and report on a project/experiment.
- Keep a well-maintained and instructive laboratory logbook.

Section I:

1) Oscillations, Waves and Sound (Any 4 experiments)

1. Logarithmic decrement (in air and water)
2. Study of coupled oscillators comprising two simple pendulum (Mechanical) and determination of coupling coefficient.
3. Study of musical scales using a signal generator and musical instruments.
4. Determination of frequency of AC mains using sonometer.
5. Measurement of coefficient of absorption of sound for different materials (cork, thermocol, mica, paper etc.)
6. Velocity of sound by phase shift method.
7. Determination of speed of sound by Quincke's method interferometer.
8. Directional characteristics of Microphone.

2) Optics (Any 4 experiments)

1. Newton's Ring: Determination of wavelength of monochromatic light source (λ)
2. Dispersive power of glass prism
3. Total internal reflection (using a LASER beam and glass prism).
4. Diffraction at the edge of a razor blade.
5. Optical activity of sugar solution (polarimeter)
6. Goniometer to determine cardinal points and focal length.
7. To determine temperature of sodium flame.
8. Double refracting prism.

Section II:

1) Electronics/Instrumentation (Any 6 experiments)

1. Circuit Theorems. (Thevenin's, Norton's and Maximum power transfer theorem)
2. Transistor characteristics (CE configuration):

3. Transistor amplifier (single stage)
4. Study of rectifiers (half wave and full wave) with different filters.
5. I-V characteristics of UJT
6. UJT as a Relaxation Oscillator.
6. Zener as a regulator, line and load regulation.
7. Study of Phase shift oscillator (using IC 741)
8. OPAMP as inverting and non inverting amplifier
9. OPAMP as an audio mixer.
10. Study of logic gates (using IC) and verification of De Morgan's theorem.
11. Use of CRO (AC/DC voltage measurement, frequency measurement).
12. To measure displacement (linear and angular) using potentiometer/variable inductor/variable capacitor.
13. To measure force using load cell.
14. To measure pressure using elastic diaphragm (in variable Capacitor/Bourden Tube)
15. To measure magnetic field using Hall probe for a system of ring magnets.

2) Computer (2 experiments)

1. Plotting various trigonometric functions using spreadsheet/any graphic softwares: $\sin x$, $\cos x$, $\tan x$, e^x , e^{-x} , $\log x$, $\ln x$, x^n and
2. equations for the following figures: circle, ellipse, parabola, hyperbola.
3. Inverse, determinant of matrix, solution of linear equations.

Additional Activities (Any Two)

1. Demonstrations- Any 4 demonstrations equivalent to 2 experiments
2. Study tour with report equivalent to 2 experiments
3. Mini project equivalent to 2 experiments
4. Computer aided demonstrations (Using computer simulations or animations)(Any demonstrations equivalent to 2 experiments)

Students have to perform at least two additional activities in addition to sixteen experiments mentioned above. Total laboratory work with additional activities should be equivalent to twenty experiments.

University of Pune

Three Year B. Sc. Degree Course in

BIOTECHNOLOGY

S.Y.B.Sc. BIOTECHNOLOGY

Syllabus

(To be implemented from Academic Year 2014-15)

Course structure: First Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Bb- 101 Fundamentals of Chemistry	Theory	100	90L
Bb- 102 Fundamentals of Physics	Theory	100	90L
Bb- 103 Basics of plant and animal sciences	Theory	100	90L
Bb- 104 Mathematics & Statistical Methods for Biologists	Theory	100	90L
Bb- 105 Fundamentals of Biological Chemistry	Theory	100	90L
Bb- 106 Biophysics & Instrumentation	Theory	100	90L
Bb- 107 Microbiology	Theory	100	90L
Bb- 108 Computers and application	Theory	100	90L
Bb- 109 Practicals in Chemistry and Biochemistry	Practical	100	30 P
Bb- 110 Practicals in Physics, Biophysics and Instrumentation	Practical	100	30 P
Bb- 111 Practicals in Biosciences	Practical	100	30 P
Bb- 112 Quantitative Methods in Biology	Practical	100	30 P

Course structure: Second Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb- 211 A Genetics & B Immunology	Theory	75 25	45L 15L
Bb- 212 Cell Biology	Theory	100	60L
Bb- 213 Environmental Biology and Biotechnology	Theory	100	60L
Bb- 214 Practicals in Environmental Biotechnology	Practical	100	30P
Bb- 215 Practicals in Cell Biology & Genetics	Practical	100	30P
Semester II			
Bb- 221 Molecular biology	Theory	100	60L
Bb- 222 Animal and Plant development	Theory	100	60
Bb- 223 Scientific writing and communication	Theory	50	30L
Bb- 224 Metabolic Pathways	Theory	50	30L
Bb- 225 Practicals in Molecular biology	Practical	100	30 P
Bb-226 Practicals in Developmental biology	Practical	100	30 P

Course structure: Third Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb-331 Microbial Biotechnology	Theory	100	60L
Bb-332 Plant and animal tissue culture	Theory	100	60L
Bb- 333 Biodiversity & Systematics	Theory	100	60L
Bb-334 Practicals in Tissue culture	Practical	100	30P
Bb- 335 A Practicals in Microbial biotechnology B Practicals in Field studies and report writing	Practical	75 25	30P
Semester II			
Bb-341 Large scale Manufacturing process	Theory	100	60L
Bb- 342 Biochemical and biophysical techniques	Theory	100	60L
Bb- 343 Practicals in Recombinant DNA Technology	Theory	100	60L
Bb -344 Techniques in Genetic Engineering	Practical	100	30P
Bb- 345 A Practicals of large scale manufacturing process B Practicals in biochemical and Biophysical techniques	Practical	50 50	30P

Bb-211 A Genetics (45L)
B Immunology (15L)

Bb-211 A: Genetics (45L)

Sr. No.	Topic	Lectures
1	Mendelian genetics Laws of heredity and modifications of monohybrid interactions (incomplete dominance, co-dominance and over dominance)	3
2	Varieties of gene expression (with at least one example each) Multiple alleles, lethal genes, Gene interactions – dominant and recessive epistasis, duplicate genes, Complementary genes and dominant & recessive interactions	2 3
3	Linkage and linkage maps Complete and incomplete linkage, crossing over, three point cross, genetic mapping, Chromosome interference, analysis of ordered and unordered tetrads	6
4	Pedigree analysis Standard symbols used, penetrance, recessive and dominant inheritance, Probability, sex linked inheritance	2
5	Chromosomal aberrations Variation in chromosome number – types, generation of variation, aneuploidy, dosage compensation and barr bodies (Human) Variation in chromosome structure – types, generation of variation, identification of heterozygotes due to chromosomal variations, consequences	3 3
6	Mutations Classification and types, molecular basis of mutations, mutagens and their action, hot spot mutations	3
7	Bacterial plasmids Types, structure, properties and significance	2
8	Operon concept Inducible and repressible operons, positive and negative regulation, lactose, tryptophan and arabinose operons pertaining to their structure and regulatory mechanisms (both positive and negative regulation in detail)	5

9	DNA transfer mechanisms Conjugation – F factor, mechanism of conjugation, Hfr strain and its transfer, sexduction Bacterial transformation – concept of transforming principle, mechanism of Transformation in Streptococcus and Haemophilus in detail Transduction – virulent and temperate phages, lytic and lysogenic life cycles, Mechanism of generalised and specialised transduction, abortive transduction, co-transduction.	2 2 3
10	Transposable elements Characteristics, transposable elements in prokaryotes (insertion sequences, Transposons) and eukaryotes (yeast Ty elements, Ac/Ds elements in maize, Copia and P elements in Drosophila, Alu sequences in humans), mechanisms of transposition, excision of transposons	4
11	Population genetics Gene frequencies, allele frequencies, random mating and Hardy –Weinberg principle	2

Bb-211 B: Immunology (15L)

Sr.No.	Topic	Lectures
1	a) History of development of Immunology b) Overview of immune system-cells & organs involved ,T & B cell subsets, effector cells, antigen presentation, c) Innate Immunity & adaptive Immunity, Introduction to Vaccines : Active & Passive immunization Types of Vaccines	5
2	Antigens –Types, factors affecting antigenicity, Structure & functions	2
3	Antibodies –Types, Structure & functions, antibody diversity	4
4	Antigen – Antibody interactions (epitope-paratope), principle & applications	3
5	Hypersensitivity: types, significance	1

Reference books:

For Genetics

1. Genetics, (2006) Strickberger MW - (Prentice Hall, India)
2. Snyder L, Champness W (2007) – Molecular genetics of bacteria (ASM Press, Washington)
3. Hartl DL, Jones EW (2001) – Genentics: analysis of genes and genomes (Jones and Bartlett, Massachusetts)

4. Griffiths AJ, Wessler SR, Carroll SB, Doebley J (2012) – Introduction to genetic analysis (Freeman & Co, New York) tenth edition.

For Immunology

5. Kuby immunology, Judy Owen , Jenni Punt , Sharon Stranford., 7th edition (2012), Freeman and Co., NY
6. Textbook of basic and clinical immunology, 1st edition (2013), Sudha Gangal and Shubhangi Sontakke, University Press, India

Bb-212 Cell Biology (60L)

Sr. No	Topic	Lectures
1	Overview of plant and animal cell structure, cellular diversity	2
2	Mitosis, meiosis in plants and animals	6
3	Cell cycle: Phases of cell cycle, checkpoints of cell cycle, regulation of cell cycle	7
4	Cell wall : Plant cell wall - primary and secondary, glycocalyx Plasma Membrane : Structure, chemistry and receptors Transport- simple diffusion, facilitated diffusion, active transport, membrane potential and synaptic transmission ,exocytosis and endocytosis, pinocytosis and phagocytosis,	10
5	Structure and function of cell organelles Endoplasmic reticulum, Mitochondria, Chloroplast, Golgi body, nucleus, lysosomes, vacuoles, peroxysomes and glyoxysomes	20
6	Protein Targeting	5
7	Cell junctions and cell matrix interactions	5
8	Apoptosis , neoplasia and cell death	5

Reference books:

1. Molecular Cell Biology. 7th Edition, (2012) Lodish H., Berk A, Kaiser C., KReiger M., Bretscher A., Ploegh H., Angelika Amon A., Matthew P. Scott M.P., W.H. Freeman and Co., USA
2. Molecular Biology of the Cell, 5th Edition (2007) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Garland Science, USA
3. Cell Biology, 6th edition, (2010) Gerald Karp. John Wiley & Sons., USA
4. The Cell: A Molecular Approach, 6th edition (2013), Geoffrey M. Cooper, Robert E. Hausman, Sinauer Associates, Inc. USA

Bb-213 Environmental Biology and Biotechnology (60L)

Sr. No.	Topic	Lectures
1	Understanding Environment and Ecology	20
1.1	Introduction to Environmental science and Ecology	2
1.2	Environmental Components- Introduction, Atmosphere, Ozone layer, Hydrosphere, Lithosphere, Biosphere.	4
1.3	Ecology and its concepts- Biogeography, Ecosystem and Community with examples, Ecosystem Evolution.	5
1.4	Energy flow- Second law of thermodynamics, Food chain, Trophic Levels, Energy Budget, Nutrient cycles (Nitrogen, Phosphorus, and Carbon).	5
1.5	Factors affecting Ecosystem Natural Factors, Inter & Intra-community Factors, Anthropogenic Factors.	4
2	Threats to Ecosystem/Environment	20
2.1	Pollution- Air, Water, Soil. Pollutants in ecosystems- Terrestrial, Aquatic ecosystems Pesticides/Insecticides, Heavy Metals, Toxins, Radiation.	8
2.2	Environmental Priorities in India- Environmental Impact Assessment (EIA case study), Red data book,	7

	TRAFIC.	
2.3	Microbial Biodegradation of Plastic, Hydrocarbons, pesticides/ insecticides and herbicides, Hazardous Waste.	6
3	Biotechnology in Protection and Restoration of Ecosystem	20
3.1	Protection- Social Awareness, Major Protection acts in India (Forest (conservation) Acts 1980, Wild life Protection Act 1972) and protection efforts in the world (Earth Summit, Agenda 21)	3
3.2	Bioremediation- Importance of bioremediation, Use of microorganisms, Phytoremediation. Bioindicators and detectors	6
3.3	Modern conservation practices- Biotechnology in conservation, <i>Ex situ</i> and <i>In situ</i> conservation practices, In vitro propagation of rare and threatened species, Conservation of genetic resources	6
3.4	Waste and Disaster Management- Waste water treatment-Biological, Biomedical waste management, Integrated waste management, Hazards in environment, Remote Sensing and GIS	5

Reference Books:

1. An Introduction To Geographic Information Technology (2009) Suchandra Choudhury I K International Pvt Ltd., New Delhi
2. Concepts and Techniques of Geographic Information Systems C.P.Lo.Albert K.W.Yeung 2nd edition, Prentice Hall, Inc., New Jersey
3. Ecology and environment (2005) Sharma PD Rastogi Publication, New Delhi
4. Ecology and environmental biology (2011) Saha T K Books & Allied (p) Ltd, Kolkata
5. Ecology science and practice (2001) Faurie et al Oxford & IBH Publ. Co. Pvg. Ltd, New Delhi
6. Ecology: Principles and Applications (1998) J. L. Chapman, M. J. Reiss Cambridge

University Press, Cambridge

7. Environment Problems & Solutions (2001) Asthana & Asthana S. Chand Limited, New Delhi
8. Environmental Biology (2000) Varma & Agarwal S. Chand Limited, New Delhi
9. Environmental biology and toxicology (2011) Sharma PD Rajpal And Sons Publishing, Delhi
10. Environmental biotechnology(2010) Rana Rastogi Publications, New Delhi
11. Environmental chemistry (2003) A. K. De 5th edition, New Age International Ltd, New Delhi
12. Environmental Chemistry (2007) B.K. Sharma 11th edition, Goel Publishing House, Delhi
13. Environmental pollution and health hazard in India (1987) Ram Kumar Ashish Pub. House, New Delhi
14. Environmental risks and hazards (1994) Susan Cutter Prentice Hall, Inc., New Jersey
15. Environmental Science (2010) G. TyMiller, Jr., Scott Spoolman Brooks and Coel, CengageBrain learning, USA
16. Environmental Science (2011) Santra S.C. New Central Book Agency, Kolkata
17. Fundamentals of Ecology (2005) Eugene Pleasants Odum, Gary W. Barrett Brooks and Coel, USA
18. Fundamentals of Ecology (2009) Dash 3rd edition, Tata McGraw-Hill Education, New Delhi
19. Introduction to Environmental Biotechnology (2007) Chattergy PHI Learning Pvt. Ltd, Delhi
20. Text book of Environmental Engineering (2005) P. Venugopala Rao PHI learning Pvt Ltd, Delhi
21. Textbook of environmental studies for undergraduate courses (2005) Erach Bahrucha Universities Press, Hyderabad
22. The Microbiology of Activated Sludge (2010) R. J. Seviour IWA publication, UK

Bb-214 Practicals in Environmental Biotechnology (30P)

Sr. No.	Practicals	Practicals (Total 30)
1	Identification of different types of Ecosystems (Local Field Visit)	3
2	Community sampling- Quadrat sampling for plants, Relative abundance, Distribution, Girth class distribution. (Local Field Visit)	3
3	Microbial (Bacterial/Algal/Fungal) community estimation	3
4	Estimation of Biomass from Terrestrial/Aquatic Ecosystem.	2
5	Estimation of Physical (Colour, Texture, Water holding capacity, Conductivity) , Chemical(pH, Organic content and Alkalinity), and Biological (microbial load with nitrogen fixers, cellulose degraders) characteristics of polluted and unpolluted soil	6
6	BOD and COD estimation of polluted water	3
7	Genotoxicity and Cytotoxicity assay to estimate water contamination	3
8	Case Study- EIA	2
9	Qualitative and quantitative estimation for Pesticide /Insecticide degradation	2
10	GIS-Remote Sensing (software demo) of local (e.g. college campus, water bodies etc.) area	3

Bb215–Practicals in cell biology and genetics (30P)

Sr. No.	Topic	Practical (30P)
1	Problem sets in Mendelian inheritance, single point & two point crosses, Gene interactions – epistasis, incomplete dominance, co-dominance, multiple alleles, lethal genes Linkage – two and three point crosses Tetrad analysis	1 2 1 1
2	Study of mitosis (onion root tip) and meiosis (grasshopper testis/ <i>Tradescantia</i>)– preparation of slides and identification of different stages	4
3	Study of polytene chromosomes – preparation of slides	2
4	Karyotype analysis	1
5	Hemeagglutination (blood grouping)	1
6	Study of antigen antibody interaction by Ouchterlony method	1
7	Isolation of mutants by replica plate technique	1
8	Microscopy & micrometry – measurement of cell size and nucleus	2
9	Observation of human cheek epithelial cells.	1
10	Staining of mitochondria in human cheek epithelial cells.	1
11	Effect of colchicine on mitosis.	1
12	Isolation of nuclei and mitochondria from chicken/goat liver by Density Gradient Centrifugation	4
13	Counting of nuclei by haemocytometer Confirming mitochondria by succinate dehydrogenase assay	2
14	Methods of Cell lysis	2
15	Study of blood cell types	2

Bb-221 Molecular Biology (60L)

Sr. No.	Topic	Lectures
1	DNA as the genetic material a. Introduction b. Different classical experiments leading to evidence of DNA as genetic material c. Structure of DNA - Watson & Crick model	3
2	Nucleic acids- structure, properties and function a. DNA forms; A, B & Z b. RNA: tRNA, rRNA , mRNA and non-coding RNA (Mi-, SiRNA)	5
3	Concept and Organization of Genomes- Viral, Bacterial, Organelles, human Types of genome sequences including gene families and gene clusters	8
4	Eukaryotic genomes: a. Chromosomal organization and structure. Euchromatin, heterochromatin, centromere, telomere. b. Chromatin structure (nucleosomes)- histone, non-histone proteins	6
5	Definition of gene – introns/exons, Regulatory sequences, promoters, enhancers and suppressors	5
6	Central dogma of Molecular Biology and exceptions to Central Dogma	2
7	DNA replication in prokaryotes and eukaryotes	6
8	DNA damage and repair a. Mutations b. DNA repair mechanisms	4
9	Transcription in Prokaryotes and Eukaryotes a. Mechanism of transcription b. Regulation of transcription	6
10	Genetic Code a. Major scientific contributions to decipher genetic code b. Concept of codon, reading frame, frame shift c. Degeneracy of codon	3
11	Translation: a. in Prokaryotes b. in Eukaryotes c. Inhibitors of translation	6
12	Post-translational modifications a. glycation, glycosylation b. ubiquitination, SUMOylation	3
13	Protein translocation a. Signal peptide b. co- & posttranslational translocation	3

Reference Books :

1. Genes X, 10th edition (2009), Benjamin Lewin, Publisher - Jones and Barlett Publishers Inc. USA
2. Molecular Biology of the Gene, 6th Edition (2008), James D. Watson, Tania Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Lodwick, Pearson Education, Inc. and Dorling Kindersley Publishing, Inc. USA
3. Molecular Biology, 5th Edition (2011), Weaver R., Publisher-McGraw Hill Science. USA
4. Fundamentals of Molecular Biology, (2009), Pal J.K. and Saroj Ghaskadbi, Oxford University Press. India

Bb- 222 Plant & Animal Development

Sr. No.	Topics	Lectures
	Plant Development	
1	Plant as a living system Unique features of plant development Principles of plant development	2
2	Plant development at: Cellular, organ and whole-plant levels Whole plant as an interacting dynamic system	3
3	Major phases of plant development Vegetative development: Zygote to seed embryo to seedling till vegetative maturity Pattern formation in plants- vegetative	3
4	Reproductive development: Shift from vegetative to reproductive phase Induction- perception of inductive stimuli and subsequent changes, Pattern formation in plants- flowering	4
5	Microsporogenesis, development of male gametophyte and male gamete Megasporesogenesis, development of female gametophyte and female gamete Double fertilization and triple fusion Development of endosperm	4
6	Concept of competence, determination, commitment, differentiation, de-differentiation and re-differentiation (partial/ terminal) <i>in vivo with one example each</i>	3
7	Model systems to understand plant development, <i>Fucus</i> , and <i>Arabidopsis</i>	2
8	Programmed Cell Death- ageing and senescence	2
9	Molecular regulation of development in <i>Arabidopsis</i>	4
10	<i>In vitro</i> response in-relation-to developmental stage(s) of plants/organs	3
	Animal Development	
1	Gametogenesis: oogenesis and spermatogenesis Fertilization	6
2	Types and patterns of cleavage, blastulation	2
3	Gastrulation in amphioxus, frog and chick up to formation of three germinal layers	7
4	Overview of organogenesis in frog, chick	3
5	Concept of stem cells, Progenitor cells, cell lineages, determination, commitment and differentiation	2
6	Concept of dedifferentiation, redifferentiation, transdifferentiation and	3

	three types of regeneration with one example of each type	
7	Role of gene/s in patterning and development of <i>Drosophila</i> .	4
8	Ageing and apoptosis,	2
9	Abnormal development and teratogenesis in animals	1

Reference Books:

1. Development Biology, 9th edition, (2010), Gilbert S.F.(Sinauer Associates, USA)
2. Principles of Development, 4th edition (2010), Wolpert L and Tickle C, Publisher: Oxford University Press, USA.
3. Bhojwani S.S. and Bhatnagar S.P.(2009) – Embryology of Angiosperms (Vikas Publ House, New Delhi)
4. Burgess J. (1985) An Introduction to Plant Cell Development (Cambridge Univ Press, UK)
5. Taiz L, Zeiger E (2010) – Plant physiology (Sinauer Associates, USA).
6. Sharma HP (2009) – Plant embryology: Classical and experimental (alpha sci)
7. Steeves TA & Sussex IM (2004) – Patterns in plant development. (Cambridge Univ Press, Cambridge, New York)

Bb-223: Scientific writing and communication (30L)

Note: This is a 30 Lectures, Topic nos. 1-6 are to be taught by a teacher of English and Topic nos. 7-16 by a Biology teacher

Sr. No	Topic	Lecture
1	Making oral presentations: Pronunciation, accent, intonation, clarity, speed, fluency, eye contact; Planning and organization.	4
2	Enrichment of vocabulary: Word forms and derivations, prefixes and suffixes, other processes of word formation. Scientific and technical vocabulary, spellings; Frequently confused words.	3
3	Basic grammar: Tenses; Voices; Propositions and conjunctions; Conditional sentences; Count and non-count nouns; Concord; Punctuations.	4
4	Effective written presentation: Order of sentences in a paragraph; Sentence connection, cohesion and coherence; Contradiction, tautology, semantic anomaly, circumlocution	2
5	Using the dictionary and the thesaurus.	1
6	The curriculum vitae.	1
7	Scientific method: Concept, hypothesis, theory, law; Design of experiment; Inductive and deductive reasoning.	2
8	Types of presentation: Oral, poster, written, audio-visual. Aids for presentation	1
9	Preparing the manuscript. Guidelines for authors. The IMRAD format.	1
10	Title, byline; Abstract and Summary; Keywords.	1
11	Introduction: Defining the problem; Literature survey; Justification of study.	1
12	Materials and Methods: Contents, sources, procedures, techniques, reproducibility, Units of measurements, metric system and SI units. Basic statistical techniques, confidence limits, tests, probability, significance.	2
13	Results: Text; How to present data; Tables and illustrations. Writing captions, labels and legends.	2
14	Discussion: Components and sequence. Analysis, comparison and integration of data. Likely sources of errors in Results; Conclusions and significance. Implications for further study.	2
15	Acknowledgements. Literature citation systems. Sources of references: Journals, books, bibliographies, abstracting journals; Databases.	2
16	Preparing and submitting the manuscript. Revising, editing, proofreading.	2

Reference Books:

1. Scientists Must Write. 2nd Edition, (2002), Barrass, R., Routledge, Oxon, UK
2. How to Write and Publish a Scientific Paper. 6th Edition, (2006), Day, R.A. and B. A. Gastgel, Greenwood Press, Westport, CT, USA.
3. Medical Writing: A prescription for clarity. 3rd Edition, (2006), Goodman, N.W. and M.B. Edwards, Cambridge University Press, Cambridge, UK.
4. Planning, Proposing and Presenting Science Effectively, 2nd Edition, (2006), Hailman, J.P. and K. B. Strier, Cambridge University Press, Cambridge, UK.
5. Biomeasurement: Understanding, Analysing and Communicating Data in Biosciences, (2005), Hawkins, D., Oxford University Press, Oxford, UK.
6. AMA Manual of Styles. A Guide for Authors and Editors, 10th Edition, (2007), JAMA and Archives Journals, Oxford University Press, New York.
7. Successful Scientific Writing: A step-by- step guide for the biological and medical sciences, 3rd Edition, (2008), Mathews, J.R. and R.W. Mathews, Cambridge University Press, Cambridge, UK
8. Writing Papers in the Biological Sciences. 4th Edition, (2004),McMillan, V.E., Bedford Books/St Martins.
9. A Short Guide to Writing About Biology. 6th Edition, (2006), Pechenik, J.A., Longman, New York.
10. A Manual for Writers of Research Papers, Theses and Dissertations. Edn. 7, (2007), Turabian K.L., W.C. Booth, G.G. Colomb, J.M. Williams and University of Chicago Press Staff, University of Chicago Press, Chicago, IL, USA.

Bb- 224 Metabolic Pathways (60L)

Sr. No.	Topic	Lecture
1	Bioenergetics: Bioenergetics, Source of free energy for cells. Free energy change during reaction, important types of reaction in metabolism, oxidation- reduction reaction , biological oxidation reduction reaction, types of electron transfer, redox potential, phosphoryl group transfer and ATP.	1
2	Enzymes: Definition, advantages over chemical catalyst, classification with examples, how enzymes work, specificity. Enzyme activity, specific activity, turnover number. Enzyme kinetics: substrate concentration, Presteady state, steady state assumption , Michaelis Menten equation, initial velocity , V_{max} , K. Lineweaver Burke's Plot. Inhibition: Reversible, irreversible, competitive, non- competitive, uncompetitive, Regulation : Allosteric enzymes and regulation, feedback inhibition.	3
3	Metabolism: Introduction to anabolism and catabolism.	1
4	Carbohydrate Metabolism: Glycolysis, fates of pyruvate: cori cycle fermentation, ED pathway, TCA cycle, Anapleurotic reactions, gluconeogenesis, glycogen breakdown and glycogen synthesis, Glyoxylate pathway, pentose phosphate pathway. Regulation of pathways	10
5	Electron transport System and Photosynthesis , light and dark reaction. C3 and C4 pathways	5
6	Overview of Lipid metabolism: Action of lipases, Beta oxidation of Fatty acids (Even No.) ketone bodies, synthesis of fatty acids, overview of cholesterol synthesis. And phospholipid synthesis.	5
7	Overview of Protein metabolism: Metabolic fates of amino acids, transamination , transfer of amino group by glutamate, urea cycle, Nitrogen fixation by nitrogenase, incorporation of ammonia into biomolecules through glutamate and glutamine, Amino Acid Biosynthetic Families, Grouped by Metabolic Precursor	5

Reference books:

1. Outlines of Biochemistry: 5th Edition, Erice Conn & Paul Stumpf ; John Wiley and Sons, USA
2. Fundamentals of Biochemistry. 3rd Edition, Donald Voet & Judith Voet , John Wiley and Sons, Inc. USA
3. Biochemistry: 7th Edition (2006) , Jeremy Berg, Lubert Stryer, W.H. Freeman and company, NY
4. Lehninger, Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY. Biochemistry. 4th Edition(2008), Reginald Garrett and Charles Grisham, Brook/Cole, Cengage Learning, Boston, USA.

Bb-225 Practicals in Molecular Biology

Sr. No.	Topic	Practical (Total 30)
1.	Importance of clean handling, sterility, cleanliness	2
2.	Reagent preparation	3
3.	Absorption spectra and quantitation of DNA, RNA and proteins	4
4.	DNA isolation and determination of purity - a) Bacterial DNA: alkaline lysis/ lysozyme method, b) Eukaryotic DNA cTAB/ SDS/ homogenization	6
5.	Analysis of DNA by Agarose gel electrophoresis	2
6.	Comparative protein estimation by Biuret, Lowry and Bradford's method	6
7.	SDS-PAGE separation of proteins	4
8.	Staining and destaining of protein gels	2

Bb-226 Practicals in Developmental biology (30P)

Sr. No.	Topic	Practical (Total 30)
	Plant development	
1	Methods of studying plant development a) Dissection b) Sectioning c) Maceration d) Staining e) Mounting	5
2	Study of apices and meristem- RAM, SAM, florally induced meristem Microsporogenesis- anther squash technique Development of male and female gametophytes Developmental stages during plant embryogenesis in dicots and monocots Dissection of seed and excision of young embryo and endosperm (one dicotyledon and one monocotyledon)	4 2 3 2 4
	Animal development	
1	Study of different types of eggs	1
2	Study of frog development, observation of frog embryos, different development stages, life cycle	1
3	Study of amphioxus development, observation of embryos, different development stages	1
4	Study of staging & staining of Chick embryos (18h, 24 h, 48h, 72 h)	4
5	Chick embryo culturing	4
6	Effect of teratogen on development of chick embryo by window technique	3
7	Demonstration of regeneration of hydra	1

UNIVERSITY OF PUNE

REVISED SYLLABUS FOR S.Y. B.Sc. CHEMISTRY FROM 2014-2015

(According to Semester system 2014-2015)

Course structure: There will be four theory papers of 50 Marks each, (40 marks external + 10 marks internal) and one practical course of 100 marks. (80 marks External + 20 marks Internal). The examination will be held semester-wise for theory papers whereas the examination for practical course CH-223 will be held at the end of **SEMETER-II**

SEMESTER	PAPER	COURSE TITLE	MARKS
I	CH-211	PHYSICAL & ANALYTICAL CHEMISTRY	50
I	CH-212	ORGANIC & INORGANIC CHEMISTRY	50
II	CH-221	PHYSICAL & ANALYTICAL CHEMISTRY	50
II	CH-222	ORGANIC & INORGANIC CHEMISTRY	50

Practical Course in Chemistry: CH-223 - 100 Marks

Equivalence of Previous Syllabus:

Semester	Old Course (2009-10)	New Course (2014-15)
I	CH-211 : Physical Chemistry	CH-211 : Physical & Analytical Chemistry
I	CH-212 : Organic Chemistry	CH-212 : Organic & Inorganic Chemistry
II	CH-221 : Inorganic Chemistry	CH-222 : Organic & Inorganic Chemistry
II	CH-222 : Analytical Chemistry	CH-221 : Physical & Analytical Chemistry
	CH- 223: Practical	CH- 223: Practical

S. Y. B. Sc. (Chemistry) Syllabus

Semester - I

Paper 1: CH-211: Physical and Analytical Chemistry

Paper 2: CH-212: Organic and Inorganic Chemistry

Semester - II

Paper 3: CH-221: Physical and Analytical Chemistry

Paper 4: CH-222: Organic and Inorganic Chemistry

Practical Course in Chemistry CH-223 (To be conducted during both semesters)

SEMESTER – I

Paper 1: CH-211

Section – I

Physical Chemistry

Chapter 1: Elementary Chemical Kinetics

[10]

Introduction to Chemical kinetics, molecularity and order of reaction, reaction rates, rate laws, rate constant and its significance, Integrated rate law expression and its characteristics—first order, second order (single reactant, two reactants involved), examples of 1st and 2nd order reaction, pseudomolecular reactions, factors affecting rate of reaction, measurement of rate of reaction, numericals.

Aim: To introduce concept of kinetics at undergraduate level.

Objectives: Student should learn

- i. Concept of kinetics, terms used, rate laws, types of order
- ii. Discuss examples of first order and second order reaction
- iii. Pseudo molecular reactions
- iv. Factors affecting on rate of reaction
- v. Techniques of measurement of rate of reaction
- vi. To solve problems

Chapter 2: Photochemistry

[10]

Introduction, thermal reactions and photochemical reactions, laws of photochemistry, quantum yield, measurement of quantum yield, types of photochemical reactions—photosynthesis, photolysis, photocatalysis, photosensitization, photophysical process—fluorescence, phosphorescence, quenching, chemiluminiscence, numericals.

Aim: To impart basic knowledge of photochemistry and its applications

Objectives: After studying the chapter student should be able to

- i. Know about photochemistry
- ii. Understand difference between thermal and photochemical reactions
- iii. Understand laws of photochemistry
- iv. Learn what is quantum yield and its measurement
- v. Know Types of photochemical reactions and photophysical process
- vi. Know about quenching and chemiluminence
- vii. To solve numericals

Chapter 3: Distribution law

[04]

Nernst distribution law, Statement and thermodynamic proof for Nernst distribution law, association and dissociation of solute in solvent, application of distribution law, Numericals.

Aim: To understand Nernst Distribution Law and its applications

Objectives: Students should learn

- i. Concept of distribution of solute amongst pair of immiscible solvents
- ii. Distribution law and its thermodynamic proof
- iii. Distribution law and nature of solute in solution state
- iv. Application – Solvent extraction
- v. To solve numericals

Ref.1: Page no. 298 to 302 and 775-800

Section – II

Analytical Chemistry

Chapter 4: Introduction to Analytical Chemistry

[3]

Introduction, Chemical analysis, applications of chemical analysis, sampling, types of analysis, Common techniques, Instrumental methods, other techniques, factors affecting on choice of method

Aim: To introduce basics of analytical chemistry

Objectives: Students should learn

- i. What is Analytical Chemistry
- ii. Chemical analysis and its applications
- iii. Sampling
- iv. Common techniques
- v. Instrumental methods and other techniques
- vi. Choice of method

Ref: Vogel chapter 1 (Page 1 - 11) up to section 1.9 except use of literature.

Chapter 5: Errors in Quantitative Analysis

[5]

Introduction, Error, Accuracy, precision, methods of expressing accuracy and precision, classification of errors, significant figures and computations, distribution of random errors, mean and standard deviations, reliability of results, Numericals.

Aim: To understand errors and its interpretation

Objectives: Students should learn

- i. Meaning of error and terms related to expression & estimation of errors
- ii. Methods of expressing accuracy and precision
- iii. Classification of errors
- iv. Significant figures and computations
- v. Distribution of errors
- vi. Mean and standard deviations
- vii. Reliability of results

Ref: Vogel, 5th edn chapter 4 (127-137 up to section 4.10) extended up to 4.13

Chapter 6: Inorganic Qualitative Analysis [8]

Basic principle, common ion effect, solubility, solubility product, preparation of original solution, classification of basic radicals in groups, separation of basic radicals, removal of interfering anions (phosphate and borate), detection of acid radicals.

Aim: To study the theory underlying Inorganic Qualitative analysis

Objectives: A student should know

- i. Basic principles in qualitative analysis
- ii. Meaning of common ion effect
- iii. Role of common ion effect and solubility product
- iv. Different groups for basic radicals
- v. Group reagent and precipitating agents
- vi. Interfering anions and its removal
- vii. Separation for basic radicals
- vii. Method of detection of acidic radicals

Chapter 7: Analysis of Organic Compounds (Qualitative & Quantitative) [8]

I. Qualitative

A. Types of organic compounds, Characteristic tests and classifications, reactions of different functional groups, analysis of binary mixtures.

II Quantitative

B. Analysis—estimation of C, H, (O) by combustion tube, detection of nitrogen, sulfur, halogen and phosphorous by Lassigen's test.

C. Estimation of nitrogen by Dumas's Kjeldahl's method, estimation of halogen, sulphur and phosphate by Carious method.

D. Determination of empirical and molecular formula, numerical problems.

Aim: To disseminate knowledge of qualitative & quantitative analysis of organic compounds

Objectives: A student should know-

- i. Classification of compounds with different functional groups
- ii. Different tests for detection of elements like C, H, (O), N, S & P.
- iii. Characteristic tests for different functional groups
- iv. Different colour tests and the reactions
- v. Quantitative analysis of C, H by Liebig's method
- vi. Kjeldahl's method with example
- vii. Carius tube method with example
- vii. Empirical and molecular formula
- vii. To solve numericals.

Name of the reference book:

1. Analytical Chemistry by G.D. Christian, sixth edition. Pages: 1-10
2. Vogel's textbook of Quantitative Analysis, sixth edition
J. Mendham, R.C. Denney, J.D. Barnes, MJK Thomas
3. A textbook of macro & semi micro qualitative analysis by
A.J. Vogel, fifth edition
4. Quantitative Organic Analysis, fourth edition, A.J. Vogel, ELBS

Paper 2: CH-212
Section – I
Organic Chemistry

Chapter 1: Stereoisomerism **[12]**

Introduction to optical isomerism: Chirality, optical activity and polarimetry, enantiomers, absolute configuration, R/S system nomenclature with wedge and Fischer representation of two chiral centres, erythro, threo, meso-diastereomers with R/S configuration. Stereoisomerism Baeyer's strain theory, heat of combustion, cycloalkanes, factors affecting the stability of conformation, Conformation of cyclohexane - equatorial and axial bonds, Monosubstituted cyclohexane stability with $-\text{CH}_3$ and $-\text{C}(\text{CH}_3)_3$ substitutes. Structures of geometrical isomers of dimethylcyclohexane only.

Ref. 3

Aims and Objectives

Students should be able to –

- i) Identify chiral center in the given organic compounds.
- ii) Define Erythro, threo, meso, diastereoisomers with suitable examples.
- iii) Able to find R/S configuration in compounds containing two chiral centers.
- iv) Explain Bayer's strain theory, Heat of combustion and relates stability of cycloalkanes.
- v) Explain the stability of cyclohexanes.
- vi) Draw the structure of boat and chair configuration of cyclohexane.
- vii) Draw axial and equatorial bonds in cyclohexane.
- viii) Draw structure of conformations of mono- & disubstituted cyclohexanes
- ix) Explain the stability of axial and equatorial conformation of monosubstituted cyclohexanes.

Chapter 2: Organic reaction Mechanism **[12]**

Introduction, types of reagents—electrophile, nucleophile and free radical.

Types of organic reactions: Addition, Elimination (β -elimination and Hofmann elimination), substitution (aliphatic electrophilic and nucleophilic, aromatic electrophilic) and rearrangement.

Mechanism: (i) Aldol condensation (ii) Markovnikov and anti-Markovnikov addition reaction (iii) Saytzeff and Hoffmann elimination (iv) S_N^1 and S_N^2 reactions (v) Hofmann rearrangement.

Ref. 1 & 4

Aims and Objectives

Students should be able to –

- i) Define and classify heterocyclic compounds.
- ii) Use Huckel rule to predict aromaticity.
- iii) Suggest synthetic route for preparation of various heterocyclic compounds.
- iv) Write and complete various reactions of heterocyclic compounds.
- v) Predict products.

Reference Books:

- Ref. 1: Organic Chemistry-6h Ed. Morrison and Boyd Prentice Hall of India Pvt Ltd, New Delhi-2001.
- Ref. 2: Outline of Biochemistry 5h Ed., Conn, Stumpf Bruening and Roy Doi John Wiley 1987.
- Ref. 3: Stereochemistry of carbon compounds - E. L. Eliel
- Ref. 4: Reactions, rearrangements and reagents – S N Sanyal

Section – II

Inorganic Chemistry

Chapter 3: General Principles of Metallurgy: [6]

Introduction, occurrence of metals, ores and minerals, types of ores, operations involved in metallurgy, crushing, connotation, various methods of concentration such as hand picking, gravity separation, magnetic separation. Froth flotation, Calcinations, Roasting etc. Reduction, various methods of reduction such as smelting, Aluminothermic process and electrolytic reduction, Refining of metals, various methods of refining such as poling, liquation, electrolytic and vapour phase refining (Van Arkel Process).

Aims: To study principles and process of metallurgy.

Objectives: A student should be able -

- i) To differentiate between ore and minerals.
- ii) To differentiate between calcination and roasting and smelting.
- iii) To know the different methods for separation of gangue or matrix from metallic compounds.
- iv) To know the terms smelting, flux.

References:

- i) Advanced Inorganic Chemistry, Satyaprakash, Tuli, Basu, pages 262-271.
- ii) Text book of Inorganic Chemistry, P.L. Soni, pages 2.3-2.8, 2.13-2.17.

Chapter 4: Metallurgy of Aluminium (Electrometallurgy): [4]

Occurrence, Physiochemical principles, Extraction of Aluminium, Purification of bauxite by Baeyer's process, Electrolysis of alumina, application of aluminum and its alloys.

Aims: To study metallurgy of Aluminium.

Objectives: A student should be able -

- i) To know physico-chemical principles involved in electrometallurgy.
- ii) To understand electrolysis of alumina and its refining.
- iii) To explain the uses of Aluminum and its alloys.
- iv) To know purification of bauxite ore.

References:

- i) Advanced Inorganic Chemistry, Satyaprakash, Tuli, Basu pages 458-463.
- ii) Text book of Inorganic Chemistry, P.L. Soni pages 2.209 to 2.211

Chapter 5: Metallurgy of Iron and Steel (Pyrometallurgy) [8]

Occurrence, concentration, calcination, smelting physio-chemical principles, reactions in the blast furnace, wrought iron, manufacture of steel by Bessemer and L.D. process, its composition and applications.

Aims: To study metallurgy of Iron.

Objectives: A student should be able -

- i) To explain the term pyrometallurgy and to explain the physico chemical principles involved in the reduction process by carbon monoxide.
- ii) To know different reactions in the blast furnace.
- iii) To differentiate between properties of pig iron and wrought iron.
- iv) To explain the basic principles of different methods for preparation of steel.
- v) To explain the merits and demerits of different methods.

Reference:

- i) Advanced Inorganic Chemistry, Satyaprakash, Tuli, Basu pages 830-849.

Chapter 6: Corrosion and Passivity: [6]

(a) Corrosion : Definition of corrosion, Types of corrosion, Atmospheric, Immersed, Mechanism of electrochemical corrosion, Factors affecting corrosion - position of metal in E. C. S., purity effect of moisture, effect of oxygen, pH, physical state of metal, methods of protection of metal from corrosion- alloy formation, making metal cathodic, controlling

external condition. Coating-galvanising, Tinning, electroplating, metal cladding, organic coating.

(b) Passivity : Definition, Theories of passivity - (i) Oxide film theory (ii) Gaseous film theory (iii) Physical film theory, Valence theory, Catalytic theory, Allotropic theory, Electrochemical passivity.

A student should know -

- i) Definition of corrosion.
- ii) Types of corrosion.
- iii) Mechanism of corrosion.
- iv) Factors affecting corrosion.
- v) Methods of prevention of metal from corrosion.
- vi) Meaning of passivity.
- vii) Different theories of passivity.
- viii) Galvanising, Tinning, Electroplating from corrosion.

Reference:

- i) Introduction to Electrochemistry by S. Glasstone, 2nd Ed. pages 491-503.

SEMESTER – II

Paper 3: CH-221

Section – I

Physical Chemistry

Chapter 1: Free Energy and Equilibrium [12]

Introduction, Helmholtz free energy, variation of Helmholtz free energy with volume and temperature, Helmholtz free change energy for chemical reaction, Gibb's free energy, Variation of Gibb's free energy with pressure and temperature, Gibb's free energy change for chemical reaction, Free energy change for physical transitions, Free energy change for an ideal gas; standard free energy change, Gibb's-Helmholtz equation, Properties and significance of Gibb's free change, Van't Hoff reaction isotherm, thermodynamic equilibrium constants, Relation between K_p and K_c for gaseous reactions, variation of equilibrium constant with temperature, Criteria for chemical equilibrium, Physical equilibrium, Clapeyron equation, Clausius–Clapeyron equation, Application of Clausius–Clapeyron equation, numericals.

Aim: To conceptualize phenomenon of free energy and equilibria.

Objectives: The student should able to know

- i. Free energy concepts, types and its variation
- ii. Free energy change for chemical reaction and physical transition
- iii. Free energy change for ideal gases
- iv. Gibb's Helmholtz equations and its properties & significance
- v. van't Hoff reaction isotherm and thermodynamic equilibrium constants,
- vi. Chemical and physical equilibrium
- vii. Clausius –Clapeyron equation and its applications
- vii. To solve numericals.

Ref. 1: Page no. 189 to 200, 206

Ref. 2: Relevant pages.

Chapter 2: Solutions of Liquids in Liquids [12]

Types of solutions, Ideal solutions, Raoult's law, ideal and non ideal solutions, Henry's law, Application of Henry's law with example CS_2 in acetone, problems based on Raoult's law and Henry's law, vapor pressure–composition diagram of ideal and non ideal solution, temperature composition diagram of miscible binary solutions, distillation from temperature–composition diagram, Azeotropes, Partially immiscible liquids.

Aim: To distinguish behavior of liquid phase solutions.

Objectives: The student should to know

- i. Ideal and non ideal solutions and laws governing these solutions
- ii. Interpretation of vapor pressure–composition diagram
- iii. Interpretation of temperature composition diagram.
- iv. Distillation from temperature – composition diagram,
- v. Azeotropes
- vi. Partially immiscible liquids.
- vii. To solve numericals

Ref.2: Pages 229 to 247, 254 to 258

Reference books:

1. Principles of Physical Chemistry by S.H. Maron & C. Prutton 4th edition.
2. Physical Chemistry by W.J. Moore 5th edition.
3. Physical Chemistry by P.W. Atkins 4th edition
4. Physical Chemistry by D. Alberty 3rd edition.

Section – II

Analytical Chemistry

Chapter 3: Introduction to volumetric analysis

[6]

Introduction, methods of expressing concentrations, primary and secondary standard solutions. Apparatus used and their calibration: burettes, microburettes, volumetric pipettes, graduated pipettes, volumetric flask, methods of calibration, Instrumental & non-instrumental analysis – principles & types.

Aim: To provide basic knowledge essential for volumetric analysis

Objectives: A student should be able to know

- i. Meaning of equivalent weight, molecular weight, normality, molality, primary and secondary standards.
- ii. Different way to express concentrations of the solution.
- iii. Preparation of standard solution.
- iv. To solve numerical problems.
- v. Calibrate various apparatus such as burette, pipette, volumetric flask, barrel pipette etc.
- vi. Types instrumental and non instrumental analysis

Chapter 4: Non Instrumental volumetric analysis [18]

Indicators–theory of indicators, acid base indicators, mixed and universal indicators [3]

Acid–Base titrations: Strong acid–Strong base, Weak acid–strong base, Weak acid-Weak base titration, Displacement titrations, polybasic acid titrations. (Discuss titration with respect to neutralization and equivalence point determination and limitations) [6]

Redox titrations: Principle of redox titration, detection of equivalence point using suitable indicators. [3]

Complexometric titrations: Principle, EDTA titrations, choice of indicators [6]

Iodometry and Iodimetry: Principle, detection of end point, difference between iodometry and iodimetry, Standardization of sodium thiosulphate solution using potassium dichromate and iodine method, Applications – estimation of Cu , estimation of Cl_2 .

Aim: To learn and equip with non instrumental volumetric techniques

Objectives: The student should able to

- i. Explain role of indicators.
- ii. Know mixed and universal indicators.
- iii. Know neutralization curves for various acid base titration
- iv. Know principle of complexometric precipitation and redox titrations.
- v. Know the definitions and difference between iodometry and iodimetry.
- vi. To know standardization of sodium thiosulphate and EDTA.
- vii. Reactions between CuSO_4 and Iodine and liberated I_2 and $\text{Na}_2\text{S}_2\text{O}_3$
- viii. Choice of suitable indicator.
- ix. Estimate copper from CuSO_4 and available chlorine in bleaching powder.
- x. Prepare standard silver nitrate solution.
- xi. Mohr's and Fajan's method.
- xii. Determine the amount of halides separately and in presence of each other.

Paper 4: CH-222

Section – I

Organic Chemistry

Chapter 1: Reagents in Organic Synthesis [8]

Catalytic hydrogenation including liquid phase hydrogenation, Birch reduction, NaBH_4 , LiAlH_4 , Sn/HCl

Oxidation reagents: KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, Jones reagent, PCC, Per acids, OsO_4 .

Student should understand:

- i) Concept of different reagents used in the one type of conversion
- ii) Merits & demerits of different reagents
- iii) Reagent based mechanisms
- iv) Use of different hydrogen donors for hydrogenation

Ref. 1 & 4

Chapter 2: Chemistry of heterocyclic compounds with one hetero atom. [6]

Definition and classification of heterocyclic compounds, nomenclature and aromatic character. Synthesis of Pyrrole, Furan, Thiophene, Pyridine and their reactions: Nitration, Sulphonation, Acylation and Catalytical reduction. Structure and synthesis of quinoline and Isoquinoline.

Student should know:

- i) Define and classify heterocyclic compounds.
- ii) Use Huckel rule to predict aromaticity.
- iii) Suggest synthetic route for preparation of various heterocyclic compounds.
- iv) Write and complete various reactions of heterocyclic compounds.
- v) Predict products.

Ref. 1

Chapter 3: Introduction of Bio-molecules [10]

Carbohydrates: Definition, classification, reaction of monosaccharide (glucose)- oxidation, reduction, osazone and ester formation, isomerization, Killiani-Fischer synthesis and Ruff

degradation, Configuration of D/L configuration of (+) Glucose, Fischer-Haworth and chair formulae, Brief account of disaccharides: Sucrose, cellobiose, maltose and lactose.

Polysaccharides: Starch, cellulose and glycogen.

Amino acids: Fischer projection, relative configuration, classification, structures and reactions of amino acids, Properties and chemical reactions with amino and carboxylic group.

Proteins: Formation of Peptide linkage, α -helical conformation, β -plated structure, primary, secondary, tertiary and quaternary structure of proteins.

Ref. 2 & 3

Student should know

- i) Know different biomolecules.
- ii) Appreciate the role of biochemistry in the day to day life.
- iii) Understand the importance of biochemistry.
- iv) Define carbohydrates.
- v) Classify carbohydrates giving suitable examples.
- vi) Write and complete various reactions of glucose.
- vii) Explain optical activity in carbohydrates.
- viii) Write Fischer projection and perspective formula with glyceraldehydes as reference compound.
- ix) Explain the principle in Killani Fischer synthesis.
- x) Explain stereoisomerism in monosaccharide.
- xi) Draw structure of some common aldoses and ketoses.
- xii) Distinguish between diastereomers and epimers.
- xiii) Write cyclic structure of glucose in Fischer, Haworth and chair form.
- xiv) Know the phenomenon of mutarotation.
- xv) Draw the structure and bonding in maltose, lactose, cellobiose and sucrose.
- xvi) Know about polysaccharide, structures of starch and cellulose.
- xvii) Classify the naturally occurring amino acids.
- xviii) Explains the amphoteric nature of amino acids.
- xix) Know the important reactions of α -amino acids.
- xx) Outline the formation of peptide bond.
- xxi) Explain the hydrogen bonding in α -helical structure.
- xxii) Relate the stability of α -helical chain and their R-groups.

xxiii) Define primary, secondary, tertiary and quaternary structure of proteins.

xxiv) Classify proteins.

Reference Books:

Ref. 1: Organic Chemistry-6th Ed. Morrison and Boyd Prentice Hall of India Pvt Ltd, New Delhi-2001.

Ref. 2: Outline of Biochemistry 5th Ed., Conn, Stumpf Bruening and Roy Doi John Wiley 1987.

Ref. 3: Stereochemistry of carbon compounds - E. L. Eliel

Ref. 4: Reactions, rearrangements and reagents – S N Sanyal

Section – II

Inorganic Chemistry

Chapter 4: Chemistry of d-block elements [6]

Position of d-block in periodic table, electronic configuration, trends in properties of these elements w.r.t.(a) size of atoms & ions (b) reactivity (c) catalytic activity (d) oxidation state (e) complex formation ability (f) colour (g) magnetic properties (h) non-stoichiometry (i) density, melting & boiling points.

Student should know:

- i) To know position of d-block elements in periodic table.
- ii) To know the general electronic configuration & electronic configuration of elements.
- iii) To know trends in periodic properties of these elements w.r.t. size of atom and ions, reactivity, catalytic activity, oxidation state, complex formation ability, colour, magnetic properties, non-stoichiometry, density, melting point, boiling point.

Chapter 5: Organometallic Chemistry [6]

Definition of Organometallic compounds and Organometallic chemistry, CO as a π -acid donor ligand, binary metal carbonyls, methods of synthesis; (a) Direct reaction (b) Reductive carbonylation (c) Photolysis and thermolysis. Molecular and electronic structures (18 electron rule) of metal carbonyls. Homogenous catalysis-Hydroformylation (Oxo Process) and Wacker Process.

Aim: To study the metal carbonyl complexes and their uses in the homogenous catalysis.

Objectives:

Students should be able:

- i) To understand M-C bond and to define organometallic compounds
- ii) To define organometallic chemistry

- iii) To understand the multiple bonding due to CO ligand.
- iv) To know methods of synthesis of binary metal carbonyls.
- v) To understand the structure and bonding using valence electron count (18 electron rule)
- vi) To understand the catalytic properties of binary metal carbonyls.
- vii) To understand the uses of organometallic compounds in the homogenous catalysis.

References:

1. Concise Inorganic Chemistry by J. D. Lee-relevant pages.
2. General Chemistry-Raymond Chang- relevant pages.

Chapter 6: Acids, Bases and Solvents [6]

Definition of acids and bases, Arrhenius theory, Lowry-Bronsted theory, Lewis concept, Lux-Flood theory, strength of acids and bases, trends in the strength of hydracids and oxyacids, Properties of solvents, M.P-B.P range, dipole moment, dielectric constant, Lewis acid-base character and types of solvents.

Ref: Basic Inorganic Chemistry – F. A. Cotton (Pages- 163-173)

(6) Acids, Bases, Solvents and reactions in non-aqueous solvents:

Aims: To study different solvents and to know the different theories of acids and bases.

Objectives: A student should be able -

- i) To define acids and bases according to Arrhenius theory Lowry- Bronsted concept, Lewis concept.
- ii) To explain the merits and demerits of different theories of acids and bases.
- iii) To define the conjugate acid and base pairs.
- iv) To explain the leveling effect of solvents.
- v) To demonstrate the trends in the strength of hydracids, oxyacids.
- vi) To define hard and soft acids.
- vii) To know the trends in the strength of hydra and oxyacids.
- viii) To know the rules governing the strength of oxyacids.
- ix) To explain the properties of a solvent that determines their utility.
- x) To know some useful solvents.
- xi) To explain the reactions in non-aqueous solvents like HF and NH₃.

Chapter 7: Chemical Toxicology [6]

Toxic chemicals in the environment, Impact of toxic chemistry on enzymes.

Biochemical effect of Arsenic, Cadmium, Lead, Mercury, Biological methylation.

A student should be able -

- i) To know toxic chemical in the environment.

- ii) To know the impact of toxic chemicals on enzyme.
- iii) To know the biochemical effect of Arsenic, Cd, Pb, Hg.
- iv) To explain biological methylation.

Reference:

- i) Fundamental Chemistry by A. K. Dee. (3rd Ed.)

Practical Course in Chemistry CH – 223

A) Physical Chemistry practicals (Any Five)

- i. To determine critical solution temperature of phenol water system
- ii. To determine molecular weight of given organic liquid by steam distillation
- iii. Determination of solubility of benzoic acid at different temperature and to determine ΔH of dissociation process.
- iv. To study neutralization of acid (HCl) base (NaOH) and CH_3COOH by NaOH and H_2SO_4 by NaOH.
- v. To determine the rate constant (or to study kinetics) of acid catalyzed ester hydrolysis.
- vi. To determine the rate constant of base catalyzed ester hydrolysis.
- vii. Partition coefficient of iodine between water and carbon tetrachloride.

Aim: To equip students to correlate theoretical and experimental knowledge

Objectives: After completion of practical course student should be able to

- i. Verify theoretical principles experimentally
- ii. Interpret the experimental data
- iii. Improve analytical skills
- iv. Correlate the theory and experiments and understand their importance

B) Inorganic Qualitative Analysis (Minimum Five mixtures)

- i. One simple mixture (without phosphate or borate)
- ii. Two Mixtures containing PO_4^{3-} (With PO_4^{3-} removal)
- iii. Two Mixtures containing BO_3^{3-} (With BO_3^{3-} removal)

Inorganic Qualitative Analysis of Binary Mixtures (including phosphate and borate removal).

Sodium carbonate extract is to be used wherever necessary for detecting acidic radicals.

C) Organic Chemistry Practical

- a. Organic qualitative analysis of Binary Mixtures without ether separation
(**Four only**)

Two: solid-solid, one: solid-liquid, one: liquid-liquid

- b. Organic Preparation: (**Any two including Crystallization, MP, TLC**)

- i) Phthalic anhydride to phthalamide
- ii) Glucose to osazone

- iii) Acetanilide to p-bromoacetanilide
- iv) Benzaldehyde to dibenzylidene acetone

After completion of practical course student should be able to –

- i) Verify theoretical principles experimentally.
- ii) Acquire skill of crystallisation, record correct m. p. / b. p.
- iii) Perform the complete chemical analysis of the given organic compound and should be able to recognize the type of compound.
- iv) Write balanced equation for all the reactions, they carry in the laboratory.
- v) Perform the given organic preparation according to the given procedure.
- vi) Follow the progress of the reaction by using TLC technique.
- vii) Set up the apparatus properly for the given experiments.
- viii) Perform all the activities in the laboratory with neatness and cleanness.

Ref. 1 Organic Qualitative Analysis: A. I. Vogel

D) Analytical Chemistry Practicals (Any Five)

- i. Estimation of sodium carbonate content of washing soda.
(Vogel 5th Edition: 10.30 page 295).
- ii. Determination of Ca in presence of Mg using EDTA.
Ref.2: Page 412
- iii. a) Preparation of standard 0.05 N oxalic acid solution and standardization of approx. 0.05N KMnO₄ solution.
b) Determination of the strength of given H₂O₂ solution with standard 0.05 N KMnO₄ solution.
- iv. Estimation of Aspirin from a given tablet and find errors in quantitative analysis.
- v. Estimation of Al (III) from the given aluminium salt solution by using Erichrome Black-T indicator (Back titration method)
- vi. Iodometric estimation of copper.
- vii. Report on one day industrial educational visit.

Reference books

- 1. Analytical Chemistry by G.D. Christian 6th edition.
- 2. Vogel's Textbook of Quantitative chemical analysis 6th edition R.C. Denney, J.D. Barnes, M.J.K. Thomas

Aim: To equip students to correlate theoretical and experimental knowledge

Objectives: After completion of practical course student should be able to

- i. Verify theoretical principles experimentally
- ii. Interpret the experimental data
- iii. Improve analytical skills
- iv. Correlate the theory and experiments and understand their importance

N.B. - Industrial visit during the academic year is compulsory.

S.Y.B.Sc. (Electronic Science)
Revised Syllabus
To be implemented from A.Y. 2014-15

Structure of S. Y. B. Sc. (Electronic Science) course

Sem-I	Paper-I : Analog Circuit Design (EL211)	Paper-II: Digital Circuit Design (EL212)
Sem-II	Paper-I: Electronic Instrumentation (EL221)	Paper-II: Communication Electronics (EL222)
Sem-I & II	Paper- III: Practical Course (EL 203)	

Equivalence Subject/Paper and Transitory Provision

Semester	Old Syllabus	New Syllabus
Semester I	Paper - I : Analog Circuits and Systems	Paper-I : Analog Circuit Design (EL 211)
	Paper - II: Digital System Design	Paper-II: Digital Circuit Design (EL 212)
Semester II	Paper – I: Electronic Instrumentation	Paper-I: Electronic Instrumentation (EL221)
	Paper – II: Communications system	Paper-II: Communication Electronics (EL222)
Semester I and II	Practical Course	Paper- III: Practical Course (EL 203)

S.Y.B.Sc. Electronic Science -Semester I

Paper - I: Analog Circuit Design (EL 211)

Objectives:

1. To study basic principles of amplifiers and oscillators.
2. To understand the working of various analog circuits.
3. To develop analog circuit design skills.
4. To apply the knowledge of analog circuits in different applications.

UNIT- 1: Transistor Amplifiers: (12)

General classification of amplifiers: with respect to signal amplitude, frequency and configuration. Small signal amplifier: A.C.-D.C. analysis, frequency response, gain Bandwidth product. Design of single stage amplifier. Types of coupling (quantitative analysis): RC coupled, transformer coupled and direct coupled. Multi-stage RC coupled CE amplifier: effect of coupling capacitor and bypass capacitor on frequency response (qualitative approach) and application area.

UNIT-2:Power Amplifiers : (12)

Concept: Difference between voltage and power amplifier, Comparison of small signal and large signal amplifiers: with respect to gain, efficiency, and distortion. Classification of power amplifiers on the basis of conduction: class-A, class-B, class-AB, class-C. Class-A amplifier: resistive load/transformer coupled load, efficiency calculation. Concept of harmonic distortion. Class B amplifier: Push-pull amplifier concept, complimentary symmetry class-B push pull amplifier, crossover distortion, class AB push pull amplifier. Concept, use and types of heat sinks.

UNIT-3: Feedback Systems : (12)

Concept of negative and positive feedback and Barkhausen criterion. Types of feedback circuits: current shunt, current series, voltage shunt and voltage series, comparison and applications. Effect of negative feedback: on gain ,Bandwidth, input and output impedance, stability of an amplifier. Positive feedback: oscillator circuits -Wien bridge , Phase Shift , Hartley , Colpitts and Crystal. Design of oscillators for given feedback factor and frequency of oscillation.

UNIT-4: Differential Amplifiers and Applications of Operational Amplifier: (12)

Concept and working of differential amplifier. Configurations of differential amplifier: Single ended, double ended. Differential and Common mode gains, Use of constant current source and its effect on CMRR.

Op-amp Applications: Integrator, Differentiator, Voltage to current converter, Current to voltage converter, Bridge amplifier, Instrumentation amplifiers with three op-amp, Precision rectifier, First order Butterworth active filters -Low pass and High pass filters.and its design for cut off frequency.

Recommended Books:

1. Electronic Principles by Malvino A.P TMH
2. Operational amplifiers and linear Integrated Circuits by Gaykawad R. PHP
3. Operational amplifier by Clayton G.B. ELBS
4. Electronic devices and circuits by Millman, Halkias McGrawHill
5. Electronic devices and circuits by Boylestead PHP
6. Principles of Electronics by Meheta V.K. S.Chand and Company
7. Principles of Electronics by B.L.Thereja S.Chand and Company
8. Basic Electronic Devices and Circuits: R.Y. Borse 1st Edition 2012 Adhayan Publishers and distributors, New Delhi.

S.Y.B.Sc. (Electronic Science)-Semester-I

Paper- II: Digital Circuit Design (EL 212)

Objectives:

1. To utilize k-maps in the design of combinational circuits.
2. To understand the design principles of sequential circuits.
3. To study the design and working of various data converters
4. To configure the digital circuits in system interfacing and applications.

UNIT -1: Combinational Circuits: (12)

Revision of K maps, Design of code converters: BCD to Seven segments, Binary to Gray and Gray to binary. Serial adder, Priority encoder, Parity generator/Checker, Magnitude comparator.

UNIT -2: Sequential Circuits: (12)

State table, State diagram, excitation table and transition table, Design of counters using state machines: Synchronous, asynchronous, modulus and up-down counter, Sequence generator

UNIT -3: Data Converters : (12)

Digital to analog converters : weighted resistive network, R-2R ladder network, D/A accuracy and resolution, Analog to Digital converters: Simultaneous conversion, counter method, Tracking method, successive approximation method, Single slope, dual slope, A/D accuracy and resolution

UNIT -4: Digital System Interfacing and Applications : (12)

Interfacing of LED's, single and multi digit 7 segment display/ driver, Switches, Keypad, Thumb wheel switches, Relays, Interface considerations for ADC/DAC with digital systems.

Applications of counters:- Totalizer, Digital clock, auto-parking, two digit bank token display.

Recommended Books:

1. Digital Fundamentals by Floyd Thomas (Pearson)
2. Digital Circuit design by Morris Mano (PHP)
3. Digital Principles and applications by Malvino Leach (TMH)
4. Modern digital Electronics by R.P.Jain (TMH)
5. Practical Digital IC's by Willams (TMH)

S. Y. B. Sc. Electronic Science – Semester II
Paper - I : Electronic Instrumentation (EL 221)

Objectives:

1. To study the block diagram of electronic instruments
2. To understand the working principles of frequently used instruments.
3. To know important technical specifications of an instruments.
4. To learn the operating procedure of instruments.

UNIT- 1: Measurement Principles and Basic Instruments (12)

Measurement of physical parameters, measurement system block diagram, Measurement characteristics like accuracy, precision, sensitivity, linearity, resolution, reliability, repeatability, errors. Construction and working principles of Volt meter, Current meter, Ohm meter, multi-range meters, multi-meter, AC Voltmeter.

UNIT- 2: Signal Sources and Oscilloscope (12)

Principle, block diagram, working and important specifications of signal and function generators, sweep generators, dual channel and dual trace CRO, digital storage oscilloscope (DSO).

UNIT- 3: Digital Instruments (12)

Block diagram, working principle and specifications of DPM, DMM, DFM, LCR meter, Digital thermometer, Lux meter, Speedometer, pH meter, energy meter, power factor meter and decibel meter .

UNIT- 4: Power Supplies (12)

Principle, block diagram, working, important specifications and operating procedures for- Fixed voltage power supply, variable power supply, dual power supply, CVCC supply, SMPS, DC to DC converter, UPS.

Recommended Books:

1. Helfrik A. & Copper W., Modern Electronic Instrumentation and measurement techniques, PHI.
2. Kalsi H. S., Electronic Instrumentation, TMH.
3. Bouwens, Digital Instrumentations, TMH
4. Rashid Muhammad H, Power Electronics, PHI
5. B. S. Sonde, Power Supplies, TMH

S.Y.B.Sc. (Electronic Science)-Semester-II

Paper - II: Communication Electronics (EL 222)

Objectives:

1. To study basics of communication systems and telephone system.
2. To understand Amplitude and Frequency Modulation.
3. To understand basics of AM and FM Receivers.
4. To study the digital communication system.

UNIT- 1: Basics of Communication and Telephone Systems (12)

Block diagram of communication system, types of communication system: simplex, duplex, analog and digital communication, Electromagnetic spectrum, base band and broad band communication. noise concept and types, signal to noise ratio, noise figure, noise temperature. Problems based on noise calculations.

Block diagram of Telephone handset, types of dialing, Block diagram of PSTN.

UNIT- 2: Amplitude Modulation and AM Receiver (12)

Need of modulation, concept of modulation, AM waveform, mathematical expression of AM, concept of sideband, Definition and problems: modulation index, power distribution. AM using diode/transistor, demodulation principles, demodulator circuit using diode.

AM Receiver: TRF and super-heterodyne receiver, characteristics of receiver: selectivity, sensitivity, Image frequency and dynamic range.

UNIT-3: Frequency Modulation and FM receiver (12)

FM modulation: definition, mathematical representation, frequency spectrum, bandwidth and modulation index. FM using varactor diode, problems based on modulation index, frequency deviation, average power. FM Demodulator: Slope detector, Foster-Seeley detector.

Block Diagram of FM Receiver.

UNIT- 4: Pulse and Digital Communication Systems (12)

Block diagram of digital communication system, advantages of digital communication system, bit rate, baud rate and bandwidth. Serial and parallel communication, concept of sampling, Sampling theorem, concept of ASK, PSK, FSK, PAM, PWM, PPM, PCM, Concept of FDM and TDM, Concept of MODEM, Concept of Set Top Box.

Recommended Books:

1. Communication Electronics :Principles and applications by Louis E Frenzel 3rd edition
TMH Publications.
2. Electronics Communication Systems by Keneddy
3. Telecommunication Switching Systems and Network by Vishwanathan Thiagarajan, PHI
publication.
4. Electronics Communication Systems by Denis Roddy, John Coolen, PHI publication.

S.Y.B.Sc. (Electronic Science)
Paper- III: Practical Course (EL 203)

Objectives:

1. To make use of basic concepts for building different electronic circuits..
 2. To understand design procedures of different electronic circuit as per requirement
 3. To build experimental setup and test the circuits.
 4. To develop skills of analyzing test results of given experiments .
- Total Practical to be conducted :20.
 - 16 experiments compulsory: At least four practical from each of the A B C D groups.
 - One activity equivalent to 2 experiments by the student.
 - a. Continuation of F. Y. activity.
 - b. PSPICE Simulation
 - c. Documentation type experiments
 - d. Presentation/Seminar on Electronics /advanced topic/research topics.
 - One activity equivalent to 2 experiments to be arranged by the teacher – Arrange at least two practical demonstrations / Workshops /Industrial visit which will enhance quality and skills of the student.
 - Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two session of 3 Hrs as usual practice.**

Session I 40 marks

Practical work 32 marks , Oral based on the student's own activities 8 marks

Session II 40 marks

Practical work 32 marks,Oral based on Common activities arranged by teachers 8 marks

32 Marks can be divided as -Circuit diagram	10
Connection	05
Demonstration and working explanation	10
Results	05
Result analysis / conclusion / comments	02

Group A :List of Practicals (Digital Circuit Design): Any Four

1. Code conversion using logic gates – binary to gray , gray to binary
2. 3 bit synchronous counter using flip flops
3. Decimal to BCD encoder using logic gates
4. Study of RAM
5. Study of 4- Bit Arithmetic Unit using IC 74181
6. DAC using R-2R ladder network
7. ADC using IC 0808/IC 7109/IC 741/IC 324
8. Sequence generator for stepper motor

Group B: List of Practicals (Analog Circuit Design): Any Four

1. Design of Low Pass Filter and High Pass Filter using OPAMP IC-741
2. Wein bridge oscillator/Phase shift oscillator
3. Design and build two stage amplifier using transistor
4. Effect of negative feedback on amplifier parameters
5. Push pull amplifier
6. Design and build V to I converter using opamp

Group C: List of Practicals (Communication Electronics): Any Four

1. Design, Build and test Amplitude Modulator and Demodulator.
2. Time Division Multiplexing circuit.
3. Frequency Shift Keying(FSK) using XR 2206
4. Delta Modulation circuit using opamp
5. Hamming Code generation and error detection.
6. Demonstration of PAM,PPM and PWM
7. Study of radiation pattern of antenna

Group D : List of Practicals (Electronic Instrumentation): Any Four

1. Design and build three opamp Instrumentation Amplifier
2. Variable power supply using IC 317.
3. Temperature measurement system using LM – 35
4. Study of UPS.
5. Study of Function generator
6. Multirange voltmeter
7. Study of CVCC/SMPS.
8. Design and build bridge amplifier for temperature sensors thermistor/RTD/PT100
9. Study of LDR based system
10. Study of LVDT

University of Pune

S.Y.B.Sc. Environmental Science Revised Syllabus 2014-15 Course Design

Paper	Semester	Course No.	Course Title	Marks Distribution			
				Internal	University	Subtotal	Total
I	I	EVS – 201	Ecology & Ecosystem.	10	40	50	100
	II	EVS – 201	Biological Diversity & its Conservation.	10	40	50	
II	I	EVS – 202	Natural Resources, Energy & their Management.	10	40	50	100
	II	EVS – 202	Pollution Control & Environmental Technology.	10	40	50	
III	I & II	EVS – 203	Practical Course Based on EVS - 201 & EVS - 202	20	80	100	100

EQUIVALENCE

Revised Course (2014-15)			»	Previous Course (2009-10)		
Semester	Course Code	Course Name		Semester	Course Code	Course Name
I	EVS: 201	Ecology & Ecosystem		I	ENV: 201	Ecology & Ecosystem
I	EVS: 202	Natural Resources, Energy & their Management.		F.Y. Term II	ENV: 101	Life Science: Natural Resources
II	EVS: 201	Biological Diversity & its Conservation.		II	ENV: 201	Biological Diversity
II	EVS: 202	Pollution Control & Environmental Technology.		III (T.Y.)	ENV: 303	Water Quality
				III (T.Y.)	ENV: 303	Air & Soil Quality
I & II	EVS: 203	Practical Course Based on EVS: 201 & EVS: 202		I & II	ENV: 203	Practical Course Based on ENV: 201 & ENV: 202

EXAMINATION

- Pattern of Examination-
 - i) Theory Papers – Semester Pattern
Internal Exam + University Exam (10 + 40) marks.
 - ii) Practical Paper – Annual Pattern
Internal Exam + University Exam (20 + 40) marks.
- Pattern of the question paper (University Exam)-
 - i) Semester Theory Paper Maximum Marks – 40.

Q1) 1 mark X 10 10 marks.
Q2) 5 marks X 2 10 marks.
Q3) 5 marks X 2 10 marks.
Q4) 10 marks X 1 10 marks.

ii) Annual Practical Paper Maximum Marks – 80.

Q1) 10 marks.
Q2) 10 marks.
Q3) 10 marks.
Q4) 10 marks.
Q5) 10 marks.
Q6) 3 marks X 5 15 marks.
Q7) 5 marks X 3 15 marks.
- Setting of question paper / Pattern of question paper –
 - i) Semester Theory Papers (EVS – 201 & EVS – 202): Maximum Marks – 40.

Q1) Answer the following in 1 – 2 lines 10
a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

Q2) Write short notes on any two of the following 10
a)
b)
c)

d)

Q3) Answer any two of the following 10

a)

b)

c)

d)

Q4) Answer any one of the following 10

a)

b)

ii) Annual Practical Paper (EVS – 203) Maximum Marks – 80.

Q1) Determine the rate of Atmospheric Dustfall / Respirable Particulate Matter from the collected samples. Comment on the result (10)

OR

Determine the Optimum Dose of Alum Required for / Turbidity of the given water sample. Comment on the result (10)

Q2) Determine the Dissolved Oxygen / Residual Chlorine from the given water sample. Comment on the result (10)

OR

Determine the concentration of Nitrate / Phosphate from the given water sample. Comment on the result (10)

Q3) Determine the concentration of Soluble Salts in / Lime Requirement of the given soil sample. Comment on the result (10)

OR

Determine the amount of Available Nitrogen / Potassium from the given soil sample. Comment on the result (10)

Q4) Determine the Primary Productivity of grassland community, from the given data. Comment on the result (10)

OR

Determine the Minimum Area & Number of Quadrats Required to sample the community, from the given vegetation data. Comment on the result..... (10)

Q5) Determine the Total Chlorophyll Content from the plants in Clean / Polluted Environment. Comment on the result (10)

OR

Determine the Frequency, Abundance & Density of the plant species, from the given List Count Quadrat data of a grassland community / Line & Belt Transect data of a terrestrial- aquatic transitional community. Comment on the result (10)

Q6) Identification	(15)
a) Identify & comment on the Water Treatment Process	(3)
b) Identify & comment on the Waste Disposal / Management Method	(3)
c) Identify & describe the Watershed Management Technique	(3)
d) Identify & describe the Working Principle of the energy generation	(3)
e) Identify & comment on the Inter-specific / Intra-specific relations of the organism	(3)
Q7)	(15)
a) Reports of the Study Visits	(5)
b) Report & verification of e-networking & dissemination of ideas on any environmental issue/s pertaining to the course	(5)
c) Viva-Voce & Certified Journal	(5)

Paper – I, Semester – I, EVS – 201,

Ecology & Ecosystem

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Ecology	• Introduction & Interdisciplinary nature of Ecology. • Historical Overview of Ecology – From the ecological views of prehistoric man to the current state of ecology as an applied science. • Levels of Organisation – a) Biological / Ecological Spectrum. b) Ecological Hierarchy by Barrett et al. • Ecological Classification based on – a) Taxonomic Affinity (From Kingdom to Species Level Ecology). b) Habitat Types (Terrestrial & Aquatic Ecology). c) Levels of Organisation (Autecology & Synecology – Population, Community, Biome & Ecosystem Ecology).	08
2.	Ecosystem Structure & Function – Energy Flow	• Origin of the term. • Concept of the Ecosystem. Macro & Micro-ecosystems ...etc. • Ecosystem Structure – Abiotic & Biotic Components. • Ecosystem Function : Energy Flow – a) Ecosystem processes involved – Photosynthesis, Respiration, Heterotrophy & Decomposition. b) Food Chain – Grazing & Detritus. c) Food Web & Ecosystem Stability d) Ecological Energetics – i) Energy Input. ii) Energy Flow – Single Channel & Y shaped models. e) Productivity of Ecosystem – i) Primary Production – GPP & NPP. ii) Secondary Production. iii) Net Ecosystem / Community Production. iv) Standing Crop (Biomass). f) Ecological Pyramids – of Number, Biomass & Energy.	08
3.	Ecosystem Function : Nutrient Cycling	• Concept of – a) Macro & Micro-nutrients. b) Nutrient Cycling c) Biogeochemical Cycles. • Biogeochemical Cycles – a) Gaseous Cycles – Hydrological, Carbon & Nitrogen Cycles. b) Sedimentary Cycles – Phosphorus & Sulphur Cycles. c) Human Impact on Biogeochemical Cycles. • Cycling of Organic Nutrients. • Cycling of Non-essential Elements. • Ecosystem Nutrient Cycling Model – Intra-system Cycling &	08

		Extra-system Transfers. - Nutrient Inputs. - Biotic Accumulation of Nutrient. - Nutrient Outputs. - Recycling Pathways. - Nutrient Budget.	
4.	Population Ecology	- Introduction & Basic Concepts. - Population Characteristics – - Size & Density. - Dispersion – Random, Aggregate & Uniform. - Natality (Potential & Realised). - Fecundity - Mortality (Potential & Realised). - Survivorship Curves. - Age & Sex Structure. - The Concept of Carrying Capacity. - Population Growth – - Growth Curves – Exponential & Logistic. - Population Fluctuation. - Biotic Potential & Environmental Resistance. - Population Regulation – Concept of Density Dependent & Density In-dependent Controls.	08
5.	Community Ecology	- Characteristics of Community - Species Diversity, Growth form & Structure, Dominance, Succession, Trophic Structure, Ecological Niche, Ecotone & Edge Effect. - Community Composition & Structure. - Zonation & Stratification in an aquatic & a terrestrial ecosystem. - Characters used in Community Structure- - Analytical Characters – - Quantitative. - Qualitative. - Synthetic Characters. - Inter-specific & Intra-specific Relationships.	08
6.	Ecological Succession	- Causes of Succession. - Trends of Succession. - Basic Types – Primary, Secondary, Autogenic, Allogenic ...etc. - Mechanism of Succession – - Nudation. - Invasion. - Competition, Co-action & Reaction. - Stabilisation (Climax). - Models of succession – - Hydrosere. - Lithosere.	08

Paper – I, Semester – II, EVS -201,

Biological Diversity & its Conservation.

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Biological Diversity – Ecosystem Diversity	(Biological Diversity) • The Concept, Definition & Scope. • Levels – Ecosystem, Species & Genetic. • Biodiversity at Local, National & International level. (Ecosystem Diversity) • Classification of Ecosystem – a) Udvardy's Classification. b) Bailey's Classification. c) Olsen's Classification. d) Holdridge's Classification. • Major Ecosystem types of India with their physical & biological characteristics. • Major Ecosystem types of the World with their physical & biological characteristics.	08
2.	Species Diversity	• Number of Species – a) Species Inventory. b) Latest estimates for major groups of Plants, Animals & Microbes. • Measuring Species Diversity – Species Richness, Species Abundance, Species Evenness. • Factors affecting global distribution of Species Richness – Latitudinal, Altitudinal, Rainfall gradients ...etc. • Endemism – a) The Concept. b) Types with Examples. c) Endemism in India. • Centers of Diversity – a) The Concept. b) Centers of Diversity : Analyses at Global Level – i) Myer's Hot-spots. ii) IUCN's Centers of Plant Diversity. iii) Megadiversity Centers / Countries. iv) Diversity Zones. c) Western Ghat as a Hot-spot. d) India as a Megadiversity Country.	08
3.	Genetic Diversity	• Meaning & Introduction to Genetic Variations in Species. • Nature & Origin of Genetic Variations. • Factors affecting Genetic Diversity. • Measurement of Genetic Diversity – a) Based on DNA & Chromosomes. b) Molecular Marker Techniques. • Transgenic Organisms.	08

4.	Agro-biodiversity	• Introduction – meaning & significance. • Origin & Evolution of Agrobiodiversity – a) Domestication. b) Dispersal & Diversification. • Centers of Agrobiodiversity – a) Vavilov’s Centers. b) Harlan’s Domestication Area. • Diversity in Domesticated Species – a) Variations since the first domestication to the present. b) Land Races, Advanced Cultivars, Wild Relatives of Cultivated Plants & Feral Plants.	08
5.	Significance & Threat to Biodiversity	(Significances) • Ecological Significances – Contribution of Biodiversity to various Eco- Services. • Non Ecological Significances – Nutritional, Medicinal, Aesthetic, Cultural, Commercial Values ...etc. (Threats) • Threats with suitable Examples – a) Large Scale Dev. Projects – Habitat Destruction & Fragmentation. b) Change in Natural Habitat. c) Changing Agri. & Forestry Practices. d) Invasion by Introduced Species. e) Over-exploitation. f) Env. Pollution. g) Global Climate Change. h) Loss of Traditional Knowledge. i) Nature of Legal & Mgmt. System – Human Wildlife Conflict. j) Genetically Modified Organisms ...etc.	08
6.	Biodiversity Conservation	• Conservation Methods – In-situ & Ex-situ methods with Example. • National Conservation Efforts – a) The laws – Environment Protection Act, Fisheries Act, Forest Act, Wildlife Act, Biodiversity Act ...etc. b) Involving People’s Participation – NBSAP, PBR ...etc. c) Involving Community Participation – JFM, EDP ...etc. d) People’s Movement – Silent Valley Movement, Beej Bachao Andolan ...etc. • International Conservation Efforts – a) IUCN – The World Conservation Union. b) CBD. c) CITES. d) Convention on Wetlands of International Importance. e) World Heritage Convention. • Traditional Methods of Conservation – Sacred Groves / Ponds / Species, Periodic restrictions on resource harvesting ...etc. • Need & Awareness.	08

Paper – II, Semester – I, EVS – 202,

Natural Resources, Energy & their Management. (T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Resources	• Meaning & Definition. • Classification of Resources: a) Natural Vs Artificial Resources. b) Material Vs Energy Resources. c) Biotic / Biological Vs Abiotic / Non-biological Resources. d) On the basis of its Renewability with-in the Human Time Scale as – Non-renewable, Potentially renewable & Perpetual Resources. • Renewability & Finite Nature of Resources – Regenerative & Assimilative Capacity of the Earth. • Man's interaction with Natural Resources – a) As Resource Base. b) As Waste Sink. c) Cultural Significance of Natural Resources. • Importance & Scope of Natural Resources.	08
2.	Forest, Grassland & Wildlife Resources	A) Forest Resource: • Classification – Old & Second Growth Forests ...etc. • Ecological Significance. • Forest Mgmt. in India – Laws, JFM, EDP, Protected Areas. B) Grassland Resource: • Classification. • Significance - Ecological & Non-ecological. • Grassland Mgmt. – Prevention from Overgrazing ...etc. C) Wildlife Resource: • Meaning & Definition. • Significance - Ecological & Non-ecological. • Protection & Conservation of Wildlife – Laws, Protected Areas (In-situ) & Ex-situ methods.	08
3.	Food Resources	• World Food Problems: a) Increasing World Food Demand. b) Nutrition Related Problems. c) Food Distribution. • Traditional & Modern Agricultural Systems. • The Green Revolution in India. • Effects of Modern Agriculture: a) Chemical related Problems – Soil & Under-ground Water Pollution. b) Change in Land-use Pattern. c) Loss of Genetic Diversity as a result of use of HYV's & GM Crops. d) Irrigation related Problems – Waterlogging, Salinisation. e) Social changes – Increasing inequity ...etc. • Sustainable Agriculture.	08

4.	Land & Water Resources	A) Land Resource: • Significance of the top-most layer. • Soil Erosion – Causes – Water & Wind Erosion of Soil. • Control of Erosion & Soil Conservation Methods. B) Water Resource: • Sources / Occurrences & Distribution. • Water Scarcity – the reasons. • Conflicts over water in World & India. • Conservation & Mgmt. – a) Traditional Methods. b) Rain-water Harvesting & Ground Water Recharge. c) Water-shed Mgmt. – the concept.	08
5.	Energy Resources -I	• Classification of energy resources: a) Exhaustible Vs Inexhaustible. b) Polluting Vs Non-polluting. c) Conventional Vs Non-conventional. • Energy Crisis. Energy Scenario in World & in India. • Conventional Energy Resource – a) Coal. b) Oil. c) Natural Gas. d) Nuclear Energy. • Solar Energy – Solar Cells, Solar Heating (Active & Passive), Solar Collectors. • Wind Energy – Location of Wind Generator Site, Wind Energy Converters.	08
6.	Energy Resources -II	• a) Hydro-electric Energy – Impulse & Reaction Turbines. • b) Tidal Energy – Wells Turbine. • c) Wave Energy. • Geothermal Energy. • Bioenergy – a) Biomass &, Biomass Programme – Energy Plantation, Wastes. b) Biogas. c) Ethanol. d) Biodiesel. • Energy Management – Energy Audit ...etc.	08

Paper – II, Semester – II, EVS – 202,

Pollution Control & Environmental Technology.

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Control Of Air Pollution	• At source reduction: a) Raw material changes. b) Process / Operational changes. c) Equipment modification / replacement. • Air Pollution control technology: Principle - a) Condensation. b) Absorption. c) Adsorption. d) Filtration. e) Electrostatic Precipitation. f) Gravity Settling. g) Wet scrubbing. • Control of emissions from automobiles. a) Redesigned engines. b) Catalytic converters ...etc.	08
2.	Control Of Water Pollution	• Segregation & Re-utilisation of Domestic Waste Water – Gray & Black Water. • Waste Water Treatment: a) Primary Treatment – Screening, Grit removal, Sedimentation etc. b) Secondary Treatment - • Aerobic Method- i) Activated Sludge Process. ii) Trickling Filter. • Anaerobic Method. c) Tertiary Treatment – Disinfection (Chlorination). d) Advanced Treatments – Carbon Adsorption, Reverse Osmosis, Ion exchange. - Bioremediation.	08
3.	Control Of Noise Pollution	• Noise Control Techniques - a) Sound Insulation. b) Sound Absorption. c) Vibration Damping. d) Vibration Isolation. e) Active Noise Control/ Noise Cancellation. • Control at Source - a) Selection & Maintenance of machines. b) Control over vibrations. • Control in Transmission Path - Installation of barriers / enclosures ...etc. • Control at Reciever - a) Using protective equipments. b) Job rotation to reduce exposure ...etc.	08

4.	Control Of Solid Waste Pollution	• a) Material Separation - Separation Techniques. b) Processing – Recovery, Recycling and Reuse. • Mechanical Volume and Size Reduction - a) Dewatering and Drying . b) Volume Reduction / Compaction. c) Size Reduction/ Shredding. • Disposal/Management Options - a) Uncontrolled Dumping/ Non Engineered Disposal. b) Sanitary Landfill. c) Composting. d) Incineration. e) Pyrolysis. f) Injection Wells. g) Gasification/ Bio Gasification. h) Ocean Dumping.	08
5.	Control Of Soil Pollution	• Biological Methods: a) To reduce dependency on chemicals – Use of Biofertilizers & Biopesticides, Conservational Tillage, Mixed Cropping, Crop rotation, Biological Pest Mgmt., Organic Farming ...etc. b) Bio / Phyto-remediation of contaminated sites. • Chemical Methods: a) Ex-situ - Acid Leaching. b) In-situ - pH correction using Lime or Gypsum. • Physical / Mechanical Methods: a) Ex-situ - Heavy metal immobilization through Vitrification. b) In-situ – Soil Vapour Extraction.	08
6.	Control Of Thermal & Nuclear Pollution	• Control of Thermal Pollution - a) Cooling Ponds. b) Spray Ponds. c) Cooling Towers (Wet And Dry Cooling Towers). d) Direct Conversion of Heat into Electricity. e) Other Uses (Heating Of Buildings, Heating Swimming Pools, Desalination...etc.). • Control of Nuclear Pollution – a) Control of release & exposure. b) Proper Treatment & Disposal of Nuclear Waste. c) Protection to Workers.	08

Paper-III, EVS- 203,

Practical Course Based on EVS 201 & EVS 202.

(Any 24 Practical to be Conducted.)

Sr. No.	Description	Practical Type	Practical Sessions
1.	Sampling of Atmospheric Dust by Gravity Settling to measure the rate of Dustfall.	Field + Laboratory.	02
2.	Sampling & Determination of Respirable Particulate Matter. (Respirable Dust Sampler)	Field + Laboratory.	02
3.	Determination of Optimum Dose of Alum (Coagulant) required for water.	Laboratory.	01
4.	Determination of Turbidity of water. (Turbidimeter / Nephelometer)	Laboratory.	01
5.	Determination of Residual Chlorine from treated water.	Laboratory.	01
6.	Determination of Dissolved Oxygen in water.	Laboratory.	01
7.	Determination of Nitrate from water. (UV Spectrophotometer)	Laboratory.	01
8.	Determination of Inorganic Phosphate from water. (Colorimeter)	Laboratory.	01
9.	Visit to Water / Waste Water Treatment Plant.	Visit.	01
10.	Determination of Soluble Salts from Soil.	Laboratory.	01
11.	Determination of Available Nitrogen from soil.	Laboratory.	01
12.	Determination of Available Potassium from soil. (Flame Photometer)	Laboratory.	01
13.	Determination of Lime required for Acidic soil.	Laboratory.	01
14.	Visit to Soil Survey Department.	Visit.	01
15.	Visit to Municipal Land-fill.	Visit.	01
16.	Field visit to study Watershed Mgmt. Techniques.	Visit.	01
17.	Study of the Working Principle of Solar Collectors. (Demonstration)	Demonstration.	01
18.	Visit to Wind Energy Farm.	Visit.	01
19.	Measurement of Primary Productivity of grassland by Harvest Method.	Field + Laboratory.	01

20.	Estimation of Total Chlorophyll from plants in Clean & Polluted Environment.	Laboratory.	01
21.	Study of grassland vegetation by List Count Quadrat Method to determine the Frequency, Density & Abundance.	Field.	01
22.	Determination of Frequency, Density & Abundance of species in grassland vegetation by List Count Quadrat Method.	Field.	01
23.	Determination of Frequency & Abundance of species across terrestrial – aquatic transitional zone, by Line Transect Method.	Field.	01
24.	Determination of Density of species across terrestrial – aquatic transitional zone by Belt Transect Method.	Field.	01
25.	Visit to Nature Interpretation / Information Centre.	Visit.	01
26.	Visit to National Park / Wildlife Sanctuary to study Wildlife & various Inter-specific & Intra-specific Relations.	Visit.	≥ 01 Day
27.	Continuation of the use of Social Media for e-networking & dissemination of ideas on Environmental Issues Pertaining to the Course.	---	≥ 02

Reference Books

- Understanding Environment; Chokkar K. B., Pandya M. & Raghunathan M.; Centre for Environment Education; Sage Publication, New Delhi.
- An Advanced Textbook on Biodiversity – Principles & Practice; Krishnamurthy K.V.; Oxford & IBH Publishing Co. Pvt. Ltd.; New Delhi.
- Ecology – Principles & Applications; Chapman J. L. & Reiss M. J.; Cambridge University Press.
- Fundamentals of Ecology; Odum P.E.; Natraj Publishers; Dehradun; 3 Edt..
- Ecology, Environment & Resource Conservation; Singh J.S., Singh S.P. & Gupta S.R.; Annamaya Publishers; New Delhi.
- Ecology & Environment; Sharma P.D.; Rastogi Publication; Meerut; 11 Rev. Edt..
- Environment Science; Tyler M.G.; Wadsworth Publishing Co.; 1997.
- Perspective in Environmental Studies; Kaushik & Kaushik; New Age International Pvt. Ltd. Publishers.
- Environmental Science; Santra S.C.; New Central Book Agency (P) Ltd.; 2 Edt..
- Environmental Chemistry, Dey A. K.; New Age International Publishers; 6 Edt..
- Air Pollution; Rao M.N. & Rao H.V.N.; Tata McGraw Hill; New Delhi; 1989.
- Environmental Pollution Control & Environmental Engineering; Rao C. S.; Tata McGraw Hill; New Delhi; 1994.
- Pollution Management; Agarwal S.K.
- Environmental Science; Daniel Chiras.
- Waste Water Engineering, Treatment, Disposal & Reuse; Metcalf & Eddy.
- Manual for Field Ecology; Mishra R.
- Handbook of Methods in Environmental Studies Vol-I &II; Mailti S.K.; ABD Publishers; Jaipur.
- Physico-Chemical Examination of Water, Sewage & Industrial Effluents; Manivasakam N.; Pragati Prakashan; Meerut; 1984.
- Chemical & Biological Methods for Water Pollution Studies; Trivedi R.K. & Goel P.K.; Environmental Publications; Karad; 1986.
- Instrumental Methods of Analysis; Willard; cbspd; 7 Edt..

UNIVERSITY OF PUNE, PUNE.
BOARD OF STUDIES IN MATHEMATICS
Syllabus for S.Y.B.Sc
Subject: MATHEMATICS
(With effect from June 2014)

Introduction:

University of Pune has decided to change the syllabi of various faculties from June, 2013.

Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of S.Y.B.Sc. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: F.Y.B.Sc. ,as per University rules

Structure of the course:

	Semester I		Semester II	
Paper I	MT 211	Multivariable Calculus I	MT 221	Linear Algebra
Paper II	MT 212(A)	Discrete Mathematics	MT 222(A)	Multivariable Calculus II
	MT212(B)	Laplace Transform and Fourier Series	MT222(B)	Numerical methods and it's applications
Paper III	MT213	Practical based on MT211,MT212	MT223	Practical based on MT221,MT222

Paper I, Paper III is compulsory .In Paper II student can opt for ,any one of MT 212(A), MT212(B) in first semester and any one of MT221(A),MT222(B) in second semester.

In paper I and II, each course is of 50 marks (40 marks theory and 10 marks internal examination)

Paper III each course is of 50 marks(32 marks theory,8 marks oral and 10 marks internal examination)

Medium of Instruction: English

Examination:

A) Pattern of examination: Semester wise

B) Standard of passing : 20 Marks out of 50 marks for each papers.

But for passing a student should obtain minimum 16 marks out of 40 in the theory and oral examination and overall total marks for theory, oral and internal should be minimum 20.

C)Pattern of question papers: For Paper I and Paper II

Q1. Attempt any 05 out of 07 questions each of 02 marks. [10Marks]

Q2. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.3. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.4. Attempt any 01 out of 02 questions each of 10 marks. [10 Marks].

The pattern of question paper for Paper III

Q1.A) Attempt any 01 out of 02 questions each of 08 marks. (Based on Paper I) [08 Marks]

B) Attempt any 02 out of 03 questions each of 04 marks. (Based on Paper I) [08 Marks]

Q2. A) Attempt any 01 out of 02 questions each of 08 marks. (Based on Paper II) [08 Marks]

B) Attempt any 02 out of 03 questions each of 04 marks. (Based on Paper II) [08 Marks]

D) External Students: Not allowed.

E) Variation / Revaluation: Allowed for Paper I and II.

F) Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules)

- Textbooks will be prepared by the BOS Mathematics, University of Pune.

Equivalence of Previous syllabus along with new syllabus:

Semester I		Semester II	
New Course	Old Course	New Course	Old Course
MT 211 Multivariable Calculus I	MT 211 Calculus of Several Variables	MT 221 Linear Algebra	MT:221 Linear Algebra
MT 212(A) Discrete Mathematics	MT:222(B)) Discrete Mathematics	MT 222(A) Multivariable Calculus II	MT:222(A)) Vector Calculus
MT212(B) Laplace Transform and Fourier Series	MT:212(A) Differential Equations	MT222(B) Numerical methods and it's applications	MT:212(B) Numerical Analysis
MT213 Practical based on MT211,MT212	MT213 Practical based on MT211,MT212	MT223 Practical based on MT221,MT222	MT213 Practical based on MT211,MT212

Details of Syllabus:

Paper I MT 211: Multivariable Calculus I

1. **Limit and Continuity of Multivariable functions:** [06]
 - 1.1. Functions of several variables, graphs and level curves of function of two variables.
 - 1.2. Limit and Continuity in higher dimensions.
2. **Partial Derivatives:** [04]
 - 2.1. Definition and examples.
 - 2.2. Second order partial derivative, the mixed derivative theorem.
 - 2.3. Partial derivatives of higher order.
3. **Differentiability:** [12]
 - 3.1. Differentiability, the increment theorem for functions of two variables (without proof).
 - 3.2. Chain rules for composite function.
 - 3.3. Directional derivatives, gradient vectors.
 - 3.4. Tangent planes, normal lines and differentials.
4. **Extreme Values:** [10]
 - 4.1. Extreme values, First derivative test and Second derivative test for local extreme values.
 - 4.2. Lagrange's multipliers method for finding extreme values of constraint function (One Constraint)
 - 4.3. Taylors Formula for two variables.
5. **Multiple Integrals:** [16]
 - 5.1. Double Integral over rectangles, Fubini's theorem for calculating double integrals (Without proof).
 - 5.2. Double integrals in polar form.
 - 5.3. Triple integrals in rectangular coordinates.
 - 5.4. Triple integral in cylindrical and spherical coordinates.
 - 5.5. Substitution in multiple integrals, Application to area and volumes.

Text book: Prepared by the BOS Mathematics, University of Pune.

Recommended Book: Thomas' Calculus, 11th Edition, G. B. Thomas.

Revised by Maurice D. Weir, Joel Hass and Frank R. Giordano.

Pearson Edition 2012.

Articles: 14.1 to 14.10, 15.1, 15.3, 15.4, 15.6, 15.7

Reference Books:

1. Basic Multivariable Calculus, J. E. Marsden, A. J. Tromba , A. Weinstein, Springer Verlag (Indian Edition).
2. Shanti Narayan, R.K. Mittal, A Text-book of Vector Calculus, S.Chand and Company.
3. D.V. Widder, Advanced Calculus (2nd Edition), Prentice Hall of India ,NewDelhi,(1944).
4. T.M. Apostol , Calculus Vol. II (2nd Edition), John Wiley, New York, (1967).

Paper II(A) MT 212(A):Discrete Mathematics

- 1. Logic and Proofs:** [24]
 - 1.1 Propositional logic.
 - 1.2 Propositional equivalences.
 - 1.3 Predicates and quantifiers.
 - 1.4 Nested quantifiers.
 - 1.5 Rules of inference.
 - 1.6 Introduction to proofs.
- 2. Counting:** [20]
 - 2.1 The basics of counting.
 - 2.2 Permutation and combinations.
 - 2.3 Generalized permutation and combinations.
- 3. Advanced Counting Technique:** [04]
 - 3.1 Inclusion-Exclusion (without proof).

Text book: Prepared by the BOS Mathematics, University of Pune.

Recommended Book:

1. Discrete Mathematics and Its Applications, Kenneth H Rosen, Seventh Edition, McGraw Hill.
- Sections: 1.1 to 1.6, 5.1, 5.3, 5.5, 6.5

Reference Books:

1. Symbolic Logic, I.M. Copi, Fifth Edition, Prentice Hall of India, 1995.
2. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross and Nadeem-ur-Rehman: Discrete Mathematical Structures, Fifth Edition, Pearson Education, Inc., 2004.
3. Applied Combinatorics, Fourth Edition, by Alan Tucker.

Paper II(B) MT 212(B):Laplace Transforms and Fourier Series

- 1. The Laplace Transform:** [18]
 - 1.1 Definition, Laplace Transform of some elementary functions.
 - 1.2 Some important properties of Laplace Transform.
 - 1.3 Laplace Transform of derivatives, Laplace Transform of Integrals.
 - 1.4 Methods of finding Laplace Transform, Evaluation of Integrals.
 - 1.5 The Gamma function, Unit step function and Dirac delta function.

2. The Inverse Laplace Transform: [18]

2.1 Definition, Some inverse Laplace Transform.

2.2 Some important properties of Inverse Laplace Transform.

2.3 Inverse Laplace Transform of derivative, Inverse Laplace Transform of integrals.

2.4 Convolution Theorem, Evaluation of Integrals.

3. Applications of Laplace Transform: [04]

3.1 Solution of Ordinary Differential Equations with constant coefficients.

4. Fourier Series [08]

4.1 Definition and examples of Fourier Series.

Text-Book: Prepared by the BOS Mathematics, University of Pune.

Recommended Book:

1. Schaum's Outline Series - Theory and Problems of Laplace Transform by

Murray R. Spiegel. Articles 1, 2, 3.

2. Richard R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing Co.

Pvt. Ltd. (1970). Art. 12.1

Reference Books

1. Joel L. Schiff : The Laplace Transforms - Theory and Applications, Springer-

Verlag New York 1999.

2. Dyke : An Introduction to Laplace Transforms and Fourier Series, Springer

International Edition, Indian Reprint 2005.

TERM -II

Paper I MT 221: Linear Algebra

1. Vector Spaces [16]

Definition, examples, linear dependence, basis and dimension, vector subspace, Necessary and sufficient condition for subspace, vector space as a direct sum of subspaces

2. Inner Product Spaces [16]

Inner product, norm as length of a vector, distance between two vectors, orthonormal basis, orthonormal projection, Gram Schmidt process of orthogonalization, null space, range space, rank, nullity, Sylvester Inequality

3. Linear Transformations [16]

Definition, examples, properties of linear transformations, equality of linear transformations, kernel and rank of linear transformations, composite transformations, Inverse of a linear transformation, Matrix of a linear transformation, change of basis, similar matrices

Textbook: Prepared by the BOS Mathematics, University of Pune.

Recommended Book:

Matrix and Linear Algebra aided with MATLAB, Kanti Bhushan Datta, PHI learning Pvt.Ltd, New Delhi(2009) (Sections:5.1,5.2,5.3,5.4,5.5,5.7,6.1,6.2,6.3,6.4

Reference Books:

1. Howard Anton, Chris Rorres., Elementary Linear Algebra, John Wiley & Sons, Inc
2. K. Hoffmann and R. Kunze Linear Algebra, Second Ed. Prentice Hall of India , New Delhi, (1998).
3. S. Lang, Introduction to Linear Algebra, Second Ed. Springer-Verlag, New York.
4. A. Ramchandra Rao and P. Bhimasankaran, Linear Algebra, Tata McGraw Hill, New Delhi (1994).
5. G. Strang, Linear Algebra and its Applications. Third Ed. Harcourt Brace Jovanovich, Orlando, (1988).

Paper II (A) MT 222(A): Multivariable Calculus II

- 1. Vector valued function:** [14]
 - 1.1 Vector valued function.
 - 1.2 Limit and Continuity of vector function.
 - 1.3 Derivative of vector function and motion.
 - 1.4 Differentiations rules.
 - 1.5 Constant vector function and its necessary and sufficient condition.
 - 1.6 Integration of vector function of one scalar variable.
 - 1.7 Arc length and unit tangent vector T . Curvature and the unit normal vector N .
- 2. Line Integrals:** [16]
 - 2.1 Definition and evaluation of line integral.
 - 2.2 Properties of line integrals.
 - 2.3 Vector fields, work, circulation and flux across smooth curves.
 - 2.4 Path independence, Potential functions, Conservative fields.
 - 2.5 Green's theorem in plane, evaluating integrals using Green's theorem.
- 3. Surface and volume integrals:** [18]
 - 3.1 Surface area and surface integrals.
 - 3.2 Surface integral for parameterized surfaces.
 - 3.3 Stokes theorem (without proof).
 - 3.4 The Gauss divergence theorem (proof for special regions).

Textbook: Prepared by the BOS Mathematics, University of Pune.

Recommended Book:

Thomas' Calculus, 11th Edition, G. B. Thomas. Revised by Maurice D. Weir, Joel Hass and Frank R. Giordano. Pearson Edition 2012. Articles: 13.1, 13.3, 13.4, 16.1 to 16.8.

Reference Books:

1. Basic Multivariable Calculus, J. E. Marsden, A. J. Tromba, A. Weinstein, Springer Verlag (Indian Edition).
2. Shanti Narayan, R.K. Mittal, A Text-book of Vector Calculus, S.Chand and Company.
3. John M. H. Olmsted, Advanced Calculus, Eurasia Publishing House, New Delhi (1970).
4. T.M. Apostol, Calculus Vol. II (2nd Edition), John Wiley, New York, (1967).

Paper II(B) MT 222(B): Numerical Methods and its applications

1. Errors:

[4]

- 1.1 Errors and Their Computations
- 1.2 Rounding off numbers to n significant digits, to n decimal places.
- 1.3 Absolute, relative and percentage errors.
- 1.4 A general error formula.

2. Solution of Algebraic and Transcendental Equations:

[10]

- 2.1 Bisection method.
- 2.2 The method of False position.
- 2.3 The iteration method, Aitken's Δ^2 process
- 2.4 Newton- Raphson Method.

3. Interpolation:

[16]

- 3.1 Finite Difference Operators and their relations.
- 3.2 Detection of Errors using difference table.
- 3.3 Differences of a polynomial
- 3.4 Newton's Interpolation Formulae (Forward and Backward)
- 3.5 Lagrange's Interpolation Formula
- 3.6 Divided differences and Newton's General Interpolation formula.

4. Least Squares Curve Fitting Procedures

[4]

- 4.1 Fitting a Straight Line
- 4.2 Nonlinear curve fitting: Power function $y = ax^c$, polynomials of degree 2 and 3, Exponential function $y = cx^d$

5. Numerical Differentiation and Integration:

[8]

- 5.1 Numerical Differentiation
- 5.2 Numerical Integration, General quadrature formula.
- 5.3 Trapezoidal rule.
- 5.4 Simpson's $\frac{1}{3}$ rule.
- 5.5 Simpson's $\frac{3}{8}$ rule.

6. Numerical solution of first order ordinary differential equations:

[6]

- 6.1 Taylor Series method
- 6.2 Euler's method.
- 6.3 Modified Euler's methods.
- 6.4 Runge - Kutta Methods 2nd and 4th order.

Text Books : Prepared by the BOS Mathematics, University of Pune.

Recommended Book:

- 1. S.S. Sastry; Introductory Methods of Numerical Analysis, 3rd edition, Prentice Hall of India.

Sections: 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 3.3, 3.4, 3.5, 3.6, 3.9.1, 3.10 (3.10.1 only),
4.2.1, 4.2.2, 5.2 (excluding 5.2.1, 5.2.2), 5.4.1, 5.4.2, 5.4.3, 7.2, 7.4, 7.4.1, 7.4.2, 7.5

Reference Book:

- 1. K.E. Atkinson; An Introduction to Numerical Analysis, Wiley Publications.
- 2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.

Modalities For Conducting The Practical and The Practical Examination:

- 1) There will be one 3 hour practical session for each batch of 12 students per week
- 2) A question bank consisting of 60 questions in all for each semester, distributed in two sections: 25 questions each of Paper I and Paper II will be the course work for this paper. Question Bank will be prepared by the individual subject teacher based on pattern of questions provided by university. The question bank of each year should be preserved by the subject teachers, which can be reviewed by the L.I.C. members visiting college.
- 3) University will conduct the Practical Examination each semester twice a year. The practical examination will consist of written examination of 32 marks and oral examination of 08 marks.
- 4) The practical exam will be of the duration of 3 hours duration.

5) The pattern of question paper for Paper III

Q1.A) Attempt any 01 out of 02 questions each of 08 marks. (Based on Paper I) [08 Marks]

B) Attempt any 02 out of 03 questions each of 04 marks. (Based on Paper I) [08 Marks]

Q2. A) Attempt any 01 out of 02 questions each of 08 marks. (Based on Paper II) [08 Marks]

B) Attempt any 02 out of 03 questions each of 04 marks. (Based on Paper II) [08 Marks]

- 6) Each student will maintain a journal to be provided by the college.
- 7) The internal 20 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.
- 8) It is recommended that concept may be illustrated using computer software and graphing calculators wherever possible.
- 9) Trips/Study tours may be arranged at places having important mathematical institutes or historical places.
- 11) Special Instruction: Before starting each practical necessary introduction, basic definitions, intuitive inspiring ideas and prerequisites must be discussed.

Faculty of Science

S. Y. B. Sc.

MICROBIOLOGY

SYLLABUS

From- A.Y. 2014-15

Equivalence of previous syllabus along with revised syllabus from A.Y. 2014-15

S.Y.B.Sc. Microbiology

EQUIVALENCE

SEMI STER	PRESENT COURSE		Revised COURSE From A.Y.2014-15	
	COURSE CODE	COURSE NAME	COURSE CODE	COURSE NAME
I	MB: 211	Microbial Physiology	MB: 211	Bacterial Systematics and Physiology
	MB: 212	Microbial Genetics	MB: 212	Industrial and Soil Microbiology
II	MB: 221	Bacterial Systematics and Analytical Microbiology	MB: 221	Bacterial Genetics
	MB: 222	Applied Microbiology I	MB: 222	Air and Water Microbiology
	MB: 223	Practical Course based on MB:211, MB:212, MB:221, MB:222	MB: 223	Practical Course based on MB:211, MB:212, MB:221, MB:222

Note- Practical Examination will be conducted at the end of the Second Semester.

S. Y. B. SC. MICROBIOLOGY SYLLABUS (SEM I)

MB – 211: BACTERIAL SYSTEMATICS & PHYSIOLOGY		[48]
I	BACTERIAL SYSTEMATICS	(15)
	a. Concept of species	2
	b. Chemotaxonomy	4
	c. Numerical taxonomy	3
	d. Genetic basis of taxonomy i. G + C content ii. DNA hybridization iii. Base sequence similarity (Use of 16s rRNA databanks)	6
II	BACTERIAL PHYSIOLOGY	(20)
	a. Radioisotopes in the study of metabolic pathways i. Autoradiography ii. Phosphor imaging iii. Pulse chase (tracer studies)	3
	b. Definitions of Metabolism, catabolism, anabolism, respiration and fermentation	1
	c. Metabolic pathways (with structures) EMP, HMP, ED, Phosphoketolase, Glyoxylate, TCA (with emphasis on amphibolism), Homofermentative and heterofermentative pathways	12
	d. High Energy Compounds, Electron transport chain, Oxidative phosphorylation and Substrate level phosphorylation , Chemiosmotic hypothesis of ATP formation, Concept of Standard redox potential (Nernst equation)	4
III	BIOCATALYSTS	(13)
	a. Introduction to Enzymes: Nature of active site, ribozymes, coenzymes, apoenzymes, prosthetic group and cofactors.	3
	b. Nomenclature & classification as per IUB (up to class level).	2
	c. Structure of active site; common amino acids at active site Models for catalysis – i. Lock and key ii. Induced fit iii. Transition state.	4
	d. Specific catalytic groups involved in enzyme catalyzed reactions: Acid-base catalysis, metal ion catalysis, covalent catalysis.	1
	e. Effect of pH & temperature, substrate concentration & enzyme concentration, activators and inhibitors of enzyme	3

REFERENCES

1. Conn E., Stumpf P.K., Bruening G., Doi RH. (1987) Outlines of Biochemistry 5th Ed , John Wiley and Sons, New Delhi. (Unit I & II)
2. Moat A.G. & Foster J.W. (1988) Microbial Physiology 2nd Ed. John Wiley and Sons New York. (Unit II & III)
3. Nelson D. L. & Cox M. M. (2005) Lehninger's Principles of Biochemistry, 4th edition, W. H. Freeman & Co. NY (Unit II & III)
4. Voet D. & Voet J. G. (1995) Biochemistry, 2nd Ed.. John Wiley & sons New York. (Unit II & III)
5. Bergey D. H. & Holt J. G. (1994) Bergey's Manual of Determinative Bacteriology. 9th Edition. Lippincott Williams & Wilkins. (Unit I)
6. Garrity G. M. (2005) Bergey's Manual of Systematic Bacteriology. 2nd Edition. (Vols. 1 – 4). Williams & Wilkins. (Unit I)
7. Madigan M. T., Martinko J. M. (2006) Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc. (Unit I, II& III)
8. Prescott L. M., Harley J. P. and Klein D. A. (2005) Microbiology, 6th Edition. MacGraw Hill Companies Inc.(Unit II)
9. Priest F. G. & Brian Austin. (1993) Modern Bacterial Taxonomy. Edn 2, Springer. (Unit I)

MB – 212: INDUSTRIAL AND SOIL MICROBIOLOGY		(48)
I	INTRODUCTION TO INDUSTRIAL MICROBIOLOGY	(22)
	a. Strains of industrially important microorganisms:	
	i. Desirable characteristics of industrial strain	1
	ii. Principles and methods of primary and secondary screening	3
	iii. Master, working and seed culture; development of inoculum	2
	b. Equipment: Design of a Fermenter (typical CSTR Continuous stirred Tank Reactor); different parts and their operation.	2
	c. Process Control and Monitoring of different fermentation parameters (temperature, pH, aeration, agitation, foam)	4
	d. Types of fermentations: Batch, continuous, dual fermentations	1
	e. Media for industrial fermentations: Constituents of media (Carbon source, nitrogen source, amino acids and vitamins, minerals, water, buffers, antifoam agents, precursors, inhibitors and inducers)	8
	f. Contamination: Sources, precautions, and consequences	1
II	SOIL MICROBIOLOGY	(26)
	a. Soil microorganisms, composition and types of soil.	2
	b. Rhizosphere microflora and its role in the rhizosphere	1
	c. Role of microorganisms in composting and humus formation	2
	d. Biofertilizers: Bacterial, Cyanobacterial, fungal and their large scale production	3
	e. Biocontrol agents: Bacterial, Viral, Fungal and their large scale production	3
	f. Role of microorganisms in following elemental cycles in nature Carbon, Nitrogen, Sulphur, Phosphorous.	8
	g. Degradation of cellulose, hemicelluloses, lignin and pectin	3
	h. Brief account of microbial interactions Symbiosis, Neutralism, Commensalism, Competition, Ammensalism, Synergism, Parasitism, and Predation	4

REFERENCES:

1. Casida LE. (1984) Industrial Microbiology. Wiley Easterbs, New Delhi
2. Ingraham J. L. and Ingraham C.A. (2004) Introduction to Microbiology. 3rd Edition. Thomson Brooks / Cole.
3. Madigan M.T., Martinko J.M. (2006) Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
4. Modi H. A., (2008) Fermentation Technology – Volumes I and II, Pointer Publishers, Jaipur, India
5. Patel A.H. (1985) Industrial Microbiology, Macmillan India Ltd.
6. Peppler H.L. (1979) Microbial Technology, Vol I and II, Academic Press.
7. Prescott S.C. and Dunn C.G. (1983) Industrial Microbiology. Reed G. AVI tech books.
8. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Publishing Co.
9. Martin A. Introduction to Soil Microbiology (1961) John Wiley& Sons, New York and London publication
10. Subba Rao N. S. (1977) Soil Microbiology, 4th Ed., Oxford & IBH Publishing Co. Pvt. Ltd.
11. Dubey R.C., and Maheswari, D.K. Textbook of Microbiology, S. Chand & Co.
12. Martin A. (1977) An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London.
13. Mexander M. (1977) Introduction to soil microbiology, John Wilery NY.
14. Dube H.C. and Bilgrami. K.S.(1976) Text book of modern pathology. Vikas publishing house. New Delhi.
15. Rangaswami G. (1979) Recent advances in biological nitrogen fixation. Oxford and IBH. New Delhi.
16. Stanbury P. F. and Whittaker A. (1984) Principles of Fermentation technology. Pergamon press

S. Y. B. SC. MICROBIOLOGY SYLLABUS (SEM II)

MB – 221: BACTERIAL GENETICS		[48]
I	UNDERSTANDING MOLECULES OF HEREDITY	(10)
	a. RNA world and shift to DNA world with time	1
	b. Discovery of transforming material (hereditary material): Griffith's experiment	1
	c. Evidence for nucleic acid as genetic material i. Avery and MacLeod experiment ii. Gierer and Schramm / Fraenkel-Conrat & Singer experiment (TMV virus) iii. Hershey & Chase experiment	3
	d. Prokaryotic genome organization	1
	e. Concept of Gene, basic structure of B form of DNA, Properties of nucleotides related with DNA stability	3
	f. Comparative account of different forms of DNA	1
II	DNA REPLICATION AND EXPRESSION	(13)
	a. DNA replication i. Messelson and Stahl's experiment (semiconservative) ii. Mechanisms of DNA replication: Theta model (semi-discontinuous), J Cairn's experiment, rolling circle model (plasmid DNA, λ phage DNA)	2 5
	b. Gene organization and expression i. Properties of genetic code ii. Basic mechanism of transcription iii. Basic mechanism of translation	2 2 2
III	MUTATIONS AND REVERSIONS	(18)
	a. Spontaneous mutations i. Occurrence and Mechanisms ii. Fluctuation test	2
	b. Mechanisms of induced mutations i. Base pair substitution (Transitions, Transversions), Base analogues (2-amino purine, 5-bromo uracil), HNO ₂ , Alkylating agents (ethyl methyl sulphonate) ii. Frame shift mutations (Insertions and deletions), Intercalating agents (EtBr, acridine orange), Cross linking agents (Psorolin, mitomycin), UV rays, X rays, Biological mutagens (bacteriophage μ , transposomes)	10

	c. Types of mutations: Nonsense, Missense, Silent, Null, Conditional lethal-temperature sensitive, amber, leaky& non leaky	2
	d. Isolation of Mutants: Replica plate technique	1
	e. Reversion: i. True reversion ii. Suppression (intragenic and intergenic)	3
IV	PLASMID GENETICS	(7)
	a. Structure and Properties of plasmids	2
	b. Types of plasmids	1
	c. Plasmid replication	1
	d. Plasmid incompatibility	1
	e. Plasmid curing	1
	f. Plasmid amplification	1

REFERENCES:

1. Benjamin Lewin (1994) Genes I. Oxford University Press
2. Friefelder D. (1995) Molecular Biology, 2nd Edn. Narosa Publishing House.
3. Gardner E.J., Simmons M.J and Snustad D.P. (1991) Principles of Genetics. 8th Ed. John Wiley & Sons Inc.
4. Russel Peter. Essential Genetics. 2nd Edn, Blackwell Science Pub.
5. Stanier R.Y. (1985) General Microbiology. 4th and 5th Edn Macmillan Pub. Co. NY
6. Stent S.G. & Calender R. (1986) Molecular Genetics: An Introductory Narrative, 2nd Edition, CBS Publishers and Distributors, India.
7. Stricberger M.W. (1985) Genetics. 3rd Edition Macmillan Pub. Co. NY.
8. Watson J.D. (1987) Molecular Biology of the Gene, 4th Ed. The Benjamin Cummings Publishing Company Inc.

MB – 222: AIR AND WATER MICROBIOLOGY			(48)
I	AIR MICROBIOLOGY		(10)
	a. Air flora i. Transient nature of air flora ii. Droplet, droplet nuclei, and aerosols		1
	b. Air pollution: Chemical pollutants, their sources in air and effects on human health		2
	c. Methods of Air sampling and types of air samplers i. Impaction on solids ii. Impingement in liquid iii. Sedimentation iv. Centrifugation v. Precipitation vi. Thermal Precipitation		4
	d. Air sanitation: Physical and chemical methods		2
	e. Air borne infections		1
II	WATER MICROBIOLOGY		(38)
	a. Types of water: surface, ground, stored, distilled, mineral and de-mineralized water		2
	b. Water purification methods, Bacteriological standards of potable water Maharashtra pollution control board (MPCB), Central pollution control board (CPCB), Bureau of Indian standards (BIS) World health Organization (WHO)		2
	c. Indicators of faecal pollution; i. <i>Escherichia coli</i> ii. <i>Bifidobacterium</i> iii. <i>Streptococcus faecalis</i> iv. <i>Clostridium perfringens</i> v. New indicators: <i>Campylobacter</i> and <i>Pseudomonas</i>		5
	d. Water borne Infections		3
	e. Bacteriological analysis of water for potability i. Presumptive coliform count ii. Confirmed test iii. Completed test iv. Eijkman test v. Membrane filter technique		6

f. Sewage and Waste Water	
1. Analysis of waste water	6
i. Physic chemical parameters: pH, temperature, total solids, suspended solids, Chemical Oxygen Demand(C.O.D.)	
ii. Biological parameters: B.O.D., Toxicity (Fish bioassay)	
iii. Industrial water pollutants, their ecological effects and health hazards (Biomagnification and eutrophication)	
2. Methods of effluent treatment – Primary, secondary, tertiary treatment methods	6
3. Recycling of waste water and sludge	2
4. Solid waste management	6
i. Raw materials	
ii. Organisms involved and their activity	
iii. Biochemical mechanisms of Biomethanation.	
iv. Types of anaerobic digesters.	
v. Applications of biogas (Methane)	

REFERENCES:

1. Daniel Lim., Microbiology, 2nd Edition; McGraw-Hill Publication
2. Ingraham J.L. and Ingraham C.A. (2004) Introduction to Microbiology. 3rd Edition. Thomson Brooks / Cole.
3. Madigan M.T, Martinko J.M. (2006) Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
4. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Publishing Co.
5. Tortora G.J., Funke B.R., Case C.L. (2006) Microbiology: An Introduction. 8th Edition.
6. Stanier R.Y. (1985) General Microbiology. 4th and 5th Edn Macmillan Pub. Co. NY
7. Pelzar M. J., Chan E. C. S., Krieg N. R.(1986) Microbiology. 5th Edition, McGraw-Hill Publication
8. Prescott, Lancing M., John, P. Harley and Donald, A. Klein (2006) Microbiology, 6th Edition, McGraw Hill Higher Education
9. Hans G. Schlegel (1993) General Microbiology, 8th Edition, Cambridge University Press
10. Martin Frobisher (1937) Fundamentals of Microbiology, 8th Edition, Saunders, Michigan University press
11. Standard Methods for the Examination of Water and Wastewater (2005) 21st edition, Publication of the American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF); edited by Andrew D. Eaton, Mary Ann H. Franson.

MB – 223: PRACTICAL COURSE BASED ON MB 211, 212, 221, 222 (27)		
1	Air sampling using an air sampler & calculation of air flora from different locations with the knowledge of respective standards of bacterial & fungal counts.	1
2	Growth curve: a. Absorbance measurement for bacterial culture b. Calculation of growth rate, specific growth rate and generation time c. Graph plotting by using computer software	2
3	Measurements of cell dimension by micrometry using all the objectives	1
4	Bacteriological tests of potability of water a. MPN, confirmed and completed test. b. Membrane filter technique (Demonstration)	3 1
5	Determination of B.O.D., total solids and total suspended solids	2
6	I. Biochemical characterization of bacteria: a. Sugar utilization test (minimal medium + sugar) b. Sugar fermentation test c. IMViC d. Enzyme detection – Amylase, Gelatinase, Catalase, Oxidase e. Oxidative-fermentative test II. Identification of Any Two bacterial isolates at least up to genus level from soil or air. (Preferably spore forming and pigmented bacteria).	5 6
7	Air Flora: a. Diversity determination. b. Simpson index and settling velocity determination	1
8	Primary screening of industrially important organisms: a. Organic acid producing microorganisms OR b. Antibiotic producing microorganisms (crowded plate technique)	1
9	a. Induction of mutations by using physical mutagen (e.g. UV rays) and chemical mutagen (e.g. HNO ₂) b. Isolation of mutants by any suitable method c. Demonstration of UV survival curve	3
10	Visits to a. Water purification plant/ b. Sewage treatment plant/Effluent treatment plant/ c. Fermentation industry	1

N.B.

1. Use semilog paper & computers both to plot the growth curve.
2. Visit report in the journal is mandatory.
3. Latest computer should be provided to the microbiology department.
4. 50% teaching of this practical course should be completed in Ist semester.
5. University examination will be held at the end of the IInd semester

UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
Revised Syllabus for S. Y. B. Sc. (Zoology) To be
implemented from June, 2014
S.Y. B. Sc. (Zoology) New Syllabus

Semester-I

Paper I- ZY-211: Animal Systematics and Diversity – III

Paper II- ZY-212: Applied Zoology – I

Semester-II

Paper I- ZY-221: Animal Systematics and Diversity – IV

Paper II- ZY-222: Applied Zoology – II

Semester-I and II (Annual Examination)

Paper III- ZY-223: Practical course (Corresponding to Theory papers)

UNIVERSITY OF PUNE
BOARD OF STUDIES IN ZOOLOGY
COURSE STRUCTURE OF UNDERGRADUATE CLASSES

Class: F.Y. B. Sc. (To be implemented from June 2013)

Paper	Course No.	Term I	Term II
I	ZY 101	Animal Systematics and Diversity -I	Animal Systematics and Diversity –II
II	ZY 102	Fundamentals of Cell Biology	Genetics
III	ZY 103	Practical course	

Class: S.Y. B. Sc. (To be implemented from June 2014)

Paper	Course No.	Semester I	Course No.	Semester II
I	ZY.211	Animal Systematics and Diversity -III	ZY. 221	Animal Systematics and Diversity –IV
II	ZY.212	Applied Zoology I	ZY.222	Applied Zoology II
III	ZY.223	Practical course		

Class: T.Y. B. Sc. (To be implemented from June 2015)

Paper	Course	Semester III	Course	Semester IV
I	ZY.331	Animal Systematics and Diversity V	ZY.341	Biological Techniques
II	ZY.332	Mammalian Histology	ZY.342	Mammalian Physiology and Endocrinology
III	ZY.333	Biological Chemistry	ZY.343	Genetics and Molecular Biology
IV	ZY.334	Environmental Biology and Toxicology	ZY.344	Organic Evolution
V	ZY.335	Parasitology	ZY.345	General Embryology
VI	ZY.336	General Pathology or Cell Biology	ZY.346	Public Health and Hygiene or Medical Entomology
VII	ZY.347	Practicals corresponding to ZY 331, ZY 332, ZY 341 & ZY 342		
VIII	ZY.348	Practicals corresponding to ZY 333, ZY 334, ZY 343 & ZY 344		
IX	ZY.349	Practicals corresponding to ZY 335, ZY 336, ZY 345 & ZY 346		

Prin. (Dr) D. K. Mhaske
Chairman, B.O.S. in Zoology
University of Pune

University of Pune

Draft of Syllabus to be implemented from June 2014

S. Y. B. Sc. Zoology

Semester-I

Paper I- ZY-211: Animal Systematics and Diversity – III

Paper II- ZY-212: Applied Zoology – I

Semester-II

Paper I- ZY-221: Animal Systematics and Diversity – IV

Paper II- ZY-222: Applied Zoology – II

Semester-I and II (Annual Examination)

Paper III- ZY-223: Practical course (Corresponding to Theory papers)

Equivalence of Previous Syllabus:

Semester	Old Course (2009 Pattern)	New Course (2014 Pattern)
Semester-I	Paper I: General Zoology and Biological Techniques-I	Paper I: Animal Systematics and Diversity –III
Semester-I	Paper II: Applied Zoology-I	Paper II: Applied Zoology-I
Semester-II	Paper I: General Zoology and Biological Techniques-II	Paper I: Animal Systematics and Diversity –IV
Semester-II	Paper II: Applied Zoology-II	Paper II: Applied Zoology-II
Annual Examination	Paper III: Practical course	Paper III: Practical course

PAPER I: FIRST SEMESTER

ZY-211: ANIMAL SYSTEMATICS AND DIVERSITY -III

- 1. Salient features and classification upto classes of the following: (any two examples from each class) :** **15**
 - 1.1** Arthropoda :- Crustacea, Arachnida, Insecta, Myriapoda, Onychophora.
 - 1.2** Mollusca:- Aplacophora, Gastropoda, Pelecypoda, Scaphopoda, Cephalopoda.
 - 1.3** Echinodermata:- Asteroidea, Ophuroidea, Holothuria, Echinoidea, Crinoidea.
- 2. Study of following with reference to:** **15**
 - 2.1** Arthropoda:- Mouthparts in Insects, Metamorphosis in Insects, Mimicry in Insects,
Economic importance of Insects, Larval forms in Crustacea
 - 2.2** Mollusca:- Economic importance of mollusc, Shell and foot modification in mollusc,
Torsion and Detorsion in mollusc, Larval forms in molluscs
 - 2.3** Echinodermata:- Origin of Echinodermata, Types of Pedicellariae, Larval forms in Echinodermata,
- 3. Study of Starfish :** **18**
 - 4.1** Systematic position, Habit and habitat
 - 4.2** External characters
 - 4.3** Digestive system
 - 4.4** Water vascular system
 - 4.5** Reproductive system
 - 4.6** Autotomy and regeneration

PAPER –I: SECOND SEMESTER

ZY-221: ANIMAL SYSTEMATICS AND DIVERSITY – IV

- 1. Salient features of following classes and its subclasses with two examples of each:** **12**
 - 1.1 Reptilia
 - 1.2 Aves
 - 1.3 Mammalia
- 2. General topics:** **16**
 - 2.1 Poisonous and non-poisonous snakes (Two examples each)
 - 2.2 Desert adaptations in reptiles in brief.
 - 2.3 Beak and feet modifications in birds
 - 2.4 Migration in birds
 - 2.5 Aerial adaptations in birds
 - 2.6 Egg laying mammals
 - 2.7 Aquatic mammals
- 3. Study of *Scoliodon* :** **20**
 - 3.1 Systematic position, Habit and habitat
 - 3.2 External characters
 - 3.3 Digestive system, food, feeding and physiology of digestion
 - 3.4 Respiratory system
 - 3.5 Blood vascular system
 - 3.6 Nervous system and sense organs
 - 3.7 Male urinogenital system and female reproductive system

PAPER II: FIRST SEMESTER
ZY-212: APPLIED ZOOLOGY – I

1. Fisheries :

- 1.1** An introduction to fisheries and its types (in brief) : Freshwater fisheries,
Marine fisheries, Brackish water fisheries. **2**
- 1.2** Different types of ponds used in fishery : Nursery pond, Rearing pond
Stock pond **2**
- 1.3** Habit, habitat and culture methods of following freshwater forms : **10**
- a) Rohu (*Labeo rohita*)
 - b) Catla (*Catla catla*)
 - c) Mrigal (*Cirrhinus mrigala*)
 - d) Giant prawn (*Macrobrachium rosenbergi*)
- 1.4** Harvesting methods of following marine forms : **4**
- a) Harpadon
 - b) Mackerel
 - c) Lobster
 - d) Pearl oyster
- 1.5** Crafts and gears in Indian Fishery : **2**
- a) Crafts – Catamaran, Machwa, Dinghy, Dug out canoe, Built –up boat
Gears – Gill net, Dol net, Purse net, Rampani net, Cast net
- 1.6** Fishery byproducts : **2**
- a) Fish meal
 - b) Fish flour
 - c) Liver oil
 - d) Ising glass
 - e) Fish glue
 - f) Fish manure
 - g) Fish fin soup
- 1.7** Fish preservation technique : **2**
- a) Chilling
 - b) Freezing
 - c) Salting
 - d) Drying
 - e) Canning

2. Agricultural Pests and their control :

- 2.1** An introduction to Pest, types of pests (agricultural, household, stored grain, structural, veterinary, forestry and nursery) **2**
- 2.2** Major insect pests of agricultural importance (Marks of identification, life cycle, nature of damage and control measures) **9**
- a)** Jowar stem borer
 - b)** Red cotton bug
 - c)** Brinjal fruit borer
 - d)** Mango stem borer
 - e)** Pulse beetle
 - f)** Rice weevil
- 2.3** Non insect pest : Rats and Bandicoots, Crabs, Snails, Slugs, Birds and Squirrels **2**
- 2.4** Pest control practices in brief : Cultural control, Physical control, Mechanical control, Chemical control, Biological control, Pheromonal control and Concept of IPM in brief **6**
- 2.5** Plant protection appliances : Rotary duster, Knapsack sprayer, Cynogas Pump. **3**
- 2.6** Hazards of pesticides on human and antidotes. **2**

PAPER II: SECOND SEMESTER

ZY-222: APPLIED ZOOLOGY – II

1. Apiculture :

- 1.1 An introduction to Apiculture, Study of habit, habitat and nesting behavior of *Apis dorsata*, *Apis indica*, *Apis florae* and *Apis mellifera*. 3
- 1.2 Life cycle, Colony organization and division of labour, Polymorphism 3
- 1.3 Bee behaviour and bee communication. 3
- 1.4 Bee keeping equipments : **a)** Bee box (Langstroth type) **b)** Honey extractor **c)** Smoker **d)** Bee-veil **e)** Gloves **f)** Hive tool **g)** Bee Brush **h)** Queen excluder 3
- 1.5 Bee keeping and seasonal management. 2
- 1.6 Bee products (collection methods, composition and uses: **a)** Honey **b)** Wax **c)** Bee Venom **d)** Propolis **e)** Royal jelly **f)** Pollen grains 4
- 1.7 Diseases and enemies of Bees:
- a)** Bee diseases – Protozoan, Bacterial, Viral, Fungal – with two examples.
- b)** Bee pests – Wax moth (Greater and Lesser), Wax beetle.
- c)** Bee Enemies – Bee eater, King crow, Wasp, Lizard, Bear, Man. 5
- 1.8 Bee pollination 1

2. Sericulture :

- 2.1 An introduction to sericulture, Study of different types of silk moths, their distribution and varieties of silk produced by Mulberry, Tassar, Eri and Muga silk worms in India. 4
- 2.2 External morphology and life cycle of *Bombyx mori*. 3
- 2.3 Cultivation of mulberry (moriculture): **a)** Varieties for cultivation, **b)** Rainfed and irrigated mulberry cultivation – Fertilize schedule, Pruning methods and leaf yield. 4
- 2.4 Harvesting of mulberry: **a)** Leaf plucking **b)** Branch cutting **c)** Whole shoot cutting. 2
- 2.5 Silk worm rearing: **a)** Types of rearing **b)** Rearing house **c)** Rearing techniques **d)** Important diseases and pests. 7
- 2.6 Post harvest processing of cocoons:
- a)** Harvesting and Preparation of cocoons for marketing

- b) Stiffling, Sorting, Storage, Deflossing and Riddling**
- c) Cocoon cooking, Reeling Equipment and Rereeling,
Washing and Polishing.**

PAPER III: FIRST AND SECOND SEMESTER

ZY-223: PRACTICAL COURSE

- Practical 1. Study and classification with reasons of the following animals
Phylum Arthropoda:- Scorpion, Crab, Cockroach, Head louse, Centipede, Peripatus (D)
- Practical 2. Study and classification with reasons of the following animals
Phylum Mollusca:- Chiton, Snail, Bivalve, Dentalium, Octopus, (D)
- Practical 3. Study and classification with reasons of the following animals
Phylum Echinodermata:- Star fish, Brittle star, Holothuria, Sea Urchin, Echinus (D)
- Practical 4. Study of permanent slides of mouthparts of the following insects : (D)
Cockroach, Mosquito, Plant bug/Bed bug, Butterfly, Honey Bee and Housefly
- Practical 5. A) Study of Shell:- Chiton, Pila, Sepia, Pecten, Dentalium,
B) Study of Foot:- Chiton, Patella, Aplysia, Sepia, Octopus, Dentalium (D)
- Practical 6. To Study the external characters and digestive system of *starfish*. (E)
- Practical 7. A) Study of water vascular system of *starfish*. (E)
B) Temporary preparation of gonads from *starfish*. (E)
- Practical 8. A) Study of permanent slides of T. S. of arm and types of pedicellariae of *starfish*. (D)
B) Larval forms in Echinodermata. (D)
- Practical 9. Identification, Classification and study of habit, habitat and economic importance of the following:
a) Rohu, Catla, Mrigal, Pomphret. (D)
b) Prawn, Crab, Oyster. (D)
- Practical 10. Study and maintenance of Aquarium. (E)
- Practical 11. Study of any three types of crafts and gears in fishing. (D)
- Practical 12. Study of insect pests with respect to marks of identification, nature of damage and economic importance (Examples related to theory course) (D)
- Practical 13. Study of pest control appliances (Sprayer/Duster) (D)
- Practical 14. Study and classification with reasons of the following animals (D)
Class Reptilia – Cobra, Garden lizard, Turtle, Rat snake, Draco

- Practical 15. Study and classification with reasons of the following animals (D)
 Class Aves – Sparrow, Crow, Parrot, Woodpecker
 Class Mammals – Rabbit, Mongoose, Kangaroo
- Practical 16. Identification of Poisonous and non- poisonous snakes with the help of identification key with two examples of each (D)
- Practical 17. Study of modifications of beaks and feet in birds (Museum specimen) (D)
 a) Beaks: tearing and piercing, fruit eating, mud probing, fish catching, wood chiseling and flower probing.
 b) Feet: perching, raptorial, climbing, swimming, running.
- Practical 18. Study of external characters and digestive system of *Scoliodon*. (E)
- Practical 19. Study of brain of *Scoliodon* (E)
- Practical 20. a) Temporary preparation of placoid scales from *Scoliodon* (E)
 b) Study of cranial nerves, eye ball muscles of *Scoliodon* (D)
 c) Study of Membranous labyrinth of *Scoliodon* (D)
- Practical 21. a) Study of life cycle of Honey bee (D)
 b) Study of mouth parts, thoracic appendages (legs and wings) and sting apparatus of Honey bee (E)
- Practical 22. Study of various bee keeping equipments (D)
- Practical 23. Study of: a) bee products, b) bee pests, d) bee enemies (D)
- Practical 24. a) Study of life cycle of *Bombyx mori*. (D)
 b) Study of any five equipments in Sericulture. (D)
- Practical 25. Compulsory submission of field visit report along with at least five Photographs/ sketches of insect pest/fishes/any animal corresponding to theory courses
- Practical 26. Compulsory study tour/visit to sea coast/fishery institute/sericulture farm/apiculture institute / agricultural farm.

Practical Skeleton Paper

Class – S.Y.B.Sc.

Subject – Zoology

Time – 10.00 am onwards

Max. Marks – 80

- Q.1 – Dissect Starfish/*Scoliodon* so as to expose its.....system. (16)
- Q.2 – Make a stained temporary preparation of
from Honey bee/Starfish/*Scoliodon* (10)
- Q.3 – Identification (Non-chordates and Chordates) (21)
- a) Identify and classify giving reasons (Arthropoda)
 - b) Identify and classify giving reasons (Mollusca/Echinodermata)
 - c) Identify and classify giving reasons (Cyclostomata/Reptiles)
 - d) Identify and classify giving reasons (Aves/Mammals)
 - e) Identify and describe the types of mouthparts of insect
 - f) Identify and describe (Shell/Foot of mollusca/Poisonous/Non poisonous snake)
 - g) Identify and comment on its modifications (Beak/feet modifications in birds)
- Q.4 – Identification (Applied Zoology) (18)
- a) Identify and give its economic importance (Any fish)
 - b) Identify and describe (Any gear/craft)
 - c) Identify and give its application (Plant protection appliance)
 - d) Identify and describe (One stage of life cycle of honeybee/silkworm)
 - e) Identify and describe (Sericulture equipment)
 - f) Identify and describe (Bee keeping equipment/Bee product)
- Q.5 – a) Tour report and Certified Journal (05)
- b) Viva- voce (05)
- Q.6- Submission of field visit report along with five photographs/sketches
of insect pest/fishes/any animal (05)

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ZY- 212 Applied Zoology Part- I

Fisheries & Agricultural pests and their Control

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ZY- 221 Animal Systematics and Diversity - IV

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ZY-222 Applied Zoology Part-II

Apiculture and Sericulture

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पुणे विद्यापीठ

मराठी

द्वितीय वर्ष विज्ञान (S.Y.B.Sc.)

जून २०१४ - १५ पासूनचा पुनर्रचित अभ्यासक्रम

S.Y. B. Sc.

द्वितीय वर्ष विज्ञान

मराठी विज्ञानसाहित्य आणि व्यावहारिक मराठी

उद्दिष्टे :

- १ विद्यार्थ्यांमध्ये मराठी विज्ञानसाहित्याविषयी आवड निर्माण करणे.
- २ विद्यार्थ्यांमध्ये वैज्ञानिक जाणिवा निर्माण करून देणे.
- ३ विद्यार्थ्यांना विज्ञान, उद्योगातील विविध प्रवाह, संधी यांचा परिचय करून देणे.
- ४ विद्यार्थ्यांमध्ये लेखन, वाचन, आकलन आणि संभाषण ही भाषिक कौशल्ये अधिकाधिक विकसित करणे.
- ५ भाषिक कौशल्यांचे विविध आविष्कार आणि प्रसारमाध्यमे यांच्या परस्परसंबंधाचे ज्ञान विद्यार्थ्यांना करून देणे.
- ६ वैज्ञानिक, कार्यालयीन, व्यावसायिक आदी कामकाजात मराठीच्या होणाऱ्या वापराची माहिती देत पारिभाषिक संज्ञांची ओळख विद्यार्थ्यांना करून देणे.

प्रथम सत्र

एकूण तास : ४८

गुण : ४०

१. निबंधलेखन

तास : ०८

गुण १०

विज्ञान, सामाजिक व वैचारिक विषयावर निबंधाचे लेखन करणे.

२. पाठ्यपुस्तक

तास : ४०

गुण ३०

विज्ञानसृष्टी

संपादक : प्रा. डॉ. स्नेहल तावरे

प्रा. डॉ. बाळासाहेब गुंजाळ

३. मौखिक परीक्षा

सत्राच्या अखेरीस १० गुणांची मौखिक परीक्षा घ्यावी. यात विद्यार्थ्यांना सामान्यज्ञान आणि पाठ्यपुस्तकाशी निगडित प्रश्न विचारावेत. विद्यार्थ्यांच्या हजेरीला दोन गुण द्यावेत.

द्वितीय सत्र

एकूण तास : ४८

गुण : ४०

१. भाषांतर

तास : ०८

गुण १०

२.सारांशलेखन

तास : ०८

गुण १०

३. प्रसारमाध्यमांसाठी विज्ञानविषयक लेखन

तास : २४

गुण १५

- १ वृत्तपत्रांसाठी लेख
- २ आकाशवाणीसाठी भाषणाचे संहितालेखन
- ३ दूरचित्रवाणीसाठी मुलाखत लेखन

४. पारिभाषिक संज्ञांना मराठी संज्ञा

तास : ८

गुण ५

इंग्लिशमधील पारिभाषिक संज्ञांना मराठीतील पर्यायी पारिभाषिक संज्ञा लिहिणे.

३. मौखिक परीक्षा

सत्राच्या अखेरीस १० गुणांची मौखिक परीक्षा घ्यावी. यात विद्यार्थ्यांना सामान्यज्ञान आणि पाठ्यपुस्तकाशी निगडित प्रश्न विचारावेत. विद्यार्थ्यांच्या हजेरीला दोन गुण द्यावेत.

प्रश्न पत्रिकेचे स्वरूप व गुण विभागणी आराखडा

प्रथम सत्र परीक्षा

वेळ : २ तास

गुण ४०

प्रश्न १: खालील पैकी एका विषयावर निबंध लिहा. (चारशे शब्दांपर्यंत) १०

विज्ञान, सामाजिक व वैचारिक यांपैकी एका विषयावर निबंध लिहिणे.

प्रश्न २: दीर्घोत्तरी प्रश्न विचारणे. (तीनशे शब्दांपर्यंत) १५

दोन प्रश्नांपैकी एका प्रश्नाचे उत्तर लिहिणे.

प्रश्न ३: टिपा लिहा. (शंभर शब्दांपर्यंत) १५

सहा टिपांपैकी तीन टिपांची उत्तरे लिहिणे.

द्वितीय सत्र परीक्षा

वेळ : २ तास

गुण ४०

प्रश्न १:

२० गुण

१ भाषांतर करा.

१०

किमान २५० शब्दांच्या इंग्लिश परिच्छेदाचे मराठीत भाषांतर करणे.

२ सारांश करणे.

१०

किमान ३०० शब्दांच्या मराठी परिच्छेदाचा १/३ सारांश करणे.

प्रश्न २: तीन पैकी दोन प्रश्नांची उत्तरे लिहा.

१५ गुण

१ वर्तमानपत्रासाठी लेख लिहिणे. (दोनशे शब्दांपर्यंत)

२ आकाशवाणीसाठी भाषण लिहिणे (दोनशे शब्दांपर्यंत)

३ दूरचित्रवाणीसाठी मुलाखत लेखन (पाच मिनिटे)

प्रश्न ३: इंग्लिश भाषेतील विज्ञानविषयक पारिभाषिक संज्ञांना मराठीतील पर्यायी पारिभाषिक संज्ञा लिहिणे.

५ गुण

दहा शब्दांपैकी पाच पारिभाषिक संज्ञा लिहिणे.

संदर्भ ग्रंथ

- १ व्यावहारिक मराठी पाठ्यपुस्तक - द्वितीय वर्ष वाणिज्य व द्वितीय वर्ष विज्ञान- पुणे विद्यापीठ प्रकाशन, पुणे.
- २ व्यावहारिक मराठी- कल्याण काळे व द.दि.पुंडे, निराली प्रकाशन, पुणे.
- ३ व्यावहारिक मराठी- ल.रा.नसिराबादकर, फडके प्रकाशन, कोल्हापूर.

- ४ नवभारत- व्यावहारिक मराठी विशेषांक, ऑगस्ट-सप्टें, १९८२, प्राज्ञ पाठशाला, वाई.
- ५ उपयोजित अभ्यासक्रम, मराठी भाषेची संवादकौशल्ये-प्रकाशक : यशवंतराव महाराष्ट्र मुक्त विद्यापीठ, नाशिक.
- ६ शासनव्यवहारात मराठी (समस्या : स्वरूप: प्रक्रिया)- भाषा संचालनालय, महाराष्ट्र शासन, शासकीय फोटो झिंको मुद्रणालय, पुणे-१९९७
- ७ व्यावहारिक मराठी- प्रकाश परब, मिथुन प्रकाशन, प्रथमावृत्ती : जून १९८९,डोंबिवली (पूर्व).
- ८ व्यावहारिक मराठी - डॉ. स्नेहल तावरे
- ९ व्यावहारिक मराठी - डॉ. गोविलकर , डॉ. पाटणकर
- १० व्यावहारिक मराठी - डॉ. मोकाशे, डॉ. नेमाडे
- ११ व्यावहारिक आणि उपयोजित मराठी - डॉ. मनोहर रोकडे
- १२ बातमीची कार्यक्षेत्रे संपादक - यशवंतराव चव्हाण महाराष्ट्र मुक्त संगीत समीक्षा विद्यापीठ, नाशिक
- १३ दूरदर्शनसाठी लेखन- केशव केळकर
- १४ जाहिरातीचे युग- केशव केळकर
- १५ सर्जनात्मक लेखन- आनंद पाटील, पद्मगंधा प्रकाशन
- १६ मराठी लेखन मार्गदर्शिका- यास्मिन शेख, राज्य मराठी विकास संस्था, मुंबई
- १७ भयंकर सुंदर मराठी भाषा- द.दि.पुंडे, मॅजिस्टिक प्रकाशन, पुणे.
- १८ पत्रकारितेचा स्वभाव- ल.ना.गोखले, पुणे विद्यापीठ प्रकाशन
- १९ फीचर रायटिंग- प्रसन्नकुमार अकलूजकर, श्रीविद्या प्रकाशन
- २० भाषांतर मीमांसा- कल्याण काळे, अंजली सोमण, प्रतिमा प्रकाशन
- २१ पत्रकारिता : स्वरूप आणि चिकित्सा- महावीर जोंधळे, सुविद्या प्रकाशन
- २२ व्यावहारिक मराठी भाषा - शरदिनी मोहिते
- २३ व्यावहारिक व व्यावसायिक लेखनप्रणाली - डॉ. मधुकर मोकाशी
- २४ जाहिरात शास्त्र - डॉ. वंदना खेडीकर
- २५ मराठी चित्रपटाची पटकथा- डॉ.अनिल सपकाळ, प्रतिमा प्रकाशन,पुणे.
२६. मराठी साहित्य : काही लेखनबंध - डॉ.सुधाकर शेलार, स्वरूप प्रकाशन, औरंगाबाद.



University of Pune

S. Y. B. Sc. [Botany]

Class – S.Y. B .Sc. (To be implemented From June 2014)		
Paper	Semester - I	Semester – II
I	Taxonomy of Angiosperms and Plant community	Plant Anatomy and Embryology
II	Plant Physiology	Plant Biotechnology
III	Practicals based on Theory courses (Paper I and II)	

Equivalence of previous syllabus at S.Y.B.Sc. Botany

Paper	2008 Pattern (Implemented from 2009)	2013 Pattern (To be implemented from 2014)
Paper I Semester I	BO-211: Fundamentals of Plant Systematics and Plant Ecology	BO-211: Taxonomy of Angiosperms and Plant community
Paper II Semester I	BO-212: Fundamentals of Plant Physiology	BO-212: Plant Physiology
Paper I Semester I	BO-221: Structural Botany (Anatomy, Embryology and Palynology)	BO-221: Plant Anatomy and Embryology
Paper II Semester I	BO-222: Fundamentals of Plant Biotechnology	BO-222: Plant Biotechnology
Practical Course	Practical based on theory courses (Paper I and Paper II)	Practical based on theory courses (Paper I and Paper II)

S.Y.B.Sc. Botany
(Semester I, Paper I)
Taxonomy of Angiosperms and Plant Community (48 Lectures)

1. Introduction to Plant Taxonomy	3L
1.1 Definition, scope, objectives and importance	
1.2 Identification, classification, nomenclature	
1.3 Concept of Systematics	
2. Systems of classification	6L
2.1 Types of systems with their merits and limitations- a)Artificial system- Carl Linnaeus , b)Natural system -Bentham and Hooker, c) Phylogenetic system- Engler and Prantl	
3. Taxonomic literature	2L
Flora, monograph, revisions, manuals, journals, periodicals and references books.	
4. Sources of data for Systematics	6L
4.1 Morphology	
4.2 Anatomy	
4.3 Cytology	
4.4 Embryology	
4.5 Phytochemistry	
4.6 Molecular biology	
5. Botanical Nomenclature	6L
5.1 History	
5.2 Binomial nomenclature	
5.3 ICBN- principles	
5.4 Rules of nomenclature	
5.5 Coining of generic names and specific epithets.	
5.6 Ranks and endings of taxa names	
5.7 Principle of priority	
5.8 Effective and valid publications	
5.9 Single and double authority citation	
5.10 <i>Nomina conservanda</i>	

6. Study of Plant Families

11L

Study of following families with reference to systematic position, salient features, floral formula, floral diagram and any five examples with their economic importance – Annonaceae, Meliaceae, Myrtaceae, Rubiaceae, Solanaceae, Asclepiadaceae, Euphorbiaceae and Amaryllidaceae

7. Computer in taxonomy

4L

7.1 Concept of herbarium their advantages and limitations

7.2 Digital /e-herbarium and their advantages

7.3 Data bases: concept and needs.

7.4 Use of computer in plant classification

8. Introduction to ecology

5L

8.1 Definition

8.2 Concept

8.3 Autecology and synecology

8.4 Ecosystem and its components: biotic and abiotic.

8.5 Food chain

8.6 Food web

8.7 Ecological pyramids

9. Ecological grouping of the plants

5L

Ecological grouping of the plants with reference to their significance of adaptive external and internal features: a) Hydrophytes, b) Mesophytes c) Xerophytes d) Halophytes with examples.

References-

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16. Stewart W.N. and Rathwell G.W. 1993. Paleobotany and the Evolution of plants. Cambridge University Press.
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18. Takhtajan A. 1969. Flowering Plants; Origin and Disposal.
19. Theodore Cooke(1903)- The flora of The Presidency of Bombay Vol. I, II, III
20. V.V.Shivrajan-Introduction to Principles plant taxonomy
21. Yadav S.R. and Sardesai M.R.- Flora of Kolhapur District.

S. Y. B. Sc. [Botany]
(Semester I, Paper II)
Plant Physiology (48 Lectures)

1.	Introduction to Plant Physiology	2L
	Brief history, Scope and applications of plant physiology	
2.	Plant – water relations	8L
	2.1 Physico-chemical properties of water	
	2.2 Membrane structure, permeability and aquaporin	
	2.3 Diffusion – Definition, factors affecting diffusion, importance of diffusion in plants	
	2.4 Osmosis – Definition, types of solutions – hypotonic, hypertonic and isotonic, endosmosis and exosmosis, concept of osmotic pressure (OP), turgor pressure (TP), wall pressure (WP), Diffusion pressure deficit (DPD), relation between OP, TP and DPD, role of osmosis in plants.	
	2.5 Plasmolysis – Definition, mechanism, deplasmolysis, significance of plasmolysis	
	2.6 Imbibition – Concept, mechanism and significance	
3.	Absorption of water	3L
	3.1 Role of water in plants	
	3.2 Concept of water potential and capillary water	
	3.3 Mechanisms of water absorption	
	3.4 Factors affecting rate of water absorption	
4.	Ascent of sap	4L
	4.1 Introduction and definition.	
	4.2 Theories of ascent of sap	
	4.3 Vital theories: Jamin – Chame theory and Bose theory	
	4.3.1 Physical force theories: a) Capillary theory, b) Imbibitional theory, c) Atmospheric pressure theory,	
	4.3.2 Transpiration pull or cohesion-tension theory, evidences and objections	
	4.4 Factors affecting ascent of sap	
5.	Transpiration	6L
	5.1 Definition	
	5.2 Types of transpiration – cuticular, lenticular and stomatal	
	5.3 Structure of stomata	

- 5.4 Mechanism of opening and closing of stomata –Steward’s hypothesis, active K^+ transport mechanism
- 5.5 Factors affecting the rate of transpiration
- 5.6 Significance of transpiration
- 5.7 Antitranspirants
- 5.8 Guttation
- 5.9 Exudation
- 6. Plant growth and plant growth regulators 6L**
- 6.1 Introduction
- 6.2 Phases of growth
- 6.3 Measurement of growth- Arc auxanometer, Bose crescograph, fresh and dry weight method
- 6.4 Factors affecting growth
- 6.5 Plant Growth Regulators- Introduction and definition
- 6.6 Properties and practical applications of auxins, cytokinins, gibberellins, ethylene and abscisic acid
- 7. Nitrogen metabolism 8L**
- 7.1 Introduction
- 7.2 Biological nitrogen fixation
- 7.2.1 Symbiotic nitrogen fixation, nitrogenase enzyme- structure and function
- 7.2.2 Non-symbiotic nitrogen fixation
- 7.3 Denitrification, ammonification and nitrification
- 7.4 Reductive amination and transamination
- 7.5 Role of nitrogen in plants
- 8. Seed dormancy and germination 4L**
- 8.1 Definition and types of seed dormancy
- 8.2 Methods to break seed dormancy
- 8.3 Metabolic changes during seed germination
- 9. Physiology of flowering 7L**
- 9.1 Photoperiodism – Concept, definition, short day plants, long day plants and day neutral plants, photoperiodic induction, phytochrome and flowering
- 9.2 Phytohormones and initiation of flowering
- 9.3 Applications of photoperiodism

9.4 Vernalisation – concept and definition, mechanism of vernalisation, applications of vernalisation, devernialization

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3. Hans-Walter Heldt. 1997. Plant Biochemistry And Molecular Biology. Oxford University Press, New York. Usa.
4. Moore, T.C. 1979. Biochemistry And Physiology Of Plant Hormones. Springer-Verlag. Berlin.
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15. Fitter, A. and Hay, R.K.M. 2001. Environmental Physiology of Plants. Academic Press, UK.
16. Press, M.C., Barker, M.G., and Scholes, J.D. 2000. Physiological Plant Ecology, British Ecological Society Symposium, Volume 39, Blackwell Science, UK.

S. Y. B. Sc. [Botany]
(Semester II, Paper I)
Plant Anatomy and Embryology (48 Lectures)

Plant anatomy:

- 1. Introduction** **2L**
Definition, scope of plant anatomy and types of tissues
- 2. Epidermal tissue system** **4L**
Structure and function of epidermal tissue system, uniseriate and multiseriate epidermis, stomata: structure, types and functions, epidermal outgrowth: glandular and non-glandular
- 3. Mechanical tissue system** **4L**
Principles involved in distribution of mechanical tissues – inflexibility, incompressibility, inextensibility and shearing stress, tissues providing mechanical support, their distribution in leaf, stem and root of dicots and monocots.
- 4. Vascular tissue system** **4L**
Structure and function of xylem, phloem and cambium
- 5. Normal secondary growth** **5L**
Introduction, cambium and its role, process in stems of *Helianthus annuus* and *Annona squamosa*, extrastelar and intrastelar secondary growth, annual rings, periderm, bark, tylosis and lenticel
- 6. Anomalous secondary growth** **5L**
Introduction, causes, anomalous secondary growth in dicot stem (*Bignonia*) dicot root (*Raphanus*) and monocot stem (*Dracaena*).

Plant Embryology

- 7. Introduction** **1L**
Definition and scope of plant embryology
- 8. Microsporangium and male gametophyte** **5L**
 - a. Microsporangium: structure of tetrasporangiate anther, types of tapetum, sporogenous tissue.
 - b. Microsporogenesis: process and its types, types of microspore tetrad.
 - c. Male gametophyte: structure and development of male gametophyte.

10. Megasporangium and female gametophyte:**7L**

- a. Megasporangium: structure, types of ovules – anatropous, orthotropous, amphitropous, campylotropous, circinotropous.
- b. Megasporogenesis: tenuinucellate and crassinucellate ovules, types of megaspore tetrads.
- c. Female gametophyte: structure of typical embryo sac, types of embryo sacs with examples – monosporic, bisporic and tetrasporic.

11. Fertilization:**5L**

Mechanism of pollination- entomophily, anemophily, hydrophily, zoophily, germination of pollen grain, double fertilization (syngamy and triple fusion) and its significance.

12. Endosperm and embryo**6L**

- a. Endosperm: Types – nuclear, helobial and cellular.
- b. Embryogeny: structure of dicot and monocot embryo and seed formation.

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10. Maheshwari P, An introduction to Embryology of Angiosperm
11. Nair P K K Essentials of Palynology.

S. Y. B. Sc. [Botany]
(Semester II, Paper II)
Plant Biotechnology (48 Lectures)

1. Introduction	2L
1.1 Biotechnology- Definition, concept and scope	
1.2 Interdisciplinary nature of biotechnology	
2 . Enzyme Technology	7L
2.1 Introduction, definition and properties of enzymes.	
2.2 Classification of enzymes	
2.3 Industrial applications of enzymes.	
2.4 Production of amylase, proteases and lipase enzyme	
2.5 Enzymes immobilization - concept and techniques of immobilization	
3. Fermentation Technology.	7L
3.1 Introduction.	
3.2 Liquid and solid state fermentations	
3.3 Principles of microbial growth	
3.4 Bioreactors used in fermentations- stirred tank and tubular tower and digestive tank fermenters	
3.5 Media composition for liquid and solid state fermentations	
3.6 Industrial applications of fermentation	
3.7 Downstream processing- citric acid production.	
4. Single cell protein	5L
4.1 Introduction	
4.2 Need of proteins in diet	
4.4 Production of SCP from algae (<i>Spirulina</i>) and fungi (Yeast)	
4.5 The economic implications of SCP	
4.6 Acceptability of SCP	
5. Environmental Biotechnology	6L
5.1 Introduction	
5.2 Phytoremediation- definition and concept	
5.3 Methods of phytoremediation- Rhizofiltration, phytoextraction, phytostabilization, phytovolatilization, phytodegradation,	
5.4 Environmental sustainability	

- 6 . Basics of plant genetic engineering** **7L**
- 6.1 Introduction and structure of DNA
- 6.2 Structure of gene in prokaryotes and eukaryotes- Promoter, coding region and terminator
- 6.3 General method of gene isolation from the plants-DNA isolation, restriction enzymes, restriction digestion of DNA, DNA electrophoresis, southern hybridization, ligation of DNA fragments
- 6.4 Gene cloning- vectors used for gene cloning
- 7. Methods of gene transfer in plants** **8L**
- 7.1 Direct gene transfer methods- Electroporation, biolistic gene transfer, liposome mediated transfer.
- 7.2 Vector mediated gene transfer- *Agrobacterium* mediated gene transfer in plants, Ti-plasmid: structure and functions, Ti plasmid based vectors, advantages.
- 8. Application of plant genetic engineering in crop improvement.** **4L**
- 8.1 Introduction
- 8.2 Insect pest resistance, abiotic stress tolerance, herbicide resistance, storage protein quality
- 9. Nano-biotechnology** **2L**
- 9.1 Definition and concept
- 9.2 Applications of nanotechnology in agriculture (fertilizers and pesticides).

REFERENCES:

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2. Bionanotechnology: concepts, Lessons from Nature”, David.S. Goodsell, 2004 Wiley-Liss
3. Nanobiotechnology Protocols; Sandra J Rosenthal, David W Wright 2005, Humana Press Inc
4. Nanoscale Technology in Biological Systems; R.S. Greco, F.B.Prinz and R.L.Smith 2005 CRC press,.
5. Fundamental Molecular Biology ; Allison LA; 2007
6. Recombinant DNA, Watson et al ; 5th Ed; 2006
7. Techniques for Engineering Genes ; Curell BR et al;2004
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11. Recombinant DNA and Biotechnology ; 2nd Ed ; Kreuzer H and Massey A ;ASM;2006
12. Text book of biotechnology, R.C.Dubey, 2009, S.Chand, Delhi

S. Y. B. Sc. [Botany] Paper III

Practicals Based on Theory Paper I and II

a) Taxonomy of Angiosperms and Plant Community

1. Description of flowering plant in botanical terms (01 P)
2. Study of plant families (any four) (03 P)
3. Study of ecological adaptations in Hydrophytes with any two examples (01P)
4. Study of ecological adaptations in Xerophytes with any two examples (01P)
5. Study of vegetation by list count quadrat method. (01P)
6. Study of tools of taxonomy and ecological instruments (any four each) (01P)

b) Plant Physiology

1. Determine water holding capacity (WHC) and pH of soil (pH by pH meter.) (01 P)
2. Study of plasmolysis in suitable plant material (01 P)
3. Determination of Diffusion Pressure Deficit (DPD). (01 P)
4. Determine rate of transpiration under different conditions of Sunlight, Shade and wind (01 P)
5. Demonstration Experiments. (Compulsory Practical) (01 P)
 - a. Curling Experiment
 - b. Imbibition in seeds
 - c. Arc Auxanometer
 - d. Effect of auxins on rooting
 - e. Transpiration pull
 - f. Spectrophotometer
 - g. Portable leaf area meter
 - h. Conductivity meter
 - i. Centrifuge
6. Assessing seed viability by TTC method (01 P)

c) Plant Anatomy and Embryology

1. Study of epidermal tissue system – non-glandular and glandular trichomes, multilayered epidermis, typical stomata (dicot and monocot). (01 P)
2. Study of mechanical tissues and their distribution in root, stem and leaves. (01 P)
3. Study of normal secondary growth in dicot stem – *Annona* /*Moringa*. (01 P)
(Double stained temporary preparation).

4. Study of anomalous secondary growth in *Bignonia* and *Dracaena* stem. (01 P)
(Double stained temporary preparation).
5. Study of tetrasporangiate anther and types of ovules. (01 P)
6. Study of dicot and monocot embryo. (01 P)

b) Plant Biotechnology

1. Production of citric acid by *Aspergillus niger* and estimation of citric acid by titration method. (02 P)
2. Production of single cell protein production i.e. *Spirulina* / yeast and study of commercial products (01 P)
3. Demonstration of fermentation and fermentation products (01 P)
4. Demonstration of separation of plasmid DNA by agarose gel electrophoresis (01 P)
5. Demonstration of enzyme immobilization (01 P)

N.B. Botanical excursion tour and submission of at least five correctly identified wild plant photographs is compulsory.

UNIVERSITY OF PUNE

Revised Course Structure of English

S. Y. B. Sc. & S. Y. B. Sc. (Computer Science) English (w. e. f- 2014- 2015)

Prescribed Text: *Literary Vistas* Ed. Board of Editors, Orient Blackswan

Literature Components

1. The Sun, the Planets and the Stars- *C. Jones*
2. The Scientific Point of View- *J. B. S. Haldane*
3. TV As Babysitter- *Jerzy Kosinski*
4. A Cup of Tea- *Katherine Mansfield*
5. With the Photographer- *Stephen Leacock*
6. Purdah (1) - *Imtiaz Dharker*
7. A Psalm of Life- *Henry Wadsworth Longfellow*
8. Ozymandias of Egypt- *Percy Bysshe Shelley*
9. If— *Rudyard Kipling*
10. Daffodils- *William Wordsworth*

Language Components

1. Vocabulary

Introduction

Synonyms

Antonyms

Collocations: Words that go together

Commonly confused words

Word formation

2. Grammar

Tenses

Simple, compound and complex sentences

Transformation of sentences

3. Communication Skills

Interviews

Group discussions

Presentations

Paragraph writing

Essay writing

Reviews

Report writing

Summaries

Term-wise division of the syllabus:

Term-I

Literature components

Unit – 01, 02, 03 & 06, 07.

Language components

1. Vocabulary

2. Grammar

Term-II

Literature components

Unit –0 4, 05 & 08, 09, 10.

Language component

Communication skills

Question Paper Pattern (SEMESTER-I)

Prescribed Text : Literary Vistas

Time: Two Hours Total marks-40

Ques.1. Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit No. **01** and **02** only) 10 Marks

Ques.2 Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit No.**03** , **06** and **07** only) 10 Marks

Ques.3. Objective questions on vocabulary (Fill in the blanks, Match the pairs ,
Complete the sentences ,right combinations). 10 Marks

Ques.4. Objective questions on Grammar (Fill in the blanks, Do as directed,
Transformation of sentences) 10 Marks

Question Paper Pattern (SEMESTER-II)

Time: Two Hours

Total Marks-40

Ques.1. Attempt any one from (A) and one from (B) in about 100 words each.
(Questions on Unit NO. **04** and **05** only) 10 Marks

Ques.2. Attempt any one from (A)and one from (B) in about in 100 words each.
(Questions on Unit No. **08** ,**09** and **10** only) 10 Marks

Ques.3. Practical questions on Communication Skills (any two out of four).
(Questions on topics –Interviews, Group Discussions and presentations) 10 Marks

Ques.4. Practical questions on Communication Skills (any two out of four).
(Questions on topics –paragraph writing, Essay Writing, Reviews,
Report Writing, Summaries) 10 Marks

(Note: Internal Assessment-10 marks each semester-either written or oral)

University of Pune

Board of Studies in Mathematics

S. Y. B. Sc. (Comp. Sc.)

Syllabus of Mathematics

Introduction:

University of Pune has decided to change the syllabi of various faculties from June, 2013.

Taking into consideration the rapid changes in science and technology and new approaches in different areas of mathematics and related subjects Board of studies in Mathematics with concern of teachers of Mathematics from different colleges affiliated to University of Pune has prepared the syllabus of S.Y.B.Sc. Comp.Sci. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

Aims:

- i) Give the students a sufficient knowledge of fundamental principles, methods and a clear perception of innumerable power of mathematical ideas and tools and know how to use them by modeling, solving and interpreting.
- ii) Reflecting the broad nature of the subject and developing mathematical tools for continuing further study in various fields of science.
- iii) Enhancing students' overall development and to equip them with mathematical modeling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- iv) Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

Objectives:

- (i) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.
- (ii) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- (iii) A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
- (iv) A student be able to apply their skills and knowledge, that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- (v) A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

Eligibility: F.Y.B.Sc. Comp.Sci., as per University rules

Structure of the course:

	Semester - I		Semester -II	
Paper I	Applied Algebra	(MTC :211)	Computational Geometry	(MTC:221)
Paper II	Numerical Analysis	(MTC:212)	Operations Research	(MTC:222)
Paper III	Practical			(MTC:223)

In paper I and II, each course is of 50 marks (40 marks theory and 10 marks internal examination)

Paper III is is of 100 marks

Medium of Instruction: English

Examination:

- A) Pattern of examination: Paper I and II:Semester wise
PaperIII: Practical Annual
- B) Standard of passing :For Paper I and II: 20 Marks out of 50 marks for eachcourse.

But for passing a student should obtain minimum 16 marks out of 40 in the theory and oral examination and overall total marks for theory, oral and internal should be minimum 20.

C) Pattern of question papers: For Paper I and Paper II

Q1. Attempt any 05 out of 07 questions each of 02 marks. [10Marks]

Q2. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.3. Attempt any 02 out of 03 questions each of 05 marks. [10 Marks].

Q.4. Attempt any 01 out of 02 questions each of 10 marks. [10 Marks].

The pattern of question paper for Paper III : Given in details of Syllabus

D) External Students: Not allowed.

E) Variation / Revaluation: Allowed for Paper I and II.

F) Qualifications for Teacher: M.Sc. Mathematics (with NET /SET as per existing rules)

Equivalence of Previous syllabus along with new syllabus:

Semester I		Semester II	
New Course	Old Course	New Course	Old Course
(MTC :211) Applied Algebra	(MTC :211) Linear Algebra	(MTC:221) Computational Geometry	(MTC:221) Computational Geometry
(MTC:212) Numerical Analysis	(MTC:212) Numerical Analysis	(MTC:222) Operations Research	(MTC:222) Operations Research
MTC 223 Practical			

Applied Algebra (MTC: 211)

1. General Vector Spaces: [14]
 - 1.1 Real vector spaces.
 - 1.2 Subspaces.
 - 1.3 Linear independence.
 - 1.4 Basis and dimensions.
 - 1.5 Row space, Column space and null space.
 - 1.6 Rank and Nullity.
2. Eigen values and Eigen vectors:
 - 2.1 Eigen values and Eigen vectors. [09]
 - 2.2 Diagonalization.
 - 2.3 Quadratic forms.
3. Linear Transformations: [10]
 - 3.1 General linear transformations.
 - 3.2 Kernel and range. (Rank nullity theorem without proof.)
 - 3.3 Inverse linear transformation.
 - 3.4 Matrix of general linear transformation.
4. Groups and Coding: [15]
 - 4.1 Cyclic group, normal subgroup.
 - 4.2 Products and quotients of groups.
 - 4.3 Coding of binary information and error detection.
 - 4.4 Decoding and error correction.
 - 4.5 Public key cryptology.

Note: All theorems in sections 1.5, 1.6, 2.2, 2.3, 2.4, 3.3, 3.4, 4.1, 4.2, 4.3, 4.4 are without proofs.

Text Book:

1. Elementary Linear Algebra (Applications Version) by Howard Anton, Chris Rorres. (Seventh Edition) John Wiley & Sons, Inc.
Sections: 5.1 to 5.6, 7.1, 7.2, 9.5, 9.6, 8.1 to 8.4

2. Discrete Mathematical Structures (sixth edition), Kolman, Busby and Ross. PHI.

Sections: 9.5, 11.1 to 11.3

Reference Books:

- (1) M. Artin, Algebra, Prentice Hall of India , New Delhi, (1994).
- (2) K. Hoffmann and R. Kunze Linear Algebra, Second Ed. Prentice Hall of India New Delhi, (1998).
- (3) S. Lang, Introduction to Linear Algebra, Second Ed. Springer-Verlag, New York, (1986).
- (4) A. Ramchandra Rao and P. Bhimasankaran, Linear Algebra, Tata McGraw Hill, New Delhi (1994).
- (5) G. Strang, Linear Algebra and its Applications. Third Ed. Harcourt Brace Jovanovich, Orlando, (1988).

Numerical Techniques (MTC: 212)

1. Errors	[02]
1.1 Accuracy of Numbers	
1.2 Errors	
2. Algebraic and Transcendental Equation	[05]
2.1 False Position Method	
2.2 Newton-Raphson Method	
3. Calculus of Finite Differences	[10]
3.1 Differences	
3.1.1 Forward Differences	
3.1.2 Backward Differences	
3.1.3 Central Differences	
3.1.4 Other Differences	
3.1.5 Properties of Operators	
3.1.6 Relation between Operators	
3.2 Fundamental Theorem on Differences of polynomial	
3.3 Estimation of Error by Difference Table	
3.4 Technique to determine the Missing Term	

- 4. Interpolation with Equal Interval [10]
 - 4.1 Newton's Gregory Formula for Forward Interpolation
 - 4.2 Newton's Gregory Formula for Backward Interpolation
 - 4.3 Central Difference Formulae
 - 4.3.1 Gauss Forward Difference Formula
 - 4.3.2 Gauss Backward Difference Formula
 - 4.3.3 Bessel's Interpolation Formula
- 5. Interpolation with Unequal Interval [08]
 - 5.1 Lagrange's Interpolation Formula
 - 5.2 Error in Lagrange's Interpolation Formula
 - 5.3 Divided Difference
 - 5.4 Newton's Divided Difference Formula
 - 5.5 Hermite's Interpolation Formula
- 6. Numerical Integration [06]
 - 6.1 General Quadrature Formula
 - 6.2 Trapezoidal Rule
 - 6.3 Simpson's one-Third Rule
 - 6.4 Simpson's Three-Eight Rule
 - 6.5 Euler-Maclaurin's Formula
- 7. Numerical Solution of Ordinary Differential Equation [07]
 - 7.1 Euler's Method
 - 7.2 Euler's Modified Method
 - 7.3 Runge-Kutta Method
 - 7.4 Milne's Predictor-Corrector Method

Text Book:-

A textbook of Computer Based Numerical and Statistical Techniques, by A. K. Jaiswal and Anju Khandelwal. New Age International Publishers.

Sections: 1.2, 1.3, 1.3, 2.1, 2.5, 2.7, 3.1, 3.2, 3.4, 3.5, 3.6, 3.7, 4.1, 4.2, 4.3, 4.4.1, 4.4.2, 4.4.4, 4.5, 5.1, 5.2, 5.3.1, 5.4, 5.5, 5.6, 6.1, 6.3, 6.4, 6.5, 6.6, 6.7, 6.10, 7.1, 7.4, 7.5, 7.6, 7.7

Reference Books:-

1. S.S. Sastry; Introductory Methods of Numerical Analysis, 3rd edition, Prentice Hall of India, 1999.
2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.
3. K.E. Atkinson; An Introduction to Numerical Analysis, Wiley Publications.
4. Balguruswamy; Numerical Analysis.

Computational Geometry (MTC : 221)

1. Two dimensional transformations:

[16]

- 1.1 Introduction.
- 1.2 Representation of points.
- 1.3 Transformations and matrices.
- 1.4 Transformation of points.
- 1.5 Transformation of straight lines.
- 1.6 Midpoint transformation.
- 1.7 Transformation of parallel lines.
- 1.8 Transformation of intersecting lines.
- 1.9 Transformation: rotations, reflections, scaling, shearing.
- 1.10 Combined transformations.
- 1.11 Transformation of a unit square.
- 1.12 Solid body transformations.
- 1.13 Transformation and homogeneous coordinates. Translation.
- 1.14 Rotation about an arbitrary point.
- 1.15 Reflection through an arbitrary line.
- 1.16 Projection – a geometric interpretation of homogeneous coordinates.
- 1.17 Overall Scaling.
- 1.18 Point at infinity.

2. Three dimensional transformations:

[16]

- 2.1 Introduction.
- 2.2 Three dimensional – Scaling, shearing, rotation, reflection, translation.
- 2.3 Multiple transformations.
- 2.4 Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space.
- 2.5 Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes.

- 2.6 Affine and perspective transformations.
- 2.7 Orthographic projections.
- 2.8 Axonometric projections.
- 2.9 Oblique projections.
- 2.10 Single point perspective transformations.
- 2.11 Vanishing points.

3. Plane Curves:

[10]

- 3.1 Introduction.
- 3.2 Curve representation.
- 3.3 Non – parametric curves.
- 3.4 Parametric curves.
- 3.5 Parametric representation of a circle and generation of circle.
- 3.6 Parametric representation of an ellipse and generation of ellipse.
- 3.7 Parametric representation of a parabola and generation of parabolic Segment.
- 3.8 Parametric representation of a hyperbola and generation of hyperbolic segment.

4. Space curves:

[6]

- 4.1 Bezier Curves – Introduction, definition, properties (without proof), Curve fitting (up to $n = 3$), equation of the curve in matrix form (upto $n = 3$)

Textbook:

D. F. Rogers, J. A. Adams, Mathematical elements for Computer graphics, Mc Graw Hill Intl Edition.

Reference books:

- Schaum Series, Computer Graphics.
- M. E. Mortenson, Computer Graphics Handbook, Industrial Pres Inc

Operations Research (MTC:222)

- 1. Modeling with Linear Programming** [06]
 - 1.1 Two-Variable LP Model
 - 1.2 Graphical LP Solution
 - 1.3 Linear Programming Applications
 - 1.3.1 Production Planning and Inventory Control
- 2. The Simplex Method** [12]
 - 2.1 LP Model in Equation Form
 - 2.2 Transition from Graphical to Algebraic Solution
 - 2.3 The Simplex Method
 - 2.4 Artificial Starting Solution
 - 2.4.1 M-Method
 - 2.5 Special Cases in Simplex Method
- 3. Duality** [08]
 - 3.1 Definition of the dual problem
 - 3.2 Primal dual relationships
- 4. Transportation Model and Its Variants** [12]
 - 4.1 Definition of the Transportation problem
 - 4.2 The Transportation Algorithm
 - 4.3 The Assignment Model
- 5. Decision Analysis and Games** [10]
 - 5.1 Optimal solution of two person zero sum games
 - 5.2 Solution of mixed strategy games

Text Book:-

Operation Research (An Introduction) Ninth Edition, by Hamdy A. Taha.
Sections: 2.1, 2.2, 2.4.2, 3.1, 3.2, 3.3, 3.4, 3.5, 4.1, 4.2, 5.1, 5.3, 5.4, 15.4

Reference Books:-

1. Operations Research by S. D. Sharma
2. Operations Research by R. Panneerselvam, Prentice Hall of India.
3. Principles of Operations Research by H. M. Wagner, Prentice Hall of India.
4. Operations Research by Gupta and Hira.
5. Operation Research by J.K. Sharma

Paper III : Mathematics practical (MTC:223)

(Semester – I)

1. Using scilab

- i. Revision of scilab with some basic commands
e.g. size,length,eye,ones,rand,zeros etc.
- ii. Use of ' deff ' command for one and two variables functions.
- iii. Draw 2-D and 3-D graph for some standard functions.
e.g. x^2 , $\sin(x)$, $\exp(x)$, x^3+y^3 etc .

2. Using scilab

- i. basic operations on matrices .
e.g. addition , subtraction, multiplication ,square etc.
- ii. solution for system of linear equation .

3. Scilab programming :

- i. Regula-Falsi Metho.
- ii. Newton-Raphson Method.

4 . Using scilab .

- i. Eigen values and Eigen vectors.
- ii. Diagonalization.

5. Scilab programming :

- i. Newton's forward interpolation formula.
- ii. Newton's backward interpolation formula.

6. Scilab programming :

- i. Lagranges interpolation for unequal interval.
- ii. Newton's divided difference formula.

7. Scilab programming :

- i. Numerical Integration by Trapezoidal method.
- ii. Numerical Integration by Simpson's (1/3)rd rule.
- iii. Numerical Integration by Simpson's (3/8)th rule.

8. Scilab programming :

- i. Euler's Method
- ii. Runge-Kutta Method

9. Written practical : Coding Theory and cryptology.

Semester II

10. C -programming

- i. Sorting a set of points with respect to a line.
- ii. Sorting a set of points with respect to a rectangle.

11. C- programming

- i. Find a pair of points with least mutual distance from the given set
- ii. Find a pair of points with farthest mutual distance from the given set

12. Written practical : Solution of L. P. P. by simplex method

Verification by TORA

13. Written practical : 2 -D transformations

14. Written practical : Transportation and assignment problem

Verification by TORA

15. Written practical : 3 -D transformations.

16. C - programming

- i. Generation of uniformly n- points on standard Circle
- ii. Generation of uniformly n- points on standard Ellipse

17. C -programming

- i. Sorting a set of points with respect to a polygon
- ii. Sorting a set of points with respect to a rectangular block

18. Written practical : Be'ziers curve

Instructions:

1. The annual examination is of 80 marks and 20 marks are based on internal evaluation (journal, attendance ,vivo-voce etc).
2. The annual examination of 80 marks having 3 hours duration and has two parts
 - i. Question paper solving
 - ii. Computer Session
3. The maximum marks for the question paper is 30 and is of 1 hr duration.
there will be 5 questions ; each of 10 marks and student has to solve any three questions .
4. Computer session is of 2 hrs duration . It consist of two questions with first on C' programming of 20 marks .and second on scilab of 30 marks with internal options .
5. The slips for the questions on c-programming and problems solving by scilab should be prepared and can be use in annual examination at least for 3 years.

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S.Y.B.Sc. Computer Science (Electronics)
Revised Syllabus
To be implemented from A.Y. 2014-15

Structure of S. Y. B. Sc. (Computer Science) Course

Sem-I	Paper-I : Digital System Hardware (ELC 211)	Paper-II: Analog Systems (ELC 212)
Sem-II	Paper-I: The 8051 Architecture, Interfacing & Programming (ELC 221)	Paper-II: Communication Principles (ELC 222)
Sem-I & II	Paper- III: Practical Course (ELC 203)	

Equivalence Subject/Paper and Transitory Provision

Semester	Old Syllabus	New Syllabus
Semester I	Paper-I: Microprocessor and programming (ELC211)	Paper-I: Digital System Hardware (ELC 211)
	Paper- II: Communication Principles (ELC 212)	Paper-II: Communication Principles (ELC 222)
Semester II	Paper-I: 8051 Microcontroller and Embedded Systems (ELC 221)	Paper-I: The 8051 Architecture, Interfacing and Programming (ELC 221)
	Paper-II: Digital Signal processing (ELC 222)	Paper-II: Analog Systems (ELC 212)
Semester I and II	Practical course	Paper- III: Practical Course (ELC 203)

S.Y.B.Sc. (Computer Science) Electronics -Semester I

Paper - I: Digital System Hardware (ELC 211)

Objectives:

1. To study the applications of logic gates.
2. To use K-maps for digital circuit design.
3. To study and understand basics of microprocessors
4. To understand fundamentals of multicore technology

UNIT- 1: Digital circuit design

[12]

Introduction to digital circuit design, Circuit design using logic gates: Binary to gray converter, Gray to Binary converter, Decimal to BCD encoder

Circuit design using state table/K-map: Design of Full adder, full subtractor, BCD to seven segment decoder, Concept of excitation table, Design of 3 bit synchronous up counter , 3 bit random sequence generator .

UNIT- 2: Memory

[12]

Memory Architecture, Memory Hierarchy, Introduction to USB storage device, Memory parameters (Access time, speed, capacity, cost), Vertical & horizontal Memory expansion (increasing the capacity, increasing word size), Associative Memory, Cache memory, cache mapping techniques, virtual memory, virtual memory mapping (paging and segmentation).

UNIT- 3: Computer Organization

[14]

Concept of Address Bus, Data Bus, Control Bus. Register based CPU organization, stack organization, I/O organization: need of interface, block diagram of general I/O interface. Working concepts like polling, interrupt initiated data transfer. Concept of DMA , DMA transfer, DMA Controller Serial communication: Synchronous, asynchronous and their data transmission formats, RS-232, General block diagram of UART.

UNIT- 4: Microprocessor

[10]

Evolution of Microprocessor (8086 to Pentium 4), Features like address, data, bus size, speed, cache capacity, number of parallel instructions executed. Concept of RISC & CISC, Von-Neumann & Harvard Architecture, Concept of pipeline. Architecture of basic microprocessor:

8086 & Pentium (Basic Version), Introduction to multicore processors, its development and impact on Hardware, Software.

Recommended Books:

1. Fundamental of Digital electronics : R.P. Jain ,
2. Digital design : M. Morris Mano, Prentice-Hall of India
3. Computer System Architecture : Morris Mano, Prentice-Hall of India
4. The Pentium Microprocessor : James Antonakos
5. Microprocessors and Interfacing Programming and Hardware: Douglas V. Hall- TATA
McGRAW-HILL EDITION
6. The Intel Microprocessors : Barry B. Brey- Pearson Education Asia

S.Y.B.Sc. (Computer Science) Electronics-Semester I

Paper-II: Analog Systems (ELC 212)

Objectives:

- 1) To understand basics of analog electronics
- 2) To study different types of sensors
- 3) To understand different types of signal conditioning circuits
- 4) To learn data conversion techniques
- 5) To apply knowledge of analog systems in different applications

UNIT -1: Analog Electronic System

[14]

Introduction of analog electronic systems. Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility. Temperature sensors (LM-35 and AD590), pH sensor, piezoelectric humidity sensor, optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), tilt sensor, touch sensor, ultrasonic sensor

UNIT- 2: Signal Conditioning

[14]

Introduction to signal conditioning, Signal conditioning of passive sensors using bridge circuit: Wheatstone 's bridge, Level Shifter, Amplifier, Three OP-amp instrumentation amplifier, Filters; active and passive filters, Concept of Order of filters. Working principle of Single order Op-Amp based Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter, Band reject filter; Working of Voltage to frequency Converter using OpAmp.

UNIT- 3: Data Converters

[12]

Digital to Analog Converter (DAC): Resistive divider, R-2R ladder, Parameters: Linearity, resolution, accuracy, Analog to Digital Converter (ADC): Types of ADC- Flash, Successive approximation, dual slope. Parameters of ADC: Linearity, resolution, conversion time, accuracy. Applications of DAC and ADC.

UNIT – 4: Case studies

[08]

Temperature monitoring system using LM35, Intruder detector system using PIR sensor, Water Level Indicator system using float switch, Electrocardiography (ECG).

Recommended Books:

1. Sensors & Transducers : Dr. A. D. Shaligram: CTC publications
2. Op-Amps and Linear Integrated Circuits: Ramakant Gaikwad: PHI: 4th Ed.
3. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Ed.
4. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick, William D. Cooper: PHI publications
5. Electronic measurements : K.A. Bakshi, A. V. Bakshi and U. A. Bakshi, Technical publications.
6. A Course in Electrical and Electronic measurements and Instrumentation: A.K. Sawhney: Dhanpat Rai & Sons Educational & technical publishers
7. Handbook of Biomedical instrumentation: R. Khandpur, Tata McGraw Hill Publications 2003.

S.Y.B.Sc(Computer Science) Electronics- Semester II

Paper-I: The 8051 Architecture, Interfacing & Programming (ELC 221)

Objectives:

1. To study the basics of 8051 microcontroller
2. To study the Programming and interfacing techniques of 8051
3. To apply knowledge of 8051 to design different application circuits
4. To introduce the basic concepts of advanced Microcontrollers

UNIT- 1: Basics of Microcontroller & Intel 8051 architecture [12]

Introduction to microcontrollers, difference in controller and processor. Architecture of 8051, Internal block diagram, Internal RAM organization, SFRS, pin diagram of 8051, I/O ports and specifications of I/O Ports, External Memory Interface.

UNIT-2: Programming model of 8051 [12]

Instruction classification, Instruction set, Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives (org, end), features with example, I/O Bit & Byte programming using assembly language for LED and seven segment display (SSD) interfacing. Introduction to 8051 programming in C.

UNIT- 3: Timer / counter, serial communication, Interrupts & Programs using 'C' [12]

TMOD, TCON, SCON, SBUF, PCON Registers, Timer modes, programming for time delay using mode 1 and mode 2. Introduction to interrupt, Interrupt types and their vector addresses, Interrupt enable register and interrupt priority register(IE,IP), Synchronous and asynchronous serial communication, Programming serial port without interrupt, Use of timer to select baud rate for serial communication.

UNIT- 4: Interfacing, programming using 'C' & Applications of 8051 [12]

Interfacing ADC, DAC, LCD, stepper motor. Study of advance micro controllers (ARM & PIC): Features and applications

Recommended books:

1. 8051 microcontroller and Embedded system using assembly and C : Mazidi, Mazidi and McKinley, Pearson publications
2. The 8051 microcontroller – Architecture, programming and applications: K.Uma Rao and AndhePallavi, Pearson publications.
3. ARM System Developers guide: Sloss, Andrew n. Symes.
4. Design with PIC microcontrollers: Peatman, Pearson publications.

S.Y.B.Sc(Computer Science) Electronics-Semester II
Paper- II: Communication Principles (ELC 222)

Objectives:

1. To understand basics of communication systems.
2. To understand modulation, demodulation and multiplexing of signals.
3. To understand digital communication techniques
4. To introduce concepts in advanced wireless communication.

UNIT-1: Introduction to Electronic Communication

[12]

Importance of Communication, Elements of Communication system, Electromagnetic spectrum, types of communication, serial communication, Concepts of communication system: Signal bandwidth, channel bandwidth, data rate, baud rate, Nyquist theorem, Signal to noise ratio, and channel capacity, error handling code- Hamming code, Shannon theorem, and concept of companding.

UNIT-2: Modulation and Demodulation

[14]

Introduction to concepts of modulation and demodulation. Modulation techniques: Analog modulation: Amplitude, Phase and Frequency modulation, Circuit diagram and working of transistorized amplitude modulator and diode demodulator. Equation of amplitude modulated wave, modulation index and frequency spectrum. (Phase and frequency modulation circuits are not expected).

Digital modulation: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Block diagram and working, delta modulation circuit, MODEM - concept of ASK, FSK, BPSK, QPSK and block diagram of MODEM using FSK.

UNIT-3: Multiplexing and Multiple Access Techniques

[14]

Study of multiplexing and multiple access techniques: Space division multiplexing, Time division multiplexing, Frequency Division Multiplexing, Code division multiplexing, spread spectrum techniques: DSSS, FHSS, Introduction to multiple access and corresponding access types: FDMA, TDMA, CDMA.

UNIT- 4: Wireless Communication system

[10]

Introduction to wireless communication system. Need of wireless communication systems. Antenna – Introduction, Need, working Principle, Parameters of antenna: Gain, directivity, Radiation pattern, Beam width, Bandwidth, front to back ratio (FBR).

Introduction to mobile communication, Cellular concept, Working of GSM, Hand over, Introduction to GPRS. Introduction to RFID, Zigbee, Bluetooth and Wi-Fi (Comparison based on range, data rate, frequency, Power).

Recommended Books:

1. Communication Electronics : Principles and Applications. L.E.Frenzel 3rd Edition.
2. Modern Electronic Communication. G.M. Miller 7th Edition.
3. Mobile Communication Jochen Schiller 2nd Edition.
4. Wireless Communications: Principles and Practice. Rappaport
5. Wireless Communications and Networks. William Stallings

S. Y .B. Sc. (Computer Science) Electronics
Paper- III: Practical Course (ELC-203)

Objectives:

1. To use basic concepts for building various applications in electronics.
 2. To understand design procedures of different electronic circuits as per requirement.
 3. To build experimental setup and test the circuits.
 4. To develop skills of analyzing test results of given experiments.
- Total Practical to be conducted 20.
 - 16 experiments compulsory: At least four practical from each of the A B C D groups.
 - One activity equivalent to 2 experiments by the student.
 - a. Continuation of F. Y. activity.
 - b. Electronics project
 - c. Documentation type experiments
 - d. Presentation/Seminar on Electronics /advanced topic/research topics.
 - One activity equivalent to 2 experiments to be arranged by the teacher – Arrange atleast two practical demonstrations / Workshops /Industrial visit which will enhance quality and skills of the student.
 - Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two sessions of 3 Hrs each as usual practice.**

Session I- 40 marks: Practical work 32 marks , Oral based on the student's own activities 8 marks

Session II -40 marks: Practical work 32 marks, Oral based on common activities arranged by teachers 8 marks

32 Marks can be divided as -Circuit diagram / flowchart and algorithm	10
Connection / program	05
Demonstration and working explanation	10
Results	05
Result analysis / conclusion / comments	02

Group A: List of Practicals (Digital System Hardware): Any Four

1. Build and test code converter using logic gates – binary to gray , gray to binary .
2. Build and test Decimal to BCD encoder using logic gates.
3. Build and test 3 bit synchronous counter using JK flip flops.
4. Build and test 4 bit sequence generator for counting sequence 0,2,4, 6, 8, 1, 3, 5, 7, 9, 0
5. Study of read and write action of RAM (using IC 2112/4 or equivalent).
6. Serial communication using RS 232 and ZigBee

Group B: List of Practicals (Analog Systems): Any Four

1. LM-35 based temperature sensing system/Optocoupler /opto-isolator based system.
2. Low Pass Filter and High Pass Filter using IC-741 Op Amp.
3. Build and test DAC using R-2R Ladder network.
4. Flash ADC using discrete components.
5. Build and test LDR based light control system.
6. Study of Linear Variable Differential Transformer.
7. Build and test Instrumentation Amplifier.

Group C :List of Practicals (Microcontroller): Any Four

1. Arithmetic, logical & code conversion problems using assembly/C programming
2. Interfacing the thumbwheel & seven segment display.
3. Traffic light controller using microcontroller.
4. Interfacing LCD to Microcontroller.
5. Waveform generation using DAC Interface.
6. Event counters using opto- coupler using seven segment display / LCD.
7. Speed Controller of stepper motor using microcontroller.

Group D: List of Practicals (Principles of Communication): Any Four

List of Practicals (Principles of Communication): Any Four

1. Build and test Amplitude Modulator and Demodulator.
2. Build and test Time Division Multiplexing circuit.
3. Build and test Frequency Shift Keying.
4. Build and test Delta Modulation circuit using IC.
5. Build and test Pulse Amplitude Modulation.
6. Study of radiation pattern of antenna.
7. Build and test Hamming Code generator and detector circuit.

**Syllabus for M.Sc. (Computer Science)
in affiliated colleges to University of Pune
(To be implemented from Academic year 2014-2015)**

Credit Based System

Year/ Semester	Subject	Paper	Title of Paper	Hours/ Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-III	Core	CS-301	Software Metrics & Project Management	4	5	50	50	100
	Core	CS-302	Mobile Computing	4	5	50	50	100
	Core	CS-303	Soft Computing	4	5	50	50	100
	Elective	CS-304	Project	4	5	50	50	100
	Elective	CS-305	Web Services	4	5	50	50	100
	Elective	CS-306	Database and System Administration	4	5	50	50	100
	Elective	CS-307	Functional Programming	4	5	50	50	100
	Elective	CS-308	Business Intelligence	4	5	50	50	100

Minimum Credit : 25, Maximum Credit : 35 Core Subject is compulsory, From elective courses student can select two course for minimum credit and four for maximum credit. IA :- Internal Assessment, UE :- University Examination

Year/ Semester	Subject	Paper	Title of Paper	Hours/ Week	Credit	% of Assessment		
						IA	UE	Total
II Year Sem-IV	Core	CS-401	Industrial Training /Institutional project	-	15	50	50	100
	Elective	CS-402	Parallel Computing	4	5	50	50	100
	Elective	CS-403	Embedded System	4	5	50	50	100
	Elective	CS-404	Software Quality Assurance	4	5	50	50	100
	Elective	CS-405	Modeling and Simulation	4	5	50	50	100

Core Subject is compulsory. If student had completed 85 credit within three semesters then no need to select any elective course otherwise student should select appropriate number of elective courses to minimum complete 100 credits.

IA :- Internal Assessment, UE :- University Examination

M.Sc (Computer Science)

Part - II / Semester 3

(CORE) CS 301: Software Metrics & Project Management

No of lectures: 48

Pre-requisites

- Software Engineering
- Basic testing concepts

Objectives

- Software Metrics and Project Management covers skills that are required to ensure successful medium and large scale software projects.
- It examines Requirements Elicitation, Project Management, Verification and Validation and Management of Large Software Engineering Projects.
- Student learn to select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management; perform software verification and validation using inspections, design and execution of system test cases.

Chapter 1 : Introduction to Project Management [4]

- What is a Project?
- What is Project management?
- Project phases and project life cycle
- Organizational structure
- Qualities of Project Manager

Chapter 2 : Project Management Components [6]

- Project Integration Management-Project plan development and execution
- Change controls
- Configuration management

Chapter 3 : Scope Management [4]

- Strategic planning
- Scope planning, definition
- Verification and control

Chapter 4 : Time management [2]

- Activity planning
- Schedule development and control

Chapter 5 : Cost Management	[2]
• Cost estimation and Control	
Chapter 6 : Quality Management	[2]
• Quality planning and assurance	
Chapter 7 : Human Resource Management	[2]
• Organizational planning	
• Staff acquisition	
Chapter 8 : Communication Management	[2]
• Information distribution	
• Reporting	
Chapter 9 : Risk Management	[2]
• Risk identification	
• Quantification and control	
Chapter 10 : Procurement Management	[2]
• Solicitation	
• Contract administration	
Chapter 11 : Software Metrics	[6]
• The scope of software metrics	
• Software metrics data collection	
• Analyzing software data	
• Measuring size, structure, external attributes	
Chapter 12 : Software Reliability	[6]
• Measurement and prediction	
• Resource measurement	
• Productivity, teams and tools	
Chapter 13 : Planning a measurement program	[4]
• What is metrics plan?	
• Developing goals, questions and metrics	

- Where and When: Mapping measures to activities
- How: Measurement tools
- Who: Measurers , analyst, tools revision plans

Chapter 14 : Quality Standards

[4]

- CMM
- PSP/TSP

Reference Books

1. Information Technology Project Management, 6th Edition Kathy Schwalbe ISBN-13 :9781111221751 , Cenage Learning
2. Software Metrics: A rigorous and Practical Approach by Norman E. Fenton and Shari Lawrence Pfleeger, International Thomson Computer Press
3. Software Engineering: A Practioner's Approach by Roger S. Pressman ISBN: 9780071267823
4. Practical Software Metrics for Project Management and Process Improvement Robert B. Grady, Prentice hall, ISBN : 9780137203840

Note: -

- Numerical should be covered on Cost Management (COCOMO), Time Management.
- For Internal Evaluation group-wise case study is compulsory.

(CORE) CS 302: Mobile Computing

No of Lectures: 48

Prerequisites

- Concepts of multiplexing and modulation
- Concepts of Networking
- Conversant with OS internals
- Familiar with event handling
- Web browsers
- Create and Compile Java Programs
- Brief History of wireless communication

Objectives

- To familiarize the students with the buzz words and technology of mobile communication
- Understand the GSM architecture
- Understand the issues relating to Wireless applications

Chapter 1 : Introduction to Mobile Computing [3]

- Introduction and need for Mobile computing
- Mobility and portability
- Mobile and Wireless devices
- Applications
- Brief History of wireless communication

Chapter 2 : Wireless Transmission [3]

- General Concepts of multiplexing and modulation
- Spread Spectrum
- Cellular Systems

Chapter 3 : Medium Access Control Layer [4]

- Why specialized MAC?
 - a. hidden and exposed terminals
 - b. near and far terminals
- ii. General Concepts and comparison of SDMA, FDMA, TDMA , CDMA

Chapter 4 : Mobile IP [8]

- Goals, assumptions and requirements
- Entities and terminologies
- Agent Discovery
- Registration
- Tunneling and encapsulation

- Optimization
- Reverse Tunneling
- IPv6
- IP micro-mobility support – Cellular IP, Hawaii, Hierarchical, mobile IPv6
- Mobile Routing :
 - Destination sequence distance Vector, Dynamic Source Routing,
 - Alternative Metrics, Adhoc Routing Protocols -Flat, Hierarchical,
 - Geographic-position-assisted

Chapter 5 : Mobile TCP

[5]

- Traditional TCP
 - o Congestion Control, Slow start, Fast retransmit / Fast recovery
 - o Implications on mobility
- Classical TCP improvements
 - Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit / Fast recovery, Transmission / Timeout freezing, Selective Retransmission, Transaction oriented TCP
- TCP over 2.5/3G wireless networks

Chapter 6 : GSM

[8]

- Mobile Services (Bearer, Tele-and-supplementary services)
- System Architecture
 - o Radio subsystem
 - o Network and switching subsystem
 - o Operation subsystem
- Protocols
- Localization and calling
- Handover
- Value Added Services
 - o SMS: Architecture, Mobile Originated and Mobile Terminated procedures
 - o Cell Broadcast Service: Architecture, Message Transfer Procedure
 - o MMS: Architecture, Protocol framework, Message Transfer Procedure
 - o Location Services: Logical Reference Model, Control Procedures, Network Architecture, determination of Location Information, Location based services
- GPRS

Chapter 7 : 3G mobile networks

[8]

- UMTS
 - System architecture, radio interface
- UTRAN
 - Architecture, Functions of RNC, Core network
- Handover
 - Hard and soft handover

Chapter 8 : Wireless Application Protocol

[4]

- Architecture
- Wireless datagram protocol
- Wireless transport layer security
- Wireless transaction protocol
- Wireless session protocol
- Wireless application environment
- WAP Push Architecture, protocols

Chapter 9 : Introduction to Android Operating System& Programming

[10]

- Overview and evolution of Android
- Features of Android
- Android architecture
- Components of an Android Application, Manifest file
- Android Activity and Service Lifecycle
- UI Designing (layout designinig)
- All components (e.g Button , Slider, Image view, Toast)
- Event Handling

Reference Books

1. Mobile Communications Jochen Schiller, Pearson Education, 2nd Edition, ISBN : 9780321123817
2. Beginning Android Application Development by Wei-Meng Lee Wiley India ISBN:9788126531066
3. Mobile Networks GSM and HSCSD- Nishit Narang, Sumit Kasera, TataMcGrawHill
4. Mobile Computing: Technology, Applications, and Service Creation by Asoke K. Talukder,
5. Beginning Android 3 by Mark Murphy APress , ISBN 9788132203568
6. The Android Developers Guide [<http://developer.android.com/guide/index.html>]

Note: -

- For internal evaluation Android Application Development / Assignments are compulsory for 20 marks.

(CORE) CS 303: Soft Computing

No of Lectures: 48

Objective

- To understand the concepts of how an intelligent system work and its brief development process.

Prerequisites

- Probability
- First Order Predicate Logic
- Classical Logic
- Calculus

Description

Intelligent systems can function as intelligent assistants, augmenting or supplementing human expertise while increasing productivity. This course exposes learners to Neural Network, Fuzzy Logic and Genetic Algorithms, which are the major building blocks of Intelligent Systems.

Chapter 1 : Introduction to Fuzzy Logic

[16 to 20]

The Illusion : Ignoring Uncertainty and accuracy, Uncertainty and information, Fuzzy set and membership, Chance versus Fuzziness. Classical Sets, Fuzzy Sets, Cartesian Product, Crisp Relations, Fuzzy relations, Tolerance and equivalence Relations, Fuzzy Tolerance and equivalence Relations, Value assignments, Other Forms of the Composition Operations, Features of the membership Function, various forms, Fuzzification, Defuzzification to Crisp set, λ -Cuts for fuzzy Relations, Defuzzification to Scalars, Fuzzy Logic, Approximate Reasoning, Others forms of implication operations, Natural Language, Linguistic Hedges, Fuzzy (Ruled-Based) system, Graphical technique of inference, Membership value assignment-Intuition, Inference.

From Book 1 Chapters 1,2,3,4,5,6

Chapter 2 : Fuzzy System and Classification

[10 to 12]

Fuzzy System Simulation- Fuzzy Relation, Equations, Nonlinear Simulation Using Fuzzy Systems, Fuzzy Associative Memories.

Fuzzy Classification- Classification by Equivalence Relations, Cluster Analysis, Cluster Validity, c-Means Clustering, Hard c-Means, Fuzzy c-Means, Classification Metric, Hardening the Fuzzy c-Partition, Similarity Relations from Clustering.

Fuzzy Arithmetic and Extension Principle-Extension Principle, Fuzzy Arithmetic, Interval Analysis in Arithmetic, Approximate Methods of Extension.

From Book 1 Chapters 8, 10, 12

Chapter 3 : Neural Network

[20 to 22]

Neural networks: Artificial Neural Network: Definition, Advantages of Neural Networks
Application Scope of Neural Networks

Fundamental Concept: Artificial Neural Network, Biological Neural Network, Brain vs. Computer-Comparison Between Biological Neuron and Artificial Neuron (Brain vs. Computer) Book3.

Artificial Neurons, Neural Networks and Architectures: Neuron Abstraction, Neuron Single Functions, Mathematical Preliminaries, Neural Networks Defined, Architectures: Feedforward and Feedback, Salient Properties of Neural Networks

Geometry of Binary Threshold Neurons and Their Networks: Pattern Recognition and Data Classification, Convex Sets, Convex Hulls and Linear Separability, Space of Boolean Functions, Binary Neurons are Pattern Dichotomizers, Non-linearly Separable Problems, Capacity of a Simple Threshold Logic Neuron, Revisiting the XOR Problem, Multilayer Networks, How Many Hidden Nodes are Enough?

Learning and Memory: An Anecdotal Introduction, Long Term Memory, The Behavioral Approach to Learning, The Molecular Problem of Memory, Learning Algorithms, Error Correction and Gradient Descent Rules, Learning Objective for TLNs, Pattern Space and Weight Space. From Book 2

Linear Separability, Hebb Network, Perceptron Network. From Book3
 α - Least Mean Square Learning, MSE Error Surface and Its Geometry, Steepest Descent Search with Exact Gradient Information, μ -LMS: Approximate Gradient Descent, Application of LMS TO Noise Cancellation.

From Book 2

Chapter 4 :Genetic Algorithms:

[2 to 4]

A Gentle Introduction to Genetic Algorithms: What are Genetic Algorithms? , Robustness of Traditional Optimization and Search Methods, The Goals of Optimization, How are Genetic Algorithms Different from Traditional Methods?, A simple Genetic Algorithm, Genetic Algorithms at Work—a Simulation by hand, Grist for the Search Mill—Important Similarities, Similarity Templates (Schemata), Learning the Lingo.

From Book 4

Reference Books

1. Fuzzy Logic With Engineering Applications, 3rd Edition By Timothy Ross , Wiley Publication
2. Neural Networks By Satish Kumar, Tata McGraw Hill
3. Introduction to Soft Computing by Deepa &Shivanandan, Wiley Publication
4. Genetic Algorithms in Search, Optimization and Machine Learning By David E. Goldberg, Pearson Education

(ELECTIVE) CS 304: Project

- The Project can be platform, Language and technology independent.
- Project will be evaluated by project guide.
- Assessment will be done weekly in the respective batch.
- Evaluation will be on the basis of weekly progress of project work, progress report, oral, results and documentation and demonstration.
- You should fill your status of the project work on the progress report and get the Signature of project guide regularly. Progress report should sharply focus how much time you have spent on specific task. (The format of progress report is given as follow.)
- You should keep all signed progress report.
- Project will not be accepted if progress report is not submitted and all responsibility remains with student.
- Students should prepare design document using SE/UML techniques depends on your project.

About project Report: -

- The report should be typed on A4 size, executive bond paper for the final submission. The report should be in the good quality Rexene bound. We suggest, using one-and-half spaced printing, Times New Roman 12 font sizes for the normal text, 14-16 font sizes for headings & page titles.
- Number of copies:
For one project you should prepare 2 copies of the project report. One for yourself, one for college (**College copy can be in CD**).

Evaluation for internal 50 Marks

Description	Marks
UML Diagrams	10 M
Technology And Design Based First Demo	15 M
Project Technology Based 2 assignments	10 M
Second Demo	15M

Evaluation for external 50 Marks

Description	Marks
Demo	15 M
Report	15 M
Presentation	15 M
Viva	05M

(ELECTIVE) CS 305: Web Services

No of lectures: 48

Pre-requisites

- Strong knowledge about Java programming.
- Good Understanding of Object Oriented Programming concepts.
- Must be familiar with XML.

Objectives

- To Understand Web Services and implementation model for SOA
- To Understand the SOA, its Principles and Benefits
- Understanding cloud computing as a web service
- Discuss the concept of virtualization and data in cloud.

Chapter 1 : Web Service and SOA fundamentals

[8]

Introduction, Concept of Software as a Service(SaaS), Web services versus Web based applications, Characteristics of Web services, Service interface and implementation, The Service Oriented Architecture(SOA), Quality of service (QoS), Web service interoperability, Web services versus components, RESTful services , Impact and shortcomings of Web services.

Chapter 2 : Web Services Architecture.

[8]

Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

Chapter 3 : SOAP: Simple Object Access Protocol

[10]

Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP communication model, Building SOAP Web Services, developing SOAP Web Services using Java, Error handling in SOAP, Advantages and disadvantages of SOAP.

Chapter 4 : Describing and Discovering Web Services

[12]

WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL, Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

Chapter 5 : Emerging trends: Cloud Computing

[10]

What is Cloud Computing?, SOA meets the Cloud, Cloud Service Models, SaaS-Salesforce.com, PaaS-Google App Engine, IaaS-Amazon EC2, Cloud Deployment Models – Public, Community, Private, Hybrid. Virtualization , Virtual Machine(VM) Technology, Virtual Machine Monitor or Hypervisor - KVM, Xen, VMware hypervisors and their features, Multi-tenancy, Architecture model for Cloud Computing .

Case Study: Use Cloud Services – Amazon EC2, Google App Engine, Salesforce.com

Text books:

1. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.
4. Gautam Shroff, “Enterprise Cloud Computing” ,Cambridge.

Reference Books:

1. Building Web Services with Java, 2nd Edition, S. Graham and others, Pearson Edn., 2008.
2. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
3. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
4. Java Web Services Programming,R.Mogha,V.V.Preetham,Wiley India Pvt.Ltd.
5. 5.Ronald Krutz and Russell Dean Vines, “Cloud Security”, Wiley-India
6. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
7. Dr. Kumar Saurabh,”Cloud Computing”, Wiley Publication
8. Borko Furht, “Handbook of Cloud Computing”, Springer

(ELECTIVE) CS 306: Database and System Administrator

No of lectures: 48

Pre-requisites

- Concepts of Databases
- Basic knowledge of any operating system and programming language.

Objectives

- This curriculum offers you the opportunity to acquire a combination of both Operating Systems & Database Administration skills.
- SDBA program gives you ideal opportunity to practice what you have learned through real life case studies.

DBMS Administration

Chapter 1 : Client/Server Concepts [1]

- Client server Architecture
- Invoking Client Programs

Chapter 2 : MySQL Client Program [4]

- Using MySQL interactively
- Statement Terminators
- Using Script Files with MySQL
- MySQL Output Formats
- Client Commands and SQL Statements
- Using Server-Side Help
- Using the – safeupdates Option

Chapter 3 : MySQL Architecture [3]

- Client/Server Overview
- Communication Protocols
- The SQL Parser and Storage Engine
- Tiers
- How MySQL Uses Disk Space
- How MySQL Uses Memory

Chapter 4 : Starting, Stopping, and Configuring MySQL [3]

- Types of MySQL Distributions
- Starting and Stopping MySQL Server on Windows
- Starting and Stopping MySQL Server on Unix
- Runtime MySQL Configuration
- Log and Status Files

- Loading Time Zone Tables
- Security-Related Configuration
- Setting the Default SQL mode
- Upgrading MySQL

Chapter 5 : Locking [2]

- Locking Concepts
- Explicit Table Locking
- Advisory Locking

Chapter 6 : Storage Engines [5]

- MySQL Storage Engines
- The MyISAM Engine
- The MERGE Engine
- The InnoDB Engine
- The MEMORY Engine
- The FEDERATED Engine
- The Cluster Storage Engine
- Other Storage engines

Chapter 7 : Data (Table) Maintenance [3]

- Types of Table Maintenance Operations
- SQL Statements for Table Maintenance
- Client and Utility Programs for Table Maintenance
- Repairing InnoDB Tables
- Enabling MyISAM Auto-Repair

Chapter 8 : Data Backup and Recovery Methods [3]

- Introduction
- Binary Versus Textual Backups
- Making Binary Backups
- Making Text Backups
- Backing Up Log and Status Files
- Replication as an Aid to Backup
- MySQL Cluster as Disaster Prevention
- Data Recovery

System Administration

Chapter 9 : Introduction [1]

- Know Your PC
- Different Linux Distribution
- Daily tasks of system Administrator
- Responsibilities of System Administrator

Chapter 10 : Linux Installation [2]

- Text VS Graphics
- Partitioning & Disk management
- GUI Configuration

Chapter 11 : File manipulations Under Linux [4]

- Copy rename, delete & move
- File & directory listing
- File handling & I/O redirection
- File systems and their types
- Names & contents of important Unix/Linux file directories
- Compatibility of file Systems
- fsck & Disk check Commands, Log files

Chapter 12 : Command Line Interface [3]

- Text Manipulation Commands e.g. cut, grep, egrep, split, paste
- Vi editor
- su, ps, find, make, df/du
- Introduction to Regular expression
- awk, sed, passwd, wc, Antivirs, utilities, tar, gzip/gunzip, accessing pen drive, CD

Chapter 13 : Users and Groups [2]

- Concept of users & groups
- Owner creator
- Primary and Secondary group
- Types of file and directory permission

Chapter 14 : Startup/shut down [2]

- Booting
- Run Levels
- /etc/init tab
- shut down
- handling crashes

Chapter 15 : Basic system Administration [6]

- Managing Users and groups (from console & GUI modes) Using command like adduser, userdel, groupadd, groupdel etc.
- Basic Network Setup Setting hostname, IP address of the machine. Setting a dialup connection.

- Installing and removing packages. Using the RPM, source package installation, URPMI.
- Managing Partitions
- Boot loader management Understanding the lilo and grub boot loader and its configuration files.
- Configuring services, chkconfig, ntsys, start, Resart & stop Service

Chapter 16 : Networking

[2]

- Internetworking with windows (samba)
- Ping Telnet, ftp program
- NIS, NFS, Tomcat web server

Chapter 17 : Print Services

[2]

- Printers Installation
- Print command

Reference Books

1. Linux System Administrator's guide by Lars Wirzenius, Joanna Oja, Stephen Stafford, Alex Weeks
2. Linux Administration Made Easy by Steve Frampton
3. MySQL 5 for Professionals By Ivan Bayross, Sharanam Shah [SPD Publications]
4. High Performance MySQL By Jeremy D. Zawodny, Derek J. Balling [O'Reilly Media Publications]
5. MySQL in a Nutshell By Russell Dyer [O'Reilly Media Publications]

Important Links

1. http://www.thegeekstuff.com/2008/11/overview-of-mysql-information_schema-database-with-practical-examples/
2. <http://www.learn-mysql-tutorial.com/Identifiers.cfm>

Note: -

- **Some chapters are practical oriented so faculty should teach those chapter with demonstration.**
- **And, those chapters are kept for internal evaluation.**
- **Hence, hands on must be taken for these chapters.**

(ELECTIVE) CS 307: Functional Programming

No of Lectures: 48

Prerequisites

Anyone who has a mature understanding of programming in an imperative language (e.g., Java, C/C++, or Pascal), of basic algorithms and data structures (e.g., sorting, searching, lists, stacks, and trees), and of basic discrete mathematics (e.g., sets, relations, functions, induction, and simple algebraic concepts)

Objectives

- Understand what functional programming is, what different variants are there and have some grasp of their history;
- Explain the semantics of different functional languages using precise formal specifications;
- Know how to implement functional languages and what optimizations are important;
- Be able to state and critique what it means for an implementation of a functional programming language to be correct;
- Be able to (in principle) formally prove correctness of their implementations, including their compilers and garbage collectors

Chapter 1 : Introduction to FP & Mathematical Functions

[6]

Principles of FP, History, Varieties of FP languages, Declarative style of programming, Declarative style of programming, Why functional programming Mathematical functions : definition, lambda expression, Functional Forms or a higher-order function :- Function Composition, Construction, Apply-to-all, Disadvantages of FP

Chapter 2 : Introduction to Lambda calculus

[12]

Introduction, The benefits of lambda notation, Lambda calculus as a formal system - Lambda terms (Variables, Constants, Combinations, Abstractions), Free and bound variables, Substitution, Conversions (Alpha conversion, Beta conversion, Eta conversion), Lambda equality, Lambda reduction, Reduction strategies, Combinators

Chapter 3 : Reduction strategies and lazy evaluation

[8]

Reduction, Evaluation in a strongly typed language, What is reduction?, 2 types of reduction rules, Reduction rules, Alternate reductions, Reduction strategies - Eager evaluation and Lazy Evaluation, Advantages and disadvantages of reduction strategies, Graph Reduction, Reduction of higher order functions and currying

Chapter 4 : Introduction to Python

Scripting versus Traditional Programming

[2]

Why Scripting is Useful in Computational Science, Classification of Programming Languages, Productive Pairs of Programming Languages, Gluing Existing Applications, Scripting Yields Shorter Code, Efficiency, Type-Specification (Declaration) of Variables, Flexible Function Interfaces, Interactive Computing, Creating Code at Run Time, Nested Heterogeneous Data Structures, GUI Programming, Mixed Language Programming, When to Choose a Dynamically Typed Language, Why Python?, Script or Program?

Chapter 5 : Basic Python

[2]

Python identifiers and reserved words, Lines and indentation, multi-line statements, comments, print and raw_input()/input, command line arguments and processing command line arguments, standard data types - basic, none, boolean (true & False), numbers, Python strings, data type conversion, Python basic operators (Arithmetic, comparison, assignment, bitwise logical), Python membership operators (in & not in), Python identity operators (is & is not), Operator precedence, Control Statements, Python loops, Iterating by subsequence index, loop control statements (break, continue, pass) , Mathematical functions and constants (import math), Random number functions

Chapter 6 : Python strings

[4]

Concept, Slicing, escape characters, String special operations, String formatting operator, Triple quotes, Raw String, Unicode strings, Built-in String methods.

Python Lists - concept, creating and accessing elements, updating & deleting lists, basic list operations, reverse, Indexing, slicing and Matrices, built-in List functions, Functional programming tools - filter(), map(), and reduce(), Using Lists as stacks and Queues, List comprehensions

Chapter 7 : Python tuples and sets

[1]

Concept (immutable), creating & deleting tuples, accessing values in a tuple, updating tuples, delete tuple elements, basic tuple operations, Indexing, slicing and Matrices, built-in tuple functions. Sets - Concept, operations.

Chapter 8 : Python Dictionary

[1]

Concept (mutable), creating and accessing values in a dictionary , updating dictionary, delete dictionary elements, properties of dictionary keys, built-in dictionary functions and methods.

Chapter 9 : Functions

[3]

Defining a function (def), calling a function, Function arguments - Pass by value, Keyword Arguments, default arguments, Scope of var - basic rules and , Documentation Strings, Variable Number of Arguments, Call by Reference, Order of arguments (positional, extra & keyword), Anonymous functions, Recursion, Treatment of Input and Output Arguments, Unpacking argument lists, Lambda forms, Function Objects, function ducktyping & polymorphism, generators (functions and expressions) and iterators, list comprehensions

Chapter 10 : Working with Files and Directories

[3]

Creating files, Operations on files (open, close, read, write), file object attributes, file positions, Listing Files in a Directory, Testing File Types, Removing Files and Directories, Copying and Renaming Files , Splitting Pathnames, Creating and Moving to Directories, Traversing Directory Trees

Chapter 11 : Python Classes / Objects

[3]

Object oriented programming and classes in Python - creating classes, instance objects, accessing members, data hiding (the double underscore prefix), built-in class attributes, garbage collection, the constructor, overloading methods and operators, inheritance - implementing a subclass, overriding methods, Recursive calls to methods, Class variables, class methods, and static methods

Chapter 12 : Python regular expressions

[1]

Matching Vs searching, match & search functions, search & replace, option flags, RE patterns, non-greedy repetitions, grouping, back references, alternatives, anchors.

Chapter 13 : Python Exceptions

[1]

Exception handling, assert statement, except clause - with no exceptions and multiple exceptions, try - finally, raising exceptions, user-defined exceptions

Reference Books

1. Functional Programming: Practice and Theory by Bruce J. MacLennan
 - ISBN-10: 0201137445
 - ISBN-13: 978-0201137446
2. An Introduction to Functional Programming Through Lambda Calculus (Dover Books on Mathematics) Paperback by Greg Michaelson
 - ISBN-10: 0486478831
 - ISBN-13: 978-0486478838
3. Computational Semantics with Functional Programming by Jan van Eijck (Author), Christina Unger (Author)
 - ISBN-10: 0521757606
 - ISBN-13: 978-0521757607
4. Programming Languages: Principles and Practice By Kenneth C. Louden
 - ISBN-10: 1575864967
 - ISBN-13: 978-1575864969
5. E-Books : python_tutorial. pdf, python_book_01.pdf

Note: -

- **For Internal Evaluation ,
20M Theory + 30M Programming**

(ELECTIVE) CS 308: Business Intelligence

No of lectures: 48

Pre-requisites

- Relational database concepts, database design and entity-relationship (E-R) modeling, data normalization, and Structured Query Language (SQL).
- Data Mining techniques

Objectives

- Understand the role of BI in enterprise performance management and decision support.
- Understand the applications of data mining and intelligent systems in managerial work.
- Understand data warehousing and online analytical processing (OLAP) concepts, including dimensional modeling, star and snowflake schemas, attribute hierarchies, metrics, and cubes.
- Learn data analysis and reporting using an available BI software.

Chapter 1 : Introduction to Business intelligence

[6]

Definition and History of BI, Transaction processing versus analytical processing, BI implementation , Major tools and techniques of BI

Chapter 2 : Data warehousing

[10]

Definition and concepts, , Data warehouse architecture, ETL process, data warehouse development, Top down vs. Bottom up, Data Mart vs. EDW, Implementation issues, Real-time data warehousing

Chapter 3 : Business performance management

[14]

Key performance indicators and operational metrics, Balanced scorecard , Six Sigma , Dashboards and scorecards

Chapter 4 : Data Mining for Business Intelligence

[10]

Data mining process, Data mining methods, ANN for Data Mining

Chapter 5 - Text, and Web mining for Business intelligence [08]

Text mining Applications, Process and Tools, Web content, structure and usage mining

Chapter 6 : BI implementation , Integration and emerging trends [10]

Implementing BI, BI Application Life Cycle , Connecting BI to Enterprise systems, On-demand BI, Issues of legality, privacy and Ethics, Emerging topics in BI, Social Networking and BI, RFID and BI

Reference Books

1. Business Intelligence: A Managerial Approach, 2nd Edition, PEARSON 2012
Authors: EfraimTurban, Ramesh Sharda, Dursun Delen, and David King
ISBN-10: 0-13-610066-X
ISBN-13: 978-0-13-610066-9
2. Oracle Business Intelligence Applications, McGraw Hill Education 2013
Authors : Simon Miller, William Hutchinson ISBN-10: 93-5134-153-4
ISBN-13: 978-93-5134-153-6

Note : -

- **Group wise Case studies can be given for Internal Evaluation.**

M.Sc (Computer Science)

Part - II / Semester 4

(CORE) CS 401: Full Time Industrial Training/ Industrial Project

Period – Minimum 4 months

1. There will be a teacher coordinator for a group of students. A teacher coordinator will take care of joining letters from students along with other necessary submission listed below.
2. A student will have to submit 2 reports during the period of ITP to the Department of the college.
3. After the completion of the ITP, a student will have to submit a synopsis along with the project completion certificate from the respective industry/research institute /educational institute.
4. A student will submit one hard copy (Student Copy) and a soft copy's (preferably 2 CDs) of the work carried out towards ITP.
5. The project will be graded by the experts (One internal examiner, one external examiner(academic expert) and one industrial expert) as follows:

O – 75 and above	C – 50 and above	F - A student will have to carry out project once again for a complete semester
A – 65 and above	D – 45 and above	
B – 55 and above	E – 40 and above	

Important Note: A student can complete ITP with a research project of a teacher / an expert funded by the University of Pune/ a funding agency.

Evaluation for internal 50 Marks will be done according to Progress Report written by Teacher Coordinator

Evaluation for external 50 Marks will be done by Industrial Expert, Academic Expert and One Internal Examiner.

(ELECTIVE) CS 402: Parallel Computing

No. of lectures: 48

Pre-requisites

- Ability to program well in C, C++ or Fortran.
- Willingness to rethink how problems should be solved.
- Algorithm & Data Structures
- Basics of Computer Architecture

Objectives

- Learning basic models of parallel machines and tools
- How to parallelize programs and how to use basic tools like MPI and POSIX threads.

Chapter 1 : Introduction to Parallel Computing [6]

Why Parallel Computing & Scope of Parallel Computing, Sieve of Eratosthenes, Control and Data Approach, PRAM model of parallel computation, Design paradigms of Parallel Computing, examples, Bulk Synchronous Parallel (BSP) model.

Chapter 2 : Classification [12]

Flynn's Taxonomy, MPP, SMP, CC-NUMA, Clustering of Computers, Beowulf Cluster, Use of MPI in Cluster Computing. Debugging, Evaluating and tuning of Cluster Programs, Partitioning and Divide and Conquer Strategies. Cluster: dedicated high performance (HP), high availability (HA), CoPs, PoPs, CoWs; distributed, on-demand, high-throughput, collaborative, data-intensive computing, Interconnection networks.

Chapter 3 : An overview of Parallel Programming Paradigms [10]

Foster's design paradigm for Multi computing programming, Programmability Issues, Programming Models: Message passing, Message passing standards: PVM (Parallel Virtual Machine), MPI (Message Passing Interface) and its routines, Advanced Features of MPI

Chapter 4 : Overview of Programming with Shared Memory [12]

Overview of Programming with Shared Memory: OpenMP (History, Overview, Programming Model, OpenMP Constructs, Performance Issues and examples, Explicit Parallelism: Advanced Features of OpenMP)

Multi-Core programming: Introduction to Multi cores Programming Software Multi-threading using Tread Building Blocks (TBB) and Cilk++ programming, GPGPU programming with CUDA

Reference Books

1. Quinn, M. J., Parallel Computing: Theory and Practice (McGraw-Hill Inc.).
2. Bary Wilkinson and Michael Allen: Parallel Programming Techniques using Networked of workstations and Parallel Computers, Prentice Hall, 1999.
3. R. Buyya (ed.) High Performance Cluster Computing: Programming and Applications, Prentice Hall, 1999.
4. William Gropp, Rusty Lusk, Tuning MPI Applications for Peak Performance, Pittsburgh (1996).
5. W. Gropp, E. Lusk, N. Doss, A. Skjellum, A high performance portable implementation of the message passing Interface (MPI) standard, Parallel Computing 22 (6), Sep 1996.
6. Gibbons, A., W. Rytter, Efficient Parallel Algorithms (Cambridge Uni. Press).
7. Shameem A and Jason, Multicore Programming, Intel Press, 2006.
8. CUDA Programming A Developer's Guide to Parallel Computing with GPUs Shane Cook, Morgan Kaufmann

(ELECTIVE) CS 403: Embedded System

No of Lectures: 48

Pre-requisites

- Knowledge of microprocessor architecture and assembly language, microprocessor peripherals, digital design, and the C programming language is a prerequisite for this course.
- An understanding of compilers, assemblers, linkers, operating systems, analog design, diodes, transistors, and electromagnetic fields and waves will be useful

Objectives

- Understand and design embedded systems and real-time systems
- For real-time systems:
 - Identify the unique characteristics of real-time systems
 - Explain the general structure of a real-time system
 - Define the unique design problems and challenges of real-time systems
- Apply real-time systems design techniques to various software programs.
- For embedded systems, it will enable you to :
 - Understand the basics of an embedded system
 - Program an embedded system
 - Design, implement and test an embedded system.

Chapter 1 : Introduction to ES

[2]

- What is ES
- Examples of ES
- Inside ES : processor, memory, peripherals, software

Chapter 2 : Embedded Processors , Memories & Peripherals

[6]

- Microcontrollers 8051
- Discrete processors : 8-bit architecture, 16/32 bit CISC, RISC, DSP
- Integrated processors : ARM RISC
- Choosing a processor
- Memory systems : types (SRAM, DRAM, FLASH), organization, access time, validating the contents of memory
- Basic peripherals : parallel ports, timers, clocks

Chapter 3 : Real time system concepts

[12]

- Foreground/ background systems
- Critical section of code
- Resource, shared resource
- Multitasking, task, task switch

- Kernel, scheduler, non-preemptive kernel, preemptive kernel
 - Reentrancy, round-robin scheduling
 - Task priority, static priority, dynamic priority, priority inversions, assigning task priorities
 - Mutual exclusion, deadlock, synchronization, event flags, intertask communication
 - Interrupts : latency, response, recovery, ISR processing time, NMI
- (For ‘C’ implementation of above concepts, please refer to chapters 4,5,6,7 of the book “An Embedded Software Primer” by David E. Simon published by Pearson Educations)

Chapter 4 : Writing software for embedded systems

[8]

- The compilation process : compile, link, load
- Cross compilers
- Run-time-libraries : processor dependent, I/O dependent, system calls, exit routines
- Writing a library, using alternative libraries
- Porting Kernels
- C extensions for embedded systems
- Buffering and other data structures
 - Linear buffers, Directional buffers, Double buffering, Buffer exchange, Linked lists, FIFO, Circular buffers, Buffer underrun and overrun, Allocating buffer memory, Buffer leakage
- Downloading

Chapter 5 : Emulation and Debugging techniques

[6]

- Debugging techniques :
 - HLL simulation, low level simulation, on-board debugger, task level debugging, symbolic debug
- Emulation
- Optimization problems

Chapter 6 : Basic design using RTOS

[6]

- Overview
- Principles
- Example
- Encapsulating semaphores and queues
- Hard real time scheduling considerations
- Saving memory space
- Saving power

Chapter 7 : Real time without RTOS

[8]

- Choosing the SW environment
- Deriving real time performance from non-real time system
- Scheduling and data sampling
- Controlling from an external switch
- Problems

Reference Books

1. Embedded Systems Design – Steve Heath
2. Programming Embedded Systems – Michael Barr
3. Embedded Systems Building Blocks _ Jean J. Labrosse
4. An Embedded Software Primer _ David E. Simon published by Pearson Educations

(ELECTIVE) CS 404: Software Quality Assurance

No of lectures: 48

Pre-requisites

- Basic concepts of software testing

Objectives

- To enable student to learn Software Quality Assurance good practices with the help of various techniques, Strategies and tools

Chapter 1 : Software quality [4]

- Definition
- Software errors, software faults and software failures
- Software quality assurance – definition and objectives
- Software quality assurance vs. software quality control
- The objectives of SQA activities

Chapter 2 : Pre-project SQA Components [4]

- Contract Review
- Development and Quality Plan

Chapter 3 : SQA components in Project life cycle activities assessment [10]

- Verification and Validation
- Various types of Reviews
- Inspections
- Walkthrough
- Software testing
- Impact of CASE Tools

Chapter 4 : SQA Infrastructure Components [8]

- Procedures and procedure manuals
- Templates and Checklists
- Staff training
- Corrective and preventive actions
- Documentation control

Chapter 5 : Software Quality Factors [5]

- McCall's Quality Model
- Product, Process quality metrics

Chapter 6 : Standardization [4]

- ISO 9001 and ISO 9000-3
- SEI-CMM,
- IEEE 1012 standard
- ISO/IEC 12207 standard

Chapter 7 : Configuration Management [4]

- Change control
- Release and version control
- Software configuration management audit

Chapter 8 : Quality Improvement Technique [4]

- Pareto Diagrams
- Cause-Effect Diagrams
- Scatter Diagrams
- Run Charts

Chapter 9 : Quality Costs [5]

- Quality Cost Measurement
- Utilizing Quality Costs for Decision-Making

Reference books

1. Software Quality Assurance from theory to implementation – Danial Galin
2. Software Project management - Edwin Bennatan
3. Software Engineering Roger S. Pressman, TMH, 7Th Ed.
4. Software Quality Assurance : Principles and Practices Nina Godbole,
5. Project Management Body of Knowledge – PMI
6. www.softwarecertifications.org
7. Quality, 5th ed., Prentice-Hall, 2010. Donna C. S. Summers
8. Total Quality Management, Prentice Hall, 2003. Dale H. Besterfield
9. Software engineering: An Engineering approach, John Wiley. J.F.Peters, W.Pedrycz

Note: -

- **Group wise case studies are expected as a part of Internal Evaluation.**

(ELECTIVE) CS 405: Modeling and Simulation

No of lectures: 48

Pre-requisites

- The course assumes a previous knowledge of probability and statistics.
- Basic concepts of network topologies.

Objectives

- The purpose of this course is to provide students with an opportunity to develop skills in modeling and simulating a variety of problems.
- After learning the simulation techniques, the students are expected to be able to solve real world problems which cannot be solved strictly by mathematical approaches.

Chapter 1 : Systems modeling [2]

Concepts of continuous and discrete formalisms. Stepped and Event-based Time in Simulations, Sources and Propagation of Error

Chapter 2 : Types of Simulations [4]

Graph or Network Transitions Based Simulations, Actor Based Simulations, Mesh Based Simulations, Hybrid Simulations, Framework for Simulation and Modeling,

Chapter 3 : Modeling and simulators [20]

Modeling formalisms and their simulators, discrete time, continuous time, discrete event, process based simulators. Hybrid systems and their simulators

Chapter 4 : Probability [8]

Basic probability, probability distributions, estimation, testing of hypotheses

Chapter 5 : Probability in modeling [8]

Selecting input probability distributions, models of arrival processes, Queues and Random Noise, Random number generators, their evaluation, generating random variates from various distributions

Chapter 6 : Analyzing models [6]

Output analysis, transient behavior, steady state behavior of stochastic systems, computing alternative systems, variance reduction techniques. Sensitivity Analysis, Verification and Validation

Text books

1. Discrete-Event System Simulation, Fourth Edition, Banks, by J., et.el. (2005), Publisher Pearson, ISBN-13: 9780131293427
2. Simulation Modeling and Analysis, Third Edition, by Law, A.M. and W.D. Kelton (2000), Publisher McGraw-Hill, ISBN-13: 978-0071165372

Reference Books

1. Continuous System Simulation, by Kofman and Cellier, Publisher Springer, ISBN-13: 9780387261027
2. Theory of modeling and Simulation, 2nd ed., B. Zeigler, H. Praehofer, T. Kim, Publisher Academic Press, 2000, ISBN-13: 978-0127784557
3. Modeling with Data: Tools and Techniques for Scientific Computing, by Ben Klemens, Publisher: Princeton University Press 2008, ISBN-13: 9780691133140

Note: -

- **Hands on can be taken with any simulating software.**

M.Sc. (Computer Science) End Semester Examination Paper Layout for Semester 3 and Semester 4

CS-301: Software Metrics and Project Management

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows:

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to Project Management	6
2	Project Management Components	10
3	Scope Management	6
4	Time Management	4 (Numerical)
5	Cost Management	4 (Numerical)
6	Quality Management	4
7	Human Resource Management	4
8	Communication Management	4
9	Risk Management	4
10	Procurement Management	4
11	Software Metrics	10
12	Software Reliability	10
13	Planning a measurement Program	6
14	Quality Standards	4

Numerical weightage : 15M

Different Types of Numerical on topics Cost Management (COCOMO), Time Management.

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units.

CS-302: Mobile Computing

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to Mobile Computing	04
2	Wireless Transmission	06
3	Medium Access Control Layer	08
4	Mobile IP	14
5	Mobile TCP	10
6	GSM	14
7	3G mobile networks	12
8	Wireless Application Protocol	08
9	Introduction to Android Operating System & Programming	04

Examiner should note that, there should not be any programming question for chapter 9. (Only theory must be asked.)

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-303: Soft Computing

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to Fuzzy Logic	22
2	Fuzzy System and Classification	18
3	Neural Network	30
4	Genetic Algorithms	10

Fuzzy Logic: 40

Neural Networks: 30

Genetic Algorithms: 10

Every question from Q.1 to Q.8 must contain at least 1 numerical.

- 6 Questions are supposed to be of the format $4 + 4 + 2$ ($4 + 3 + 3$ or $5 + 3 + 2$)
- 2 Questions are supposed to be of the format $5 + 5$
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-305: Web Services

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Web Service and SOA fundamentals	08
2	Web Services Architecture	10
3	SOAP: Simple Object Access Protocol	20
4	Describing and Discovering Web Services	22
5	Emerging trends: Cloud Computing	20

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-306: Database and System Administrator

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Client/Server Concepts	4
2	MySQL Client Program	12
3	MySQL Architecture	12
4	Starting, Stopping, and Configuring MySQL	NIL
5	Locking	4
6	Storage Engines	16
7	Data (Table) Maintenance	NIL
8	Data Backup and Recovery Methods	4
9	Introduction	4
10	Linux Installation	NIL
11	File manipulations Under Linux	16
12	Command Line Interface	NIL
13	Users and Groups	4
14	Startup/shut down	NIL
15	Basic system Administration	NIL
16	Networking	4
17	Print Services	NIL

Chapters for which weightage written as "NIL", are kept for Internal Evaluation. And, End Semester exam will have questions only from remaining chapters.

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-307: Functional Programming

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to FP & Mathematical Functions	10
2	Introduction to Lambda calculus	20
3	Reduction strategies and lazy evaluation	12
4	Introduction to Python	04
5	Basic Python	04
6	Python strings	04
7	Python tuples and sets	02
8	Python Dictionary	04
9	Functions	06
10	Working with Files and Directories	06
11	Python Classes / Objects	04
12	Python regular expressions	02
13	Python Exceptions	02

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-308: Business Intelligence

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to Business intelligence	08
2	Data warehousing	14
3	Business performance management	20
4	Data Mining for Business Intelligence	14
5	Text, and Web mining for Business intelligence	12
6	BI implementation , Integration and emerging trends	12

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

(Elective) CS 402: Parallel Computing

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to Parallel Computing	10
2	Classification	20
3	An overview of Parallel Programming Paradigms	16
4	Overview of Programming with Shared Memory	18
5	Multi-Core programming	16

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-403 Embedded System

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Introduction to ES	04
2	Embedded Processors , Memories & Peripherals	10
3	Real time system concepts	20
4	Writing software for embedded systems	12
5	Emulation and Debugging techniques	12
6	Basic design using RTOS	10
7	Real time without RTOS	12

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS-404 Software Quality Assurance

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Software quality	6
2	Pre-project SQA Components	6
3	SQA components in Project life cycle activities assessment	18
4	SQA Infrastructure Components	14
5	Software Quality Factors	8
6	Standardization	6
7	Configuration Management	6
8	Quality Improvement Technique	6
9	Quality Costs	10

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

CS 405 : Modelling and Simulation

According to the guidelines provided in the Handbook published by University of Pune, the duration of the ESE paper is 3 Hours and the paper pattern is 5 out of 8 questions where each question is of 10 marks. Thus the final paper is of 80 Marks. The division of 80 marks chapter wise is as follows

Chapter No	Name of the Chapter	Weightage in terms of marks
1	Systems modeling	04
2	Types of Simulations	08
3	Modeling and simulators	30
4	Probability	14
5	Probability in modeling	14
6	Analyzing models	10

- 6 Questions are supposed to be of the format 4 + 4 + 2 (4 +3 +3 or 5 +3 +2)
- 2 Questions are supposed to be of the format 5 +5
- The layout should be such that
 - There should not be more than one sub questions on the same unit
 - There should not be more than one question containing sub questions on the same pair of units

Syllabus for S.Y.B.Sc.(Computer Science) to be implemented from 2014-15

Important to Note about Laboratory courses: It is absolutely necessary and essential that all the practical's for Paper III and Paper IV be conducted on Free and Open Source Operating System like Linux.

- All the practical's related to C and C++ needs to be conducted using GCC compiler.
- For laboratory work/assignments of Database Systems, PostgreSQL to be used.

1) Title of the Course : B. Sc. Computer Science

S.Y.B.Sc. Computer Science Syllabus (To be implemented from Academic Year 2014-15)

2) Preamble:

B. Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

3) Introduction:

At **first year of under-graduation** basic foundation of two important skills required for software development is laid. A course in programming and a course in database fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming.

Alongwith Computer Science two theory and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.

At **second year under-graduation:** The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Databases and preliminary software engineering form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using software engineering principles to solve a real world problem.

Simultaneously two theory and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.

At **third year under-graduation:** Six theory papers in each semester and practical courses cover the entire spectrum of topics necessary to build knowledge base and requisite skill set. Third practical course also includes project work which gives students hands on experience in solving a real world problem.

Objectives:

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards
- To train students in professional skills related to Software Industry.

- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

4) Eligibility:

Higher Secondary School Certificate (10+2) Science stream or its equivalent Examination as per the University of Pune eligibility norms.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by the University of Pune. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:

First Year B. Sc. Computer Science

Subject: Computer Science

Pattern of Examination: Annual

Theory courses (CS-101): Annual

(CS-102): Annual

Practical Course (CS-103): Annual

(CS-104): Annual

Paper/ Course No.	Title	Total Number of lectures/practical's per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Computer Science Paper I (CS-101)	Problem Solving Using Computers and 'C' Programmi ng	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al of Databases	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Practical Paper I (CS-103)	Computer Science Practical Paper I	25 Practical slots of 4 lectures each	08	32	40 *

Computer Science Practical Paper II (CS-104)	Computer Science Practical Paper II	25 Practical slots of 4 lectures each	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practical)+ Grade(practical) = 300 marks +Grade
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on continuous assessment of lab work.
4. In case of Computer Science Practical Paper II, marks out of 100 will be converted to grades

Marks	Grade
75 and above	O
65 and above	A
55 and above	B
50 and above	C
45 and above	D
40 and above	E
Below 40 (indicates Failure)	F

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 ,4 and 5	4 out of 5/6– short answer type questions; answerable in 8 – 10 lines ; mix of theory and problems

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions.

Practical: Continuous assessment of Lab work and mini project.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 3 hours duration for each practical course. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-211:Data Structures using 'C'	CS-221:Object Oriented Concepts using C++
2	Computer Science Paper II	CS-212: Relational Database Management System	CS-222:Software Engineering
3	Computer Science Paper III	CS-223:Data structures Practicals and C++ Practicals	
4	Computer Science Paper IV	CS-224:Database Practicals & Mini Project using Software Engineering techniques	
5	Mathematics Paper I	MT-211:Mathematics Paper I-Sem I	MT-221:Mathematics Paper I-Sem II
6	Mathematics Paper II	MT-212:Mathematics Paper II-Sem I	MT-222:Mathematics Paper II-Sem II
7	Mathematics Paper III	MT-223:Practical Course in Mathematics	
8	Electronics Paper I	EL-211:Electronics Paper I-Sem I	EL-221:Electronics Paper I-Sem II
9	Electronics Paper II	EL-212:Electronics Paper II-Sem I	EL-222:Electronics Paper II-Sem II
10	Electronics Paper III	EL-223:Practical Course in Electronics	
11	English	EN-211:Technical English-Sem I	EN-221:Technical English – Sem II

Pattern of examination: Semester

Theory courses (Sem I: CS-211 and CS212): Semester
 (Sem II: CS-221 and CS-222): Semester
 Practical Course (CS-223 and CS-224): Annual

Paper/ Course No.	Title	Total Number of lectures/practicals Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
Theory Paper I (CS- 211)	Data Structures using 'C'	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 212)	Relational Database Management System	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper I (CS 221)	Object Oriented Concepts using C++	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Theory Paper II (CS 222)	Software Engineering	Four lectures/Week (Total 48 per Semester)	04	16	20 *
Practical paper I (CS 223) (First & Second Sem)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals/Yr.)	08	32	40 **
Practical paper II (CS 223) (First & Second Semester)	Database Practicals & Mini Project using Software Engineering techniques	Practicals of 4 lectures each 25 practicals/ Yr.)	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks
2. Total marks per year 200 (Theory) + 100 marks (practicals)+Grade(practical) = 300 marks+Grade
3. Internal marks for theory papers given on the basis of Continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-331: System Programming	CS-341: Operating System
2	Computer Science Paper II	CS-332: Theoretical Computer Science	CS-342: Compiler Construction
3	Computer Science Paper III	CS-333: Computer Networks-I	CS-343: Computer Networks-II
4	Computer Science Paper IV	CS-334: Internet Programming- I	CS-344: Internet Programming- II
5	Computer Science Paper V	CS-335: Programming in Java-I	CS-345: Programming in Java-II

6	Computer Science Paper VI	CS-336:Object Oriented Software Engineering	CS-346:Computer Graphics
7	Computer Science Paper VII	CS-347:Practicals Based on CS-331 and CS341 – Sem I &Sem II	
8	Computer Science Paper VIII	CS-348:Practicals Based on CS-335 and CS-344 – Sem I &Sem II and Computer Graphics using Java	
9	Computer Science Paper IX	CS-349:Practicals Based on CS-334 and CS-344 – Sem I &Sem II andProject	

Subject: Computer Science

Pattern of examination: Semester

Theory courses:

(Sem III: CS-331-CS-336): Semester (Sem IV: CS-341-CS-346): Semester

Practical Course:

(CS-347-CS-349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of lectures Per Semester	Standard of passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
CS-331	System Programmin g	48	4	16	20*
CS-332	Theoretical Computer Science	48	4	16	20*
CS-333	Computer Networks-I	48	4	16	20*
CS-334	Internet Programmin g- I	48	4	16	20*
CS-335	Programmin g in Java-I	48	4	16	20*
CS-336	Object Oriented Software Engineering	48	4	16	20*
SEM IV					

CS-341	Operating System	48	4	16	20*
CS-342	Compiler Construction	48	4	16	20*
CS-343	Computer Networks-II	48	4	16	20*
CS-344	Internet Programming- I	48	4	16	20*
CS-345	Programming in Java-I	48	4	16	20*
CS-346	Computer Graphics	48	4	16	20*
Practical Papers					
CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	25 practicals/ year	08	32	40 **
CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and CS-344 – Sem I & Sem II and Computer Graphics using Java	25 practicals/ year	08	32	40 **
CS 349 (Semester III & IV)	CS-349:Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	25 practicals/ year	08	32	40 **

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50×6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 questions, each of 1 marks	10 marks
Question 2 and 3	Sub-questions carrying 5 marks (2 out of 3)	10 marks each
Question 4	Sub-questions carrying marks depending on their complexity with options	10 marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: one internal assessment test + practical journals + attendance + activity.

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Certified journal is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

- i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)
- ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks out of 40 must be obtained in the University Theory Examination.)
- iii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Examination.)

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc.

While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D) Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.: For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune. Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F.Y.B.Sc.Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc.Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be English.

7) Equivalence of Previous Syllabus:

Semester & Paper	Title of Paper (Old Pattern)(Implemented from theacademic year 2009-10)	Title of Paper (New Pattern)(to be implemented from the academic year 2014-15)
Semester-I, Paper-I	CS-211, Data Structures Using C	CS-211 Data Structures using 'C'
Semester-I, Paper-II	CS- 212, Relational Database Management System	CS-212 Relational Database Management System
Semester-II, Paper-I	CS-221, Object Oriented Concepts and Programming in C++	CS-221 Object Oriented Conceptsusing C++
Semester-II, Paper-II	CS-222, Software Engineering	CS-222Software Engineering
Practical paper II (CS 223) (First & Second	CS-224: Database Assignments and Mini Project using Software Engineering	CS-224: Database Practicals & Mini Project using Software

Semester)	Techniques	Engineering techniques

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:
S.Y.B.Sc. Computer Science Paper I

CS-211: Data Structures using 'C'
CS-221: Object Oriented Concepts using C++

S.Y.B.Sc. Computer Science Paper II

CS-212: Relational Database Management System
CS-222: Software Engineering

S.Y.B.Sc. Computer Science Paper III

CS-223: Data structures Practicals and C++ Practicals

S.Y.B.Sc. Computer Science Paper IV

CS-224: Database Practicals & Mini Project using Software Engineering techniques

S.Y.B.Sc. Computer Science Theory Paper I
Semester – 1
CS 211- DATA STRUCTURES USING ‘C’
(Compulsory Course)

Total Lectures: 48

Objective:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement the different data structures
4. To efficiently implement solutions for specific problems

Prerequisites: Knowledge of C Programming Language

1. Introduction to data structures [3]

- 1.1 Concept
- 1.2 Data type, Data object, ADT
 - 1.2.1 Data Type
- 1.2.2 Data Object
 - 1.2.3 ADT -Definition, Operation, examples on rational number
- 1.3 Need of Data Structure
- 1.4 Types of Data Structure

2. Algorithm analysis [2]

- 2.1 Algorithm – definition, characteristics
- 2.2 Space complexity, time complexity
- 2.3 Asymptotic notation (Big O, Omega Ω)

3. Linear data structures [6]

- 3.1 Introduction to Arrays - array representation
- 3.2 Sorting algorithms with efficiency
 - Bubble sort, Insertion sort, Merge sort, Quick Sort
- 3.3 Searching techniques –Linear Search, Binary search

4. Linked List [8]

- 4.1 Introduction to Linked List
- 4.2 Implementation of Linked List – Static & Dynamic representation,
- 4.3 Types of Linked List
- 4.4 Operations on Linked List
 - create, display, insert, delete, reverse, search, sort, concatenate & merge
- 4.5 Applications of Linked List – polynomial manipulation
- 4.6 Generalized linked list – Concept and Representation

5. Stacks [6]

- 5.1 Introduction
- 5.2 Representation- Static & Dynamic
- 5.3 Operations
- 5.4 Application - infix to postfix, infix to prefix, postfix evaluation,
- 5.5 Simulating recursion using stack

6. Queues [4]

- 6.1 Introduction
- 6.2 Representation - Static & Dynamic
- 6.3 Operations
- 6.4 Circular queue, priority queue (with implementation)
- 6.5 Concept of doubly ended queue

7. Trees [12]

- 7.1 Concept & Terminologies
- 7.2 Binary tree, binary search tree
- 7.3 Representation – Static and Dynamic
- 7.4 Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes , non recursive inorder traversal
- 7.5 Application - Heap sort
- 7.6 Height balanced tree- AVL trees- Rotations, AVL tree examples.

8. Graph [7]

- 8.1 Concept & terminologies
- 8.2 Graph Representation – Adjacency matrix, adjacency list, inverse Adjacency list, adjacency multilist, orthogonal list
- 8.3 Traversals – BFS and DFS
- 8.4 Applications – AOV network – topological sort, AOE network – critical path

References:

1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C and C++ --- By [Yedidyah Langsam](#), [Aaron M. Tenenbaum](#), [Moshe J. Augenstein](#)
3. Introduction to Data Structures using C---By Ashok Kamthane
4. Data Structures using C --- Bandopadhyay&Dey (Pearson)
5. Data Structures using C ---By Srivastava BPB Publication.

S.Y.B.Sc. Computer Science Theory paper-II
Semester – I

CS-212-Relational Database Management System
(Compulsory Course)

Total Lectures: 48

Objective:-

- To teach fundamental concepts of RDBMS (PL/PgSQL)
- To teach principles of databases
- To teach database management operations
- To teach data security and its importance
- To teach client server architecture

Prerequisites: Knowledge of DBMS

1. Relational Database Design [14]

1.1 Preliminaries

Functional Dependencies

Basic concepts : Closure of a set of functional dependencies, Closure of attribute set, Canonical cover, Decomposition.

1.2 PL/PgSQL: Datatypes, Language structure

1.3 Controlling the program flow, conditional statements, loops

1.4 Views

1.5 Stored Functions, Stored Procedures

1.6 Handling errors and exceptions

1.7 Cursors

1.8 Triggers

2 Transaction Concepts and concurrency control [14]

2.1 Describe a transaction, properties of transaction, state of the transaction.

2.2 Executing transactions concurrently associated problem in concurrent execution.

2.3 Schedules, types of schedules, concept of Serializability, precedencegraph for Serializability.

2.4 Ensuring Serializability by locks, different lock modes, 2PL and its variations.

2.5 Basic timestamp method for concurrency, Thomas Write Rule.

2.6 Locks with multiple granularity, dynamic database concurrency (Phantom Problem).

2.7 Timestamps versus locking.

2.8 Deadlock handling methods

2.8.1 Detection and Recovery (Wait for graph).

2.8.2 Prevention algorithms (Wound-wait, Wait-die)

3 Database Integrity and Security Concepts [8]

3.1 Domain constraints

3.2 Referential Integrity

3.3 Introduction to database security concepts

3.4 Methods for database security

3.4.1 Discretionary access control method

3.4.2 Mandatory access control and role base access control for multilevel security.

3.5 Use of views in security enforcement.

3.6 Overview of encryption technique for security.

3.7 Statistical database security.

4 Crash Recovery [8]

4.1 Failure classification

4.2 Recovery concepts

4.3 Log base recovery techniques (Deferred and Immediate update)

4.4 Checkpoints

4.5 Recovery with concurrent transactions (Rollback, checkpoints, commit)

4.6 Database backup and recovery from catastrophic failure.

5. Client-Server Technology [4]

5.1 Describe client-server computing.

5.2 Evolution of Client - Server information systems.

5.3 Client – Server Architecture benefits.

5.4 Client Server Architecture

- Components, Principles, Client Components
- Communication middleware components
- Database middleware components
- Client Server Databases

References:-

1. Fundamentals of Database Systems (4th Ed) By: Elmasri and Navathe
2. Database System Concepts (4th Ed) By: Korth, Sudarshan, Silberschatz
3. Practical PostgreSQL O'REILLY
4. Beginning Databases with PostgreSQL, From Novice to Professional, 2nd Edition By Richard Stones , Neil Matthew, Apress

CS-223 : Data structures Practicals and C++ Practicals (semester 1)

Objective:-

1. Design and implement Data structures and related algorithms
2. Understand several ways of solving the same problem.

S.Y.B.Sc.(Computer Science) : Paper III : Data Structures using C Assignments

No	Topic	Lectures
1	Sorting Algorithms – Bubble sort, Insertion	4
2	Recursive Sorting Algorithms – Quick sort , Merge Sort	4
3	Searching Method-Linear search, Binary search	4
4	Static/Dynamic stack implementation, infix to postfix, infix to prefix and evaluation of Postfix.	8
5	Static and Dynamic Queue Implementation – Linear Queue, Circular queue	8
6	Dynamic implementation of Singly Linked List, Doubly Linked List and Circular Linked List.	8
7	Polynomial addition (Using Linked list).	4
8	Binary Search Tree Traversal: Create, add, delete, and display nodes.	8
9	Adjacency matrix to adjacency list conversion, in degree, out degree	4
10	Graph: DFS, BFS.	4

CS-224:Database Practicals & Mini Project using Software Engineering techniques (Semester 1)

Title: Database Assignments and Mini Project using Software Engineering techniques

Objective:-

- o Understanding the use of cursors, triggers, views and stored procedures
- o Understanding the steps of system analysis and design
- o Understanding Data requirements for a specific problem domain
- o Designing Data base as per the Data requirements
- o Designing queries as per the functional requirements

No	Topic	Lectures
1	Simple Queries	4
2	Nested Queries, using aggregate functions	4
3	Queries using Views	8
4	Queries using loops and conditional statements	8
5	Stored Function	12
6	Exception Handling	4
7	Cursors and Triggers	12

S.Y.B.Sc. Computer Science Theory Paper I
Semester II
CS 221 -Object Oriented Concepts using C++

Total Lectures: 48

Objective:-

1. Acquire an understanding of basic object oriented concepts and the issues involved in effective class design
2. Write C++ programs that use object oriented concepts such as information hiding, constructors, destructors, inheritance etc.

Prerequisites: Knowledge of C Programming Language

1. Object oriented concepts [2]

- 1.1 Object oriented concepts
- 1.2 Features, advantages and Applications of OOPS

2. Introduction to C++ [6]

- 2.1 Data types, new operators and keywords, using namespace concept
- 2.2 Simple C++ Program
- 2.3 Introduction to Reference variables
- 2.4 Usage of 'this' pointer
- 2.5 Classes and Objects
- 2.6 Access specifiers
- 2.7 Defining Data members and Member functions
- 2.8 Array of objects

3. Function in C++ [8]

- 3.1 Call by reference, Return by reference
- 3.2 Function overloading and default arguments
- 3.3 Inline function
- 3.4 Static class members
- 3.5 Friend Concept – Function, Class

4. Constructors and destructor [4]

- 4.1 Types of constructors
- 4.2 Memory allocation (new and delete)
- 4.3 Destructor

5. Operator overloading [4]

- 5.1 Overloading Unary and Binary operators
- 5.2 Overloading using friend function
- 5.3 Type casting and Type conversion

6. Inheritance [8]

- 6.1 Types of inheritance with examples
- 6.2 Constructors and destructor in derived classes
- 6.3 Virtual base classes, Virtual functions and Pure virtual function
- 6.4 Abstract base classes

7. Managing Input and Output using C++ [4]

- 7.1 Managing console I/O
- 7.2 C++ stream classes
- 7.3 Formatted and unformatted console I/O
- 7.4 Usage of manipulators

8. Working with files [6]

- 8.1 File operations – Text files, Binary files
- 8.2 File stream class and methods
- 8.3 File updation with random access
- 8.4 Overloading insertion and extraction operator

9. Templates [4]

- 9.1 Introduction to templates
- 9.2 Class templates, function templates and overloading of function templates
- 9.3 Templates with multiple parameters

10. Exception Handling in C++ [2]

- 10.1 try, catch and throw primitives

Reference Books: -

- 1. Object Oriented Programming with C++ by Robert Lafore
- 2. Object Oriented Programming with C++ by E. Balagurusamy
- 3. Object Oriented Modeling and Design by James Rumbough
- 4. The Complete Reference C++ by Herbert Schildt
- 5. Let us C++ by – YashwantKanitkar
- 6. Mastering C++ by Venugopal, T Ravishankar, RajkumarTHM Pub.
- 7. Trouble free C++ by HarimohanPande, ANE publication

S.Y.B.Sc.Computer Science Theory paper-II

Semester – II

CS - 222: Software Engineering

Total Lectures : 48

Objectives:-

- To teach basics of System Analysis and Design.
- To teach principles of Software Engineering
- To teach various process models used in practice
- To know about the system engineering and requirement engineering
- To build analysis model

Prerequisites: Basic knowledge of DBMS

1. System Concepts [5] (R1 : Chapter 1 & R3 : Chapter 1)

1.1 System Definition

1.2 Characteristics of a System : Organization, Subsystem, Interaction, Interdependence, Integration, Central objective, Standards, Black-box

1.3 Elements of a system : Outputs, Inputs, Processor(s), Control, Feedback, Environment, Boundaries, Interface.

1.4 Types of Systems : Physical & Abstract Systems, Open & Closed Systems, Computer-based Systems (MIS : Management Information System & DSS : Decision Support System)

2. Software and Software Engineering [5] (R2 : Chapter 1)

2.1 The Nature of Software

2.1.1 Defining Software

2.1.2 Software Application Domains

2.1.3 Legacy Software

2.2 Software Engineering

2.3 The Software Process

2.4 Software Engineering Practice

2.4.1 The Essence of Practice

2.4.2 General Principles

2.5 Software Myths

3. System Development Life Cycle (SDLC) [8] (R3 : Chapter 1)

3.1 Introduction

3.2 Activities of SDLC

3.2.1 Preliminary Investigation (Request Clarification, Feasibility Study, Request Approval)

3.2.2 Determination of System Requirements

3.2.3 Design of System

3.2.4 Development of Software

3.2.5 System Testing (Unit Testing, Integration testing, System Testing)

3.2.6 System Implementation & Evaluation

3.2.7 System Maintenance

4. Process Models [6] (R2 : Chapter 2)

4.1 A Generic Process Model

4.2 Prescriptive Process Models

4.2.1 The Waterfall Model

4.2.2 Incremental Process Models

4.2.3 Evolutionary Process Models

4.2.3.1 Prototyping

4.2.3.2 Spiral Model

4.2.4 Concurrent Models

5. Requirements Engineering [8] (R2 : Chapter 5)

5.1 Introduction

5.2 Requirements Engineering Tasks

- 5.2.1 Inception
- 5.2.2 Elicitation
- 5.2.3 Elaboration
- 5.2.4 Negotiation
- 5.2.5 Specification
- 5.2.6 Validation
- 5.2.7 Requirements Management
- 5.3 Initiating the Requirements Engineering Process
 - 5.3.1 Identifying the Stakeholders
 - 5.3.2 Recognizing Multiple Viewpoints
 - 5.3.3 Working toward Collaboration
- 5.4 Fact Finding Techniques (R3 : Chapter 3)
 - 5.4.1 Interview
 - 5.4.2 Questionnaire
 - 5.4.3 Record Review
 - 5.4.4 Observation
- 6. Structured Analysis Development Strategy [10] (R3 : Chapter 4)
 - 6.1 Structured Analysis
 - 6.1.1 What is Structured Analysis?
 - 6.1.2 Components of Structured Analysis
 - 6.1.3 What is Data Flow Analysis?
 - 6.2 Features & Tools of Data Flow Analysis
 - 6.2.1 Logical Data Flow Diagram (Logical DFD)
 - 6.2.1.1 Notations
 - 6.2.1.2 Drawing a Context Diagram
 - 6.2.1.3 Exploding A Context diagram into Greater detail (1st level, 2nd Level DFD etc...)

6.2.1.4 Evaluating Data Flow Diagram for Correctness

6.2.2 A Data Dictionary

6.2.2.1 What is a Data Dictionary?

6.2.2.2 Why is a Data Dictionary Important?

6.2.2.3 What does a Data Dictionary Record?

7. An Agile View of Process [6] (R2 : Chapter 3)

7.1 What is an Agility?

7.2 What is an Agile Process?

7.2.1 The Politics of Agile Development

7.2.2 Human Factors

7.3 Agile Process Models

7.3.1 Extreme Programming (XP)

7.3.2 Adaptive Software Development (ASD)

7.3.3 Dynamic Systems Development Method (DSDM)

Reference Books :

R1 : System Analysis and Design (Second Edition) by Elias M. Awad, Galgotia Publications Pvt. Ltd.

R2 : Software Engineering : A Practitioner's Approach (Seventh Edition) by Roger S. Pressman, McGraw Hill International Edition.

R3 : Analysis and Design of Information Systems (Second Edition) by James A. Senn, McGraw Hill International Editions.

CS-223 : Data structures Practicals and C++ Practicals (semester 2)

C++ Lab Assignments

1	Class , Object and methods implementation	4
2	Constructor: Copy Constructor, Default Constructor, Parameterized Constructor	4
3	Memory Allocation: new and delete operators , dynamic constructor	4
4	Inline function, friend function, default argument,	4
5	Function Overloading.	4
6	Operator overloading.	8
7	Inheritance: Single, multiple, multilevel, hierarchy, Constructor and destructor in derived class	12
8	File Handling: Updation of files using random access	4

**CS-224: Database Practicals & Mini Project using Software
Engineering techniques
(Semester 2)**

No	Topic	Lectures
1	Problem definition , scope	8
2	Feasibility study	4
3	Gathering Data Requirements and Functional Requirement	12
4	ERD	4
5	Designing the normalized Database	8
6	Designing queries related to Functional requirements	12

University of Pune
S.Y.B.Sc.(Computer Science) Practical Examination
Lab Course I
(Data Structures Using C & Object Oriented Programming Concepts Using C++)

Duration: 3 hours

Max. Marks: 80

Q 1. Data Structures using C

1. Simple program based on searching / sorting / ADT of Stack, Queue, operations on linked list [15]
2. Program based on applications of stack/queue/linked list, trees / graph [25]

OR

3. Program based on case study involving multiple data structures [40]

Q 2. Object Oriented Concepts and Programming in C++

1. Program based on different concepts in C++ [30]

OR

2. Program based on different concepts in C++ [30]
3. Viva [10]

University of Pune
(Pattern – 2013) w.e.f. 2014 – 15

B.C.A. Semester III

Subject Name-: RDBMS (Relational Database Management System)

Course Code-: 301

Objectives:

1. Enables students to understand relational database concepts and transaction management concepts in database system.
2. Enables student to write PL/SQL programs that use: procedure, function, package, cursor and trigger.

Unit	Topic	No. of Lectures	Ref. Book
Unit 1	Introduction To RDBMS 1.1 Introduction to popular RDBMS product and their features 1.2 Difference Between DBMS and RDBMS 1.3 Relationship among application programs and RDBMS	2	1
Unit 2	PLSQL 2.1 Overview of PLSQL 2.2 Data Types 2.3 PLSQL Block 2.3.1 % type, % rowtype 2.3.2 Operators, Functions, comparison, numeric, character, date 2.3.3 Control Statement 2.4 Exception Handling 2.4.1 Predefined 2.4.2 User defined exceptions 2.5 Functions , Procedures 2.6 Cursor 2.6.1 Definition 2.6.2 Types of cursor- implicit, explicit (attributes) 2.6.3 Parameterized cursor 2.7 Trigger 2.8 Package	20	4
Unit 3	Transaction Management 3.1 Transaction Concept 3.2 Transaction Properties 3.3 Transaction States 3.4 Concurrent Execution 3.5 Serializability 3.5.1 Conflict Serializability 3.5.2 View Serializability 3.6 Recoverability	10	1,2,3

	3.6.1 Recoverable Schedule 3.6.2 Cascadless Schedule		
Unit 4	Concurrency Control 4.1 Lock Based Protocol 4.1.1 Locks 4.1.2 Granting of Locks 4.1.3 Two Phase Locking Protocol 4.2 Timestamp Based Protocol 4.2.1 Timestamp 4.2.2 Timestamp ordering protocol 4.2.3 Thomas's Write Rule 4.3 Validation Based Protocol 4.4 Deadlock Handling 4.4.1 Deadlock Prevention 4.4.2 Deadlock Detection 4.4.3 Deadlock Recovery	8	1,2,3
Unit 5	Recovery System 5.1 Failure Classification 5.1.1 Transaction Failure 5.1.2 System Crash 5.1.3 Disk Failure 5.2 Storage Structures 5.2.1 Storage Types 5.2.2 Data Access 5.3 Recovery & Atomicity 5.3.1 Log based Recovery 5.3.2 Deferred Database Modification 5.3.3 Immediate Database Modification 5.3.4 Checkpoints 5.4 Recovery with Concurrent Transaction 5.4.1 Transaction Rollback 5.4.2 Restart Recovery 5.5 Remote Backup System	8	1,2,3
Total No. of Lectures		48	

Recommended Books :

- 1) Database System Concepts 5th Edition - Silberschatz, Korth, Sudershan.
- 2) Database Management System - Bipin Desai
- 3) An Introduction to Database Systems Eighth Edition C. J.Date, A.Kannan,
S.Swamynathan
- 4) SQL/PLSQL the programming language of oracle - Ivan Bayross

B.C.A. Semester III

Subject Name -: Data Structure Using C

Course Code -:302

Objective:-

1. To understand different methods of organising large amounts of data
2. To efficiently implement different data structure
3. To efficiently implement solution for different problems
4. To get more knowledge on C programming language

Unit	Topic	No. of Lectures	Reference Books
Unit 1	Basic Concept and Introduction to Data Structure 1.1 Pointers and dynamic memory allocation 1.2 Algorithm-Definition and characteristics 1.3 Algorithm Analysis -Space Complexity -Time Complexity -Asymptotic Notation Introduction to Data structure 1.5 Types of Data structure 1.6 Abstract Data Types (ADT) Introduction to Arrays and Structure 1.7 Types of array and Representation of array 1.8 Polynomial - Polynomial Representation - Evaluation of Polynomial - Addition of Polynomial 1.9 Self Referential Structure	9	1,2
Unit 2	Searching and Sorting Techniques	9	1,2,3

	2.1 Linear Search 2.2 Binary Search(Recursive , Non-Recursive) 2.3 Bubble Sort 2.4 Insertion Sort 2.5 Selection Sort 2.6 Quick Sort 2.7 Heap Sort (No Implementation) 2.8 Merge Sort 2.9 Analysis of all Sorting Techniques		
Unit 3	Linked List 3.1 Introduction 3.2 Static & Dynamic Representation 3.3 Types of linked List - Singly Linked list(All type of operation) - Doubly Linked list (Create , Display) - Circularly Singly Linked list (Create, Display) 3.4 Circularly Doubly Linked list (Create, Display)	10	1,3
Unit 4	Stack and Queue 4.1 Introduction stack 4.2 Static and Dynamic Representation 4.3 Primitive Operations on stack 4.4 Application of Stack 4.5 Evaluation of postfix and prefix expression 4.6 Conversion of expressions- Infix to prefix & Infix to postfix Queue 4.7 Introduction queue 4.8 Static and Dynamic Representation 4.9 Primitive Operations on Queue	9	1,2,3

	4.10 Application of Queue 4.11 Type of Queue Circular Queue De Queue Priority Queue		
Unit 5	Trees 5.1 Introduction & Definitions 5.2 Terminology 5.3 Static and Dynamic Representation 5.4 Types of tree 5.5 Operations on Binary Tree & Binary Search Tree 5.6 Tree Traversal Inorder, Preorder, Postorder (Recursive & Iterative) 5.7. AVL Tree	7	1,2
Unit 6	Graphs 6.1 Representation -Adjacency Matrix -List 6.2 In degree , out degree of graph 6.3 Graph operation DFS , BFS 6.4 Spanning Tree	4	1,2,3
	Total No. of Lectures	48	

Recommended Books:-

1. Fundamentals of data structures – Ellis Horowitz and Sartaj Sahni
2. Data Structure Using C - Radhakrishanan and Shrivastav.
3. Data Structure Using C and C++ - Rajesh K. Shukla ,Wiley -India
4. Data Structures Files and Algorithms – Abhay K. Abhyankar
5. Data Structures and Algorithms – Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman (Pearson Education)

B.C.A.Semester III

Subject Name -: Introduction to Operating System
Course Code -: 303

Objective -:

1. To know system programming
2. To know services provided by operating system
3. To know the Scheduling concepts

Unit	Topic	No. of Lect.	Reference Books
Unit 1	Introduction to Operating System 1.1 What is operating system 1.2 Computer system architecture 1.3 Services provided by OS 1.4 Types of OS	02	Book 1,2
Unit 2	System Structure 2.1 User operating system Interface 2.2 System Calls 2.3 Process or job control 2.4 Device Management 2.5 File Management 2.6 System Program 2.7 Operating System Structure	02	Book 2
Unit 3	Process Management 3.1 What is Process 3.2 Process State 3.3 Process Control Block 3.4 Context Switch 3.5 Operation on Process Process Creation Process Termination	03	Book 2
Unit 4	CPU Scheduling 4.1 What is scheduling 4.2 Scheduling Concepts 4.2.1 CPU- I/O Burst Cycle 4.2.2 CPU Scheduler 4.2.3 Preemptive and Non-preemptive scheduling 4.2.4 Dispatcher 4.3 Scheduling criteria (Terminologies used in scheduling) 4.4 Scheduling Algorithms 4.4.1 FCFS 4.4.2 SJF (Preemptive & non-preemptive) 4.4.3 Priority Scheduling (Preemptive & Non-preemptive) 4.4.4 Round Robin Scheduling 4.5 Multilevel Queues	08	Book 2

	4.6 Multilevel Feedback queues		
Unit 5	Process Synchronization 5.1 Introduction 5.2 Critical section problem 5.3 Semaphores 5.3.1 Concept 5.3.2 Implementation 5.3.3 Deadlock & Starvation 5.3.4 Binary Semaphores 5.4 Critical Sections 5.5 Classical Problems of synchronization 5.6 Bounded buffer problem 5.7 Readers & writers problem 5.8 Dining Philosophers problem	06	Book 2
Unit 6	Deadlock 6.1 Introduction 6.2 Deadlock Characterization 6.3 Necessary Condition 6.4 Resource allocation graph 6.5 Deadlock Prevention 6.6 Deadlock Avoidance Safe State Resource allocation graph algorithm Bankers algorithm 6.7 Deadlock Detection 6.8 Recovery from deadlock Process Termination Resource Preemption	07	Book 2
Unit 7	Memory Management 7.1 Introduction to memory management 7.2 Address Binding 7.3 Dynamic Loading 7.4 Dynamic Linking 7.5 Overlays 7.6 Logical vs. physical addresses 7.7 Swapping 7.8 Contiguous memory allocation 7.8.1 Single Partition Allocation 7.8.2 Multiple Partition Allocation 7.8.3 External and Internal Fragmentation 7.9 Paging 7.10 Segmentation 7.11 Segmentation with paging 7.12 Virtual memory 7.13 Demand paging 7.14 Page replacement algorithms FIFO MRU	08	Book 2

	LRU LRU approximation using reference bit MFU LFU Second Chance algorithm Optimal replacement		
Unit 8	File System 8.1 Introduction & File concepts (file attributes, Operations on files) 8.2 Access methods Sequential access Direct access 8.3 File structure Allocation methods Contiguous allocation Linked Allocation Indexed Allocation 8.4 Free Space Management Bit Vector Linked List Grouping Counting	07	Book 2
Unit 9	I/O System 9.1 Introduction 9.2 I/O Hardware 9.3 Application of I/O Interface 9.4 Kernel I/O Subsystem 9.5 Disk Scheduling FCFS Shortest Seek time first SCAN C- SCAN C- Look	05	Book 2
	Total No. of Lectures	48	

Recommended Books

1. System Programming and Operating System – D. M. Dhamdhere
2. Operating System Concepts – Silberschatz, Galvin, Gagne

BCA Semester-III
Subject Name: - Business Mathematics
Course Code: - 304

Unit No	Topic	No of Lectures
Unit 1	Ratio, Proportion and Percentage Ratio- Definition, Continued Ratio, Inverse Ratio, Proportion, Continued Proportion, Direct Proportion, Inverse Proportion, Variation, Inverse Variation, Joint Variation, Percentage- Meaning and Computations of Percentages.	08
Unit 2	Profit And Loss Terms and Formulae, Trade discount, Cash discount, Problems involving cost price, Selling Price, Trade discount and Cash Discount. Introduction to Commission and brokerage, Problems on Commission and brokerage.	08
Unit 3	Interest Simple Interest, Compound interest (reducing balance & Flat Interest rate of interest), Equated Monthly Installments(EMI), Problems	06
Unit 4	Matrices And Determinants (upto order 3 only) Multivariable data, Definition of a Matrix, Types of Matrices, Algebra of Matrices, Determinants, Ad joint of a Matrix, Inverse of a Matrix via ad joint Matrix, Homogeneous System of Linear equations, Condition for Uniqueness for the homogeneous system, Solution of Non-homogeneous System of Linear equations (not more than three variables). Condition for existence and uniqueness of solution, Solution using inverse of the coefficient matrix, Problems.	14
Unit 5	Linear Programming problem (L.P.P.) Meaning of LPP, Formulation of LPP, and solution by graphical methods.	04
Unit 6	Transportation problem (T.P.) Statement and meaning of T.P. methods of finding initial basic feasible solution by North West corner Rule, Matrix Minimum method and Vogel's approximation method. Simple numerical problems (concept of degeneracy is not expected).	08
	Total no of lectures	48

Reference Books:

- 1) Business Mathematics by Dr. Amarnath Dikshit & Dr. Jinendra Kumar Jain.
- 2) Business Mathematics by V. K. Kapoor - Sultan chand & sons, Delhi
- 3) Business Mathematics by Bari - New Literature publishing company, Mumbai
- 4) Operations Research by Dr. S. D. Sharma – Sultan Chand & Sons.
- 5) Operations Research by Dr. J. K. Sharma – Sultan Chand & Sons.

B.C.A. Semester III

Subject Name:- Software Engineering

Course Code:- 305

Course Objective: This course enables students to understand system concepts and its application in Software development.

Unit	Name of the Topic	Number of lecturer	Reference Book
Unit 1	Introduction to System Concepts 1.1 Definition , Elements of System 1.2 Characteristics of System 1.3 Types of System 1.4 System Concepts	6	Book1
Unit 2	Requirement Analysis 2.1 Definition of System Analysis 2.2 Requirement Anticipation 2.3 Knowledge and Qualities of System Analyst 2.4 Role of a System Analyst 2.5 Feasibility Study And It's Types 2.6 Fact Gathering Techniques 2.7 SRS(System Requirement Specification)	8	Book1
Unit 3	Introduction to Software Engineering 3.1 Definition Need for software Engineering 3.2 Software Characteristics 3.3 Software Qualities (McCall's Quality Factors	6	Book2
Unit 4	Software Development Methodologies 4.1 SDLC (System Development Life Cycle) 4.2 Waterfall Model 4.3 Spiral Model 4.4 Prototyping Model 4.5 RAD MODEL	6	Book2
Unit 5	Analysis and Design Tools 5.1 Entity-Relationship Diagrams 5.2 Decision Tree and Decision Table 5.3 Data Flow Diagrams (DFD) 5.4 Data Dictionary 5.4.1 Elements of DD 5.4.2 Advantage of DD 5.5 Pseudo code 5.6 Input And Output Design 5.7 CASE STUDIES (Based on Above Topic)	10	Book1, Book2

Unit 6	Structured System Design 6.1 Modules Concepts and Types of Modules 6.2 Structured Chart 6.3 Qualities of Good Design 6.3.1 Coupling, Types of Coupling 6.3.2 Cohesion, Types of Cohesion	6	Book1 and Book2
Unit 7	Software Testing 7.1 Definition, Test characteristics 7.2 Types of testing 7.2.1 Black-Box Testing 7.2.2 White-Box Testing 7.2.3 Unit testing 7.2.4 Integration testing 7.3 Validation 7.4 Verification	6	Book1 and Book2
	Total No. of Lectures	48	

Recommended Books :

- 1) Software Engineering - Roger s. Pressman.
- 2) SADSE (System Analysis Design) - Prof. Khalkar and Prof. Parthasarathy.

B.C.A. Semester IV
Subject Name:- Object Oriented Programming Using C++
Course Code:- 401

Objectives:

1. Acquire an understanding of basic object-oriented concepts and the issues involved in effective class design.
2. Enables student to write C++ programs that use: object-oriented concepts such as information hiding, constructors, destructors, inheritance.

Unit	Topic	No. of Lectures	Ref. Book
Unit 1	Introduction to C++ 1.1 Basic concepts of OOP, benefits, applications of OOP 1.2 A simple C++ program 1.3 Structure of C++ program 1.4 Creating a source file, compiling and Linking	2	1
Unit 2	Tokens, Expressions and Control structures 2.1 Introduction 2.2 Tokens, keywords, Identifiers and constants 2.3 Data types - Basic, User defined and Derived 2.4 Symbolic constant 2.5 Type Compatibility 2.6 Variables - Declaration and Dynamic initialization 2.7 Reference variable 2.8 Operators in C++ 2.8.1 Scope resolution operator 2.8.2.Member Referencing operators 2.8.3Memory management operators 2.8.4 Manipulators 2.8.5 Type cast operators 2.9 Expression and their types 2.10 Special Assignment Expressions 2.11 Implicit conversions 2.12 Operator overloading introduction 2.13 Operator precedence 2.14 Control structures – if-else, do-while, for , switch	3	1,2,3
Unit 3	Functions in C++ 3.1 Introduction 3.2 The main function 3.3 Function prototyping 3.4 Call by reference 3.5 Return by reference 3.6 Inline function – Making an outside function Inline 3.7 Arguments - default, constant 3.8 Math library functions	5	1,2,3

Unit 4	Classes and Objects 4.1 Introduction 4.2 Creating a class and objects 4.3 Defining member functions inside and outside class definition 4.4 Nesting of member functions 4.5 Private member functions 4.6 Arrays within a class 4.7 Memory allocation of objects 4.8 Static data members and static member functions 4.9 Array of objects 4.10 Objects as function arguments 4.11 Friend functions 4.12 Returning objects 4.13 Constructors 4.14 Types of constructor 4.15 Destructors	10	1,2
Unit 5	Inheritance 5.1 Introduction 5.2 Base class and derived class examples 5.3 Types of Inheritance 5.4 Virtual base class 5.5 Abstract class 5.6 Constructors in derived class	9	1,2
Unit 6	Polymorphism 6.1 Compile Time Polymorphism 6.1.1 Function overloading 6.1.2 Operator Overloading Introduction 6.1.3 Overloading unary and binary operator 6.1.4 Overloading using friend function 6.1.5 Overloading insertion and extraction operators 6.1.6 String manipulation using operator overloading 6.2 Runtime Polymorphism 6.2.1 this Pointer, pointers to objects, pointer to derived classes 6.2.2 Virtual functions and pure virtual functions	8	1,2
Unit 7	Managing console I/O operations 7.1 Introduction 7.2 C++ streams and C++ stream classes 7.3 Unformatted I/O operations 7.4 Formatted console I/O operations 7.5 Managing output with manipulators	3	1,2
Unit 8	Working with Files 8.1 Classes for File Stream operations 8.2 File operations - Opening, Closing and updating 8.3 Error handling during File operations 8.4 Command Line arguments	5	1
Unit 9	Templates 9.1 Introduction 9.2 Class Templates	3	1

	9.3 Function Templates 9.4 Exception Handling(Introduction)		
	Total No. of Lectures	48	

Recommended Books :

- 1) Object oriented programming with C++ - by E Balagurusamy
- 2) Object Oriented Programming with C++ by Robert Lafore
- 3) Object Oriented Programming in C++ by Dr. G. T. Thampi, Dr. S. S. Mantha,
DreamTech Press

B.C.A. Semester IV

Subject Name: Programming in Visual Basic

Course Code: 402

Objectives:-

To learn properties and events, methods of controls and how to handle events of different controls. To understand the use of active controls and how to design VB application
To learn connectivity between VB and databases.

Unit No	Topic	No. of Lectures	Ref .Book
Unit 1	<u>Getting started with V. B.</u> 1.1 Object Oriented Concept 1.2 Event Driven Programming Language 1.3 Working with properties 1.3.1 Studying the Events of a Form 1.3.2 Working code for events 1.3.3 Planning the Design	4	1,3
Unit 2	<u>Constants, Variables , Operators, Control Structure, Looping & Array</u> 2.1 Constant 2.2 Data Types 2.2.1 Number , long , Boolean , doubles , variant, String 2.2.2 User defined data types 2.3 Variables 2.4 Operators 2.5 Control Structures 2.5.1 If 2.5.2 If....Else 2.5.3 Nested If....Else 2.5.4 Select Case 2.6 Looping 2.6.1 Do Loop 2.6.2 While Loop 2.6.3 Until Loop 2.6.4 For Loop 2.6.5 With Statement 2.7 Array 2.7.1 Single Dimensional Array 2.7.2 Multidimensional Array 2.7.3 Control Array 2.8 Functions(Built in and user defined)	10	1,2,3
Unit 3	<u>Working with Controls</u> 4.1 Adding controls on form 4.2 Working with Properties and Methods of each Controls 4.3 Creating an application 4.4 Creating MDI application	10	

	4.4.1 Working with Multiple Forms 4.4.2 Loading, Showing & Hiding Forms 4.4.3 Setting the Startup form 4.4.4 Creating forms in Code 4.4.5 Using the MDI 4.4.6 Arranging MDI Child Window 4.4.7 Opening new MDI child window 4.4.8 Creating Properties in a form 4.4.9 Creating a method in a form		2,3
Unit 4	<u>Working with ActiveX Controls & Menus</u> 4.1 Creating Status Bar For your program 4.2 Working with Progress Bar 4.3 Working with Toolbar 4.4 Setting up the Image List Controls 4.4.1 Adding and Deleting Images with code 4.4.2 Study of Different Dialog Boxes 4.5 Menus 4.5.1 Creating new Menu Item 4.5.2 Modifying & Deleting Menu Item 4.5.3 Adding Access Characters 4.5.4 Adding Shortcut Keys 4.5.5 Creating Sub Menus 4.6 Pop-up Menus 4.6.1 Creating pop-up menu 4.6.2 Displaying pop-up menu 4.7 Adding & Deleting Menus At Run-time 4.8 Adding Menu Items for MDI Child Form	12	1,2,3
Unit 5	<u>Working With Database</u> 5.1 Data Control 5.1.1 Studying the Properties and methods of Data Control 5.1.2 Connectivity with MS-Access 5.1.3 Operations of database through coding 5.2 ADO Data Control 5.2.1 Advantages of ADODC over DC 5.2.2 Studying the properties and Methods of ADODC 5.2.3 Connectivity with MS-Access 5.2.4 Connectivity with Oracle 5.2.5 Report Generation 5.3 Developing ADO application through ADODC and coding 5.4 Report Generation	12	2,3
	Total No. of Lectures	48	

Recommended Books :

- 1) Mastering Visual Basic
- 2) Visual Basic Black Book
- 3) Learn VB in 21 days

B. C. A. Semester IV

Subject Name : Computer Networking

Course Code :- 403

Objective :-

1. To know about computer network.
2. To understand different topologies used in networking
3. To learn different types of network.
4. To understanding the use of connecting device used in network.

Unit No.	Topic	No. of Lectures	Ref. Books
Unit 1	Basics of Computer Networks 1.1 Computer Network 1.1.1 Definition 1.1.2 Goals 1.1.3 Applications 1.1.4 Structure 1.1.5 Components 1.2 Topology 1.2.1 Bus 1.2.2 Star 1.2.3 Ring 1.2.4 Mesh 1.3 Types of Networks 1.3.1 LAN, MAN, WAN, Internet 1.3.2 Broadcast & Point-To-Point Networks 1.4 Communication Types 1.4.1 Serial 1.4.2 Parallel 1.5 Modes of Communication : 1.5.1 Simplex 1.5.2 Half Duplex 1.5.3 Full Duplex 1.6 Server Based LANs & Peer-to-Peer LANs 1.6.1 Comparison of both 1.7 Protocols and Standards	8	1,2,3
Unit 2	Network Models 2.1 Design issues of the layer 2.2 Protocol Hierarchy 2.3 ISO-OSI Reference Model : 2.3.1 Layers in the OSI Model 2.3.2 Functions of each layer 2.4 Terminology 2.4.1 SAP 2.4.2 Connection Oriented services 2.4.3 connectionless services	8	1,2,3

	2.4.4 Peer Entities 2.5 Internet Model (TCP/IP) 2.6 Comparison of ISO-OSI & TCP/IP Model 2.7 Addressing 2.7.1 Physical Addresses 2.7.2 Logical Addresses 2.7.3 Port Addresses 2.8 IP Addressing 2.8.1 Classful addressing 2.8.2 Classless addressing		
Unit 3	Transmission Media 3.1 Guided Media(Wired) : 3.1.1 Coaxial Cable:- Physical Structure, Standards, BNC Connector, Applications 3.1.2 Twisted Pair :- Physical Structure, UTP vs STP, Connectors, Applications 3.1.3 Fiber Optics Cable :- Physical Structure, Propagation Modes (Single Mode & Multimode), Connectors, Applications 3.2 Unguided Media(Wireless) 3.2.1 Electromagnetic Spectrum For Wireless Communication 3.2.2 Propagation Methods 3.2.2.1 Ground, 3.2.2.2 Sky, 3.2.2.3 Line-Of-Sight 3.3.3 Wireless Transmission 3.3.3.1 Radio Waves 3.3.3.2 Infra-Red, 3.3.3.3 Micro-Wave	10	1,2,3
Unit 4	Wired and Wireless LANs 4.1 IEEE Standards 4.2 Standard Ethernet 4.2.1 MAC Sublayer 4.2.2 Physical layer 4.3 Fast Ethernet 4.3.1 MAC Sublayer 4.3.2 Physical layer 4.4 Gigabit Ethernet 4.4.1 MAC Sublayer 4.4.2 Physical layer 4.5 Network Interface Cards(NIC) 4.5.1 Components of NIC 4.5.2 Functions of NIC 4.5.3 Types of NIC 4.6 Wireless LAN 4.6.1 IEEE802.11 Architecture 4.6.2 MAC Sub layer 4.6.3 Frame Format	10	1,2,3

	4.6.4 Frame Types 4.6.5 Addressing Mechanism 4.6.6 Bluetooth (Architecture, Piconet and Scatternet, Applications)		
Unit 5	Network Connectivity Devices 5.1 Categories of Connectivity Devices 5.1.1 Passive & Active Hubs 5.1.2 Repeaters 5.1.3 Bridges 5.1.3.1 Transparent Bridges(Loop Problem, Spanning Tree) 5.1.3.2 Source Routing Bridges 5.1.4 Switches 5.1.5 Router 5.1.6 Gateways 5.2 Network Security Devices 5.2.1 Firewalls 5.2.1.1 Packet-Filter firewall 5.2.1.2 Proxy firewall	6	1,2,3
Unit 6	Internet Basics 6.1 Concept of Intranet & Extranet 6.2 Internet Information Server(IIS) 6.3 Web Server 6.4 World Wide Web(WWW) 6.4.1 Architecture, 6.4.2 Web Documents :- static, dynamic and active documents 6.5 Search Engines 6.6 Internet Service Providers(ISP) 6.7 HTTP 6.7.1 HTTP Transaction 6.7.2 Persistent and non persistent connection	6	2,3
Total No. of Lectures		48	

Recommended Books :

- 1) Computer Networks - Andrew Tanenbaum (III Edition)
- 2) Data Communications & Networking - Behrouz Ferouzan (III Edition)
- 3) Complete Guide to Networking - Peter Norton

B.C.A. Semester IV

Subject Name :- Enterprise Resource Planning and Management.

Course Code :-404

Objectives :-

1. To know what is ERP.
2. To learn different ERP technologies.

Unit No.	Topic	No. of Lect.	Reference Books
Unit 1	ERP : An Overview 1.1. What is ERP. 1.2. Reasons for Growth Of ERP 1.3. Problem areas in ERP implementations. 1.4. The future of ERP 1.5. Characteristics and features of ERP 1.6. Benefits of ERP.	04	1,2
Unit 2	Enterprise Modeling and Integration for ERP 2.1.Enterprise-An overview 2.2.What is enterprise 2.3.Integrated Management Information 2.4.The role of enterprise 2.5.Business modeling 2.6.Integrated Data Model 2.7.Role of Common/Shared Enterprise Database 2.8.Linkages of the Enterprise 2.8.1.Establishing Customer-Enterprise Link 2.8.2.Establishing Vendor-Enterprise Link 2.8.3.Establishing Links within the Enterprise 2.8.4.Establishing Links with Environment 2.9. Scope of Enterprise system 2.10.Generic Model of ERP System 2.11.Client/Server Architecture and Enterprise – wide Computing 2.11.1. Characteristics of client/Server Architecture 2.11.2. Different Components of ERP Client/Server Architecture	08	1,2
Unit 3	ERP And related Technologies 3.1.BPR(Business Process reengineering) 3.1.1.Definition 3.2.BPR –The different phases 3.3.Enterprise Redesign Principles 3.4.BPR and IT 3.5.Data Warehousing 3.6.Data Warehouse Components	08	1,2

	3.7.Structure and Uses of Data Warehouse 3.8.Data Mining 3.9.What Is Data Mining 3.10.Data Mining Process 3.11.Advantages and Technologies Used In Data Mining 3.12.OLAP 3.13.Supply Chain Management 3.13.1.Definition 3.13.2.Stevan's Model 3.13.3.Benefits 3.13.4.ERP Vs SCM 3.14.CRM		
Unit 4	ERP Implementation 4.1.Evolution 4.2.Evolution of ERP. 4.3.Evolution of Packaged Software Solutions. 4.4.The Obstacles in ERP implementation. 4.5.ERP Implementation Lifecycle (Different Phases). 4.6.Implementation Methodology. 4.7.ERP Implementation-The Hidden Costs. 4.8.In-house Implementation-Pros and Cons 4.9.Vendors and role of vendors for ERP 4.10.Consultants and role of consultants for ERP.	08	1,2
Unit 5	Technologies In ERP System 5.1.Introduction 5.2.Electronic Data Interchange(EDI) 5.2.1.Use of EDI 5.2.2.Evolution of EDI 5.2.3.Benefits of the EDI 5.2.4.EDI Standards 5.2.5.EDI Services 5.2.6.EDI Components 5.2.7.EDI Administration 5.3.IDoc Application 5.4.EDI Integration 5.5.ALE Integration 5.6.Internet Integration 5.7 OCR Integration	07	2
Unit 6	The ERP Domain 6.1.Vendors in the ERP Market. 6.2.SAP's Markets 6.2.1.SAP Architecture And Integration 6.2.2.Scalability of SAP 6.2.3.SAP Business Structure 6.2.4.Common SAP Installation 6.2.5.SAP R/3 System	07	1,2

	6.2.6.SAP Tools 6.3.Pepole Soft. 6.4.Jd Edwards 6.5.Oracle		
Unit 7	ERP Present and Future 7.1. Limitations of ERP 7.2. EIA(Enterprise Integration Application) 7.3. EIA Products 7.4. Two Flavors of EIA and Messaging 7.5. ERP And E-Commerce 7.6. ERP and Internet. 7.7. Future Directions in ERP.	06	1
	Total No. of Lectures	48	

Recommended Books

1. ERP : Demystified – Alexis Leon (Tata McGraw Hill)
2. ERP – Ravi Shankar and S. Jaiswal (Galgotia)

B.C.A .Semester IV

Subject: - Human Resource Management

Course Code:- 405

Objective: To acquaint the students with the Human Resource Management its different functions in an organization and the Human Resource Processes that are concerned with planning, motivating and developing suitable employees for the benefit of the organization.

Unit No.	Topic	No. of Lect.	Reference Books
Unit I	Introduction To HRM Definition and Concept of HRM and Personnel Management, Difference between PM and HRM, Importance of HRM, activities and functions of HRM, Challenges before HRM,HRD,HRP, Concept of recruitment –sources of recruitment. Concept of Selection –selection Procedure, Induction and placement	12	1,2,3,4
Unit II	Performance Appraisal, Training and development Meaning and Definition-need- objective –importance of training, training method –evaluation of training program, Concept and Objective Performance Appraisal-Process of performance appraisal method –uses and limitation of performance appraisal, Promotion and demotion policy, Transfer Policy.	12	1,2
Unit III	Wages and Salary Administration Method of wage payment –Employee Remuneration factors determining the level of remuneration-profit sharing –fringe benefit and employee services.	8	3,4
Unit IV	Grievance and discipline Meaning, Definition and nature of Grievance .Grievance procedure-Grievance Machinery. Definition of Discipline-aim and objective of discipline Principle of discipline.	8	1,2,3
Unit V	The E-HR Nature of E-HRM,E-HR activity, E-Recruitment , E-Selection, E-learning ,E-Compensation	8	2,4
	Total No. of Lectures	48	

Recommended Book:

- 1) P. C. Perdeshi – Human Resources Management.
- 2) K. Ashwathappa –Human Resources Management.
- 3) C. B. Mamoria – Personnel Management.
- 4) A. M. Sharma – Personnel and Human Resource Management.

Introduction to Cyber Security / Information Security

Syllabus for 'Introduction to Cyber Security / Information Security' program* for students of University of Pune is given below.

The program will be of 4 credits and it will be delivered in 60 clock hours**.

*: Course material for this program will be developed by CINS

**: These clock hours also includes practical sessions and demonstrations wherever required.

SR. NO.	TOPIC	HOURS	MARKS
1	Module 1: Pre-requisites in Information and Network Security	14	25
	Chapter 1: Overview of Networking Concepts	3	
	Chapter 2: Information Security Concepts	3	
	Chapter 3: Security Threats and Vulnerabilities	5	
	Chapter 4: Cryptography / Encryption	3	
2	Module 2: Security Management	13	25
	Chapter 1: Security Management Practices	7	
	Chapter 2: Security Laws and Standards	6	
3	Module 3: Information and Network Security	13	25
	Chapter 1: Access Control and Intrusion Detection	3	
	Chapter 2: Server Management and Firewalls	4	
	Chapter 3: Security for VPN and Next Generation Technologies	6	
4	Module 4: System and Application Security	20	25
	Chapter 1: Security Architectures and Models	5	
	Chapter 2: System Security	5	
	Chapter 3: OS Security	5	
	Chapter 4: Wireless Network and Security	5	

Detail Syllabus for Credit Course for University of Pune

Module 1: Pre-requisites in Information and Network Security

Chapter 1: Overview of Networking Concepts

1. Basics of Communication Systems
2. Transmission Media
3. Topology and Types of Networks
4. TCP/IP Protocol Stacks
5. Wireless Networks
6. The Internet

Chapter 2: Information Security Concepts

1. Information Security Overview: Background and Current Scenario
2. Types of Attacks
3. Goals for Security
4. E-commerce Security
5. Computer Forensics
6. Steganography

Chapter 3: Security Threats and Vulnerabilities

1. Overview of Security threats
2. Weak / Strong Passwords and Password Cracking
3. Insecure Network connections
4. Malicious Code
5. Programming Bugs

6. Cyber crime and Cyber terrorism
7. Information Warfare and Surveillance

Chapter 4: Cryptography / Encryption

1. Introduction to Cryptography / Encryption
2. Digital Signatures
3. Public Key infrastructure
4. Applications of Cryptography
5. Tools and techniques of Cryptography

Module 2: Security Management

Chapter I: Security Management Practices

1. Overview of Security Management
2. Information Classification Process
3. Security Policy
4. Risk Management
5. Security Procedures and Guidelines
6. Business Continuity and Disaster Recovery
7. Ethics and Best Practices

Chapter 2: Security Laws and Standards

1. Security Assurance
2. Security Laws
3. IPR

4. International Standards
5. Security Audit
6. SSE-CMM / COBIT etc

Module 3: Information and Network Security

Chapter 1: Access Control and Intrusion Detection

1. Overview of Identification and Authorization
2. Overview of IDS
3. Intrusion Detection Systems and Intrusion Prevention Systems

Chapter 2: Server Management and Firewalls

1. User Management
2. Overview of Firewalls
3. Types of Firewalls
4. DMZ and firewall features

Chapter 3: Security for VPN and Next Generation Technologies

1. VPN Security
2. Security in Multimedia Networks
3. Various Computing Platforms: HPC, Cluster and Computing Grids
4. Virtualization and Cloud Technology and Security

Module 4: System and Application Security

Chapter 1: Security Architectures and Models

1. Designing Secure Operating Systems
2. Controls to enforce security services
3. Information Security Models

Chapter 2: System Security

1. Desktop Security
2. email security: PGP and SMIME
3. Web Security: web authentication, SSL and SET
4. Database Security

Chapter 3: OS Security

1. OS Security Vulnerabilities, updates and patches
2. OS integrity checks
3. Anti-virus software
4. Configuring the OS for security
5. OS Security Vulnerabilities, updates and patches

Chapter 4: Wireless Networks and Security

1. Components of wireless networks
2. Security issues in wireless

University of Pune

S.Y.B.Sc. Environmental Science Revised Syllabus 2014-15 Course Design

Paper	Semester	Course No.	Course Title	Marks Distribution			
				Internal	University	Subtotal	Total
I	I	EVS – 201	Ecology & Ecosystem.	10	40	50	100
	II	EVS – 201	Biological Diversity & its Conservation.	10	40	50	
II	I	EVS – 202	Natural Resources, Energy & their Management.	10	40	50	100
	II	EVS – 202	Pollution Control & Environmental Technology.	10	40	50	
III	I & II	EVS – 203	Practical Course Based on EVS - 201 & EVS - 202	20	80	100	100

EQUIVALENCE

Revised Course (2014-15)			»	Previous Course (2009-10)		
Semester	Course Code	Course Name		Semester	Course Code	Course Name
I	EVS: 201	Ecology & Ecosystem		I	ENV: 201	Ecology & Ecosystem
I	EVS: 202	Natural Resources, Energy & their Management.		F.Y. Term II	ENV: 101	Life Science: Natural Resources
II	EVS: 201	Biological Diversity & its Conservation.		II	ENV: 201	Biological Diversity
II	EVS: 202	Pollution Control & Environmental Technology.		III (T.Y.)	ENV: 303	Water Quality
				III (T.Y.)	ENV: 303	Air & Soil Quality
I & II	EVS: 203	Practical Course Based on EVS: 201 & EVS: 202		I & II	ENV: 203	Practical Course Based on ENV: 201 & ENV: 202

EXAMINATION

- Pattern of Examination-
 - i) Theory Papers – Semester Pattern
Internal Exam + University Exam (10 + 40) marks.
 - ii) Practical Paper – Annual Pattern
Internal Exam + University Exam (20 + 40) marks.
- Pattern of the question paper (University Exam)-
 - i) Semester Theory Paper Maximum Marks – 40.

Q1) 1 mark X 10 10 marks.
Q2) 5 marks X 2 10 marks.
Q3) 5 marks X 2 10 marks.
Q4) 10 marks X 1 10 marks.

ii) Annual Practical Paper Maximum Marks – 80.

Q1) 10 marks.
Q2) 10 marks.
Q3) 10 marks.
Q4) 10 marks.
Q5) 10 marks.
Q6) 3 marks X 5 15 marks.
Q7) 5 marks X 3 15 marks.
- Setting of question paper / Pattern of question paper –
 - i) Semester Theory Papers (EVS – 201 & EVS – 202): Maximum Marks – 40.

Q1) Answer the following in 1 – 2 lines 10
a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

Q2) Write short notes on any two of the following 10
a)
b)
c)

d)

Q3) Answer any two of the following 10

a)

b)

c)

d)

Q4) Answer any one of the following 10

a)

b)

ii) Annual Practical Paper (EVS – 203) Maximum Marks – 80.

Q1) Determine the rate of Atmospheric Dustfall / Respirable Particulate Matter from the collected samples. Comment on the result (10)

OR

Determine the Optimum Dose of Alum Required for / Turbidity of the given water sample. Comment on the result (10)

Q2) Determine the Dissolved Oxygen / Residual Chlorine from the given water sample. Comment on the result (10)

OR

Determine the concentration of Nitrate / Phosphate from the given water sample. Comment on the result (10)

Q3) Determine the concentration of Soluble Salts in / Lime Requirement of the given soil sample. Comment on the result (10)

OR

Determine the amount of Available Nitrogen / Potassium from the given soil sample. Comment on the result (10)

Q4) Determine the Primary Productivity of grassland community, from the given data. Comment on the result (10)

OR

Determine the Minimum Area & Number of Quadrats Required to sample the community, from the given vegetation data. Comment on the result..... (10)

Q5) Determine the Total Chlorophyll Content from the plants in Clean / Polluted Environment. Comment on the result (10)

OR

Determine the Frequency, Abundance & Density of the plant species, from the given List Count Quadrat data of a grassland community / Line & Belt Transect data of a terrestrial- aquatic transitional community. Comment on the result (10)

Q6) Identification	(15)
a) Identify & comment on the Water Treatment Process	(3)
b) Identify & comment on the Waste Disposal / Management Method	(3)
c) Identify & describe the Watershed Management Technique	(3)
d) Identify & describe the Working Principle of the energy generation	(3)
e) Identify & comment on the Inter-specific / Intra-specific relations of the organism	(3)
Q7)	(15)
a) Reports of the Study Visits	(5)
b) Report & verification of e-networking & dissemination of ideas on any environmental issue/s pertaining to the course	(5)
c) Viva-Voce & Certified Journal	(5)

Paper – I, Semester – I, EVS – 201,

Ecology & Ecosystem

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Ecology	• Introduction & Interdisciplinary nature of Ecology. • Historical Overview of Ecology – From the ecological views of prehistoric man to the current state of ecology as an applied science. • Levels of Organisation – a) Biological / Ecological Spectrum. b) Ecological Hierarchy by Barrett et al. • Ecological Classification based on – a) Taxonomic Affinity (From Kingdom to Species Level Ecology). b) Habitat Types (Terrestrial & Aquatic Ecology). c) Levels of Organisation (Autecology & Synecology – Population, Community, Biome & Ecosystem Ecology).	08
2.	Ecosystem Structure & Function – Energy Flow	• Origin of the term. • Concept of the Ecosystem. Macro & Micro-ecosystems ...etc. • Ecosystem Structure – Abiotic & Biotic Components. • Ecosystem Function : Energy Flow – a) Ecosystem processes involved – Photosynthesis, Respiration, Heterotrophy & Decomposition. b) Food Chain – Grazing & Detritus. c) Food Web & Ecosystem Stability d) Ecological Energetics – i) Energy Input. ii) Energy Flow – Single Channel & Y shaped models. e) Productivity of Ecosystem – i) Primary Production – GPP & NPP. ii) Secondary Production. iii) Net Ecosystem / Community Production. iv) Standing Crop (Biomass). f) Ecological Pyramids – of Number, Biomass & Energy.	08
3.	Ecosystem Function : Nutrient Cycling	• Concept of – a) Macro & Micro-nutrients. b) Nutrient Cycling c) Biogeochemical Cycles. • Biogeochemical Cycles – a) Gaseous Cycles – Hydrological, Carbon & Nitrogen Cycles. b) Sedimentary Cycles – Phosphorus & Sulphur Cycles. c) Human Impact on Biogeochemical Cycles. • Cycling of Organic Nutrients. • Cycling of Non-essential Elements. • Ecosystem Nutrient Cycling Model – Intra-system Cycling &	08

		Extra-system Transfers. - Nutrient Inputs. - Biotic Accumulation of Nutrient. - Nutrient Outputs. - Recycling Pathways. - Nutrient Budget.	
4.	Population Ecology	- Introduction & Basic Concepts. - Population Characteristics – - Size & Density. - Dispersion – Random, Aggregate & Uniform. - Natality (Potential & Realised). - Fecundity - Mortality (Potential & Realised). - Survivorship Curves. - Age & Sex Structure. - The Concept of Carrying Capacity. - Population Growth – - Growth Curves – Exponential & Logistic. - Population Fluctuation. - Biotic Potential & Environmental Resistance. - Population Regulation – Concept of Density Dependent & Density In-dependent Controls.	08
5.	Community Ecology	- Characteristics of Community - Species Diversity, Growth form & Structure, Dominance, Succession, Trophic Structure, Ecological Niche, Ecotone & Edge Effect. - Community Composition & Structure. - Zonation & Stratification in an aquatic & a terrestrial ecosystem. - Characters used in Community Structure- - Analytical Characters – - Quantitative. - Qualitative. - Synthetic Characters. - Inter-specific & Intra-specific Relationships.	08
6.	Ecological Succession	- Causes of Succession. - Trends of Succession. - Basic Types – Primary, Secondary, Autogenic, Allogenic ...etc. - Mechanism of Succession – - Nudation. - Invasion. - Competition, Co-action & Reaction. - Stabilisation (Climax). - Models of succession – - Hydrosere. - Lithosere.	08

Paper – I, Semester – II, EVS -201,

Biological Diversity & its Conservation.

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Biological Diversity – Ecosystem Diversity	(Biological Diversity) • The Concept, Definition & Scope. • Levels – Ecosystem, Species & Genetic. • Biodiversity at Local, National & International level. (Ecosystem Diversity) • Classification of Ecosystem – a) Udvardy's Classification. b) Bailey's Classification. c) Olsen's Classification. d) Holdridge's Classification. • Major Ecosystem types of India with their physical & biological characteristics. • Major Ecosystem types of the World with their physical & biological characteristics.	08
2.	Species Diversity	• Number of Species – a) Species Inventory. b) Latest estimates for major groups of Plants, Animals & Microbes. • Measuring Species Diversity – Species Richness, Species Abundance, Species Evenness. • Factors affecting global distribution of Species Richness – Latitudinal, Altitudinal, Rainfall gradients ...etc. • Endemism – a) The Concept. b) Types with Examples. c) Endemism in India. • Centers of Diversity – a) The Concept. b) Centers of Diversity : Analyses at Global Level – i) Myer's Hot-spots. ii) IUCN's Centers of Plant Diversity. iii) Megadiversity Centers / Countries. iv) Diversity Zones. c) Western Ghat as a Hot-spot. d) India as a Megadiversity Country.	08
3.	Genetic Diversity	• Meaning & Introduction to Genetic Variations in Species. • Nature & Origin of Genetic Variations. • Factors affecting Genetic Diversity. • Measurement of Genetic Diversity – a) Based on DNA & Chromosomes. b) Molecular Marker Techniques. • Transgenic Organisms.	08

4.	Agro-biodiversity	• Introduction – meaning & significance. • Origin & Evolution of Agrobiodiversity – a) Domestication. b) Dispersal & Diversification. • Centers of Agrobiodiversity – a) Vavilov’s Centers. b) Harlan’s Domestication Area. • Diversity in Domesticated Species – a) Variations since the first domestication to the present. b) Land Races, Advanced Cultivars, Wild Relatives of Cultivated Plants & Feral Plants.	08
5.	Significance & Threat to Biodiversity	(Significances) • Ecological Significances – Contribution of Biodiversity to various Eco- Services. • Non Ecological Significances – Nutritional, Medicinal, Aesthetic, Cultural, Commercial Values ...etc. (Threats) • Threats with suitable Examples – a) Large Scale Dev. Projects – Habitat Destruction & Fragmentation. b) Change in Natural Habitat. c) Changing Agri. & Forestry Practices. d) Invasion by Introduced Species. e) Over-exploitation. f) Env. Pollution. g) Global Climate Change. h) Loss of Traditional Knowledge. i) Nature of Legal & Mgmt. System – Human Wildlife Conflict. j) Genetically Modified Organisms ...etc.	08
6.	Biodiversity Conservation	• Conservation Methods – In-situ & Ex-situ methods with Example. • National Conservation Efforts – a) The laws – Environment Protection Act, Fisheries Act, Forest Act, Wildlife Act, Biodiversity Act ...etc. b) Involving People’s Participation – NBSAP, PBR ...etc. c) Involving Community Participation – JFM, EDP ...etc. d) People’s Movement – Silent Valley Movement, Beej Bachao Andolan ...etc. • International Conservation Efforts – a) IUCN – The World Conservation Union. b) CBD. c) CITES. d) Convention on Wetlands of International Importance. e) World Heritage Convention. • Traditional Methods of Conservation – Sacred Groves / Ponds / Species, Periodic restrictions on resource harvesting ...etc. • Need & Awareness.	08

Paper – II, Semester – I, EVS – 202,

Natural Resources, Energy & their Management. (T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Resources	• Meaning & Definition. • Classification of Resources: a) Natural Vs Artificial Resources. b) Material Vs Energy Resources. c) Biotic / Biological Vs Abiotic / Non-biological Resources. d) On the basis of its Renewability with-in the Human Time Scale as – Non-renewable, Potentially renewable & Perpetual Resources. • Renewability & Finite Nature of Resources – Regenerative & Assimilative Capacity of the Earth. • Man's interaction with Natural Resources – a) As Resource Base. b) As Waste Sink. c) Cultural Significance of Natural Resources. • Importance & Scope of Natural Resources.	08
2.	Forest, Grassland & Wildlife Resources	A) Forest Resource: • Classification – Old & Second Growth Forests ...etc. • Ecological Significance. • Forest Mgmt. in India – Laws, JFM, EDP, Protected Areas. B) Grassland Resource: • Classification. • Significance - Ecological & Non-ecological. • Grassland Mgmt. – Prevention from Overgrazing ...etc. C) Wildlife Resource: • Meaning & Definition. • Significance - Ecological & Non-ecological. • Protection & Conservation of Wildlife – Laws, Protected Areas (In-situ) & Ex-situ methods.	08
3.	Food Resources	• World Food Problems: a) Increasing World Food Demand. b) Nutrition Related Problems. c) Food Distribution. • Traditional & Modern Agricultural Systems. • The Green Revolution in India. • Effects of Modern Agriculture: a) Chemical related Problems – Soil & Under-ground Water Pollution. b) Change in Land-use Pattern. c) Loss of Genetic Diversity as a result of use of HYV's & GM Crops. d) Irrigation related Problems – Waterlogging, Salinisation. e) Social changes – Increasing inequity ...etc. • Sustainable Agriculture.	08

4.	Land & Water Resources	A) Land Resource: • Significance of the top-most layer. • Soil Erosion – Causes – Water & Wind Erosion of Soil. • Control of Erosion & Soil Conservation Methods. B) Water Resource: • Sources / Occurrences & Distribution. • Water Scarcity – the reasons. • Conflicts over water in World & India. • Conservation & Mgmt. – a) Traditional Methods. b) Rain-water Harvesting & Ground Water Recharge. c) Water-shed Mgmt. – the concept.	08
5.	Energy Resources -I	• Classification of energy resources: a) Exhaustible Vs Inexhaustible. b) Polluting Vs Non-polluting. c) Conventional Vs Non-conventional. • Energy Crisis. Energy Scenario in World & in India. • Conventional Energy Resource – a) Coal. b) Oil. c) Natural Gas. d) Nuclear Energy. • Solar Energy – Solar Cells, Solar Heating (Active & Passive), Solar Collectors. • Wind Energy – Location of Wind Generator Site, Wind Energy Converters.	08
6.	Energy Resources -II	• a) Hydro-electric Energy – Impulse & Reaction Turbines. • b) Tidal Energy – Wells Turbine. • c) Wave Energy. • Geothermal Energy. • Bioenergy – a) Biomass &, Biomass Programme – Energy Plantation, Wastes. b) Biogas. c) Ethanol. d) Biodiesel. • Energy Management – Energy Audit ...etc.	08

Paper – II, Semester – II, EVS – 202,

Pollution Control & Environmental Technology.

(T.L - 48)

Unit No.	Name of the Unit	Content	Lectures
1.	Control Of Air Pollution	• At source reduction: a) Raw material changes. b) Process / Operational changes. c) Equipment modification / replacement. • Air Pollution control technology: Principle - a) Condensation. b) Absorption. c) Adsorption. d) Filtration. e) Electrostatic Precipitation. f) Gravity Settling. g) Wet scrubbing. • Control of emissions from automobiles. a) Redesigned engines. b) Catalytic converters ...etc.	08
2.	Control Of Water Pollution	• Segregation & Re-utilisation of Domestic Waste Water – Gray & Black Water. • Waste Water Treatment: a) Primary Treatment – Screening, Grit removal, Sedimentation etc. b) Secondary Treatment - • Aerobic Method- i) Activated Sludge Process. ii) Trickling Filter. • Anaerobic Method. c) Tertiary Treatment – Disinfection (Chlorination). d) Advanced Treatments – Carbon Adsorption, Reverse Osmosis, Ion exchange. - Bioremediation.	08
3.	Control Of Noise Pollution	• Noise Control Techniques - a) Sound Insulation. b) Sound Absorption. c) Vibration Damping. d) Vibration Isolation. e) Active Noise Control/ Noise Cancellation. • Control at Source - a) Selection & Maintenance of machines. b) Control over vibrations. • Control in Transmission Path - Installation of barriers / enclosures ...etc. • Control at Reciever - a) Using protective equipments. b) Job rotation to reduce exposure ...etc.	08

4.	Control Of Solid Waste Pollution	• a) Material Separation - Separation Techniques. b) Processing – Recovery, Recycling and Reuse. • Mechanical Volume and Size Reduction - a) Dewatering and Drying . b) Volume Reduction / Compaction. c) Size Reduction/ Shredding. • Disposal/Management Options - a) Uncontrolled Dumping/ Non Engineered Disposal. b) Sanitary Landfill. c) Composting. d) Incineration. e) Pyrolysis. f) Injection Wells. g) Gasification/ Bio Gasification. h) Ocean Dumping.	08
5.	Control Of Soil Pollution	• Biological Methods: a) To reduce dependency on chemicals – Use of Biofertilizers & Biopesticides, Conservational Tillage, Mixed Cropping, Crop rotation, Biological Pest Mgmt., Organic Farming ...etc. b) Bio / Phyto-remediation of contaminated sites. • Chemical Methods: a) Ex-situ - Acid Leaching. b) In-situ - pH correction using Lime or Gypsum. • Physical / Mechanical Methods: a) Ex-situ - Heavy metal immobilization through Vitrification. b) In-situ – Soil Vapour Extraction.	08
6.	Control Of Thermal & Nuclear Pollution	• Control of Thermal Pollution - a) Cooling Ponds. b) Spray Ponds. c) Cooling Towers (Wet And Dry Cooling Towers). d) Direct Conversion of Heat into Electricity. e) Other Uses (Heating Of Buildings, Heating Swimming Pools, Desalination...etc.). • Control of Nuclear Pollution – a) Control of release & exposure. b) Proper Treatment & Disposal of Nuclear Waste. c) Protection to Workers.	08

Paper-III, EVS- 203,

Practical Course Based on EVS 201 & EVS 202.

(Any 24 Practical to be Conducted.)

Sr. No.	Description	Practical Type	Practical Sessions
1.	Sampling of Atmospheric Dust by Gravity Settling to measure the rate of Dustfall.	Field + Laboratory.	02
2.	Sampling & Determination of Respirable Particulate Matter. (Respirable Dust Sampler)	Field + Laboratory.	02
3.	Determination of Optimum Dose of Alum (Coagulant) required for water.	Laboratory.	01
4.	Determination of Turbidity of water. (Turbidimeter / Nephelometer)	Laboratory.	01
5.	Determination of Residual Chlorine from treated water.	Laboratory.	01
6.	Determination of Dissolved Oxygen in water.	Laboratory.	01
7.	Determination of Nitrate from water. (UV Spectrophotometer)	Laboratory.	01
8.	Determination of Inorganic Phosphate from water. (Colorimeter)	Laboratory.	01
9.	Visit to Water / Waste Water Treatment Plant.	Visit.	01
10.	Determination of Soluble Salts from Soil.	Laboratory.	01
11.	Determination of Available Nitrogen from soil.	Laboratory.	01
12.	Determination of Available Potassium from soil. (Flame Photometer)	Laboratory.	01
13.	Determination of Lime required for Acidic soil.	Laboratory.	01
14.	Visit to Soil Survey Department.	Visit.	01
15.	Visit to Municipal Land-fill.	Visit.	01
16.	Field visit to study Watershed Mgmt. Techniques.	Visit.	01
17.	Study of the Working Principle of Solar Collectors. (Demonstration)	Demonstration.	01
18.	Visit to Wind Energy Farm.	Visit.	01
19.	Measurement of Primary Productivity of grassland by Harvest Method.	Field + Laboratory.	01

20.	Estimation of Total Chlorophyll from plants in Clean & Polluted Environment.	Laboratory.	01
21.	Study of grassland vegetation by List Count Quadrat Method to determine the Frequency, Density & Abundance.	Field.	01
22.	Determination of Frequency, Density & Abundance of species in grassland vegetation by List Count Quadrat Method.	Field.	01
23.	Determination of Frequency & Abundance of species across terrestrial – aquatic transitional zone, by Line Transect Method.	Field.	01
24.	Determination of Density of species across terrestrial – aquatic transitional zone by Belt Transect Method.	Field.	01
25.	Visit to Nature Interpretation / Information Centre.	Visit.	01
26.	Visit to National Park / Wildlife Sanctuary to study Wildlife & various Inter-specific & Intra-specific Relations.	Visit.	≥ 01 Day
27.	Continuation of the use of Social Media for e-networking & dissemination of ideas on Environmental Issues Pertaining to the Course.	---	≥ 02

Reference Books

- Understanding Environment; Chokkar K. B., Pandya M. & Raghunathan M.; Centre for Environment Education; Sage Publication, New Delhi.
- An Advanced Textbook on Biodiversity – Principles & Practice; Krishnamurthy K.V.; Oxford & IBH Publishing Co. Pvt. Ltd.; New Delhi.
- Ecology – Principles & Applications; Chapman J. L. & Reiss M. J.; Cambridge University Press.
- Fundamentals of Ecology; Odum P.E.; Natraj Publishers; Dehradun; 3 Edt..
- Ecology, Environment & Resource Conservation; Singh J.S., Singh S.P. & Gupta S.R.; Annamaya Publishers; New Delhi.
- Ecology & Environment; Sharma P.D.; Rastogi Publication; Meerut; 11 Rev. Edt..
- Environment Science; Tyler M.G.; Wadsworth Publishing Co.; 1997.
- Perspective in Environmental Studies; Kaushik & Kaushik; New Age International Pvt. Ltd. Publishers.
- Environmental Science; Santra S.C.; New Central Book Agency (P) Ltd.; 2 Edt..
- Environmental Chemistry, Dey A. K.; New Age International Publishers; 6 Edt..
- Air Pollution; Rao M.N. & Rao H.V.N.; Tata McGraw Hill; New Delhi; 1989.
- Environmental Pollution Control & Environmental Engineering; Rao C. S.; Tata McGraw Hill; New Delhi; 1994.
- Pollution Management; Agarwal S.K.
- Environmental Science; Daniel Chiras.
- Waste Water Engineering, Treatment, Disposal & Reuse; Metcalf & Eddy.
- Manual for Field Ecology; Mishra R.
- Handbook of Methods in Environmental Studies Vol-I &II; Mailti S.K.; ABD Publishers; Jaipur.
- Physico-Chemical Examination of Water, Sewage & Industrial Effluents; Manivasakam N.; Pragati Prakashan; Meerut; 1984.
- Chemical & Biological Methods for Water Pollution Studies; Trivedi R.K. & Goel P.K.; Environmental Publications; Karad; 1986.
- Instrumental Methods of Analysis; Willard; cbspd; 7 Edt..

Revised Syllabi for Three - Year Integrated B.Com. Degree course (From June 2013)

1) INTRODUCTION

The revised syllabi for B.Com Degree Course will be introduced in the following order.

i)	First Year B.Com.	2013-2014
ii)	Second Year B.Com.	2014-2015
iii)	Third Year B.Com.	2015-2016

The B.Com. Degree Course (Revised Structure) will consist of three Years. The first year annual examination will be held at the end of the first year. The Second Year annual examination will be held at the end of the second year. The Third annual examination shall be held at the end of the third year.

2) ELIGIBILITY

1. No Candidates shall be admitted to enter the First Year of the B.Com. Degree Course (Revised Structure) unless he/she has passed the Higher Secondary School Certificate Examination of the Maharashtra State Board of Higher Secondary Education Board or equivalent or University with English as a passing subject.
2. No candidate shall be admitted to the annual examination of the First year B.Com. (Revised Structure) unless he/ she has satisfactorily kept two terms for the course at the college at the college affiliated to this University.
3. No candidate shall be admitted to the annual examination of the Second Year unless he/she has kept two terms satisfactorily for the course at the college affiliated to this University.
4. No candidate shall be admitted to the Third year of the B.Com. Degree Course (Revised Structure) unless he/she has passed in all the papers at the First Year B.Com. Examination and has passed in all the papers at the first Year B.Com. Examination and has satisfactorily kept terms for the second year and also two terms for the third year of B.Com. satisfactorily in a college affiliated to this University.

3) A.T.K.T. Rules :

As far as A.T.K.T. is concerned, a student who fails in two theories and one practical head of passing at F.Y.B.Com may be admitted to S.Y.B.Com. likewise a student who fails in the two theory and one practical head of passing at S.Y.B.Com may be admitted to T.Y.B.Com. But a student passing S.Y.B.Com but fails in any subject at F.Y.B.Com cannot be admitted to T.Y.B.Com.

4) (A) Revised Structure of B.Com. Course.

F.Y.B.Com. w.e.f. 2013-14	
Sr. No.	Compulsory / Main Subjects
101	Compulsory English
102	Financial Accounting
103	Business Economics (Micro)
104 (A)	Business Mathematics and Statistics
	or
104 (B)	Computer Concepts and Applications
105	Optional Group (Any one of the following) a) Organizational Skill Development. b) Banking & Finance c) Commercial Geography d) Defense Organization and Management in India e) Co-Operation. f) Managerial Economics
106	Optional Group (Any one of the following) a) Essentials of E-Commerce b) Insurance & Transport c) Marketing & Salesmanship d) Consumer Protection & Business Ethics. e) Business Environment & Entrepreneurship f) Foundation Course in Commerce
107	(Any one of the language from the following groups) Modern Indian Languages (M.I.L.) -: Compulsory English / Marathi / Hindi / Gujarathi / Sindhi / Urdu / Persian. Modern European Languages (M.E.L.) -: French / German. Ancient Indian Languages (A.I.L.) -: Sanskrit. Arabic.

S.Y.B.Com. w.e.f. 2014-15	
Sr. No.	Compulsory / Main Subjects
201	Business Communication.
202	Corporate Accounting.
203	Business Economics (Macro)
204	Business Management
205	Elements of Company Law
206	Special Subject – Paper I (Any one of the following) a) Business Administration b) Banking & Finance.

	c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

T.Y. B.Com. w.e.f. 2015-16	
Sr. No.	Compulsory / Main Subjects
301	Business Regulatory Framework (Mercantile Law)
302	Advanced Accounting.
303 (A)	Indian & Global Economic Development
	Or
303 (B)	International Economics
304	Auditing & Taxation
305	Special Subject – Paper II (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.
306	Special Subject – Paper III (Same special subject offered at S.Y. B.Com.) a) Business Administration b) Banking & Finance. c) Business Laws & Practices. d) Co-operation & Rural Development. e) Cost & Works Accounting. f) Business Statistics. g) Business Entrepreneurship. h) Marketing Management. i) Agricultural & Industrial Economics. j) Defense Budgeting, Finance & Management. k) Insurance, Transport & Tourism. l) Computer Programming and Applications.

B) Subjects Carrying Practical's

There will be practical examination for the F.Y.B.Com. for the subject Financial Accounting. There will be practical and practical examinations for the special subjects at S.Y.B.Com. and T.Y.B.Com. levels. There will be Practical for the S.Y.B.Com level Compulsory subject Business Communication & for T.Y.B.Com Auditing & Taxation.

(C) A Student must offer the same Special Subject at T.Y.B.Com. which he has offered at S.Y.B.Com.

(D) In an exceptional cases, a student may change the subject chosen by him at second year during the first term of the third year provided he keeps the additional terms of the new subject at S.Y.B.Com.

4. EXTERNAL CANDIDATES

- 1) The student who has registered his name as the external student will appear at the annual examination.
- 2) The result of external student will be declared on the basis of Annual Examination of 80 marks for practical subjects by converting the same out of 100.
- 3) No foreign student shall be allowed to register as an External Student.

5. MEDIUM OF INSTRUCTION.

Medium of instruction for B.Com. degree course shall be either Marathi or English except languages.

The Medium of instructions for Business Communication (S.Y.B.Com) shall be English only.

6. WORKLOAD

The present norms of workload of lectures, tutorials and practicals per subject in respect of B.Com. Course shall continue.

7. UNIVERSITY TERMS

The dates for the commencement and conclusion of the first and the second terms shall be as determined by the University Authorities. The terms can be kept only by duly admitted students. The present relevant ordinances pertaining to grant of terms will be applicable.

8. VERIFICATION AND REVALUATION

The candidate may apply for verification and revaluation or result through Principal of the College which will be done by the University as per ordinance framed in that behalf.

9. EQUIVALENCE AND TRANSITORY PROVISION

The University will conduct examination of old course for next three academic years from the date of implementation of new course.

The candidate of old course will be given three chances to clear his subjects as per the old course and thereafter he will have to appear for the subjects under new course as per the equivalence given to old course.

10. RESTRUCTURING OF COURSES

This new revised structure shall be made applicable to the colleges implementing 'Restructured Programme' at the undergraduate level from June, 2004. The existing pattern of 'C', 'D', and 'E' Components shall be continued.

The Colleges under the Restructured Programme which has revised their structure in the light of the "2008 Pattern" shall be introduced with effect from academic year 2010-11.

11. SETTING OF QUESTION PAPERS

1. A candidate shall have the option of answering the question in any of the subjects either in Marathi or English except in languages.
2. The question papers shall be framed so as to ensure that no part of the syllabus is left out of study by a student.
3. The question paper shall be balanced in respect of various topics outlined in the syllabus.
4. The question papers shall have combination of long and short answer type question. As far as possible short answer type questions should not exceed 15 to 20 percent.
5. There shall be no overall option in the question paper, instead, there shall be internal options (such as either/ or and three short answers out of five etc.).
6. In case of question paper under the Special Subject (Paper No. III) one question carrying 10 marks will be set on current knowledge in relating subject in the academic year.

	▪ Formation. ▪ Legality. ▪ Recognition. (Chapter 4.Sec.11-13 of I T Act,2000 relating to attribution, acknowledgement, dispatch of E-Records) • Digital Signatures –Meaning & functions, Digital Signature certificates [Sections 35-39] • Legal issues involved in E-Contracts.	
Term II		
5	The Consumer Protection Act, 1986 • Salient features of the C.P. Act. • Definitions-Consumer, Complainant, Services, Defect & Deficiency, Complainant, unfair trade practice, restrictive trade practice. • Consumer Protection Councils. • Procedure to file complaint & Procedure to deal with complaint & Reliefs available to consumer.(Sec.12 to14) • Consumer Disputes Redressal Agencies. (Composition, Jurisdiction, Powers and Functions.)	12
6	Intellectual Property Rights : (IPRs) • WIPO: Brief summary of objectives, organs, programmes& activities of WIPO.TRIPS: As an agreement to protect IPR-Objectives & categories of IPR covered by TRIPS. • Definition and conceptual understanding of following IPRs under the relevant Indian current statutes. • Patent: Definition & concept, Rights & obligation of Patentee, its term. • Copyright: Characteristics & subject matter of copyright, Author & his Rights, term. • Trademark: Characteristics, functions, illustrations, various marks, term, internet domain name- Rights of trademark holder. • Design: Importance, characteristics, Rights of design holder. • Geographical Indications, Confidential Information & Trade Secrets, Traditional knowledge—Meaning & scope of these IPRs.	16
7	Negotiable Instruments Act, 1881: • Concept of Negotiable Instruments: Characteristics, Meaning Important relevant definitions under the Act • Definitions, Essentials of promissory note, bill of exchange and cheque. Distinction between these instruments. Crossing of cheques – It's meaning and types. • Holder and holder in due course, Privileges of holder in due course. • Negotiation, endorsement, kinds of endorsement. • Liabilities of parties to negotiable instruments. • Dishonour of N. I., kinds, law relating to notice of dishonour. Dishonour of cheques.	14
8	Arbitration & Conciliation: • Concept of Arbitration & Conciliation. • Definition & Essentials of Arbitration Agreement.	06

	• Power and Duties of Arbitration. Conciliation proceeding. (Provisions of Arbitration & Conciliation Act, 1996 in nutshell to be covered.)	
	Total	48

Recommended Books:

- 1) Business and Corporate Law :- Dr. Kaur Harpreet, Lexis Nexis (2013)
- 2) Laws for Business, Sulphery M.M.&Basheer, PHI Learning Pvt. Ltd., Delhi. (2013)
- 3) Business Laws :- Kuchhal M.C.&KuchhalVivek, Vikas Publishing House (2013)
- 4) Business and Commercial Laws:-Sen And Mitra
- 5) An Introduction to Mercantile Laws :-N.D.Kapoor
- 6) Business Laws :- N.M.Wechlekar
- 7) Company Law :-Avtar Singh
- 8) Business Law for Management :-Bulchandani K.R
- 9) Negotiable Instruments Act :-Khergamwala
- 10) Intellectual Property Law:-P.Narayan.
- 11) Cyber Laws :- Krishna Kumar
- 12) Consumer Protection Act In India :-Niraj Kumar
- 13) Consumer Grievance Redressal under CPA :-Deepa Sharma.
- 14) Business Law – Dilip Shinde, Kiran Nerkar, Shantnu Jog, Anant Deshmukh
(Sai Jyoti Publication)

T.Y. B.Com.
Compulsory Paper
Subject Name :- Advanced Accounting.
Course Code :- 302

Objectives:-

- ❖ To impart the knowledge of various accounting concepts
- ❖ To instill the knowledge about accounting procedures, methods and techniques.
- ❖ To acquaint them with practical approach to accounts writing by using software package.

TERM - I

Unit No.	Topic and Contents	No. of Lectures
1.	Accounting Standards & Financial Reporting (Introduction to IFRS-Fair Value Accounting):- Brief Review of Indian Accounting Standard :- AS- 3, AS-7, AS-12, AS-15 AS-17 to AS-25 simple practical examples of application nature.	12
2.	Final Accounts of Banking Companies :- * Introduction of Banking Company - Legal Provisions - Non Performing Assets (NPA) - Reserve Fund - Acceptance, Endorsements & Other Obligations - Bills for Collection - Rebate on Bills Discounted - Provision for Bad and Doubtful Debts - Preparation of Final Accounts in vertical form as per Banking Regulation Act 1949. * Introduction to Core Banking System.	12
3.	Insurance Claim Accounts :- A. Claim for Loss of Stock - Introduction - Procedure for Calculation - Average Clause - Treatment of abnormal items of goods - Under & Overvaluation of Stock. B. Claim for Loss of Profit - Introduction - Indemnity under policy - Some important terms - Procedure for ascertaining claims. C. Claim for Loss of Fixed Assets - Introduction - Some important terms - Procedure for ascertaining claims.	12
4.	Final Accounts of Co-operative Societies :- a. Credit Co-operative Societies :- b. Consumer Co-operative Societies :- Meaning - Allocation of Profit as per Maharashtra State Co-operative Societies Act. Preparation of Final Accounts of Credit Co-operative Societies and Consumer Co-operative Societies.	12
TOTAL		48
TERM - II		
5.	Computerized accounting practices:- A. VAT & VAT Report B. Service Tax C. Central Value Added Tax D. Income Tax - Tax Deducted at Source (TDS) Including entries with the help of Accounting Software. (Demonstration and Hands Experience.)	12
6.	Branch Accounts :- Stock and Debtors System :- Introduction - Types of Branches - Goods supplied at Cost & Invoice Price.	12

7.	Single Entry System :- Conversion of Single Entry into Double Entry :- Introduction - Preparation of Cash Book - Total Debtor Account - Total Creditor Account - Final Accounts.	12
8.	Analysis of Financial Statements :- Ratio Analysis :- Meaning - Objectives - Nature of Ratio analysis - Problems on Ratio Analysis restricted to the following Ratio only - *Gross Profit Ratio *Net Profit Ratio * Operating Ratio * Stock Turnover Ratio * Debtor Turnover Ratio * Current Ratio * Liquid Ratio * Debt to Equity Ratio.	12
TOTAL		48

Allocation of Marks :-

Theory :-	30%
Problems :-	70%
Total :-	100%

Recommended Books:-

1. Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd. New Delhi)
2. Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers, New Delhi)
3. Advanced Accountancy: By R.L.Gupta & M. Radhaswamy (Sultan Chand & Sons, New Delhi)
4. Advanced Accounting: By Dr. K.N. Jagtap, Dr. S. Zagade.
5. Student Guide to Accounting Standards : D.S. Rawat (Taxmann, New Delhi)
6. Accounting Standards : Sanjeev Singhal.
7. Principal of Management Accounting : Dr. S.N. Maheshwari.
8. Advanced Management Accounting : Ravi Kishor.

Journals:-

1. The Chartered Accountant: Journal of the Institute of Chartered Accountants of India.
2. The Accounting World : ICAI Hyderabad

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T.Y. B.Com.
Compulsory Paper
Subject Name -: Indian & Global Economic Development
Course Code -: 303 (A)

Objectives:

- 1) To expose students to a new approach to the study of the Indian Economy.
- 2) To help the students in analyzing the present status of the Indian Economy.
- 3) To enable students to understand the process of integration of the Indian Economy with other economics of the world.
- 4) To acquaint students with the emerging issues in policies of India's foreign trade.

Unit No.	Topic		Lectures
1	Introduction		12
	1.1	Basic Characteristics of the Indian Economy as an emerging economy.	
	1.2	Comparison of the Indian Economy with developed economies with respect to	
	1.2.1	National Income	
	1.2.2	Per-Capita Income	
	1.2.3	Agriculture	
	1.2.4	Industry	
	1.2.5	Service Sector	
2	Agricultural Development in India Since Independence		12
	2.1	Place of Agriculture in Indian Economy	
	2.2	Constraints in Agricultural Development	
	2.3	Rural Indebtedness – Causes and measures	
	2.4	Agricultural Marketing – Problems and measures	
	2.5	Price Policy – Minimum Support Price (M.S.P.)	
3	Industrial Development in India Since 1991		12
	3.1	Role of Industrialization in Economic development	
	3.2	Role of Small, Medium and Large Scale Enterprises (SMEs) – Problems & Prospects	
	3.3	New Industrial Policy 1991	
	3.4	Evaluation of Industrial Policy 1991	
4	Infrastructure in India Since 1991		12
	4.1	Role of Basic infrastructure in economic development of India.	
	4.2	Private v/s Public investment in infrastructure development	
	4.3	Role of Private Sector in infrastructural development	
	4.4	Role of Public Sector in infrastructural development	
TERM - II			
5	Human Resource Development		12
	5.1	Role of Human Resource in Economic Development	
	5.2	Concept of Human Development Index (HDI)	

Unit No.	Topic		Lectures
	5.3	Concept of Human Poverty Index	
	5.4	Concept of Gender – related development index	
	5.5	Gender Employment measures	
6	Global Economic Development and Foreign Capital		12
	6.1	Meaning and Challenges of Liberalization, Privatization & Globalization.	
	6.2	Meaning and Role of Foreign Capital	
	6.3	Need for Foreign Capital	
	6.4	Forms of foreign capital	
	6.5	Advantages & Disadvantages of Foreign Capital	
7	Foreign Trade and Balance of Payment		12
	7.1	Importance of Foreign Trade in Economic Development.	
	7.2	Concept of Balance of Trade and Balance of Payment	
	7.3	India's Balance of Payment Position since 1991	
	7.4	Convertibility of Indian Rupee – Current & Capital Account	
	7.5	Current Export – Import Policy (EXIM Policy)	
8	Regional & International Economic co-operation Importance, Objectives, Structure and functions of -		12
	8.1	South Asian Association for Regional co-operation (SAARC)	
	8.2	International Monetary Fund (IMF)	
	8.3	World Bank or International Bank for Reconstruction and Development (IBRD)	
	8.4	World Trade Organization (WTO)	
	8.5	BRICS – Introduction & Functions	

Recommended Books :

- 1) Indian Economy – S.K.Misra and V.K.Puri, Himalaya Publishing House, Delhi.
- 2) International Business Environment – Black and Sundaram, Prentice Hall India.
- 3) The Global Business Environment – Tayebmonis H. Sage Publication, New Delhi.
- 4) International Business – Competing in the Global Market place – Charles Hill, Arun kumar Jain, Tata McGraw Hill.
- 5) International Economics – M.L.Jhingan Vrinda Publications, Delhi.
- 6) Indian Economy – Ruddar Datta and K.P.M. Sundaram S. Chand and Co. New Delhi.
- 7) Indian Economy – Problems of Development and Planning A.N.Agarwal, New Age International Publishers.

Economic Survey – Government of India

UNDP, Human Development Report.

World Bank, World Development Report

Magazines / Journals

Reports, Web sites

T.Y. B.Com.
Compulsory Paper
Subject Name :- International Economics
Course Code :- 303 (B)

Objectives :

- 1) To study the theories of International Trade.
- 2) To highlight the trends and challenges faced by nations in a challenging global environment.

TERM-I

Unit No.	Topic		Lectures
1	Introduction		12
	1.1	Meaning and Scope of International Economics.	
	1.2	Importance of International Trade	
	1.3	Domestic Trade Vs International Trade	
	1.4	Role of International Trade in Economic Growth	
2	Theories of International Trade		12
	2.1	Theory of absolute cost advantage	
	2.2	Theory of comparative cost advantage	
	2.3	Theory of factor endowment (Hecksher-ohlin Theory, Leontief Paradox)	
	2.4	Intra Industrial Trade	
3	Terms of Trade		12
	3.1	Concept of Terms of Trade A) Gross Barter Terms of Trade B) Net Barter Terms of Trade C) Income Terms of Trade and Trade Policy D) Single Factorial Terms of Trade E) Double Factorial Terms of Trade	
	3.2	Factors affecting on Terms of Trade	
	3.3	Free Trade Policy – Meaning, Arguments for and against	
	3.4	Protection Policy – Meaning, Arguments for and against	
4	Regional and International Economic Co-operation		12
	4.1	Regional Co-operation – European Union (E.U)	
	4.2	South Asian Association for Regional co-operation (SAARC)	
	4.3	Concept of Trade Blocks and Economic Integration	
	4.3.1	South American Preferential Trading Arrangement (SAPTA)	
	4.3.2	North Atlantic free Trade Agreement (NAFTA)	
	4.4	BRICS – Introduction & Functions	
TERM – II			
5	Balance of Payment		12
	5.1	Concept of Balance of Trade and Balance of Payments	
	5.2	Balance of Payment on current Account and Capital Account	
	5.3	Measures to correct disequilibrium of Balance of Payment	
	5.4	Causes of disequilibrium of Balance of Payment	

Unit No.	Topic		Lectures
	5.5	Convertibility of Rupee on Current and Capital Account.	
6	Foreign Exchange Rate		12
	6.1	Meaning of Foreign exchange rate	
	6.2	Fixed v/s flexible exchange rate	
	6.3	Theories of Exchange Rate	
	6.3.1	Purchasing Power Parity Theory	
	6.3.2	Balance of Payments Theory	
7	Foreign Exchange Market		12
	7.1	Structure of foreign exchange market	
	7.2	Management of Foreign Exchange -inflow and outflow of foreign capital.	
	7.3	Euro Dollar Market – Nature and Scope	
	7.4	Advantages & Disadvantages of Foreign Exchange Market.	
8	Factor Mobility and Foreign Trade Policy		12
	8.1	Foreign Capital – Meaning of Foreign Direct Investment and Foreign Institutional Investments	
	8.2	Role of Multi National Corporations (MNC's)	
	8.3	Motives and effects of International Labour Migration	
	8.4	India's Foreign Trade Policy since 1991 Features, Trends and Evaluation.	

Recommended Books :

- 1) Dr.D.M.Mithani – International Economics (Himalaya Publishing house ltd)
- 2) Z.M.Jhingan : International Economics (Vrinda Publication)
- 3) Dr.Mrs.Nirmal Bhalerao & S.S.M.Desai – International Economics (Himalaya Publishing house ltd)
- 4) Deminic Salvatove – International Economics
- 5) Francis Cherulliom - International Economics (Prentice hall)
- 6) L.M.Bhole – Financial Institutions Markets (Tata McGraw Hill)
- 7) H.R.Macharaju – International Financial Markets and India (Wheeler Publication)
- 8) RBI Report on Currency Finance

Magazines / Journals , Reports, Websites

T.Y. B.Com.
Compulsory Paper
Subject Name :- Auditing & Taxation
Course Code :- 304

Objectives :- The Study of Various Components of this course will enable the students:

1. To acquaint themselves about the concept and principles of Auditing, Audit process, Assurance Standards, Tax Audit, and Audit of computerized Systems.
2. To get knowledge about preparation of Audit report.
3. To understand the basic concepts and to acquire knowledge about Computation of Income, Submission of Income Tax Return, Advance Tax, and Tax deducted at Source, Tax Collection Authorities under the Income Tax Act, 1961.

Term I Section
Section- I Auditing

Unit No.	Topic	Lectures
1.	Introduction to Principles of Auditing and Audit Process. Definition, Nature-objects-Advantages of Auditing-Types of errors and frauds Various Classes of Audit. Audit programme, Audit Note Book, Working Papers, Internal Control-Internal Check-Internal Audit	12
2.	Checking, Vouching and Audit Report Test checking-Vouching of Cash Book-Verification and Valuation of Assets and Liabilities. Qualified and Clean Audit Report-Audit Certificate-Difference between Audit Report and Audit Certificate. Auditing and Assurance Standards. (AAS- 1,2,3,4,5,28,29)	12
3.	Company Auditor Qualification, Disqualifications, Appointment, Removal, Rights, Duties and liabilities.	08
4.	Tax Audit Definition of Accountant-Scope of Auditor's Role under Income Tax Act Compulsory Tax Audit- Certification for Claiming exemptions- Selective Tax Audit Tax Consultancy and Representation- Proforma of Computerized Systems.	08
5.	Audit of Computerized Systems Auditing in an EDP environment-planning an audit in a computer Environment - problems encountered in an EDP environment-General EDP Control - EDP Application Control- System Development- Data transfer- Audit practice in relation to computerized systems-Computer Assisted Audit Techniques (Factors and Preparation of CAAT)	08
	Total	48

Term II
Section - II Income Tax

Unit No.	Topic	Lectures
1.	Important Concepts and Definitions under Income Tax Act-1961. Income, Person, Assessee, Assessment year, Pervious year, Agricultural Income, Exempted Income, Residential Status of an Assessee, PAN, TAN	08

	House Property	regarding Income from house property, Determination of gross annual value of self occupied property,	Property owner/ Guest lecture
7.	Profits & Gains of Business & Profession	Meaning of business & profession, procedure for computing taxable profit of business and profession	Visit to Business Firm
8.	Deduction Under Sec.80 C to 80 U	Deduction Under Sec.80 C to 80 U	Visit to Tax Consultant/ Guest lecture
9.	Income Tax Returns –Form 16, ITR – I,II, III,IV	Filling and collecting the Form No. 16, Filling and collecting ITRs	Visit to Tax Consultant/ Guest lecture

Recommended Books	
1. Practical Auditing -: Spicer and Peglar 2. Auditing Principles -: Jagadish Prasad 3. A Handbook of Practical Auditing -: B.N. Tondon 4. Auditing assurance standards- -: The Institute of Chartered Accountants of India 5. Indian Income Tax -: Dr.Vinod Singhania 6. Income Tax- -: Ahuja and Gupta 7. Income Tax Act -: R.N.Lakhotia 8. Indian Income Tax Act -: H.C.Malhotra 9. Income Tax -: Manoharem 10. Student guide to Income Tax -: Dr.Vinod Singhania	

Objective :-

To acquaint the students with basic concepts & functions of HRD and nature of Marketing functions of a business enterprise.

Term I :- Human Resource Development.

Unit No.	Content	Lectures
1.	Human Resource function 1.1 Meaning, Objectives of Human Resource Function, Difference between H.R.M. and H.R.D. 1.2 Organization, Scope and functions of Human Resource Department in Modern Business. 1.3 Human Resource Planning – Nature and Scope, Job analysis - Job description - Job specification. 1.4 Emerging Concept of H.R.D. – Quality Circles –Kaizen - Voluntary Retirement Schemes.	14
2.	Recruitment and Training 2.1 Methods or sources of Recruitment of manpower, Role of Recruitment Agencies- Selection Process. 2.2 Types of Interviews- Interview Techniques. 2.3 Objectives and importance of Training and Development. 2.4 Types and Methods of Training Programmes.	10
3.	Employee Career and Succession planning 3.1 Aims and objectives of career planning. 3.2 Career Planning Process – Career Planning Structure. 3.3 Succession Planning - Meaning Need and importance. 3.4 Types of Career Opportunities A) Public Sector:- State and Local Government level - Personnel officer, Purchasing officer, secretary, Director of Administration Accountant etc. B) Private sector:- Marketing and Sales, Production and Material Management, Financial sector, Management as a profession, Insurance Industry, Accounting and Management Information System.	12
4.	Performance Appraisal Management. 4.1 Concept and Importance. 4.2 Performance Appraisal Process. 4.3 Methods and Techniques. 4.4 Merits and limitations of performance appraisal.	12
	Total	48

Term II :- Marketing Functions.

Unit No.	Content	Lectures
1.	Introduction 1.1 Meaning and scope of Marketing. 1.2 Objectives of Marketing.	10

	1.3 Classification of marketing. 1.4 Functions of Marketing.	
2.	Marketing Mix 2.1 Meaning and Importance of Product, Product mix, product life cycle. New product development- Types of new product, Branding, Packaging, Labeling. 2.2 Price – Meaning, Factors affecting Pricing Decisions, Methods of Pricing. 2.3 Place – Functions of distribution channels, Types of distribution channels, Impact of technology on Distribution. 2.4 Promotion – Meaning of sales promotion, Importance, Methods and New techniques of sales promotion.	13
3.	Advertising 3.1 Advertising- Meaning, Scope, Importance, Role of advertising in modern business, Criticism on Advertising practices. 3.2 Advertising media – Different medias of advertising, Selection of advertising media. 3.3 Ethics in advertising- Ethics and appeals in Advertising, Advertising Standards Council of India. 3.4 Future of advertising – Advertising in depression and crisis, Employment opportunities in advertising field.	13
4.	Modern Marketing Trends 4.1 Global marketing – Meaning, Scope, Importance, International marketing Challenges and Problems. 4.2 Marketing Research- Meaning, Scope and Methods of Marketing research. 4.3 Retailing- Meaning, New Trends in Marketing, Direct Marketing, Malls, Franchising. 4.4 Recent Trends in Marketing- i) E-Marketing ii) Telemarketing iii) Internet Marketing iv) M-Marketing.	12
	Total	48

Recommended Books	
1.	Personnel and Human Resource Management – A M Sharm(Himalaya Publishing House)
2.	Personnel Management and Industrial Relations- R S Davar (Vikas Publishing House)
3.	Human Resource Development and Management- Biswanath Ghosh (Vikas Publishing House)
4.	Personnel Management – C.B. Mamaria, S V Gankar (Himalaya Publishing House)
5.	Human Resource Management – AShwathappa
6.	Basics of Marketing- Cannon
7.	Marketing Management, Philips, Kotler
8.	Marketing – Gandhi
9.	Principles of Marketing – Sherlekar S.A.
10.	International Marketing- P. Saravanavel (Himalaya Publishing House)
11.	Modern Marketing Management- R.S. Davar

Objectives :

1. To acquaint the students with Financial Markets and its various segments.
2. To give the students and understanding of the operations and developments in financial markets in India.
3. To enable them to gain an insight into the functioning and role of financial institutions in the Indian Economy.

Term - I

Unit No.	Topic	Lectures
1	Indian Financial System : A) Financial Institutions - Regulatory, Intermediary and Non-Intermediaries. B) Financial Markets - Money and Capital Markets. C) Financial Instruments D) Indicators of Financial Development E) Role of Financial System in Economic Development	12
2	Indian Money Market 2.1 Meaning and Scope of Indian Money Market 2.2 Structure and Characteristics of Money Market 2.3 Functions of Indian Money Market 2.4 Institutions in the Money Market 2.5 Deficiencies of Indian Money Market. 2.6 Reforms in Indian Money Market after 1991	12
3	Indian Capital Market 3.1 Meaning and Scope of Indian Capital Market. 3.2 Characteristics of Capital Market. 3.3 Participants of Capital Market BSE - Bombay Stock Exchange NSE -National Stock Exchange OTCEI - Over the Counter Exchange of India. 3.4 Primary and Secondary Markets : its working 3.5 Reforms in Indian Capital Market after 1991.	12
4	Foreign Exchange Market 1. Meaning, Segments, Participants. 2. Spot, Forward Market 3. Basics of Exchange Rate Determination 4. Rate Quotations 5. Methods of Foreign Exchange 6. Exchange Risk Management	12
		48

TERM - II

5	NBFIs (Non-Banking Financial Institutions 5.1 Meaning and Types of NBFIs	

	5.2 Distinction between Bank And NBFIs 5.3 Functions of Following : 1. Lease Financing 2. Mutual Funds 3. Factoring 4. Housing Finance 5. Venture Capital 6. Merchant Bank	12
6	Development Financial Institutions (DFIs) Working and Progress of : 1. IFCI - Industrial Finance Corporation of India 2. SIDBI - Small Industries Development Bank of India 3. SFCs - State Finance Corporations. 4. NSSIDC - National Small Scale Industrial Development Corporation 5. Mudra Bank 6. Bharatiya Mahila Bank	12
7	Investment Institutions in India Organization, Working & Functions of 7.1 UTI - Unit Trust of India. 7.2 Life Insurance Companies - Public & Private. 7.3 Non Life Insurance Companies - Public & Private. 7.4 Post office Savings Schemes 7.5 Provident Funds 7.6 Pension Funds	12
8	Regulatory Institutions In Market : Organization Functions & Working of 8.1 SEBI - Security Exchange Board of India 8.2 IRDA - Insurance Regulatory & Development Authority. 7.3 PFRDA - Provident Fund Regulatory Development Authority.	12
		48
Recommended Books		
1. Financial Institution and Market : L. M. Bhole 2. Financial market and institutions of India : Dr. MukundMahajan, NiraliPrakashan 3. Indian Banking System : Dr. B. R. Sangale, Success Publication, Pune. 4. Business Finance and Financial Services : Dr. MukundKohok 5. Indian Financial System : Dr. M. Y. Khan 6. Investment and Securities Markets in India : V. A. Avadhani 7. Economic Reforms and Capital Markets in India : Anand Mittal 8. BharatiyaVittaBajar : Dr. Shinde S. G., Success Publication, Pune. Financial Market and Institutions in India :Dr. Sunil Shete, Succes Publication.		

T.Y. B.Com.
Business Laws & Practices Special Paper II
Subject Name -: Business Laws & Practices.
Course Code -: 305 – c.

Objectives –

- 1) To impart the students with the knowledge and understanding of important business Laws including labour laws.
- 2) To acquaint the students with certain provisions of Company law and its governance.

Term I

Unit No.	Topic	Lectures
1	The Factories Act, 1948 (Sections 1-20) Objects and Definitions, Approval, Licensing and Registration of Factories, The Inspecting Staff, Provisions Regarding Worker's Health, Provisions Regarding Safety and Welfare of Workers.	12
2	The Payment of Wages Act, 1936 (Sections 1 to 12,12a, 12b,13,13a &20) Introduction, Definitions, Rules for Payment of Wages, Deductions from Wages, Administration of Payment of Wages Act.	08
3	The Trade Union Act, 1926 (Sections 1 to 27) Object and Definitions, Registration of Trade Union, Privileges of a Registered Trade Union, Change of Name, Amalgamation, Dissolution.	10
4.	The Payment of Bonus Act, 1965 (Sections 1to3,8 to 12,20 to 25 and29) Introduction - Application of the Act, Definitions, Minimum and Maximum Bonus, Eligibility for Bonus, Available Surplus, Time Limit for Payment of Bonus.	08
5.	The Employees Provident funds and Miscellaneous Provisions Act, 1952 Object and scope of the Act, Applicability and Constitutional validity of the Act., Definitions, Employees' Provident Fund Scheme, Employees' pension scheme and Employees Deposit Linked Insurance scheme Authorities - Under the Act, and their workings, penalties, offences and protection.	10
Term II		48
6.	Historical Development of Company Law in India : Development of various concepts and trends in company law – Social responsibilities of companies – Development of company law administration.	10
7.	Prevention of Oppression and Mismanagement. Meaning of oppression, who can apply to court, Rule of Majority, protection of minority interest, remedies and rights of minority shareholders, Prevention of oppression and mismanagement, powers of the court	12
8	Inspection and Investigations: Inspection and investigation suo-moto - Investigation by Government -	10

	Rights and duties of Inspector - Report by an Inspector.	
9	Compromise and Arrangement: Schemes for Compromise and Arrangement - Persons entitled to apply for sanction of court - Powers of court - Conditions for sanction of compromise - Effect of sanction	10
10.	Rules of Corporate Governance : History, Concept of corporate Governance – Cadbury Committee Report – Principles of Morality and business ethics –Code of conduct for professionals.	06
		48

Recommended Books :-

1. Mercantile Law – P.L. Malik
2. Industrial Law – P.L. Malik
3. Labour and Industrial Law – M.N. Mishra (Central Publication Allahabad)
4. Company Law – Avtar singh (Eastern Book Comp. Lucknow)
5. Secretarial Practice – M.C. Kuchhal
6. Company Law - A.K.Mujumdar (Taxmann Publication Pvt.Ltd.)
7. Corporate Law – Dilip Shinde, Kiran Nerkar, Abhishek Sahu
(Sai Jyoti Publication)

T.Y. B.Com.
Co-operation and Rural Development Special Paper II
Subject Name :- Co-operation and Rural Development.
Course Code :- 305 – d.

Objectives:-

1. To acquaint students with the Co-operative Management.
2. To study the Co-operative Organization and Management.

Term I

Sr. No.	Topics	Lectures
Unit 1	Introduction to Co-operative Management 1.1 Meaning, Nature and Scope of Co-operative Management. 1.2 Objectives of Co-operative Management. 1.3 Principles of Co-operative Management. 1.4 Functions of Co-operative Management	10
Unit 2	Management and its Role 2.1 Evaluation of Co-operative Management 2.2 Levels of Management. 2.3 Board of Directors and Executives Duties, Responsibilities and Role in Co-operative Management. 2.4 Professionalisation of Management- Need and Significance.	10
Unit 3	Human Resource Management in Co-operative 3.1 Human Relationship in Co-operative. 3.2 Co-operative Philosophy and H.R.D. 3.3 Recruitment 3.4 Training and Managerial Development 3.5 Appraisal and Evaluation	10
Unit 4	Decision Making in Co-operative Management 4.1 Decision Making – Meaning and Importance's. 4.2 Decision Making Process – Steps Involved 4.3 Measures to overcome the defects in Co-operative Management. 4.4 Trends in Co-operative Management in Global Scenario.	10
Unit 5	Co-operative Administration 5.1 Organizational structure of Co-operative Department in Maharashtra. 5.2 Powers, Functions and Responsibilities of Registrar. 5.3 Problems of Co-operative Administration in Maharashtra.	08
	Total	48

Term II

Sr. No.	Topics	Lectures
Unit 6	Financial Management of Co-operatives 6.1 Meaning, Nature and Importance of Financial Management. 6.2 Sources of Finance to Co-operative. 6.3 Distinction between Corporate Finance and Co-operative Finance. 6.4 Significance of financial Management in Co-operatives.	10
Unit 7	Financial Planning 7.1 Meaning and Characteristic	10

	7.2 Estimation of Financial Requirement. 7.3 Capital and Funds of Co-operatives and their raising. 7.4 Budget and Accounting of Co-operatives.	
Unit 8	Financial Control 8.1 Meaning and Need 8.2 Proper utilization of Funds and Capital. 8.3 Investment Policy- Profitability and Security. 8.4 Operating Expenditure and Cost Control	08
Unit 9	Co-operative Audit 9.1 Meaning, Definition and Nature of Co-operative Audit 9.2 Objectives and Significance of Co-operative Audit. 9.3 Provisions of co-operative law related to Audit. 9.4 Types of Audit – Statutory Audit, Re-Audit, Test Audit and Internal Audit.	10
Unit 10	Co-operative Auditor 10.1 Powers and Duties of Auditor 10.2 Audit Report and Rectification. 10.3 Importance of Audit Report.	08
	Total	48

Recommended Books :

- 1) G.S.Kamat –New Dimensions of Co-operative management-Himalaya Publication House, Mumbai
- 2) Dr.Nakkiran S.A.- Co-operative Management principals and techniques Himalaya Publication House, Mumbai
- 3) Ram Krishna Y.- Management of Co-operatives Jaico Publishing Home, New Delhi.
- 4) Goel B.B- Co-operative Management and Administration, Deep and Deep Publication, New Delhi.
- 5) Kulandaiswamy V. Principles and Practice of Co-operative Management - Rainbow Publications, Coimbatore.
- 6) Taimani K.K. – Managing the Co-operative Enterprise, Minerva Associates, Calcutta.
- 7) G.S.Kamat – Cases in Co-operative Management.
- 8) Jagdish Killol- The Maharashtra Co-operative Societies Rules 1961-Amended up to 2014.

Objectives :-

1. To provide Knowledge about the concepts and principles application of Overheads
2. To provide also understanding various methods of costing and their applications.

Level of Knowledge :- Basic Knowledge.**Term I**

Unit No.	Topic	No. of Lectures
1.	Overheads:	6
	1.1.Meaning and definition of overheads.	
	1.2.Classification of overheads	
2.	Accounting of Overheads (Part-I)	14
	2.1 Collection and Allocation of overheads.	
	2.2 Apportionment and Re-apportionment of overheads	
3.	Accounting of Overheads (Part-II)	20
	3.1 Absorption - Meaning ,Methods of Overhead Absorption	
	3.4 Under and Over Absorption of overheads- Meaning, Reasons and Accounting treatment	
4.	Activity Based Costing	8
	4.1 Definitions-Stages in Activity Based Costing	
	4.2 Purpose and Benefits of Activity Based Costing	
	4.3 Cost Drivers	
	4.4 Problems on Activity Based Costing [Simple Problems only]	
Total		48

Term II

Unit No.	Topic	Lecture
5.	Methods of Costing:	08
	5.1 Introduction to Methods of Costing.	
	5.2 Job Costing- Meaning, Features, Advantages and Limitations	
6.	Contract Costing:	16
	6.1 Meaning and Features of Contract Costing	
	6.2 Work Certified and Uncertified, Escalation clause, Cost Plus contract, work-in- progress	
	6.3 Profit on incomplete contract	
7.	Process Costing	14
	7.1 Meaning and features of process costing	
	7.2 Preparation of process accounts including normal and abnormal loss/gain	
	7.3 Joint Products and By Products [Theory Only]	
8.	Service Costing:	10

	8.1 Meaning, Features and Applications. 8.2 Cost Unit-Simple and composite 8.3 Cost Sheet for Motor transport service 8.4 Cost Statement for Hospital and Hotel Organization	
	Total	48

Note -: Allocation of Marks -:

- a) 50 % for Theory.
- b) 50% for Practical Problems.

Areas of Practical Problems

- Accounting & Control of Overhead. [Part I]5
Primary Distribution of Overheads, Repeated & Simultaneous equation methods only.
- Accounting & Control of Overhead. [Part II]
Problems on Machine Hour Rate Only.
- Contract Costing - Preparation of Contract Account & Contractive Account [without B/s]Simple Problem without Escalation clause
- Process Costing Simple Problems on Process Costing [Where there is no work in process].
- Service Costing - Cost Sheet for Motor Transport and Hotel and hospital industry Service.

Books Journals and Websites Recommended for Cost and Works Accounting Paper I, II and III	
1.	Prof. Subhash jagtap -: Practice in Advanced costing and Management Accounting. Nirali Prakashan, Pune
2.	Ravi Kishor -: Advanced Cost Accounting and Cost Systems Taxman's Allied Service Pvt. Ltd., New Delhi.
3.	S.P. Lyengar -: Cost Accounting Principles and Practice, Sultan Chand & Sons Accounting, Taxman's, New Delhi.
4.	Ravi Kishor -: Students Guide to Cost Accounting Taxman's, New Delhi.
5.	M.N. Arora -: Cost Accounting Principles and Practice Vikas Publishing House Pvt. Ltd., New Delhi
6.	S.N. Maheshwari and S.N. Mittal -: Cost Accounting, Theory and Problems, Mahavir book Depot, New Delhi.
7.	B.L. Lall and G.L. Sharma -: Theory and Techniques of Cost Accounting. Himalaya Publishing House, New Delhi.
8.	V.K. Saxena and Vashista -: Cost Accounting – Text book. Sultan Chand and Sons, New Delhi
9.	V.K. Saxena and Vashista -: Cost Audit and Management Audit. Sultan Chand and Sons, New Delhi
10.	Jain and Narang -: Cost Accounting Principles and Practice. Kalyani Publishers
11.	N.K. Prasad -: Principles and Practice of Cost Accounting Book Syndicate Pvt. Ltd., Calcutta.
12.	N.K. Prasad -: Advanced Cost Accounting Syndicae Pvt Ltd., Calcutta.
13.	R.K. Motwani -: Practical Costing. Pointer Publisher, Jaipur
14.	R.S.N. Pillai and V. Bhagavati -: Cost Accounting.

15. Horne, Fraser and Datar -: Cost Accounting and Managerial Emphasis.
16. Dr.J.P.Bhosale -: Management Accounting, Vision Publication
17. Prof.Jagtap, Nare & Pagar -: Cost & Works Accounting, Paper-II
18. Journal -: Cost Accounting Standards issued by ICWAI, Kolkata
19. Journal -: Management Accountant Issued by ICWA of India, Calcutta.
20. Website -: - www.icwai.org & www.aicmas.com.

T.Y. B.Com.
Business Statistics Special Paper II
Subject Name :- Business Statistics.
Course Code :- 305 – f.

Objectives:

1. To distinguish between random and non-random experiments.
2. To find probabilities of events.
3. To apply standard distribution to different situations.
4. To test the hypotheses.

Sr. No.	Topic	No. of Lectures
Term 1		
Unit 1	Introduction to Probability: Definitions of : Permutation, Combination, Sample Space, Event, different types of events, Probability of an event, Conditional Probability, Independence of two events, Partition of sample space. Bayes Theorem (statement only). Examples and problems.	12
Unit 2	Uni-variate Discrete Probability Distribution: Definitions of : random variable, discrete random variable, probability distribution of discrete random variable, Probability mass function (p.m.f.), Cumulative distribution function, mean , variance and standard deviation. Properties of distribution function. Examples and problems.	12
Unit 3	Some Standard Discrete Probability Distributions : 1. Bernoulli: p.m.f., mean and variance. (statement only) 2. Binomial: p.m.f., mean, variance and additive property. (statement only) real life situation. 3. Poisson: p.m.f., mean, variance and additive property. (statement only) real life situation. Examples and problems.	12
Unit 4	Bi-variate Discrete Probability Distribution: Bivariate discrete random variable, Joint probability distribution of bivariate discrete random variable, marginal and conditional distribution and independence of two variables. Examples and problems.	12
Term 2		
Unit 5	Normal Distribution: Normal Distribution : Definition, p.d.f. curve, properties of normal distribution, state mean and variance, standard normal variate, problems to evaluate probabilities (using statistical table and excel), additive property for two variables (statement only). Fitting of normal distribution using Excel. Examples and problems.	14
Unit 6	Test Of Hypothesis-I: 1. Definitions of : Hypothesis, Null hypothesis, Alternating hypothesis, Critical region, Types of Errors, Level of significance,	18

	P-value. 2. Test for Population Mean (for large and exact sample): Describe test procedure for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ and $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$. If population variance is known. 3. Test for Population Mean: Describe test procedure for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ and $H_0: \mu_1 = \mu_2$ against $H_1: \mu_1 \neq \mu_2$. If population variance is unknown. 4. Describe the test procedure for paired t-test. 5. Test for population proportion : Describe test procedures for testing $H_0: P = P_0$ against $H_1: P \neq P_0$ and $H_0: P_1 = P_2$ against $H_1: P_1 \neq P_2$.	
Unit 7	Test Of Hypothesis-II: 1. Describe Chi-square test for testing - Goodness of fit. - Independence of attributes. 2. Describe test procedure for testing $H_0: \sigma_1^2 = \sigma_2^2$ against $H_1: \sigma_1^2 \neq \sigma_2^2$ (test based on F-distribution)	8
Unit 8	Non-parametric Tests : Introduction , sign test, run test, Kolmogorov – Smirnov test, Mann whitney test.	8

List of Practicals

Sr. No.	Name of Experiment
1	Applications of Binomial and Poisson Distribution.
2	Bi-variate Probability Distribution.
3	Applications of Normal distribution.
4	Testing of Population means and proportions.
5	Test based on Chi-square and F distributions.
6	Non parametric test.

Books Recommended:

1. Fundamentals of Mathematical Statistics: Gupta, Kapoor V.K.
2. Fundamentals of Statistics: S.C. Gupta
3. Business Statistics : Gupta Indra
4. Fundamentals of Statistics: D.N. Elhance
5. Statistical Methods: S.P. Gupta

T.Y. B.Com.
Business Entrepreneurship Special Paper II
Subject Name -: Business Entrepreneurship.
Course Code -: 305 – g.

Objective : To enable students to understand the basic concepts of entrepreneurship and preparing a business plan to start a small industry.

1. To Develop Knowledge and understanding in creating and managing new venture.
2. To Equip students with necessary tools and techniques to set up their own business venture.
3. To Help students to bring out their own business plan.
4. To make students aware about business crises and sickness.

Term I

Unit No	Topic	Lectures
1	SMALL SCALE INDUSTRIES Definition - Meaning - Product Range - Capital Investment - Meaning and importance of Tiny Industries, Ancillary Industries, Cottage Industries. Role played by SSI in the development of Indian Economy. Problems faced by SSI's and the steps taken to solve the problems - Policies Governing SSI's.	12 Hrs
2	FORMATION OF SMALL SCALE INDUSTRY Business opportunity, scanning the environment for opportunities, evaluation of alternatives and selection based on personal competencies. Steps involved in the formation of a small business venture: location, clearances and permits required, formalities, licensing and registration procedure.	12 Hrs
3	BUSINESS PLAN PREPARATION : Meaning and importance - objectives - Selection of suitable form of organisation - Precautions to be taken by an entrepreneur while preparing Business Plan. Project Appraisal - Break - even Analysis and Ratio Analysis : Debt : Service Coverage Ratio - Gross Profit : Net Profit Ratio and Return on Investment (ROI), Project Audit	14 Hrs
4	PROJECT ASSISTANCE Financial assistance through SFC's, SIDBI, Commercial Banks, IFCI - Non-financial assistance from DIC, SISI, KVIC - Financial incentives for SSI's and Tax Concessions - Assistance for obtaining Raw Material, Machinery, Land and Building, Venture Capital and Technical Assistance	10 Hrs
Total		48 Hrs

Term II

Unit No	Topic	Lectures
5	BUSINESS PLAN (BP) IMPLEMENTATION	12 Hrs

	Meaning - importance - preparation of Business Plan, Financial aspects, Marketing aspects, Human Resource aspects, Technical aspects, Social aspects of Business Plan. Common pitfalls to be avoided in preparation of a Business Plan.	
6	SMALL ENTERPRISE MANAGEMENT : (As Distinct from corporate sector management) Functional v/s Integrated Approach Structured v/s Flexible Approach Logical v/s Creative Approach Start up phase Management: Difference of opinion with in promoting team - Avoiding failure – Problem-Solving, Creativity and Innovation, Stability Phase Management, Growth phase Management,	12 Hrs
7	BUSINESS CRISES AND SICKNESS : Types of Business Crises, Starting crises, Cash crises, Delegation Crises, Leadership Crises, Financial Crises, Prosperity Crises, Succession Crises, Sickness : Meaning and Definition, Symptoms, Causes, Turnaround Strategies, Revival Schemes of Sickness,	12 Hrs
8	SKILL DEVELOPMENT • Preparation of a Project report to start a SSI Unit. • Preparing a letter to the concerned authority-seeking license to the SSP Unit (You propose to start). • Format of a business plan. • A Report on the survey of SSI units in the region where college is located • Chart showing financial assistance available to SSI along with rates of interest • Chart showing tax concessions to SSI both direct and indirect. • Success stories of Entrepreneurs in the region. (Any Two) • Documents required for Registration of SSI	12 Hrs
Total		48 Hrs

Recommended Books

1. Desai Vasant -: "Management of Small Scale Industries" Himalaya Publishing House.
2. Khanka S.S. -: "Entrepreneurial Development" S.Chand.
3. Gupta S.S. -: "Entrepreneurial Development" Sultan Chand & Sons.
4. Taneja Satish and Gupta S.L. "Entrepreneurship Development - New Venture Creation" Gaigotia Publishing Company, New Delhi.
5. Chandra P. - 'Project - Preparation, Appraisal and Implementation' - Tata McGraw Hill, New Delhi.
6. Jain P.C. (ed.) 'Handbook for New Entrepreneurs' - Entrepreneurship Development Institute of India, Ahmedabad.

7. Pandey G.N. - 'A Complete Guide to Successful Entrepreneurship' Vikas Publishing House Pvt. Ltd.
8. Maharashtra Centre for Entrepreneurship Development - 'Project Profile', 'Profile for SSI Projects.'
9. Edward D. Boao - 'Opportunities'.
10. Prof. John Mullins - 'The New Business Road Tests' - Pearson.
11. Prof. Rajeev Roy - 'Entrepreneurship' Oxford University Press.
12. Rashmi Bansal - 'Stay Hungry Stay Foolish' - CIIFIM, Ahmedabad.
13. Dr. Patel V.G. - 'When The Going Gets Tough' - Tata McGraw Hill, New Delhi.
14. dovagr yaaogiraja Á]VaogasaMQal Á SaaoQaa mhNajao saapDola – ka^inTnaonTla p`kaSana, puNao
15. rSmaI bansala Á sTo hMga`I sTo fUilaSa ³marazI Anauvaad Á ivadulaa Taokokr´
16. Mark. J. Dollinger, Entrepreneurship - Strategies and Resources, Pearson Edition.
17. Udai Pareek and T.V. Rao, Developing Entrepreneurship
18. S.V.S. Sharma, Developing Entrepreneurship, Issues and Problems
19. Srivastava, A Practical Guide to Industrial Entrepreneurs
20. Anil Kumar: Small Business and Entrepreneurship I.K. International Publishers
21. Government of India, Report of the committee on Development of small and medium entrepreneurs, 1975
22. Bharusali, Entrepreneur Development
23. Vidya Hattangadi : Entrepreneurial
24. Dr. Venkataramanappa : : Entrepreneurship Development
25. B. Janakiraman , Rizwana M: Entrepreneurship Development
26. N.V.R Naidu : Entrepreneurship Development, I.K. International Publishers
27. Business Entrepreneurship – Dr. M. B. Sonawane
28. Business Entrepreneurship – Dr. Sudhakar Jadhavar (Dean Commerce Faculty)
29. Business Entrepreneurship –Dr. S. L. Shirgave.

T.Y. B.Com.

Marketing Management Special Paper II

Subject Name :- Marketing Management.

Course Code :- 305 - h.

Objectives of the Paper

- I. To understand the concept and functioning of marketing planning and sales management
- II. To know marketing strategies and organization
- III. To inform various facets of marketing with regulatory aspects
- IV. To understand marketing in globalize scenario

First Term

Unit I

Marketing Planning and Sales Forecasting

Meaning of Marketing Planning

Importance of Marketing Planning

Types of Marketing Plan

Elements of a Marketing Plan

Process of Preparing a Marketing Plan

Meaning of Sales Forecast, Sales Budgets and Sales Quota

Sales Forecasting Methods

Forecasting Techniques

(12 Periods)

Unit 2

Social Marketing:

Meaning and Objectives of Social Marketing

Social Responsibility of Marketing Manager

Impact of Marketing on Society and Other Business

Social Criticism of Marketing

Recent Trends in Social Marketing

(16 Periods)

Unit 3

Marketing Organisations

Meaning of Marketing Organisation

Changing role of Marketing Organisation

Factors affecting on Marketing Organisation

Essentials of an effective Marketing Organisation

Types of Marketing Organisation

(10 Periods)

Unit 4

Marketing Strategies

Concept of Strategy

Characteristics of Strategy

Meaning of Marketing Strategy

Competitive Marketing Strategies

Competitive Strategies in Global Environment

Benchmarking – A total for effective Marketing Strategy – meaning, process and advantages of Benchmarking
(10 Periods)

Second Term

Unit 5

Agricultural marketing

Meaning of Agriculture Marketing

Types of Agri-Products

Features of Agri-Products

Types of Markets – Defects of Agri- marketing and remedies

Marketing Intelligence System and Agriculture Marketing

Distinction between manufacture goods marketing and Agriculture goods marketing

(14 Periods)

Unit 6

International Marketing

Meaning, nature, need and importance of International Marketing

International Marketing Vs Domestic Marketing

Problems and Challenges in International Marketing

Mode of entry in International Market

Scope of International Marketing

(12 Periods)

Unit 7

Marketing Regulations

Importance of Marketing Regulations in Marketing.

Relevance and importance of following Acts in the Context Marketing Management

Consumer Protection Acts, 1986

Trade Mark Acts, 1999

Competition Acts, 2002

Indian Patent (amendment) Acts, 2005

Bureau of Indian Standards Act

(12 Periods)

Unit 8

Globalization and Marketing

Meaning of Globalization

Features of Globalization

Marketing in 21st Century

Impact of Globalization on marketing

Benefits and limitation of Globalization

Case study related to Global Marketing

(10 Periods)

Recommended:

Books:

T.Y. B.Com. w.e.f. 2015-16

Philip Kotler	Marketing Management
David Carson	International Marketing: A Comparative System Approach, Wiley, New York
Steven M. Bungess	The New Marketing Halfway House, Zebra Press, South Africa
David J. Schwartz	Marketing Today: A Basic Approach Harcourt Brace Jovanovich, New York
Thomas V. Boroma	The Marketing Edge: Making Strategic Work The Free Press, New York
Peter Doyle	Value-based Marketing: Marketing Strategies for Corporate Growth and Shareholder value John Wiley, Crichester, England
E. Jenome McCarthy	Basic Marketing: A Managerial Approach Irwin, Homewood, Illinois

Suggested mode of conducting practical

1. Guest lecture
2. Library assignment
3. Case study
4. Field visit
5. Conducting Survey
6. Presentation

T.Y. B.Com.
Agricultural and Industrial Economics Special Paper II
Subject Name :- Agricultural and Industrial Economics.
Course Code :- 305 – i.

Objectives –

1. To study the agricultural development in India.
2. To analyze the importance of industrial development in India

Term I – Agricultural Development in India		
Unit	Topic	Lectures
1.	Agriculture :- 1.1 Role of Agriculture in Indian Economy 1.2 Progress of Agriculture since 1991. 1.3 Concept & Problems of Productivity 1.4 Causes of low Productivity in Indian Agriculture 1.5 Measures adopted to improve the productivity 1.6 Causes and its effects on sub-division and fragmentation of land holding	10
2.	Land Reforms :- 2.1 Technological & Institutional Reforms 2.2 Evaluation of Land Reforms.	08
3.	Agriculture Labour :- 3.1 Types of Agriculture Labour. 3.2 Causes of increase Agriculture Labour. 3.3 Government Policy Measures : EGS/MGNREGA	10
4.	Problems of Farming :- 4.1 Seasonal changes and farming 4.2 Minimum support price of crops. 4.3 Purchasing of foods by Government 4.4 Role of Government in natural calamities 4.5 Problems of Farmers Suicide. 4.6 Land Acquisition	12
5.	Agricultural Processing :- 5.1 Role of Agricultural Processing in India 5.2 Scope & Importance of Agricultural Processing. 5.3 Problems & remedial measures of Agricultural Processing.	08
		Total 48
Term II – Industrial Development		
Unit	Topic	Lectures
6.	Industry & Economic Development :- 6.1 Role of Industry in India 6.2 Highlights of Industrial growth Since 1991 6.3 Ownership of Industry 6.4 Pattern of Ownership of Indian Industries 6.5 Public & Private Sector. 6.6 Role of Small Scale Industries.	10

	6.7 Problems & Policy measures adopted to their developments.	
7.	Major Industries in India :- 7.1 Sugar & Textile. 7.2 Iron & Steel. 7.3 Power Generation.	10
8.	Industrial Labour :- 8.1 Government wage policy 8.2 Industrial Dispute – Causes and Measures 8.3 Social Security & Welfare Measures.	08
9.	Industrial Finance :- 9.1 Problems of Industrial Finance 9.2 Sources of Industrial Finance 9.3 IDBI, IFCI, ICICI, SFC.	10
10.	Public Enterprises :- 10.1 Government policy of Public Enterprises. 10.2 Problems of Public Enterprises 10.3 Arguments against Privatization of Public Enterprises	

Recommended Books :

1. S.K.Misra and V.K.Puri : Indian Economy - Himalaya Publishing House, Delhi.
 2. Khedkar B.D. : Indian Economy, Success Publication, Pune
 3. Sundaram & Black : The International Business Environment, New Delhi
 4. Agrawal A.N. Indian Economy – Vikas Publication
 5. Khem Farooq A. Business and society, S.Chand Delhi
 6. Dutt R & Sundaram K.P.M – Indian Economy, s.chand delhi
 7. Dutt Rudder : Economic Reforms in India – A Critique – S Chand, New Delhi
 8. Hedge: Environmental Economics, MaMillan
- K.V. Srivyya and V.R.M. Das : Indian Industrial Economy, Chand & Com.New Delhi 1977.

Defense Budgeting, Finance & Management Special Paper II
Subject Name :- Defense Budgeting, Finance & Management.
Course Code :- 305 – j.

Aim of the paper

One of the crying needs of the hour is to ensure that the National Security objectives are met-in a cost effective manner. Against such backdrop, the aim can be achieved by educating the students and disseminating the information and by giving the planners, decision makers and administrators all the information they need in an easily understandable form. By studying this paper students will understand all the financial aspects of budgetary and defence production in India.

Term I

Unit No.	Topic	Lectures
1.	Rationale of Defence Production in India. a. Economic aspects of Defence Production. b. Political aspects of Defence Production.	12
2.	Defence and Development. a. Concept of Defence v/s Development. b. Evaluation of the Debate. c. Future prospects of the debate	12
3.	Government Policies towards Defence Production in India. a. Industrial Policy Resolution of the Government 1947-48, 1956-57, Since 1991 onwards. b. Weapons Procurement Policies in India since 1947.	12
4.	Structure of Defence Production. a. Department of Defence Production in the Ministry of Defence b. Structure and Functions. c. Defence Public Sector Undertakings - Basic Aims and Objectives. d. Information & role of Defence Public Sector Undertakings.	12
Total		48

Term II

Unit No.	Topic	Lectures
5.	Role of Private Sector in Defence Production. a. Status of Indigenous arms production in India. b. Problems of prospectus of arms production in India.	12
6.	Defence Management. a. Nature, Scope, Function and Principles of Management. b. Principles and Types of Organisation, Military and Non Military Organisations.	12
7.	Decision making in Armed Forces. a. Organisational aspects of Decision Making. b. Decision making process in India.	12
8.	Logistics Management for Indian Defence. a. An understanding of Logistics management - meaning and concept.	12

	b. Significance and Historical Evaluation. c. Scope of Logistics management. d. Principles of Logistics Management. e. Logistics Planning for Indian Defence.	
Total		48

Recommended Books	
1.	Raju G.C. Thomas, "The Defence of India: A Budgetary Perspective" (MacMillan Publication, New Delhi, 1978)
2.	Subramanyam K., "India's Security Perspective – Policy and Planning", (Lancer Books, New Delhi, 1991).
3.	Nanda Ravi, "National Security Perspective, Policy and Planning", (Lancer Books, New Delhi, 1991).
4.	Khanna D. D. and Malhotra P. N., "Defence vs. Development: A Case Study of India", (Indus Publication Company, New Delhi, 1993).
5.	Kennedy Gavin, "Defence Economics", (Gerald Duckworth & Co. Ltd, 1983).
6.	Ghosh Amiya, "India's Defence Budget & Expenditure Management in Wider Context", (Lancer Publication and Span Tech, Delhi, 1996).
7.	Dutta Meena and Sharma Jai Narayan, "Defence Economics", (Deep and Deep Publication, New Delhi)
8.	Deger S. & Sen S. "Military Expenditure in the Third World Countries: The Economic Effects", (Routlet & Kegan Paul, 1986).
9.	Agarwal Rajesh K., "Defence Production and Development", (Gulab Vazirani for Arnold Heinermann Publishers, 1978).
10.	Thomas Raju G. C., "Indian Security Policy", (Princeton, New Jersey, University Press, 1988).
11.	Robert Loony and David Winterford, "Economic Causes and Consequences of Defence Expenditure in the Middle East and South Asia", (University Press, 1995).
12.	Shrinivas V. N., "Budgeting for Indian Defence: Issues of Contemporary Relevance", (KW Publishers Pvt., Ltd., New Delhi – 2008).
13.	Annual Report, Ministry of Defence, Government of India.
14.	Report of the Finance Commission, Government of India.

T.Y. B.Com.
Insurance Transport and Clearance Special Paper II
Subject Name :- Insurance Transport and Clearance
Course Code :- 305 – k.

Objectives :

- 1) To know the fundamentals of Life Insurance & General Insurance.
- 2) To create the awareness of Insurance Business & practices .
- 3) To know the knowledge about laws & regulations relating to Life Insurance & General Insurance.

Term I

Unit	Topic	Lectures
1	Insurance Management Life Insurance, Claim Settlements ,Maturity Claims – Meaning , Procedure for claim ,types of claims ,survival benefits ,Death claims , early claims , required documents & forms	12
2	Nomination & assignments of policies Difference between Nominations & assignments , policy conditions ,loans & surrender of policies, post maturity claims	12
3	Privatization & Insurance Business Effect of privatization on Insurance Business, Comparative study of private companies & government companies, Malhotra committee report, current trends in global insurance business.	12
4	Laws relating with Insurance Business 1) Commentaries on Insurance Act 1938 2) Life Insurance corporation Act 1956 3) Insurance Regulatory & Development Act 1991 4) Overview of Income Tax Act	12
Total-		48

Term II

1	Insurance Management General Insurance Maturity Claims – Meaning ,Procedure for claim , Types of claims, survival benefits ,Death claims , early claims, required documents & forms, Accidental benefits & disability benefits, various conditions in the policy , permanent disability benefits, post maturity claims, payments, importance of timely payment, due dates of payment, methods & rules of payment , current trends of General Insurance in Global Business	12
2	Premium Payments Importance of timely payment, due date of payment Surrender values – Meaning & Conditions, Lapse of policy, forfeiture & revival of policies, special revival scheme, Installment revival scheme, loan cum revival scheme	12

3	Laws related to General Insurance Business	12
	1) Insurance Act 1938	
	2) Insurance Amendment Act 2002	
	3) IRDA Regulations 2002	

4	Insurance Business & Saving Plans	12
	1) Financial planning & Taxation	
	2) Mutual Funds & shares	
	3) Unit Trust & Unit based policies	
	4) Record Keeping & performance for insurance Agents	
	5) Business Targets & Incentives	

Total- 48

Recommended Books

- 1) Principles and Practices of Insurance- Dr. P. Periaswamy
Himalaya Publishing House, Mumbai
- 2) Theory and Practice of Insurance Business- M. Ariff Khan
- 2) Marketing and Life Insurance Business- P.K. Biswas Roy
Discovery Publishing House, New Delhi
- 4) Travel and Tourism Business Management – Dr.S.K.Wadekar
Shanti Prakashan, Ahmedabad (Gujrat)
- 5) Life Insurance Administration, Insurance Institute of India
- 6) Manual for Agents- LIC India

T.Y. B.Com.
Computer Programming and Application Special Paper II
Subject Name :- Computer Networking and Cyber Security.
Course Code :- 305 – I.

Course Objectives:

1. To know about computer network.
2. To understand different topologies used in networking
3. To learn different types of network.
4. To understanding the use of connecting device used in network.

Term-I

Unit No.	Name of the Topic	No. of Lectures	Ref. Books
1	Chapter 1: Computer Networks. 1.Introduction Computer Network, Topology, Types of Networks 2.Communication Types Serial, Parallel 3.Modes of Communication : Simplex, Half Duplex, full Duplex, Server Based LANs &Peer-to-Peer LANs, Comparison of both 4.Protocols and Standards	14	1,2,3
2	Chapter 2 : Network Models 1.Design issues of the layer 2. Protocol Hierarchy 3.ISO-OSI Reference Model : Layers in the OSI Model, Functions of each layer 4. Terminology : SAP, Connection Oriented services, connectionless services, Peer Entities 5. Internet Model (TCP/IP) 6. Comparison of ISO-OSI & TCP/IP Model 7. Addressing : Physical Addresses, Logical Addresses, Port Addresses 8. IP Addressing : Classfull addressing, Classless addressing	12	1,2,3
3	Chapter 3 :Transmission Media 1.Guided Media (Wired) : Coaxial Cable:- Physical Structure, standards, BNC Connector, Applications, Twisted Pair: Physical Structure, UTP vs STP, Connectors, Applications, Fiber Optics Cable: Physical Structure, Propagation Modes (Single Mode & Multimode), Connectors, Applications. 2. Unguided Media(Wireless) Electromagnetic Spectrum For Wireless Communication, Propagation Methods(Ground, Sky, Line-Of-Sight),Wireless Transmission(Radio Waves, Infra-Red,	12	1,2,3

	Micro- Wave)		
4	Chapter 4 : Wired LANs : Ethernet 1. IEEE Standards 2. Standard Ethernet(MAC Sublayer, Physical layer) 3. Fast Ethernet(MAC Sublayer, Physical layer) 4. Gigabit Ethernet(MAC Sublayer, Physical layer) 5. Network Interface Cards (NIC), Components of NIC, Functions of NIC, Types of NIC.	10	1,2,3
Total No of Lectures		48	

Term-II

Unit No.	Topic	No. of Lectures	Ref. Books
5.	Chapter 5 : Wireless LANs 1. IEEE802.11 (Architecture, MAC Sub layer, Frame Format, Frame Types, Addressing Mechanism) 2. Bluetooth (Architecture Piconet and Scatternet Applications)	10	1,2,3
6.	Chapter 6 : Information Security Concepts 1. Information Security Overview: Background and Current Scenario 2. Types of Attacks 3. Goals for Security 4. E-commerce Security 5. Computer Forensics 6. Steganography	10	1,2,3
7	Chapter 7: Security Threats and Vulnerabilities 1. Overview of Security threats 2. Weak / Strong Passwords and Password Cracking 3. Insecure Network connections 4. Malicious Code 5. Programming Bugs	10	
8.	Chapter 8 : Cryptography / Encryption 1. Introduction to Cryptography / Encryption 2. Digital Signatures 3. Public Key infrastructure 4. Applications of Cryptography 5. Tools and techniques of Cryptography	10	
9.	Chapter 9: Wireless Networks and Security 1. Components of wireless networks 2. Security issues in wireless	08	
Total No. Lectures		48	

Recommended Books:

- 1) Computer Networks - Andrew Tanenbaum (III Edition)
- 2) Data Communications & Networking - Behrouz Ferouzan (III Edition)
- 3) Complete Guide to Networking - Peter Norton

Objective :-

To acquaint the students with the basic concepts in finance and production functions of a business enterprise.

Term I

Unit No.	Finance	Lectures
	content	
1	Finance :- 1.1 Money and Finance, Need, Nature and Importance of Finance. 1.2 Finance Functions, Objectives of Financial Management, Functions of Finance Manager. 1.3 Financial need of a modern business organization.	10
2	Financial Planning :- 2.1 Meaning, Nature and characteristics of financial planning. Scope, Importance, Advantages, Limitations, of Financial Planning . 2.2 Steps in financial planning. 2.3 Methods of estimating financial requirements.	12
3	Capitalization and Capital Structure :- 3.1 Capitalization – Concept, Factors governing capitalization, over and under capitalization - Causes and effects, Fair Capitalization. 3.2 Capital Structure- Meaning, Concept and Principles of capital structure, Factors influencing the pattern of capital structure. 3.3 Trading on equity- Concepts and effects.	12
4	Management of Capital :- 4.1 Types of capital- Fixed capital and working capital, owned and borrowed capital, Short and Long term Capital. 4.2 Need, Importance, Factors governing fixed and working capital requirement. 4.3 Sources of capital - Shares, Debentures, Public Deposits, Ploughing back of profits, Loans from Bank and Financial Institutions, Trade creditors, Installment credit etc.	14
	Total	48

Term II**(Production, Operations Functions)**

Unit No.	Production, Operations Functions	Lectures
	content	
1	Production management Functions :- 1.1 Meaning, Definition, Functions of Production Management, Responsibilities of Production manager . 1.2 Production Planning - Objectives, Importance, levels of planning. 1.3 Routing & Scheduling - Meaning, Route Sheets, Scheduling, Master and sequential scheduling, scheduling devices.	14

	1.4 Production control- Definition and meaning, Necessity, objectives, factors and techniques of production control	
2	Plant Location and Plant Layout 2.1 Introduction, importance, factors responsible for plant location. 2.2 Plant Layout- Meaning, Definition, Importance of good layout, factors relevant for choice of layout, Line, Process and Product layout. 2.3 Plant Layout - Advantages, disadvantages and techniques.	10
3	Inventory management 3.1 Inventory management -Introduction, methods, and Norms. 3.2 EOQ, Use of Computers in Inventory Management, 3.3 Material Requisition Planning (MRP) , Just In Time (JIT),ABC Analysis.	10
4	Material Handling and supply chain management 4.1 Meaning, function of material handling, principles of material handling. 4.2 Common material handling devices fork lift truck, platform truck, straddle carrier, chain hoist, roller and belt conveyor, bridge crane, crawler crane. 4.3 Supply chain management- Theory, Principles, Implications, Factors affecting supply chain management.	14
	Total	48

Recommended Books	
1.	Fundamentals of Business Finance- Dr. R. M. Shrivastav
2.	Corporate Finance- S C Kuchhal
3.	Industrial Finance- M C Kuchhal
4.	Corporate Finance- Dr. P V Kulkarni
5.	Financial Management- Dr. Prasanna Chandra
6.	Production, Operations Management - Dr.B.S. Goel (Pragati Prakashan Meerut)
7.	Operations Management- Norman Gaither, Greg Frazaiier (Sengage Learning)
8.	Production Management - Chunawalla

T.Y. B.Com.

Banking & Finance Special Paper III

Subject Name :- Banking Law and Practices in India.

Course Code :- 306 - b.

Objectives:

1. To acquaint the students with Banking Law and Practice in relation to the Banking system in India
2. To understand the legal aspects of Banking transactions and its implications as Banker and Customer.
3. To make the Students aware of the Banking Law and Practice in India

Term I

Unit No.	Topic	Lectures
1.	LAWS RELATING TO BANKING IN INDIA Provisions of The Banking Regulation Act, 1949, with reference to the following: Definition – Capital - Reserve Fund - Cash Reserve for Non Schedule Banks Liquid Assets – Licensing - Branch Licensing - Management Profit and Loss Account and Balance Sheet – Sec. 10, 29 & 30 Powers of the Reserve Bank of India – Sec. 35 & 36 Voluntary Amalgamation – Sec. 44A Compulsory Amalgamation – Sec. 45 Liquidation – Sec. 45 Banking Regulation Act as applicable to Co-operative Banks.	14
2.	NEGOTIABLE INSTRUMENTS ACT, 1881 Definition, Characteristics and Presumptions of Negotiable Instruments. Promissory Note, Bills of Exchange and Cheque – Definition and Features Parties to Negotiable Instruments Negotiation Presentment Notice of Dishonor Noting and Protesting	14
3.	PAYING BANKER Precautions in Payment of Customers' Cheques Paying Banker's Duties and Rights Statutory Protection to Paying Banker Payment of forged Cheque Return of cheques	10
4.	COLLECTING BANKER Precautions in collecting Customer's Cheques Collecting Banker's - Duties and Rights Statutory Protection to Collecting Banker Dishonor of Cheques by Non-Acceptance and Non-Payment	10
Total		48

Term II

Unit No.	Topic	Lectures
5	RELATIONSHIP BETWEEN BANKER AND CUSTOMER	14

	Definition of Banker and Customer Relationship as Debtor and Creditor Banker as Trustee Banker as Agent Banker's Obligation of Secrecy of Accounts Banker's Lien Right of Set Off Disclosure permitted by the Banker's Practices and Usage Bankers Obligation to honour Cheques Garnishee Order Termination of Relationship	
6	SECURITIES FOR ADVANCES: Principles of Secured Advances Precautions to be taken by the banker while advancing against: a. Documents of title to Goods b. Real Estate c. Fixed Deposit Receipt d. Bullion e. Supply Bills f. Life Insurance Policy g. Shares h. Agricultural Produce	10
7.	MODES OF CREATING CHARGE: Lien , Pledge , Hypothecation Mortgages and types of Mortgages, Precautions to be taken by Bankers while creating and recording charge	10
8.	PROJECT APPRAISAL & RECOVERY MEASURES A) Steps in Project Appraisal - Economic, Technical, Managerial, Operational and Financial Aspects. B) Recovery Measures: i) Legal Measures: Debt Recovery Tribunal – LokAdalat – Corporate Debt ii) Non Legal Measures: Follow up action – One time settlement – Recovery Camps – Recovering through Self Help Groups. Recovery System – Recovery under Securitisation and Reconstruction of financial Assets and enforcement of Security Interest Act, 2003	14
Total		48

Recommended Books

1. Practice of Law and Banking -: G.S. Gill
2. Banking Law and Practice -: P.N. Varshney
3. Banking Theory and Law Practice -: E. Gordon, K. Natarajan
4. Banking Law and Practice in India -: M.L. Tannan
5. Banking Law and Practice in India -: Maheshwari
6. Law and Practice of Banking -: Prof. Mugli
7. Banking Theory and Practice -: K.C. Shekar
8. Law and Practice of Banking -: B.M. Lall and Nigam
9. Banking Law & Practices Shri. Prakash Misal, Success Publication.

T.Y. B.Com.
Business Laws & Practices Special Paper III
Subject Name -: Business Laws & Practices.
Course Code -: 306 – c.

Objectives –

- 1) To impart the students with the knowledge and understanding of important business Laws including tax related laws.
- 2) To acquaint the students with Company law & Secretarial Practice.

Term I

Unit No.	Topic	Lectures
1	Central Excise Act 1944 Meaning and object of Excise - Definitions- Goods, Manufacture, Production, Excisable Goods - Registration Procedure and Documentation - Valuation - Transaction Value, Valuation under MRP, Tariff Value, Valuation under Central Excise Valuation Rules. Simple Problems on valuation - Daily Stock Account (DSA), Invoicing and Periodical returns, Assessment - Payment of Duty - Method, manner and mode of duty, payment, Account Current and TR – 6 – Challan - CENVAT - Definition of INPUT, CAPITAL GOODS, Manner and availment of CENVAT - SSI Unit - Records, Documents to be maintained, Benefits for SSI Units - SSI Units and Manufacture of Branded goods - SSI Unite and job work	10
2	Service Tax – 1. Meaning, object and scope of the service tax. 2. Taxable Services - Stock Broking. – Advertising – Courier - Tour Operator - Photography Services - Online information and data base access and/or retrieval - services - Value of taxable service 3. Procedure of Registration, Payment of Service Tax, Refund of Service Tax. 4. Return of Service Tax, Assessment and Penalties.	10
3	CUSTOM ACT 1962. , 1. Meaning object and scope, Definitions - Customs Area, Customs Port / Air Port / Station /Water - Prohibited goods - smuggling - Shipping Bill - Entry - Bill of Entry-Bill of Export - Costal Goods. 2. Levy and exemption from Custom duty - Valuation of goods for purpose of assessment. 3. Clearance of Imported and Exported goods - Confiscations of goods and conveyances and imposition of penalty.	10
4	CENTRAL SALES TAX ACT 1956 1. Definitions - Sale, inter-state sales, intra-state sales, sales during import sales, export, goods, dealer, appropriate state, declared goods. 2. Persons liable to pay CST, Rate of CST, Practical Problems on Calculation of CST payable. 3. Registration under CST Act	10
5	Law of patent & Trade Mark	08

	Patent Act 1970 – Important Definitions, Inventions Net Partner, Application for patents,, Opposition to Grant of Patent, Grant and sealing of patents, Suit concerning infringement of patents, Surrender and revocation of patents, penalties. Trade Mark Act 1999 – Important definitions, procedure of Registration, Duration, Renewal etc. of registration - infringement of Trade Mark -Penalties.	
Term II		48
6	Role of company secretary Origin & concept – Definition of secretary - Importance of company secretary - Duties, Liabilities & Rights of company secretary - Qualification of Company secretary	12
7	Borrowing Powers and Methods of Borrowing Statutory Provisions - Unauthorized Borrowings - Security for borrowings - Mortgage – Pledge – Hypothecation – Charge - Fixed Mortgage and Charge - Registration of Charges Method of borrowings - Short-term Borrowings – Loan From Banks - Public Deposits - Companies Acceptance of Deposits Rule 1975 - Repayment of Deposit and Powers of Company • Company Law Board • Income Tax on Company Deposits • Regulation by RBI • Long and Medium Term Borrowings Debentures : Meaning, Kinds - Procedure for Issue of Debentures - Guidelines for Issue of Debentures - Rights of Debenture holders - Liabilities of Trustees - Transfer and Transmission of Debentures – Redemption - Reissue of Redeemed Debentures • Appointment of a Receiver and Its Registration • Inter-Company Loans and Investments	08
8	Dividend, Interest & Bonus Shares Dividend Meaning, Statutory Provisions - Conditions under which Dividend may not be paid - Declaration of Dividend - Dividend paid out of Reserves - Unpaid or Unclaimed Dividend Transfer to Central Govt. - Procedure for Payment of Dividend - Dividend Mandates / Authority - Interim Dividend - Loss of Dividend Warrants - Payment of Interest out of Capital - Dividend and Income Tax Interest – Meaning and Distinction from Dividend - Procedure of paying Interest on Debentures Bonus Shares – Bonus Shares or Capitalization of Profits - Statutory Provisions / Guidelines for Issue of bonus shares, Procedure for Issue of Bonus Shares - Forms of Issue of Bonus Shares - Effects of Issue of Bonus Shares - Advantages of the Issue of Bonus Shares - Limitations of the	14

	Issue of Bonus Shares	
9	Accounts, Statutory Books & Registers Accounts : Books of Accounts - Annual Accounts - Balance Sheet of a Holding Company - Annual Return - Statutory Books and Registers - Statistical Books	04
10	Company Audit Appointment of Auditors - Special Audit - Audit of Cost Accounts - Removal of Auditors - Remuneration and Expenses of an Auditor - Qualifications and Disqualifications of an Auditor - Rights, Powers and Duties of an Auditor - Auditor's Report - Liabilities of Auditor	10
		48

Recommended Books :-

1. Company Law – A.K.Mujumdar (Taxmann Publication Pvt.Ltd.)
2. Company Law – Avtar singh (Eastern Book Comp. Lucknow)
3. Secretarial Practice – M.C. Kuchhal
4. Indirect Taxes – V.S.Datey (Taxmann Publication Pvt.Ltd.)
5. Indirect Taxes- S.C. Mehrotra (Sahitya Bhavan Publication, Agra)
6. Corporate Law – Dilip Shinde, Kiran Nerkar, Abhishek Sahu
(Sai Jyoti Publication)

T.Y. B.Com.
Co-operation and Rural Development Special Paper III
Subject Name -: Co-operation and Rural Development.
Course Code -: 306 – d.

Objectives -:

1. To acquaint students with the co-operative marketing
2. To develop the capability of students for knowing different types Marketing.
3. To aware the role of National Agricultural Co-operative Marketing Federation (NAFED)

Term I

Unit No.	Topic	Lectures
1	Introduction to Marketing 1.1 Meaning and definition 1.2 Elements 1.3 Objectives 1.4 Importance 1.5 Evaluation of marketing 1.6 Scope of marketing 1.7 Classification of markets - Local, Regional, National and Global markets	10
2	Co-operative Marketing 2.1 Basic concepts and features. 2.2 Structure of cooperative marketing 2.3 Primary Co-operatives Marketing Societies-objects, Functions and Progress. 2.4 District and State Co-operatives marketing societies / Federation - objects, Functions and Progress. 2.5 Development and Evaluation.	10
3	Consumer Co-operatives 3.1 Meaning, Need and Importance 3.2 Structure. 3.2.1 Primary Co-operative Consumer Stores, Student Consumer Stores. 3.2.2 Wholesale Co-operative Stores 3.2.3 Super markets 3.2.4 State Co-operative Consumer Federation 3.2.5 National Co-operative Consumer Federation 3.2.6 Problems of consumer co-operatives 3.3 Evaluation and development	10
4	Other Co-operative and It's Marketing 4.1 Dairy Co-operatives 4.2 Poultry Co-operatives 4.3 Sugar Co-operatives. 4.4 Cotton processing (Ginning, Spinning Mills)	5
5	Pricing 5.1 Meaning and Objectives of Pricing 5.2 Competitive and Co-operative Pricing 5.3 Agricultural Cost and Price Commission (ACPC)	8

	5.4 Mechanism of estimating of Minimum Support Price (MSP) by ACPC 5.5 Problems related to MSP	
6	Marketing Research 6.1 Concept and Scope 6.2 Steps involved in marketing research 6.3 Globalization and marketing research 6.4 Need and practice of marketing research in co-operatives	5
	Total	48

Term-II

Unit No.	Topic	Lectures
6.	Marketing Strategy for Co-operatives 6.1 Meaning and definition 6.2 Importance of marketing strategy in co-operatives 6.3 Factors influencing marketing strategy of co-operatives 6.4 Marketing strategy followed by 6.4.1 Agricultural Cooperative Processing. 6.4.2 Co-operative produce Marketing. 6.4.3 Co-operative Service Marketing. 6.5 Strategy for Exporting Agricultural Produce.	12
7.	National Agricultural Co-operative Marketing Federation (NAFED) of India limited. 7.1 Objectives 7.2 Organizational Set-up 7.3 Functions 7.4 Performance and evaluation of NAFED.	8
8.	Agricultural Produce Market Committee 8.1 Organizational Set-up 8.2 Functions 8.3 Progress and Problems	10
9.	Agricultural Produce Market (Regulation) Act, 1963 9.1 Background for Enactment 9.2 Objectives 9.3 Feature of the Act 9.4 Main Provisions.	8
10.	The Agricultural Produce Marketing (Development & Regulation) Act, 2003 (Model Act) 10.1 Objectives 10.2 Basic features. 10.3 Main provisions 10.4 Impact on Agricultural Marketing	10
	Total	48

Recommended Books

Dr. Mukund Tapkir:- Sahakar ,Nirali Prakashan, Pune

Dr G.H.Barhate, Dr.J.R.Bhor and, Prof. L.P.Wakale--Sahakar ,Seth Publication , Mumbai.

G.S.Kamat.- Cases in Co-operative management.

K.K.Taimani.- Co-operative Organization and Management.

G.S.Kamat.- New Dimensions of Co-operative Management.

Dr G.H.Barhate, Prof.B.G.Sahane and Prof, L.P.Wakale---Sahakar vikas , Seth Publication, Mumbai.

Vasant Desai—Fundamentals of Rural Development.

Dr.Dandekar and Rath- Poverty in India.

Dr.P.R.Dubhashi- Rural Development and Administration in India.

V.Reddy- Rural Development in India

S.K.Gopal- Co-operative Farming in India.

I.C.A--State and Co-operative Movement.

K.K.Taimani.- Co-operative Organization and Management.

Dr.D.M.Gujrathi and Prof.A.D.Divekar, Patsansthace Vishwat

Objectives :-

- 1 To impart knowledge regarding costing techniques.
- 2 To provide training as regards concepts, procedures and legal Provisions of cost audit.

Level of Knowledge :- Basic Knowledge.**Term I**

Unit No.	Topic	Lectures
1.	Marginal Costing:	18
	1.1 Meaning and concepts- Fixed cost, Variable costs, Contribution, Profit-volume Ratio, Break-Even Point & Margin of Safety. 1.2 Cost-Profit-Volume Analysis- Assumptions and limitations of cost volume analysis 1.3 Application of Marginal Costing Technique:- Make or buy decision, Acceptance of export order & Limiting factors.	
2.	Budgetary Control:	12
	2.1 Definition and Meaning of Budget & Budgetary control 2.2 Objectives of Budgetary control 2.3 Procedure of Budgetary control 2.4 Essentials of Budgetary control 2.5 Advantages and Limitations of Budgetary control 2.6 Types of Budgets.	
3.	Uniform costing and Inter-firm Comparison	08
	3.1 Meaning and ,objectives 3.2 Advantages and disadvantages.	
4.	Introduction to management information system in Costing	10
	4.1 Meaning , objectives and Advantages 4.2 Procedure of MIS	
	Total	48

Term II

Unit No.	Topic	Lecture
5.	Standard Costing	16
	5.1 Definition and meaning of standard cost & standard Costing . 5.2 Types of standards, setting up of Material & Labour Standards 5.3 Difference between Standard Costing & Budgetary Control. 5.4 Advantages and Limitations of standard costing 5.5 Variance Analysis & its Significance 5.6. 1 Meaning, Types and Causes of Material & Labour variances. 5.6. 2 Problems on Material & Labour variances.	
6	Farm Costing	10
	6.1 Meaning and Features of Farm Costing 6.2 Advantages & Limitations of Farm Costing 6.3 Practical Problems	

7	Cost Accounting Record Rules & Cost Audit:	12
	7.1 Introduction to cost accounting record u/s 148 of the companies Act 2013 7.2 Cost records and Verification of Cost Records 7.3 Cost auditor – Appointment- Rights and duties	
8	Cost Audit (Legal Provisions):	10
	8.1 Cost Audit - Meaning, Scope, objectives & advantages of Cost Audit. 8.2 Cost Audit Report and Annexure to cost Audit Report. 8.3 Introduction to Cost Accounting Standards issued by Institute of Cost and Management of India . 8.4 Generally accepted Cost Accounting principles.	
	Total	48

Note :-

Allocation of Marks-

- a) 50% For Theory.
- b) 50% For Practical Problems.

Areas of Practical Problems:

Marginal Costing [problems on P/V Ratio BEP, M/S Angle of incidence
Budgetary Control-[Sales Budget, Cash Budget, Flexible budget .
Standard Costing-Material & Labour Variances only. [Simple problem]
Farm Costing [Farm Cost sheet]

Books Journals and Websites Recommended for Cost and Works Accounting Paper I, II and III	
1.	Prof. Subhash jagtap -: Practice in Advanced costing and Management Accounting. Nirali Prakashan, Pune
2.	Ravi Kishor -: Advanced Cost Accounting and Cost Systems Taxman's Allied Service Pvt.Ltd., New Delhi.
3.	S.P. Lyengar -: Cost Accounting Principles and Practice, Sultan Chand & Sons Accounting Taxman's, New Delhi.
4.	Ravi Kishor -: Students Guide to Cost Accounting Taxman's, New Delhi.
5.	M.N. Arora -: Cost Accounting Principles and Practice Vikas Publishing House Pvt. Ltd., New Delhi.
6.	S.N. Maheshwari and S.N. Mittal -: Cost Accounting, Theory and Problems, Mahavir book Depot, New Delhi.
7.	B.L. Lall and G.L. Sharma -: Theory and Techniques of Cost Accounting. Himalaya Publishing House, New Delhi.
8.	V.K. Saxena and Vashista -: Cost Accounting – Text book. Sultan Chand and Sons, New Delhi
9.	V.K. Saxena and Vashista -: Cost Audit and Management Audit. Sultan Chand and Sons, New Delhi
10.	Jain and Narang -: Cost Accounting Principles and Practice. Kalyani Publishers
11.	N.K. Prasad -: Principles and Practice of Cost Accounting Book Syndicate Pvt. Ltd., Calcutta.
12.	N.K. Prasad -: Advanced Cost Accounting Syndicate Pvt. Ltd., Calcutta.
13.	R.K. Motwani -: Practical Costing. Pointer Publisher, Jaipur.
14.	R.S.N. Pillai and V. Bhagavati -: Cost Accounting.
15.	Hornefrain and Datar -: Cost Accounting and Managerial Emphasis.
16.	Dr.J.P.Bhosale -: Management Accounting, Vision Publication

T.Y. B.Com.
Business Statistics Special Paper III
Subject Name :- Business Statistics.
Course Code :- 306 – f.

Objectives:

1. To study different optimization techniques.
2. To study different charts.
3. To study simulation.

Sr. No.	Topic	No. of Lectures
Term 1		
Unit 1	Game Theory: Meaning, two person zero-sum game, pure and mix strategies, Pay off tables, saddle points, minimax and maximin principles, Dominance principles. Examples and problems.	10
Unit 2	Statistical Decision Theory: Introduction, acts, states of nature, pay off, regret, Decision Making Under Risk, Expected Opportunity Loss (EOL) Criterion and Expected Monetary Value (EMV) Criterion. Decision Making Under Uncertainty, Maximin Criterion, Maximax , Minimax Regret Criterion, Laplace Criterion, Hurvitz Criterion, Examples and problems.	16
Unit 3	Replacement Problem: Introduction, replacement of Item that deteriorates with time when value of money remains same during the period.	6
Unit 4	Statistical Quality Control : Introduction, Chance and assignable Causes of variation, Uses of SQC, Control limits, specification limits, Tolerance limits Process and product control, Control charts for mean, range, P-Chart, C-Chart , Process Capability study , Interpretation of capability index C_p and C_{pk}	16
Term 2		
Unit 5	CPM/PERT: Meaning and scope, activity, event, node, network, path, critical path, slack, float (total, free, independent), forward pass and backward pass methods. Pessimistic, Most likely and Optimistic times in PERT, mean and variance for each activity, expected duration of project, probability of completion of project, Examples and problems.	16
Unit 6	Simulation: Meaning and scope, Advantages and disadvantages of simulations, Examples and problems, step wise procedure of drawing model sample using EXCEL from i) uniform distribution and ii) normal distribution using Box-Muller transformation.	10
Unit 7	Queuing Theory: Meaning, calling population, queue discipline, inter arrival rate, service	10

	rate, traffic intensity, single channel Poisson arrival with exponential service rate, average waiting time in i) queue and ii) system, average length of i) queue and ii) system. Examples and problems.	
Unit 8	Application of derivative in Business: Algebraic Function: Cost function, Profit function, Revenue function. Derivative and double derivative of some simple algebraic functions and its meaning in computation of maxima and minima of a function. Concept of average cost, marginal cost, variable cost and fixed cost. Examples and problems.	12

List of Practicals

Sr. No.	Name of Experiment
1	Game Theory
2	Statistical Decision Theory
3	Statistical Quality Control
4	CPM/PERT
5	Simulation Using Excel
6	Queuing Theory

Books Recommended:

1. Operations Research : Harndy, Taha
2. Operations Research: Kantiswroop, Gupta
3. Business Mathematics : J. K. Sharma
4. Statistical Quality Control: Montgomery
5. Fundamentals of Mathematical Statistics: Gupta, Kapoor V.K.
6. Fundamentals of Statistics: S.C. Gupta

Pattern of Question Paper (Annual Exam)

Max. Marks:80

Time : 3 hours

Question No.

Max. Marks

Q 1 Attempt any five of the following (2x5)	10
Q 2 Attempt any four of the following (5x4)	20
Q 3 Attempt any four of the following (5x4)	20
Q 4 Attempt any two of the following (15x2)	30

T.Y. B.Com.
Business Entrepreneurship Special Paper III
Subject Name -: Business Entrepreneurship.
Course Code -: 306 – g.

Objectives:-

- 1) To develop the Knowledge and understanding of behavioral aspects of entrepreneurship.
- 2) To acquaint students with the behavioral aspects of members of the team or employees

Term I

Unit No.	Topic	Lectures
1.	Organizational Behavior: Organization; Meaning, Definitions, Goals, Approaches. Organizational Behavior – Meaning, Definitions, Need. Nature. Importance & Scope Historical roots of OB. Organizational Behavior Models.	12
2.	Individual Behavior and Personality: Determinants of individual behavior – Personality: Meaning, Definitions, Determinants of Personality, Personality Traits, Personality Development, Emotional Intelligence, Entrepreneurial Personality.	12
3.	The study of Autobiographies of following Entrepreneurs: (1) Dr. Nilakantha Kalyani (2) Shri. D.S. Kulkarni (3) Mr. Aditya Vikram Birla (4) Shri. Dilip Narayan Borawake (5) Mrs. Jyoti Naik (Ejjat Ki Lajjat, Shri Mahila Gruh Udyog, Lijjat Papad) (6) Shri Ramesh J. Chavan-Thundered Unbottled	12
4.	Group and Group Dynamics: Meaning and Definitions of group, Classification of group, Group task Group size – Group formation process. Group Structure. Group Dynamics: Influence in Group Group Cohesion – Helping Behavior, Co – Operation and Competition Improved Work group.	12
Total		48

Term II

Unit No.	Topic	Lectures
5.	Team Building: Team - Meaning and Definitions Team v/s Group Types of team Creating high performance team Managing team	12
6.	Stress and Conflict Management: Stress – Meaning and Definitions. Types Sources and Consequences of stress Stress management – Personal and Organizational approach	12

	Conflict Management: Meaning and nature of Conflicts. Types Causes of Conflicts. Remedies to overcome the Conflicts	
7.	Motivation: Motivation at work place – Meaning and Definitions. Need & Types of Motivation Job description & Job analysis Management by Objects (MBO)– Job rotation – Job enrichment – Employee Involvement Programme	12
8.	Organizational Change and Development: Meaning and Definitions Causes of Change A Change Model Resistance to Change Strategies of Change and Development	12
	Total	48

Recommended Books	
1)	Tosi H.L., Rizzo J.R., Carrol S.J. 'Handbook of Organizational Behaviour' – Infinity Books, New Delhi.
2)	Robbins Stephen – 'Organizational Behaviour' Prentice – Hall of India, New Delhi.
3)	Ghandekar (Dr.) Anjali – 'Organisational Behaviour' – Everest Publishing House.
4)	Journal: Shri. Ram Centre for Industrial Relations and Human Resources – 'Indian Journal of Industrial Relations' New Delhi.
5)	Vyavsay Udhojyakata-Dr.Sudhakar Jadhavar Success Publication Pune
6)	Udhojyakanchi Kartutvagatha-Dr.P,C,Shejwalkar

T.Y. B.Com.

Marketing Management Special Paper III

Subject Name :- Marketing Management.

Course Code :- 306 - h.

Objectives of the Paper

1. To know detailing of Marketing Research
2. To understand the role Brand and Distribution Management in marketing
3. To inform about Marketing and Economic Development
4. To Know of the importance of control on marketing activities

First Term

Unit 1

Advertising I

a) Fundamentals of Advertising

1. Conceptual framework, Nature, Scope and Functions of Advertising
2. Role of Advertising in Modern Business
3. Advertising – Objectives – Types, Benefits and Limitations
4. Ethics in Advertising

b) Advertising Media

1. Definitions – Classifications and Characteristics of Different Media
2. Comparative Study of Advertising Media
3. Selection of Media-Factors Affecting Selection of Media
4. Media Mix-Geographical selective-Media Scheduling
5. E-Advertising
(14 periods)

Unit 2

Advertising II

Appeals and Approaches in Advertisement

1. Introduction- Different Appeals and their Significance
2. Advertising Message
3. Direct and Indirect Appeal
4. Relation between Advertising Appeal and Buying Motive
5. Positive and Negative Emotional Approaches
(12 periods)

Unit 3

Brand management

- a) Introduction of Branding
- b) Brand identity
- c) Advertising and Branding
- d) Brand Extension
- e) Identity Sources – symbols, logos, trademarks
(10 Periods)

Unit 4

Industrial Marketing

- a) Introduction to Industrial Marketing
 - b) Types of Industrial Goods
 - c) Difference between Industrial and Consumer Marketing
 - d) Purchasing practices of Industrial customers
- (12 Periods)

Second Term

Unit 5

Marketing Research

- a) Meaning, nature and scope of Marketing Research
 - b) Marketing Research process
 - c) Types of Research
 - d) Types of Data
 - e) Types of Questionnaire
- (14 Periods)

Unit 6

Distribution Management

- a) Warehousing and Transport decisions
 - b) Logistics – meaning, nature
 - c) Logistics Function
 - d) Warehousing – need, functions
 - e) Transportation – modes, factors affecting transportation costs
- (10 Periods)

Unit 7

Target Marketing

- a) Meaning, nature, importance
 - b) Market Targeting
 - c) Selection of Target Segment
 - d) Targeting Strategies
- (10 Periods)

Unit 8

Marketing Control

- a) Meaning, objectives of Marketing Control
 - b) Benefits of Marketing Control: - essential of an effective Marketing Control System
 - c) Techniques of Marketing Control
 - d) Process of Marketing Control
 - e) Marketing Audit – meaning, characteristics, objectives, process of Marketing Audit
- (14 Periods)

Recommended Books:

Philip Kotler	Marketing Management
David Carson	International Marketing: A Comparative System Approach, Wiley, New York
Steven M. Bungess	The New Marketing Halfway House, Zebra Press, South Africa
David J. Schwartz	Marketing Today: A Basic Approach Harcourt Brace Jovanovich, New York
Thomas V. Boroma	The Marketing Edge: Making Strategic Work The Free Press, New York
Peter Doyle	Value-based Marketing: Marketing Strategies for Corporate Growth and Shareholder value John Wiley, Crichester, England
E. Jenome McCarthy	Basic Marketing: A Managerial Approach Irwin, Homewood, Illinois
Bert Rosenbloom	Marketing Channels: A Management View Dryden, Hinsdale, Illinois
Edward L. Nash	Direct Marketing: Strategy, Planning, Execution McGraw Hill, New York

Suggested mode of conducting practical

1. Guest lecture
2. Library assignment
3. Case study
4. Field visit
5. Conducting Survey
6. Presentation

T.Y. B.Com.
Agricultural and Industrial Economics Special Paper III
Subject Name :- Agricultural and Industrial Economics.
Course Code :- 306 – i.

Objectives –

1. To study the agricultural development in India.
2. To understand the role of industries in India – in the light of globalization.

Term I – Agriculture and Rural Development		
Unit	Topic	Lectures
1.	Rural Economy of India 1.1 Features of Rural Economy. 1.2 Recent Trends in Agriculture Economy – Horticulture & Sericulture	08
2.	Irrigation and Agricultural Inputs 2.1 Types of Irrigation. 2.2 Modern Changes in Irrigation. 2.3 Plant Analysis and Soil Analysis Methods	10
3.	Rural Credit :- 3.1 Need &Types of Rural Credit. 3.2 Role of cooperative credit. 3.3 Role of NABARD	10
4.	Rural Development Programs :- 4.1 Community Development Programme. 4.2 Intensive Agricultural Area Programme. 4.3 Small Farmers Development Agency.	10
5.	Co-Operation in India :- Functions, Growth and Weaknesses of 5.1 Dairy Cooperatives. 5.2 Poultry Cooperatives. 5.3 Service Cooperatives.	10
		Total 48

Term II – Industrial Development		
Unit	Topic	Lectures
6.	Industrial Policy 6.1 Importance of Industrial Policy 6.2 Impact of Industrial Policy since 1991	08
7.	Industrial Imbalance 7.1 Meaning of Industrial Imbalance. 7.2 Need for balance Regional Development in Indian Industry 7.3 Causes & Measure of Industrial Imbalance in India.	08
8.	Globalization & Industrialization :- 8.1 Concept of Multinational Corporations (MNC's) in India. 8.2 Multinational Corporations & Industrial Development. 8.3 Role of Multinational Corporations in Indian Economy 8.4 Impact of Multinational Corporations in India	12

9.	Special Economic Zones (SEZ's) in India :- 9.1 Role of Government in SEZ. 9.2 Impact of SEZ in India	08
10	Infrastructural Development in India 10.1 Importance of Infrastructural Development in Economic Development 10.2 Role of Private Investment in Infrastructural Development. 10.3 Problems of Public Sector Investment in Infrastructural Development.	12
		Total 48

Recommended Books :

1. S.K.Misra and V.K.Puri : Indian Economy - Himalaya Publishing House, Delhi.
2. Khedkar B.D. : Indian Economy, Success Publication, Pune
3. Sundaram & Black : The International Business Environment, New Delhi
4. Agrrawal A.N. Indian Economy – Vikas Publication
5. Khem Farooq A. Business and society, S.Chand Delhi
6. Dutt R & Sundaram K.P.M – Indian Economy, s.chand delhi
7. Dutt Rudder : Economic Reforms in India – A Critique – S Chand, New Delhi.
8. Hedge: Environmental Economics, MaMillan.
9. K.V. Srivyya and V.R.M. Das : Indian Industrial Economy, Chand & Com.New Delhi 1977

T.Y. B.Com.
Defense Budgeting, Finance & Management Special Paper III
Subject Name -: Defense Budgeting, Finance & Management.
Course Code -: 306 – j.

Aim of the paper

One of the crying needs of the hour is to ensure that the National Security objectives are met-in a cost effective manner. Against such backdrop, the aim can be achieved by educating the students and disseminating the information and by giving the planners, decision makers and administrators all the information they need in an easily understandable form. By studying this paper students will understand all the financial aspects of budgetary and management systems in India.

Term I

Unit No.	Topic	Lectures
1.	Financial Management. a. Purpose, Planning, Control and Need. b. Salient Features of India's Economic System.	10
2.	Economic Theories of Defence. a. Concept of Public Good. b. Defence and Development. c. Basic Macro – Economic Concept.	10
3.	Government Financial System. a. Introduction – Principles, Structure Ministry of Finance, Parliament, Controller and Auditor General.	10
4.	Defence Budget Structure. a. Preparation. b. Allocation and Execution of Defence Budget.	08
5.	Financial Administration in Defence Services. a. Role of Financial Advisor. b. Defence Accounts Department. c. Structure of the Five Year Defence Plan and its Formulation, Approval and Execution.	10
Total		48

Term II

Unit No.	Topic	Lectures
6.	New Trends in India's Defence Expenditure. a. Understanding of the Defence Budget. b. Analysis of India's Defence Expenditure Since 1998. c. Impact of Expenditure on Defence Forces.	12
7.	Elements of War Potential. a. Economic Elements. b. Natural Resources and Raw Material. c. Manpower and its utility. d. Industrial Capacity. e. Foreign Aid as a Contributory Element.	12

8.	Effects of War. a. Economic Structure. b. Industry. c. Post War Problem.	12
9.	Challenges in Defence and Financial Management. a. System of Financial Management in Defence. b. Linkages between Planning and Budget. c. Arm Impacts vs. Indigenisation: Progress, Pitfalls and Impact on Defence Budget.	12
Total		48

Recommended Books	
1.	Raju G.C. Thomas, "The Defence of India: A Budgetary Perspective" (MacMillan Publication, New Delhi, 1978)
2.	Subramanyam K., "India's Security Perspective – Policy and Planning", (Lancer Books, New Delhi, 1991).
3.	Nanda Ravi, "National Security Perspective, Policy and Planning", (Lancer Books, New Delhi, 1991).
4.	Khanna D. D. and Malhotra P. N., "Defence vs. Development: A Case Study of India", (Indus Publication Company, New Delhi, 1993).
5.	Kennedy Gavin, "Defence Economics", (Gerald Duckworth & Co. Ltd, 1983).
6.	Ghosh Amiya, "India's Defence Budget & Expenditure Management in Wider Context", (Lancer Publication and Span Tech, Delhi, 1996).
7.	Dutta Meena and Sharma Jai Narayan, "Defence Economics", (Deep and Deep Publication, New Delhi)
8.	Deger S. & Sen S. "Military Expenditure in the Third World Countries: The Economic Effects", (Routlet & Kegan Paul, 1986).
9.	Agarwal Rajesh K., "Defence Production and Development", (Gulab Vazirani for Arnold Heinermann Publishers, 1978).
10.	Thomas Raju G. C., "Indian Security Policy", (Princeton, New Jersey, University Press, 1988).
11.	Robert Loony and David Winterford, "Economic Causes and Consequences of Defence Expenditure in the Middle East and South Asia", (University Press, 1995).
12.	Shrinivas V. N., "Budgeting for Indian Defence: Issues of Contemporary Relevance", (KW Publishers Pvt., Ltd., New Delhi – 2008).
13.	Annual Report, Ministry of Defence, Government of India.
14.	Report of the Finance Commission, Government of India.

T.Y. B.Com.
Insurance Transport and Clearance Special Paper III
Subject Name :- Insurance Transport and Clearance
Course Code :- 306 – k.

Objectives :

- 1) To understand the importance of travel and tourism industry.
- 2) To study the functions and working of various Travel Organizations.
- 3) To understand the marketing mix and recent trends of Global Tourism and Transport Business.

Term I		
Unit	Topic	Lectures
1	Development of Tourism Planning for International Tour, Factors considers to travel and tourism business, planning for tour, Reservation, Group Tours, Currency ticket arraignment, Hotel Reservations	12
2	Functions and Working of Travel Organizations IATA (International Air Travel Agency) WTO (World Tourism Organization) IUTO (International Union of Travel Organization) TAAI (Travel Agents Association of India) PATA (Pacific Air Travel Association)	12
3	Tour Planning Requirement documents for foreign tour-Passport, Visa, Health clearance, reading of maps, Role of Embassy, City Guides, Whether conditions, comparative study of tourism in India and Other Countries.	12
4	Transport Means Current scenario of Railway, Road, Water and Air transport in India Significance of Transport in Indian Economy, Role of Air and water transport in global trade. Logistic Management- Elements, Features, Important of logistics management in Business and Industry	12
		Total- 48

Term II		
1	Development of Tourism Role of Tour and Travel Agents- Advertisement, Publicity, Marketing of group tours, Knowledge of employer packages, schemes, LTC facility to employee, Designing of Package tours suitable to employees.	12
2	Tourism Knowledge of Popular Countries Thailand And Malaysia, Gulf and Dubai, Singapore and Hong Kong, U.K., Europe.	12

3	Reservation and Accommodation	12
	Holiday Homes, Campus, Rest Houses, Hotels, Hostels, motels, Clubs, Availability of Food and Catering Services at various sites	
4	Qualities Required for Tourism Business	12
	a. Product Knowledge	
	b. Customer Orientation	
	c. Communication skills	
	d. Analytical , ability skills	
	e. Motivation and Behavioral skills	
	f. Presentation skills	
	g. Personality Development and Behavioral Aspects	

Total 48

Recommended Books

- 1) Travel and Tourism Management – Foster Dougals, Macmillan London.
- 2) Service Marketing – Jha S.M., Himalaya Publishing House, Mumbai
- 3) Tourism and Travel Management – Bishwanath Ghosh, Vikash Publishing House
- 4) Tourism Management- Wahab & Salah, Tourism International Press, London.
- 5) Travel and Tourism Business Management – Dr.S.K.Wadekar
Shanti Prakashan, Ahemadabad (Gujrat)

T.Y. B.Com.
Computer Programming and Application Special Paper III
Subject Name :- Software Engineering.
Course Code :- 306 – I.

Objective:

- a. To understand the different system concepts used in Software Engineering.
- b. To learn the different types applications of Software Engineering.
- c. To know the facts about Software Development.

Term-I

Unit No.	Name of the Topic	Number of lectures	Reference Book
1	Introduction to System Concepts 1 Definition , Elements of System 2 Characteristics of System 3 Types of System 4 System Concepts	10	Book1
2	Requirement Analysis 1 Definition of System Analysis 2 Requirement Anticipation 3 Knowledge and Qualities of System Analyst 4 Role of a System Analyst 5 Feasibility Study And It's Types 6 Fact Gathering Techniques 7 SRS(System Requirement Specification)	14	Book1
3	Introduction to Software Engineering 1 Definition Need for software Engineering 2 Software Characteristics 3 Software Qualities (McCall's Quality Factors	10	Book2
4	Software Development Methodologies 1 SDLC (System Development Life Cycle) 2 Waterfall Model 3 Spiral Model 4 Prototyping Model 5 RAD MODEL	14	Book2
	Total Lectures	48	

Term-II

Unit No.	Name of the Topic	Number of lectures	Reference Book

5	Analysis and Design Tools 1 Entity-Relationship Diagrams 2 Decision Tree and Decision Table 3 Data Flow Diagrams (DFD) 4 Data Dictionary Elements of DD, Advantage of DD 5 Pseudo code 6 Input And Output Design 7 CASE STUDIES (Based on Above Topic solve min.5 case studies)	16	Book1, Book2
6	Structured System Design 1 Modules Concepts and Types of Modules 2 Structured Chart 3 Qualities of Good Design Coupling, Types of Coupling, Cohesion, Types of Cohesion 4 CASE STUDIES (Based on Above Topic solve min.5 case studies)	14	Book1 and Book2
7	Software Testing 1 Definition, Test characteristics 2 Types of testing Black-Box Testing, White-Box Testing, Unit testing, Integration testing 3 Validation 4 Verification 5 Testing Tools	10	Book1 and Book2
8	Risk Management 1 Software risk 2 Risk identification 3 Risk projection	08	Book1
	Total Lectures	48	

Recommended Books:

- 1) Software Engineering - Roger s. Pressman.
- 2) SADSE (System Analysis Design) - Prof. Khalkar and Prof. Parthasarathy.

**Savitribai Phule Pune University
(Pattern – 2013) w.e.f. 2015-2016**

**T.Y. B.B.A.
Semester V
Compulsory Paper**

Subject Name :- Supply Chain and Logistics Management

Course Code :- 501

Objectives:

1. To introduce the fundamental concepts in Materials and Logistics Management.
2. To familiarize with the issues in core functions in materials and logistics management

Unit Number	Particulars	No. of lectures
1	Supply Chain Management – 1.1 Concept, objectives, significance 1.2 Process view of a supply chain-cycle and push pull view 1.3 Drivers/components of supply chain – Facilities, Inventory, Transportation, Information, Material Handling 1.4 Achieving tradeoff between customer service and cost	10
2	Physical distribution – 2.1 Definition, Importance, participants in physical distribution process. 2.2 Marketing Channels – Definition and Importance 2.3 Different forms of channels - Unconventional channels - Channels for Consumer goods, Industrial Goods & Services – Integrated Marketing Channels – Horizontal, Vertical, Multi channel 2.4 Functions of Marketing Channels 2.5 Channel Management – Channel Selection Process & criteria 2.6 Performance appraisal of Channel Members - Channel Conflicts & Techniques to resolve channel conflicts	10
3	3.1 Procurement - Supplier Management, Management Supplier Selection, Tendering, E-Tendering, Negotiation 3.2 Warehouse and Dispatch Management - Types of Warehousing, Warehouse Layout Docking and Marshalling, Warehouse Safety Management.	10
4	Inventory - 4.1 Need and Types of Inventory - 4.2 Costs associated with Inventory– Basic EOQ Model - EOQ with discounts; ABC Analysis - (<i>Numericals expected on Basic EOQ, EOQ with discounts & ABC</i>) 4.3 Stacking and Racking Systems. LIFO , FIFO	10
5	Current trends in Supply chain management – 5.1 Green Supply Chain Management	8

	5.2 Role and Future of IT in the Supply Chain 5.3 Customer Relationship Management 5.4 Supplier Relationship Management 5.5 E-Business and the Supply Chain; E-Business in Practice	
	Total	48

Reference Books:

1. *Supply Chain Management* by Sunil Chopra, Peter Meindl & D.V. Kalra
2. *Inventory Management* by L.C. Jhamb
3. *Principles and Practices of Costing* by Sunita Pokharna, Success Publications, Pune
4. *Sales and Distribution Management* by Krishna K. Havaladar & Vasant M Cavale
5. *Purchasing and Supply Management* by Dobler and Burt
6. *Supply Chain Management Best Practices* by David Blanchard
7. *Channel Management & Retail Management* by Meenal Dhotre
8. *The Supply Chain handbook* by James A. Tompkins, Dale A. Harmelink

Compulsory Paper

Subject Name :- Entrepreneurship Development

Course Code :- 502

Objectives:

1. To create entrepreneurial awareness among the students.
2. To help students to up bring out their own business plan.
3. To develop knowledge and understanding in creating and managing new venture.

Unit Number	Particulars	No. of lectures
1	Entrepreneur and Entrepreneurship: 1.1 Concept of Entrepreneur, Manager, Intrapreneur 1.1.1 Definition ,meaning and functions of an entrepreneur 1.1.2 Concept of Manager 1.1.3 Roles and Responsibilities of Manager 1.1.4 Concept of Intrapreneur 1.2. Need and Importance of Entrepreneurship 1.3. Enterprise v/s Entrepreneurship 1.4. Self Employment v/s Entrepreneurship 1.5. Problem of Unemployment and Importance of wealth creation 1.6. Entrepreneurial career as an option.	10
2	Business opportunity Identification and Preliminary Project Report(PPR): 2.1 Opportunity Search: Divergent Thinking Mode: 2.1.1 Meaning ,Objectives 2.1.2 Tools and Techniques: Environmental scanning for business opportunity Identification 2.2 Opportunity Selection: Convergent Thinking Mode: 2.2.1 Meaning ,Objectives 2.2.2 Tools And Techniques: Market Survey 2.3 Preliminary Project Report(PPR)	10
3	Business Plan: 3.1 Meaning and ,Objectives of Business Plan 3.2 Elements of Business Plan 3.3 Business Planning Process - Self Audit, Evaluation of Business Environment, Setting Objectives, Forecasting Market Conditions, Stating actions and resources required, Evaluating Proposed plan, Assessing Alternative strategic plans, Controlling the plan through Annual Budget	10
4	Institutional Support to New Venture (Students are expected to study the assistance scheme of following institutions) 4.1 District Industries Center(DIC)	12 3

	4.2 Maharashtra Industrial Development Corporation(MIDC) 4.3 Small Industries Service Sector(SISI) 4.4 Micro, Small & Medium Enterprise(MSME) Financial Assistance for Small Enterprise: Institutional: a)Bank Loan b) Angel Funding c) Venture Funding d) Self Employment Schemes of Government of Maharashtra e) Government Financial Institutions: Khadi and Village Industries Board(KVIB),Rajiv Gandhi Udyami Mitra Yojana (RUGMY) f) Prime Minister Employment Generation Programme (PMEGP)	
5	Study of Entrepreneurs' Biographies: 5.1 Rahul Bajaj 5.2 Kiran Muzumdar Shaw 5.3 Azim Premji 5.4 Sabeer Bhatia	6
	Total	48

Reference Books:

1. Desai Vasant: "Management of Small Scale Industries" - Himalaya Publishing House
2. Taneja Satish and Gupta: "Entrepreneurship Development-New Venture Creation" - Galgotia Publishing Company, New Delhi
3. Jain P.C: Handbook For New Entrepreneurs Entrepreneurship Development Institute of India
4. Sangle B. R. : Business Environment & Entrepreneurship, Success Publications, Pune
5. Gupta C.B. & Srinivas: "Entrepreneurial Development"- Sultan D, Chand & Sons, New Delhi
6. Prof Rajeev Roy: "Entrepreneurship" - Oxford University Press
7. Edward D. Bono: "Opportunities"

Compulsory Paper

Subject Name :- Business Law

Course Code :- 503

Objectives:

1. To understand basic legal terms and concepts used in law pertaining to business
2. To comprehend applicability of legal principles to situations in Business world by referring to few decided leading cases.

Unit Number	Particulars	No. of lectures
1	Indian Contract Act 1872 1.1 Definition, kinds and concepts of contracts, Essentials U/S10 1.2 Offer and Acceptance 1.3 Consideration 1.4 Legality and Objects of consideration 1.5 Capacity of Parties 1.6 Free Consent 1.7 Void Agreements and Agreements opposed to public policy 1.8 Performance of Contract. 1.9 Discharge of Contract and Remedies.	10
2	The Sale of Goods Act 1930 2.1 Contract of Sales of Goods-Essentials 2.2 Distinction between Sale and Agreement to Sale 2.3 Subject matter of Contract of Sale-Classification of goods & Concept of Price 2.4 Conditions and Warranties-Types and Distinction 2.5 Transfer of Property-Possession & Risk, Passing of property, Goods sent on approval or "on sale or return" basis, Sale by Non-owner 2.6 Performance of a contract of sale-Delivery of goods, Rights and duties of the buyer, buyers liability for rejecting or refusing delivery 2.7 Rights of unpaid Seller 2.8 Remedies for Breach of Contract of Sale	8
3	The Companies Act, 1956 3.1 Company-Definition, Meaning, Features and Types of Companies 3.2 Incorporation of a Company-Mode of forming ,Documents to be filed with registrar, Certificate of Incorporation, Effects of Registration, Promoter and his position 3.3 Memorandum of Association-Its contents and alteration, Doctrine of Ultra Vires 3.4 Article Of Association- Its contents and alteration-Comparison between Articles and Memorandum, Doctrine of	8

	Indoor Management 3.5 Prospectus- Registration and contents 3.6 Statement in lieu of Prospectus	
4	Information Technology Act, 2000 4.1 Preliminary and Definitions 4.2 Digital Signature: Concept, Authentication of electronic records 4.3 Electronic Governance (Legal recognition of electronic records, Legal recognition of digital signatures, Use of electronic records and digital signatures in Government and its agencies) 4.4 Advantages and Disadvantages of E-Governance	8
5	The Right To Information Act, 2005 5.1 Preliminary & Definitions 5.2 Right to Information and obligations of Public Authority: 5.3 Designation of Public Information Officers: 5.4 Request for obtaining information, Disposal of request, Exemption from disclosure of information. 5.5 Grounds for rejection to access in certain cases, Severability, Third party information 5.6 The Central Information Commission: • Constitution of State Information Commission. • Tenure of office and conditions of service. • Removal of State Chief Information Commissioner or State Information Commissioner • Powers & Functions of the Information Commissions, Appeals and Penalty	14
	Total	48

Reference Books:

- 1) *Business and Commercial Laws-Sen and Mitra.*
- 2) *Mercantile Law-S. U. Jadhavar, Success Publications, Pune*
- 3) *Business Law-G. M. Dumbre, Success Publications, Pune.*
- 4) *An Introduction to Mercantile Laws-N. D. Kapoor*
- 5) *Business Laws-N. M. Wechlekar*
- 6) *Company Law-Avatar Singh*
- 7) *Law of Contract-Avtar Singh*
- 8) *Business Laws-Kuchhal M.C.*
- 9) *Business Law for Management-Bulchandani K.R.*
- 10) *Consumer Protection Act in India. Niraj Kumar*
- 11) *Consumer protection in India. V.K.Agrawal*
- 12) *Consumer Grievance Redressal under CPA. Deepa Sharma.*
- 13) *Commentary on the Information Technology Act 2000 by Bhansali S.R*
- 14) *E Governance Issues and Strategies by Chaudhary, Suman Kalyan & Nayak, Sudhanshu Shekhar*
- 15) *Information Technology Act, 2005*

Compulsory Paper

Subject Name :- Research Methodology

Course Code :- 504

Objectives:

1. To provide the students with basic understanding of research process and tools for the same.
2. To provide an understanding of the tools and techniques necessary for research and report writing.

Unit Number	Particulars	No. of lectures
1	Introduction to Research 1.1 Research – Meaning, Characteristics & Importance 1.2 Basic Research Process – An overview & steps involved 1.3 Research Design – Meaning, Characteristics of a good research design 1.4 Components of Research Design 1.5 Sampling Design – Steps involved & Types of Samplings	10
2	Sources of Collection of Data: 2.1 Primary Data: Concept and Definitions 2.2 Respondents: Concept and Meaning 2.3 Secondary Data: Concept and Definition 2.4 Types of sources of secondary data	8
3	Methods of Collecting of Data: 3.1 Primary Data: Methods of collecting primary data, 3.1.1 Survey Method: Types of surveys 3.1.2 Questionnaire Method: Types of questions, Essentials of good questionnaire 3.1.3 Interview Method: Types of Interviews 3.1.4 Experimentation & Observation Methods: Types of observations 3.1.5 Focus Group Methods like Panel groups & Group Discussions 3.2 Secondary Data: Methods of collecting secondary data 3.2.1 Evaluating Quality of Data 3.2.2 Advantages and Disadvantages of Secondary Data	10
4	Data Processing & Analysis 4.1 Data Processing – Editing, Codification, Classification, Tabulation, Scaling & Measurement (Should be taught with help of computer) 4.2 Data Analysis – Methods of analyzing data 4.3 Hypothesis - Concept and Types of Errors 4.4 Hypothesis Testing – Chi Square Test, Z-test & t-test	10

5	Writing Skills for Business Research: 5.1 Project Report Writing – Selecting and defining topic, Writing Chapters, Subject Matter, Style and Structure 5.2 Research Paper Writing – Structure of research paper, referencing styles 5.3 One Research Paper to be written and presented by student (50 % Weightage in Internal Evaluation to be given for the same)	10
	Total	48

Reference Books:

1. Ghosh, B.N. *Scientific Method and Social Research* (Sterling: New Delhi)
2. Kothari. C.R. *Research Methodology – Methods and Techniques* (New Age: New Delhi)
3. Sangale B. R. *Research Methodology – (Success Publications, Pune)*
4. Donald. R. Cooper and Pamela S. Schindler, *Business Research Methods* (Irwin McGraw-Hill Publications, New Delhi).
5. Naresh K. Malhotra, *Basic Marketing Research 4/E* (Pearson Education Publications).
6. S. N. Murthy and U. Bhojanna, *Business Research Methods*. (Excel Books, New Delhi).

Finance Special Paper I

Subject Name -: Analysis of Financial Statements

Course Code -: 505 – A

Objectives:

1. This course is designed to prepare students for interpretation and analysis of financial statements effectively.
2. To make the student well acquainted with current financial practices
3. This course is designed primarily for students who expect to be intensive users of financial statements as part of their professional responsibilities.

Unit Number	Particulars	No. of lectures
1	Financial Statements of Corporate Organizations 1.1 Meaning of Financial statements 1.2 Need of Financial statements 1.3 Importance of Financial statements. 1.4 Preparation of Financial Statements as per schedule VI of the Amended Companies Act 2013 1.5 Revised Schedules 1.6 How to read company's Balance Sheet	8
2	Introduction to analysis and Interpretation of financial statements 2.1 Analysis and Interpretation of financial statements – Meaning/ introduction 2.2 Types of financial analysis 2.3 Advantages of financial analysis 2.4 Limitations of financial analysis 2.5 Techniques of financial analysis i. Comparative financial statements ii. Trend Analysis iii. Common Size Financial Statements iv. Funds Flow Analysis v. Cash Flow Analysis vi. Ratio Analysis	8

3	Ratio Analysis 3.1 Concept of Ratio 3.2 Meaning of Ratio Analysis 3.3 Interpretation of Ratios 3.4 Classification of Ratios i) Liquidity Ratios ii) Turnover Ratios iii) Solvency Ratios iv) Profitability Ratios V) Miscellaneous Group 3.5 Role of Ratio 3.6 Advantages of Ratio Analysis 3.7 Limitations of Ratio Analysis 3.8 Practical Problems	10
4	Cash Flow Analysis 4.1 Meaning of Cash Flow Statement 4.2 Objectives of Cash Flow Statement 4.3 Uses of Cash Flow Statement 4.4 Limitations of Cash Flow Statement 4.5 Preparation of Cash Flow Statement 4.6 Methods of Cash Flow Statement a) Direct Method – b) Indirect Method 4.7 Cash Flow Activities – Operating, Investing, Financing 4.8 Practical Problems on Indirect Method	11
5	Funds Flow Analysis 5.1 Concept of Fund 5.2 Meaning of Fund Flow Statement 5.3 Uses of Fund Flow Statement 5.4 Limitations of Fund Flow Statement 5.5 Preparation of Fund Flow Statement a) Funds From Operations b) Statement of Changes in Working Capital	11

	c) Funds Flow Statement.	
	5.6 Practical Problems	
	Total	48

Allocation of Marks:

Theory - 50%

Practical problems - 50%

Reference Books:

1. N.M. Vechlekar *Financial Management*
2. G. M. Dumbre *Advanced Management Accounting, Success Publications, Pune*
3. I.M Pandey *Financial Management*
4. Ravi. M. Kishore *Financial Management*
5. P.C Pardeshi *Business Finance.*
6. Khan and Jain *Financial Management*
7. N.D.Kapoor *Financial Management*
8. Prasanna Chandra *Financial Management*
9. Prof.Satish Inamdar *Financial Statement and Analysis*

Marketing Special Paper I

Subject Name -: Sales Management

Course Code -: 505 – B

Objectives:

1. To provide the students with basic understanding of the processes and skills necessary to be successful in personal selling and insights about recent trends in sales management.
2. To provide an understanding of the tools and techniques necessary to effectively manage the sales function - organization - sales individual.
3. To provide students with advanced skills in the areas of interpersonal communications, Motivational techniques

Unit Number	Particulars	No. of lectures
1	Introduction to Sales Management: 1.1 Definition 1.2 Meaning 1.3 Objectives 1.4 Role of sales management in marketing 1.5 Recent trends in sales management 1.6 Ethical and legal issues involved in sales management	10
2	Sales Organization: 2.1 Need for sales organization 2.2 Types and structures of sales organization 2.3 Principles for building successful sales organization 2.4 Functions and responsibilities of sales manager	8
3	Managing the Sales Force: 3.1 Recruitment and Selection: Sales personnel selection process, criteria used for selection of sales personnel 3.2 Training: Importance, Areas of sales training- Company specific knowledge, product knowledge, Industry and market trend knowledge, Customers and technology, Relationship Selling, Customer education, Value added Selling. 3.3 Motivation: Motivation and productivity of sales force, Types of compensation plans, sales meetings, sales contests, fine tuning of compensation plan 3.4 Sales Reporting: Sales records, Sales reports, Sample of Sales Report Format, Key Performance Indicators of sales	10
4	Sales planning and control: 4.1 Sales planning: Sales forecasting – concept and methods- qualitative and quantitative 4.2. Market and Sales potential- concept and methods 4.3 Sales quotas- concept, purpose and types	10

	4.4 Sales control: process of sales control- Goal setting, Performance Measurement, diagnosis and corrective actions	
5	Personal Selling and Relationship Management: 5.1 Personal Selling: concept, process, Tools for personal selling 5.2 Effective selling techniques 5.3 Concepts of Sales leads, sales calls, types of sales calls, sales presentation 5.4 Characteristics of a successful salesman 5.5 Use of technology in personal selling 5.6 Relationship Management: concept 5.7 Role of relationship management in personal Selling 5.8 Characteristics of relationship	10
	Total	48

Reference Books:

1. *Sales and Distribution Management by Havaladar & Cavale, TMGH*
2. *Sales Management by Still, Cundiff & Govani, Pearson Education*
3. *Sales and Distribution Management, SL Gupta, Excel books*
4. *Marketing Management, B. R. Sangale, Success Publications, Pune*
5. *Retailing Management by Michael Levy & Barton Weitz, TMGH, 5th Edition*
6. *Building a Winning Sales Team – Gini Graham & Scott*
7. *Sales Management Handbook – Forsyth P. Trick*
8. *Professional Sales Management – Anderson, Hair and Bush*
9. *Sales Management - Richard R Still Edward W. Cundiff*
10. *International Marketing – Robert Reed*
11. *Strategies for selling-Gerald A. Michaelson*

Human Resource Management Special Paper I

Subject Name -: Human Resource Management Principles and Functions

Course Code -: 505 – C

Objective:

To introduce the concept, principles and practices of H.R.M. to the students

Unit Number	Particulars	No. of lectures
1	Human Resource Management and HR planning 1.1. Introduction to Human Resource Management 1.2. Nature of Human Resource Management 1.3. Scope & Functions of HRM 1.4. Objectives of HRM 1.5. Role of H.R. manager 1.6. Strategic HRM: Meaning, Objectives & Challenges 1.7. HR Planning: Meaning, Definition 1.8. Need for HR Planning 1.9. Process HR Planning 1.10. Job Analysis, Job Design & Job Evaluation	12
2	HR Recruitment and Selection 2.1. Recruitment: Meaning & Definition 2.2. Recruitment Source: Internal vs. External 2.3. E-recruiting Methods, Benefits and Limitations 2.4. Factors Affecting Recruitment 2.5. Selection: Meaning & Process 2.6. E-selection, Advantages and Disadvantages. 2.7. Promotion: Policy and Types 2.8. Transfer: Policy and Procedure for Transfer 2.9. Demotion: Meaning, Causes of Demotion 2.10. Labor Turnover: Meaning. Measurement of Labor Turnover, Causes and Control measures	10
3	Training, development and evaluation 3.1. Training: Meaning, Objectives & Need 3.2. Training Process & Evaluation 3.3. Methods of Training: On the Job & Off the Job 3.4. Management Development: Meaning & Methods of MDP 3.5. Management Development Process and Evaluation 3.6. Performance Appraisal: Meaning, Definition & Need 3.7. Techniques of PA: Traditional & Modern Techniques 3.8. Possible Errors or Problems in Appraisal 3.9. E-performance Management: Meaning, Advantages & Disadvantages 3.10. Performance Management System: Meaning & Importance	12

4	Personnel records reports and audit 4.1. Meaning & Significance of Records and Reports 4.2. Essentials of a good Record and good Report 4.3. Personnel Audit: Objective, Scope & Importance 4.4. Methods of Analysis 4.5. Audit Report: Meaning & Importance	6
5	New trends in HRM and exit policy 5.1. Exit Policy: Meaning & Procedure 5.2. Challenges in implementing Exit Policy 5.3. Voluntary Retirement Schemes: Meaning, Merits & Demerits 5.4. Effects of Excess Manpower 5.5. HR in International Context: Global competency and Global Dimensions 5.6. Developing Cross Cultural Sensitivity 5.7. Human Resource Accounting 5.8. Human Resource Audit 5.9. Bench marking 5.10. Human Resource Research	8
	Total	48

Reference Books:

1. *Personnel Management: - Bhatia S. K. and Singh Nirmal*
2. *Business Administration – G. M. Dumbre, Success Publications, Pune*
3. *Personnel Management: - Kumar Arun and Sharma Rachana*
4. *Human Resource Management- Ashwathappa*
5. *International Human Resource Management by Peter J Dowling, Device E Welch, 4th Edition.*
6. *International Human Resource Management by K Aswathappa and Sadhna Dash, TMGH*

Service Sector Management Special Paper I

Subject Name -: Management of Services

Course Code -: 505 – D

Objectives:

1. To inculcate in depth knowledge of services as an essential economic activity.
2. To get overall understanding about special features of services, various concepts and issues related with management of services.

Unit Number	Particulars	No. of lectures
1	An Introduction to services 1.1 Concept of services – Definitions and meaning 1.2 Characteristics of services 1.3 Differences between goods and services 1.4 Stages of Economic Development - Preindustrial Society, Industrial Society, Post Industrial Society 1.5 Dependency of Manufacturing on Services 1.6 Fastest Growing Services – Banking, Insurance, Wholesale and Retail Trading, Health care, Travel and Tourism, I.T. and B.P.O. 1.7 Role of services in the economy 1.8 Management challenges in the service sector	10
2	Classification of services 2.1 Bases for Classifying services 2.2 Service Package 2.3 Distinctive Characteristics of Service Operations 2.4 Nature of service Act 2.5 Relationship of service organisation with customers, Customization and Judgment in Service Delivery 2.6 Nature of demand and supply of service delivery	8
3	Managing Service Operations 3.1 Forecasting demand for services – Meaning and Techniques 3.2 Managing Service Capacity - Strategies for managing demand, Strategies for managing supply 3.3 Yield management – Meaning, Characteristics and Applications 3.4 Managing waiting lines - Inevitability of waiting, The Psychology of waiting. 3.5 Queuing systems – Meaning, Essential features of Queuing Systems.	10
4	Designing of Service Enterprise 4.1 New service development – Meaning, Process cycle 4.2 Service design elements, service blueprinting, Benchmarking 4.3 Generic approaches to service system design 4.4 Technology in services	12

	4.5 Service quality – meaning, Scope of Service Quality, Service Quality Improvement – i) Quality and Productivity Improvement ii) Quality tools for Analysis and Problem solving – Check Sheet, Run Chart, Histogram, Pareto Chart, Flowchart, Cause and Effect Diagram, Scatter Diagram, Control Chart etc. iii) Programs for organizational quality improvement – Personnel Programs for Quality Assurance, Quality-Improvement Program to Achieve Zero Defects, Deming's 14-Point Program, ISO 9000 and Six-Sigma.	
5	Globalization of Services 5.1 Meaning and importance of globalization of services 5.2 Globalization and Indian services 5.3 Domestic growth and expansion strategies – focused service, focused network, clustered service and diversified network 5.4 Franchising – meaning, nature, benefits and issues 5.5 Global service strategies – Multi country expansion, importing customers, following your customers, service off-shoring and Beating the Clock.	8
	Total	48

Reference Books:

1. Service Management – Operations, Strategy, information Technology, James A. Fitzsimmons & Mona J. Fitzsimmons, Tata McGRAW-Hill.
2. Services Management, Sanjay V. Patankar, Himalaya Publishing House, Mumbai.
3. Services Marketing – M. G. Mulla, Success Publications, Pune.
4. Marketing Management – B. R. Sangale, Success Publications, Pune.
5. Services Management, Dr. K.Ramachandra, B. Chandrashekara and S. Shivakumar, Himalaya Publishing House, Mumbai.
6. Services Marketing –Text and cases, Rajendra Nargoundkar, Tata McGRAW-Hills.
7. Services Marketing – Govind Apte, Oxford University Press 2004.

Agri Business Management Special Paper I

Subject Name :- Agricultural and Rural Development

Course Code :- 505 – E

Objectives:

1. To study the importance of rural economy of India
2. To understand the role of agribusiness management in development of economy

Unit Number	Particulars	No. of lectures
1	Introduction to Agribusiness Management 1.1 Indian Agricultural Economy – Characteristics, importance and Economic Planning, 1.2 Meaning, Scope and Importance of Agribusiness Management 1.3 Basic Infrastructural Facilities for Agribusiness 1.4 Linkages of Agro Industries to Indian Economy	8
2	Rural Credit 2.1 Role of Commercial Banks in Agricultural Sector 2.2 Role of National Bank for Agriculture and Rural Development (NABARD) 2.3 Role of cooperative institutions 2.4 Role of Regional Rural Banks (RRBs) 2.5 Introduction to Microfinance and concept of Self help Group	12
3	Reforms in Indian Agriculture 3.1 Land Reforms: Abolition of Zamindari Act, Tenancy reforms 3.2 Government Schemes/ programmes in Agriculture Sector: National Food Security Mission (NFSM); Rashtriya Krishi Vikas Mission (RKVM); National Rural Employment Guarantee Act (NREGA) 3.3 Irrigation	12
4	Agricultural Taxation in India 4.1 Importance of agricultural taxation for a developing country like India 4.2 Agricultural Income Tax	6
5	Role of Corporate Sector and Agri Export 5.1 Management Decisions 5.2 Export of Agricultural Products – Export Potential of Agro Based Products 5.3 Agricultural Export Zones 5.4 New Export Promotion Scheme (NEPS) 5.5 Role of NGOs in promotion of export of Agricultural produce	10
	Total	48

Reference Books:

1. *Indian Economy : Dutt and Sundaram.*
2. *Indian Economy : A.N. Agarwal.*
3. *Agri. Business Management : Smita Diwase*
4. *Agricultural Business Management: Prof. H. L. Nagaraja Muthy; Himalaya Publishing House*

Finance Special Paper II

Subject Name -: Long Term Finance

Course Code -: 506 – A

Objectives:

1. To make the study of long-term financing
2. To make the student well-acquainted regarding current financial structure

Unit Number	Particulars	No. of lectures
1	Sources of Finance: 1.1 Owned and Borrowed funds 1.2 Equity Shares, Preference Shares 1.3 Debentures, Term Loan, Lease Financing, Hire Purchasing	10
2	Capital Structure: 2.1 Meaning, factors affecting Capital Structure – Internal factors, External factors and General factors 2.2 Cost of Capital, Trading on Equity, Capital Gearing and Leverages	14
3	Capital Budgeting: 3.1 Meaning 3.2 Techniques of Capital Budgeting 3.3 Mutually Exclusive Proposals	8
4	Specialized Private Financial Institutions- objectives and functions of 4.1 IFCI 4.2 IDBI 4.3 ICICI 4.4 SFCs 4.5 UTI	10
5	Dividend Decisions: 5.1 Dividend policy, determinants of dividend policy 5.2 Types of dividend policy 5.3 Forms of dividend	6
	Total	48

Topic for practical problems:

1. Leverages
2. Cost of Capital and Capital Structure

Reference Books:

1. I.M.Pandey – Financial Management – Vikas Publishing House
2. Ravi M.Kishore – Financial Management

3. *G. M. Dumbre – Modern Banking, Success Publications, Pune.*
4. *P.C.Pardeshi – Business Finance*
5. *Khan and Jain – Financial Management – Tata McGraw Hill*
6. *Prasanna Chandra – Financial Management – Tata McGraw hill*
7. *Appannaiah, Reddy, Satyaprakash – Financial Management – Himalaya Publishing Pvt. Ltd*
8. *Satish Inamdar – Financial Statement and Analysis*

Marketing Special Paper II

Subject Name -: Retail Management

Course Code -: 506 – B

Objectives:

1. To provide insights into all functional areas of retailing.
2. To give a perspective of the Indian retail scenario.
3. To identify the paradigm shifts in retailing business with increasing scope of technology and e-business.

Unit Number	Particulars	No. of lectures
1	Retailing: 1.1 Overview of retailing: Definition, Scope , Role and Functions of retailers, Advantages of Retailing, Organized and Unorganized Retailing, Indian Retail Scenario Vs. Global Retail Scenario , Drivers of retail change in India, Emerging Trends in Retailing in India , Role of Retail in Nation's Economy. 1.2. Classification of Retailers: a. Traditional Retail Formats : (Store Based Retail Formats) Independent stores, chain stores, Franchisee, Discount Stores, Cooperatives, Specialty stores, supermarkets, departmental stores, hypermarkets, convenience stores, chain stores, off price retailers etc. b. Modern Retail Formats: (Non Store Based Retail Formats) Direct Selling, Direct Marketing, Catalog Marketing, Tele Marketing, Automatic Vending Machines, Airport Retailing, Kiosks, Electronic Shopping	12
2	Retail Location and site selection, store layout & design and visual merchandising, category management: 2.1 Retail Location and Site Selection: Concept of location and site, factors to be considered in retail locations, important retail locations- central business district-destination locations-stand alone locations-convenience locations, process of retail location and site selection- selection of a city, deciding about trade location in the city, analysis of alternative sites 2.2 Store Design and Store Layout: The concept of store design, element of store design(interior and exterior), Store layout- Types of layout , factors affecting store	11

	layout, store facade 2.3 Visual Merchandising: Concept, Need and importance, tools used for visual merchandising and store atmospherics	
3	Retail Merchandising, Merchandise Planning and Category Management: 3.1 Retail Merchandising: Concept and principles of merchandising, 3.2 Merchandise Planning: Concept of merchandise planning, types of merchandise, process of merchandise planning, introduction of Private label brands 3.3 Category Management: Definition and process	08
4	Promotion mix in retailing and Retail Strategies 4.1 Promotion Mix in Retailing: Concept, need and objectives of promotion mix, elements of promotion mix, tool of promotion mix in store advertisements, outdoor advertisement, online advertising, 4.2 Retail Strategies: Differentiation strategy, growth strategy, expansion strategy, pricing strategy	09
5	Current trends in retailing: 5.1 Role of IT in retailing: Electronic Data Interchange(EDI), Database Management, Data Warehousing, Data Mining, Radio Frequency Identification(RFID), E-tailing, Bar Coding 5.2 Rural Marketing -Retail: Concept of rural marketing, Emerging models in rural markets Opportunities and Challenges in rural retail marketing. 5.3 Mall Management: Nature and concept of a mall, growth of malls globally and in India, Indian Malls Vs. Western countries Malls.	08
	Total	48

Reference Books:

1. *Retailing Management : Michael Levy and Barton Weitz, TMGH, 5th Edition*
2. *Retail Management: Swapna Pradhan, TTMGH*
3. *Retail Management : Gibson Vedamani, Jaico Books*
4. *Fundamentals of Retailing: K V S Madaan, McGraw Hill*
5. *Retail Marketing Management: David Gilbert, Pearson Publication*
6. *Retail Management : Arif Sheikh, Himalaya Publishing*

Supplementary Reading Material

1. *It happened in India by Kishor Biyani, Rupa and Company*
2. *Business Today , November 1999, Mall Management , pp. 7-22*

Websites

1. www.indiaretailing.com
2. www.imageretail.com

Human Resource Management Special Paper II

Subject Name -: Human Resource Practices

Course Code -: 506 – C

Objectives:

To familiarize the students with it & practices

Unit Number	Particulars	No. of lectures
1	A Introduction to Strategic HRM 1.1 What is Strategy & Strategic Management? 1.2 Functional Level strategies 1.3.Challenges of Strategic HRM B Job Analysis – Job Description & Job Specification 1.4 Work Scheduling 1.5 Job stress	
2	A Executive Compensation 2.1 Introduction 2.2 Methods/ Techniques 2.3 Importance B. Working Conditions & Welfare 2.4 Importance Working Condition 2.5 Employee welfare- Importance, Types. 2.6 Industrial Accidents- causes and prevention, Accidents reports & records.	
3	Organizational Development 3.1 Concept & objectives 3.2 OD programme 3.3 OD Process and OD Culture 3.4 Ethics- organizational	
4	A. Employee Grievance & Discipline 4.1 Meaning & Need for Discipline 4.2 Objectives 4.3 Causes of Indiscipline & its Actions 4.4 Essentials of a good Disciplinary System B. Grievance causes & its Procedure	
5	E- Human Resource 5.1 E- Job Design 5.2 E- Human Resource Planning 5.3 E- Recruitment & E- Selection 5.4 E-Compensation 5.5 E- HR Records & E- HR Information 5.6 E-HR Audit	
	Total	48

Reference Books:

1. *Human Resource Management- V S P Rao (Excel Books)*
2. *Personnel & Human Resource Management- P. Subba Rao (Himalaya Publishing House)*
3. *Human Resource Management- Ashwathappa (McGraw-Hill)*
4. *Human Resource Management – S. S. Shete (Success Publications, Pune)*
5. *Fundamentals of Human Resource Management- Gary Dessler (Pearson Education; First edition (2010))*
6. *E-Human Resources Management: Managing knowledge people – Teresa Torres, Mario Arias, Oliva*
7. *Strategic Human Resource Management – A general Managerial Approach- Charlis R. Greer; second edition*

Service Sector Management Special Paper II

Subject Name :- Marketing Services

Course Code :- 506 – D

Objectives:

Unit Number	Particulars	No. of lectures
1	Introduction 1.1 Meaning & Scope of Services Marketing, 1.2 Nature and characteristics of services, 1.3 Classification of services, 1.4 Importance of services marketing,	8
2	Delivering quality services 2.1 Services based components of quality, perceived quality, 2.2 Gaps in quality, 2.3 Bench marking, 2.4 TQM and customer satisfaction measurement techniques, 2.5 Strategies for improvement of service quality service guarantee.	10
3	Services Marketing Mix 3.1 Concept and definition of Marketing Mix 3.2 Four P's(Product, Price, Place and Promotion) 3.3 Extended Ps of Marketing (People, Process and Physical evidence)	10
4	Managing service competition 4.1 Guidelines for managing service competition, 4.2 Approaches to service competition, 4.3 Promotional planning and marketing strategy for services	10
5	Recent Trends of Services Marketing In India 5.1 Role of IT services. 5.2 Types of E- Services – 5.2.1 E- services–Financial services, 5.2.2 Hospitality services, 5.2.3 Education services, 5.2.4 IT services, 5.2.5 Hotel & Tourism services, 5.2.6 Event management services, 5.2.7 Consultancy services	10
	Total	48

Reference Books:

1. *Services Marketing – (Concepts, Practices and Case from Indian Environment)*
Dr. S. Shajahan, Himalaya Publication House
2. *Services Marketing – Vasanti Vanugopal Raghu V.N. Himalaya Publications House*

3. *Services Marketing – Text and cases Hansh V. Varma Parsons Educations*
4. *Services Marketing – M. G. Mulla, Success Publications, Pune.*
5. *Services Marketing Text and Cases - Harsh V Varma*
6. *Principles of Marketing - Phillip Kotler and Gary Armstrong*
7. *Marketing - V.S. Ramaswamy and S Namankumari*

Agri Business Management Special Paper II

Subject Name -: International Agricultural Systems

Course Code -: 506 – E

Objectives:

1. To study of farming system and recent issues in agriculture sector.
2. To understand export potential of Agri. Business

Unit Number	Particulars	No. of lectures
1.	Study of Farming System in various countries of the world. 1.1 Israeli System 1.2 Chinese System 1.3 American System	12
2.	Recent Issues in Agriculture. 2.1 Genetically modified crops. 2.2 Ecological farming and sustainable agriculture	10
3	WTO and Agriculture. 3.1 Agreement on Agriculture(AoA) 3.2 Controversy regarding Agricultural Subsidies 3.3 India's New Patent Regime	12
4.	Export potential of Agri Business 4.1 Agricultural SEZs 4.2 Agro Processing Zones (APZs) 4.3 Agro Export Zones (AEZs) 4.4 Initiatives for Export Promotions	08
5.	Foreign Direct Investment 5.1 Meaning, Significance 5.2 FDI Vs Exports in relation to Agriculture	06
	Total	48

Reference Books:

1. *Indian Economy : Dutt and Sundaram*
2. *Agri.Business Management : Smita Diwase*
3. *Agri.Business Management: A.C. Broadway and Broadway*
4. *Indian Economy : A.N. Agarwal*
5. *Indian Economy : Mishra Puri*

**T.Y. B.B.A.
Semester VI**

Compulsory Paper

Subject Name :- Business Planning and Project Management

Course Code :- 601

Objectives:

To acquaint the students with the planning process in business and familiarize them with the function and techniques of project management

Unit Number	Particulars	No. of lectures
1	Planning: 1.1 Introduction, Meaning, Definition, Characteristic, objective, nature of Planning 1.2 Advantages and limitations of planning 1.3 Steps in planning process 1.4 Methods of planning 1.5 Essentials of a good planning 1.6 Obstacles in planning, Planning Premises and Classification of Planning Premises 1.7 Plan and Planning, Business Planning Planning and Forecasting : 1.8 Introduction, Meaning, Definition, Characteristics, Process, 1.9 Importance of forecasting 1.10 Areas of forecasting 1.11 Forecasting Techniques- Types, Methods 1.12 Advantages of forecasting, Limitations of forecasting 1.13 Difference between forecasting and planning	10
2	Project Management – 2.1 Definition of a “Project” 2.2 Why project Management, The project Life-Cycle, Project Management Maturity 2.3 Project Selection and Criteria of Choice 2.4 The Nature of Project Selection Models, Types of Project Selection Models 2.5 Project Portfolio Process, Project Proposals. 2.6 The Project Manager – Qualities , Project Management and the Project Manager, Special Demands on the Project Manager 2.7 Problems of Cultural Differences, Impact of Institutional Environments, Project Organization, 2.8 The project as Part of the Functional Organization, Pure Project Organization, The Matrix organization 2.9 Choosing an Organizational form The Project Team.	10

3	Initial Project Coordination 3.1 The Nature of Negotiation, Partnering, Chartering and change, Conflict and the project life cycle. 3.2 Estimating Project Budgets, Improving the Process of Cost Estimation.	10
4	Network Techniques 4.1 PERT and CPM 4.2 Risk Analysis Using Simulation with Crystal Ball 2000 4.3 Critical Path Method- Crashing a Project, The Resource Allocation Problem, Resource Loading, Resource Leveling, Constrained Resource Allocation 4.4 The Planning-Monitoring-Controlling Cycle, Information Needs and the Reporting Process, Earned Value Analysis 4.5 The Fundamental Purposes of Control, Three Types of Control Processes, Comments on the Design of Control Systems, Control as a Function of Management.	10
5	Purposes of Evaluation 5.1 Goals of the System 5.2 The Project Audit, Construction and Use of the Audit Report, The Project Audit Life Cycle, some essentials of an Audit/Evolution 5.3 The Varieties of Project Termination, when to Terminate a Project, The Termination Process.	8
	Total	48

Reference Books:

1. *Production and Operation Management:K. Ashwathappa and Siddharth Bhat, Himalaya Publishing House,2010 editions*
2. *Project Management- Samule J Mantel, Jr, Jack R. Meredith, Scott M. Shafer, Margaret M, Sutton with M.R. Gopalan, Wiley India Pvt. Ltd.*
3. *Business Administration with G. M. Dumbre, Success Publications, Pune.*
4. *Successful Project Management- Milton D. Rosenau, Jr., Cregory D. Githens, Wiley India Pvt. Ltd*
5. *Project Management- Vasant Desai, Himalaya Publishing House*
6. *Project Management : A Managerial Approach, Jack R. Meredith, Samuel J. Mantel Jr. Wiley India Pvt. Ltd.*
7. *Principles of Management – T. Ramasamy, Himalaya Publishing House*
8. *The McGraw-Hill 36-Hour Project Management Course -McGraw-Hill*

Compulsory Paper

Subject Name -: Event Management

Course Code -: 602

Objectives: To acquaint the students with concepts, issues and various aspects of event management.

Unit Number	Particulars	No. of lectures
1	<u>Introduction to Event and Event Management</u> 1.1 Introduction and Definition of Event. 1.2 Event Designing, 5 C's of Events. 1.3 5 W's of Event. 1.4 Types of Events. 1.5 Categories of Event and its characteristics. 1.6 Objectives of Event Management. 1.7 Problems associated with traditional media.	08
2	<u>Facets of Event Management</u> 2.1 <u>Event Infrastructure</u>: Core Concept, Core People, Core Talent, Core Structure. 2.2 <u>Clients</u>: Set Objectives for the Event, Negotiating Contracts with Event Organizers, Locating Interaction Points, Banners , Displays etc., at the Event, Preparing the Company's Staff for the Event, Post-event Follow-up. 2.3 <u>Event Organizers</u>: Role of Event Organizer, Qualities of an Event Organizer, Steps in Organizing an event. 2.4 <u>Venue</u>: In-house Venue, External Venue.	10
3	<u>Execution of Event:</u> 3.1 <u>Networking Components</u>: Print Media, Radio Television, The Internet, Cable Network, Outdoor Media, Direct Media. 3.2 <u>Types of promotion methods used in events</u>: Sales Promotions, Audience Interaction, Public Relations, Merchandising, In-venue Publicity, Direct Marketing, Advertising, Public relations. 3.3 <u>Activities in Event Management</u>: Pre-event Activities, During-event Activities, Post-event Activities. 3.4 <u>Functions of Event Management</u>: Planning, Organizing, Staffing, Leading and Coordination, Controlling. 3.5 <u>Event Management Information System</u>. 3.6 <u>Technology in Event Management</u>. - Role and Importance.	10
4	<u>Marketing of Event</u> 4.1 <u>Concept of Market in Events</u> *Revenue Generating Customers. *Nonrevenue Generating Customers. 4.2 <u>Segmentation for Events</u>, Niche marketing in events. 4.3 <u>Targeting</u>.	10

	4.4 Positioning of Events. 4.5 Branding in Events. 4.6 Reach Interaction Matrix. 4.7 Concept of Pricing in Events. 4.8 Legislation and Tax Laws. 4.9 Marketing Communication Tool. 4.10 Implementation of Marketing Plan. 4.11 Relationship Building. 4.12 <u>The Diverse Marketing Needs Addressed by Events:</u> Brand Building, Focusing the Target Market, Creating Opportunities for Better Deals with Different Media, Events and the Economy. 4.13 Concept of Ambush Marketing.	
5	<u>Strategies of Event Management</u> 5.1 Strategic Approach. 5.2 Critical Success Factor Analysis. 5.3 <u>Strategic Alternatives Arising From Environmental Analysis:</u> Maintenance Strategy, Developmental Strategy, Preemptive Strategy, Survival Strategy. 5.4 <u>Strategic Alternatives Arising from Competitive Analysis:</u> Sustenance Strategy, Rebuttal Strategy, Accomplishment Strategy, Venture Strategy. 5.5 Strategic Alternatives Arising from Defined Objectives. 5.6 PREP Model. 5.7 Risk versus Return Matrix. 5.8 Forms of Revenue Generation. 5.9 <u>The Basic Evaluation Process:</u> Establishing Tangible Objectives and Sensitivity in Evaluation, Measuring Performance, Correcting deviations, Critical Evaluation Points in Events.	10
	Total	48

Reference Books:

1. *Event Management: Wagen, Iynn Van Der, Pearson Education, 2012*
2. *Event Marketing and Management: Gaur, Sanjaya Singh, Vikas Publishing House Pvt Ltd. 2003*
3. *Business Management : G. M. Dumbre, Success Publications, Pune.*
4. *Event Planning And Management: Sharma, Diwakar, Deep & Deep Publication Pvt Ltd. 2005*
5. *Events Management: Raj, Razaq, SAGE Publication India Pvt. Ltd. 2009*

Compulsory Paper

Subject Name :- Management Control System

Course Code :- 603

Objectives:

To introduce to the students the function of management control, its nature, functional areas, and techniques.

Unit Number	Particulars	No. of lectures
1	Introduction To Management Control System 1.1 The control function- Elements of Control- Nature of Control – Problems in control 1.2 Management Control – Characteristics, Principles & Types of Management Control 1.3 Factors Affecting Managerial Philosophy 1.4 Management Control Systems - Elements of MCS – Designing of MCS – 10 commandments of Effective Control System	10
2	Management Controls In Functional Areas 2.1 Production Control: Need – Procedure – Techniques Of Production Control 2.2 Inventory Control: Classification Of Inventories – Motives For Holding Inventories- Determination Of Stock Levels 2.3 Marketing Control: Process Of Marketing Control- Importance Of Marketing Control System- Tools And Techniques Of Marketing Control 2.4 Control In Personnel Area: Reasons For Workers Resistance To Controls- Kind Of Control Devices 2.5 IT Measures And Control – Installation Of Management Information & Control System, Structured & unstructured Decision	12
3	Computers Systems 3.1 Computer for Management Control Purposes- Are Computers essential for MIS? 3.2 Computers and Information System – Manual Systems – Mechanical Systems- MIS – Decision Support Systems- Characteristics of DSS- Where to apply DSS- Expert Systems.	8
4	Management Control Of Projects 4.1 Meaning of project – Aspects of Project – Factors affecting Project - 4.2 Project Planning – Time Dimension – Cost Dimension- Quality Dimension 4.3 Project Control- Reports Costs and Time- Reports on output- Revisions.	10

5	Implementing MCS for small & medium size companies 5.1 Methodology of implementing Management Controls - Roles and responsibilities in implementing Management Control. 5.2 Management Control Structure - Responsibility centre, cost centre, profit centre, investment centre. 5.3 MCS in service & non-profit organizations.	8
	Total	48

Reference Books:

1. Anthony R. N. and John Dearden: *Management Control Systems*
2. 3. Bhattacharya S. K.: *Managerial Planning & Control System*
4. Mark G. Simkin : *Computer information systems for Business*
5. Robert J. Mockler: *Readings in Management Control*
6. Subhash Das : *Management Control Systems.*
7. P. Saravanavel : *MCS – H.P. House*
8. Arora Ashok & Akshay Bhatia, *Excel Books, New Delhi: Information Systems for Managers*

Compulsory Paper

Subject Name :- E- Commerce

Course Code :- 604

Objectives:

1. To know the concept of electronic commerce
2. To know the concept of Cyber Law & Cyber Jurisprudence
3. To know Internet marketing techniques

Unit Number	Particulars	No. of lectures
1	E- Commerce and Business Model Concepts 1.1 Main Activities of E Commerce 1.2 Definition 1.3 Goals 1.4 Technical Components 1.5 Functions 1.6 Status 1.7 Prospects 1.8 Significance 1.9 Advantages 1.10 Disadvantages E-Commerce Business Models 1.11 Major Business to Consumer (B2C)Business Model Portal, E-tailor 1.12 Major Business to Business (B2B) Business Model 1.13 E Distributor, E-Procurement, Exchanges 1.14 Business models in Emerging E-Commerce Areas - C2C, P2P, and B2G.	11
2	E-Money 2.1 Real World Cash 2.2 E-Money 2.3 Requirements 2.4 Types of Electronic Payment Media 2.5 B2B E-Payment Systems Viruses 2.6 Types of Viruses 2.7 Spyware & Adware 2.8 Virus Characteristics 2.9 Protection against Fraud & Viruses	10
3	E-Marketing 3.1 Identifying Goals	11

	3.2 Browsing Behavior Model 3.3 Online Marketing 3.4 E Advertising 3.5 Internet Marketing Trends 3.6 Target Markets 3.7 E-Branding 3.8 Marketing Strategies 3.9 Consumer Online: The Internet Audience and Consumer Behavior 3.10 E-cycle of Internet Marketing.	
4	Cyber Law Concepts 4.1 E Contract 4.2 Jurisdiction Concept 4.3 Choice of Law 4.4 Minimum Contacts 4.5 Internet Jurisdiction 4.6 Contractual Obligation in cyberspace 4.7 Active Vs Passive Websites 4.8 E-mail Transactions	8
5	Cyber Jurisprudence 5.1 Evolution of New System 5.2 Legal Meaning of Software 5.3 Legal Issues for Internet Commerce 5.4 Cyber Attack –Trojan, Virus, Worm, Spam 5.5 Hacking – Phishing, IP Spoofing.	8
	Total	48

Reference Books:

1. *E – Commerce Concepts – Models – Strategies*, Himalaya Publishing House. ISBN : 978-81-8488-096-0; C.S.V. Murthy
2. *Electronic Commerce From Vision to Fulfillment*, 3rd Edition, PHI. ISBN : 81-203-3027-7; Elias M. Awad
3. *E – Commerce An Indian Approach*, 2nd Edition, PHI ISBN : 81-203-2788-8; P.T. Joseph, S.J.
4. *Laws Relating to Computers Internet & E-Commerce*, 4th Edition, Universal Law Publishing Company. ISBN : 978-81-7534-778-6; Nandan Kamath
5. *E-Commerce –The Cutting Edge of Business* Second Edition; Kamlesh K Bajaj, Debjani Nag
6. *E-Commerce –Business, Technology, society*; Kenneth C. Laudon, Carol Guercio Traver
7. *Introduction to E-Commerce*; Zheng Qin

Finance Special Paper III

Subject Name -: Financial Services

Course Code -: 605 A

Objectives:

- 1) To study in detail various financial services in India
- 2) To make the students well acquainted regarding financial markets

Unit Number	Particulars	No. of lectures
1	Indian Financial System : An Overview 1.1 Introduction to Financial System 1.2 Structure of Financial System - Financial Institutions , Financial Markets, Financial Instruments and Financial Services 1.3 Overview of Indian Financial System since 1991 1.4 Financial Intermediaries in Financial System: - Merchant Bankers, Underwriters, Depositories, Brokers, Sub brokers, Bankers etc.	9
2	Introduction to Financial Markets 2.1 Capital Market- Primary Market – Management of IPO, Secondary Market – Stock Exchanges in India – Introduction , NSE , BSE , OTCEI 2.2 Role of SEBI as a regulatory authority 2.3 Introduction to Derivatives, Futures and Options 2.4 Money Market – Introduction , Money Market instruments – Call and Notice money market , Treasury Bill , Commercial Papers , Certificate of Deposits , Money Market Mutual Fund , Inter corporate deposits 2.5 Difference between Money Market and Capital Market	14
3	Financial Services in India 3.1 Mutual Fund 3.2 Factoring and Forfeiting 3.3 Credit Rating 3.4 Venture Capital	9
4	Banking and Insurance Sector in India :- 4.1 Introduction 4.2 Structure of Banking and Insurance Sector in India 4.3 Role of RBI and IRDA as a regulatory authority	5
5	Recent Trends in Accounting and Finance 5.1 Zero Base Budgeting 5.2 Inflation Accounting 5.3 Human Resource Accounting 5.4 Activity Based Costing 5.5 Mergers and Acquisition	11
	Total	48

Reference Books:

1. Kohak MA :- *Financial Services*
2. L M Bhole and Jitendra Mahakut – *Financial Institutions and Markets*
3. G. M. Dumbre – *Modern Banking, Success Publications, Pune.*
4. S. S. Shete – *Financial Marketing and Institutions in India, Success Publications, Pune.*
5. Dr. S Gurusamy :- *Essentials of Financial Services*
6. M Y Khan :- *Indian Financial System*
7. Rajesh Kothari :- *Financial Services in India , Concept and Application*

Marketing Special Paper III

Subject Name -: Advertising and Sales Promotion

Course Code -: 605 B

Objectives:

1. To develop knowledge and understanding of importance and functions of advertising.
2. To understand Key features of Sales Promotion

Unit Number	Particulars	No. of lectures
1	Introduction and Measurement of Effective Advertising 1.1 Advertising – Evolution, Meaning, Definition, Classification, Benefits, Functions, Criticism, Ethics, Social issues 1.2 Strategic Advertising Decision - Setting Advertising Objectives, Deciding Advertising Budget, Advertising Framework planning and Organization. 1.3 Advertising Campaign – Meaning, Basis of Campaign, Length of Campaign, Parameters governing advertising Campaign, Planning of advertising of Campaign 1.4 Advertising Agency – Meaning, Definition, Functions, Types, Advantages, Structure, Advertiser and Advertising Interface 1.5 Advertising Effectiveness – Objective of measuring Advertising Effectiveness, Difficulties and Evaluation of Advertising Effectiveness 1.6 Advertising Control – Control of Advertising by Practitioners	12
2	Copy Decisions 2.1 Advertising Copy --Meaning, Objectives, Elements, Features, Types of Copy 2.2 Advertising Layout – Principles, Components, Visualization of Layout, Layout Format, 2.3 Copy Creation – Approaches, Principles, Styles of Copy creation, Verbal Versus Visual Thinking, Pre Testing methods and Measurements.	10
3	Media Decisions 3.1 Advertising Media – Meaning, Definition, Functions, Types of Media 3.2 Media Planning – Importance, Process, Difficulties, Basics of Reach, Frequency, Continuity in Media Planning 3.3 Media Research – Meaning, Importance, Functions, Process of Media Research 3.4 Media Selection – Approaches and factors affecting Media Selection	10
4	Sales Promotion And Brand Equity 4.1 Sales Promotion – Meaning, Definition, Objectives of sales	10

	promotion, Factors affecting Sales Promotion Growth, Techniques of Sales Promotion 4.2 Strategic Sales Promotion -- Strategies and Practices in Sales Promotion, Cross Promotions, Surrogate Selling, Bait and Switch advertising issues. 4.3 Brand Equity – Concepts and Criteria, Building, Measuring and Managing Brand Equity, Linking Advertising and sales promotion to achieve “Brand standing”, Leveraging Brand values for business and non-business contexts.	
5	Role of Information Technology in Advertising and Sales Promotion 5.1 Comparison of Traditional and Modern Advertising 5.2 Internet Advertising – Purpose, Types, Advantages, disadvantages of internet Advertising 5.3 Pre-Requisites of Online Advertising 5.4 E – Advertising Guidelines 5.5 Internet Advertising today	6
	Total	48

Reference Books:

1. *Advertising and Promotions - Belch & Belch, Tata McGraw Hill 2001*
2. *Advertising Management - Rajeev Batra, John G. Myers & David A Aaker-PHI*
3. *Otto Kleepner's Advertising Procedure – PH*
4. *Advertising Management – Rawal C. N., Success Publications, Pune.*
5. *International Edition - Contemporary Advertising Irwin/McGraw –Hill*
6. *Integrated Marketing Communications - Duncon- TMH*
7. *Foundations of Advertising Theory & Practice- S.A.Chunawalla & K.C.Sethia-Himalaya Publishing*
8. *Integrated Advertising, Promotion and Marketing Communication- By Clow Baack*
9. *Advertising Management- Manendra Mohan*
10. *Advertising Management- Batra, Myers & Aaker*
11. *Sales Promotion: M.N.Mishra*
12. *Advertising and Promotion- George Belch and Michael Belch*
13. *Marketing Management – Philip Kotler, Keller Jha- Pearson Education, 11th Edition*

Human Resource Management Special Paper III

Subject Name -: Labour Laws

Course Code -: 605 C

Objective:

To acquaint the students with important legal provisions governing the industrial employees

Unit Number	Particulars	No. of lectures
1	An Introduction to Labour Laws in India 1.1 History and Evolution of Labour Laws in India 1.2 Labour Policy of India 1.3. Classification of Labour Laws and an overview of labour laws. 1.4 Unfair Labour Practices 1.5 Labour Laws in the unorganized sector 1.6 Authorities under the Labour Laws in India (Ministry of Labour & Employment –Government of India, Chief Labour Commissioner Labour Courts / Industrial Tribunals, (Appointment, Qualification, Disqualification, Rights & duties) 1.7 International Labour Organization	10
2	The Employees Provident Funds And Miscellaneous Provisions Act,1952 2.1 Scope, Application and Definitions 2.2 Schemes under the Act 2.3 Chapter II of the Act(Employee Provident Fund Scheme, State Board, appointment of Officers, Employees Pension Scheme and Fund, Employee Deposit Linked insurance Scheme, Inspectors.) 2.4 Membership of the Fund.	10
3	The Employees State Insurance Act,1948 3.1 Scope, Application and Definitions 3.2 Chapter II of the Act(ESI Corporation, Standing Committee, Medical Benefit Council, Principle Officers) 3.3 Chapter III of the Act(Finance & Audit) 3.4 Chapter IV-(Contributions, Recovery of Contribution,) 3.5 Chapter V(Benefits) 3.6 Chapter VI(Adjudication of Disputes & Claims) 3.7 Chapter VII(Punishment)	10
4	The Child Labour (Prohibition and Regulation) Act,1986 4.1 Part I (Preliminary) 4.2 Part II (prohibition of Employment of Children in Certain Occupations and Processes) 4.3 Part III (Regulation of Conditions of Work of Children) 4.4 Part IV (Miscellaneous- Penalties)	08

	4.5 IPEC(International Programme on Elimination of Child Labour)	
5	Maternity Benefits Act,1961 5.1 Extent, Application and Definitions 5.2 Employment or work prohibited by women in certain periods 5.3 Right to Payment of Maternity Benefits 5.4 Payment of Maternity benefits in case of death of women 5.5. Payment of Medical Bonus 5.6 Leave for Miscarriage and wages for Tubectomy Operation 5.7 Leave for Pregnancy illness, delivery, premature birth of a child, Medical Termination of Pregnancy, Nursing Breaks 5.8 Appointment of Inspectors, Powers and Duties	10
	Total	48

Reference Books:

1. Bare Acts
2. Business Law – G. M. Dumbre, Success Publications, Pune.
3. Industrial and Labour Laws-S.P.Jain
4. Industrial Law - P.L. Malik
5. Labour Laws- Taxman
6. Labour & Industrial Laws-S.K.Puri
7. Labour & Industrial Laws-Goswami V.G.
8. Labour & Industrial Laws- Mishra S.N.
9. Labour & Industrial Laws- K.M.Pillai

Service Sector Management Special Paper III

Subject Name -: Special Services of Marketing in India

Course Code -: 605 D

Objective:

1. To create a right understanding about nature of services in India.
2. To develop a right approach towards marketing of services in India.
3. To make students aware about upcoming areas of services in India.

Unit Number	Particulars	No. of lectures
1	Introduction:- 1.1 Introduction 1.2 Concept and objectives of Services Marketing 1.3 Reasons of growth of Service Sector 1.4 Role of Services in Indian Economy 1.5 Challenges of Service Marketing	8
2	Marketing of Bank Services and Insurance Services:- 2.1 Introduction to banking services, Concepts and objectives, Bank Marketing in Indian prospective, Application of Indian concepts in Indian Banking. 2.2 Introduction to Life insurance services, Concepts and objectives, Marketing of Life Insurance in India, Marketing approach of Life Insurance (Study of 4P's of Marketing Mix)	10
3	Tourism, Hospitality and Health Care Services:- 3.1 Tourism marketing concept - Market segmentation for tourism, Special Characteristics of Indian Tourism Marketing. 3.2 Uses of hospitality services, Health care marketing, Study of 7p's of marketing mix. 3.3 Introduction to Health Care Services, Consumer buying behaviour in health care services.	10
4	Marketing of Other Services:- 4.1 Emerging trends and its features : 4.2 Marketing of Higher Education, Political Marketing, Airline Marketing, Cellular and Entertainment Services, Internet services	10
5	Technology in Services:- 7.1 Technology in services 7.2 The emergence of self service 7.3 Automation in services 7.4 Technological innovations in services: Challenges of adopting new technology in service 7.5 Managing the new technology adoption process	10
	Total	48

Reference Books:

1. *Services Marketing* - S.M.Jha, Himalaya Publication House
2. *Services Marketing* - P.K.Sinha, S.C.Sahoo, Himalaya Publication House
3. *Services Marketing* – M. G. Mulla, Success Publications, Pune.
4. *Services Marketing* – Vasanti Venugopal, Raghu V.N., Himalaya Publication House
5. *Service Management* – James A. Fitzsimmons, Mona J. Fitzsimmons, TATA McGraw Hill
6. *Marketing of Services - An Indian Perspective – Text and Cases*, Dr. S. L. Gupta, V.V. Ratna, Wisdom Publications, Delhi.

Agri Business Management Special Paper III

Subject Name -: Recent Trends in Agri business

Course Code -: 605 E

Objectives:

1. To study the agro base industries in Indian economy
2. To understand services associated with Agriculture Business.

Unit Number	Particulars	No. of lectures
1	Introduction 1.1 Agro based industries and their linkages to the Indian Economy. 1.2 Impact of International Agri. Business on Indian Economy. 1.3 Contract Framing.	10
2	Inputs in Agriculture 2.1 Agricultural Research and Education. 2.2 Agricultural Insurance.	8
3	Agro based Industries. 3.1 Food Processing Industries – Meaning, Future prospects of Processed food industry, constraints in export of processed food 3.2 Poultry Industries. 3.3. Dairy Industry – Characteristics, product range, future growth 3.4. Sugar Industry 3.5. Cotton Textiles Industry	12
4	Services Associated with agriculture. 4.1 Processing of Agricultural Products. 4.2 Agricultural Marketing 4.3 Agricultural Retailing. 4.4 Agricultural Finance. 4.5 HRM in agri business	10
5	Standardization and legislation : 5.1 Co-operative Management 5.2 Co-operative Marketing 5.3 Cooperative Institutions. 5.4 Grading and Standardization, Bureau of Indian Standards (BIS) 5.5 Business Legislation – Essential Commodities Act, Food Adulteration Act, Food safety and standards, Consumer Protection Act.	8
	Total	48

Reference Books:

1. *Indian Economy : Dutt and Sundaram*
2. *Agri.Business Management : Smita Diwase*
3. *Agri.Business Management: A.C. Broadway and Broadway*
4. *Indian Economy : A.N. Agarwal*
5. *Indian Economy : Mishra Puri*

Finance Special Paper IV

Subject Name -: Cases in Finance/ Project

Course Code -: 606 A

The student shall write a project report on the topics selected under the guidance of a faculty and submit one hard binding copy and one soft copy of the same to the Principal of the college before 31st March. Soft copy should be conserved at college level. The project shall be assessed both internally (20 marks) and externally (30 marks). For external evaluation there will be a viva voce. Such viva-voce shall be conducted by a panel of two referees appointed by the University.

Total Lectures: 24 Project + 24 Cases in Finance = 48

Topics for Project:

1. Projected financial statements to be submitted to the bank for loan proposal.
2. Analysis & interpretations of financial statement with the help of Techniques like Ratio analysis, Fund flow Analysis, Cash flow Analysis.
3. Project related Insurance sector.
4. Working Capital Management.

The students can select any other topic related to finance, for their project in consultation with their respective teacher. At least ten cases covering the following aspects should be studied.

- A. Capital Budgeting
- B. Working Capital
- C. Cost of Capital

Total Lectures: 24 Project + 24 Cases in Marketing = 48

NOTE: Scheme of marking for this paper will be as follows:

Project work	30
Viva voce (conducted by internal as well as external to be appointed by University)	20
Theory Paper on cases in finance	50

	Total 100 marks

Project report should be evaluated by both internal and external examiner. Each examiner will allot marks out of 50 i.e. project work 30 marks and viva voce 20 marks. The total marks given by both internal and external examiner will be out of 100 and will be converted into marks out of 50.

Sample Case No 1:

Jay Industries Ltd. is considering purchasing a new machine. Two alternative models are under consideration. The comparative data of the two machines are as follows:

Particulars	Machine X	Machine Y
Cost of Machine	3,00,000	5,00,000
Estimated Life	10 years	10 years
Estimated Saving is Scrap p.a.	20,000	30,000
Additional Cost of Supervision p.a	24,000	32,000
Additional Cost of Maintenance p.a.	14,000	22,000
Cost of Indirect Material p.a.	12,000	16,000
Additional Savings in Wages p.a	1,80,000	2,40,000

Rate of Taxation: 50% of the Profits. Assume Targeted Cost of Capital @ 10%. As a Finance Executive advice Management regarding which machine may be a profitable investment by calculating Annual Cash Flow, Payback Period, NPV and PL. Total PV @ 10% for 10 years = 6.144

Sample Case No 2:

The following information is related to Parekh Industries Pvt. Ltd., Pune. Budgeted Sales (78,000 units) Rs. 46.80 lakhs. 25% Sales are Cash Sales

Analysis of Selling Price

Raw Material	60% of Selling Price
Direct Labour	6.00 per unit
Variable Overheads	1.00 per unit
Fixed Overheads	5 Lakhs
	(Including Rs. 1, 10,000 as depreciation)

It is estimated that:

- (a) Holding Period of:
 - Raw Materials – 3 weeks
 - Work-in-Process – 1 week
 - Finished Goods – 2 week
- (b) Suppliers will give 4 weeks credit.
- (c) Customers are allowed 4 weeks credit.
- (d) Wages are paid after 4 weeks.
- (e) Lag in payment of overheads will be 2 weeks.
- (f) Cash in Hand Rs. 50,000.

Prepare a statement showing working capital requirement for a year using cash cost approach. Year = 52 weeks

Marketing Special Paper IV

Subject Name :- Cases in Marketing / Project

Course Code :- 606 B

Objectives:

To understand of application of theory into practice

The student shall write a project report on the topics selected under the guidance of a faculty and submit one hard binding copy and one soft copy of the same to the Principal of the college before 31st March. Soft copy should be conserved at college level. The project shall be assessed both internally (20 marks) and externally (30 marks). For external evaluation there will be a viva voce. Such viva-voce shall be conducted by a panel of two referees appointed by the University.

Total Lectures: 24 Project + 24 Cases in Marketing = 48

CASES STUDIES :- (50 Marks)

1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –
Characteristics & Importance of Case Studies –
Guidelines for Case Studies & Cases Discussion.

2. Topics for Case Studies:-

- Advertising & Sales Promotions
- Consumer Behavior
- Buyer Behavior
- Industrial Marketing
- Service Marketing
- Brand Marketing
- Retail Marketing
- Rural Marketing
- Sales and Distribution Management
- International Marketing
- Marketing Research
- New & Existing Products
- E-Commerce / On-line Marketing

Sample Case No-1

Computer Consumables Ltd. (CCL) is a small scale company with a product portfolio consisting of printer Ribbons, Cartridges and Ink Jet refill packs. The company's turnover in its first year (i.e. year ending March 2014) is Rs. 2-5 crores. It has a marketing department consisting of one G.M. (Mktg.), one Sales Manager, one Dispatch Assistant and Five Sales Engineers covering Maharashtra and Gujarat. Next year's sales turnover target is Rs. 5 Crore. The G.M. (Mktg.) has proposed addition of two

Product/Brand Executives and twenty Sales Engineers. The Managing Director is not convinced of the utility of product/brand executives to his company. He also has hesitation about the return on investment (ROI) of additional Rs. 25 lakh towards salary of additional staff in marketing department.

- 1) Identify and allot new territories for Sales Engineers and the Sales Targets.
- 2) Develop an advertising plan for CCL.

Sample Case No-2

For unless the consumer walked into a retailer and specially asked for Frooti, the retailer might choose to push any other product, including those on which the retailer margins were higher or those that were then undertaking a major promotional activity. Indeed, the sales of Frooti had been falling over the years. Besides just competition from products in other categories, its market shares in the 'tetra pack' category was also gradually falling, as new players had entered the segment and were using the same packaging technique. Clearly, something needed to be done. Frooti had acquired an 'old boy' image, as a 'kids-only' product, perhaps due its 'tetra pack' packaging as opposed to the glass and PET bottles used by other beverage manufacturers. Consumers typically consumed the product using a straw, something seen as 'for kids'.

- (1) How could the brand re-position itself in the market? In particular, it needed to drop the perception of being only for kids.
- (2) What should Frooti have done when its market share was falling consistently?

Sample Case No -3

Jack and Jill of Goa, are two partners, engaged in the business of manufacturing and selling sports equipments under the brand name 'J2'. They cater to the needs of indoor and outdoor sports and recreation activities.

Recently they have acquired an imported sewing machine, which can stitch cotton as well as synthetic fabrics. The machine is being used to stitch anoraks, track-suits, tents, tent-covers, etc. The machine is so versatile, that it can stitch jackets, jerkins, rajais and quilts, which are so commonly used in central and northern states, in winter. Inspired by this impressive range of products, that they can create, Jack and Jill wish to chalk-out an elaborate marketing action-plan. Extend your advice for the following:

- (1) Analyze this case with suitable title.
- (2) Suggest Market Segmentation for their new non-sports products.

Reference Books:

1. Sales Management handbook – Forsyth Patrick
2. Sales Management – Richard R Still Edward W. Cundiff
3. Retail Management – Gibson Vedamani
4. Channel Management & Retail Management – Minal Dhotre
5. Advertising and Promotions – Belch & Belch
6. Marketing Management – Rajan Saxena
7. Principles of Marketing 9th Edition – Philip Kotler and Garry Armstrong

Human Resource Management Special Paper IV

Subject Name -: Cases in Human Resource Management / Project

Course Code -: 606 C

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

- Facts of the case
- Analysis
- Solution
- Action points
- Conclusion

Unit 2. Topics for Case studies:-

1. Recruitment and Selection
2. Training & Development
3. Working conditions
4. Salary and Wage Administration -Pay scales and Grades
5. Performance Management System
6. Grievance Handling
7. Settlement of Industrial disputes-Industrial Relations
8. Transfer- Promotion-Demotion
9. Labor Welfare
10. Retrenchment- Layoffs
11. VRS

Sample Case 1:

Sidhdheshwar Textile Ltd. is employing about 600 employees. During the last 6 to 7 years, the company is earning good profits. Due to general recessionary trends and other adverse factors, its profits are reduced beyond expectation. The internal unions of workers 'Solapur Majadur Sangh' and staff members (two separate unions) are insisting for 20% bonus, while the company is ready to give 15% bonus. Several rounds of negotiations were proved fruitless. Surprisingly, one day just before Diwali staff union decided to accept 15% bonus. The news was not welcomed by the Solapur Majadur Sangh. Some office-bearers of the Solapur Majadur Sangh charged the company to adopt 'divide and rule' policy. The company representatives refused to have done unfair labour practice. When the allegations were again made, company suspended six office-

bearers of Solapur Majadur Sangh, pending enquiry. The workers declared strike as a protest. The indefinite strike of workers deprived the other union's members 15% bonus, which was acceptable to them.

Questions:

- (a) Comment on the Industrial relations of the company in the context of bonus policy.*
- (b) What crucial role should the Personnel Manager play to ensure peace and harmony?*
- (c) Is the action of suspending union office-bearers correct? Examine pros and cons.*

Sample Case 2:

Mr. Patole is a Branch Manager of 'Janata Co-operative Bank Ltd.' at one of its village branches. His staff includes two clerks and one attender. Very often, Mr. Patole was left alone in the Bank after 5 p.m. to tally accounts, daybooks and complete all other formalities. On 30 December, Mr. Patole was working till past 2 a.m. tallying the accounts, since hardly one day was left for closing the accounts for the year. On this fateful night, the Branch Manager was attacked by a band of robbers, who looted the bank after brutally wounding Mr. Patole right hand, which had to be amputated, later. After his recovery, the Branch Manager applied for compensation. The Bank Management was of the opinion that Mr. Patole violated the job specifications by working beyond the stipulated hours of work. He, in its view, was not entitled to any compensation as the accident occurred during non employment hours. They also called for an explanation as to why the amount lost cannot be recovered from his salary and the provident fund.

Questions:

- (a) Analyze the case with suitable title.*
- (b) How do you justify the bank's stand in this case?*
- (c) What modifications do you suggest in job description to overcome such incidents in future?*

Service Sector Management Special Paper IV

Subject Name :- Cases in Service Sector Management / Project

Course Code :- 606 D

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

Facts of the case

Theoretical implications: Market research: Methodologies of research.

SWOT

Analysis

Solution

Action points

Conclusion

Sample Case1:

Mr. Kishore runs a hotel in a populated residential area. This hotel was started by his grandfather 50 years back. Since then this hotel was their only family business. However over the past few years the hotel faced consistent losses as the popularity of the hotel had reduced and not many people visited their hotel. Mr. Kishore is very concerned about this issue and wants to conduct a research to find the causes.

Q1. Frame a strategy to conduct a research to find the reasons for reduction in the customer walk-in's of the restaurant.

Q2. Design a questionnaire to collect customer feedback regarding food quality, service, ambience, etc.

Sample Case2:

Mr. Joshi, had just retired as a primary school teacher. He has opened an account with a private sector bank. He used to pay his house rent by cheque every month. He had dropped a new cheque book request slip in the ATM drop box and was expecting the same to reach him in a week's time. However he did not receive the cheque book even after ten days. He required cheques urgently and hence went to the bank to complain about the issue, after waiting for 45 minutes he was called by a customer care officer. The officer told him that he can be issued a emergency cheque book for which he will have to pay a charge of Rs. 250/- The officer did not agree to the fact that Mr. Joshi had applied for the cheque book and did not receive one, hence he should not be charged for this cheque book. Mr. Joshi was not happy with the service he received.

Q1. What should have been the officials approach towards Mr. Joshi as a senior citizen?

Q2. What should Mr. Joshi do to safeguard his interest as a customer of this bank?

Sample Case no.3:

Using a mobile today has become a necessity rather than luxury, everyone, irrespective of income class can now afford a mobile phone. The telecom service providing companies are providing SIM cards at very low prices to target the masses. However the users consistently complain about services issues of these companies. One of such issues is pop up's that are recurrently appearing on the mobile screens and for people who are not aware about it, are unknowingly subscribing for unwanted services, like dialer tone, daily astrology, act. It becomes very difficult for a common man to disable the services. All the more they have to pay for the service they did not even want.

Q1. Is this activity of the telecom service providers Ethical? Explain with justification.

Sample Case no.4:

"Pretty Lady" is a reputed ladies wellness centre being run in a residential locality for almost a decade. The proprietors wish to conduct a survey to find out the perception of the customers about the quality of service being offered.

Q1. State the importance of quality in service sector

Q2. Prepare a questionnaire to collect the feedback of customers on quality of the service being provided.

Sample Case no.5:

Digital Marketing has evolved as a new channel of distribution in the retail sector. Hundreds of websites have started selling multiple products and brands online.

Many people are finding this option as a convenient one, due to their hectic schedules. However there is no face to face interaction between the seller and the buyer, making good service all the more important. The growth of this channel of distribution has also increased the demand for logistic services which would deliver these products to the door step of the customers. It is very important for this sector to provide good service to make sure the customer doesn't switch over to the competitors.

Q1. Analyse this case and suggest how the service factors can be improved by this channel of distribution.

Agri Business Management Special Paper IV

Subject Name -: Cases in Agri Business Management / Project

Course Code -: 606 E

Objectives:

To understand of application of theory into practice

Unit 1. Introduction to Case Studies:-

Case – Meaning – Objectives of Case Studies –Characteristics & Importance of Case Studies – Cases Discussion

Guidelines for Analyzing Case Studies on the following points

- Introduction to case
- Facts of the case
- Actual Practical Solution for case with alternate if applicable
- Conclusion about the case

Unit 2. Topics for Case studies

- a. Rural Credit System.
- b. Role of Corporate Sector & Agri Export
- c. Reforms in Indian Agriculture
- d. Agro Based Industries
- e. Services Associated with Agriculture

Sample Case 1:

The distraught farmers of Maharashtra are at loss to understand the measures to protect their agricultural income. Severe drought conditions have destroyed their crop, 80 of the farmers are not aware of the schemes like Crop Insurance and relief aid from the Government.

Advise them on following points:

- i. Information regarding Insuring Crops.
- ii. The Crops that could be covered under Crop Insurance Scheme.
- iii. The agencies that provide Crop Insurance Scheme.
- iv. The procedure to get the relief aid from the Government and the rules and regulation.

Sample Case 2:

Kisan is a young farmer in the draught prone Marathwada. He wishes to develop a Horticulture Farm.

- i. What suggestions will you give?
- ii. Suggest the types of crops he could grow in the land where water is scarce.
- iii. Suggest water conservation techniques that are more suitable

Sample Case 3:

A group of people in Maharashtra decide to develop a dairy plant on co-operative basis, (Amul Model), give advice on following points:

- i. Procedure to establish co-operative dairy.
- ii. Resources required for development.
- iii. Various avenues of business except milk (Milk By-products)

Sample Case 4:

Suresh has a limited cultivable agricultural land. He is totally dependent on the agricultural income which is very less. Advise him on following points:

- i. A small side business which complements his agricultural land.
- ii. The procedure to open such business.
- iii. The resources that are required.

Support your answers with suitable examples

Sample Case 5:

Ram is a farmer from Marathwada, which is facing severe drought conditions and scarcity of water. He suffered heavy losses but decides to do proper planning next year.

Suggest:

- (i) Water Conservation Methods
- (ii) Rain Harvesting
- (iii) Maximum Yield with minimum use of water

Third Year Bachelor of Business Administration (T.Y.B.B.A.)

Pattern of Question paper of Theory papers

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Draw neat and well labeled diagrams wherever necessary.

Q.1) Theory question (15)

OR

Theory Question

Q.2) Theory question (15)

OR

Theory Question

Q.3) Theory question (15)

OR

Theory Question

Q.4) Theory question (15)

OR

Theory Question

Q.5) Write Short Notes (Any **four** out of **six**) (20)

Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 606- Project/ Cases

Time: 2 Hours

Total Marks: 50

Instructions:

1. **Q1.is compulsory.**
2. **Attempt any two** from the remaining.
3. Figures to the right indicate full marks.

Q1.	Case study	20
Q2.	Case study	15
Q3.	Case study	15
Q4.	Case study	15

Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 505 (A) – Analysis of Financial Statements

Time: 3 Hours

Total Marks: 80

Instructions:

1. All Questions are Compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q.1) Theory question (16)

OR

Theory Question

Q.2) Theory question (16)

OR

Theory Question

Q3. Write Short Notes (Any **two** out of **four**) (8)

Q4. (A) Practical Problem (10)

(B) Practical Problem (10)

Q5. Practical Problem (20)

Third Year Bachelor of Business Administration (B.B.A.) Semester VI

Pattern of Question paper of 506 (A) – Long Term Finance

Time: 3 Hours

Total Marks: 80

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Use of calculator is allowed.

Q1. Practical Problem (15)

Q2. Theory Question (15)

OR

Theory Question

Q3. Theory Question (15)

OR

Theory Question

Q4. Theory Question (15)

OR

Theory Question

Q5. Write Short Notes (Any four out of six) (20)

Savitribai Phule Pune University

Three Year B. Sc. Degree Course in

BIOTECHNOLOGY

T.Y.B.Sc. BIOTECHNOLOGY

Syllabus

(To be implemented from Academic Year 2015-16)

Course structure: First Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Bb- 101 Fundamentals of Chemistry	Theory	100	90L
Bb- 102 Fundamentals of Physics	Theory	100	90L
Bb- 103 Basics of plant and animal sciences	Theory	100	90L
Bb- 104 Mathematics & Statistical Methods for Biologists	Theory	100	90L
Bb- 105 Fundamentals of Biological Chemistry	Theory	100	90L
Bb- 106 Biophysics & Instrumentation	Theory	100	90L
Bb- 107 Microbiology	Theory	100	90L
Bb- 108 Computers and application	Theory	100	90L
Bb- 109 Practicals in Chemistry and Biochemistry	Practical	100	30 P
Bb- 110 Practicals in Physics, Biophysics and Instrumentation	Practical	100	30 P
Bb- 111 Practicals in Biosciences	Practical	100	30 P
Bb- 112 Quantitative Methods in Biology	Practical	100	30 P

Course structure: Second Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb- 211 A Genetics & B Immunology	Theory	75 25	45L 15L
Bb- 212 Cell Biology	Theory	100	60L
Bb- 213 Environmental Biology and Biotechnology	Theory	100	60L
Bb- 214 Practicals in Environmental Biotechnology	Practical	100	30P
Bb- 215 Practicals in Cell Biology & Genetics	Practical	100	30P
Semester II			
Bb- 221 Molecular biology	Theory	100	60L
Bb- 222 Animal and Plant development	Theory	100	60
Bb- 223 Scientific writing and communication	Theory	50	30L
Bb- 224 Metabolic Pathways	Theory	50	30L
Bb- 225 Practicals in Molecular biology	Practical	100	30 P
Bb-226 Practicals in Developmental biology	Practical	100	30 P

Course structure: Third Year B.Sc. Biotechnology

Course Code and Course Name	Theory/ Practical	Marks	Lecture/ Practical
Semester I			
Bb-331 Microbial Biotechnology	Theory	100	60L
Bb-332 Plant and animal tissue culture	Theory	100	60L
Bb- 333 Biodiversity & Systematics	Theory	100	60L
Bb-334 Practicals in Tissue culture	Practical	100	30P
Bb- 335 A Practicals in Microbial biotechnology B Practicals in Field studies and report writing	Practical	75 25	30P
Semester II			
Bb-341 Large scale Manufacturing process	Theory	100	60L
Bb- 342 Biochemical and biophysical techniques	Theory	100	60L
Bb- 343 Recombinant DNA Technology	Theory	100	60L
Bb -344 Techniques in Genetic Engineering	Practical	100	30P
Bb- 345 A Practicals of large scale manufacturing process B Practicals in biochemical and Biophysical techniques	Practical	50 50	30P

Bb-331: Microbial biotechnology (60L)

Sr. No.	Topic	Lecture
1	Microbial Biotechnology- History and Scope	1
2	a. Microbial Growth Kinetics: Batch (Monod's equation), Fed Batch and continuous culture. b. Yield Coefficients: (Definition and Concept) $Y_{x/s}$, $Y_{p/s}$, $Y_{p/x}$, Y_{ATP} , Respiratory quotient (RQ) c. Growth in relation to product formation (Growth linked and non-growthlinked products) d. Classification of microorganisms on the basis of their environmental requirements such as: pH, Temperature, oxygen, salt, sugar, moisture and their molecular adaptations to extreme environments.	8
3	Immobilization of enzymes: Methods, Properties, Applications, Advantages and Disadvantages of Immobilization, Biosensors and Biochips-Types and applications	4
4	Medical Microbiology: Normal flora, diseases of various systems (Tuberculosis, SARS, Typhoid, Polio, Syphilis, Tetanus, Anthrax, Leprosy), causative agent, symptoms, morphology, pathogenesis, diagnosis & treatment	8
5	Food and Dairy Microbiology A) Food Microbiology: - Food as a substrate (Intrinsic and extrinsic factors) - Microbiological spoilages and sources of microorganisms, Spoilage of foods- Meat and poultry products, bread, fruits and vegetables, eggs, canned foods. - Food Preservation: - General principles and methods of food preservation, Use of Chemicals (Added and Developed Preservatives) Canning, Radiations, Low and High Temperature - Concept of TDP, TDT, D, F and Z values. - HACCP (Hazard Analysis and Critical Control Points) - Different types of fermented foods produced from microorganisms- Idli, Dhokla, Soysauce, Sauerkraut B) Dairy Microbiology: - Definitions of milk and milk products, composition of milk and factors affecting composition - Sources of contamination of milk - Flavour and Colour defects, Sweet curdling, and Stormy fermentation, Ropiness - Preservation- Pasteurization (LTH, HTST, UHT), phosphatase test. - Grading of milk (Direct and indirect tests), Brucella ring and Mastitis tests - Fermented dairy foods-Curd, yoghurt, kefir, butter and cheese and their spoilages	20

	C) Food sanitation and Food borne diseases: Intoxications and Infections <i>(Staphylococcus aureus, Clostridium botulinum Salmonella, pathogenic E. coli, Aspergillus flavus)</i>	
6	Water and Waste water: i) Water : Indicators of faecal pollution, Routine bacteriological analysis of water for potability: Presumptive, Confirmed, Completed test, Membrane Filter Technique and Eijkman tests. Bacteriological standards of drinking water.(WHO, BSI) ii) Drinking Water purification methods: Sedimentation, coagulation, flocculation, Filtration (Slow sand and Rapid Sand),disinfection. ii) Sewage and Industrial waste water: Types of wastes, relevance of COD and BOD determination in analysis of waste water, iii) Methods and principles of treatment of sewage (primary, secondary and tertiary treatment methods- Effluent treatment (Distillery and Textile) Microbial consortium for effluent treatment.	15
6.	Applications of microorganisms: i) Geomicrobiology-Ore leaching (methods and examples), MEOR, Microorganisms in extraterrestrial life studies ii) Alcoholic beverages: Wine, Beer iii) Biofertilizers and Biopesticides and Microbial plant growth Promoters(gibberellins and IAA) iv) GMOs-Norms and applications v) Microbial Sweeteners (Thaumatococcus, Monelin) , Flavour enhancers and microbial toxin production and their applications vi) Microbial Polysaccharide production: Xanthan, Dextran, Alginate, Scleroglucan, Gellan, Pullulan, Curdlan vii) Bioplastic-Biopol, Microbial rubber and adhesive polymers - viii) Biotransformations-Indigo and glycerol to dihydroxy acetone ix) Biotechnology biosafety –Norms and measures	12

References:

1. Microbiology – 5th Edition (1993), Pelczar M.J., Chan E.C.S., Krieg N.R., The McGraw Hill Companies Inc. NY, USA
2. General Microbiology - Stanier R.Y., 5th edition, (1987)Macmillan Publication, UK.
3. Food Microbiology –Frazier W. C., 4th edition (2008) The McGraw Hill Companies Inc. NY, USA

Bb-332 Plant and Animal Tissue Culture (60L)

Sr. No.	Topic	Lecture
	A. Plant Tissue Culture:	
1	Concepts of Cell theory & Cellular totipotency, Landmarks in plant tissue culture.	1
2	Infrastructure & Organization of plant tissue culture laboratory – General & aseptic laboratory, different work areas, equipments & instruments required.	2
3	Aseptic techniques – Washing & preparation of glassware, packing & sterilization, media sterilization, surface sterilization, aseptic work station, precautions to maintain aseptic conditions.	2
4	Culture Media – Nutritional requirements of the explants, PGRs and their <i>in vitro</i> roles, media preparation.	3
5	‘Explant’ for plant tissue culture Response of explants <i>in vitro</i> – Dedifferentiation and redifferentiation a) callus formation b) organogenesis (direct and indirect) c) embryogenesis (direct and indirect)	4
6	Callus culture technique– Introduction, principle, , factors affecting, Morphology & internal structure	2
7	Suspension culture technique – Introduction, principle, types, synchronization	2
8	Organ culture technique – Introduction, principle, factors affecting w.r.t. root tip culture, leaf culture, shoot tip & meristem culture,	2
9	Anther & pollen culture – Introduction, principle, , factors affecting,	2
10	Ovary, ovule, embryo and endosperm culture.	2
11	Protoplast –isolation, culture and fusion	3
12	Parameters to assess growth and development <i>in vitro</i>	1
13	Somaclonal variation – Introduction, terminology, origin	1
14	Applications of plant tissue culture	3
	B. Animal Tissue culture	
1	a. Introduction: Comparison with bacterial culture b. <i>In vivo</i> verses <i>in vitro</i> growth conditions for cells of multicellular organisms c. Concept of monolayer, suspension, histotypic/ organotypic, organ culture d. Maintenance of aseptic conditions	5
2	Equipment and infrastructure a. Laboratory design b. Instruments used in ATC c. Labware: TC flasks .	4
3	Nutrition & Physiology	4

	a. Rationale behind medium formulation with examples b. Advantages and disadvantages of serum. Serum free media c. Balanced salt solutions,	
4	Primary cell culture a. Source selection, different methods of establishing primary cell culture b. Special reference to fibroblast culture and lymphocyte culture	3
5	Cell lines a. Evolution of cell line b. Finite and transformed cell lines c. Mammalian and insect cell line growth conditions d. Subculture	6
6	Characterization of cell lines a. Need for characterization b. Karyotyping, biochemical & genetic characterization of cell lines.	4
7	Cell storage and distribution a. Cryopreservation b. Cell repositories	2
8	Application of Animal cell cultures.	2

Reference Books:

1. R. Ian Freshney. Culture of animal cells, 6th Edition, 2010. A John Wiley & Sons, Inc., USA
2. R.W.Masters. Animal Cell Culture- Practical Approach, 3rd Edithion,2000, Oxford University Press. USA
3. Principles And Practice Of Animals Tissue Culture, Sudha Gangal, 2nd edition, (), University Press, India
4. Razdan M.K. (2009) - Introduction to Plant Tissue culture (Oxford & IBH Publ, New Delhi)
5. Bhojwani S.S. & Razdan M.K. (1996) - Plant Tissue Culture : Theory & Practice (Elsevier, New Delhi)
6. Jha TB & Ghosh B (2007) – Plant tissue culture: Basic and applied (Universities Press, Hyderabad)

Bb-333 Biodiversity and Systematics (60L)

Sr. No.	Topic	Lectures
I	Biodiversity	45
1	Understanding Biodiversity	13
1.1	Concept of Biodiversity, Definitions, Taxonomic, ecological and genetic perspectives of biodiversity, Change in Biodiversity over time and space, Magnitude.	7
1.2	Ecosystem diversity, Species diversity, Genetic diversity, Indices of biodiversity analysis. (Plant, Animal and Microbial)	6
2	Biodiversity in Ecosystems	6
2.1	Biomes of the world	2
2.2	Biodiversity in India: Habitats, Niche	2
2.3	Behaviour patterns of animals- Habits	2
3	Population Interactions	10
3.1	Population growth forms, age class distribution and carrying capacity	2
3.2	Population density, abundance and richness	3
3.3	Population Structure and interactions	2
3.4	Mathematical modeling- of Logistic growth, competition and prey-predator dynamics	3
4	Conservation of Biodiversity	9
4.1	Status of biodiversity and need for conservations	2
4.2	Strategies for Conservation, methods for conservation- <i>Ex situ</i> and <i>In situ</i>	4
4.3	Conservation policies, laws and organization- Rio Conference, Earth Summit, Conservation efforts in India- Governmental and NGOs	3
5	Biodiversity Utilization	7
5.1	Management, documentation and databases of biodiversity (Biodiversity Informatics)	2
5.2	Domesticated animal and agricultural diversity	3
5.3	Socio- economic importance of biodiversity	2
II	Systematics	15
6	Biological Systematics	7
6.1	Concept of species and variation	4
6.2	Need for taxonomy and nomenclature	2
6.3	Introduction to classification systems	1

7	Important Tools and techniques in Systematics	8
7.1	Techniques in morphological, histological, embryology and anatomical analysis	4
7.2	Molecular tools in taxonomy	4

Reference Books:

1. A Text Book of the Plant Geography Of India (1983) Bharucha F R OUP India
2. An Advanced Text Book On- Biodiversity- Principle And Practices (2004) Krishnamurthy K V Oxford and IBH Publishing, Delhi
3. Biological Systematics: Principles And Applications (2002) Randall T. Schuh Cornell University Press, USA
4. Biotechnology Applications (2009) C S K Mishra I K Interntional Pvt Ltd, New Delhi
5. Communities And Ecosystems (1975) Whittaker R H Macmillan Pvt Ltd, NewYork
6. Ecology: Principles and Applications (1998) J. L. Chapman, M. J. Reiss Cambridge University Press, Cambridge
7. Environmental biotechnology(2010) Rana Rastogi Publications, Meerut
8. Environmental Science (2011) Santra S.C. New Central Book Agency, Kolkata
9. Evolution (2005) Douglas J. Futuyma Sinauer Associates, Inc. Publishers, Sunderland
10. Fundamentals of Ecology (2009) Dash 3rd edition, Tata McGraw-Hill Education, New Delhi
11. Fundamentals of Molecular Biology (2009) Pal & Ghaskadbi Oxford University Press, New Delhi
12. Fundamentals of Plant Systematics (1986) Radford A E Harper and Row, New York
13. Genetic Engineering: Principles And Practice (1996) Sandhya Mitra Macmillan Pvt Ltd India, Bangalore
14. Genetics Of Populations (2011) Philip Hedrick Jones & Bartlett Learning, Burlington, MA
15. Global Biodiversity Strategies (1992) Courrier Kathleen (Editor) World Resource Institute,USA
16. Introduction To Microbiology (2004) John and Catherin Ingraham Brooks/Cole Pub, USA
17. Living In The Environment (2012) G. Tyler Miller, Jr., Scott E. Spoolman Brooks and Coel, CengageBrain learning, USA

18. Mathematical Biology (1989) Murray J D Springer, New York
19. Modern Text Book of Zoology-Vertebrates (2010) Kotpal R E Rastogi Publication, New Delhi
20. Phylogenetic Systematics (1999) W Hennings, D Dwight Davis, R Zangerl University of Illinois Press, Champaign, IL
21. Plant Systematics (2010) Michael G. Simpson Academic Press, Salt lake city, UT, USA
22. Plant Systematics- A Phylogenetic Approach (2008) Walter S Judd Sinauer Associates, Sunderland
23. Population Genetics (2011) Hamilton M Wiley Publisher, New Delhi
24. Principles Of Gene Manipulation And Genomics (2009) S. Primrose and R. Twyman Blackwell Publishing House, New Jersey
25. Systematics And Biogeography (2010) David M. Williams, Malte C. Ebach Springer, New York
26. Systematics And The Origin Of Species, From The Viewpoint Of A Zoologist (1942) Meyer E Harvard University Press, Cambridge, MA
27. Systematics: A Course Of Lectures (2012) Ward C. Wheeler Wiley-Blackwell Publishing, New Jersey
28. Text Book of Biodiversity (2003) Krishnamurthy K V Science Publishers, Jodhpur
29. <http://www.earthsummit.info/>
30. <http://www.un.org/geninfo/bp/enviro.html>

Bb-334 Practicals in Tissue Culture (30P)

Sr. No.	Topic	Practical (Total 30 P)
1	ATC laboratory design and equipment used in ATC	1
2	Familiarity to Aseptic conditions	2
3	Animal cell culture media preparation, sterilization, washing, packing	2
4	Observation of cells in culture – Principles & practice	1
5	Isolation of Lymphocyte for culture: Ficoll-hypaque density gradient separation	2
6.	Maintenance of cell lines (Sp2O)	3
7	Cell staining methods viz. Giemsa	1
8	Viable cell count and growth studies	2
9	PTC Laboratory : organization of facility and equipment	1
10	Aseptic manipulation – washing, capping, packing & sterilization, laminarflow operation and safety precautions	2
11	Stock solutions & media preparation	2
12	Callus culture technique-Initiation of culture, callus morphology & internal structure	2
13	Suspension culture technique–Initiation of culture, sub culture and growth measurement	2
14	Effect of plant growth regulators on <i>in vitro</i> response of explants.	2
15	Initiation of shoot tip & axillary bud culture	2
16	Anther and/ embryo culture	2

BT 335 a Practicals in Microbial Biotechnology

Sr. No.	Practical Title	Practicals (23P)
1	Study of Growth Curve and Generation time of Bacteria/ Yeast using turbidometry	1
2	Effect of Environmental factors on growth of bacteria (pH, Temperature, salt and Sugar)	2
3	Immobilization of whole yeast cells/ enzyme by suitable method and determination of stability of immobilized enzyme.	2
4	Isolation and identification (Genus level) of spoilage causing microorganisms from spoiled foods.	2
5	Detection of Aflatoxin in foods	1
6	Isolation and identification of starter organisms from Idli batter/ Dahi	2
7	Grading of raw milk (Dye reduction test, DMC)	2
8	Determination of efficiency of Pasteurization by quantitative phosphatase test.	1
9	Assessment of potability of water a.Presumptive b.Confirmed and c.Completed test. d. Eijkman's test e. IMViC tests	3
10	Preparation and Efficiency testing of Biofertilizer/ Biopesticide.	2
11	Production of microbial Polysaccharide.	3
12	Visit to Dairy/ Effluent treatment plant / Sewage Treatment plant.	2

Bb-335 b Practicals in Field studies (7P)

One day field visit to local forest ecosystem to conduct following Practicals-

Quadrant/transect methods for plant diversity analysis

Point count for bird/butterfly/insect diversity

Calculation of species diversity, richness and abundance from the field visit data

Report writing of the field visit with photo documentation.

Bb341 Large Scale Manufacturing Process (60L)

Sr.No.	Topic	Lectures
1	a. Fermentation - Definition, Historical perspective, Lay out of a typical fermentation unit. b. Definition and Concept of Bioprocess Engineering, Various components of Bioprocess. c. Types of fermentations: Submerged, Surface, Solid State, Dual, Batch, Continuous, Fed Batch.	4
2	a. Screening - Definition and Objectives: Primary and Secondary Screening b. Strain Improvement : Objectives, Methods for strain improvement with examples (mutant selection, mutants with altered permeability, auxotrophic mutants, analogue resistant DNA technology) c. Microbes of industrial importance, Culture collection centers of industrially important microorganisms. d. Inoculum build up for Industrial fermentations : Bacteria and Fungi	5
3	a. Bioreactor Design : Characteristics of an ideal Fermenter, Construction material used, surface treatment of material Design of a typical Batch Fermenter Aerator and Agitator- types, Baffles, Seals and valves used, steam traps. Additional accessories and peripherals. b. Different designs of bioreactors : Mechanically agitated and non-mechanically agitated • Bubble column • Bubble Cap • Air Lift (internal and external loop) • Packed Bed reactor • Fluidized bed reactor • Pressure cycle • Animal and Plant cell Bioreactors	8
4	Media components and optimization : Media used for large scale production: Carbon sources : Cane and Beet molasses, Malt, Corn, Starch, oils, hydrocarbons, alcohols. Nitrogen sources : Corn steep liquor, Soybean meal, peanut meal Buffers Chelators Water Precursors, Inhibitors, Inducers Antifoams- types, mode of action, advantages and disadvantages. Inoculum and Production media Media for animal cell culture. Medium Optimization • Classical Approach	5

	• Plackett and Burman design • Response Surface Methodology (RSM)	
5	Air and Media Sterilization: Concept of Aseptic Operations and Containment. Air sterilization: Principles, Mechanism of capture of particles in air, Fixed (absolute) and non-fixed pore (depth) filters, Filter sterilization of air, Theory of depth filter, Validation of air filters. Media Sterilization: Principles, Thermal Death time, Decimal reduction time, Del factor, Indicator organism, Designing of sterilization cycle using thermal death of microbes, loss of nutrient quality during sterilization, Equipments used in sterilization: Batch and Continuous, Use of Non sterilized media.	4
6	a. Measurement and Control of different Bioprocess parameters: (Physical and Chemical Parameters): Temperature, pH, Dissolved oxygen, Microbial biomass, Fluid flow, Pressure, Weight, In let and exit gas, foam, CO₂, Use of computers in Bioprocess b. Oxygen Uptake rate, Oxygen transfer rate, Concept and importance of K_{La}, Determination of K_{La} values, Different rheologies of fermentation media, Factors affecting K_{La} values c. Scale Up and Scale down.	10
7	Methods and equipments used in Downstream processing: - Definition: Unit operations and downstream processing, General strategy of product recovery. - Precipitation (Agents used :Salts, Organic solvents, polyelectrolytes, acids and bases) - Filtration (Plate Frame. Rotary Vacuum, Filter Aids, Flocculating agents) - Centrifugation (types used in Industry: basket, tubular bowl, Scroll, multichamber, disc bowl) - Cell Disruption (Physico – mechanical and chemical methods). - Liquid- Liquid extraction(Principle, Co and counter current extraction) - Chromatography (one example each of use of Adsorption, Ion exchange, Gel and Affinity in product recovery can be explained along with manufacturing process of antibiotics, enzymes and vaccines). - Membrane Processes (Ultra filtration, Reverse Osmosis) - Drying (Drum and Spray Drying) - Whole broth Processing.	8
8	Large Scale Manufacturing Process of: - Biomass based Products: Baker's Yeast, Single cell Protein - Enzymes: Amylase, Restriction Enzymes - Antibiotics: Penicillin, Streptomycin - Vitamins: B12, Riboflavin	10

	e. Amino acids: Glutamic acid, Lysine f. Vaccines: DPT, Polio g. Biotransformation Products : Steroids, Ascorbic acid	
9	a. Concept of Good Manufacturing Practices(GMP),Standard Operating Practices(SOP) b. Quality Control and Quality Assurance (Definition, Functions and Responsibilities) c. Tests Used for Quality Assurance of finished product: i. Sterility Testing ii. Pyrogen testing iii. Bacterial endotoxin (LAL test) iv. Ames Test.	4
10	Bioprocess Economics: Basic objectives in developing economically viable process, Market Potential, Fixed and Variable costs, Depreciation, Amortization, and Selection of Pricing.	2

Reference Books:

1. Principles of Fermentation Technology, 2nd edition, (2003), Whittaker & Stan bury, Butterworth-Heinemann, An imprint of Elsevier Science, UK
2. Practical fermentation technology, 1st edition, (2008), BRIAN MCNEIL & LINDA M. HARVEY, John Wiley & Sons, USA
3. Industrial Microbiology: An Introduction, 1st edition, (2007), Waits and Morgan, Blackwell Science Ltd USA.
4. Morden Industrial Microbiology and biotechnology, 1st edition, (2007), Nduka Okafor, Science Publishers, USA
5. Industrial Biotechnology, 1st edition, (2009), Abilasha Mathuriya, Ane books Pvt.Ltd, India

Bb-342 Biochemical & Biophysical Techniques

Sr. No.	Topic	Lecture
1	Introduction, Lab safety, Scientific notation & Units, errors & accuracy in experimentation, understanding of concentration of solutions, Strong acids and bases, weak acids and bases, polyprotic acids, buffers, biological buffers, pH metry.	10
2	Microscopy: Introduction to different types of microscopy, con focal microscopy, phase contrast, fluorescence microscopy, inverted microscopy. preparation of specimens for different types of microscopy	10
3	Spectrophotometry: Electromagmantic radiations(dual nature) wavelength, frequency, properties of Electromagnetic radiation, electromagnetic spectra, light absorption and excitations of electrons. Beer-Lambert's Law, UV-visible spectroscopy (chromophores in proteins), instrumentation(spectrophotometer and colorimeter), molecular extinction coefficient, fluorescence spectroscopy	10
4	Centrifugation: Introduction, basic principle of sedimatisation, angular velocity & centrifugal field, g & RPM conversion - preparative & analytical centrifugation, [ultracentrifuge], density gradient centrifugation, rotor types , care maintenance & safety.	10
5	Chromatography: Introduction, principles- distribution coefficient, RF value Types of chromatographs a) Thin layer, HPTLC, paper chromatography b) Column chromatography – gel filtration, ion-exchange, affinity chromatography, c) adsorption chromatography	10
6	Electrophoresis: Introduction, Theory, principles, supporting matrices, capillary electrophoresis. Electrophoresis of proteins- SDS, native, activity staining Nucleic acids – Agarose, Pulse field gel electrophoresis.	10

Reference Books:

1. Biophysics, an introduction. 1st edition. (2002) Cotteril R. John Willey and Sons Ltd., USA
2. Biophysics. 1st edition (2002), Pattabhi V and Gautham N. Kluwer Academic Publisher, USA.
3. Textbook of optics and atomic physics – P.P. Khandelwal (Himlaya Publishing House.)
4. Instrumentation measurements and analysis – 2nd edition (2003). Nakra and Choudhari, Tata Mc Graw Hill, India.
5. Nuclear Physics: An Introduction. 2nd edition (2011). S. B. Patel. Anshan Publication, India

Bb 343: Recombinant DNA Technology (60L)

Sr. No	Topic	Lecture
1	Milestones of genetic engineering- Historical perspective. Recombinant DNA Technology- Introduction	2
2	Molecular tools and applications -restriction enzymes, ligases, polymerases, alkaline phosphatase.	5
3	Gene cloning Vehicles- vector: plasmids, cosmids, phage vectors- λ and M13, YACs, BACs, expression vectors, Agrobacterial vectors host – properties of host	10
4	Transformation- techniques of introducing DNA in bacteria, animal and plant cells Selection of transformants & characterization	8
5	Nucleic acid purification, yield, yield analysis, plasmid characterization, isolation strategies.	5
6	DNA sequencing techniques– Maxam-Gilbert's method, Sanger's Dideoxy method, Automated DNA sequencing, Next generation sequencing	4
7	Restriction enzyme digestion and restriction mapping Southern and northern analyses.	4
8	Genomic library-screening of recombinants	4
9	Gene manipulations by site-directed mutagenesis -PCR Technology cDNA library, reverse transcription, comparison between genomic and cDNA library	7
10	Genome mapping, DNA fingerprinting	5
11	Applications of Genetic Engineering, Recombinant DNA guidelines	6

Reference Books:

1. Molecular Biology of the Gene, 6th Edition (2008), James D. Watson, Tania Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Lodwick, Pearson Education, Inc. and Dorling Kindersley Publishing, Inc. USA
2. Molecular Biotechnology: 4th edition. (2010), Glick B.R., Pasternak J.J., Patten C. L., ASM press, USA
3. Principles of Gene Manipulation & Genomics, 7th Edition (2006), Primrose and Twyman, Blackwell Publishing, USA.
4. Molecular cloning – a laboratory manual – (Vol. 1-3), 4rd edition, (2012), Green and Sambrook, Cold Spring Harbor Laboratory Press, USA

Bb-344 Practicals in Recombinant DNA Technology (30P)

Sr. No.	Topic	Practical (30P)
1	Isolation of plasmid DNA & Gel electrophoresis	3
2	Genomic (Plant andAnimal) DNA- Isolation and	4
3	Genomic (bacterial) DNA- Isolation and quantitation	3
4	DNA Ligation	2
5	Preparation of competent Cells	1
6	Transformation of <i>E. coli</i> and selection of recombinants.	4
7	Colony PCR of recombinant and analysis	2
8	Restriction mapping of recombinant DNA	4
9	Southern blotting techniques	4
10	Western blotting technique	3

Bb-345 A Practicals in large scale manufacturing process**Bb-345 B Practicals in Biochemistry & Biophysical Techniques**

Sr. No.	Topic	Practicals (30P)
	Bb- 345 A Practicals in large scale manufacturing process	(15P)
1	a. Screening and isolation of antibiotic producing organism from soil (Crowded plate/ Giant colony method) b. Isolation of auxotrophic mutants by Gradient plate technique.	3
2	Production, Recovery (Filtration, Precipitation) and estimation (Titrimetric or colorimetric) a of Primary metabolite (Organic acid)	3
	Production, Recovery (Filtration, Solvent extraction) and estimation (Bioassay) a of Secondary metabolite (Antibiotic)	3
4	Preparation of wine	2
5	Laboratory Scale Production, Recovery and estimation of Ethanol	2
6	Determination of Minimum inhibitory Concentration (MIC) of antibacterial compound	1
7	Sterility testing of injectables/autoclave	1
8	Visit to a Fermentation Units	
	Bb-345 B Biochemistry & Biophysical Techniques	(15P)
9	Preparation of buffer.	1
10	Laboratory safety, preparation of solutions, calibration of pipette.	1
11	Thin layer chromatography – sugar , amino acids	2
12	Paper chromatography – amino acids	1
13	Estimation of cholesterol	1
14	Spectrophotometry – Estimation of ascorbic acid – DCPIP method	1
15	Spectrophotometry – A spectra of Protein, nucleic acid.	2
1	Chromatography – Ion-exchange –separation of compounds	2
17	Electrophoresis – separation of mixture of proteins – Native PAGE and activity staining	2
18	Demonstration of HPLC and GC	2

Savitribai Phule Pune University, Pune
T.Y.B.Sc. Chemistry Syllabus

To be implemented from June 2015
(Academic Year 2015-16)

Preamble of the Course

1. T.Y.B.Sc. Chemistry is consisting of six theory and three practical courses.
 2. Each theory course is of 48 lectures; 4 lectures per course per week should be conducted in every semester.
 3. Out of five optional courses recommended for CH-336 and CH-346, only one option should be taught and the same course should be implemented for the next semester.
 4. Each practical course is of 4 lectures per week per batch. Practical batch for each course should comprise of 12 students only.
 5. Each theory paper will carry 50 Marks out of which 10 Marks will be allotted for Internal assessment and University Examination will be conducted for 40 Marks at the end of each semester.
 6. The practical examination of six hours for each practical course will be conducted at the end of Semester-IV. Each practical course will carry 100 Marks out of which 20 Marks will be allotted for Internal assessment and University Examination will be conducted for 80 Marks.
 7. **Marks for internal assessment of Practical courses will be allotted as follows.**
 - a. Completed and Certified journal and regularity of the student 10 Marks
 - b. Oral Examination and Internal Test 10 Marks
 8. Internal assessment for theory courses will be done on the basis of the performance of the student in tests. Minimum two tests should be arranged for each course in a Semester.
 9. Visit to a chemical industry may be organized during the academic year.
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Savitribai Phule Pune University
Board of Studies in Chemistry
T.Y.B.Sc. Chemistry Syllabus

Structure to be implemented from June 2015 (i.e. from Academic Year 2015-16)

Semester	Course Code and Title	Number of Lectures	Marks
Semester III	CH-331: Physical Chemistry	48	50
	CH-332: Inorganic Chemistry	48	50
	CH-333: Organic Chemistry	48	50
	CH-334: Analytical Chemistry	48	50
	CH-335: Industrial Chemistry	48	50
	OPTIONAL COURSE CH-336-A Nuclear Chemistry OR CH-336-B Polymer Chemistry OR CH-336-C Introduction to Biochemistry and Molecular Biology OR CH-336-D Environmental and Green Chemistry OR CH-336-E Agriculture Chemistry	48	50
Semester IV	CH-341: Physical Chemistry	48	50
	CH-342: Inorganic Chemistry	48	50
	CH-343: Organic Chemistry	48	50
	CH-344: Analytical Chemistry	48	50
	CH-345: Industrial Chemistry	48	50
	OPTIONAL COURSE CH-346-A Nuclear Chemistry OR CH-346-B Polymer Chemistry OR CH-346-C Introduction to Biochemistry and Molecular Biology OR CH-346-D Environmental and Green Chemistry OR CH-346-E Dairy Chemistry	48	50
	PRACTICAL COURSES		
	CH-347: Physical Chemistry Practicals		100
	CH-348: Inorganic Chemistry Practicals		100
	CH-349: Organic Chemistry Practicals		100

NOTE

1. Each theory paper will carry 50 Marks out of which 10 Marks will be allotted for internal assessment and University Examination will be conducted for 40 Marks at the end of each semester.
2. The practical examination will be conducted at the end of Semester-IV. Each practical course will carry 100 Marks out of which 20 Marks will be allotted for internal assessment and University Examination will be conducted for 80 Marks.

3. Marks for internal assessment of Practical courses will be allotted as follows.

a. Completed and certified journal 10 Marks

b. Overall performance and regularity
of the student during whole academic year 10 Marks

4. Internal assessment for theory courses will be done on the basis of the performance of the student in tests. Minimum two tests should be arranged for each course in a Semester.

Date: 29/04/2015

Dr. B. R. Khot
Chairman,
BOS in Chemistry

Savitribai Phule Pune University

Board of Studies in Chemistry

T.Y.B.Sc. Chemistry Syllabus

To be implemented from June 2015 (i.e. from Academic Year 2015-16)

Equivalence of the Courses

Semester	Course Code and Title (Old)	Course Code and Title (New)
Semester III	CH-331: Physical Chemistry	CH-331: Physical Chemistry
	CH-332: Inorganic Chemistry	CH-332: Inorganic Chemistry
	CH-333: Organic Chemistry	CH-333: Organic Chemistry
	CH-334: Analytical Chemistry	CH-334: Analytical Chemistry
	CH-335: Industrial Chemistry	CH-335: Industrial Chemistry
	OPTIONAL COURSE	OPTIONAL COURSE
	CH-336-A Nuclear Chemistry	CH-336-A Nuclear Chemistry
	CH-336-B Polymer Chemistry	CH-336-B Polymer Chemistry
Semester IV	CH-336-C Introduction to Biochemistry and Molecular Biology	CH-336-C Introduction to Biochemistry and Molecular Biology
	CH-336-D Environmental Chemistry	CH-336-D Environmental and Green Chemistry
	CH-336-E Agriculture Chemistry	CH-336-E Agriculture Chemistry
	CH-341: Physical Chemistry	CH-341: Physical Chemistry
	CH-342: Inorganic Chemistry	CH-342: Inorganic Chemistry
	CH-343: Organic Chemistry	CH-343: Organic Chemistry
	CH-344: Analytical Chemistry	CH-344: Analytical Chemistry
	CH-345: Industrial Chemistry	CH-345: Industrial Chemistry
	OPTIONAL COURSE	OPTIONAL COURSE
	CH-346-A Nuclear Chemistry	CH-346-A Nuclear Chemistry
	CH-346-B Polymer Chemistry	CH-346-B Polymer Chemistry
	CH-346-C Introduction to Biochemistry and Molecular Biology	CH-346-C Introduction to Biochemistry and Molecular Biology
	CH-346-D Environmental Chemistry	CH-346-D Environmental and Green Chemistry
	CH-346-E Dairy Chemistry	CH-346-E Dairy Chemistry
	PRACTICAL COURSES	PRACTICAL COURSES
	CH-347: Physical Chemistry Practicals	CH-347: Physical Chemistry Practicals
	CH-348: Inorganic Chemistry Practicals	CH-348: Inorganic Chemistry Practicals
	CH-349: Organic Chemistry Practicals	CH-349: Organic Chemistry Practicals

Date: 29/04/2015

Dr. B. R. Khot
Chairman, BOS in Chemistry

Semester-III
Course: Physical Chemistry (CH-331)

Topic	No. of Lectures
1. Chemical Kinetics	10
2. Electrolytic Conductance	14
3. Investigation of Molecular Structure	16
4. Phase Rule	08
Total Lectures	48

1. Chemical Kinetics :

[10 L]

Recapitulation of Chemical Kinetics, Third order reaction, Derivation of integrated rate law for third order reaction with equal initial concentration, characteristics of third order reaction, examples of third order reaction, Methods to determine order of reaction using Integrated rate equation method, Graphical method, Half-life method, Differential method. Effect of temperature on reaction rate, Arrhenius equation, related numerical.

[Ref. 1 : Pages 567-574, Ref. 2: Pages 600-612]

2. Electrolytic Conductance:

[14 L]

Recapitulation of Electrolytic conductance, Specific and equivalent conductance, Variation of equivalent conductance with concentration, Kohlrausch's law and its applications to determine

- a. Equivalent conductance at infinite dilution of a weak electrolyte,
- b. The ionic product of water,
- c. Solubility of sparingly soluble salts,

Migration of ions and ionic mobilities, absolute velocity of ions, Transport number determination by Hittorf's method and moving boundary method, Relation between ionic mobility, ionic conductance and transport number, Ionic theory of conductance, Debye-Huckel –Onsager equation and its validity, Activity in solution, fugacity and activity coefficient of strong electrolyte.

[Ref. 1 : Pages 398-437, Ref. 2 : Pages 686-703]

3. Investigations of Molecular Structure:

[16 L]

Molar refraction, Electrical polarization of molecules, Permanent dipole moment, Determination of dipole moment, Molecular spectra - Rotational, vibrational and Raman spectra Reference

[Ref. 1 : pages 691-710 Ref. 2 : Pages 398-424]

4. Phase Rule:

[08 L]

Definitions, Gibb's phase rule, one component system (moderate pressure only) for sulphur and water system, two component system for silver-lead and zinc-cadmium.

[Ref. 1 : Pages 344-350, 350-354; Ref. 2 Pages 558-575]

AIMS AND OBJECTIVES:

1. Chemical Kinetics : After studying this topic students are expected to know-

- i. Expression for rate constant k for third order reaction
- ii. Examples of third order reaction
- iii. Characteristics of third order rate constant k
- iv. Derivation for half-life period of third order reaction and to show that half-life is inversely proportional to square of initial concentration of reactants.
- v. Experimental determination of order of reaction by Integrated rate equation method, Graphical method, Half-life method and Differential method.
- vi. Explain the term energy of activation with the help of energy diagram
- vii. Explain the term temperature coefficient.
- viii. Effect of temperature on rate constant k
- ix. Derivation of Arrhenius equation
- x. Graphical evaluation of energy of activation
- xi. Solve the numerical problems based on this topic.

2. Electrolytic Conductance : After studying this topic students are expected to know-

- i. Ohm's law and electrical units such as coulomb, Ampere, Ohm and Volt.
- ii. Meaning of specific resistance, specific conductance, cell constant and their units.
- iii. Cell constant, its theoretical and experimental determination.
- iv. Preparation of conductivity water.
- v. Experimental determination of conductance.
- vi. Variation of specific and equivalent conductance of strong and weak electrolyte with dilution
- vii. Meaning of infinitely dilute solution.
- viii. Kohlrausch's law of independent migration of ions and its applications such equivalent conductance of weak electrolyte at zero conc., degree of dissociation (α), ionic product of water.
- ix. Transport number of an ion
- x. Hittorf's rule
- xi. Experimental determination of transport number by Hittorf's and moving boundary method.
- xii. Drawbacks of Arrhenius theory, Debye-Huckel-Onsager Interionic Attraction theory
- xiii. Asymmetry /Relaxation effect
- xiv. Electrophoretic effect
- xv. Validity of Onsager equation
- xvi. Fugacity and activity concept
- xvii. Activity and activity coefficient of strong electrolyte.
- xviii. Solve the numerical problems based on this topic.
- xix.

3. Investigation of molecular structure : After studying this topic students are expected to know-

- i. Understand the term additive and constitutive properties
- ii. Understand the term specific volume, molar volume and molar refraction.
- iii. Understand the meaning of electrical polarization of molecule.

- iv. Understand the meaning of induced and orientation polarization
- v. Dipole moment and its experimental determination by temperature variation method.
- vi. Application of dipole moment for structure determination.
- vii. Nature of wave and its characteristics such as wavelength, wave number, frequency and velocity.
- viii. Rotational / Microwave spectroscopy
- ix. Derivation for rotational spectra for the transition from J to J+1
- x. Limitations of Rotational Spectra.
- xi. Vibrational Spectra
- xii. Vibrational rotational Spectra
- xiii. Raman Spectroscopy
- xiv. Solve the numerical problems based on this topic.

4. Phase Rule : After studying this topic students are expected to know-

- i. Meaning and Types of equilibrium such as true or static, metastable and Unstable equilibrium.
- ii. Meaning of phase, component and degree of freedom.
- iii. Derivation of phase rule.
- iv. Explanation of water system : Description of the curve, Phase rule relationship and typical features.
- v. Explanation of sulphur system : Description of the curve, Phase rule relationship and typical features.
- vi. Explanation of two component system curve : for silver-lead and Zinc-cadmium.

References:

1. Principles of Physical Chemistry, Fourth Edition by S.H. Marron and C. F. Pruton
 2. Essentials of Physical Chemistry by B.S. Bahl, G.D.Tuli and ArunBahl Edition 2000 S. Chand and Company Ltd.
 2. Essentials of Physical chemistry by BahlTuli-Revised Multicolor Edition 2009
 3. Essentials of Nuclear Chemistry, H.J.Arnika Second edition
 4. Nuclear and Radiation Chemistry, Third edition
 5. Quantum Chemistry second edition by Manas Chandra
 6. Physical Chemistry a molecular approach by Donald A. McQuarrie , John D. Simon
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Semester-IV
Course: Physical Chemistry (CH-341)

Topic	No. of Lectures
1. Electrochemical Cells	14
2. Nuclear Chemistry	12
3. Crystal Structure	12
4. Quantum Chemistry	10
Total Lectures	48

1. Electrochemical Cells

[14 L]

Reversible and irreversible cells, EMF and its measurements, Standard cells, cell reaction and EMF, Single electrode potential and its calculation, Calculation of cell EMF, Thermodynamics of cell EMF, Types of electrodes, Classification of electrochemical cells with and without transference, Applications of EMF measurement-i) Solubility product of sparingly soluble salt, ii) Determination of pH, iii) Potentiometric titration

[Ref. 1 : Pages: 471-486, 492-519]

2. Nuclear Chemistry

[12 L]

The atom, nucleus and outer sphere, classification of nuclides, nuclear stability and binding energy. Discovery of radioactivity, types of radioactivity, general characteristics of radioactive decay and decay kinetics, Measurements radioactivity, gaseous ion collection method, proportional and G.M. counter.

Applications of radioactivity-

Radiochemical principles in the use of tracers,

Typical applications of radioisotopes as a tracer-

i) Chemical investigations- reaction mechanism,

ii) Structure determination- phosphorus pentachloride and thiosulphate ion

iii) Age determination- by Carbon-14 dating and Uranium-Lead/ Thorium-Lead Ratio

iv) Medical applications-Assess the volume of blood in patients body, Goiter

[Ref. 3 : Pages 1, 4-15, 117-119, 121-125, 371-378, Ref. 4: Pages 243-245, 247-251]

3. Crystal structure

[12 L]

Crystallization and fusion process, Crystallography, Crystal systems, -Properties of crystals, Crystal lattice and unit cell, -Crystal structure analysis by X ray - The Laue method and Braggs method,
- X-ray analysis of NaCl crystal system,
- Calculation of d and λ for a crystal system.

[Ref. 1 : Pages 67-85]

4. Quantum Chemistry

[10 L]

Concept of quantization, atomic spectra (no derivation), wave particle duality, uncertainty principle, wavefunction and its interpretation, well-behaved function, Hamiltonian (energy) operator, formulation of Schrodinger equation, particle in box (1D, 2D and 3D box) (no derivations), sketching of wavefunction and probability densities for 1D box, correspondence principle, degeneracy (lifting of degeneracy), applications to conjugated systems, harmonic oscillator, wavefunction and probability densities (no derivation), zero point energy and quantum tunneling.

[Ref. 5. Quantum Chemistry second edition by Manas Chandra- Relevant pages

Ref. 6. Physical Chemistry a molecular approach by Donald A. McQuarrie, John D. Simon- Relevant pages]

AIMS AND OBJECTIVES:

1. Electrochemical Cell :After studying this topic students are expected to know-

- i. What is meant by Electrochemical cell with specific example
- ii. Origin of EMF of electrochemical cell.
- iii. Conventions used to represent electrochemical cell.
- iv. Thermodynamic conditions of reversible cell
- v. Explanations of reversible and irreversible electrochemical cell with suitable example.
- vi. What is meant by reference electrode?
- vii. Primary and secondary reference electrode
- viii. Construction, representation, working and limitation of Standard hydrogen Electrode
- ix. Construction, representation and working of Calomel and Silver –Silver Chloride electrode
- x. Types of electrodes
- xi. Conditions of Standard Cell
- xii. Construction, representation and working of Weston Standard Cell.
- xiii. Measurement of EMF of electrochemical cell
- xiv. Nernst Equation for theoretical determination of EMF.
- xv. Thermodynamics and EMF: Relation of EMF with ΔG , ΔG° , ΔH , ΔS and equilibrium constant K of the cell reaction.
- xvi. Explanation of the term liquid junction potential
- xvii. Classification of electrochemical cell
- xviii. Chemical cell with and without transfer
- xix. Electrode and electrolytic concentration cell
- xx. Concentration cell with and without transfer.
- xxi. Application of EMF measurement such as pH determination, Determination of solubility and solubility product.
- xxii. Potentiometric titrations: Weak acid against strong base, Titration of polybasic acids, Precipitation and Redox titrations.
- xxiii. Solve the numerical problems based on this topic.

2. Nuclear Chemistry: After studying this topic students are expected to know-

- i. The atom its nucleus and outer sphere.
- ii. Classification of nuclides with suitable examples such as isotope, isobar, isotone and isomers
- iii. Explanation of stability of nucleus through neutron to proton ratio, odd and even nature of proton and neutron, Mean binding energy.
- iv. Conversion of mass into energy
- v. Mass defect, Total and mean binding energy
- vi. Explanation of binding energy curve.
- vii. Types of decay
- viii. Discovery of radioactivity
- ix. Decay kinetics
- x. Relation of half-life with decay constant.
- xi. Unit of Radioactivity : Curie Bq
- xii. Measurement of radioactivity by G.M. and proportional counter
- xiii. Principle, construction and working of G.M. / Proportional counter.
- xiv. Application of radioisotopes as a tracer
- xv. Chemical investigation : Reaction mechanism and structure determination w.r.t PCl_5 and thiosulphate ion
- xvi. Age determination- by Carbon-14 dating and Uranium-Lead/ Thorium-Lead Ratio
- xvii. Medical applications-Assess the volume of blood in patients body, Goitre
- xviii. Solve the numerical problems based on this topic.

3. Crystal Structure:After studying this topic students are expected to know-

- i. Distinguish between crystalline and amorphous solids / anisotropic and isotropic solid
- ii. Explain the term crystallography and laws of crystallography
- iii. Weiss and Millers Indices
- iv. Crystal system and their characteristics
- v. Explain the term polymorphism /allotrophism
- vi. Distance between the planes for 100, 110 and 111 type of simple, body centred and face centred cubic crystals
- vii. Bragg's experiment and Derivation of $(n\lambda = 2d\sin\theta)$ Bragg's equation
- viii. Explanation: Structure of NaCl can be ascertained with the help of X-ray analysis.
- ix. Laue's and Bragg's method.

4.Quantum Chemistry: After studying this topic students are expected to know-

- i. Concept of quantization
- ii. Atomic spectra
- iii. Wave particle duality
- iv. Uncertainty principle and its physical significance
- v. Derivation of time independent Schrodinger wave equation.
- vi. Wave function and its Interpretation
- vii. Well behaved function
- viii. Hamiltonian Operator
- ix. Particle in a box (1 and 3 dimensional)
- x. Degeneracy

- xi. Application to conjugated systems
- xii. Harmonic oscillator
- xiii. Solve the numerical problems based on this topic.

References:

1. Principles of Physical Chemistry, Fourth Edition by S.H. Marron and C. F. Pruton
 2. Essentials of Physical Chemistry by B.S. Bahl, G.D. Tuli and Arun Bahl Edition 2000 S. Chand and Company Ltd.
 2. Essentials of Physical chemistry by Bahl Tuli-Revised Multicolor Edition 2009
 3. Essentials of Nuclear Chemistry, H.J. Arnikar Second edition
 4. Nuclear and Radiation Chemistry, Third edition
 5. Quantum Chemistry second edition by Manas Chandra
 6. Physical Chemistry a molecular approach by Donald A. McQuarrie, John D. Simon
-

Physical Chemistry Practicals:CH- 347

Group A:

1. Chemical Kinetics: (Any Five):

- 1.To study the effect of concentration of the reactants on the rate of hydrolysis of an ester.
- 2.To compare the relative strength of HCl and H_2SO_4 by studying the kinetics of hydrolysis of an ester.
- 3.To compare the relative strength of HCl and H_2SO_4 by studying the kinetics of Inversion of cane sugar using Polarimeter.
- 4.To study the kinetics of iodination of acetone
- 5.To determine the first order velocity constant of the decomposition of hydrogen peroxide by volume determination of oxygen.
- 6.To determine the energy of activation of the reaction between potassium iodide and potassium persulphate.
- 7.To determine the order of reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI by half-life method.

2. Viscosity:

To determine the molecular weight of a high polymer by using solutions of different concentrations.

3.Adsorption

To investigate the adsorption of oxalic acid /acetic acid by activated charcoal and test the validity of Freundlich / Langmuir isotherm

4. Phenol-water system

To study the effect of addition of salt on critical solution temperature of phenol water System

5. Transport number

To determine the transport number of cation by moving boundary method.

6. Refractometry (any two)

- i)To determine the specific refractivity's of the given liquids A and B and their mixture and hence determine the percentage composition their mixture C.
- ii) To determine the molecular refractivity of the given liquids A, B, C and D.
- iii)To determine the molar refraction of homologues methyl, ethyl and propyl alcohol and show the constancy contribution to the molar refraction by $-\text{CH}_2$ group.

Group B

1. Colorimetry (any two)

- i)Determination of λ_{max} and concentration of unknown solution of KMnO_4 in 2 N H_2SO_4
- ii)Determination of λ_{max} and concentration of unknown solution of CuSO_4 .
- iii)To titrate Cu^{2+} ions with EDTA photometrically.
- iv)To determine the indicator constant of methyl red indicator

2. Potentiometry(any three)

- i)To prepare standard 0.2 M Na_2HPO_4 and 0.1 M Citric acid solution, hence prepare four different buffer solutions using them. Determine the pka value of these and unknown solutions.
- ii)To determine the concentrations of strong acid and weak acid present in the mixture by titrating with strong base.
- iii)To determine the formal redox potential of $\text{Fe}^{2+} / \text{Fe}^{3+}$ system potentiometrically

iv) To determine the amount of NaCl in the given solution by potentiometric titration against silver nitrate.

3. pH metry (any two)

- i) To determine the degree of hydrolysis of aniline hydrochloride
- ii) To determine p_Ka value of given weak acid by pH-metric titration with strong base.
- iii) To determine the dissociation constant of oxalic acid by pH-metric titration with strong base
- iv) To determine pH of various mixtures of sodium acetate and acetic acid in aqueous solution and hence to find the dissociation of acetic acid.

4. Radioactivity (any one)

- i) To determine plateau voltage of the given G M counter.
- ii) To determine the resolving time of GM counter
- iii) To determine E_{max} of beta particle

5. Conductrometry (any two)

- i) To determine the cell constant of the given cell using 0.01 M KCl solution and hence determine dissociation constant of a given monobasic weak acid.
- ii) To estimate the amount of lead present in given solution of lead nitrate by conductometric titration with sodium sulphate.
- iii) To investigate the conductometric titration of any one of the following
 - a) Strong acid against strong base
 - b) Strong acid against weak base
 - c) Strong base against weak acid
 - d) Weak acid against weak base

STRUCTURE OF PRACTICAL EXAMINATION

Experiment	Marks
1. One Experiment from Group – A	35
2. One Experiment from Group-B	35
3. Oral	10

References:

1. Practical Physical Chemistry, 3rd Edn. A. M. James and F. E. Prichard, Longman publication.
 2. Experiments in Physical Chemistry, R. C. Das and B. Behra, Tata McGraw Hill.
 3. Advanced Practical Physical Chemistry, J. B. Yadav, Goel Publishing House.
 4. Advanced Experimental Chemistry, Vol-I, J. N. Gurtu and R. Kapoor, S. Chand and Company.
 5. Physical Chemistry Experiments, Raghvan and Vishwanathan.
-

Semester-III

Course: Inorganic Chemistry (CH-332)

Topic	No. of Lectures
1. Molecular Orbital Theory	15
2. Coordination Chemistry	33
Total Lectures	48

1. Molecular Orbital Theory

15 L

Limitations of Valence Bond theory(VBT), Need of Molecular orbital theory (MOT), Features of MOT, Formation of molecular orbitals(MO's) by LCAO principle, Rules of LCAO combination, Different types of combination of Atomic orbital(AO's): S-S, S-P, P-P and d-d, Non-bonding combination orbitals(formation of NBMO), M.O. Energy level diagram for homonuclear diatomic molecules, Bond order and existence of molecule from bond order, Energy (β) and magnetic behavior for following molecules or ions: H_2 , H_2^+ , He_2^+ , Li_2 , Be_2 , B_2 , C_2 , N_2 , O_2 , O_2^+ , O_2^- , O_2^{2-} , F_2 , Ne_2 ,

M.O. energy level diagram, for heteronuclear diatomic molecule like CO, NO, HCl, HF.

M.O. energy level diagram, for heteronuclear triatomic molecule like CO_2 , NO_2

Ref. 2 Pages 89-112, 106-117

Ref. 4 Pages 55-72

Aims and objective:

A student should:

- Know the theories of covalent bond formation
- Know the assumptions and limitations of VBT
- Understand the need of concept of MOT
- Know LCAO principal and its approximation
- Understand and show the formation of bonding and antibonding MO's
- Draw the shapes of s, p, d orbital
- Draw combinations of s-s, s-p, p-p and d-d orbital to form σ and π molecular orbitals.
- Give the comparison of
 - Atomic orbital and molecular orbital
 - BMO and ABMO
 - Sigma and pi MO's
 - VBT and MOT
 - Comparison between BMO, ABMO and NBMO
- Draw the MO energy level diagrams for homonuclear diatomic molecules having interactions between 2s and 2p orbitals and having no interactions between 2s and 2p orbitals : H_2 , H_2^+ , He_2^+ , Li_2 , Be_2 , B_2 , C_2 , N_2 , O_2 , O_2^+ , O_2^- , O_2^{2-} , F_2 , Ne_2 ,
- Draw the shapes of molecular orbitals.
- Give the calculations of bond order, energy and explanation on stability of the above molecule and ions
- Draw the MO energy level diagrams for heteronuclear diatomic molecules: CO, NO, HCl, HF and calculations of bond order, energy and explain the stability of the molecules.

- xiii. Understand the formation of BMO, ABMO and NBMO in CO_2 or NO_2 molecule and construct MO energy level diagrams for them.

2. Coordination Chemistry

33L

I. INTRODUCTION TO COORDINATION CHEMISTRY (03 L)

1. General account and meaning of the terms involved in coordination chemistry:

Coordinate bond, central metal atom or ions, ligand, double salt, complex compound, coordination number, charge on the complex ion, oxidation number of Metal ion, first and second coordination sphere.

2. Ligands: Definition, Classification, Chelates and chelating agents.

3. Formation Constant, inert and labile complexes.

4. IUPAC nomenclature of coordination compounds

5. Different geometries of coordination compounds with C.N.= 4 to C.N.=10 and examples of each geometry.

II. WERNER'S THEORY OF COORDINATION COMPOUNDS (02 L)

Assumptions of Werner's coordination theory, Werner's formulation of Coordination compounds, Physical and chemical test to support his formulation of ionizable and non-ionizable complexes, Stereoisomerism in complexes with C.N.4 and C.N. 6 to identify the correct geometrical arrangement of the complexes.

III. ISOMERISM IN COORDINATION COMPLEXES (04 L)

Definition of isomerism in complexes-Structural Isomerism and stereoisomerism,

1. Structural isomerism (ionization, hydrate, linkage, ligand, coordination position and polymerization isomers)

2. Stereoisomerism and its types-Geometrical isomerism and optical isomerism.

IV. SIDGWICK THEORY (02 L)

Concept of Sidgwick's model, Scheme of arrow indication for M-L bond suggested by Sidgwick, Effective Atomic Number rule (EAN), Calculations of EAN value for different complexes and stability of complexes, Advantages and Drawbacks of Sidgwick's theory.

V. PAULING'S VALENCE BOND THEORY (06 L)

Introduction of Valence Bond Theory (VBT), Need of concept of hybridization, Aspects of VBT, Assumptions, VB representation of tetrahedral, square planer, trigonalbipyramidal and octahedral complexes with examples, Inner and outer orbital complexes, Electro neutrality principle, Multiple bonding($d\pi-p\pi$ and $d\pi-d\pi$), Limitations of VBT.

VI. CRYSTAL FIELD THEORY (10 L)

Introduction and need of Crystal Field Theory(CFT), Assumptions, Shapes and degeneracy of d orbital, Splitting of d-orbitals, Application of CFT to octahedral complexes, pairing energy(P) and distribution of electrons in e_g and t_{2g} level, calculation of magnetic moment using spin-only formula, Crystal Field Stabilization Energy (CFSE), calculation of CFSE in weak oh field and strong oh field complexes, Evidence for CFSE, Interpretation of spectra of complexes, calculation of $10 Dq$ and factors affecting magnitude of $10Dq$, d-d transitions and colour of the complexes, Jahn-Teller distortion theorem for octahedral complexes and its illustration, CFT of tetrahedral and square planar

complexes, calculations of CFSE, Spectrochemical series, Nephelauxetic effect and Nephelauxetic series, Limitations of CFT, modified CFT (LFT), Problems related to calculation of $10 Dq$, CFSE and spin only magnetic moment for octahedral, tetrahedral & square planar complexes. (i.e. for high spin & low spin complexes)

VII. MOLECULAR ORBITAL THEORY OF COORDINATION COMPLEX (06 L)

Introduction, Assumptions, MO treatment to octahedral complexes with sigma bonding, Formation of MO's from metal orbitals and Composite Ligand Orbitals (CLO), MO correlation diagram for octahedral complexes with sigma bonding, effect of π bonding, Charge transfer spectra, Comparison of VBT, CFT, and MOT.

Ref. 2 Pages 194 -236

Ref. 8 Relevant Pages

Ref. 9 Relevant Pages

Aims and objective

A student should:

- i. Know the meaning of various terms involved in coordination chemistry.
- ii. Know the different types of Ligands.
- iii. Understand the chelating agents, chelate and stability of chelates and complexes.
- iv. Calculate the charge on complex ion and the oxidation number.
- v. Be able to give the IUPAC name the co-ordination compound.
- vi. Know the application of co- ordination compounds in biology and chemistry.
- vii. Be able to understand the Werner's formulation of complexes and identify the ionizable ions.
- viii. Be able to distinguish between ionizable and non-ionizable valencies with suitable examples.
- ix. Give the suitable physical and chemical test for identification of number and types of ionizable ions.
- x. Be able to draw the geometrical and optical isomerism of complexes.
- xi. Choose the correct geometry for complexes with C.N. 4 and C.N. 6 with the help of stereoisomerism.
- xii. Be able to define and explain isomerism in complexes.
- xiii. Be able to explain various types of isomerism.
- xiv. Comment on the stereoisomerism in complexes with C.N. 4 and C. N. 6.
- xv. Define EAN rule and calculate EAN value of the complexes.
- xvi. Comment on EAN value and stability of complexes.
- xvii. Know the merits and the demerits of Sidgwick's theory.
- xviii. Be able to explain the need of concept of hybridization.
- xix. Explain the VB representation of tetrahedral, square planar, trigonalbipyramidal and octahedral complexes.
- xx. Be able to identify which d-orbitals are involved in hybridization during formation of complexes with different geometries such as tetrahedral, square planar, trigonalbipyramidal and octahedral.
- xxi. Be able to explain structure and magnetic behaviour of the complexes.
- xxii. Be able to identify the high spin and low spin complexes.
- xxiii. Be able to identify inner orbital and outer orbital complexes.
- xxiv. Explain electroneutrality principle and different types of pi bonding.
- xxv. Know the limitations of VBT.
- xxvi. Know the shapes of d-orbitals and degeneracy of d-orbitals.

- xxvii. Know the assumptions of CFT.
- xxviii. Understand how splitting of d-orbitals occurs when ligand approaches.
- xxix. Be able to draw crystal field splitting diagrams of d orbital of metal ion in octahedral, tetrahedral, square planar or tetragonal ligand field.
- xxx. Interpret the spectra of complexes and calculate the $10 Dq$.
- xxxi. Understand the factors affecting magnitude of $10 Dq$.
- xxxii. Be able to find high spin and low spin complexes when $10 Dq$ and pairing energy are given.
- xxxiii. Be able to explain d-d transitions and colour of the complexes.
- xxxiv. Know the conditions under which Jahn-Teller distortion occurs.
- xxxv. Explain, why Jahn-Teller distortion should occur in O_h complexes?
- xxxvi. Be able to explain Nephelauxetic effect towards covalent bonding.
- xxxvii. Explain MOT of Octahedral complexes with sigma bonding.
- xxxviii. Be able to explain Charge Transfer Spectra.
- xxxix. Be able to compare the different approaches to bonding in Coordination compounds.

Reference Books:

Ref. 1 Introduction to Electrochemistry by Glasstone - 2nd edition.

Ref. 2 Concise Inorganic Chemistry by J.D. Lee - 5th edition.

Ref. 3 Inorganic Chemistry, - D.F. Shriver & P.W. Atkins- C.H. Longford ELBS - 2nd edition.

Ref. 4 Basic Inorganic Chemistry, - F.A. Cotton and G. Wilkinson, Wiley Eastern Ltd 1992.

Ref. 5 Concept and Model of Inorganic Chemistry by Douglas – Mc Daniels - 3rd edition.

Ref. 6 Chemistry by Raymond Chang - 5th edition

Ref. 7 New Guide to Modern Valence Theory by G.I. Brown - 3rd edition

Ref. 8 Co-ordination Compounds by Baselo and Pearson.

Ref. 9 Theoretical Inorganic Chemistry by Day and Selbin.

Ref. 10 Inorganic Chemistry by A. G. Sharpe - 3rd Edition.

Ref. 11 Coordination Chemistry by A. K. De.

Semester-IV
Course: Inorganic Chemistry (CH-342)

Topic	No. of Lectures
1. Chemistry of f-block element	08
2. Metals Semiconductors and Superconductors	10
3. Ionic Solids	10
4. Homogeneous Catalysis	06
5. Heterogeneous Catalysis	08
6. Bioinorganic Chemistry	06
Total Lectures	48

1. Chemistry of f- block elements (08 L)

Introduction of f-block elements- on the basis of electronic configurations, occurrence and reactivity, F-block elements as Lanthanide and Actinide series

I. Lanthanides

Position in periodic table, Name and electronic configuration of lanthanides, Oxidation States, Occurrence and separation (Group/ Individual) by modern methods (ion exchange and solvent extraction method), Lanthanide contraction & its effect on chemistry of Lanthanides and post-lanthanide elements, applications of lanthanides

II. Actinides

Position in periodic table, Name and electronic Configuration of actinides, Oxidation States, Occurrence, and general methods of preparation of transuranic elements [viz., a) Neutron Bombardment, b) Accelerated projectile bombardment and c) Heavy ion bombardment], Nuclear Fuels-Nuclear Fusion fuels & nuclear fission fuels, IUPAC nomenclature system for super heavy elements with atomic no. (z) greater than 100, Comparison between Lanthanides and Actinides.

Ref. 2 Pages 859-863, 865-866, 874 – 875, 879-886, 891-893, 898-900

Aims and objective

A student should know:

- The meaning of term f-block elements, Inner transition elements, lanthanides, actinides.
- Electronic configuration of lanthanides and actinides.
- Oxidation states of lanthanides and actinides and common oxidation states.
- Separation lanthanides by modern methods.
- Lanthanide contraction and effects of lanthanide contraction on post-lanthanides.
- Use of lanthanide elements in different industries.
- Transuranic elements.
- Preparation methods of transuranic elements.
- Nuclear fuels and their applications.
- Why transuranic elements are called as the synthetic elements?
- IUPAC nomenclature for super heavy elements with atomic no. 100 onwards.

2. Metals, semiconductors and Super conductors (10 L)

Introduction, Metallic bonding, Band theory in metals with respect to Na along with n (E) and N(E) diagrams, Electrical conductivity of metals (Na, Mg, Al), Valence electrons and conductivity of

metals, Effect of temperature and impurity on electrical conductivity of metals, Semiconductors – types of Semiconductors: I. Intrinsic II. Extrinsic, effect of temperature and impurity on semiconductivity, N & P type semiconductors ZnO and NiO, Super conductivity- Discovery, Property, Models structure and superconductivity, Applications of superconductors,

Ref. 7 Pages 209-221

Ref. 6 Related Pages

Aims and objective

A student should know:

- a. The meaning of metal & semiconductor.
- b. The difference between metal, semiconductor and insulator.
- c. Metallic bond on the basis of band theory.
- d. The energy band and energy curve.
- e. Draw $n(E)$ & $N(E)$ curves.
- f. Explain the electrical conductivity of metals with respect to valence electrons.
- g. Explain the effect of temperature and impurity on conductivity of metals and semiconductors.
- h. Intrinsic and extrinsic semiconductor.
- i. The term valance band and conduction band.
- j. n and p type of semiconductors.
- k. Non-stoichiometry and semi conductivity.
- l. Insulators on the basis of band theory.
- m. The difference between Na, Mg, and Al in terms of valence electrons and conductivity.
- n. Meaning of super conductors and their structure.
- o. Discovery and applications of superconductors.

3. Ionic Solids

(06 L)

Crystalline and amorphous solids, crystal structures simple cubic, body centered cubic and face centered cubic, Properties of ionic solids, packing arrangements of anions in an ionic solids, Voids in crystal structure- tetrahedral and octahedral, Ionic radius, Palings univalent and crystal radii, Conversion of univalent radii to crystal radii, problems based on conversion of radii, Radius ratio effect, Lattice energy, Born-Lande equation, Born Haber cycle and its applications, Schottky and Frenkel defect.

Ref. 2 Pages 32-61

Ref. 5 Pages 102-127

Ref. 7 Pages 55-62

Aims and objectives

A student should:

- i. Know the nature of solids.
- ii. Know the crystal structures of solids.
- iii. Draw the simple cubic, BCC and FCC structures.
- iv. Identify the C.N. of an ion in ionic solid.
- v. Identify the type of void.
- vi. Know the effect of radius ratio in determining the crystal structure.
- vii. Be able to define Pauling's univalent radius and crystal radius.

- viii. Be able to solve simple problems based on Pauling's univalent radii and crystal radii.
- ix. Know how to draw Born-Haber cycle.
- x. Be able to solve simple problems based on Born- Haber cycle.
- xi. Know the defects in Ionic solids.
- xii. Be able to differentiate between the defects.

4. Homogeneous Catalysis

(06 L)

Definition, types of homogeneous catalysts, Essential properties of homogeneous catalysts, Catalytic Reactions such as:

- a. Wilkinson's Catalysis
- b. Zeigler Natta Catalysis
- c. Monsanto acetic acid synthesis

Ref. 3 Related Pages

Ref. 6 Related Pages

Ref. 13 Pages 650-652 and 656-661

Aims and objectives

A student should:

- i. Define the homogeneous catalysis.
- ii. Give examples of homogeneous catalysts.
- iii. Understand the essential properties of homogeneous catalysts-Give the catalytic reactions for Wilkinson's Catalysis, Zeigler Natta Catalysis, Monsanto acetic acid synthesis
- iv. Give the brief account of homogeneous catalysis.

5. Heterogeneous Catalysis

(08 L)

Definition, types of heterogeneous catalysts-metals, semiconductors, solid acid catalysts and supported catalysts, Essential properties of heterogeneous catalysts, Catalytic Reactions such as:

- a. Oxidation-
 - i. Synthesis of terephthalic acid from xylene using ZSM-5
 - ii. Synthesis of benzoic acid from toluene using KMnO_4
- b. Reduction-
 - i. Hydrogenation of alkene to alkane using Raney Ni catalyst.
 - ii. Synthesis of p-aminophenol from nitrobenzene using Pd/C catalyst.
- c. Cyclization- Benzimidazole synthesis using o-phenenediamine and benzaldehyde by acidic support or clay-solid support, amberlist or NH_4Cl .
- d. Biodiesel Synthesis- using heteropolyacid catalyst- Transesterification using phosphomolybdic or phosphotungstic acid.

Ref. 5 Related Pages

Ref. 11 Related Pages

Ref. 13 Related Pages

Aims and objectives

A student should:

- i. Define the heterogeneous catalyst and heterogeneous catalysis.
- ii. Give examples of heterogeneous catalysts.
- iii. Understand the essential properties of heterogeneous catalysts.
- iv. Give the catalytic reactions for oxidation, reduction and cyclization processes.
- v. Give the brief account of biodiesel synthesis using heterogeneous catalysis.
- vi. Enlist the catalysts used for benzimidazole synthesis.

- vii. Understand the catalytic reactions used in industries around.

6. Bioinorganic Chemistry

(06 L)

I. Introduction, Role of metals in bioinorganic chemistry-

- Classification as enzymatic and non-enzymatic metals, Enzymatic redox metals such as Cu (SOD) and enzymatic non redox metals such as Zn (Hydrolase).
- Role of metal ions in non-enzymatic process- Na, K, Ca, Mg (one example of each and brief discussion).
- Role of metals in enzymatic processes-Transition metals- Catalase, peroxidase and nitrogenase (Redox active).

II. Metalloproteins-Iron proteins-Introduction of Fe-S proteins, Electron transfer proteins (Fe-S, Fe_2S_2 , Fe_3S_4 , Fe_4S_4). Transport protein (transferrin) and Storage protein (ferritin)

III. Bioinorganic Chemistry of Fe: Hemoglobin and myoglobin, its structure and functions.

IV. Bioinorganic Chemistry of Co: Vitamin- B_{12} , its structure and function.

Ref. 3 Pages 782-806

Ref. 2 Pages 353, 775, 779, 796-797

Ref. 12 Pages 1-13, 24, 285-290

Aims and objective

A student should:

- Identify the biological role of inorganic ions & compounds.
- Know the abundance of elements in living system and earth crust.
- Give the classification of metals as enzymatic and non-enzymatic.
- Understand the role of metals in non-enzymatic processes.
- Know the metalloproteins of iron.
- Explain the functions of hemoglobin and myoglobin in O_2 transport and storage.
- Understand the toxicity of CN^- and CO binding to Hb.
- Draw the structure of Vit. B_{12} and give its metabolism.

Reference Books:

Ref. 1 Introduction to Electrochemistry by Glasstone - 2nd edition.

Ref. 2 Concise Inorganic Chemistry by J.D. Lee - 5th edition.

Ref. 3 Inorganic Chemistry, - D.F. Shriver & P.W. Atkins- C.H.Longford ELBS - 2nd edition.

Ref. 4 Basic Inorganic Chemistry, - F.A. Cotton and G. Wilkinson, Wiley Eastern Ltd 1992.

Ref. 5 Concept and Model of Inorganic Chemistry by Douglas – Mc Daniels - 3rd edition.

Ref. 6 Chemistry by Raymond Chang - 5th edition

Ref. 7 New Guide to Modern Valence Theory by G.I. Brown - 3rd edition

Ref. 8 Co-ordination Compounds by Baselo and Pearson

Ref. 9 Theoretical Inorganic Chemistry by Day and Selbin

Ref. 10 Inorganic Chemistry by A. G. Sharpe - 3rd Edition

Ref. 11 Heterogenous Catalysis by D.K Chakrabarty and B. Vishwanathan, New Age Intl. Publishers, 1st Edn.

Ref. 12 Principles of Bioinorganic Chemistry by S. J. Lippard and J. M. Berg, Panima Publishing Corporation, 1st Edn.

Ref. 13 Inorganic Chemistry by J.E. Huheey, 4th Edn, Pearson Education.

CH-348 - INORGANIC CHEMISTRY PRACTICALS

A) Gravimetric estimations (Any 3)

1. Fe as Fe_2O_3
2. Nickel as Ni – DMG
3. Al as Aluminum oxide
4. Gravimetric estimation of Ba as BaSO_4 using homogeneous precipitation method.

B) Volumetric Estimations (Any 4)

1. Mn by Volhard's method
2. Estimation of NO_2^- by using KMnO_4 .
3. Estimation of % purity of given sample of Sodium Chloride
4. Analysis of Brass-Estimation of copper by Iodometry
5. Fertilizer analysis (PO_4^{3-})

C) Inorganic preparations (Any 4)

1. Preparation of Hexamminenickel(II), $[\text{Ni}(\text{NH}_3)_6]^{2+}$.
2. Preparation of Potassium Trioxalatoferrate (III), $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$.
3. Preparation of Tetraamminecopper (II) sulphate, $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$.
4. Preparation of Manganese (III) acetylacetonate $[\text{Mn}(\text{acac})_3]$.
5. Preparation of Tris(Thiourea)Copper (I) Chloride $[\text{Cu}(\text{Thiourea})_3]\text{Cl}$.

D) Colorimetric Estimations (Any 2)

1. Iron by thiocyanate method.
2. Cobalt by using R-nitroso salt method.
3. Titanium by H_2O_2 .

E) Separation of binary mixture of cations by Column Chromatography (3 mixtures)

(One mixture should be colorless, Zn + Al, Zn + Mg)

OR

E) Flame Photometry (Any 3)

1. Estimation of Na by flame photometry by calibration curve method.
2. Estimation of Na by flame photometry by regression method.
3. Estimation of K by flame photometry by calibration curve method.
4. Estimation of K by flame photometry by regression method.

F) Qualitative Analysis (4 mixtures including Borates and Phosphates)

G) Visit to a chemical industry and report writing is compulsory.

Reference Books: Ref. 1 General Chemistry Experiment – Anil J Elias (University press).

Ref. 2 Vogel Textbook of Quantitative Chemical Analysis G.H. Jeffery, J. Basset.

Ref. 3 Quantitative Chemical Analysis S. Sahay (S. Chand & Co.).

Ref. 4 Quantitative Analysis R.A. Day, Underwood (Prentice Hall).

Ref. 5 Practical Chemistry K.K. Sharma, D. S. Sharma (Vikas Publication).

Ref. 6 Vogel's Textbook of Quantitative Chemical Analysis.

Ref. 7 Monograph on Green Chemistry Laboratory Experiments by Green Chemistry Task Force Committee, DST.

Ref. 8 "Experimental Methods in Inorganic Chemistry." Tanaka, J. and Suib, S.L., Prentice Hall, New Jersey, 1999.

STRUCTURE OF PRACTICAL EXAMINATION

Experiment	Marks
Q.1. Qualitative analysis OR Gravimetric Experiment*	35
Q.2. Volumetric Experiment (25 Marks) Preparation (10 marks) OR Flame Photometry (20 marks) Preparation (10 marks) OR Column Chromatography (20 marks) Preparation (10 marks) OR Colorimetric Estimation (25 Marks) Preparation (10 marks)	35
Q.3. Oral	10

*Minimum 50 % students of each batch should be allotted Gravimetric Estimation.

Semester III
Course: Organic Chemistry (CH-333)

Topic	No. of Lectures
1. Strength of organic acids and bases	03
2. Stereochemistry of disubstituted cyclohexane	06
3. Nucleophilic substitution at aliphatic Carbon	08
4. Reactions of unsaturated hydrocarbons and carbon oxygen double bond	15
5. Elimination Reactions	06
6. Aromatic Electrophilic and Nucleophilic Substitution Reactions	10
Total Lectures	48

1. Strength of organic acids and bases (03) Introduction, pK_a , origin of acidity, influence of solvent, simple aliphatic saturated and unsaturated acids, substituted aliphatic acid, phenols, aromatic carboxylic acids, pK_a and temperature, pK_b , aliphatic and aromatic bases, heterocyclic bases, acid base catalysis.

Aims and objectives: Students should know –

1. Definition and types of organic acid and base
2. The pK_a and pK_b concepts
3. Effect of temperature on pK_a/pK_b
4. Comparison between strengths of acids/bases
5. What is acid-base catalysis

Ref.8 (53-75), Ref. 7 Relevant pages.

2. Stereochemistry of disubstituted cyclohexane (06) Introduction, 1,1-alkyl disubstituted cyclohexane; Dimethyl cyclohexane 1,2; 1,3 and 1,4. Geometrical isomerism, Optical isomerism, stability of conformation, energy calculations.

Aims and objectives: Students should learn –

1. To draw different types of disubstituted cyclohexane in Chair form
2. To distinguish between geometrical and optical isomerism
3. Stability, energy calculations with potential energy diagram and optical activity of these conformers.

Ref. 1 Relevant pages, Ref. 3 (204-214),

3. Nucleophilic substitution at aliphatic Carbon (08) Introduction, Nucleophile and leaving groups, Mechanism of nucleophilic substitution. The S_N1 reaction: Kinetics, mechanism and stereochemistry (Racemization), stability of carbocation. The S_N2 reaction: Kinetics, mechanism & stereochemistry (inversion). How to know whether a given reaction will follow S_N1 or S_N2 mechanism. Comparison of S_N1 & S_N2 reactions. S_Ni reaction and mechanism.

Aims and objectives: Students should understand –

1. Definition and type of nucleophiles and leaving groups
2. Different types of nucleophilic substitution reactions
3. Definition of inversion and racemization
4. The kinetics, mechanism & stereochemistry of these reactions
5. Whether a given reaction follows S_N1 or S_N2 mechanism?
6. The comparison between S_N1 & S_N2 reactions
7. An S_Ni mechanism in presence and absence of pyridine
8. To predict product/s or supply the reagent/s for these reactions

Ref.1. Pages 172-203 and 208 to 210 Ref.8.Relevant pages

4. Reactions of unsaturated hydrocarbons and carbon oxygen double bond (15)

a) Reaction of Carbon-Carbon double bond: Introduction, Mechanism of electrophilic addition to C=C bond. Orientation & reactivity, Rearrangements, (Support for formation of carbocation). Addition of hydrohalogen, Anti Markownikoff's addition (peroxide effect) with mechanism, Addition of halogens (dl pairs and meso isomers), hypohalous acids (HOX), Hydroxylation (Mechanism of cis and trans 1,2-diols). Hydroboration- Oxidation (Formation of alcohol), Hydrogenation (Formation of alkane), Ozonolysis (formation of aldehydes & ketones)

Ref.1. (Pages 317-323,327-343,346-355,357,360)

b) Reactions of Carbon –Carbon triple bond: Addition of hydrogen, halogens, halogen acids, water and formation of metal acetylides and its application.

Ref.1 (Pages 431-433)

c) Reactions of Carbon –Oxygen double bond:

Introduction, Structure of carbonyl group, reactivity of carbonyl group, addition of Hydrogen cyanide, alcohols, thiols, water, ammonia derivatives, Cannizzaro and Reformatsky reactions with mechanism.

Aims and objectives: Students should know –

1. Different types of carbon-carbon unsaturated compounds
2. Orientation / rules in addition reactions
3. The structure of carbonyl group
4. Reactivity concept
5. Correct mechanism of addition reactions using different reagents
6. Types of some known addition reactions
7. To predict product/s or supply the reagent/s for such reactions.

Ref.1.Relevant pages

5. Elimination Reactions (06)

Introduction; 1,1; 1,2 elimination, E1, E2 and E1cB mechanism with evidences, Hoffmann and Saytzeff's elimination, reactivity effect of structure, attacking and leaving groups.

Aims and objectives: Students should learn –

1. Definition and types of elimination reactions
2. Different types of bases and leaving groups

3. Statement of Hoffmann and Saytzeff rule
4. The evidences, mechanism & stereochemical aspects of these reactions
5. Whether a given reaction follows E1, E2 or E1cB mechanism?
6. Comparison between E1 & E2 reactions
7. The effect of structure, attacking and leaving group on reactivity of such reactions
8. To predict product/s or supply the reagent/s for these reactions

Ref. 1. (Pages 290-310)

Ref. 2. Relevant Pages.

6. Aromatic Electrophilic and Nucleophilic substitution reactions (10)

Introduction, arenium ion mechanism, Effect of substituent group (Orientation, o/p directing and meta directing groups). Classification of substituent groups (activating and deactivating groups) Mechanism of – Nitration, Sulfonation, Halogenation, Friedel-Crafts reactions, Diazo Coupling reactions, Ipso-substitution. Addition-elimination (S_NAr), S_N1 , Elimination-addition (Benzyne) S_NR1 reactions, reactivity.

Aims and objectives: Students should understand –

1. Definition and types of aromatic substitution reactions
2. Classification of directing groups
3. What is an arenium ion and Ipso substitution?
4. The evidences, reactivity and mechanism of these reactions
5. Whether a given reaction follows addition-Elimination or Elimination-addition mechanism?
6. To predict product/s or supply the reagent/s for these reactions

Ref 1-(Pages 517-544, 666-67), Ref 7 and 8- Relevant Pages.

Reference Books:

- 1) Organic Chemistry by Morrison and Boyd 6th Edn
 - 2) Organic Chemistry by Cram and Hammond.
 - 3) Stereochemistry of Organic compounds by Eliel Tata McGraw Hill 1989.
 - 4) Organic Chemistry by John McMurry 5th Edn. 1999
 - 5) Organic Chemistry by Graham Solomans
 - 6) Organic Chemistry by I.L. Finar Vol. I & II 4th Edn.
 - 7) Organic Chemistry by Clayden, Greeves, Warren and Wothers (Oxford Press)
 - 8) A guide book to reaction Mechanism by Peter Sykes 6th Edn.
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Semester IV
Course: Organic Chemistry (CH-343)

Topic	No. of Lectures
1. Carbanions and their reactions	06
2. Retrosynthetic analysis and applications	05
3. Rearrangement reactions	06
4. Spectroscopic methods in structure determination of Organic compounds	24
5. Natural Products	07
Total Lectures	48

1. Carbanions and their reactions (06)

Introduction, Formation and stability of Carbanion. Reactions involving carbanions and their mechanisms: Aldol, Claisen, Dieckmann and Perkin condensations. Synthesis and Synthetic applications of Malonic ester, Acetoacetic ester and Wittig reagent.

Aims and objectives: Students should know –

1. Definition and formation of carbanions
2. Possible mechanism of some known name reactions involving carbanions
3. Synthetic applications some reagents
4. To predict product/s or supply the reagent/s for these reactions

Ref. 2 (270-299).

2. Retrosynthetic analysis and applications (05)

Introduction, Different terms used – Disconnection, Synthons, Synthetic equivalence, FGI, TM. One group disconnection, Retrosynthesis and Synthesis of target molecules: Acetophenone, Crotonaldehyde, Cyclohexene, Benzylbenzoate, and Benzyl diethyl malonate.

Aims and objectives: Students should learn –

1. Meaning of terms Disconnection, Synthons, Synthetic equivalence, Functional Group Interconversion, Target Molecule
2. What is retrosynthesis?
3. Various steps involved in the synthesis of some molecules (detailed mechanism is not expected)

Ref.3 Relevant pages

Ref.4. Relevant pages

3. Rearrangement reactions (06)

Introduction, Mechanism of rearrangement reaction involving carbocation, nitrene and oxonium ion intermediate. Beckmann, Bayer-Villiger, Pinacol-pincolone, Curtius, Favorski, Claisen rearrangement.

Aims and objectives: Students should understand –

1. What is rearrangement reaction?
2. Different types of intermediate in rearrangement reactions?
3. To write mechanism of some named rearrangement reactions

Ref. 8. (Pages 86-90,105,112,122,158)

Ref. 6.Relevant Pages.

4. Spectroscopic methods in structure determination of Organic compounds (24)

Introduction, meaning of spectroscopy, nature of electromagnetic radiation, wave length, frequency, energy, amplitude, wave number, and their relationship, different units of measurement of wavelength frequency, different regions of electromagnetic radiations. Interaction of radiation with matter. Excitation of molecules with different energy levels, such as rotational, vibrational and electronic level. Types of spectroscopy and advantages of spectroscopic methods.

Aims and objectives: Students should know –

1. What is Spectroscopy?
2. Different regions of electromagnetic radiations
3. Various terms used in spectroscopy
4. What is the interaction of radiation with matter
5. Types of energy levels with diagram
6. Brief idea about the advantages of spectroscopic methods

Ref-5.(Pages 1-3, 7-11), Ref. 9 and 10 Relevant pages.

A) Ultra Violet Spectroscopy

Introduction, nature of UV, Beer's law, absorption of UV radiation by organic molecule leading to different excitation. Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift(Red shift), hypsochromic shift(Blue shift), hyperchromic and hypochromic effect. Effect of conjugation on position of UV band. Calculation of λ_{max} by Woodward and Fisher rules for dienes and enone systems, Colour and visible spectrum, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)

Aims and objectives: Students should learn –

1. What is UV Spectroscopy and Beer's law?
2. Different types of electronic excitations
3. Various terms used in UV spectroscopy
4. What is the effect of conjugation on UV band
5. To calculation of λ_{max} for dienes and enone systems
6. Define colour?
7. What is the range of vision region ?
8. Applications of UV Spectroscopy

Ref-5. (Pages 13-15, 18-38)

B) Infra red Spectroscopy

Introduction, Principle of IR Spectroscopy, Fundamental modes of vibrations (3N-6, 3N-5) Types of vibrations (Stretching and bending), Hooks law, Condition for absorption of IR radiations, vibration of diatomic molecules. Regions of IR Spectrum: fundamental group region, finger print region aromatic

region, Characteristic of IR absorption of functional groups: Alkanes, alkenes, alkynes, alcohol, ethers, alkyl-halides, carbonyl compounds (-CHO, C=O, -COOR-COOH), amines, amides and Aromatic Compounds and their substitution Patterns. Factors affecting on IR absorption: Inductive effect, resonance effect, hydrogen bonding. Application of IR Spectroscopy in determination of structure, chemical reaction and hydrogen bonding.

Aims and objectives: Students should understand—

1. What is IR Spectroscopy?
2. To calculate fundamental modes of vibrations for a given molecule
3. Which factors affect IR band position?
4. To distinguish compounds by this spectroscopic method
5. To determine structure and follow the course of reaction by IR spectrum

Ref-5. (Pages 46-51, 53, 54, 72-81, 86)

C) PMR Spectroscopy

Introduction, Principles of PMR Spectroscopy, Magnetic and nonmagnetic nuclei, Precessional motion of nuclei without mathematical details, Nuclear resonance, chemical shift, shielding, & deshielding effect. Measurement of chemical shift, delta and Tau-scales. TMS as reference and its advantages, peak area, integration, spin-spin coupling, coupling constants, *J*-value (Only first order coupling be discussed)

Aims and objectives: Students should know—

1. What is the principle of PMR?
2. Various terms used in PMR spectroscopy.
3. Why TMS is used as a reference compound?
4. To distinguish compounds by PMR

Ref-5. (Pages 95-98, 106-108)

D) Problems based on U.V., I.R. and PMR.

Ref-1, 9 and 10.

5) Natural Products

(07)

Terpenoids: Introduction, Isolation, Classification. Citral- structure determination using chemical and spectral methods, Synthesis of Citral by Barbier and Bouveault Synthesis.

Alkaloids: Introduction, extraction, Purification, Some examples of alkaloids and their natural resources. Ephedrine- structure determination using chemical methods. Synthesis of Ephedrin by Nagi.

Aims and objectives: Students should learn—

1. What are terpenoids and alkaloids?
2. Various methods of isolation/extraction of these natural products.
3. Synthesis of Citral and Ephedrin by Barbier- Bouveault and Nagi methods, respectively.
4. To determine the structure of above compounds by chemical methods.

Ref-6 (1437-1440) Ref.7. Relevant Pages.

Reference Books :

1. Organic Chemistry by Morrison and Boyd. VIthEdn.
 2. A guide book to reaction mechanism by Peter Sykes VIthEdn.
 3. Designing organic Synthesis by Stuart Warren 1983
 4. Organic Chemistry by Cram and Hammond
 5. Absorption Spectroscopy of Organic Molecules by V. M. Parikh 1974
 6. Organic Chemistry by Clayden, Greeves, Warren and Wothers
 7. Organic Chemistry by I. L. Finar Vol. II VthEdn.
 8. Reactions, Rearrangements and reagents by S. N. Sanyal
 9. Introduction Spectroscopy by Pavia
 10. Spectroscopic identification of organic molecules by Silverstein
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Organic Chemistry Practical (CH-349)

A) Separation of Binary Mixtures and Qualitative Analysis (8 Mixtures)

Solid-Solid (4 Mixtures), Solid-Liquid (2 Mixtures), Liquid-Liquid (2 Mixtures).

At least one mixture from each of the following should be given-Acid-Base, Acid-Phenol, Acid-Neutral, Phenol-Base, Phenol-Neutral, Base-Neutral and Neutral- Neutral.

Name and structure of the separated components of the binary mixture is not necessary. Students are expected to record the- Type, Separation of mixture, Preliminary tests, Physical constants, Elements and Functional groups only. The purified samples of the separated components should be submitted. Separation and qualitative analysis of the binary Mixtures should be carried out on micro scale using micro scale kits.

B) Organic Estimations (Four)

- i. Estimation of acetamide.
- ii. Estimation of Glucose.
- iii. Estimation of Ethyl benzoate.
- iv. Determination of Molecular weight of Monobasic acids by Volumetric Methods.
- v. Determination of Molecular weight of Dibasic acids by Volumetric Methods.

C) Organic Preparations (Eight)

Preparation of: Adipic acid from cyclohexanone (Oxidation by Con. HNO_3)

Benzoquinone from Hydroquinone (Oxidation by $\text{KBrO}_3/\text{K}_2\text{CrO}_3$)

P-nitroacetanilide from Acetanilide (Nitration)

B-Naphthyl ether from B-naphthol (Methylation by DMS, NaOH)

Hippuric acid from Glycine (Benzoylation)

P-Iodonitrobenzene from P-Nitroaniline (Sandmeyer Reaction)

Benzoic acid from Ethyl benzoate (Ester hydrolysis)

P-Bromacetanilide from Acetanilide (Bromination)

Paraacetamol from P-Hydroxyaniline (Acetylation)

Ethylbenzene from Acetophenone (Wolff Kishner reduction)

The preparation should be carried out on small scale. The starting compound should not be given more than one gm. Double burette method should be used for titration. Monitoring of the reaction and purification should be carried out by recrystallization and purity of the product in preparation should be checked by physical constant(M.P/B.P.) determination and thin layer Chromatography (TLC) with proper selection of the solvent system.

Reference Books

- 1) Practical Organic Chemistry by – A.I. Vogel.
- 2) Practical Organic Chemistry by – O.P. Agarwal.

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STRUCTURE OF ANNUAL PRACTICAL EXAMINATION

1. Binary Mixture separation and qualitative Analysis	40 Marks
2. Organic Estimation/ Preparation	30 Marks
3. Oral	10 Marks

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Semester-III

Course: Analytical Chemistry (CH-334)

Sr. No.	Topic	No. of Lectures
1	Gravimetric Analysis	12
2	Thermal methods of analysis	06
3	Spectrophotometry	10
4	Polarography	08
5	Atomic Absorption Spectroscopy	06
6	Flame Emission Spectroscopy	06
Total Lectures		48

1. Gravimetric Analysis

(12 L)

Common ion effect and solubility product principles, Conditions for good precipitation, Factors affecting precipitation like acid, temperature, nature of solvent, Super saturation and precipitation formation, Precipitation from homogeneous solution and examples, Co-precipitation, post-precipitation and remedies for their minimization, Washing of precipitate and ignition of precipitate, Brief idea about method of filtration and drying of precipitate, Introduction to electrogravimetry: principle, applications, electrolytic separations of Cu and Ni, Numerical problems only on gravimetric analysis.

Ref. 1. Pg. 22-28, 30-33, 95, 107-114, 169-171, 403-404, 407-415

Ref. 3. Pg. 527-532

Aims and Objectives

Student should know,

1. Principles of common ion effect and solubility product
2. Formation of complex ion
3. Factors affecting on solubility of precipitation
4. Phenomenon of super saturation and precipitation formation
5. Meaning of co-precipitation and post precipitation
6. Choice of liquid for washing the precipitate
7. Precautions during filtration, drying and ignition of precipitate
8. Conceptual understanding of electrogravimetric principle
9. Numerical Problems

2. Thermal methods of analysis

(06L)

Principle of thermal analysis, classification of thermal techniques, Principle, instrumentation and applications of TGA and DTA, factors affecting the thermal analysis, numerical problem.

Aims and Objectives

Student should know,

1. Methods of thermo gravimetric analysis

2. Principles of TGA and DTA
3. Types of TGA
4. Relation between TGA and DTA
5. Thermal equation of TGA
6. Different factors affecting TGA curve
7. Determination of calcium oxalate precursor
8. Applications of TGA, DTA and DSC

Ref. 1. Pg. 515-527, 531-537

Ref. 6 Pg. 732-737

3. Spectrophotometry

(10 L)

Introduction, Electromagnetic spectrum, Interaction of electromagnetic radiations with the matter, Mathematical Statement and derivation of Lambert's Law and Beer's Law, Terminology involved in spectrophotometric analysis, Instrumentation of single beam colorimeter, Instrumentation of single and double beam spectrophotometer, Principle of additivity of absorbance and simultaneous determination, Spectrophotometric Titrations, Experimental Applications-Structure of organic compounds, Structure of complexes, Numerical Problems

Ref. 1 Pg. 693-705

Ref. 3 Pg. 144-153, 157-160, 170-174

Aims and Objectives

Student should know,

1. Principles of Spectrophotometric analysis and properties of electromagnetic radiations
2. Different Terms like absorbance, transmittance, and molar absorptivity
3. Mathematical Statement and derivation of Lambert's Law and Beer's Law
4. Different wavelength selectors and their importance
5. Instrumentation and working of single and double beam spectrophotometer
6. Additivity Principle
7. Different methods of color comparators
8. Applications
9. Numerical Problems

4. Polarography

(08 L)

Introduction to voltammetric methods of analysis, Principles of polarographic analysis, Dropping Mercury Electrode, Instrument and working of polarographic apparatus, Ilkovic equation and quantitative analysis, Polarogram and chemical analysis, Analysis of mixture of cations, Factors affecting polarographic wave, Quantitative Applications, Numerical Problems

Ref. 6. 691-734

Aims and Objectives

Student should know,

1. Voltammetry and polarography as an analytical tool
2. Construction, working, advantages and disadvantages of DME

3. Different terms involved in Ilkovic equation
4. Determination of Zn and Cd from the mixture
5. Significance of the different terms involved.
6. Need of removal of dissolved oxygen from analyte solution
4. Applications and numerical problems

5. Atomic Absorption Spectroscopy

(06 L)

Introduction and theory of atomic absorption spectroscopy, Instrumentation of single beam atomic absorption Spectrophotometer, Measurement of absorbance of atomic species by AAS, Spectral and Chemical Interferences, Qualitative and Quantitative Applications of AAS. Numerical Problems.

Ref. 3.Pg. 321-342

Aims and Objectives

Student should know,

1. Atomic absorption spectroscopy as an analytical tool
2. Measurement of absorbance of atoms by AAS.
3. Interferences in atomic absorption spectroscopy
4. Applications and numerical problems

6. Flame Emission Spectroscopy

(06 L)

Introduction and theory of atomic emission spectroscopy, Instrumentation of single beam flame emission spectrophotometer, Measurement of emission of atomic species, Interferences in emission spectroscopy, Methods of analysis- calibration curve method, Standard addition method, and internal, standard method, Qualitative and Quantitative Applications of FES, Numerical Problems.

Ref. 3.Pg. 321-322, 336-341, 364-370, 372-376

Aims and Objectives

Student should know,

1. Emission spectroscopy as an analytical tool
2. Measurement of emission of atomic species
3. Different methods of analysis
4. Application and numerical problems.

References

Ref.1 Textbook of Quantitative Chemical Analysis- 3rd Edition, A. I. Vogel

Ref.2 Principles of Physical Chemistry 4th edition – Prutton and Marron

Ref.3 Instrumental Methods of Chemical Analysis- Chatwal and Anand

Ref.4 Basic Concept of Analytical Chemistry-2nd edition S.M. Khopkar

Ref.5 Vogel's textbook of Quantitative Inorganic Analysis-4th edition

Besset Denney, Jaffrey, Mendham

Ref.6 Instrumental Methods of Chemical Analysis- 6th edition

Willard, Merritt, Dean and Settle

Ref.7 Analytical Chemistry by Skoog

Ref.8 Introduction to Instrumental Analysis- R.D. Braun

Ref.9 Instrumental methods of Chemical Analysis-Willard, Dean & Merrit-6th Edition

Semester-IV

Course: Analytical Chemistry (CH-344)

Sr. No.	Topic	No. of Lectures
1	Solvent Extraction	08
2	Chromatography	10
3	Gas Chromatography	09
4	High Performance Liquid Chromatography	09
5	Electrophoresis	06
6	Nephelometry and Turbidimetry	06
Total Lectures		48

1. Solvent Extraction

(08L)

Introduction, Principle of solvent extraction, Distribution coefficient, distribution ratio, relation between Distribution coefficient and distribution ratio, factors affecting solvent extraction, percentage extracted, solvent extraction method, separation factor, batch extraction, counter current extraction, application of solvent extraction, numerical problems.

References: 3,4,7,9 relevant pages.

Aims and Objectives

A student should know,

- Principles of solvent extraction.
- Difference between KD and D
- Various types of techniques of solvent extraction such as-
(a) extraction (b) continuous extraction (c) counter current extraction.
- Difference between batch and multiple extraction.
- Advantages and applications of solvent extraction.
- To solve the numerical problems.

2. Chromatography

(10L)

Introduction and classification of chromatographic methods, Principle of chromatographic analysis with match box model, Theoretical plates and column efficiency, Theory, Principle, technique and applications of- Column Chromatography, Ion exchange Chromatography, Thin layer Chromatography, Paper Chromatography, Numerical Problems

Ref. 1-8 Relevant pages

Aims and Objectives

Student should know:

- Principle of chromatographic methods
- Relation between theoretical plates and column efficiency
- Technique and applications of- Column Chromatography,
- Technique and applications of- Thin layer Chromatography
- Technique and applications of- Paper Chromatography

6. Technique and applications of- Ion exchange Chromatography
7. Numerical Problem

3. Gas Chromatography

(09 L)

Introduction, Theory, Principle, GSC and GLC, Separation mechanism involved in GSC and GLC, Instrumentation of Gas chromatography, Working of gas chromatography, Gas chromatogram and qualitative-quantitative analysis, Applications of gas chromatography

Ref. 1. Pg. 167-174

Ref. 4. Pg. 454-464

Ref. 5 Pg. 624-640

Aims and Objectives

Student should know,

- 1 Principle of GSC and GLC analysis
2. Separation mechanism involved in GSC and GLC
3. Instrumentation- stationary phases, column types, detectors
4. Working of gas chromatographic apparatus.
4. Chromatogram and use in qualitative-quantitative analysis
5. Applications of gas chromatography

4. High Performance Liquid Chromatography

(09 L)

Introduction, Need of liquid chromatography, Separation mechanism involved in adsorption and partition HPLC, Instrumentation and working of HPLC, Applications of HPLC, Introduction to supercritical fluid chromatography

Ref. 6. Pg. 529-545

Ref. 4. Pg. 178-183

Aims and Objectives

Student should know,

- 1 Need of liquid chromatography
2. Separation mechanism involved in adsorption and partition HPLC
3. Instrumentation and working of HPLC
4. Applications of HPLC
5. Advantages of supercritical fluid chromatography

5. Electrophoresis

(06L)

Introduction, Principle and theory of electrophoresis, Different types of electrophoresis techniques, Moving Boundary Electrophoresis, Zone electrophoresis- Paper, Cellulose acetate and Gel electrophoresis, Applications of electrophoresis

Ref. 3 and Ref. 4 relevant pages

Aims and Objectives

Student should know,

- 1 Comparison between electrophoresis and chromatography

2. Principle and theory of electrophoresis
 3. Different types of electrophoresis techniques
- Applications of electrophoresis

6. Nephelometry and Turbidimetry

(06L)

Introduction, Principles and instrumentation of Nephelometric and Turbidimetric analysis, Difference between Nephelometric and Turbidimetric measurements, Choice between Nephelometry and Turbidimetry, Factors affecting Nephelometric and Turbidimetric measurements, Quantitative Applications, Numerical Problems

Ref.1. Pg.781-785

Ref.3. Pg.380-390

Aims and Objectives

Student should know,

1. Nephelometry and Turbidimetry as an analytical tool
2. Measurement of turbidance
3. Difference between Nephelometry and Turbidimetry
4. Application and numerical problems

List of References

Ref.1 Textbook of Quantitative Chemical Analysis- 3rd Edition, A. I. Vogel

Ref.2 Principles of Physical Chemistry 4th edition – Prutton and Marron

Ref.3 Instrumental Methods of Chemical Analysis- Chatwal and Anand

Ref.4 Basic Concept of Analytical Chemistry-2nd edition S.M. Khopkar

Ref.5 Vogel's textbook of Quantitative Inorganic Analysis-4th edition
Besset Denney, Jaffrey, Mendham

Ref.6 Instrumental Methods of Chemical Analysis- 6th edition
Willard, Merritt, Dean and Settle

Ref.7 Analytical Chemistry by Skoog

Ref.8 Introduction to Instrumental Analysis- R.D. Braun

Ref.9 Instrumental methods of Chemical Analysis-Willard, Dean & Merrit-6th Edition

Semester- III

Course: Industrial Chemistry (CH-335)

Topics	No. of lectures
1. Modern Approach to Chemical Industry	08
2. Agrochemicals	08
3. Manufacture of Basic Chemicals	08
4. Petrochemicals and eco-friendly fuels	08
5. Food and Starch Industry	08
6. Cement and Glass industry	08
Total Lectures	48

1. Modern Approach to Chemical Industry

(08)

Introduction, basic requirements of chemical industries, chemical production, raw materials, unit process and unit operations, Quality control, quality assurance, process control, research and development, pollution control, human resource, safety measures, classification of chemical reactions, batch and continuous process, Conversion, selectivity and yield, copy right act, patent act, trade marks

Ref. 1: Chapter 2 (relevant pages)

2. www.wikipedia.org/wiki/copyright_act_of1976

3. www.wikipedia.org/wiki/patentact

4. www.wikipedia.org/wiki/trademark

2. Agrochemicals

(08)

General introduction and scope of agrochemicals, meaning and examples of: Insecticides, Herbicides, Fungicides, Rodenticides, Pesticides, Plant growth regulators. Pesticide formulation, slow release pesticide formulations, storage stability test, and Industrial entomology. Advantages and disadvantages of agrochemicals. Structure,: DDT, BHC, Warfarin, Aldrin, Endosulphan, synthesis and application: DDT, BHC and Endosulphan. Biopesticides like Neem oil and Karanj oil.

Ref. No. 5-7

3. Manufacture of Basic Chemicals

(08)

- Ammonia: Physicochemical principles involved, Manufacture of ammonia by modified Haber-Bosch process, its uses.
- Sulphuric acid: Physicochemical principles involved, Manufacture of sulphuric acid by contact process, its uses.
- Nitric acid: Physicochemical principles involved, Manufacture of nitric acid by Ostwald's process, its uses.

Ref.No.1: P.No. 571 to 588, 618 to 664

4. Petrochemicals and eco-friendly fuels

(08)

- Introduction, occurrence, composition of petroleum, resources, processing of petroleum, calorific value of fuel, cracking, octane rating (octane number), cetane number, flash

point, and petroleum refineries, applications of petrochemicals, synthetic petroleum, lubricating oils & additives

- b) *Fuels and eco-friendly fuels*: liquid, gaseous fuel (LPG, CNG), fossil fuels, diesel, bio diesel, gasoline, aviation fuels. Use of solar energy for power generation.

Ref. 15, 16, 17

5. Food and Starch Industry

(08)

Food Industry:

(a) Definition and scope, nutritive aspects of food constituents, , food deterioration factors and their control; (b) Preservation and processing: Heat and cold preservation and processing, cold storage, food dehydration and concentration, various foods, their processing and preservation methods, fruits, beverages, cereals, grains, legumes and oil seeds; (c) Food additives: Enhancers, sugar substitutes, sweeteners, food colors,

Ref.12

Starch industries:

Chemistry of starch, manufacturing of industrial starch and its applications, characteristics of some food starches, non-starch polysaccharides-cellulose-occurrence.

Ref. 11

6. Cement and Glass industry

(08)

Cement industry:

Introduction, Importance, composition of portland cement, raw materials, proportioning of raw materials, setting and Hardening of cement, reinforced concrete.

Ref.1: P.No. 313-333 Ref. 8: P.No173-176, Ref. 10: P.No.188-192

Glass industry

Introduction, importance, physical and chemical properties of glass, chemical reaction, annealing of glass Special glasses: colored, safety, hard, borosilicate, optical, photosensitive, conducting, glass laminates.

Ref.1: P. No.160-171;Ref. 8: P. No. 247-265; Ref.9: P. No. 197-212

Aims and objectives

1. Modern Approach to Chemical Industry

The students are expected to learn;

- i. Importance of chemical industry,
- ii. Meaning of the terms involved,
- iii. Comparison between batch and continuous process,
- iv. Knowledge of various industrial aspects

2. Agrochemicals

Students should know the

- i. Various insecticides,

- ii. Pesticides,
- iii. Fungicides,
- iv. Rodenticides & biopesticides used in agriculture field with their synthesis and applications.

3. Manufacture of Basic Chemicals

Students should know the

- i. Concept of basic chemicals,
- ii. their uses and manufacturing process.
- iii. They should also know the physical chemical principles involved in manufacturing process

4. Petrochemicals and eco-friendly fuels

Introduction, occurrence, composition of petroleum, resources, processing of petroleum, other properties

Fuels and eco-friendly fuels, use of solar energy etc.

5. Food and Starch Industry

Food Industry:

Students should know

- i. Scope,
- ii. Nutritive aspects of food constituents,
- iii. Quality factors and their measurements,
- iv. Food deterioration factors and their control;
- v. Food preservation and Food additives

Starch Industry:

Students should know about the

- i. Chemistry of starch,
- ii. Manufacturing of industrial starch and its applications,
- iii. Characteristics of some food starches,
- iv. Non-starch polysaccharides-cellulose-occurrence

6. Cement and Glass industry

Cement industry

The students are expected to

- i. Learn importance of these industries,
- ii. Manufacture of cement by modern methods
- iii. Definition of setting and hardening
- iv. Reinforced concrete

Glass industry

The students are expected

- i. To learn about making of glass by different methods,
- ii. Various operations involved in the manufacture and compositions,
- iii. Properties and uses of special glasses.

References

1. Industrial Chemistry-B.K. Sharma, Goyal publishing house, Mirut, Chapter 2 (relevant pages)
 2. www.wikipedia.org/wiki/copyright_act_of1976
 3. www.wikipedia.org/wiki/patentact
 4. www.wikipedia.org/wiki/trademark
 5. Insects and Pesticides, Saxena A B, Anmol Publications
 6. Emergency Medicine: Chapter 146 Insecticides, Herbicides & Rodenticides, by James Adams
 7. Growth Regulators in Agriculture and Horticulture, by Amarjit Basra, CRC Press, 2000
 8. Shreeve's chemical process industries 5th Edition, G.T. Oustin, McGraw Hill
 9. Riegel's hand book of Industrial chemistry, 9th Edition, Jems A. Kent
 10. Industrial chemistry –R.K. Das, 2nd Edition, 1976.
 11. Chemistry and industry of starch, New York, N.Y., Academic Press, incby Kerr, Ralph
Waldo Emerson
 12. The Complete Manual Of Small-Scale Food Processing, by Peter Fellows, Practical
Action Pub
 13. Polymeric Materials, C. C. Winding and G. D. Hiatt McGraw Hill Book Co. Polymer Science by
Gowarikar
 14. Polymer science, Bill Meyer, F. W. Jr. John Wiley& sons
 15. The Petroleum chemicals industry by R. F. Goldstine, e &Fn London
 16. Fundamentals of petroleum chemical technology by P Below.
 17. Petro Chemicals Volume 1 and 2 ; A Chauvel and Lefevrev ; Gulf Publishing company
 18. Perfumes Soaps Detergents & Cosmetics (Soaps & Detergents) (Volume 1) 1st Edition, CBS
Publisher
 19. Dyes & Paints: A Hands-On Guide to Coloring Fabric, by Elin Noble
-

Semester- IV
Course: Industrial Chemistry (CH-345)

Topics	No. of lectures
1. Polymer chemistry	10
2. Sugar and Fermentation Industry	08
3. Soap, detergents and Cosmetics	08
4. Dyes and paints	08
5. Chemistry of pharmaceutical industries	08
6. Pollution prevention and waste management	06
Total Lectures	48

1. Polymer chemistry (10)

Classification of Polymers: Organic and Inorganic polymers

(a) Basic concepts, nomenclature, degree of polymerization, classification of polymerization reactions, thermodynamic and transport properties of polymer

b) *Commercial polymers and their importance:* (a) Nylon, polyesters (terylene and dacron), rubber, vulcanization of rubber, synthetic rubber, Bun 2-N rubber, copolymers of butadiene, PVC, acrylic, teflon, polyethylene and acrylonitrile; (b) Silicone polymers: silicone oils, rubber, grease and resin; (c) Resins: Phenol-formaldehyde resins, urea-formaldehyde resins, epoxy resins, melamine-formaldehyde resins;

Ref. 13, 14

2. Sugar and Fermentation Industry (08)

Sugar: Occurrence, Manufacturing of refine cane sugar from sugar cane, general idea of carbonation and sulphitation processes and their comparison, by-product and their use.

Ref.8-10

Fermentation Industry:

Introduction, importance, Basic requirement of fermentation process, Manufacture of industrial alcohol from molasses, fruits, food grains, & ethylene, Manufacturing of wine, beer, whisky, rum ; importance Power alcohol

Ref. 1, 8-10

3. Soap, detergents and Cosmetics (08)

- A. Chemistry of soap, raw material, chemical reaction, types of soap.
- B. Meaning of the terms detergent and surfactants, emulsion and emulsifying agents, wetting and non-wetting, hydrophobic and hydrophilic nature, amphipathic structures, types of surfactants, raw materials for detergents, washing action of soaps and detergents, detergent builders, additives.

- C. Raw materials: emulsifiers (natural, synthetic and finely dispersed solids), lipid components (oils, waxes, fats), humectants, colours (dyes and pigments), preservatives and antioxidants. (b) Cosmetics for skin: Types and problems of skin, key ingredients of skin cleansing, toners, moisturizers, nourishing, protective sunscreen, talcum powder and bleaching products. (c) Hair care: classification, ingredients, special additives for conditioning and scalp health, hair colourants (temporary, semi-permanent and gradual colourants), the plant materials (herbs) used in hair cosmetics.

Ref. 18.

4. Dyes and paints

(a) *Dyes*: Introduction, classification of dyes: Structures and applications, nitro, nitroso, azo, heterocyclic, phthalenes, xanthenes, rhodamines, thiazine, cyanine, anthraquinone, indigoids, thioindigoids, phthalocyanines, wet dyes.

(b) *Paints*: Introduction of paints, ingredients and classification, new technologies; properties of coatings; solvents, plasticizers, dyes and bioactive additives;

(c) *Pigments*: Introduction, classification and general physical properties.

Ref.1: P. No.777-814; Ref.9: P. No.863-915 ;Ref.10 Relevant page

Ref. 19.

5. Chemistry of pharmaceutical industries

(08)

- General aspects of drug action*: Introduction, classification, nomenclature, structure-activity relationship, action of drugs, factors affecting drug action, metabolism of drugs, chemical structures, methods of production and pharmacological activity.
- Meaning of the terms: Prescriptions, doses, analgesic, antipyretic, diuretic, anesthetics, antibiotics, anti-inflammatory, anti-viral, tranquilizer, antiulcer, antialergic and bronchodilators, cardiovascular, cold preparations, anti-hypertensive, cough preparation, anti-neoplastic, sedative and hypnotics, steroidal, contraceptive, histamine and antihistamine.
- Synthesis and uses: Paracetamol, Aspirin, Sulphanilamide.

Ref.1: P. No.762-775; Ref.8: P. No.803-804, 818-822 ; Ref.9: P. No.987-1011

6. Pollution prevention and waste management

(06)

Introduction, importance of waste management, concept of atom economy, Terms involved in waste minimization: source reduction, recycling, product changes, source control, use and reuse, reclamation, assessment procedures, types of wastes, treatment and disposal of industrial waste. Treatment of wastes or effluents with organic impurities. Treatment of wastes or effluents with inorganic impurities. The nature, effect and treatment of some important chemical wastes-(Pulp and paper industries, soap and detergent industries and food processing industries).

Ref. 1: P.No. 8-92; Ref.6: P.No. 15-30;

Ref. [www.wikipedia.org/atom economy](http://www.wikipedia.org/atom%20economy)

Aims and Objectives:**1. Polymer chemistry**

Students should know

- i. Basics of polymer,
- ii. Nomenclature,
- iii. Degree of polymerization,
- iv. Classification of polymerization reactions,
- v. Thermodynamic and transport properties of polymer,
- vi. Commercial polymers and their importance,
- vii. Biomedical polymers: implants,
- viii. Contact lens and dental polymers.

2. Sugar and Fermentation Industry

The students are expected to learn

- i. Importance of sugar industry,
- ii. Manufacture of direct
- iii. Consumption (plantation white) sugar with flow diagram.
- iv. Cane juice extraction by various methods,
- v. Clarification by processes like carbonation,
- vi. Sulphitation,
- vii. Phosphatation, etc.
- viii. Concentration of juice by using multiple effect evaporator system,
- ix. Crystallization of sucrose by using vacuum pan.

Fermentation Industry

- i. Importance,
- ii. Basic requirement of fermentation process,
- iii. Manufacturing of ethyl alcohol by using molasses,
- iv. Food grains, fruits & ethylene.
- v. Manufacturing of wine, beer, whisky, rum etc.

3. Soap, detergents and Cosmetics

Students should know about

- i. Different types of soap products,
- ii. Chemistry of soap.
- iii. Students should know about various cosmetics,
- iv. Raw materials,
- v. Properties and various types of cosmetics used.
- i. Meaning of the terms detergent,
- ii. Surfactants, emulsion and emulsifying agents,
- iii. Wetting and non-wetting,
- iv. Hydrophobic and hydrophilic nature,
- v. Amphipathic structures,
- vi. Types of surfactants,
- vii. Raw materials for detergents,

- viii. Washing action and detergents,
- ix. Detergent builders, additives.

4. Dyes and paints

Students should know about

- i. *Dyes*: introduction,
- ii. Dye intermediates,
- iii. Preparation of dye intermediates,
- iv. Structural features of a dye;
- v. Classification of dyes,
- vi. Structures and applications,
- vii. Nitro, nitroso,
- viii. Azo, heterocyclic,
- ix. Phthalenes,
- x. Xanthenes,
- xi. Rhodamines,
- xii. Thiazine,
- xiii. Cyanine,
- xiv. Anthraquinone,
- xv. Indigoids,
- xvi. Thioindigoids,
- xvii. Phthalocyanines, wet dyes.

(b) *Paints*:

- i. Introduction of paints,
- ii. Ingredients and classification,
- iii. New technologies;
- iv. Properties of coatings;
- v. Solvents, plasticizers, dyes and bioactive additives.

(b) *Pigments*:

- i. Introduction,
- ii. Classification and general physical properties.

5. Chemistry of pharmaceutical industries

Students should know about

- i. *General aspects of drug action*:
- ii. Introduction, classification,
- iii. Nomenclature,
- iv. Structure-activity relationship,
- v. Action of drugs,
- vi. Assay of drugs and factors affecting drug action,
- vii. Metabolism of drugs,
- viii. Chemical structures,
- ix. Methods of production and pharmacological activity.
- x. Meaning of the terms of the various drugs.
- xi. Synthesis and uses of few drug molecules.

6. Pollution prevention and waste management

The students are expected to learn all the problems of pollution and disposal of waste of various industries.

References

1. Industrial Chemistry-B.K. Sharma, Goyal publishing house, Mirut, Chapter 2 (relevant pages)
 2. www.wikipedia.org/wiki/copyright_act_of1976
 3. www.wikipedia.org/wiki/patentact
 4. www.wikipedia.org/wiki/trademark
 5. Insects and Pesticides, Saxena A B, Anmol Publications
 6. Emergency Medicine: Chapter 146 Insecticides, Herbicides & Rodenticides, by James Adams
 7. Growth Regulators in Agriculture and Horticulture, by Amarjit Basra, CRC Press, 2000
 8. Shreeve's chemical process industries 5th Edition, G.T. Oustin, McGraw Hill
 9. Riegel's hand book of Industrial chemistry, 9th Edition, James A. Kent
 10. Industrial chemistry –R.K. Das, 2nd Edition, 1976.
 11. Chemistry and industry of starch, New York, N.Y., Academic Press, inc by Kerr, Ralph Waldo Emerson
 12. The Complete Manual Of Small-Scale Food Processing, by Peter Fellows, Practical Action Pub
 13. Polymeric Materials, C. C. Winding and G. D. Hiatt McGraw Hill Book Co. Polymer Science by Gowarikar
 14. Polymer science, Bill Meyer, F. W. Jr. John Wiley & sons
 15. The Petroleum chemicals industry by R. F. Goldstine, e & fn London
 16. Fundamentals of petroleum chemical technology by P Below.
 17. Petro Chemicals Volume 1 and 2 ; A Chauvel and Lefevrev ; Gulf Publishing company
 18. Perfumes Soaps Detergents & Cosmetics (Soaps & Detergents) (Volume 1) 1st Edition, CBS Publisher
 19. Dyes & Paints: A Hands-On Guide to Coloring Fabric, by Elin Noble
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Optional Course

Semester-III

Course: Nuclear Chemistry (CH-336A)

Topic	No. of Lectures
1. The Atomic Nucleus, Properties of Nucleons and Nuclei	08
2. Nuclear Models	12
3. Radioactivity	16
4. Nuclear Reactions	12
Total Lectures	48

1. The Atomic Nucleus, Properties of Nucleons and Nuclei

(08 L)

The atom, Elementary particles, Sub-nucleons, quarks, The nucleus and outer sphere, Classification of nuclides, Nuclear stability, Even-odd nature, N/Z ratio, The Nuclear potential, Binding energy, Binding energy calculations.

The nucleus, its size, shape and radius, Mechanical effects due to orbiting and spinning of nucleons, Magnetic quantum numbers, principal and radial quantum number.

Ref.1: pages 1 to 13 and 19 to 25.

2. Nuclear Models

(12 L)

Historical, The shell model, Periodicity in nuclear properties: the magic numbers, The salient features of shell model, The sequence of filling the orbit, Rectangular well potential model, Harmonic oscillator potential model, Spin-orbit coupling model, Nuclear configuration of lighter nuclides ($Z < 20$), Merits of the shell model, The liquid drop model, The semi-empirical mass equation, Merits of the liquid drop model, Limitations of liquid drop model.

Ref.1 pages 64 to 69, 72 to 84 and 91 to 92.

Ref.2 pages 464 to 469

3. Radioactivity

(16 L)

Discovery, Types of radioactive decay, Decay schemes, General characteristics of radioactive decays, decay kinetics, units of radioactivity, problem solving on decay kinetics.

Alpha decay: Alpha active nuclides, The alpha energy spectrum, Geiger-Nuttall's law, The theory of alpha decay. **Beta decay:** Types of beta decay, absorption and range through matter, Fermi theory of beta decay. (Mathematical details are not expected) **Gamma decay:** Nuclear isomerism and isomeric transitions, internal conversion, Auger effect.

Ref.1 pages 100 to 106, 120 to 135, 138 to 142, and 150 to 154.

4. Nuclear Reactions

(12 L)

Bethe's notation, Types of nuclear reactions, Conservation of nuclear reactions (Conservation of protons and neutrons, Conservation of momentum and energy), Reaction cross-section, The compound nucleus theory, Calculations of excitation energy of compound nucleus, Photonuclear reactions, Thermonuclear reactions.

Ref.1 pages 160 to 174 and 192 to 196.

Aims and objectives:

1. The Atomic Nucleus, Properties of Nucleons and Nuclei:

The students are expected to know the following from this topic.

- a) The atom, elementary particles, sub-nucleons and the quarks.
- b) Classification of nuclides, isotopes, isobars, isotones and isomers.
- c) Nuclear stability on the basis of even-odd nature of Z and N, N/Z ratio.
- d) The binding energy
- e) The nucleus, its size and shape, mechanical effects due to orbiting and spinning of nucleons, Magnetic quantum numbers, principal and radial quantum number.

2. Nuclear Models:

By studying this topic students are expected to understand

- a) The Shell model
- b) Magic number
- c) Salient features of shell model
- d) Nuclear configuration
- e) The liquid drop model
- f) Semi-empirical mass equation

3. Radioactivity:

By studying this topic students are expected to understand

- a) Types of radioactive decay, decay kinetics and their general characteristics.
- b) Alpha decay, Beta decay and gamma decay
- c) Nuclear isomerism, isomeric transitions, internal conversion, Auger effect.

4. Nuclear Reactions:

The students are expected to understand,

- a) Bethe's notation
- b) Different types of Nuclear reactions.
- c) Conservation in nuclear reaction
- d) Excitation energy of compound nucleus

References:

- 1. Essentials of Nuclear Chemistry by H. J. Arnikar, 4th Revised Edition, New Age International Publishers.
 - 2. Source book of Atomic energy by Samuel Glasstone, 3rd edition, East -West press.
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Semester-IV

Course: Nuclear Chemistry (CH-346A)

Topic	No. of Lectures
1. Nuclear Fission	10
2. Nuclear Reactors	08
3. Nuclear Accelerators	08
4. Detection and measurement of nuclear radiations	08
5. Applications of Radioactivity	10
6. Radiation Safety precautions	04
Total Lectures	48

1. Nuclear Fission

(10 L)

Introduction, Discovery of nuclear fission, The process of nuclear fission, Fission fragments and their mass distribution, Fission energy, Fission cross-section and thresholds, Fission neutrons, Theory of nuclear fission.

Ref.1: pages 209 to 225

2. Nuclear Reactors

(08 L)

The fission energy, The natural uranium reactor, The four factor formula, The classification of reactors. Reactor power, Critical size of a thermal reactor, Breeder reactor, The fast breeder test reactor at Kalpakkam, India's nuclear energy programme.

Ref.1: pages 232 to 249

3. Nuclear Accelerators

(08 L)

Electrostatic Accelerators, The Cockcroft-Walton Accelerator, The Van de Graaff Accelerator, Cyclic Accelerator, Linear Accelerator.

Ref: 2 Pages 290 to 305, 325 to 330

4. Detection and measurement of nuclear radiations

(08 L)

Scintillation Counters, Semiconductor detectors, Neutron detectors.

Ref.2 Pages 211 to 222.

5. Applications of Radioactivity

(10 L)

Probing by isotopes, Typical reactions involved in the preparation of radioisotopes, Szilard-Chalmers reaction, Cow and milk system, Use of charged plates in the collection of radioisotopes, Radiochemical principles in the use of tracers, Analytical applications: Isotope dilution analysis, Neutron activation analysis, Radiometric titrations, Numericals, medical applications a) thyroiditis (goitre), b) radioimmunoassay.

Ref.1 Pages 309 to 328, 338 to 345

6. Radiation Safety precautions

(04 L)

Safety standards, safe working methods, biological effects of radiations, nuclear waste and its management.

Ref.3 Pages 322 to 328

Aims and objectives:

1. Nuclear Fission:

By studying this topic students are expected to understand

- a) Discovery of nuclear fission
- b) The process of nuclear fission
- c) The charge distribution
- d) Fission energy
- e) Theory of nuclear fission

2. Nuclear Reactors

The students are expected to know the following from this topic

- a) the natural Uranium reactor, The breeder reactor
- b) the four factor formula
- c) Classification of reactors. d) India's Nuclear Energy programme

3. Nuclear Accelerators:

The student should understand

- a) Principle and working of various accelerators
- b) What are the electrostatic accelerators?

4. Detection and measurement of nuclear radiations

The aims and objectives are as follows

- a) Gaseous ionization and its applications
- b) Principle and working of Scintillation Counters , Semiconductor detectors, Neutrontdetectors

5. Applications of Radioactivity

The students are expected to know the following from this topic

- a) The Probing by isotopes.
- b) Typical reactions involved in the preparation of radioisotopes
- c) Szilard-Chalmer reaction
- d) Analytical applications – Isotope Dilution Analysis, Neutron Activation Analysis, Radiometric Titrations
- e) Medical applications such as thyrodiosis and radioimmunoassay.

6. Radiation Safety precautions

By studying this topic students are expected to understand

- a) Biological effects of radiations, safety standards, safe working methods
- b) Reprocessing of the nuclear waste and its management.

References :

1. Essentials of Nuclear Chemistry by H. J. Arnikar, 4th Revised Edition, New Age International Publishers
2. Source book of Atomic energy by Samuel Glasstone, 3rd edition, East -West press.
3. Nuclear Physics by Irving Kaplan, 2nd edition.
4. Introduction to Nuclear physics and chemistry by B.G. Harvey.
5. Fundamentals of Radiochemistry by D. D. Sud, A.V. R. Reddy and N. Ramamoorthy.

Semester- III
Course: Polymer Chemistry (CH-336B)

Topic	No. of lectures
1. Introduction to Polymer Chemistry	04
2. Mechanism and Nomenclature of Polymers	04
3. Chemistry of Polymerization	10
4. Polymerization Techniques	08
5. Polymer Additives	06
6. Molecular Weights of Polymers	05
7. Silicone and Cellulose Polymers	04
8. Polymer Reactions	07
Total Lectures	48

1. Introduction to Polymer Chemistry

(04 L)

Brief History, Polymer definition, Preparation, Classification, Structures, Chemical bonding & Molecular forces in Polymers.

Ref. 1: Pages 1-14

Ref. 2: Pages 1-16

Ref. 3: Pages 1-12

Ref. 4: Pages 1-17

Ref. 7: Relevant Pages

Ref. 9: Pages 1-8

2. Mechanism and Nomenclature of Polymers

(04 L)

a) Polymerization Mechanism, b) Nomenclature of Polymers-i) Common/Trivial names ii) Source-Based names, iii) Structure-Based names (Non IUPAC), iv) IUPAC Structure-based and Linkage-based nomenclature system and v) Trade names / Brand names & Abbreviations

Ref. 4: Pages 11-25

Ref. 12: Pages 6-17

3. Chemistry of Polymerization

(10 L)

a) Introduction, b) Chain Polymerization: Free radical Polymerization, Ionic polymerization, Co-ordination polymerization- Ziegler-Natta catalyst c) Step Polymerization: Polycondensation, Polyaddition polymerization, and Ring Opening polymerization.

Ref. 1: Pages 15-64

Ref. 2: Pages 25-32, 49-56, 82-86, 88-89, 91-94

Ref. 3: Relevant Pages

Ref. 4: Relevant Pages

Ref. 6: Relevant Pages

Ref. 9: Pages 22-63

4. Polymerisation Techniques

(08 L)

Bulk polymerisation, Solution polymerization, Suspension polymerization, Emulsion polymerization, Melt polycondensation, Solution Polycondensation, Interfacial condensation, electrochemical polymerisation, Salient features of different polymerization techniques

Ref. 1: Pages 71-79, 82-84

Ref. 2: Pages 126-132

Ref. 4: Pages 309-324

Ref. 12: Pages 335-341, 173-175

5. Polymer Additives

(06 L)

Fillers & Reinforcement, Plasticizers, Antioxidants & Thermal Stabilizers (Heat Stabilizers), Ultraviolet stabilizers, Fire retardants, Colourants, Antistatic agents & Curing agents.

Ref. 3: Pages 170-176

Ref. 4: Pages 502-512, 528-538

Ref. 10: Relevant Pages

6. Molecular Weights of Polymers

(05 L)

a) Average Molecular weight, Number Average & Weight Average Molecular weight, Molecular weight & degree of polymerisation, Practical significance of polymer molecular weights, b) Molecular weight determination by End Group Analysis & Viscosity method and c) Problems based on Number Average & Weight Average Molecular weight

Ref. 1: Pages 86-89, 92, 96-98, 402-409

Ref. 2&4: Relevant Pages

7. Silicone and Cellulose Polymers

(04 L)

a) Introduction, Synthesis, Reactions, Uses of Silicone polymers, b) Cellulose & Derivatives of cellulose: Rayon, Cellophane, Cellulose nitrate, Cellulose acetate and their uses.

Ref. 1: Pages 255-261

Ref. 5: Pages 143-155

8. Polymer Reactions

(07 L)

Introduction, Hydrolysis, Hydrogenation, Addition and Substitution reactions, Cross-linking reactions, Cure reactions, Reactions of various aliphatic and aromatic pendent groups in polymers.

Ref. 1: Pages 291-297, 306-308, 311-321, Ref. 3: Relevant Pages, Ref. 4: 545-555

Aims and Objectives:

The students are expected to learn the following aspects of Polymer Chemistry

- 1) History of polymers.
- 2) Difference between simple compounds and polymer.
- 3) Names of polymers.
- 4) Various methods of nomenclature.
- 5) Difference between natural synthetic, organic and inorganic polymers.
- 6) Terms-Monomer, Polymer, Polymerization, Degree of polymerization, Functionality, Number average, Weight average molecular weight.
- 7) Mechanisms of polymerization.
- 8) Polymerization techniques.
- 9) Importance of silicone polymers.
- 10) Derivatives of cellulose polymers & their applications.
- 11) Ingredients added to polymers.
- 12) What are fillers.
- 13) Polymer reactions and applications.
- 14) Polymer reactions and their effect on physical and chemical properties.
- 15) Advantages of polymer reactions to change their properties.

Reference Books:

1. Polymer Science by V.R. Gowarikar, N.V. Vishvanathan, Jaydev Shreedhar New Age International Ltd. Publisher 1996. (Reprint 2012)
 2. Textbook of Polymer Science by Fred Billmeyer, 3rd Edn. A Wiley-Interscience Publication John Wiley & Sons New York 1984. (Reprint 2008)
 3. Introductory Polymer Chemistry by G.S. Misra New Age International (P) Ltd. Publisher 1996.
 4. Polymer Chemistry by Charles E. Carraher (Jr.), 6th Edn, (First Indian Print 2005), New York-Basel.
 5. Inorganic Polymers by G.R. Chatwal Himalaya Publishing House 1st Edn. 1996
 6. Polymer Science – A Text Book by V.K. Ahluwalia, Anuradha Mishra.
 7. Principle of Polymer Science by P. Bahadur, N.V. Sastry, 2nd Edn, Narosa Publishing House.
 8. Polymer Chemistry by Ayodhya Singh, 2008, Published by Campus Book International, New Delhi.
 9. Organic Polymer Chemistry by Jagdamba Singh, R.C. Dubey, 4th Edn, 2012.
 10. Advanced Polymer Chemistry by V.K. Selvaraj, 1st Edn, 2008, Published by Campus International, New Delhi.
 11. Organic Polymer Chemistry by V. Jain, IVY Publishing House, New Delhi.
 12. Principles of Polymerisation by George Odian 3rd Edn. John Wiley & Sons New York.
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Semester- IV

Course: Polymer Chemistry (CH-346B)

Topic	No. of lectures
1. Polymer Degradation	03
2. Chemical and Geometrical structures of Polymer Molecules	04
3. Glass Transition Temperature and Heat Distortion Temperature (Softening Point)	05
4. Crystallinity in polymers	04
5. Some Important Polymers	08
6. Analysis and testing of polymers	06
7. Some Special Polymers	06
8. Polymer Processing	12
Total Lectures	48

1. Polymer Degradation

(03 L)

Introduction, Types of Degradation, Thermal degradation, Mechanical degradation, Photo degradation.

Ref. 1: Pages 262 – 277

Ref. 3: Pages 151-160

Ref. 4: Relevant Pages

Ref. 11: Pages 60-65

2. Chemical and Geometrical structures of Polymer Molecules

(04 L)

a) Microstructures based on chemical structures-Organic & Inorganic polymers, Homochain&Heterochain polymers, Homopolymers& Copolymers, b) Microstructures based on geometrical structures-Interpenetrating coils, Folded chain, Helical chain, Linear, Branched, Random, Alternating, Graft and Block polymers and c) Stereo-regular polymers-Optical and Geometric Isomerism.

Ref 1: Pages 136-149

Ref 4: Relevant Pages

3. Glass Transition Temperature (GTT) and Heat Distortion Temperature(Softening Point)(05 L)

Definition, Factors influencing the Glass transition temperature, Glass transition temperature and molecular weight, Glass transition temperature and plasticizers, Glass Transition Temperature and Crystalline melting point (T_m), Importance of Glass transition temperature.

Ref 1: Pages 150, 163-169, 171-172, 219

Ref 4: Relevant pages

Ref 9: Page 113-116

Ref 10: Pages 47-58

4. Crystallinity in polymers

(04 L)

Introduction, Degree of Crystallinity, Crystallisability, crystallites, Factors affecting crystallisability, Effect of crystallinity on the properties of polymers.

Ref. 1: Pages 173-177, 180-183, 189-191,

Ref. 5: Pages 69-74, Ref. 9: Pages 103-112

5. Some Important Polymers

(08 L)

Polystyrene, Polymethylmethacrylate, Polyester, Polycarbonates, Polyamides, Polyvinyl alcohol (PVA), Polyvinyl chloride (PVC), Polytetrafluoroethylene (Teflon) & polyvinyl fluoride, Isoprene, Polyimide, Phenol formaldehyde resin (Novolac), Urea formaldehyde resin, Epoxy polymers.

Ref. 1: Pages 213-254,

Ref. 3: Relevant Pages

Ref. 4: Relevant Pages,

Ref. 8: Relevant Pages

6. Analysis and testing of polymers

(06 L)

a) Spectroscopic Methods: IR, NMR, b) Thermal analysis: Differential Scanning Calorimeter (DSC), & Thermo Gravimetric Analysis (TGA), c) Physical testing: Mechanical properties, Thermal properties, Optical properties, Electrical properties, Chemical properties.

Ref 2: Pages 229-237, 242-252,

Ref 4: Pages 121-139

7. Some Special Polymers

(06 L)

Polymer blends, Bio-medical polymers, Biodegradable polymers, Liquid Crystalline polymers (LC's), Conducting polymers, thermally stable polymers, Optical fibers,

Ref. 4: Relevant Pages,

Ref. 6: Pages 179,185,197

Ref.7: Pages 262-299,

Ref. 9: Pages 130-162

8. Polymer Processing

(12 L)

a) Plastic Technology

(04)

1) Molding 2) Extrusion 3) Other processing methods: Calendaring, Film Casting, Coating, Foaming, Forming, Laminating & Low pressure molding, Compounding.

Ref. 2: Pages 457-469, 474-475.,

Ref. 1, 4, 6, 7, 9: Relevant pages

b) Fiber Technology

(04)

1) Introduction, Textile & Fabric properties, 2) Fiber Spinning: i) Melt spinning ii) Dry spinning iii) Wet spinning and 3) Fiber after treatments: Scouring, Lubrications, Sizing, Dyeing, Finishing, Texture yarns, Nonwoven fabrics.

Ref 2: Pages 486-501,

Ref. 1, 4, 6, 7, 9: Relevant pages

c) Elastomer Technology

(04)

1) Introduction, Vulcanization (Sulphur & non sulphur vulcanization), 2) Reinforcement, Elastomer Compounding.

Ref. 2: Pages 506-518 ,

Ref. 1, 4, 6, 7, 9: Relevant pages

Aims and Objectives

The students are expected to learn the following aspects of Polymer Chemistry

1) What is polymer degradation?

2) Chemical and geometric structures of polymers.

3) Important polymers like PVC, polystyrene, polyvinyl alcohol, Teflon, Resins, nylon, epoxy polymers, etc.

- 4) Uses & properties of polymers.
- 5) Role of polymer industry in the economy.
- 6) Advantages of polymers.
- 7) Some industrially important polymers
- 8) What is polymer processing?
- 9) Different polymer processing techniques.
- 10) Polymer testing and analysis.
- 11) Properties of polymers & testing.
- 12) Various fiber spinning techniques.
- 13) Reinforcement & compounding of polymers.

Reference Books:

1. Polymer Science by V.R. Gowarikar, N.V. Vishvanathan, Jaydev Shreedhar New Age International Ltd. Publisher 1996.(Reprint 2012)
 2. Textbook of Polymer Science by Fred Billmeyer, 3rd Edn. A Wiley-Interscience Publication John Wiley & Sons New York 1984. (Reprint 2008)
 3. Introductory Polymer Chemistry by G.S. Misra New Age International (P) Ltd. Publisher 1996.
 4. Polymer Chemistry by Charles E. Carraher (Jr.), 6th Edn, (First Indian Print 2005), New York-Basel.
 5. Inorganic Polymers by G.R. Chatwal Himalaya Publishing House 1st Edn. 1996
 6. Polymer Science – A Text Book by V.K. Ahluwalia, Anuradha Mishra.
 7. Principle of Polymer Science by P. Bahadur, N.V. Sastry, 2nd Edn, Narosa Publishing House.
 8. Polymer Chemistry by Ayodhya Singh, 2008, Published by Campus Book International, New Delhi.
 9. Organic Polymer Chemistry by Jagdamba Singh, R.C. Dubey, 4th Edn, 2012.
 10. Advanced Polymer Chemistry by V.K. Selvaraj, 1st Edn, 2008, Published by Campus International, New Delhi.
 11. Organic Polymer Chemistry by V. Jain, IVY Publishing House, New Delhi.
 12. Principles of Polymerisation by George Odian 3rd Edn. John Wiley & Sons New York.
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Semester- III

Course: Introduction To Biochemistry And Molecular Biology (CH-336C)

Name of the Topic	Number of lectures
1. Amino acids and Proteins	11
2. Carbohydrates	06
3. Lipids	06
4. Hormones	03
5. Enzymes	07
6. Vitamins and Coenzymes	04
7. Cell Biochemistry	05
8. Biochemical techniques	06
Total lectures	48

1. Amino acids and proteins:

(11 L)

Introduction, biological functions, classification-based on structure, function and composition. Structural organization of proteins- primary, secondary, tertiary and quaternary structures (general overview). Factors that stabilize protein structure. Denaturation of Proteins.

Reference: 3, Chapter 4, Amino acids and Proteins, pg 45-71.

1) Foldings and misfoldings of proteins by stepwise process

2) Diseases caused by misfoldings of proteins for ex.. Alzheimer, Prions

Reference: 1, Page no 116 to 153

2. Carbohydrates:

(06 L)

Introduction of carbohydrates, Introduction and biological significance of proteoglycans, Glycoproteins, Glycolipids, Lectin Carbohydrates- Interaction(Sugar code). Analysis of carbohydrates.

Reference.1: page no. 255 to 268

Reference.2: Page no : 648 to 653 .

3. Lipids:

(06 L)

Introduction, Biological significance, Classification-Simple , compound, steroids and derived lipids. Structure of saturated and unsaturated fatty acids, structure of phospholipids (Phosphatidic acid, Lecithin, Cephalin, Lipositol), structure of Sphingomyelin and Cholesterol. Amphipathic lipids and their behavior in water. Saponification number, Acid number, Iodine number and their significance. Rancidity of lipids. Types of Lipoproteins and their significance, Structural Lipids in membrane glycerophospholipids, Sulphalipids, Galactolipids, glycosphingolipids

Reference.1: page no. 343 to 360

Reference: 3, Chapter 3, Lipids, pg 29-42.

4. Hormones:

(03 L)

Definition, classification based on biochemical nature, location and mechanism of action. Concept of second messengers-c.AMP and Calcium inositol system.

Reference: 2, Chapter 42 and 43, pg 434, 462 and 464.

5. Enzymes: (07 L)

Classification- Six major classes of enzymes, Conjugated enzymes- Apoenzyme, Holo enzyme, prosthetic group (coenzymes and cofactors). Features of active site. enzyme specificity, Factors affecting enzyme activity- substrate concentration, pH, temperature, and enzyme concentration, product concentration. MM equation, LB equation (derivation not required) and significance of Km. Enzyme inhibition-competitive, non competitive and uncompetitive with suitable examples. Allosteric enzymes and clinical significance of Isoenzymes.

Reference: 3, Chapter 6, Enzymes, pg 85 – 112.

6. Vitamins and Coenzymes: (04 L)

Classification- Fat soluble and water soluble vitamins (source, biological functions and deficiency disorders), coenzyme forms of vitamin B complex. (Structure not required).

Reference: 2, Chapter 45: pg 481-496

7. Cell Biochemistry: (05 L)

Introduction to Cell, Unicellular and Multicellular organisms, Distinguishing features of Prokaryotic and Eukaryotic cell. Structure and function of Cell membrane, Mitochondria, Endoplasmic reticulum, Golgi complex, Lysosomes, Peroxisomes, Plant cell wall and Chloroplast. Concepts of Biomolecules and types of bonds in biomolecules.

Reference: 5, Chapter 3, Unicellular and multicellular cell, cell membrane, pg 32- 68, Chapter 10, Mitochondria, pg 191- 219, Chapter 6, Endoplasmic Reticulum, pg 154- 165, Chapter 7, Golgi Complex, pg 166- 174, Chapter 8, Lysosomes, pg 175- 183, Chapter 9, Peroxisomes, pg 184-189, Chapter 1, Chloroplast, pg 220- 240.

8. Biochemical techniques. (06 L)

Principle, working and applications of dialysis, Paper chromatography, Thin layer chromatography, Column chromatography- Gel filtration, Ion exchange, Affinity Chromatography. Electrophoresis- Paper and Gel (Agarose, Native and SDS- PAGE).

Reference: 6, Chapter 11, pg 524- 546. Chapter 10, pg 449- 473. 2, Chapter 3, pg 89. 7, pg 344-421,

Aim and Objectives :

I **Cell Biochemistry:** The student needs to understand of Cell types, Difference between a bacterial cell., Plant cell and animal cell. Biological composition and organisation of cell membrane as per Singer and Nicholson model, structure and function of various cell organelles of plant and animal cell. Concepts of biomolecules, Bonds that link monomeric units to form macromolecules.

II. **Carbohydrates,:** The student needs to know the types of carbohydrates and their biochemical significance in living organisms, structure of carbohydrates and reactions of carbohydrates with Glucose as example. Properties of carbohydrates.

III. **Lipids:** The student needs to know the types of lipids with examples, structure of lipids, properties of lipids.

IV. **Aminoacids and proteins:** The student needs to know the structure and types of amino acids. Reactions of amino acids. Properties of aminoacids. Peptide bond formation. Types of proteins. Structural hierarchy in proteins. Features of denaturation of proteins.

V. **Enzymes:** The student needs to know the classes of enzymes with subclasses and examples. Enzyme specificity, Equations of enzyme kinetics K_m and its significance, features of various types of enzyme inhibitions.

VI. **Biochemical techniques:** The student needs to know the principle, working procedure and applications of various techniques used in biochemical studies.

VII. **Vitamins and Coenzymes:** The student needs to know the types of vitamins ,their source, biochemical significance and deficiency disorders. Coenzyme forms of Vitamin B complex and their metabolic significance.

VIII. **Hormones:** Basic concepts of Endocrinology. Types of Endocrine glands and their hormones. Biochemical nature of hormones. Role of Second messengers in hormone action.

Reference Books

1. Lehninger's, Principles of Biochemistry, by Nelson and Cox Macmillan Publisher 4th Edn..
 2. Harper's Illustrated Biochemistry, 26th Edition.
 3. Biochemistry by U. Satyanarayana
 4. Biotechnology, B.D.Singh, 3rd edition.
 5. Cell biology, Genetics, Molecular Biology, Evolution and Ecology, by Verma and Agarwal, 14th edition.
 6. Principle techniques of Biochemistry and Molecular Biology by Keith Wilson and John Walker, 6th edition.
 7. Biophysical techniques by Upadhyay and Nath, 3rd revised edition.
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Semester- III

Course: Introduction To Biochemistry And Molecular Biology (CH-346C)

Name of the Topic	Number of lectures
1. Introduction to Metabolism	02
2. Carbohydrate metabolism	06
3. Lipid metabolism	04
4. Amino acid metabolism	04
5. Electron Transport Chain and Oxidative Phosphorylation	06
6. Nucleic acids	07
7. DNA replication	06
8. Transcription	05
9. Translation	04
10. Introduction to Genetic engineering	04
Total lectures	48

1. Introduction to Metabolism: (02 L)

Definition of catabolism and anabolism, Types of metabolic reactions, High energy compounds, Significance of ATP.

Reference: 3, Chapter 12, Introduction to metabolism, pg 247- 249 and Chapter 11 Biological oxidation pg. 227-230.

2. Carbohydrate metabolism and TCA cycle (06 L)

Aerobic and anaerobic glycolysis- structures of intermediates, various enzymes involved and energetics. Fate of Pyruvate, Pyruvate dehydrogenase complex. TCA cycle- enzymatic reactions and energetics.

Reference: 2, Chapter 17: Glycolysis pp 136-144 and Chapter 16: The Citric Acid Cycle pp. 130-135

3. Lipid metabolism (04 L)

Transportation of fatty acids with the help of carnitine, β -oxidation of palmitic acid in mitochondria and its energetics. Triacylglycerol synthesis, ketogenesis.

Reference: 2, Chapter 22, Oxidation of fatty acids: Ketogenesis, pp 180-189.

4. Amino acid metabolism: (04 L)

Significance of transamination, deamination, decarboxylation reactions of amino acids. Urea cycle.

Reference: 2, Chapter 29: Catabolism of Proteins and of amino acid nitrogen. pp 242 - 248

5. Electron Transport Chain and Oxidative Phosphorylation: (06 L)

Location of Electron carriers, Electron transport chain, Proton gradient, Oxidative phosphorylation- Chemiosmotic hypothesis, Inhibitors and Uncouplers of Electron transport chain and Oxidative phosphorylation.

Reference: 3, Chapter 11 Biological oxidation, pg 230-239.

6. Nucleic acids:**(07 L)**

Structures of Purines and Pyrimidines, Nucleosides, Nucleotides, Polynucleotides. Difference between DNA and RNA. Watson and Crick model of DNA. DNA as genetic material (Macleod and McCarty, Hershey and Chase experiments). RNA and its types. Central dogma of molecular biology.

Reference: 3, Chapter 5, Nucleic acids, pg 73-83.

7. DNA replication:**(06 L)**

Semiconservative model of replication (Messelson and Stahl experiment). Brief account of initiation (features of OriC), elongation and termination of DNA replication in prokaryotes. Okazaki fragments, Leading and Lagging strands, Distinguishing features of DNA polymerase I, II and III. Klenow fragment of DNA polymerase I.

Reference: 1, Chapter 25, DNA metabolism, pg 950 - 984

8. Transcription:**(04 L)**

Brief account of initiation- Promoter sequences, elongation and termination of transcription in prokaryotes. RNA polymerase. Examples of inhibitors of transcription. Chapter 26: 996- 1027

Reference: 1, Chapter 26, RNA metabolism, pg 948 – 1033.

9. Translation:**(05 L)**

Genetic code and its features. Brief account of initiation, elongation and termination of translation in prokaryotes. Examples of inhibitors of translation. Regulation of gene expression- Lac operon.

Reference: 1, Chapter 27, Protein metabolism, pg 1034- 1075.

10. Introduction to genetic engineering:**(04 L)**

Basic concepts of genetic engineering - Restriction Enzymes- Types and features, Vectors (Plasmids, Phages and Cosmids) , Recombinant or Chimeric vector. Principle and Steps involved in gene cloning with insulin as example. Applications of genetic engineering in various fields.

Reference: 1, Chapter 9, pg 307- 310, pg 311-313(vectors), 4, Chapter 2, pg 15.

Aim and Objectives

a. Metabolism, Carbohydrate, Lipid and Amino acid metabolism: The student needs to know the significance of metabolism and energetics. Role of ATP and types of other high energy compounds. Individual reactions of the metabolic pathways, various enzymes and coenzymes, energetic and features of the pathway.

b. Electron Transport Chain and Oxidative Phosphorylation: The student needs to know the concepts of biological oxidation. Types of electron carriers and their location in mitochondria. Formation of proton gradient, Proton motive force and Oxidative phosphorylation, formation of ATP in the oxysomes. Inhibitors and Uncouplers of Mitochondrial ETC.

- c. **Nucleic acids:** Understanding the structures of purines, pyrimidines, nucleosides and nucleotides , structural features of nucleic acid types and their role. Central dogma of molecular biology. Experimental procedures that prove DNA as genetic material and its interpretations.
- d. **Replication:** The student needs to know the experiment that showed the salient features of semi conservative DNA replication, stepwise events involved in replication of DNA.
- e. **Transcription:** The student needs to know stepwise events of transcription of RNA and list of inhibitors of transcription.
- f. **Translation:** The student needs to know the stepwise events of translation of proteins and its significance. List of inhibitors of translation.Features of regulation of gene expression with lac operon studies.
- e. **Introduction to genetic engineering:** The student needs to know the overview of the steps involved in insulin gene cloning, and applications of genetic engineering in various fields like agriculture, industries and medicine.

Reference Books

1. Lehninger's, Principles of Biochemistry, by Nelson and Cox Macmillan Publisher 4thEdn..
 2. Harper's Illustrated Biochemistry, 26th Edition.
 3. Biochemistry by U. Satyanarayana
 4. Biotechnology, B.D.Singh, 3rd edition.
 5. Cell biology, Genetics, Molecular Biology, Evolution and Ecology, by Verma and Agarwal, 14th edition.
 6. Principle techniques of Biochemistry and Molecular Biology by Keith Wilson and John Walker, 6th edition.
 7. Biophysical techniques by Upadhyay and Nath, 3rd revised edition.
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Semester-III

Course: Environmental and Green Chemistry (CH-336D)

Name of the Topic	Number of lectures
1. Concepts and scope of Environmental Chemistry	02
2. Atmosphere and Air Pollution	14
3. Hydrosphere and water pollution	08
4. Introduction to Green Chemistry	10
5. Green Chemistry and Technology for sustainable development	10
6. Green Chemistry and Hazardous Organic Solvents	04
Total lectures	48

Chapter 1: Concepts and scope of Environmental Chemistry

(02)

- 1.1 Introduction
- 1.2 Terminologies
- 1.3 Units of concentration
- 1.4 Segments of Environment

Ref. 1, Ref. 3

Aims and Objectives-

Students should know-

- i. Importance and conservation of environment.

Chapter 2: Atmosphere and Air Pollution

(14)

- 2.1 Composition and structure of atmosphere
- 2.2 Chemical and photochemical reactions in atmosphere
- 2.3 Chemistry of O₃, SO_x, NO_x and chlorides in atmosphere
- 2.4 Primary air pollutants
- 2.5 Sampling of air
- 2.6 Particulate matter: inorganic and organic
- 2.7 Smog: reducing and photochemical
- 2.8 Mechanism of ozone depletion
- 2.9 Stability and reactions of CFCs
- 2.10 Harmful effects of CFCs
- 2.11 CFCs substitutes
- 2.12 Bhopal gas tragedy

Ref. 1, Ref. 3, Ref. 5

Aims and Objectives-

Students should know-

- i. Segments of atmosphere

- ii. Hazards of flue gases
- iii. Ozone depletion
- iv. Ecological changes due to hazardous gases
- v. Understand the social issues

Chapter 3: Hydrosphere and water pollution

(08)

3.1 Water resources

3.2 Physical chemistry of sea water: composition, equilibria, pH, pE

3.3 Microbially mediated aquatic reactions, nitrogen cycle, iron and manganese bacteria

3.4 Classification of water pollutants

3.5 Organic and Inorganic pollutants: Pesticides, Detergents, Eutrophication, Marine, Oil, Acid mine drainage, remedial measures and sediments

3.6 Thermal pollution

3.7 Sampling and monitoring water quality parameters: pH, D.O. (Winkler Method), COD, TOC, Total hardness, free chlorine.

Ref. 1, 2, 3, and 5

Aims and Objectives-

Students should know-

- i. Water resources
- ii. Quality of potable water
- iii. WHO limits for toxic materials in water stream
- iv. Quality measures

Chapter4. Introduction to Green Chemistry

[10]

4.1 Chemistry is good

4.2 The environment and the five environmental spheres

4.3 What is environmental Chemistry?

4.4 Environmental Pollution

4.5 What is green Chemistry?

4.6 Green Chemistry and synthetic chemistry

4.7 Reduction of risk: Hazard and exposure

4.8 The risk and no risks

4.9 Waste prevention

4.10 Basic principles of green chemistry

4.11 Examples based on green technology

[Ref: Green Chemistry By Stanley E Manahan, Chemchar Research Inc. (2006) -2ndEdn. chapter 1, P1-17 and Ref.6 Relevant pages.]

Chapter 5. Green Chemistry and Technology for sustainable development

[10]

5.1 Green Chemistry from theory to practice

5.2 The twelve principles of green chemistry

5.3 Green Chemistry and sustainable Development

5.4 Designing Products under the holistic approach “ Cradle-to Cradle”

5.5 Scientific areas for practical applications of green chemistry

5.6 Use of alternative basic chemicals as feedstocks in chemical industry and research

- 5.7 Green Chemistry and Reduction of solvent Toxicity (Alternative Solvents or replacement)
5.8 Applications of New Methodologies in the synthesis of chemical compounds- catalysis and green chemistry.

[Ref : Green Chemistry–Green engineering by AthanasiosValavanidis and ThomaisVlachogianni (March 2012) ; Chapter 2 p17-37 and Ref.6 Relevant pages]

Chapter 6. Green Chemistry and Hazardous Organic Solvents (Green solvents, replacement and Alternative techniques) [04]

- 6.1 Introduction to Green Chemistry and Toxic organic solvents
6.2 Green solvents and Alternative methods
6.3 Green Chemistry, Green solvents – Alternative techniques in organic synthesis

[Ref : Green Chemistry –Green engineering , Chapter 5, p81-91, Ref.6 Relevant pages]

Aims and Objectives-(for Chapters 4, 5 and 6)

Students should know-

- i. Need of green chemistry technology
- ii. Principles of green chemistry
- iii. Advantages of green chemistry
- iv. Simple examples to clarify the principles
- v. Catalytic routes for sustainable developments

Reference Books:

- 1: Environmental Chemistry – A. K. De, 5th Edition (New age international publishers)
 - 2: Environmental Chemistry – J. W. Moore and E. A. Moore (Academic Press, New York)
 - 3: Environmental Chemistry – A. K. Bhagi and C. R. Chatwal (Himalaya Publishing House)
 - 4: Analytical Chemistry – G. D. Christian 4th Edition (John Wiley and Sons)
 - 5: Environmental Chemistry – H. Kaur 2nd Edition 2007, PragatiPrakashan, Meerut, India
 6. Environmental Chemistry with Green Chemistry A. K Das , Books and Allied (P) Ltd, and
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Semester-III
Course: Environmental and Green Chemistry (CH-346D)

Name of the Topic	Number of lectures
1. Water treatment and effluent management	08
2. Soil and solid waste management	04
3. Instrumental methods in environmental analysis	08
4. Green House Effect and Global Warming	04
5. Water the ultimate Green solvent	12
6. Energy Relations	12
Total lectures	48

Chapter 1: Water treatment and effluent management

[08]

- 1.1 Domestic sewage, waste water treatment: primary, secondary and tertiary treatments, aerobic, anaerobic and upflow anaerobic sludge bed treatment processes
- 1.2 Industrial waste water treatment i) filtration method ii) ion-exchange method iii) membrane techniques: ultrafiltration, reverse osmosis and electrodialysis
- 1.3 Treatment of drinking water

Aims and Objectives-

Students should know-

- i. Methods of water purification
- ii. Waste water treatment process
- iii. Waste water treatment plants

Chapter 2: Soil and solid waste management

[04]

- 2.1 Composition of soil and types of soil.
- 2.2 Organic and inorganic components of soil
- 2.3 Acid base and ion exchange reactions in soil and pH of soil
- 2.4 Chemistry of disposal of solid waste i) sanitary landfills ii) incinerators iii) pyrolysis

Ref.1, Ref. 2, Ref. 3

Aims and Objectives-

Students should know-

- i. Types of soil
- ii. Components of soil
- iii. Types of solid waste and their disposal

Chapter 3: Instrumental methods in environmental analysis

[08]

- 3.1 Atomic absorption spectroscopy: determination of Hg, As, Zn, Ag, Pb, Mn, Fe, Cu, Cr, Cd
- 3.2 Gas chromatography: detection and determination of CO, HC and pesticides
- 3.3 HPLC: determination of pesticides, PAH as metabolites
- 3.4 Spectrophotometry: determination of NO_x, SO₂, NH₃, CN, PO₄, Cd, Pb, Hg
- 3.5 Chemiluminescence: determination of NO_x and O₃.

3.6 Non Dispersive IR spectrometry of determination of CO

3.7 Ion selective electrodes: determination of NO₃ and dissolved oxygen (D. O.)

[Ref. 1, Ref. 2]

Aims and Objectives-

Students should know-

- i. Techniques used to monitor hazardous materials present in environment

Chapter 4: Green House Effect and Global Warming

[04]

4.1 Introduction

4.2 Greenhouse gases

4.3 Radiative forcing

4.4 Sources and sinks of CO₂

4.5 Causes of fluctuations in global temperature

4.6 Global warming and climate changes

4.7 Implications of climate changes

[Ref. 5]

Aims and Objectives-

Students should know-

- i. Green house gases and their effects
- ii. Global warming
- iii. Climate change

Chapter 5. Water the ultimate Green solvent

[12]

5.1 H₂O : Simple formula and complex molecule

5.2 Important properties of water

5.3 The hydrologic cycle

5.4 Bodies of water and life in water

5.5 Chemical process in water

5.6 Fizzy water from underground

5.7 Oxygen in water

5.8 Weak acid from sky

5.9 Why natural water contains alkalinity and calcium

5.10 Metals in water

5.11 Water interactions with other phases

[Ref: Green Chemistry By Stanley E Manahan, Chemchar Research Inc. (2006)-2ndEdn Chapter 7 : P 161-173]

Aims and Objectives-

Students should know-

- i. What do you mean by green solvent
- ii. Resources of green solvents like alcohol and water
- iii. Importance of water as a green solvent

Chapter6 .Energy Relations :

[12]

6.1 Energy

- 6.2 Radiant Energy from the sun
- 6.3 Storage and release of energy by chemicals
- 6.4 Energy sources
- 6.5 Conversions between forms of energy
- 6.6 Green engineering and energy conversion efficiency
- 6.7 Conversion of chemical energy
- 6.8 Renewable energy sources

[Ref: Green Chemistry By Stanley E Manahan, Chemchar Research Inc. (2006) -2nd Edn Chapter 6 : P 135-157]

Aims and Objectives-

Students should know-

- i. Natural resources of energy
- ii. Conventional and nonconventional energy resources
- iii. Conservation of energy
- iv. Utilization of solar and wind energies.

Reference Books:

- 1: Environmental Chemistry – A. K. De, 5th Edition (New age international publishers)
 - 2: Environmental Chemistry – J. W. Moore and E. A. Moore (Academic Press, New York)
 - 3: Environmental Chemistry – A. K. Bhagi and C. R. Chatwal (Himalaya Publishing House)
 - 4: Analytical Chemistry – G. D. Christian 4th Edition (John Wiley and Sons)
 - 5: Environmental Chemistry – H. Kaur 2nd Edition 2007, PragatiPrakashan, Meerut, India
 - 6. Environmental Chemistry with Green Chemistry A. K Das , Books and Allied (P) Ltd.
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Semester-III

Course: Agriculture Chemistry (CH-336E)

Name of the Topic	Number of lectures
1. Soil Chemistry	10
2. Problematic Soil and Soil testing	10
3. Quality of Irrigation Water	08
4. Plant Nutrients	08
5. Fertilizers and Manures	06
6. Protection of Plants	06
Total lectures	48

Chapter I –Soil Chemistry

(10 L)

- 1.1 Role of agriculture chemistry
- 1.2 Scope and importance of agricultural chemistry
- 1.3 Agricultural chemistry and other science
- 1.4 Definition of soil, Soil components-mineral component, organic matter or humus, soil atmosphere, soil water, soil microorganism
- 1.5 Physical properties of soil- soil texture, soil structure, soil color, soil temp, soil density, porosity of soil.
- 1.6 Surface soil and sub-soil
- 1.7 Chemical properties of soil, soil reactions and solutions
- 1.8 Factor controlling soil reaction, buffering capacity, importance of buffer action in agriculture, ion exchange

Ref 1- Pagers 8-12, 92-94, 98-113, 116-146

Ref 3- Pages 28-50

Chapter II – Problematic Soil and Soil testing

(10 L)

- 2.1 Acid soil- formation of acid soil, effect of soil acidity of soil, reclamation of acidic soil
- 2.2 Alkali Soil- formation of alkali soil, reclamation of alkali soil
- 2.3 Classification of alkali soil- saline soil, saline alkali soil, non-saline alkali soil
- 2.4 Calcareous soils
- 2.5 Introduction to soil testing
- 2.6 Objectives of soil testing
- 2.7 Phases of soil testing- collection of soil sample, analysis in the laboratory and fertilizer applications

Ref 1- 345-370, Ref 3- 301-312, Ref 4- 135-147 and 150-159

Chapter III- Quality of Irrigation Water

(08 L)

- 3.1 Sources of Water- Atmospheric water, Surface Water, Stored Water, Ground Water
- 3.2 Impurities in Water, Water quality, related problems in public health, environment and agriculture

3.3 Analysis of irrigation Water (ppm, meq/lit.epm)

3.4 Dissolved constituents and their functions

Major constituents- Ca, Mg, Na, K, Carbonate, bicarbonate, sulfate, Chloride and nitrate

Minor constituents- B, Si, nitrite, Sulfide and fluoride

3.5 Water quality standard- total soluble salt (TSS), sodium adsorption ratio (SAR), Exchangeable sodium percentage (ESP), Residual sodium carbonate, salinity classes for irrigation water

Ref 8- Pages 293-309

Chapter IV- Plant Nutrients

(08 L)

4.1 Need of plant nutrients, forms of nutrients updates, nutrient absorption by plants

4.2 Classification of essential nutrients

4.2.1 Primary nutrients (N, P, K), its role and deficiency symptoms in plants

4.2.2 Secondary nutrients, (Ca, Mg, S), its role and deficiency symptoms in plants

4.2.3 Micronutrients, General functions of micronutrients (Zn, Fe, Mn, Cu, B, Mo, Cl)

4.3 Effect of environmental condition, nutrient uptake

Ref 3- Pages 207-241, Ref 4- Pages 176-195, Ref 7- pages 287-300

Chapter V- Fertilizers and Manures

(06 L)

Fertilizers

5.1 Introduction, Classification & application of fertilizers

5.2 Time and methods of fertilizers

5.3 Factors affecting efficiency of fertilizers

5.4 Vermicompost preparation, effect of vermicompost on soil fertility

5.5 Synthetic fertilizers definition, comparison of synthetic fertilizers with organic fertilizers , environmental effect of synthetic fertilizers

Manures

5.6 Introduction, Definition and classification of manures

5.7 Effect of bulky organic manures on soil, farm yard manures (FYM), Factors affecting on FYM, method of preparation, losses during handling and storage

5.8 Biogas plant. Human waste, sewage and sludge, types of sludge, carbon nitrogen ratio, sewage irrigation and uses

5.9 Green manuring, types of green manuring, characteristics, advantages and disadvantages of green manuring

6.0 Biofertilizers: definition, classification, role & advantages

Ref 2- Pages 205-213, Ref 3- 90-112, 137-149

Chapter VII- Protection of Plants

(06 L)

Pesticide Classification and mode of action

7.1 Insecticide- Definition, Classification, chemical properties, elemental composition, mode of action of synthetic and plant originated compounds organophosphates, malathion, parathion, carbamates

7.2 Fungicides- Definition, Classification, Chemical properties, mode of action of S

& Cu fungicides

7.3 Herbicides- Definition,, Classification, composition, mode of action of Selective and non-selective herbicides.

Ref 6- Relevant Pages

Learning Objectives of Agriculture Chemistry

After studying this course, student is expected to

1. Know the role of agriculture chemistry and its potential
2. Understand basic concept of soil, properties of soil & its classification on the basis of pH
3. Know the different plant nutrients, Their functions and deficiency symptoms
4. Understand importance of manures as compared to chemical fertilizers'
5. Understand the importance of green manuring
6. Have the knowledge of the use of proper the plants
7. Know various techniques to protect the plants
8. Have the knowledge of various pesticides, insecticides, fungicides and herbicides
9. Identify the problematic soil and recommend method for their reclamation
10. Have the knowledge of quality irrigation water, water quality standard and analysis of irrigation water

Reference Books

1. A text book of soil science (Recise Ed) J.A. Daji, Revised by J.R. Adam, N.D. Patil, Media promoters and publishers, Mumabi, 1996
 2. Text book of soil science, T.D. Biswas, S.K. Mukharjee, Tata McGraw Hill Publishing company, New Delhi
 3. Introduction to Agronomy and soil, water management, V.G. Vaidya, K.R. Sahashtra Buddhe (Continental Prakashan)
 4. Principals of soil science, M.M. Rai, Millian complex of India, Bombay, 1977
 5. Manures and fertilizers (sixth ed), K.S. Yawalkar, J.P. Agarwal and Bokde, Agrihorticulture publishing house, Nagpur, India
 6. Chemistry of insecticides and fungicides, U.S. Sreeramula (2nd Ed), oxford and IBH Publishing company, New Delhi
 7. Fundamentals of soil sciences, C.E. Millar and L.M. Turk, Bio-Tech- New Delhi (1st Ed 2001)
 8. Soil, Plant, Water and fertilizer analysis, P.K. Gupta, Published by Agro Botanica
 9. **Biofertilizers** and biopesticides , Author: Deshmukh, A. M. (ArvindMadhavrao),
-

Semester-IV
Course: Dairy Chemistry (CH-336E)

Name of the Topic	Number of lectures
1. Market Milk	08
2. Common Dairy Processes	06
3. Special Milks	08
4. Milk proteins, Carbohydrates and Vitamins	08
5. Preservatives & Adulterants in Milk	06
6. Milk Products	08
7. Dried Milk Products	04
Total lectures	48

Chapter I – Market Milk (08 L)

Introduction, Definition, constituents of milk of different species such as cow, buffalo, goat, etc., Chemical composition of milk of Indian breed and foreign breeds of cow, factor affecting composition of milk, characteristics of milk of different mammals, physicochemical properties of milk, acidity, pH, density, specific gravity, color and flavor of milk, food and nutritive value of milk. Microbiology of milk, growth of microorganism, stages of growth, product of microbial growth, destruction of microorganisms growth.

Ref 1 chap I relevant pages, Ref 2 pages 9-26, Ref 6 – relevant pages.

Chapter II – Common Dairy Processes (06 L)
(Manufacture, storage and packaging)

Cream separation- Basic principles, gravity creaming water dilution and centrifugal creaming method, construction of centrifugal separator, factors affecting percentage of fat, speed of machine, temp. of milk, rate of inflow amount of flushing water formation of separator slime Pasteurization of milk, flow sheet diagram, process receiving milk, preheating filtration, clarification, cooling and storage raw milk, standardization, pasteurization, homogenization, packing and storage, uses of milk.

Ref 1.- Relevant pages.

Chapter- III Special Milks (08 L)

1. Sterilized milk- Definition, method of manufacture in detail, Advantages and disadvantages. 2. Homogenized milk,- Definition, merits and demerits factor influencing homogenization, Process of manufacture. 3. Soft curd milk- Definition, characteristics, method of preparation of soft curd milk. 4. Flavored milk- Definition, types, method of manufacture flow sheet diagram. 5. Vitaminised / irradiated milk- - Definition, method of manufacture. 6. Fermented milk-Definition, method of manufacture. 7. Standardized milk- Definition, method of manufacture.

Ref 1 Chap II relevant pages.

Chapter IV- Milk proteins, Carbohydrates and Vitamins (08 L)

1. Milk proteins- importance of proteins found in the milk-casein, albumin and globulin, composition, nomenclature, properties and uses. 2. Carbohydrates- importance of lactose, classification, properties, nutritive value of lactose use of lactose. 3. Vitamins- importance, definition,

properties nutritive value of vitamins, Vit-A, Vit-B, B2, B6, B12, Vit-C (Ascorbic acid) & Vitamin-D. 4. Food and nutritive value of milk, milk & public health.

Ref-2 Pages 11,12,33 to 38, 42 to 49, 51 to 53

Chapter V- Preservatives & Adulterants in Milk

(06 L)

1. Preservation of milk- Introduction, Common preservatives are used. 2. Adulterants- Introduction, Modes of Adulteration and their detection such as skimming, addition of separated milk, skim milk, Water, Starch and cane sugar.

Ref -2 Pages 78-81

Chapter VI- Milk Products

(08 L)

Cream, Butter, Cheese and Ice-Cream.

1. Cream- Definition, Classification, Composition, Food & Nutritive value, Physicochemical properties, Manufacture and uses of cream. Ref-1 117, 118, 121 & 142

2. Butter- Definition, Classification, Composition, Food & nutritive value, Physicochemical properties, Manufacture and uses of Butter selection of milk/cream. Preheating of milk, Separating of milk, neutralization of cream, Pasteurization of cream, Cooking & ageing, repending of cream, salting of butter, washing of butter, packaging & Storage, use of butter.

Ref -1 Pages 143, 144, 145 to 158 & 173

3. Cheese- Definition, Classification, Food & nutritive value, properties, Manufacture and uses of cheese.

Ref -1 Pages 224, 227, 229 to 242 & 267

4. Ice-cream- Definition, Classification, Composition, Food & Nutritive value, Manufacture, packing, hardening & Storage, uses of Ice-cream.

Ref -1 Pages 182, 183, 184, 193,223

Chapter VII- Dried Milk Products

(04 L)

Introduction, butter milk powder, whey powder, cream powder, infact milk powder, Shrikand powder, Ice-cream mix powder, cheese powder.

Ref-1 Pages 357 to377

Learning Objectives-

The students are expected to study “Dairy Chemistry” in view of-

1. Knowing importance of the subject from the point of rural economy.
2. Knowing the composition of milk, its food & nutritive value
3. Understanding the Microbiology of the milk
4. Understanding various preservation and adulterants, various milk proteins and their role for the human body.
5. Knowing various milk products, their composition, manufacture and uses.

References-

Ref- 1: Qutline of Dairy Technology- Oxford University press By- Sukumar De. (Edition-1983)

Ref- 2: Dairy Chemistry and Animal Nutrition- M.M. Rai, Kalyani, Publishers, New Delhi 3rd Edition, 1980

Ref- 3: Fundamentals of Dairy Chemistry- B.H. Webb, A.H. Hohsson, J.A. Alford, CBB Publishers and Distributors.

Ref- 4: Milk and Milk Products- C.H. Eckles, H. Macy, Tata McGraw Hikk Publishing Company Ltd.

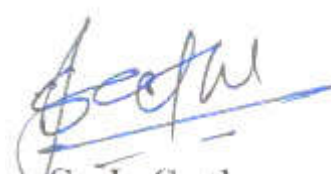
Ref- 5: Chemistry and Testing of Dairy Products- H.V. Athertion, J.A. New Lander, CBS, Publishers and Distributors.

Ref-6: Dairy Microbiology, Dr. K.C. MahantaOmsons Publication New Delhi.

SAVITRIBAI PHULE PUNE UNIVERSITY

B. Sc. Degree Course in MICROBIOLOGY

SYLLABUS FOR THIRD YEAR (To be implemented from Academic Year 2015-16)



GENERAL INFORMATION

Eligibility at third year B. Sc. Microbiology:

Student shall clear all First Year B. Sc. Microbiology courses and satisfactorily keep terms of Second Year of B. Sc. with Microbiology as one of the subjects.

Course Structure: T. Y. B. Sc. Microbiology course includes 12 theory papers and 3 practical courses. Six theory papers will be taught in semester III and the remaining six in semester IV. Practical are conducted over semesters III and IV. The examination will be held semester-wise for theory paper whereas the examination for three practical courses will be held at the end of the semester IV.

Work-load:

Theory Papers: Four Periods / Week per Paper (Total 48 / Paper per Semester)

Practical Course: Four Hours / Week per course (Total 96 / Course per Semester). Practical is to be conducted as four hours each day on three consecutive days / Batch.

Standard of Passing:

- i. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester. (Minimum 16 marks must be obtained in the University Theory Examination).
- ii. In order to pass in practical examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks must be obtained in the University Examination.)

Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the Principle subject only. The award of the class shall be as follows:

1. Aggregate 70% and above First Class with Distinction
2. Aggregate 60% and more but less than 70% First Class
3. Aggregate 55% and more but less than 60% Higher Second Class
4. Aggregate 50% and more but less than 55% Second Class
5. Aggregate 40% and more but less than 50% Pass Class
6. Below 40% Fail

ATKT Rules:

While going from F. Y. B. Sc. to S. Y. B. Sc. at least 8 courses (out of total 12) should be cleared; however all F. Y. B. Sc. courses should be cleared while going to T. Y. B. Sc.

While going from S. Y. B. Sc. to T. Y. B. Sc., at least 12 courses (out of 20) should be cleared (Practical Course at S. Y. B. Sc. will be equivalent to 2 courses).

University Terms:

University authorities declare dates for commencement and conclusion of the first and second terms. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.

Medium of Instruction: The medium of instruction for the course shall be English.

Qualification of Teachers: With minimum undergraduate and postgraduate degree in Microbiology (B. Sc. and M. Sc. Microbiology) and qualified as per UGC regulations.

**Equivalences for the New Courses (w. e. f. from 2015-16)
with Old Courses (from 2010-11) in Microbiology
T. Y. B. Sc. Microbiology**

Semester III				Semester IV				Practical Courses			
New Course		Old Course		New Course		Old Course		New Course		Old Course	
Paper	Course Title	Paper	Course Title	Paper	Course Title	Paper	Course Title	Paper	Course Title	Paper	Course Title
MB 331	Medical Microbiology - I	MB 331	Medical Microbiology - I	MB 341	Medical Microbiology - II	MB 341	Medical Microbiology - II	MB 347 Practical course – I Applied Microbiology	MB 347 Practical course – I Applied Microbiology		
MB 332	Genetics & Molecular Biology - I	MB 332	Genetics and Molecular Biology - I	MB 342	Genetics & Molecular Biology - II	MB 342	Genetics and Molecular Biology - II				
MB 333	Enzymology	MB 333	Enzymology	MB 343	Metabolism	MB 343	Metabolism	MB 348 Practical course – II Biochemistry & Molecular Biology	MB 348 Practical course – II Biochemistry & Genetics		
MB 334	Immunology - I	MB 334	Immunology - I	MB 344	Immunology - II	MB 344	Immunology - II				
MB 335	Fermentation Technology -I	MB 335	Fermentation Technology -I	MB 345	Fermentation Technology - II	MB 345	Fermentation Technology - II	MB 349 Practical course – III Diagnostic Microbiology & Immunology	MB 349 Practical course – III Diagnostic Microbiology & Immunology		
MB 336	Food & Dairy Microbiology	MB 336	Food & dairy Microbiology	MB 346	Agricultural & Environmental Microbiology	MB 346	Soil & Agricultural Microbiology				

Course Structure

T. Y. B. Sc. Microbiology

Theory Courses							
Semester III				Semester IV			
Paper	Course Title	Internal Exam Marks	University Exam Marks	Paper	Course Title	Internal Exam Marks	University Exam Marks
MB 331	Medical Microbiology - I	10	40	MB 341	Medical Microbiology - II	10	40
MB 332	Genetics & Molecular Biology - I	10	40	MB 342	Genetics & Molecular Biology - II	10	40
MB 333	Enzymology	10	40	MB 343	Metabolism	10	40
MB 334	Immunology - I	10	40	MB 344	Immunology - II	10	40
MB 335	Fermentation Technology - I	10	40	MB 345	Fermentation Technology - II	10	40
MB 336	Food & Dairy Microbiology	10	40	MB 346	Agricultural & Environmental Microbiology	10	40

Practical Courses			
Paper	Course Title	Internal Exam Marks	University Exam Marks
MB 347	Practical course – I Applied Microbiology	20	80
MB 348	Practical course – II Biochemistry & Molecular Biology	20	80
MB 349	Practical course – III Diagnostic Microbiology & Immunology	20	80

MB – 331: MEDICAL MICROBIOLOGY - I

Sr. No.	Topic	No. of Lectures
I	Introduction to infectious diseases of following human body systems: (Brief anatomy and physiology, Diseases, Pathogens and Symptoms) a. Respiratory system b. Gastrointestinal system c. Kidney and Liver d. Genital system e. Central nervous system	10
II	Epidemiology: a. Definition, scope and applications b. Incidence and prevalence rates, mortality and morbidity rates c. Disease distribution based on time, place and person d. Case control and cohort studies – study design and application e. Principle and methods – Clinical trials of drugs and vaccines (Randomized control trials Concurrent parallel and cross-over trials) f. Epidemiology of infectious diseases i. Sources and reservoirs of infection ii. Modes of transmission of infections iii. Disease prevention and control measures	10
III	Study of following groups of bacterial pathogens: (with respect to - Classification and Biochemical characters, Antigenic structure, Viability characteristics, Pathogenicity, Pathogenesis, Symptoms, Laboratory diagnosis, Epidemiology, Prophylaxis and Chemotherapy): i. Enteric pathogens (<i>E. coli</i> , <i>Shigella</i> , <i>Salmonella</i> , <i>Campylobacter</i> , <i>Vibrio</i>) ii. Pneumococci and <i>Neisseria</i> iii. Pyogenic organisms – <i>Staphylococcus</i> , <i>Streptococcus</i> , <i>Pseudomonas</i> iv. Spirochetes – <i>Treponema</i> , <i>Leptospira</i> v. <i>Clostridium tetani</i> and <i>Clostridium perfringens</i> vi. <i>Bacillus anthracis</i> vii. <i>Acinetobacter</i> spp. viii. <i>Mycobacterium tuberculosis</i> and <i>Mycobacterium leprae</i> ix. <i>Rickettsia</i>	28

MB – 341: MEDICAL MICROBIOLOGY - II

Sr. No.	Topic	No. of Lectures
I	Chemotherapy: 1. Introduction to chemotherapy 2. Desirable parameters of chemotherapeutic agent (Selective toxicity, Bioavailability of Drug, MIC, MBC, LD-50 value, routes of drug administration) 3. Mode of action of antimicrobial agents on:	20

	a. Bacteria: - Cell wall (Beta lactams [1st to 6th Generation- e.g. Meropenem, Imipenem Piperacillin], Tazobactam, Cycloserine, Bacitracin) - Cell membrane (Polymyxin, Monensin) - Protein synthesis (Streptomycin, Tetracycline) - Nucleic acids (Nalidixic acid, Rifamycin, Quinolones) - Enzyme inhibitors (Trimethoprim) b. Fungi: (Griseofulvin, Nystatin, Amphotericin B, Anidulafungin, Voriconazole) c. Viruses: (Acyclovir, Zidovudine, Oseltamivir) d. Protozoa: (Metronidazole, Mepacrine) 4. Resistance to antibiotics: - Development of antibiotic resistance (e.g. ESBL, VRE, MRSA) - Reasons and Mechanisms of drug resistance - Antibiotics misuse	
II	a. Introduction to cultivation of viruses: b. Study of following groups of viral pathogens (with respect to – Virion characteristics, Viability characteristics, Pathogenicity, Pathogenesis, Symptoms, Laboratory diagnosis including serological diagnosis, Epidemiology, Prophylaxis and Chemotherapy): - HIV - Polio virus - Hemorrhagic viruses (Dengue, Ebola) - Hepatitis A and Hepatitis B viruses - Influenza virus (human, swine and bird) - FMD virus and Rinderpest virus - Japanese encephalitis virus - Rota virus - Rhabdoviruses (Rabies) - Herpes Virus (simplex, zoster) - Oncogenic viruses (DNA, RNA)	2 16
III	Study of following groups of parasites (with respect to – Classification, Life cycle, Morphological characteristics, Viability characteristics, Pathogenicity, Pathogenesis, Symptoms, Laboratory diagnosis (Serological diagnosis wherever applicable), Epidemiology, Prophylaxis and Chemotherapy): <i>Plasmodium</i> <i>Entamoeba</i> <i>Giardia</i>	5
IV	Study of following groups of <i>Candida</i> and Non-<i>Candida</i> fungal pathogens (with respect to – Morphological and cultural characteristics, Classification, Pathogenicity, Pathogenesis, Symptoms, Laboratory diagnosis, Epidemiology, Prophylaxis and Chemotherapy)	5

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MB – 332: GENETICS AND MOLECULAR BIOLOGY - I

Sr. No.	Topic	No. of Lectures
I	Gene Linkage and crossing over: a. Mendelian laws, b. Recombination in eukaryotes Double Strand Break (DSB) model c. Gene linkage and cross over d. Chromosome mapping, Recombination frequency, Map unit e. Mapping Chromosome by Tetrad analysis f. Mapping Chromosome by Para sexual cycle	10
II	DNA Replication: a. Single replicon b. Bidirectional movement of replication fork. Ori C, c. Prepriming and Priming reaction. d. DNA polymerases, DNA synthesis of leading, lagging strand e. Okazaki fragments. f. Termination- Ter sequence, Tus protein g. Mismatched repair	7
III	Prokaryotic and Eukaryotic Transcription: a. Structure of Promoters b. Structure and role of RNA polymerases. c. Initiation, elongation and termination d. Post transcriptional modification e. Regulation of transcription f. Introduction to RNA splicing	11
IV	Prokaryotic and Eukaryotic Translation: a. Role of m-RNA, t-RNA and Ribosomes in translation b. Synthesis of amino acyl tRNA c. Initiation, elongation, translocation and termination of protein d. Regulation of translation	8
V	Guidelines for gene manipulation: a. History of recombinant DNA technology - Potential uses and biohazards b. Safety guidelines for recombinant DNA technology laboratory set up	4
VI	Techniques used in recombinant DNA technology: a. Isolation and purification of genomic DNA b. Agarose gel electrophoresis c. Blotting- Southern, Northern and Western	8

MB – 342: GENETICS AND MOLECULAR BIOLOGY - II

Sr. No.	Topic	No. of Lectures
I	Gene transfer by transformation: a. Development of competence in Gram positive and Gram negative bacteria. b. Process of transformation in Gram positive and Gram negative bacteria.	5

	c. Factors affecting transformation. d. Mapping of chromosome by co-transformation.	
II	Gene transfer by transduction: a. Process of generalized transduction. b. Process of specialized transduction. c. Mapping by Co-transduction.	4
III	Gene transfer by conjugation: a. Properties of F plasmid, b. F⁺, F⁻, Hfr and F' strains c. Process of conjugation between F⁺ and F⁻ and Hfr and F⁻ d. Mapping of conjugant's by interrupted mating experiment.	5
IV	DNA damage and repair: a. DNA damage by hydrolysis, deamination, alkylation oxidation and radiation b. Base excision repair and nucleotide excision repair c. Recombinational repair d. Photoreactivation e. Translesion DNA synthesis	8
V	Recombination and Mutants in Bacteriophages a. Bacteriophage mutants i. Plaque morphology ii. Conditional lethal (Ts and Am) mutants iii. Deletion Mutants b. Deletion Mapping using bacteriophage deletion mutants c. Benzer's spot tests d. Genetic Complementation i. Cis-trans test of genetic function ii. Intercistronic (rII locus of T4 phage) iii. Intracistronic (β galactosidase)	10
VI	Tools of Recombinant DNA technology: a. Vectors used: Plasmids, Viral DNA, cosmids, phagemids, PACs, BACs, YACs, Expression vectors b. Restriction Enzymes c. Insertion of foreign DNA in hosts d. Genomic and c DNA library e. Concept of a clone and probe	8
VII	Generation of recombinant DNA molecule: a. Cutting and joining the DNA molecules. b. Methods to transfer recombinant DNA into host cells. c. Methods of screening the cells containing the recombinant DNA. d. Identification of clones using probes	8

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MB – 333: ENZYMOLOGY

Sr. No.	Topic	No. of Lectures
I	Enzymes: a. Structure of enzymes: Methods to determine amino acid residues at active site (Physical and chemical methods)	5
	b. Role of cofactors in metabolism: Occurrence, Structure and Biochemical functions of the following: i. Nicotinic Acid (Niacin) and the Pyrimidine nucleotides. ii. Riboflavin (Vitamin B ₂) and the Flavin nucleotides iii. Thiamine (Vitamin B ₁) and Thiamine Pyrophosphate iv. Pantothenic acid and coenzyme A v. Pyridoxal phosphate (Vitamin B ₆) vi. Metal ions	6
II	Enzyme assays: a. Principles of enzyme assays: Sampling methods and continuous assay b. Enzymes assays with examples by: i. Spectrophotometric methods ii. Spectrofluorometric methods iii. Radioisotope assay	4
III	Principles and Methods of Enzyme purification: a. Methods of cell fractionation b. Principles and methods of enzyme purification: i. Based on molecular size ii. Based on charge iii. Based on solubility differences iv. Based on specific binding property and selective adsorption c. Criteria for purity: SDS-PAGE, ultracentrifugation, and construction of purification chart d. Characterization of enzymes: i. Determination of Molecular weight based on: Ultracentrifugation, SDS-PAGE, gel filtration ii. Stability of enzyme activity at pH and temperature	12
IV	Enzyme Kinetics: a. Concept and use of initial velocity b. Michaelis Menton equation for the initial velocity of single substrate enzyme catalyzed reaction. Brigg's Haldane modification of Michaelis Menton equation. Michaelis Menton plot. Definition with significance of Km, Ks, Vmax c. Different plots for plotting Kinetic data: i. Lineweaver and Burk plot ii. Hanes plot iii. Eadie Hofstee plot iv. Eisanthal, Cornish-Bowden plot d. Concepts and types of Enzyme Inhibitions	10
V	Metabolic Regulations: i. Enzyme compartmentalization at cellular level ii. Allosteric enzymes iii. Feedback mechanisms	9

	iv. Covalently modified regulatory enzymes (e.g. Glycogen phosphorylase) v. Proteolytic activation of zymogens vi. Isozymes - concept and examples vii. Multienzyme complex e.g. Pyruvate dehydrogenase complex(PDH)	
VI	Immobilization of enzymes: Concept, methods of immobilization and applications	2

MB – 343: METABOLISM

Sr. No.	Topic	No. of Lectures
I	Membrane transport mechanisms: i. Passive transport - Diffusion, Osmosis, Facilitated transport ii. Active transport - Active transport systems in bacteria iii. Group translocation of sugars in bacteria iv. Ionophores: Mechanism and examples	6
II	Bioenergetics: i. Laws of thermodynamics ii. Concepts of free energy, entropy, high energy compounds: Pyrophosphate, enolic phosphates, acyl phosphates, thioester compounds, and guanidinium compounds iii. Mitochondrial electron transport chain: components, arrangement of different components in the inner membrane, structure and function of ATP synthetase, inhibitors and uncouplers of ETC and oxidative phosphorylation, energetics of mitochondrial electron transfer chain	16
III	Biosynthesis and Degradation: a. Chemistry, concept of polymerization of macromolecules: Polysaccharides. (Starch, glycogen and peptidoglycan) and Lipids (Fatty acids, triglycerides and phospholipids) b. Degradation of macromolecules – Polysaccharides (starch, glycogen and cellulose), Lipids (fatty acids oxidation) and Proteins (urea cycle)	18
IV	Bacterial Photosynthesis: i. Habitat and examples of photosynthetic bacteria ii. Photosynthetic apparatus iii. Oxygenic and Anoxygenic mechanisms iv. Calvin cycle and its regulation	8

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MB – 334: IMMUNOLOGY – I

Sr. No.	Topic	No. of Lectures
I	Immunity: Definition and Classification	2
II	Formation of blood cells: Erythrocytic, myelocytic, monocytic and lymphocytic lineages and differentiation process, lymphocyte types and subsets	2
III	Organs of immune system: a. Primary lymphoid organs (Thymus and Bursa): Thymus – structure, thymic education (positive and negative selection)	3
	b. Secondary lymphoid organs – structure and function of spleen and lymph node, mucous associated lymphoid tissue; response of secondary lymphoid organs to antigen, lymphatic system and lymph circulation	3
IV	Innate immunity: Non specific mechanisms of defense a. First line of defense – Physical, chemical and biological barriers	1
	b. Second line of defense: i. Humoral components: Defensins, pattern recognition proteins (PRP) and pathogen associated molecular patterns (PAMPs), complement, kinins, acute phase reactants.	2
	ii. Cellular components: Phagocytic cells – PMNL, macrophages (reticulo-endothelial cell system) and dendritic cells	2
	iii. Functions: Phagocytosis (oxygen dependent and independent systems), Complement activation (Classical, Alternative and lectin pathway), Coagulation system, Inflammation (cardinal signs, mediators, vascular and cellular changes, role of Toll-like receptors)	6
V	Antigen: a. Concepts and factors affecting immunogenicity	2
	b. Antigenic determinants, haptens and cross-reactivity, Carriers, Adjuvants	2
	c. Types of antigens: Thymus-dependent and thymus-independent antigens, Synthetic antigens, Soluble and particulate antigens, Autoantigens, Isoantigens	2
VI	Immunoglobulins: a. Structure of basic unit, chemical and biological properties	2
	b. Characteristic of domain structure, functions of light and heavy chain domains	1
	c. Antigenic nature of immunoglobulin molecules	1
	d. Molecular basis of antibody diversity (kappa chain, lambda chain and heavy chain diversity)	2
VII	Adaptive / Acquired Immunity (Third line of defense): 1. Humoral Immune Response a. Primary and secondary response kinetics, significance in vaccination programs	3
	b. Antigen processing and presentation (MHC class I and class II restriction pathways), cell-cell interactions and adhesion molecules,	6

	response to super-antigens, role of cytokines in activation and differentiation of B-cells	
	2. Cell Mediated Immune Response - Activation and differentiation of T cells - Mechanism of CTL mediated cytotoxicity, ADCC - Significance of CMI	3
VIII	Transplantation and Immunity - Types of Grafts, - Allograft rejection mechanisms - Prevention of allograft rejection	3

MB – 344: IMMUNOLOGY – II

Sr. No.	Topic	No. of Lectures
I	Major Histocompatibility Complex: - Structure of MHC in man and mouse - Structure and functions of MHC class-I and class-II molecules - Polymorphism of MHC molecules - MHC antigen typing (microcytotoxicity and mixed lymphocyte reaction)	6
II	Cytokines: Types, General characters and role in immune activation - Interferons, Interleukins and TNFs	3
III	Antigen- Antibody Interactions Principles of interactions: Antibody affinity and avidity, ratio of antigen antibody, lattice hypothesis and two stage theory, antigen-antibody reaction kinetics (dialysis equilibrium experiment) Visualization of antigen antibody complexes - Precipitation reactions: in fluid and in gel, immunoelectrophoresis - Agglutination reactions: hemagglutination, bacterial agglutination, passive agglutination and agglutination-inhibition - Immunofluorescence techniques: direct and indirect, FACS - ELISA, biotin-avidin system, - RIA - Jerne's hemolytic plaque assay, ELISpot assay	12
IV	Immunohematology - Systems of blood group antigens - ABO system - Biochemistry of blood group substances, Bombay blood group, Inheritance of ABH antigens - Rh system - Laboratory methods of blood group typing, Coomb's test - Medico-legal applications of blood groups - Blood banking practices, transfusion reactions	10
V	Public health immunology - Types of vaccines and antisera - Immunization schedules: principles, schedules in developing and developed countries	2 2
VI	Hypersensitivity	

	a. Immediate and delayed type hypersensitivity	2
	b. Gell and Coomb's classification of hypersensitivity – mechanism with examples for type I, II, III and IV	4
	c. Autoimmunity – Types, Immunopathological mechanisms, Theories of origin of autoimmunity, Pathophysiology (mechanism of symptom generation) of Myasthenia gravis and Rheumatoid arthritis, Therapeutic immunosuppression for autoimmunity	4
VII	Hybridoma Technology and Monoclonal Antibodies	2
	a. Preparation, HAT selection and propagation of hybridomas secreting monoclonal antibodies	
	b. Applications of monoclonal antibodies	1

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MB – 335: FERMENTATION TECHNOLOGY – I

Sr. No.	Topic	No. of Lectures
I	Strain Improvement: - Objective of strain improvement - Methods for strain improvement: - selection of different types of mutants - application of rDNA technology	9
II	Media optimization: - Classical approach – One factor at a time, Full factorial design - Placket & Burman design - Response Surface Methodology (RSM)	4
III	Sterilization of Media: - Methods of sterilization - Batch sterilization and Continuous sterilization - Concept and derivation of Del factor	4
IV	Scale-up and Scale-down: - Objective of scale-up - Levels of fermentation (laboratory, pilot-plant and production levels) - Criteria of scale-up for critical parameters (aeration and agitation, broth rheology and sterilization) - Scale-down	5
V	Principles and methods of downstream processing: - Cell disruption - Filtration - Centrifugation - Liquid-liquid extraction - Distillation - Ion exchange chromatography - Drying	9
VI	Quality assurance (QA) of fermentation product: - Detection and Quantification of the product by physicochemical, biological and enzymatic methods - Sterility testing - Pyrogen testing – Endotoxin detection - Ames test and modified Ames test - Toxicity testing - Shelf life determination	12
VII	Fermentation economics: Contribution of various expense heads to a process (Recurring and non recurring expenditures) citing any suitable example. Introduction to Intellectual Property Rights (IPR) - Types of IPR	3 2

MB – 345: FERMENTATION TECHNOLOGY – II

Sr. No.	Topic	No. of Lectures
I	Introduction to Solid State Fermentation and Submerged Fermentation	2
II	Large scale production of:	
	a. Primary Metabolites:	
	i. Vitamins (B12 and Riboflavin)	4
	ii. Amino acid - Glutamic acid, Lysine	4
	iii. Organic acids (Citric acid, Vinegar and Lactic acid)	6
	b. Secondary metabolites:	
	i. Ethanol and alcoholic Beverages (Beer and Wine)	6
	ii. Antibiotics (Penicillin and Streptomycin)	5
	c. Enzymes (Amylase, Esterases and Proteases)	6
	d. Microbial transformation of steroids	2
	e. Biomass based products:	
	i. Yeast: Baker's and Distiller's yeast	3
	ii. Mushroom production	2
	f. Milk products: Cheese and Yogurt	3
	g. Vaccines (Polio, Tetanus and Rabies)	3
	h. Immune sera	2

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MB – 336: FOOD AND DAIRY MICROBIOLOGY

Sr. No.	Topic	No. of Lectures
I	DAIRY MICROBIOLOGY	
	3. Dairy Development in India: Role of National Dairy Development Board (NDDB), National Dairy Research Institute (NDRI), Military dairy farm, Indian Dairy Corporation (IDC), Dairy Co-operatives, Milk Grid, Operation Flood.	2
	4. Milk Chemistry and Constituents: a. Definition and Composition of milk b. Types of Milk (skimmed, toned and homogenized). c. Concept of clean milk d. Factors affecting quality and quantity of milk. e. Nutritive value of milk f. Physico-Chemical properties of milk.	5
	5. Microbiology of milk: a. Common micro-organisms found in milk b. Fermentation and spoilage of milk c. Milk borne diseases	8
	6. Preservation of Milk by Pasteurization & its storage: a. Methods of Pasteurization – LTH, HTST, UHT b. Storage specifications after pasteurization c. Phosphatase test and its significance	3
	7. Microbial analysis of milk: a. Dye reduction test (using methylene blue and resazurin) b. Total bacterial count. c. Brucella ring test and tests for mastitis. d. Somatic cell count	4
II	FOOD MICROBIOLOGY	
	1. Classification of Foods based on stability: Perishable, Semi-perishable & stable	1
	2. Food spoilage: a. Chemical and physical properties of food affecting microbial growth b. Sources of food spoilage micro-organisms c. Spoilage of - Meat and Poultry products - Bread - Fruits and Vegetables - Eggs - Sea foods - Canned foods	5
	c. Food preservation: a. Principles of food preservation b. Thermal destruction of bacteria - use of low temperature and high temperature. c. Determination of TDP, TDT, D, F, and Z values d. Use of chemicals and antibiotics in food preservation e. Canning	5

	f. Dehydration g. Use of radiations h. Principles of Hazard Analysis and Critical Control Points (HACCP)- i. Introduction to Tetrapack technology	
	4. Microbial food poisoning and food infection: a. Food poisoning by: i. <i>Staphylococcus aureus</i> ii. <i>Campylobacter</i> iii. <i>Clostridium botulinum</i> iv. <i>Aspergillus flavus</i> b. Food infection by : i. <i>Salmonella typhimurium</i> ii. <i>Vibrio parahemolyticus</i>	4
	5. Fermented foods: a. Definition and Types b. Significance of fermented foods (probiotic characteristics of lactic acid bacteria) c. Fermentation of <i>Idli</i> batter, butter	4
	6. Applications of genetically modified microorganisms: a. Starter cultures b. Genetically modified foods i. Food grade Bio-preservatives ii. Recombinant Dairy enzymes / Proteins	5
	7. Food Sanitation and regulation	2

MB – 346: AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY

Sr. No.	Topic	No. of Lectures
I	Agriculture Technology: 1. Plant growth improvement with respect to: a. Disease resistance b. Environmental tolerance 2. Methods of plant disease control a. Chemical control b. Eradication c. Biological control (employing bacterial and fungal cultures) d. Integrated pest management e. Development of insect resistant plants (BT crops) f. Application of viral proteins in controlling plant viral diseases g. Antisense RNA technology in plant disease control h. RNA interference (RNAi) in controlling plant pathogens i. Mycoviruses acting against fungal plant pathogens	14
II	Biochemistry and production of bio-fertilizers with respect to: a. Nitrogen Fixation i. Nonsymbiotic Nitrogen fixation : Diazotrophy, role of	8

	nitrogenase and hydrogenase, mechanism of nitrogen fixation ii. Symbiotic Nitrogen fixation : Establishment of symbiosis, Nodule development, mechanism of nitrogen fixation in root nodules iii. <i>Nod</i> genes, <i>Nif</i> genes, <i>Nif</i> gene cloning, b. Phosphate solubilization c. Potassium mobilization d. Iron chelation	
III	Bioremediation and Waste Water Treatment: 1. Bioremediation: Definition, Role of plants & Microbes in Bioremediation of: a. Hydrocarbons b. Industrial Wastes: (Dyes, Paper & Pulp, Heavy metals, Dairy, Distillery, Tannery) c. Xenobiotics 2. Bioaugmentation: a. Definition b. Use of microbial cultures and enzymes for bioaugmentation c. Applications 3. Genetically Modified Microorganisms in Bioremediation 4. Biosorption	12
IV	Bioleaching: a. Microorganisms used b. Bioleaching process c. Bioleaching of - Copper, Iron, Manganese, Gold, Silver d. Advantages of Bioleaching	6
V	Introduction to Nanobiotechnology: Synthesis of Nanoparticles using microorganisms and its' applications	2
VI	Microbial Biosensors and Biochips in Environmental Monitoring: a. Definition, components, types, advantages & limitations b. Application of Biosensors and Biochips	3
VII	Biofuel cells and Biodegradable plastic:	2
VIII	Bioterrorism	1

References:

1. Ajay Singh, Owen P. Ward, 2004 edition, Applied Bioremediation and Phytoremediation (Soil Biology). Springer;
2. Banwart G. J. (1989). Basic Food microbiology, 2nd Edn. Chapman and Hall. International Thompson Publishing.
3. Charles R. Lane, Paul Beales, Kelvin J. D. Hughes (2012). Fungal Plant Pathogens. 1st Edn. CABI Publishing.
4. Clarence Henry Eckles, Willes Barnes Combs, Harold Macy (1943). Milk and milk products, 4th Ed. McGraw-Hill book Company, Incorporated.
5. David S. Ingram, N.F. Robertson (1999). Plant Disease. 1st Edn.: Collins
6. George Nicholas Agrios (2005). Plant Pathology. 5th Edn. Academic Press Inc.
7. James M. Jay, Martin J. Loessner, David A. Golden (2005). Modern food microbiology, 7th Edn. Springer Science & Business.
8. John Postgate, (1998). Nitrogen Fixation. Cambridge University Press
9. K. S. Bilgrami, H. C. Dube (1984). A textbook of modern plant pathology. 7th Edn.

10. Martin Alexander (1999). Biodegradation and Bioremediation. Academic Press
11. Matthew Dickinson, (2003). Molecular Plant Pathology. Garland Publishing Inc.
12. N. S. Subba Rao. (1995). Soil Microorganisms and Plant growth. 3rd Edn. Science Pub Inc
13. R. Barry King, John K. Sheldon, Gilbert M. Long, 1997 Practical Environmental Bioremediation: The Field Guide, 2nd Edn. CRC Press
14. Sukumar. De (2001). Outlines of Dairy Technology. 1st Ed. Oxford University Press Delhi.
15. Vani Educational Books, a division of Vikas publishing house. New Delhi.
16. William C. Frazier, Dennis C. Westhoff, N. M. Vanitha (2013). Food Microbiology, 5thEdn.McGraw-Hill Education (India).

MB – 347: PRACTICAL COURSE – I APPLIED MICROBIOLOGY

Sr. No.	Topic	No. of Practical
I	Screening and isolation of pesticide degrading microorganisms from soil.	2
II	Isolation and identification of lactic cultures up to genus level	2
III	Laboratory scale fermentation, estimation, product recovery and yield calculation of ethanol / organic acid (any one)	2
IV	Quality assurance tests: a. Antibiotic and growth factor assay (agar gel diffusion technique) b. Sterility testing of non-biocidal injectables	2 1
V	MIC and MBC of Antibacterial compounds	2
VI	Tests for Milk and Dairy products a. Phosphatase test b. MBRT test c. Test for mastitis d. Milk fat estimation e. Standard Plate Count (for milk / milk product e.g. milk powder) f. Direct Microscopic count g. Somatic cell count	4
VII	Enrichment, Isolation, Preparation and Application of Bioinoculants (e.g. <i>Azo-Rhizo</i> / Blue Green Algae (cyanobacteria), phosphate solubilizer - anyone)	2
VIII	Isolation and identification of <i>Xanthomonas</i> spp. from infected sample	1
IX	Isolation and identification of <i>Aspergillus</i> spp. from onions infected with Black Mould	1
X	Antifungal activity of Lactic acid bacteria.	1
XI	Microscopic examination of Fungi causing Rust and Smut infections in Plants (Demonstration)	1
XII	Dye removal from wastes by dead microbial Biomass	1
XIII	Biosynthesis of nanoparticles	1
XIV	Visit to a Dairy / Fermentation industry / Agriculture college and preparation of visit report	1

MB – 348: PRACTICAL COURSE – II BIOCHEMISTRY AND MOLECULAR BIOLOGY

Sr. No.	Topic	No. of Practical
I	Determination of absorption spectra and molar extinction co-efficient (by colorimetry/ spectrophotometry)	1
II	Clinical Biochemistry - Estimations of: a. blood sugar b. blood urea c. serum cholesterol d. serum proteins and albumin	4
III	Qualitative analytical tests for proteins and carbohydrates	2
IV	Preparation of buffers	1
V	Paper chromatography	1
VI	Quantitative biochemical techniques: a. Estimation of total carbohydrates by Phenol-sulfuric acid method b. Estimation of reducing sugar by DNSA method c. Estimation of proteins by Folin Lowry method	3
VII	Enzyme production: a. Screening of amylase producing organisms b. Production of amylase using these isolates c. Precipitation of amylase from fermentation broth d. d. Determination of specific activity of crude and purified amylase	5
VIII	Isolation and enumeration of bacteriophages and study of phage morphology	2
IX	Genomic (bacterial) DNA isolation and detection	1
X	Isolation of plasmid DNA and gel electrophoresis (demonstration)	2
XI	Transformation of <i>E. coli</i> and selection of recombinants	1
XII	Visit to a research institute involved in biochemical / biotechnology research and preparation of visit report	1

B. C. A. (Semester V)

501 : Java Programming

Objectives:-

- 1. To learn the basic concept of Java Programming.**
- 2. To understand how to use programming in day to day applications.**

Unit No.	Topic	No. of Lectures	Reference Books
1	Introduction to Java 1.1 Features of java 1.2 JDK Environment & tools like(java, javac, appletviewer, javadoc, jdb) 1.3 OOPs Concepts Class, Abstraction , Encapsulation, Inheritance, Polymorphism 1.4 Difference between C++ and JAVA 1.5 Structure of java program 1.6 Data types ,Variables ,Operators , Keywords ,Naming Convention 1.7 Decision Making (if, switch), Looping(for, while) 1.8 Type Casting 1.9 Array Creating an array Types of Array - One Dimensional arrays - Two Dimensional array 1.10 String - Arrays , Methods. - StringBuffer class	8	1,2
2	Classes and Objects 2.1 Creating Classes and objects 2.2 Memory allocation for objects 2.3 Constructor 2.4 Implementation of Inheritance Simple, Multilevel, 2.5 Interfaces	10	1,2

	2.6 Abstract classes and methods 2.7 Implementation of Polymorphism 2.8 Method Overloading, Method Overriding 2.9 Nested and Inner classes. 2.10 Modifiers and Access Control 2.11 Packages Packages Concept Creating user defined packages 2.12 Java Built in packages java.lang->math java.util->Random, Date, Hashtable 2.13 Wrapper classes		
3	Collection 3.1 Collection Framework. 3.1.1 Interfaces - Collection - List - Set - SortedSet - Enumeration - Iterator - ListIterator 3.1.2. Classes - LinkedList - ArrayList - Vector - HashSet - TreeSet - Hashtable 3.2 Working with maps 3.2.1 Map interface 3.2.2 Map classes - HashMap - TreeMap	6	1,2

4	File and Exception Handling Exception 4.1 Exception types 4.2 Using try catch and multiple catch Nested try, throw , throws and finally 4.3 Creating user defined Exceptions File Handling 4.4 Stream ByteArray Classes CharacterStream Classes 4.5 File IO basics 4.6 File operations Creating file Reading file(character, byte) Writing file (character, byte)	8	1,2
5	Applet, AWT and Swing Programming Applet 5.1 Introduction 5.2 Types applet 5.3 Applet Life cycle - Creating applet - Applet tag 5.4 Applet Classes - Color - Graphics - Font AWT 5.5 Components and container used in AWT 5.6 Layout managers 5.7 Listeners and Adapter classes 5.8 Event Delegation model Swing 5.9 Introduction to Swing Component and Container Classes	12	1,2
	Total no. of Lectures	44	

Reference Books:

1. Programming with JAVA - E Balgurusamy
2. The Complete Reference – JAVA Herbert Schildt

B.C.A. (Semester V)

502 : Web Technologies

Objectives -:

- 1. To know & understand concepts of internet programming.**
- 2. To understand how to develop web based applications using PHP.**

Unit No.	Topic	No. of Lectures	Reference Books
1	Web Essentials 1.1 Clients- Servers and Communication 1.2 Internet-Basic ,Internet Protocols(HTTP,FTP,IP) 1.3 World Wide Web(WWW) 1.4 HTTP request message, HTTP response message	3	1
2	Markup Languages 2.1 Introduction to HTML 2.2 Basic HTML Structure 2.3 Common HTML Tags 2.4 Physical and Logical HTML 2.5 Types of Images, client side and server-side Image mapping 2.6 List, Table, Frames 2.7 Embedding Audio, Video 2.8 HTML form and form elements 2.9 Introduction to HTML Front Page 2.10 CSS with HTML	8	1
3	JAVA Script 3.1 Introduction to Java Script 3.2 Identifier & operator, control structure, functions 3.3 Document object model(DOM), 3.4 DOM Objects(window, navigator, history, location) 3.5 Predefined functions, math & string functions 3.6 Array in Java scripts 3.7 Event handling in Java script	6	2

4	Introduction to PHP 4.1 Introduction to PHP 4.2 What does PHP do? 4.3 Lexical structure 4.4 Language basics 4.4.1 Variable, constant, keywords, Data Types 4.4.2 Control Structures 4.4.3 Variables variable 4.4.4 Type casting, Type Juggling 4.4.5 \$_GET, \$_POST, \$_REQUEST Variables	10	3, 4
5	Function and String in PHP 5.1 Defining and calling a function 5.2 Default parameters 5.3 Variable parameters, Missing parameters 5.4 Variable function, Anonymous function 5.5 Types of strings in PHP 5.6 Printing functions 5.7 Encoding and escaping 5.8 Comparing strings 5.9 Manipulating and searching strings	10	3, 4
6	Arrays in PHP 6.1 Indexed Vs Associative arrays 6.2 Identifying elements of an array 6.3 Storing data in arrays 6.4 Multidimensional arrays 6.5 Extracting multiple values 6.6 Converting between arrays and variables 6.7 Traversing arrays 6.8 Sorting 6.9 Action on entire arrays	7	3, 4
	Total no. of Lecturers	44	

Reference Books :

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
4. Beginning PHP 5 - Wrox publication

B.C.A. (Semester V)

503 : Dot Net Programming

Objectives:-

- 1. This will introduce visual programming and event driven programming practically.**
- 2. This will enhance applications development skill of the student.**

Unit No.	Topic	No. of Lectures	Reference Books
1	Introduction to .Net Framework 1.1 IDE (Integrated Development Environment) 1.2 Event Driven Programming 1.3 . NET Framework 1.4 Architecture of .Net 1.5 Execution Process of .Net Application 1.6 Features of .Net 1.7 Advantages of .Net 1.8 Develop simple .Net Application	8	1,2
2	Introduction to VB.Net 2.1 Basics of VB.Net 2.1.1 Operators 2.1.2 Data Types 2.2 Control Structures 2.2.1 Decision making statements 2.2.2 Loops - For, while, do while etc. 2.3 Exit Statements 2.4 Build Console Applications 2.4.1 Methods - Read(), Readline(), Write(), Writeline() etc. 2.5 Build Windows Applications 2.5.1 Controls - Form, TextBox, Button, Label, CheckBox, Listbox, ComboBox, RadioButton, DateTimePicker, MonthCalender, Timer, Progressbar, Scrollbar, PictureBox, ImageBox, ImageList, TreeView, ListView, Toolbar, StatusBar, Datagridview 2.5.2 Menus and PopUp Menu 2.5.3 Predefined Dialog controls 2.5.4 DialogBox - InputBox(), MessageBox(), MsgBox()	10	1,2,4

3	Object Oriented Programming in VB .Net 3.1 Class and Object 3.2 Properties, methods and events. 3.3 Constructors and Destructors 3.4 Method overloading 3.5 Inheritance 3.5.1 MyBase , MyClass keywords. 3.6 Access modifiers: Public, Private, Protected, Friend. 3.7 Method Overriding. 3.8 Interfaces. 3.9 Polymorphism. 3.10 Exception Handling	6	1,2,4
4	Architecture Of ADO.Net 4.1 Database : Connection, Command, DataAdapter ,DataSet, DataReader, DataTable 4.2 Connection to database with Server Explorer 4.3 Multiple Table Connection 4.4 Data binding with controls like TextBox, ListBox, DataGrid. 4.5 Navigating data source 4.6 DataGridView, DataFormwizard, Data validation	12	3
5.	Crystal Report 5.1 Connection to Database, Table, Queries, Building Report, Modifying Report, Formatting Fields and Object 5.2 Header, Footer, Working with formula fields, Parameter fields, Special fields 5.3 Working with Multiple Tables.	9	6,7
	Total no. Of Lectures	44	

Reference Books:

1. Programming Microsoft Visual Basic.NET – Francesco Balena
2. The Complete Reference -Visual Basic .NET – Jeffrey R. Shapiro
3. Murach's VB.NET database programming with ADO.NET -Anne Prince and Doug Lowe
4. The Visual Basic.NET COACH
5. Visual Basic .NET 2003 in 21 Days. – Steven Holzner, SAMS Publications.
6. Mastering Crystal Report - BPB Publication
7. Crystal Report – The Complete Reference :- Tata McGraw Hill

B.C.A. (Semester V)

504 : Object Oriented Software Engineering

Objectives:-

- 1. To Understand concept of system design using UML.**
- 2. To understand system development through object oriented techniques.**

Unit No.	Topic	No. of Lectures	Reference Books
1	Object Oriented Concepts, Modeling and UML 1.1 What is Object Orientation? (Introduction to class, object, inheritance, polymorphism) 1.2 Model 1.2.1 Introduction of Modeling 1.2.2 Object Oriented Modeling 1.3 Object oriented system development 1.3.1 Function/data methods 1.3.2 Object oriented analysis 1.3.3 Object oriented construction 1.3.4 Object oriented testing 1.4 Identifying the elements of an object model 1.4.1 Identifying classes and objects 1.4.2 Specifying the attributes 1.4.3 Defining operations 1.4.4 Finalizing the object definition 1.5 Introduction to UML 1.6 Overview of UML 1.7 Conceptual Model of UML 1.8 Architecture 1.9 Advantages of UML	08	1, 2, 3
2	Basic and Advanced Structural Modeling 2.1 Classes and Relationship 2.2 Common mechanism 2.3 Diagrams 2.4 Class diagram 2.5 Advanced classes 2.6 Advanced Relationship 2.7 Interface , Types and Roles 2.8 Packages 2.9 Object Diagram	12	1

3	Basic Behavioral and Architectural Modeling 3.1 Use cases, Use Case Diagram 3.2 Interaction Diagram 3.3 Sequence Diagram 3.4 Activity Diagram 3.5 State Chart Diagram 3.6 Collaboration Diagram 3.7 Components Diagram 3.8 Deployment Diagram (Minimum 2 case studies for each diagram)	12	1
4	Object Oriented Analysis 4.1 Iterative Development 4.2 Understanding requirements 4.3 Unified process & UP Phases Inception Elaboration Construction Transition	8	1,3
5	Object Oriented Design 5.1 The Booch Method, The Coad and Yourdon Method and Jacobson and Rumbaugh Method 5.2 Generic components of OO Design model 5.3 System Design process 5.3.1 Partitioning the analysis model 5.3.2 Concurrency and subsystem allocation 5.3.3 Task Management component 5.3.4 Data Management component 5.3.5 Resource Management component 5.3.6 Inter sub-system communication 5.4 Object Design process	4	3
	Total no. of Lectures	44	

Reference Books:

1. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson.
2. Object Oriented Software Engineering by Ivar Jacobson
3. Software Engineering by Pressman

B.C.A. (Semester VI)

601 : Advanced Web Technologies

Objectives :-

- 1. To know & understand concepts of internet programming.**
- 2. To understand the concepts of XML and AJAX.**

Unit No.	Topics	No. of Lectures	Reference Books
1	Introduction to Object Oriented Programming in PHP 1.1 Classes 1.2 Objects 1.3 Introspection 1.4 Serialization 1.5 Inheritance 1.6 Interfaces 1.7 Encapsulation	6	1,2
2	Web Techniques 2.1 Web Variables 2.2 Server information 2.3 Self Processing forms 2.4 Setting response headers 2.5 Maintaining state (Cookies and Sessions)	8	1,2
3	Databases 3.1 Using PHP to access a databases 3.2 Mysql Database functions 3.3 Relational databases and SQL 3.4 PEAR DB basics 3.5 Advanced database techniques 3.6 Sample application	8	1,2

4	XML 4.1 What is XML? 4.2 XML document Structure 4.3 PHP and XML 4.4 XML parser 4.5 The document object model 4.6 The simple XML extension 4.7 Changing a value with simple XML	8	3
5	Web services 5.1 Web services concepts 5.2 WSDL, UDDI 5.3 Introduction to SOAP XML-RPC 5.4 Creating web services 5.5 Calling web services	8	3
6	Ajax 6.1 Understanding java scripts for AJAX 6.2 AJAX web application model 6.3 AJAX –PHP framework 6.4 Performing AJAX validation 6.5 Handling XML data using PHP and AJAX 6.6 Connecting database using PHP and AJAX	6	3
	Total no. of Lectures	44	

Reference Books :

1. Programming PHP - Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
2. Beginning PHP 5 - Wrox publication
3. PHP web services - Wrox publication

B. C. A. (Semester VI)

602 : Advanced Java

Objectives -:

- 1. To know the concept of Java Programming.**
- 2. To understand how to use programming in day to day applications.**
- 3. To develop programming logic.**

Unit No.	Topic	No. of Lectures	Reference Books
1	JDBC 1.1 The design of JDBC 1.2 Basic JDBC program Concept 1.3 Drivers 1.4 Architecture of JDBC 1.5 Making the Connection, Statement , ResultSet , PreparedStatement, CollableStatement 1.6 Executing SQL commands 1.7 Executing queries	10	1,2
2	Networking 2.1 The java.net package 2.2 Connection oriented transmission – Stream Socket Class 2.3 Creating a Socket to a remote host on a port (creating TCP client and server) 2.4 Simple Socket Program Example.	7	1,2
3	Servlet and JSP 3.1 Introduction 3.2 How It differ from CGI 3.3 Types of servlet 3.4 Life cycle of servlet 3.5 Execution process of Servlet Application 3.6 Session Tracking 3.7 Cookie class 3.8 Servlet- Jdbc	10	1,2

	JSP 3.9 Introduction to JSP 3.10 Components of JSP Directives , Tags, Scripting Elements 3.11 Execution process of JSP Application 3.12 Building a simple application using JSP 3.13 JSP with Database		
4	Multithreading 4.1 Introduction to Thread 4.2 Life cycle of thread 4.3 Thread Creation - By using Thread Class - By Using Runnable interface 4.4 Priorities and Synchronization 4.5 Inter thread communication 4.6 Implementation of Thread with Applet	8	1,2,3
5	Java Beans and RMI Java Beans 5.1 What is bean 5.2 Advantages 5.3 Using Bean Development kit(BDK) 5.4 Introduction to jar and manifest files 5.5 The java beans API Remote Method Invocation 5.6 Introduction to remote object RMI architecture 5.7 Stubs and skeleton 5.8 Registry 5.9 Setting up RMI 5.10 Using RMI with applet	9	1,2,3
	Total no. Of Lectures	44	

Reference Books :

1. The Complete Reference – JAVA Herbert Schildt
2. Core java –II By Cay S. Horstmann and Gary Cornell
3. Compete Reference J2EE – Jim Keogh

B. C. A. (Semester VI)

603 : Recent Trends in IT

Objectives:-

- 1. To introduce upcoming trends in Information technology.**
- 2. To study Eco friendly software development.**

Unit No.	Topic	No. of Lectures	Reference Books
1	Software Process And Project Metrics, Analysis Concepts And Principles Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance, Requirement analysis, communication techniques, analysis principles, software prototyping, Case Study	6	1
2	Distributed Databases Standalone v/s Distributed databases, Replication, Fragmentation, Client / Server architecture, types of distributed databases Object – Relational Databases Abstract Data types, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects, Case Study	8	2
3	Data Warehouse What is Data Warehouse? , A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data Warehousing to Data Mining, Data Mining, Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction	8	4
4	Network Security Cryptography; Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, Two Fundamental Cryptographic Principles; Symmetric Key Algorithms; DES-The Data Encryption Standards, AES – The Advances Encryption Standard; Public Key algorithms; RSA, Other Public Key algorithms; Digital Signatures, Symmetric-Key Signature, Public key Signature, Message Digests	14	5

5	Computing and Informatics Introduction to computing, Types of computing: Cloud, Green, Soft, Mobile, Case Study	8	5
	Total no. of lectures	44	

Reference Books :

1. Roger S. Pressman, Software Engineering , McGraw Hill(1997).
2. Database System Concepts by Korth, Silberschatz, Sudarshan - McGraw Hill
3. Oracle 8i – The Complete Reference, by Kevin Loney, Geroge Koch - Tata McGraw Hill
4. Jiawei Micheline Kamber, “Data Mining Concepts and Techniques”,Morgan Kauf Mann Publishers.
5. William Stallings, "Network Security Essentials", Prentice-Hall.
6. Artificial Intelligence by Elaine Rich, Kevin Knight, TMH, 2nd Edition.

B. C. A. (Semester VI)
604 : Software Testing

Objectives :-

- 1. To know the concept of software testing.**
- 2. To understand how to test bugs in software.**
- 3. To develop programming logic.**

Unit No.	Topic	No. of lectures	Reference Books
1	Software Testing Introduction, Nature of errors, Testing principles & Testing fundamentals, Debugging	6	1, 2
2	Approaches to Testing - I White Box Testing, Black Box Testing, Gray Box Testing, Unit Testing Integration- Top-down ,Bottom up Big Bang Sandwich	10	1, 2
3	Testing for Specialized Environments Testing GUI's, Testing of Client/Server Architectures, Testing Documentation and Help Facilities, Testing for Real-Time Systems	10	1, 2
4	Software Testing Strategies & Software metrics Validation Testing, System Testing, verification, Performance Testing, Regression Testing, Agile testing, Acceptance testing ,Smoke Testing ,Load Testing, Introduction, Basic Metrics, Complexity Metrics	12	1, 2
5	Specialized Testing & Testing Tools (Introduction) Test Case Design, Junit, Apache Jmeter, Winrunner Loadrunner, Rational Robot	6	1, 2 www.opensourcetesting.org
	Total No. of lectures	44	

Reference Books:

1. Software Engineering – A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill
2. Software Engineering for Students- A Programming Approach, Douglas Bell, Pearson Education

Savitribai Phule Pune University

**Three Year Degree Course in
B. Sc. Computer Science**

1) Title of the Course : B. Sc. Computer Science

T. Y. B. Sc. Computer Science Syllabus in the Subject Computer Science (To be implemented from Academic Year 2015-16)

2) Preamble:

B. Sc. Computer Science is a systematically designed three year course that prepares the student for a career in Software Industry. The syllabus of Computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science. The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

3) Introduction:

At **first year of under-graduation** basic foundation of two important skills required for software development is laid. A course in programming and a course in database fundamentals forms the preliminary skill set for solving computational problems. Simultaneously two practical courses are designed to supplement the theoretical training. The second practical course also includes a preliminary preparation for website designing in the form of HTML programming.

Along with Computer Science two theories and one practical course each in Statistics, Mathematics and Electronics help in building a strong foundation.

At **second year under-graduation:** The programming skills are further strengthened by a course in Data structures and Object oriented programming. The advanced topics in Databases and preliminary software engineering form the second course. Two practical courses alongside help in hands-on training. Students also undertake a mini project using software engineering principles to solve a real world problem. Simultaneously two theories and one practical course each in Mathematics and Electronics help in strengthening problem solving abilities.

At **third year under-graduation:** Six theory papers in each semester and practical courses cover the entire spectrum of topics necessary to build knowledge base and requisite skill set. Third practical course also includes project work which gives students hands on experience in solving a real world problem.

Objectives:

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices.
- To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

4) Eligibility:

Higher Secondary School Certificate (10+2) Science with Mathematics or its equivalent Examination as per Savitribai Phule Pune University eligibility norms.

Note: Admissions will be given as per the selection procedure / policies adopted by the respective college, in accordance with conditions laid down by Savitribai Phule Pune University. Reservation and relaxation will be as per the Government rules.

5 A) Examination Pattern:**First Year B. Sc. Computer Science****Subject : Computer Science**

Pattern of Examination: Annual for both Theory and Practical Courses

Paper/ Course No.	Title	Total Number of lectures/practicals per Term	Standard of passing		
			Internal marks out of 20	External marks out of 80	Total marks out of 100
Computer Science Paper I (CS-101)	Problem Solving Using Computers and 'C' Programmin g	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Paper II CS-102)	File Organizatio n and Fundament al of Databases	Three lectures/Week (Total 80 lectures)	08	32	40 *
Computer Science Practical Paper I (CS-103)	Computer Science Practical Paper I	25 Practical slots of 4 lectures each	08	32	40 *
Computer Science Practical Paper II (CS-104)	Computer Science Practical Paper II	25 Practical slots of 4 lectures each	08	32	40 *

* Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory (100 + 100) = 200 marks
2. Total marks per year 200 (Theory) + 100 marks (practical)+ Grade(practical) = 300 marks +Grade
3. Internal marks for theory papers given on the basis of internal assessment tests and for practicals on continuous assessment of lab work.
4. In case of Computer Science Practical Paper II, marks out of 100 will be converted to grades

Marks	Grade
75 And Above	O
65 And Above	A
55 and above	B
50 And above	C

45 And Above	D
40 And Above	E
Below 40 (indicates Failure)	F

Theory examination will be of three hours duration for each theory course. There shall be 5 questions each carrying equal marks. The pattern of question papers shall be:

Question 1	8 sub-questions, each of 2 marks; answerable in 2 -3 lines and based on entire syllabus
Question 2, 3 ,4 and 5	4 out of 5/6– short answer type questions; answerable in 8 – 10 lines mix of theory and problems

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each term. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain). There shall be 20 questions. Practical: Continuous assessment of Lab work and mini project.

Practical Examination: Practical examination shall be conducted by the respective college at the end of the academic year. Practical examination will be of 3 hours duration for each practical course. Certified journal is compulsory to appear for practical examination. There shall be two expert and two examiners per batch for the practical examination.

Second Year B. Sc. (Computer Science) Subject : Computer Science

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-211:Data Structures using 'C'	CS-221:Object Oriented Concepts using C++
2	Computer Science Paper II	CS-212: Relational Database Management System	CS-222:Software Engineering
3	Computer Science Paper III	CS-223:Data structures Practicals and C++ Practicals	
4	Computer Science Paper IV	CS-224:Database Practicals & Mini Project using Software Engineering techniques	

Pattern of examination: Semester

Theory courses (Sem I: CS-211 and CS212): Semester
(Sem II: CS-221 and CS-222): Semester
Practical Course (CS-223 and CS-224): Annual

Paper/Course No.	Title	Total Number of Lectures/Practicals Per Week	Standard Of Passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100

					(practicals)
Theory Paper I (CS-211)	Data Structures using 'C'	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Theory Paper II (CS-212)	Relational Database Management System	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Theory Paper I (CS-221)	Object Oriented Concepts using C++	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Theory Paper II (CS-222)	Software Engineering	Four Lectures/per Week (Total 48 per Semester)	04	16	20*
Practical paper I (CS 223) (First & Second Semester)	Data structures Practicals and C++ Practicals	Practicals of 4 lectures each 25 practicals / year)	08	32	40*
Practical paper II (CS 224) (First & Second Semester)	Database Practicals & Mini Project using Software Engineering techniques	Practicals of 4 lectures each 25 practicals / year)	08	32	40**

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 + 50) = 100 marks

2. Total marks per year 200 (Theory) + 100 marks (practicals)+Grade(practical) = 300 marks+Grade

3. Internal marks for theory papers given on the basis of Continuous internal Assessment

Theory examination will be of two hours duration for each theory course. There

shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 mark; answerable in 2 -3 lines and based on entire syllabus	10 Marks
Question 2, 3	Sub-questions carrying 5 marks (2 out of 3)	10 Marks
Question 4	Sub-questions carrying marks depending on their complexity with options	10 Marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Continuous assessment of practical performance should be using a Lab Book specifically designed for the purpose. Certified Lab book is compulsory to appear for practical examination. There is no need of attaching program printouts to the Lab Book. There shall be two experts and two examiners per batch for the practical examination. One of the examiners will be external.

Third Year B. Sc. (Computer Science)

No	Paper	Title: Semester I	Title: Semester II
1	Computer Science Paper I	CS-331: System Programming	CS-341: Operating System
2	Computer Science Paper II	CS-332: Theoretical Computer Science	CS-342: Compiler Construction
3	Computer Science Paper III	CS-333: Computer Networks-I	CS-343: Computer Networks-II
4	Computer Science Paper IV	CS-334: Internet Programming- I	CS-344: Internet Programming- II
5	Computer Science Paper V	CS-335: Programming in Java-I	CS-345: Programming in Java-II
6	Computer Science Paper VI	CS-336: Object Oriented Software Engineering	CS-346: Computer Graphics
7	Computer Science Paper VII	CS-347: Practicals Based on CS-331 and CS341 – Sem I & Sem II	
8	Computer Science Paper VIII	CS-348: Practicals Based on CS-335 and CS-344 – Sem I & Sem II and Computer Graphics using Java	
9	Computer Science Paper IX	CS-349: Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	

Pattern of examination: Semester

Theory courses:

(Sem III: CS-331-CS-336): Semester (Sem IV: CS-341-CS-346): Semester

Practical Course:

(CS-347-CS-349): Annual

Theory Papers					
Paper/Course No.	Title	Total Number of Lectures/Practicals Per Week	Standard Of Passing		
			Internal marks out of 10 (theory) Out of 20 (practicals)	External marks out of 40 (theory) Out of 80 (practicals)	Total passing marks out of 50 (theory) and out of 100 (practicals)
SEM III					
Theory Paper I (CS-331)	System Programming	48	04	16	20*
Theory Paper II (CS-332)	Theoretical Computer Science	48	04	16	20*
Theory Paper III (CS-333)	Computer Networks-I	48	04	16	20*
Theory Paper IV (CS-334)	Internet Programming I	48	04	16	20*
Theory Paper V (CS-335)	Programming in Java-I	48	04	16	20*
Theory Paper V (CS-336)	Object Oriented Software Engineering	48	04	16	20*
SEM IV					
Theory Paper I (CS-341)	Operating System	48	04	16	20*
Theory Paper II (CS-342)	Compiler Construction	48	04	16	20*
Theory Paper III (CS-343)	Computer Networks-II	48	04	16	20*
Theory Paper IV (CS-344)	Internet Programming II	48	04	16	20*
Theory Paper V	Programmin				

(CS-345)	g in Java-II	48	04	16	20*
Theory Paper V (CS-346)	Computer Graphics	48	04	16	20*
Practical Papers					
Practical paper I CS 347 (Semester III & IV)	Practicals Based on CS-331 and CS-341 – Sem I & Sem II	Practicals of 4 lectures each 25 practicals / year)	08	32	40**
Practical paper II CS 348 (Semester III & IV)	CS-348:Practicals Based on CS-335 and CS-345 – Sem I & Sem II and Computer Graphics using OpenGL	Practicals of 4 lectures each 25 practicals / year)	08	32	40**
Practical paper I CS 349 (Semester III & IV)	CS-349:Practicals Based on CS-334 and CS-344 – Sem I & Sem II and Project	Practicals of 4 lectures each 25 practicals / year)	08	32	40**

* Subject to compulsory passing in external examination and getting minimum 20 marks out of 50

** Subject to compulsory passing in external examination and getting minimum 40 marks out of 100

Notes:

1. Total marks: Theory for each semester (50 x 6) = 300 marks
2. Total marks per year 600 (Theory) + 300 marks (practicals) = 900 marks
3. Internal marks for theory papers given on the basis of continuous internal assessment

Theory examination will be of two hours duration for each theory course. There shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Theory examination will be of two hours duration for each theory course. There

shall be 4 questions carrying equal marks. The pattern of question papers shall be:

Question 1	10 sub-questions, each of 1 mark; answerable in 2 -3 lines and based on entire syllabus	10 Marks
Question 2, 3	Sub-questions carrying 5 marks (2 out of 3)	10 Marks
Question 4	Sub-questions carrying marks depending on their complexity with options	10 Marks

Internal examination: Internal assessment of the student by respective teacher will be based on written test, 10 marks each Semester. The written test shall comprise of objective type questions – Multiple Type Questions, True / False, Definitions, Answer in Two or three line question (Describe/Explain) There shall be 20 questions.

Practicals: Continuous assessment of practical performance

Practical Examination: Practical examination shall be conducted at the respective college at the end of the academic year. Practical examination will be of 3 hours duration. Continuous assessment of practical performance should be using a Lab Book specifically designed for the purpose. Certified Lab book is compulsory to appear for practical examination. There shall be one expert and two examiners per batch for the practical examination. One of the examiners will be external.

5 B) Standard of Passing:

i. In order to pass in the first year theory examination, the candidate has to obtain 40 marks out of 100 in each course. (Minimum 32 marks out of 80 must be obtained in the University Theory Examination.)

ii. In order to pass in the Second Year and Third Year theory examination, the candidate has to obtain 20 marks out of 50 in each course of each semester.

5 C) ATKT Rules:

While going from F.Y.B.Sc. to S.Y.B.Sc. at least 8 courses (out of total 13) should be passed; however all F.Y.B.Sc. courses should be passed while going to T.Y.B.Sc. While going from S.Y.B.Sc. to T.Y.B.Sc., at least 12 courses (out of 22) should be passed (Practical Course at S.Y.B.Sc. will be equivalent to 2 courses).

5 D)Award of Class:

The class will be awarded to the student on the aggregate marks obtained during the second and third year in the principal subject only. The award of the class shall be as follows:

1	Aggregate 70% and above	First Class with Distinction
2	Aggregate 60% and more but less than 70%	First Class
3	Aggregate 55% and more but less than 60%	Higher Second Class
4	Aggregate 50% and more but less than 55%	Second Class
5	Aggregate 40% and more but less than 50%	Pass Class
6	Below 40%	Fail

5 E) External Students: There shall be no external students.

5 F) Setting question papers:

F.Y.B.Sc.: For theory papers I and II annual question papers shall be set by the University of Pune and assessment done at the respective colleges. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers, the Question paper slips will be provided by the University of Pune and assessment done at the respective colleges.

S.Y.B.Sc. and T.Y.B.Sc.:For theory papers I and II for each semester and also for the annual practical examination question papers set by the University of Pune.

Centralized assessment for theory papers done as per the University instructions. Questions should be designed to test the conceptual knowledge and understanding of the basic concepts of the subject. For Practical Papers: Papers shall be set by the University of Pune and assessment done by the internal examiner and external examiner appointed by University of Pune.

5G) Verification and Revaluation Rules:

As per university Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Course Structure:

Duration: The duration of B.Sc. Computer Science Degree Program shall be three years.

a) All are Compulsory Papers:

F.Y.B.Sc. : 2 Theory + 2 Practical (Annual)

S .Y.B.Sc.: 2 Theory per semester + 2 Practical (Annual)

T.Y.B.Sc.: 6 Theory per semester + 3 Practical (Annual)

b) Question Papers :

F.Y.B.Sc. Theory paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

S.Y / T.Y. - B.Sc.Theory paper:

University Examination – 40 marks (at the end of each term)

Internal Examination – 10 marks

F.Y. / S.Y / T.Y. - B.Sc. Practical Paper:

University Examination – 80 marks (at the end of 2nd term)

Internal Examination – 20 marks

c) Medium of Instruction: The medium of instruction for the course shall be **English**.

7) Equivalence of Previous Syllabus:

Old Course (2008 Pattern)	New Course (2013 Pattern)
CS 331: System Programming & Operating System I	CS 331 : System Programming
CS 341: System Programming & Operating System II	CS 341 : Operating System
CS 332 : Theoretical Computer Science & Compiler Construction I	CS 332 : Theoretical Computer Science
CS 342 : Theoretical Computer Science & Compiler Construction II	CS 342 : Compiler Construction
CS 333 :Computer Networks I	CS 333 :Computer Networks I
CS 343 :Computer Networks II	CS 343 :Computer Networks II
CS 334 :Web development and PHP programming I	CS 334 :Internet Programming I
CS 344 : Web development and PHP programming II	CS 344 :Internet Programming II
CS 335 :Programming in Java I	CS 335 :Programming in Java I
CS 345 :Programming in Java II	CS 345 :Programming in Java II
CS 336 :Object Oriented Software Engineering	CS 336 :Object Oriented Software Engineering

CS 346 :Business Applications	CS 346 :Computer Graphics
CS 347: Lab Course I	CS 347: Lab Course I
CS 348:Lab Course II	CS 348:Lab Course II
CS 349: Lab Course III	CS 349: Lab Course III

8) University Terms: Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 75 percent attendance at theory and practical course and satisfactory performance during the term.

9) Qualification of Teachers: M.Sc. Computer Science/M.C.A. or equivalent master degree in science with class/grades and NET/SET as per prevailing University/Government /UGC rules.

10) Detail Syllabus with Recommended Books:

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Systems Programming
Code No. : CS-331

Semester III

Total Lectures : 48

Aim : To understand the design and implementation issues of System programs that play an important role in program development.

Objectives :

- To understand the design structure of a simple editor.
- To understand the design structure of Assembler and macro processor for an hypothetical simulated computer.
- To understand the working of linkers and loaders and other development utilities.
- To understand Complexity of Operating system as a software.

1. Introduction

[4]

- 1.1. Types of program – System program and Application program.
- 1.2. Difference between system programming and application programming.
- 1.3. Elements of Programming environment - Editor, Preprocessor, Assembler, Compiler, Interpreter, Linker and Loader, Debugger, Device drivers, Operating System.
- 1.4. Simulation of simple computer smac0 (hypothetical computer) -Memory, Registers, Condition Codes, Instruction format, Instruction Set, smac0 programs.

2. Editors

[2]

- 2.1 Definition, need/purpose of editor.
- 2.2 Types of editor- Examples ed, sed, VIM & emacs
- 2.3 Structure of editor

3. Assembler

[10]

- 3.1 Definition.
- 3.2 Features of assembly language, advantages
- 3.3 Statement format, types of statements – Imperative, Declarative, Assembler Directive.
- 3.4 Constants and Literals.
- 3.5 Advanced assembler directives (LTORG, ORIGIN, EQU),
- 3.6 Design of assembler – Analysis Phase and Synthesis Phase.
- 3.7 Overview of assembling process
- 3.8 Pass Structure of Assembler – One pass, Two pass assembler.
- 3.9 Problems of 1-pass assembler - forward reference, efficiency, Table of Incomplete Instructions.
- 3.10 Design of 2-pass Assembler – Pass-I and Pass-II
- 3.11 Data structure of 2-pass assembler.
- 3.12. Intermediate Code – Need, Forms-variant I and Variant II

4. Macros and Macro Processors

[10]

- 4.1 Definition
- 4.2 Macro definition and call
- 4.3 Macro expansion – positional and keyword parameters
- 4.4 Design of Data structures to be used for Macro definition and use
- 4.5 Nested macro calls
- 4.6 Advanced macro facilities – alteration of flow of control during expansion, expansion time variable, conditional expansion, expansion time loops. (with examples)
- 4.7 Design of macro preprocessor – Design overview, data structure, processing of macro definition and macro expansion (Except algorithms)

4.8 Macro assembler – Comparison of macro preprocessor and macro assembler. Pass structure of macro assembler.

5. Compiler Design options

[2]

5.1 Interpreter - Use of interpreter, definition, Comparison with compiler, Overview of interpretation, Pure and impure interpreter.

5.2 P-code compiler

6. Linker and Loader

[6]

6.1 Introduction

6.2 Concept of bindings, static and dynamic binding, translated, linked and load time addresses.

6.3 Relocation and linking concept – program relocation, performing relocation, public and external references, linking, binary program, object module.

6.4 Relocatability - nonrelocatable, relocatable, and self relocating programs (no algorithms), Linking for Overlays.

6.5 Object file formats: a.out, ELF, COFF, EXE, PE and COM

7. Debuggers & Development utilities

[6]

7.1 Debugging functions and capabilities

7.2 Types of debuggers: visual & console -Case study of ddd(visual) and gdb(console)

7.3 Development utilities on UNIX/Linux strip, make, nm, objdump, intermediate files in compilation process etc.

8. Operating System as System Software

[6]

8.1 What Operating Systems Do – User View, System View, Defining OS

8.2 Computer System Architecture – Single processor system, Multiprocessor systems, Clustered Systems

8.3 Operating System Operations – Dual mode operation, Timer

8.4 Process Management

8.5 Memory Management

8.6 Storage Management – File system management, Mass storage management, Caching, I/O systems

8.7 Protection and Security

8.8 Distributed Systems

8.9 Special Purpose System – Real time embedded systems, Multimedia systems, Handheld systems,

8.10 Computer Environment – Traditional computing, Client server computing, Peer to peer Computing

9. System Structure

[2]

9.1 Operating System Services

9.2 User Operating-System Interface – Command interpreter, GUI

9.3 System Calls

9.4 Types of System Calls – Process control, File management, Device management, Information maintenance, Communication, Protection

Reference Books:

1. Systems Programming and Operating Systems by D.M.Dhamdhare (Second Revised Edition). [Chapters: 2, 3, 4, 5, 7]

2. System Software - An introduction to Systems Programming - Leland L. Beck (Pearson Education) [Chapter: 1]

3. Linkers and Loaders – John R. Levine, Elsevier Morgan Kaufmann[chapter 6]

4. Operating System Concepts - Silberchatz, Galvin, Gagne (8th Edition).[chapter 8, 9]

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Operating Systems
Code No. : CS-341

Semester IV

Total Lectures : 48

Aim : To understand the design and implementation issues of Operating System.

Objectives :

- To understand design issues related to process management and various related algorithms
- To understand design issues related to memory management and various related algorithms
- To understand design issues related to File management and various related algorithms

1. Introduction [2]

- 1.1 Operating System Structure – Simple structure, Layered approach, Micro kernels, Modules
- 1.2 Virtual Machines – Introduction, Benefits
- 1.3 System Boot

2. Process Management [4]

- 2.1 Process Concept – The process, Process states, Process control block.
- 2.2 Process Scheduling – Scheduling queues, Schedulers, context switch
- 2.3 Operations on Process – Process creation with program using fork(), Process termination
- 2.4 Interprocess Communication – Shared memory system, Message passing systems.

3. Multithreaded Programming [2]

- 3.1 Overview
- 3.2 Multithreading Models

4. Process Scheduling [8]

- 4.1 Basic Concept – CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher
- 4.2 Scheduling Criteria
- 4.3 Scheduling Algorithms – FCFS, SJF, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling
- 4.4 Thread Scheduling

5. Process Synchronization [6]

- 5.1 Background
- 5.2 Critical Section Problem
- 5.3 Semaphores: Usage, Implementation
- 5.4 Classic Problems of Synchronization – The bounded buffer problem, The reader writer problem, The dining philosopher problem

6. Deadlocks [8]

- 6.1 System model
- 6.2 Deadlock Characterization – Necessary conditions, Resource allocation graph
- 6.3 Deadlock Prevention
- 6.4 Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm
- 6.5 Deadlock Detection
- 6.6 Recovery from Deadlock – Process termination, Resource preemption

7. Memory Management [11]

- 7.1. Background – Basic hardware, Address binding, Logical versus physical address space, Dynamic loading, Dynamic linking and shared libraries

7.2 Swapping

7.3 Contiguous Memory Allocation – Memory mapping and protection, Memory allocation, Fragmentation

7.4 Paging – Basic Method, Hardware support, Protection, Shared Pages

7.5 Segmentation – Basic concept, Hardware

7.6 Virtual Memory Management – Background, Demand paging, Performance of demand paging, Page replacement – FIFO, OPT, LRU, Second chance page replacement

8. File System

[7]

8.1 File concept

8.2 Access Methods – Sequential, Direct, Other access methods

8.3 Directory and Disk Structure – Storage structure, Directory overview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory

8.4 Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation

8.5 Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps

Reference Books:

1. Operating System Concepts - Silberchatz, Galvin, Gagne (8th Edition).

2. Operating Systems : Principles and Design – Pabitra Pal Choudhary (PHI Learning Private Limited)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Theoretical Computer Science
Code No. : CS-332

Semester III

Total Lectures : 48

Aim:

To have a introductory knowledge of automata, formal language theory and computability.

Objectives:

- To have an understanding of finite state and pushdown automata.
- To have a knowledge of regular languages and context free languages.
- To know the relation between regular language, context free language and corresponding recognizers.
- To study the Turing machine and classes of problems.

Prerequisite:

- Sets, Operations on sets, Finite & infinite sets Formal Language
- Relation, Equivalence Relation,(reflexive, transitive and symmetric closures)

1. Introduction

[3]

- 1.1 Symbol, Alphabet, String, Prefix & Suffix of Strings, Formal Language, Operations on Languages.
- 1.2 Regular Expressions (RE) : Definition & Example
- 1.3 Regular Expressions Identities.

2. Finite Automata

[12]

- 2.1 Deterministic finite Automaton – Definition, DFA as language recognizer, DFA as a pattern recognizer.
- 2.2 Nondeterministic finite automaton – Definition and Examples.
- 2.3 NFA TO DFA : Method (From Book 4)
- 2.4 NFA with ϵ - transitions Definition and Examples.
- 2.5 NFA with ϵ -Transitions to DFA & Examples
- 2.6 Finite automaton with output – Mealy and Moore machine, Definition and Examples.
- 2.7 Minimization of DFA, Algorithm & Problem using Table Method.

3. Regular Languages

[5]

- 3.1 Regular language-Definition and Examples.
- 3.2 Conversion of RE To FA-Examples.
- 3.3 Pumping lemma for regular languages and applications.
- 3.4 Closure properties of regular Languages
(Union, Concatenation, Complement, Intersection and Kleene closure)

4. Context Free Grammar and Languages

[12]

- 4.1 Grammar - Definition and Examples.
- 4.2 Derivation-Reduction - Definition and Examples.
- 4.3 Chomsky Hierarchy.
- 4.4 CFG : Definition & Examples. LMD, RMD, ,Parse Tree
- 4.5 Ambiguous Grammar : Concept & Examples.
- 4.6 Simplification of CFG :
 - 4.6.1 Removing Useless Symbols,
 - 4.6.2 Removing unit productions
 - 4.6.3 Removing ϵ productions & Nullable symbols
- 4.7 Normal Forms :
 - 4.7.1 Chomsky Normal Form (CNF) Method & Problem

- 4.7.2 Greibach Normal form (GNF) Method & Problem
- 4.8 Regular Grammar : Definition.
 - 4.8.1 Left linear and Right Linear Grammar-Definition and Example.
 - 4.8.2 Equivalence of FA & Regular Grammar
 - 4.8.2.1 Construction of regular grammar equivalent to a given DFA
 - 4.8.2.2 Construction of a FA from the given right linear grammar
- 4.9 Closure Properties of CFL's(Union, concatenation and Kleen closure) Method and examples

5. Push Down Automaton

[6]

- 5.1 Definition of PDA and examples
- 5.2 Construction of PDA using empty stack and final State method : Examples using stack method
- 5.3 Definition DPDA & NPDA, their correlation and Examples of NPDA
- 5.4 CFG (in GNF) to PDA : Method and examples

6. Turing Machine

[10]

- 6.1 The Turing Machine Model and Definition of TM
- 6.2 Design of Turing Machines
- 6.3 Problems on language recognizers.
- 6.4 Language accepted by TM
- 6.5 Types of Turing Machines(Multitrack TM,Two way TM, Multitape TM,Non-deterministic TM)
- 6.6 Introduction to LBA (Basic Model) &CSG.(Without Problems)
- 6.7 Computing TM, Enumerating TM, Universal TM
- 6.8 Recursive Languages
 - 6.5.1. Recursive and Recursively enumerable Languages.
 - 6.5.2. Difference between recursive and recursively enumerable language.
- 6.9 Turing Machine Limitations
- 6.10 Decision Problem, Undecidable Problem, Halting Problem of TM

References :-

- 1 Introduction to Automata theory, Languages and computation By John E. Hopcroft and Jeffrey Ullman – Narosa Publishing House.
2. Introduction to Automata theory, Languages and computation By John Hopcroft, Rajeev Motwani and Jeffrey Ullman –Third edition Pearson Education
3. Introduction to Computer Theory Daniel I. A. Cohen – 2nd edition – John Wiley & Sons
4. Theory of Computer Science (Automata, Language & Computation) K. L. P. Mishra & N. Chandrasekaran, PHI Second Edition
5. Introduction to Languages and The Theory of Computation John C. Martin TMH, Second Edition

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Compiler Construction
Code No. : CS-342

Semester IV

Total Lectures : 48

Aim :

To understand the various phases of a compiler and to develop skills in designing a compiler

Objective :

- To understand design issues of a lexical analyzer and use of Lex tool
- To understand design issues of a parser and use of Yacc tool
- To understand issues related to memory allocation
- To understand and design code generation schemes

1. Introduction

[5]

- 1.1 Definition of Compiler, Aspects of compilation.
- 1.2 The structure of Compiler.
- 1.3 Phases of Compiler – Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, code optimization, code generation.
- 1.4 Error Handling
- 1.5 Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping.

2. Lexical Analysis(Scanner)

[5]

- 2.1 Review of Finite automata as a lexical analyzer,
- 2.2 Applications of Regular Expressions and Finite Automata (lexical analyzer, searching using RE), Input buffering, Recognition of tokens
- 2.3 LEX: A Lexical analyzer generator (Simple Lex Program)

3. Syntax Analysis(Parser)

[20]

- 3.1 Definition , Types of Parsers
- 3.2 Top-Down Parser –
 - 3.2.1 Top-Down Parsing with Backtracking: Method & Problems
 - 3.2.2 Drawbacks of Top-Down parsing with backtracking,
 - 3.2.3 Elimination of Left Recursion(direct & indirect)
 - 3.2.4 Need for Left Factoring & examples
- 3.3 Recursive Descent Parsing : Definition
 - 3.3.1 Implementation of Recursive Descent Parser Using Recursive Procedures
- 3.4 Predictive [LL(1)]Parser(Definition, Model)
 - 3.4.1 Implementation of Predictive Parser[LL(1)]
 - 3.4.2 FIRST & FOLLOW
 - 3.4.3 Construction of LL(1) Parsing Table
 - 3.4.4 Parsing of a String using LL(1) Table
- 3.5 Bottom-Up Parsers
- 3.6 Operator Precedence Parser -Basic Concepts
 - 3.6.1 Operator Precedence Relations form Associativity & Precedence
 - 3.6.2 Operator Precedence Grammar
 - 3.6.3 Algorithm for LEADING & TRAILING(with ex.)
 - 3.6.4 Algorithm for Operator Precedence Parsing (with ex.)
 - 3.6.5 Precedence Functions
- 3.7 Shift Reduce Parser
 - 3.7.1 Reduction, Handle, Handle Pruning
 - 3.7.2 Stack Implementation of Shift Reduce Parser (with examples)

- 3.8 LR Parser
 - 3.8.1 Model
 - 3.8.2 Types [SLR(1), Canonical LR, LALR] Method & examples.
- 3.9 YACC (from Book 3) –program sections, simple YACC program for expression evaluation

4. Syntax Directed Definition [8]

- 4.1 Syntax Directed Definitions(SDD)
 - 4.1.1 Inherited & Synthesized Attributes
 - 4.1.2 Evaluating an SDD at the nodes of a Parse Tree, Example
- 4.2 Evaluation Orders for SDD's
 - 4.2.1 Dependency Graph
 - 4.2.2 Ordering the Evaluation of Attributes
 - 4.2.3 S-Attributed Definition
 - 4.2.4 L-Attributed Definition
- 4.3 Application of SDT
 - 4.3.1 Construction of syntax trees,
 - 4.3.2 The Structure of a Type
- 4.4 Translation Schemes
 - 4.4.1 Definition, Postfix Translation Scheme

5. Memory Allocation [2]

- 5.1 Memory allocation – static and dynamic memory allocation,
- 5.2 Memory allocation in block structure languages, Array allocation and access.

6. Code Generation and Optimization [8]

- 6.1 Compilation of expression –
 - 6.1.1 Concepts of operand descriptors and register descriptors with example.
 - 6.1.2 Intermediate code for expressions – postfix notations,
 - 6.1.3 triples and quadruples, expression trees.
- 6.2 Code Optimization – Optimizing transformations – compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction
- 6.3 Three address code
 - 6.3.1 DAG for Three address code
 - 6.3.2 The Value-number method for constructing DAG's.
- 6.4 Definition of basic block, Basic blocks And flow graphs
- 6.5 Directed acyclic graph (DAG) representation of basic block
- 6.6 Issues in design of code generator

References :-

1. Compilers: Principles, Techniques, and Tools ,Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman
2. Principles of Compiler Design By : Alfred V. Aho, Jeffrey D. Ullman (Narosa Publication House)
3. LEX & YACC (O'reilly Publication)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Computer Networks -I
Code No. : CS-333

Semester III

Total Lectures : 48

Pre-requisites: Basics of computer, Knowledge of 'C' for assignment.

Objectives: This course will prepare students in Basic networking concepts.

1. Understand different types of networks, various topologies and application of networks.
2. Understand types of addresses, data communication.
3. Understand the concept of networking models, protocols, functionality of each layer.
4. Learn basic networking hardware and tools.

Ch.No.	Name of Chapter	Reference Book
1	Chapter 1 Introduction to Computer Networks	[Lectures 8]
1.1	Computer Networks- Goals and applications – Business Application , Home Application, Mobile User, Social Issues	Book 1 CH1 (Pg. No.3 -14)
1.2	Network Hardware - Broadcast and point-to-point	Book 1 CH1 (Pg. No.14-16)
1.3	topologies – star, bus, mesh, ring etc.	Book 2 CH1 (Pg. No. 9-13)
1.4	Network Types-LAN, MAN, WAN, Wireless Networks, Home Networks, Internetwork	Book 1 CH1 (Pg. No.16-26)
1.5	Data Communication-Definition, components, data representation, Data Flow	Book 2 CH1 (Pg. No. 3-7)
1.6	Protocols & Standards De facto and De jure standard,	Book 2 CH1 (Pg. No. 19-20)
1.7	Network Software - Protocol Hierarchies -layers, protocols, peers, interfaces Network architecture, protocol stack, Design issues of the layers –addressing, error control, flow control, multiplexing and demultiplexing, routing Connection-oriented and connectionless service, Service Primitives – listen, connect, receive, send, disconnect and Berkley Socket ,the relationships of services to protocols.	Book 1 CH1 (Pg. No.26-37)
2.	Network Models	[Lectures 5]
2.1	OSI Reference Model - Functionality of each layer	Book 2 CH2 (Pg. No 29-42)

2.2	TCP/IP Reference Model, Comparison of OSI and TCP/IP model	Book 1 CH1 (Pg. No. 41-46)
2.3	TCP/IP Protocol Suite	Book 2 CH2 (Pg. No. 42-45)
2.4	Addressing - Physical, Logical and Port addresses (No examples)	Book 2 CH2 (Pg. No.45-50)
3.	Transmission Media	[Lectures 5]
3.1	Twisted pair cable – UTP Vs STP, categories connectors & applications , Coaxial cable – standards, connectors & applications Fiber Optic cable – propagation modes, connectors & applications(No diagrams will be asked in examination)	Book 2 CH7 (Pg. No.192,193, 195-202)
3.2	Unguided Media – Wireless- Radio Waves,- Microwaves, Infrared	Book 2 CH7 (Pg. No. 203-208)
3.3	Light wave transmission	Book 1 CH2 (Pg. No. 107-108)
3.4	Types of cabling and Networking Tool - CAT5 and CAT6 Cable Color Code, Crossover Cabling and Straight Through Cable, Crimping and Line testing tool	Book 3
4.	The Physical Layer	[Lectures 14]
4.1	Analog and Digital data, Analog and Digital signals, Periodic & Non-periodic signals Digital Signals- Bit rate, bit length, baseband Transmission (no cases)	Book 2 CH3 (Pg. No. 57-58) Book 2 CH3 (Pg. No. 71-75)
4.2	Transmission Impairments –attenuation, distortion and noise, Data Rate Limits – Noiseless channel: Nyquist’s bit rate,noisy channel : Shannon’s law (Enough problems should be covered on every topic.)	Book 2 CH3 (Pg. No. 80-88)
4.3	Performance of the Network Bandwidth, Throughput, Latency(Delay), Bandwidth –Delay Product, Jitter	Book 2 CH3 (Pg. No. 89-94)
4.4	Line Coding Characteristics, Line Coding Schemes – Unipolar - NRZ, Polar-NRZ-I, NRZ-L, RZ, Manchester and Differential Manchester (Enough problems should be covered on every topic.)	Book 2 CH4 (Pg. No. 101-109)
4.5	Transmission Modes, Parallel Transmission and Serial Transmission –Asynchronous and Synchronous and Isochronous	Book 2 CH4 (Pg. No. 131-135)
4.6	Trunks & Multiplexing FDM and TDM	Book 1 CH2 (Pg. No. 137,138 140-143)

4.7	Switching - Circuit Switching, Message Switching and Packet Switching, comparison of circuit & packet switching	Book 1 CH2 (Pg. No. 146-151)
4.8	Physical Layer Devices Repeaters, Hubs- active hub Passive hub	Book 2 CH15 (pg. No. 445-447)
5.	The Data Link Layer	[Lectures 9]
5.1	Design Issues – Services provided to the Network Layer , Framing – Concept, Methods - Character Count, Flag bytes with Byte Stuffing, Starting & ending Flags with Bit Stuffing and Physical Layer Coding Violations, Error Control, Flow Control	Book 1 CH3 (pg. No. 184-192)
5.2	Error detection code CRC (Enough problems should be covered on every topic.)	Book 1 CH3 (pg. No. 196-199)
5.3	Data Link Layer Protocols –Noiseless channel -A Simplex, Stop-And-Wait protocol, noisy channel –stop & wait, ARR, Pipelining, Go –back –N ARR & ARQ, selective repeat ARR(No examples & no algorithms)	Book 1 CH3 (pg. No. 312-338)
5.4	Sliding Window Protocols Piggybacking-Need, Advantages/Disadvantages, 1-bit sliding window protocols,	Book 1 CH3 (pg. No. 211-216)
5.5	Data Link Layer Protocols-HDLC – frame format, all frame types PPP – Use, Frame Format, Use of PPP in the Internet	Book 1 CH3 (pg. No. 234-242)
5.6	Data Link Layer Devices - Bridges – Filtering, Transparent Bridges, spanning tree and Source Routing Bridges, Bridges Connecting Different LANs	Book 2 CH15 (pg. No. 447-454)
5.7	Remote bridges	Book 1 CH4 (pg. No. 325-326)
6.	The Medium Access Sublayer	[Lectures 7]
6.1	Random Access Protocols ALOHA – pure and slotted	Book 2 CH12 (pg. No. 364-390)
6.2	CSMA – 1-persistent, p-persistent and non-persistent CSMA/CD,CSMA/CA	
6.3	Controlled Access Reservation, Polling and Token Passing	
6.4	Channelization FDMA, TDMA and CDMA-Analogy, Idea, Chips, Data Representation, Encoding and Decoding, Signal Level, Sequence Generation(Enough problems should be covered on every topic.)	

Reference Books:

- 1) Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
- 2) Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. .[4th Edition]
- 3) Networking All In One Dummies Wiley Publication.[5th Edition]

Guidelines For Examination:

- 1) Frame and Packet formats should be asked.

- 2) Problems should be asked at least for 8 marks.
- 3) Page no listed above may vary according to year of publication of 4th edition but topics remain same.
- 4) All sub topics listed pages of respective reference books should be covered.

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Computer Networks -II
Code No. : CS-343

Semester IV

Total Lectures: 48

=====

Pre-requisites: Basics of computer networks covered last semester, Knowledge of 'C'.

Objectives: This course will prepare students in

1. Basic networking concepts.
2. Understand wired and wireless networks, its types, functionality of layer.
3. Understand importance of network security and cryptography.

Ch. No.	Name of Chapter	Reference Book
1.	Wired LANs	[Lectures 9]
1.1	IEEE Standards Data Link Layer, Physical Layer	Book 2 CH13 (Pg. No 395-397)
1.2	Standard Ethernet MAC Sublayer – Frame Format, Frame Length, Addressing, Access Method	Book 2 CH13 (Pg. No 397-402)
1.3	Physical Layer – Encoding and Decoding, 10Base5, 10Base2, 10Base-T, 10Base-F,	Book 2 CH13 (Pg. No 402-405)
1.4	Changes In The Standard – Bridged Ethernet, Switched Ethernet, Full Duplex Ethernet	Book 2 CH13 (Pg. No 406-409)
1.5	Fast Ethernet – Goals, MAC Sublayer, Topology, Implementation	Book 2 CH13 (Pg. No.409-410)
1.6	Gigabit Ethernet – goals, MAC Sublayer, Topology, Implementation	Book 2 CH13 (Pg. No 412-414)
1.7	Ten-Gigabit Ethernet – goals, MAC Sublayer, Physical Layer	Book 2 CH13 (Pg. No 416)
1.8	Backbone Networks Bus Backbone, Star Backbone, Connecting Remote LANs	Book 2 CH15 (Pg. No 456-458)
1.9	Virtual LANs Membership, Configuration, Communication between Switches, IEEE standards Advantages	Book 1 CH1 (Pg. No 458-463)
2.	Wireless LAN	[Lectures 2]
2.1	IEEE 802.11 Architecture – Basic Service Set, Extended Service Set, Station Types	Book 2 CH14 (Pg. No421-422)

2.2	Bluetooth Architecture – Piconet, scatternet	Book 2 CH14 (Pg. No 434-436)
3.	The Network Layer	[Lectures 10]
3.1	Design Issues Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection Oriented Service, Comparison of Virtual Circuit and Datagram subnets	Book 1 CH5 (Pg. No 343-349)
3.2	Logical Addressing IPV4 Addresses – Address Space, Notations, Classful Addressing, Subnetting, Supernetting, Classless Addressing, Network Address Translation(NAT), (Enough problems should be covered on Addressing),	Book 2 CH19 (Pg. No 549-566)
3.3	IPV4 Protocol Datagram Format, Fragmentation, Checksum, Options	Book 2 CH20 (Pg. No 582-596)
3.4	Routing Properties of routing algorithm, Comparison of Adaptive and Non- Adaptive Routing Algorithms	Book 1 CH5 (Pg. No 350-352)
3.5	Congestion Control – Definition, Factors of Congestion, Difference between congestion control and flow control, General Principles of Congestion Control, Congestion Prevention Policies	Book 1 CH5 (Pg. No 384-389)
3.6	Network Layer Devices –Routers	Book 2 CH15 (Pg. No. 455)
4.	Address Mapping	[Lectures 4]
4.1	Protocol(ARP)-Cache Memory, Packet Format, Encapsulation, Operation, Four Different Cases, Proxy ARP, RARP , BOOTP, DHCP – Static Address Allocation, Dynamic Address Allocation, Manual and automatic Configuration	Book 2 CH21 (Pg. No 611-620)
5.	The Transport Layer	[Lectures 6]
5.1	Process-to-Process Delivery Client Server Paradigm, Multiplexing and De-multiplexing, Connectionless Vs Connection-Oriented Service, Reliable Vs Unreliable	Book 2 CH23 (Pg. No 703-708)
5.2	User Datagram Protocol(UDP) Datagram Format, Checksum, UDP operations, Use of UDP	Book 2 CH23 (Pg. No 709-715)
5.3	Transmission Control Protocol (TCP) TCP Services – Process to-Process Communication, Stream Delivery Service, sending and Receiving Buffers, Segments, Full –Duplex Communication, Connection oriented service, Reliable service	Book 2 CH23 (Pg. No 715-719)
5.4	TCP Features –Numbering System, Byte Number, Sequence Number, Acknowledgement Number, Flow Control, Error Control, Congestion Control	Book 2 CH23 (Pg. No 719-720)
5.5	TCP Segment – Format	Book 2 CH23

(Pg. No 721-723)

6.	The Application Layer	[Lectures 7]
6.1	Domain Name System (DNS) Name Space, Domain, Name Space, Distribution of Name Space, DNS in the Internet, Resolution	Book 2 CH25 (Pg. No 797-809)
6.2	E-MAIL Architecture, User Agent, Message Transfer Agent-SMTP, Message Access Agent-POP3, IMAP4, Web Based Mail	Book 2 CH26 (Pg. No 824-840)
6.3	File Transfer Protocol (FTP) Communication over control connection, Communication over Data Connection, Anonymous FTP	Book 2 CH26 (Pg. No 840-844)
6.4	WWW Architecture, WEB Documents	Book 2 CH27 (Pg. No 851-861)
6.5	HTTP - HTTP Transaction, Persistent and Non persistent Connection, Proxy Server	Book 2 CH27 (Pg. No 861-868)
6.6	Devices- Gateways –Transport & Application Gateways	Book 1 CH4 (Pg. No 328)
7.	Network Security	[Lectures 10]
7.1	Introduction – Security Services- Message-Confidentiality, Integrity, Authentication, Non repudiation. Entity (User)- Authentication.	Book 2 CH31 (Pg. No 961-962)
7.2	Message confidentiality –Confidentiality with Asymmetric-Key Cryptography, Confidentiality with Symmetric-Key Cryptography	Book 2 CH31 (Pg. No 962-964)
7.3	Cryptography Encryption Model, Substitution Cipher and Transposition Cipher (Problems should be covered.)	Book 1 CH8 (Pg. No 724-730)
7.4	Two Fundamental Cryptographic Principles	Book 1 CH8 (Pg. No 735-736)
7.5	Communication Security Firewalls	Book 1 CH8 (Pg. No 776-779)
7.6	Web Security Threats, Secure Naming, DNS Spoofing, Secure DNS, Self Certifying names	Book 1 CH8 (Pg. No 805-813)
7.7	Mobile Code Security Java Applet Security, Activex, JavaScript, Viruses	Book 1 CH8 (Pg. No 816-819)
7.8	Social Issues Privacy, Anonymous Remailers, Freedom of Speech, Steganography, Copyright	Book 1 CH8 (Pg. No 819-828)

Reference Books:

1. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
2. Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. .[4th Edition]

Guidelines For Examination:

1. Frame and Packet formats should be asked.
2. Problems should be asked at least for 8 marks.

3. Page no listed above may vary according to year of publication of 4th edition but topics remain same.
4. All sub topics listed pages of respective reference books should be covered.

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Internet Programming I
Code No. : CS-334

Semester III

Total Lectures: 48

Aim: To Design dynamic and interactive Web pages.

Objective:

- Learn Core-PHP, Server Side Scripting Language
- Learn PHP-Database handling.

Prerequisite: HTML.

1. Introduction to web techniques **[8]**

- 1.1 HTTP basics, Introduction to Web server and Web browser
 - 1.2 Introduction to PHP
 - 1.3 What does PHP do?
 - 1.4 Lexical structure
 - 1.5 Language basics
- Book 1 chapter 2

2. Function and String **[10]**

- 2.1 Defining and calling a function
 - 2.2 Default parameters
 - 2.3 Variable parameters, Missing parameters
 - 2.4 Variable function, Anonymous function
 - 2.5 Types of strings in PHP
 - 2.6 Printing functions
 - 2.7 Encoding and escaping
 - 2.8 Comparing strings
 - 2.9 Manipulating and searching strings
 - 2.10 Regular expressions
- Book 1 chapter 3 and 4

3. Arrays **[6]**

- 3.1 Indexed Vs Associative arrays
 - 3.2 Identifying elements of an array
 - 3.3 Storing data in arrays
 - 3.4 Multidimensional arrays
 - 3.4 Extracting multiple values
 - 3.5 Converting between arrays and variables
 - 3.6 Traversing arrays
 - 3.7 Sorting
 - 3.8 Action on entire arrays
 - 3.9 Using arrays
- Book 1 chapter 5

4. Introduction to Object Oriented Programming

[8]

- 4.1 Classes
- 4.2 Objects
- 4.3 Introspection
- 4.4 Serialization
- 4.5 Inheritance
- 4.6 Interfaces
- 4.7 Encapsulation
- Book 1 , 2 chapter 12

5. Files and directories

[6]

- 5.1 Working with files and directories
- 5.2 Opening and Closing, Getting information about file, Read/write to file, Splitting name and path from file, Rename and delete files
- 5.3 Reading and writing characters in file
- 5.4 Reading entire file
- 5.5 Random access to file data
- 5.6 Getting information on file
- 5.7 Ownership and permissions
- Book 2 chapter 7

6. Databases (PHP-PostgreSQL)

[10]

- 6.1 Using PHP to access a database
- 6.2 Relational databases and SQL
- 6.3 PEAR DB basics
- 6.4 Advanced database techniques
- 6.5 Sample application (Mini project)
- Book 1 chapter 9

References

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
2. Beginning PHP 5 , Wrox publication
3. PHP web services, Wrox publication
4. AJAX Black Book, Kogent solution
5. Mastering PHP , BPB Publication
6. PHP cookbook, O'Reilly publication
7. PHP for Beginners, SPD publication
8. Programming the World Wide Web , Robert W Sebesta(3rd Edition)
9. Check out Joomla!presss
Pearson (*Addison-Wesley Professional*).
10. www.php.net.in
11. www.W3schools.com
12. www.wrox.com
13. <https://api.drupal.org>

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Internet Programming II
Code No. : CS-344

Semester IV

Total Lectures: 48

Aim: To Design dynamic and interactive Web pages.

Objective:

- Learn different technologies used at client Side Scripting Language
- Learn XML,CSS and XML parsers.
- One PHP framework for effective design of web application.
- Learn JavaScript to program the behavior of web pages.
- Learn AJAX to make our application more dynamic.

1. Web Techniques

[10]

- 1.1 Variables
- 1.2 Server information
- 1.3 Processing forms
- 1.4 Setting response headers
- 1.5 Maintaining state
- 1.6 SSL
- Book 1 chapter 7

2. Handling email with php

[8]

- 2.1 Email background
- 2.2 Internet mail protocol
- 2.3 Structure of an email message
- 2.4 Sending email with php
- 2.5 Email attachments.
- 2.6 Email id validation and verification
- 2.7 PHP error handling.
- Book 2 chapter 15

3. PHP framework

[4]

- 3.1 Introduction to PHP framework.
- 3.2 Features, Applications.
- 3.3 One example like JOOMLA,DRUPAL.
- Book 11, <https://api.drupal.org>

4. XML

[8]

- 4.1 What is XML?
- 4.2 XML document Structure
- 4.3 PHP and XML
- 4.4 XML parser
- 4.5 The document object model
- 4.6 The simple XML extension
- 4.7 Changing a value with simple XML
- Book 2 chapter 8

5. WEB DESIGNING TECHNOLOGIES(JavaScript-DHTML)

[10]

- 5.1 Overview of JavaScript, DHTML
- 5.2 Object Orientation and JavaScript

- 5.3 Basic Syntax(JS datatypes, JS variables)
- 5.4 Primitives, Operations and Expressions
- 5.5 Screen Output and keyboard input(Verification and Validation)
- 5.6 JS Control statements
- 5.7 JS Functions
- 5.8 JavaScript HTML DOM Events(onmouseup, onmousedown, onclick, onload,onmouseover,onmouseout).
- 5.9 JS Strings.
- 5.10 JS String methods
- 5.11 JS popup boxes(alert, confirm, prompt).
- 5.12 Changing property value of different tags using DHTML
(ex. adding innerhtml for DIV tag, changing source of image etc.).

Book 10, www.w3schools.com.

6. AJAX

[8]

- 6.1 Introduction of AJAX
 - 6.2 AJAX web application model
 - 6.3 AJAX –PHP framework
 - 6.4 Performing AJAX validation
 - 6.5 Handling XML data using php and AJAX
 - 6.6 Connecting database using php and AJAX
- Book 4 chapter 1,2 and 9

References

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe O'Reilly publication
2. Beginning PHP 5, Wrox publication
3. PHP web services , Wrox publication
4. AJAX Black Book Kogent solution
5. Mastering PHP BPB Publication
6. PHP cookbook O'Reilly publication
7. Learning PHP and MYSQL, O'Reilly publication
8. PHP and MYSQL, O'Reilly publication
9. PHP for Beginners, SPD publication
10. Programming the World Wide Web , Robert W Sebesta(3rd Edition)
11. Check out Joomla!presss **Pearson** (*Addison-Wesley Professional*).
12. www.php.net.in
13. www.W3schools.com
14. www.wrox.com
15. <https://api.drupal.org>

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B.Sc. COMPUTER SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Programming in Java-I
Code No. : CS-335

Semester IV

Total Lectures: 48

Prerequisite:

- Knowledge of C Programming language

Objective:

- To learn Object Oriented Programming language
- To handle abnormal termination of a program using exception handling
- To create flat files
- To design User Interface using Swing and AWT

1. An Introduction to Java

[4]

- 1.1 A Short History of Java
- 1.2 Features or buzzwords of Java
- 1.3 Comparison of Java and C++
- 1.4 Java Environment
- 1.5 Simple java program
- 1.6 Java Tools – jdb, javap, javadoc
- 1.7 Java IDE – Eclipse/NetBeans (Note: Only for Lab Demonstration)

2. An Overview of Java

[4]

- 2.1 Types of Comments
- 2.2 Data Types
- 2.3 Final Variable
- 2.4 Declaring 1D, 2D array
- 2.5 Accepting input using Command line argument
- 2.6 Accepting input from console (Using BufferedReader class)

3. Objects and Classes

[8]

- 3.1 Defining Your Own Classes
- 3.2 Access Specifiers (public, protected, private, default)
- 3.3 Array of Objects
- 3.4 Constructor, Overloading Constructors and use of 'this' Keyword
- 3.5 static block, static Fields and methods
- 3.6 Predefined class – Object class methods (equals(), toString(), hashCode(), getClass())
- 3.7 Inner class
- 3.8 Creating, Accessing and using Packages
- 3.9 Creating jar file and manifest file
- 3.10 Wrapper Classes
- 3.11 Garbage Collection (finalize() Method)
- 3.12 Date and time processing

4. Inheritance and Interface

[7]

- 4.1 Inheritance Basics (extends Keyword) and Types of Inheritance
- 4.2 Superclass, Subclass and use of Super Keyword
- 4.3 Method Overriding and runtime polymorphism

- 4.4 Use of final keyword related to method and class
- 4.5 Use of abstract class and abstract methods
- 4.6 Defining and Implementing Interfaces
- 4.7 Runtime polymorphism using interface
- 4.7 Object Cloning

5. Exception Handling

[4]

- 5.1 Dealing Errors
- 5.2 Exception class, Checked and Unchecked exception
- 5.3 Catching exception and exception handling
- 5.4 Creating user defined exception
- 5.5 Assertions

6. Strings, Streams and Files

[7]

- 6.1 String class and StringBuffer Class
- 6.2 Formatting string data using format() method
- 6.2 Using the File class
- 6.3 Stream classes
 - Byte Stream classes
 - Character Stream Classes
- 6.4 Creation of files
- 6.5 Reading/Writing characters and bytes
- 6.6 Handling primitive data types
- 6.7 Random Access files

7. User Interface Components with AWT and Swing

[10]

- 7.1 What is AWT ? What is Swing? Difference between AWT and Swing.
- 7.2 The MVC Architecture and Swing
- 7.3 Layout Manager and Layouts, The JComponent class
- 7.4 Components –
 - JButton, JLabel, JText, JTextArea, JCheckBox and JRadioButton,
 - JList, JComboBox, JMenu and JPopupMenu Class, JMenuItem and JCheckBoxMenuItem,
 - JRadioButtonMenuItem , JScrollBar
- 7.5 Dialogs (Message, confirmation, input), JFileChooser, JColorChooser
- 7.6 Event Handling: Event sources, Listeners
- 7.7 Mouse and Keyboard Event Handling
- 7.8 Adapters
- 7.9 Anonymous inner class

8. Applet

[4]

- 8.1 Applet Life Cycle
- 8.2 appletviewer tool
- 8.3 Applet HTML Tags
- 8.4 Passing parameters to Applet
- 8.5 repaint() and update() method

References:

- 1) Complete reference Java by Herbert Schildt(5th edition)
- 2) Java 2 programming black books, Steven Horlzner
- 3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy
- 4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B.Sc. COMPUTER SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Programming in Java-II
Code No. : CS-345

Semester IV

Total Lectures : 48

Prerequisite:

- Knowledge of Core Java (CS – 345)

Objectives:

- To learn database programming using Java
- To study web development concept using Servlet and JSP
- To develop a game application using multithreading
- To learn socket programming concept

1. Collection

[6]

- 1.1 Introduction to the Collection framework
- 1.2 List – ArrayList, LinkedList and Vector, Stack, Queue
- 1.3 Set - HashSet, TreeSet, and LinkedHashSet
- 1.4 Map – HashMap, LinkedHashMap, Hashtable and TreeMap
- 1.5 Interfaces such as Comparator, Iterator, ListIterator, Enumeration

2. Database Programming

[10]

- 2.1 The design of jdbc, jdbc configuration
- 2.2 Types of drivers
- 2.3 Executing sql statements, query execution
- 2.4 Scrollable and updatable result sets
- 2.5 Metadata – DatabaseMetadata, ResultSetMetadata
- 2.6 Transactions – commit(), rollback(), SavePoint
(Database : PostgreSQL)

3. Servlet

[12]

- 3.1 Introduction to Servlet and Hierarchy of Servlet
- 3.2 Life cycle of servlet
- 3.3 Tomcat configuration (Note: Only for Lab Demonstration)
- 3.4 Handling get and post request (HTTP)
- 3.5 Handling a data from HTML to servlet
- 3.6 Retriving a data from database to servlet
- 3.7 Session tracking – User Authorization, URL rewriting, Hidden form fields, Cookies and HttpSession

4. JSP

[10]

- 4.1 Simple first JSP program
- 4.2 Life cycle of JSP
- 4.2 Implicit Objects
- 4.3 Scripting elements – Declarations, Expressions, Scriptlets, Comments
- 4.4 JSP Directives – Page Directive, include directive
- 4.5 Mixing Scriptlets and HTML
- 4.6 Example of forwarding contents from database to servlet, servlet to JSP and displaying it using JSP scriptlet tag

5. Multithreading

[6]

- 5.1 What are threads?
- 5.2 Life cycle of thread
- 5.3 Running and starting thread using Thread class
- 5.4 Thread priorities
- 5.5 Running multiple threads
- 5.6 The Runnable interface
- 5.7 Synchronization and interthread communication

6. Networking

[4]

- 6.1 Networking basics – Protocol, Addressing, DNS, URL, Socket, Port
- 6.2 The java.net package – InetAddress, URL, URLConnection class
- 6.3 SocketServer and Socket class
- 6.4 Creating a Socket to a remote host on a port (creating TCP client and server)
- 6.5 Simple Socket Program Example

References:

- 1) Complete reference Java by Herbert Schildt(5th edition)
- 2) Java 2 programming black books, Steven Horlizer
- 3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy
- 4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press
- 5) Core Java Volume-II-Advanced Features, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : Object Oriented Software Engineering
Code No. : CS-336

Semester III

Total Lectures: 48

Prerequisites

- Knowledge of Object Oriented Concepts
- Knowledge of Classical Software Engineering

Aim

To Understand Object Oriented Modeling techniques and their applicability.

Objectives

- Understanding importance of Object Orientation in Software engineering
- Understand the components of Unified Modeling Language
- Understand techniques and diagrams related to structural modeling
- Understand techniques and diagrams related to behavioral modeling
- Understand techniques of Object Oriented analysis, design and testing

1. Object Oriented Concepts and Principles

[4]

- 1.1 What is Object Orientation ? - Introduction , Object , Classes and Instance , Polymorphism, Inheritance
- 1.2 Object Oriented System Development- Introduction, Function/Data Methods (With Visibility), Object Oriented Analysis, Object Oriented Construction
- 1.3 Identifying the Elements of an Object Model
- 1.4 Identifying Classes and Objects
- 1.5 Specifying the Attributes (With Visibility)
- 1.6 Defining Operations
- 1.7 Finalizing the Object Definition

2. Introduction to UML

[2]

- 2.1 Concept of UML
- 2.2 Advantages of UML

3. Basic Structural Modeling

[5]

- 3.1 Classes
- 3.2 Relationship
- 3.3 Common Mechanism
- 3.4 Class Diagram (Minimum three examples should be covered)

4. Advanced Structural Modeling

[7]

- 4.1 Advanced Classes
- 4.2 Advanced Relationship
- 4.3 Interface
- 4.4 Types and Roles
- 4.5 Packages
- 4.6 Object Diagram (Minimum three examples should be covered)

5. Basic Behavioral Modeling

[9]

- 5.1 Interactions
- 5.2 Use Cases and Use Case Diagram with stereo types (Minimum three examples should be covered)
- 5.3 Interaction Diagram (Minimum two examples should be covered)
- 5.4 Sequence Diagram (Minimum two examples should be covered)
- 5.6 Activity Diagram (Minimum two examples should be covered)
- 5.6 State Chart Diagram (Minimum two examples should be covered)

6. Object Oriented Analysis

[6]

- 6.1 Iterative Development and the Rational Unified Process
- 6.2 Inception
- 6.3 Understanding Requirements
- 6.4 Use Case Model From Inception to Elaboration
- 6.5 Elaboration

7. Object Oriented Design

[4]

- 7.1 The Booch Method, The Coad and Yourdon Method and Jacobson Method and Raumbaugh Method
- 7.2 The Generic Components of the OO Design Model
- 7.3 The System Design Process - Partitioning the Analysis Model, Concurrency and Sub System Allocation, Task Management Component, The Data Management Component, The Resource Management Component, Inter Sub System Communication
- 7.4 Object Design Process

8. Architectural modeling

[6]

- 8.1 Component
- 8.2 Components Diagram (Minimum two examples should be covered)
- 8.3 Deployment Diagram (Minimum two examples should be covered)
- 8.4 Collaboration Diagram (Minimum two examples should be covered)

9. Object Oriented Testing

[5]

- 9.1 Object Oriented Testing Strategies
 - 9.2 Test Case Design for Object Oriented Software
 - 9.3 Inter Class Test Case Design
- (Use of any freeware designing tool)**

References.

1. Grady Booch, James Rumbaugh, The Unified Modeling Language User/Reference Guide, Pearson Education INC
2. Ivar Jacobson, Object Oriented Software Engineering, Pearson Education INC
3. Craig Larman, Applying UML and Patterns Pearson Education INC
4. Bennett, Simon, Object Oriented Analysis and Design McGraw Hill

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Computer Graphics
Code No. : CS-346

Semester IV

Total Lectures: 48

Pre – Requisites

- Computer programming skills in C programming language
- Basic understanding of use of data structures
- Basic Mathematical concepts related to matrices and geometry

Objectives

- To study how graphics objects are represented in Computer
- To study how graphics system in a computer supports presentation of graphics information
- To study how interaction is handled in a graphics system
- To study how to manipulate graphics object by applying different transformations
- To provide the programmer's perspective of working of computer graphics

1. Introduction to Computer graphics

[4]

- 1.1 Introduction to computer graphics & graphics systems
- 1.2 Components of Computer Graphics Representation, Presentation , Interaction and Transformations
- 1.3 Applications of Computer Graphics
- 1.3 Pixel/Point ,Raster v/s Vector ,RGB color model, intensity
- 1.4 Programming essentials – event driven programming. OpenGL library

2. Input devices and Interaction tasks

[4]

- 2.1 Logical Interaction – Locator, valuator , pick and choice;
- 2.2 Physical devices used for interaction – keyboard, mouse, trackball,spaceball, tablets, light pen, joy stick, touch panel, data glove;
- 2.4 Keyboard , Mouse interaction in OpenGL
- 2.5 Graphical User Interfaces- cursors , radio buttons, scroll bars, menus, icons
- 2.6 Implementing GUI in open GL

3. Presentation and Output devices

[4]

- 3.1 Presentation Graphics - frame buffer, display file, lookup table;
- 3.2 Display devices, Random and Raster scan display devices; CRT,
- 3.3 Hardcopy devices - Plotters and Printers

4. Raster Scan Graphics

[10]

- 4.1 Line drawing algorithms; DDA algorithm, Bresenham's line drawing algorithm, Circle generation algorithm;
- 4.2 Scan conversions- Generation of the Display, Image compression
- 4.3 Displaying Lines and characters
- 4.3 Polygon filling -Scan converting polygons, fill algorithms, Boundary fill algorithm, flood fill algorithm

5. Transformations

[7]

- 5.1 Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, Reflection, shear
- 5.2 Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline
- 5.3 Window to viewport co-ordinate transformation. Setting window and viewport in OpenGL.

6 Clipping

[7]

- 6.1 clipping operations , point clipping ,
- 6.2 Line clipping; Cohen Sutherland algorithm, Midpoint subdivision algorithm, Cyrus beck algorithm;
- 6.3 Polygon clipping , Sutherland Hodgman algorithm, Weiler-Atherton Algorithm

7 3D transformation & viewing

[6]

- 7.1 3D transformations: translation, rotation, scaling & other transformations;
- 7.2 Three dimensional viewing, Parallel and Perspective projections,
- 7.3 View Volumes and General Projection Transformations.
- 7.4 3 D clipping

8 Hidden surfaces Elimination

[4]

- 8.1 Depth comparison, A-buffer algorithm, Back face detection; Depth -Buffer
- 8.2 Scan-line Method - BSP tree method, the Painter's algorithm, Area-subdivision algorithm;

Text Books:

- 1. Hearn, Baker – “ Computer Graphics (C version 2nd Ed.)” – Pearson education
- 2. F. S. Hill, Stephen Kelly, Computer Graphics using OpenGL, PHI Learning
- 3. David F. Rogers - Procedural Elements of Computer Graphics, Tata McGRAW Hill

Reference Books:

- 4. Foley, Vandam, Feiner, Hughes – “Computer Graphics principles (2nd Ed.) – Pearson Education.
- 5. W. M. Newman, R. F. Sproull – “Principles of Interactive computer Graphics” – TMH.
- 6. D. F. Rogers, J. A. Adams – “ Mathematical Elements for Computer Graphics (2nd Ed.)” – TMH
- 7. Z. Xiang, R. Plastock – “ Schaum's outlines Computer Graphics (2nd Ed.)” – TMH

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER : System Programming & Operating System
Code No. : CS-347

Aim:

To understand the process of designing and implementing System programs and operating system components.

Objective :-

1. Design and implement System programs with minimal features to understand their complexity.
2. Design and implement simulations of operating system level procedures.

Syllabus

Sr. No	Topic	Lectures
1	Line Editor	8 lectures
2	SMAC0 simulator	8 lectures
3	Assembler	12 Lectures
4	Macro processor	12 lectures
5	DFA driver	8 lectures
6	Development Utilities	8 lectures
7	Toy shell	8 Lectures
8	CPU Scheduler	12 lectures
9	Deadlock detection	8 lectures
10	Page Replacement Algorithms	12 lectures
11	File Allocation methods	12 Lectures

Examination

Internal Marks : Activity + Labbook(10+10)

External Marks : two programs(35each) oral(5) Activity(5)

SAVITRIBAI PHULE PUNE UNIVERSITY
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Lab Course II – Programming in Java
Code No. : CS-348

Aim:

To understand the process of designing and implementing Core and Advanced Java programs.

Objective :-

1. Implement core Java programs to solve simple problems
2. Implement Client and Server end Java programs

Syllabus

Sr. No	Topic	Lectures
Core and Advanced Java		
1	Simple Java programs	8 Lectures
2	Arrays and Packages	8 Lectures
3	Inheritance and Interfaces	8 Lectures
4	Exception Handling	8 Lectures
5	File Handling	8 Lectures
6	GUI designing & Event Handling	8 Lectures
7	Database Programming	8 Lectures
8	Multithreading	4 Lectures
9	Collection	8 Lectures
10	Servlets	8 Lectures
11	JSP	8 Lectures
12	Socket Programming	4 Lectures
Computer Graphics		
1	Simple Graphics program using OpenGL	4 Lectures
2	Using graphics primitives to display graphics	4 Lectures
3	Window to viewport transformations and other transformations	4 Lectures
4	Using simple Keyboard and Mouse interaction	4 Lectures
5	Graphics Mini project	16 Lectures

Examination

Internal Marks : Activity(CG) + Seminar(Enhanced java+ listening) (10+10)

External Marks : two programs(30each) oral(5) Activity(5)+ Labbook(10)

SAVITRIBAI PHULE PUNE UNIVERSITY
Proposed Draft of
T.Y. B. Sc. COMPUTER SCIENCE SYLLABUS
TO BE IMPLEMENTED FROM ACADEMIC YEAR 2015-16
TITLE OF PAPER :Lab Course III – Programming in PHP & Project
Code No. : CS-349

Aim:

To understand the process of designing and implementing Web applications, using PHP.

Objective :-

1. Implement Simple PHP programs to solve simple problems

Syllabus

Sr. No	Topic	Lectures
PHP		
1	String manipulation	8 Lectures
2	Arrays	8 Lectures
3	Inheritance	8 Lectures
4	File Handling	8 Lectures
5	Form designing	8 Lectures
6	Database Connectivity	8 Lectures
7	Sessions and cookies	8 Lectures
8	Java script with AJAX	8 Lectures
Networking		
1	Setting a LAN Environment	4 Lectures
2	Configuring the Server	4 Lectures
3	Use of Service Primitives	4 Lectures
4	Use of Networking Tools	12 Lectures
Project		
1	Choose Project topic and Prepare problem description	
2	Study of Existing System	
3	Identifying users and functionalities of proposed system	
4	Preparing the Design of the proposed system- Data Design Screen and Report Designs	
5	Implementation	

Examination

Internal Marks: Project (20) Continuous Evaluation.

External Marks: One programs (30) (large program on PHP + small program PHP), networking(10)
– Internal, Lab book(10), Project(30) -20 Marks External + 10 Marks Internal for Project Demo
before Final Practical Exam