**PROGRESSIVE EDUCATION SOCIETY'S**
# MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE, GANESHKHIND PUNE - 411016

## S.Y.B.A. Economics Syllabus
**(Choice Based Credit System and Semester System)**

**Revised Syllabus will be implemented from the academic year 2023-2024**

# Introduction:

In the second year of BA (Economics) program, various courses are included so that students develop a basic understanding of economic principles. In this year they would learn microeconomics, macroeconomics, financial system and basic concepts of research methodology.

There are a total of eight economics courses that students are required to take across four semesters. A student of B.A. (Special) Economics will have four Discipline Specific Elective (DSE) Courses to be completed in the third and fourth semesters. A course on Skill Enhancement (SEC) is to be done by these students in both the semesters. There are two core courses (CC) that is compulsory for the students who are doing B.A. special economics and this course can be opted by students from other department as well.

# Programme Specific Outcomes (PSOs):

PSO1: To learn basic concepts of Economics so as to make the students aware of importance of Economics.

PSO2: Students become aware of economic situation of India and countries across the world.

PSO3: Provides through understanding and deep knowledge about basic principles that lead to trade across the countries.

PSO4: To learn restructuring of economic policies as per the requirement of the economic situation.

PSO5: Students' get to know various career opportunities related to Economics.

# Examination Pattern:

| SEM III & IV | CIA Marks | ESE Marks | Total Marks | Grand Total Marks |
|---|---|---|---|---|
| DSE and CC papers Total 6 papers | 30 | 70 | 100 | |
| | | | 600 | |
| SEC Total 2 papers | 15 | 35 | 50 | |
| | | | 100 | **700** |

# Suggested internal assessment tools for courses:

1. MCQ Tests
2. Home Assignments
3. Tutorials/ Practical
4. Research Project
5. Group Discussion
6. Open Book Test

7.      Study Tour
8.      Written Test
9.      PPT presentation
10.     Field Visit

## Teaching Methodology:

Classroom lectures, Use of ICT, YouTube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations, Case Studies

# Subject List

| Sr. No. | | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|---|
| | | | | Theory | Practical | Total | |
| 1 | **Semester III** | DSE 1 | 23 A2311 Micro Economics - I | 3 | | | 48 |
| 2 | | DSE 2 | 23 A2312 Macro Economics – I | 3 | | | 48 |
| 3 | | Core Course - 1 | 23 A2313 Financial System - I | 3 | | | 48 |
| 4 | **Semester IV** | SEC - 1 | 23 A2314 Basic Concept of Research Methodology - I | 2 | | 22 | 45 |
| 5 | | DSE 1 | 23 A2411 Micro Economics - II | 3 | | | 48 |
| 6 | | DSE 2 | 23 A2412 Macro Economics – II | 3 | | | 48 |
| 7 | | Core Course - 2 | 23 A2413 Financial System - II | 3 | | | 48 |
| 8 | | SEC - 2 | 23 A2414 Basic Concept of Research Methodology - II | 2 | | | 45 |

# Syllabus

# Core Course: Financial System

**Subject Code: 23 A2313 & 23 A2413**
**Subject: Financial System-I & II  (3 Credit Course)**
**Total Lectures = 48 + 48**

**Preamble:**
A financial system is a network of financial institutions, financial markets, financial instruments and financial services to facilitate the transfer of funds. It serves as a backbone of any economy.  This paper aims to provide knowledge about the financial system in the country. It also aims to introduce international financial institutions operating in the global economy. The present era is the one with huge changes, development and challenges in every sector. This paper on financial system will also highlight some of the important changes taking place in the Indian financial sector.

**Objectives (Course Outcomes) of the Paper:**
* To understand fundamentals of modern financial system.
* To understand the recent trends and developments in banking system.
* To understand the role of the Reserve Bank of India in Indian financial system.
* To provide the knowledge of various financial and non-financial institutions.
* To provide the students the intricacies of Indian financial system for better financial decision making.

## Core Course: Financial System I
## Semester III

| Unit | Name and Contents | Number of Lectures |
|---|---|---|
| | **Indian Financial System** | |

| | | |
|---|---|---|
| **1** | 1.1 Introduction: Meaning, Nature, Role and Importance of Indian Financial System. | **10** |
| | 1.2 Structure of Indian Financial System. | |
| | 1.3 Characteristics and Functions of Indian Financial System. | |
| **2** | **Banking Institutions and Financial Regulation in India** | **14** |
| | **2.1 Regulatory Bodies:**<br>**2.1.1. Reserve Bank of India – Structure, Role and Functions, Monetary Policy Tools**<br>**2.1.2. SEBI – Role and Functions**<br>**2.1.3. IRDA – Role and Functions** | |
| | 2.2 Commercial Banks: Public and Private Sector Banks, Foreign Banks: Management, Organization and Functions. | |
| | 2.3 Regional Rural Banks and Co-operative Banks: Evolution, Management and Organization, Loan Management, Functions, Problems and Measures to solve the problem. | |
| **3** | **Non-Banking Financial Companies in India** | **10** |
| | **3.1 Meaning and Importance of Financial Institutions.** | |
| | **3.2 Role and Functions of Financial Institutions in India with reference to UTI, LIC, GIC** | |
| **4** | **Financial Markets in India I** | **14** |
| | 4.1 Classification of Financial Market. | |
| | 4.2 Indian Money Market: Features and Functions. | |
| | 4.3 Indian Capital Market: Features and Functions. | |
| | 4.4 Stock Markets: NSE and BSE: Meaning & Functions | |
| | 4.5 Foreign Exchange Market: Role and Importance. | |

# Core Course: Financial System II
# Semester IV

| Unit | Name and Contents | Number of Lectures |
|------|-------------------|--------------------|
| 1 | **Financial Markets in India II** | 12 |
| | **1.1 Debt Market – Characteristics and Functions** | |
| | **1.2 Equity Market – Characteristics and Functions** | |
| | **1.3 Derivative Market – Characteristics and Functions** | |
| 2 | **Financial Instruments and Services** | 10 |
| | **2.1 Money Market Instruments – Treasury Bills, Commercial Papers, Certificates of Deposits, Call/ Notice Money market, Money Market Derivatives** | |
| | **2.2 Capital Market Instruments – Bonds, Securities, Shares, Debentures, Derivatives** | |
| | **2.3 Financial Services: Merchant Banking, Hire Purchase, Leasing, Factoring, Venture Capital, Angel Investors, Crowd Funding, Peer to Peer Financing etc.** | |
| 3 | **International Financial Institution** | 14 |
| | 3.1 Role, Structure, Objectives and Functions of IMF. | |
| | 3.2 Role, Structure, Objectives and Functions of World Bank. | |
| | 3.3 Role, Structure, Objectives and Functions of Asian Development Bank. | |
| | 3.4 Role, Structure, Objectives and Functions of BRICS Bank. | |
| **4** | **Recent Developments in Indian Financial Sector** | 12 |
| 4.1 | Objectives and Outcomes of Changing Landscape of Banking Sector in India. | |
| 4.2 | FERA and FEMA: Objectives and Features | |
| 4.3 | Insolvency and Bankruptcy Code | |
| 4.4 | Risk Management in Banking Sector | |

**Basic Reading List:**

1. The Indian Financial System, Markets, Institutions and Services, BharatiV.Pathak, Kindle Edition.

2. Indian Financial System, Jaydeb Sarkhel, Seikh Salim, McGraw-Hill India Pvt.Ltd. Chennai, 2018.

3. Indian Banking, R. Parmehwaram & S. Natrajan, S. Chand Publishing, Delhi.

4. Non-Banking Financial Companies in India: Functioning & Reforms, Jafor Ali Akhan, New Century Publications, 2010

5. Indian Financial Markets, Ajay Shah, Michael Gorham and Susan Thomas, Elsevier, 2008.

6. The Story of the Reserve Bank of India, Rahul Bajoria, Kindle Editon.

**Advanced Reading List:**

1. Securities Market and Products: Mr. Sunder Sankaran, Taxman Publication Pvt. Ltd New Delhi.

2. Financial System & Economic Reforms: P. Mohan Rao, Deep & Deep Publication Pvt. Ltd. New Delhi 2008.

3. Indian Banking Towards 21st Century: Chawla A.S. & others, Deep & Deep Publications, New Delhi.

4. Black Money & Indian Economy: Bhadane J R, International Publications, 2018.

5. Financial Institutions and Markets: Jitendra Mahakund and L.M. Bhole, McGraw Hill India, 2017.

# DSE1-A: Micro Economics

**Subject Code: 23 A2311 & 23 A2411**
**Subject: Microeconomics-I & II  (3 Credit Course)**
**Total Lectures = 48 + 48**

## Preamble

As a foundation course, in this Paper, student is expected to understand the definition, nature and scope of economics, method and approaches to the study of Economics. The chapters incorporated in this Paper deal with the theory of consumer's behavior, theory of demand and supply, analysis of production function, cost and revenue analysis, market structures and the equilibrium of a firm and industry. In addition, the principles of factor pricing  and commodity pricing and welfare economics have been included.

## Objectives of the Paper:

- To develop an understanding about subject matter of Economics.
- To impart knowledge of microeconomics.
- To clarify micro economic concepts
- To analyze and interpret charts, graphs and figures
- To develop an understanding of basic theories of micro economics and their application.
- To demonstrate that the theories discussed in class will usually be applied to real-life situations.
- To help the students to prepare for varied competitive examinations

## Method of Teaching:

Classroom lectures, Use of ICT, YouTube lectures, Online PPTs, Group Discussions, Teacher driven Power Point Presentations, Case Studies

# DSE – 1A - Micro Economics I
# Semester III

| Unit | Name and Contents | Number of Lectures |
|------|-------------------|--------------------|
| **Unit 1** | **Introduction** | |
| 1.1 | Meaning, Nature, Scope, Importance of Micro economics | 10 |
| 1.2 | Basic Economic Problems | |
| 1.3 | Tools of economic analysis- Functional Relationship, Schedules, Graphs and Equations. | |
| 1.4 | Variables- Dependent and Independent Variable, Endogenous and Exogenous | |
| **Unit 2** | **Theory of Consumer Behavior** | |
| 2.1 | Utility – Meaning and Types<br>Cardinal Approach: Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Consumer's Equilibrium, **Consumer Surplus** | 14 |
| 2.2 | Ordinal Approach: Indifference Curve Analysis- Meaning and Definition, Characteristics of Indifference Curve, Consumer's Equilibrium – **Price effect, Income Effect and Substitution Effect.** | |
| **Unit 3** | **Theory of Demand** | |
| 3.1 | Meaning of Demand, Determinants of Demand, **Demand Estimation and Demand Forecasting** | 12 |
| 3.2 | The Law of Demand & Its Exceptions, Market Demand | |
| 3.3 | Elasticity of Demand –Meaning and Types<br>3.3.1 Price Elasticity of Demand: Meaning, Types, Methods of Measurement<br>3.3.2 Income Elasticity of Demand: Meaning and Types<br>3.3.3 Cross Elasticity of Demand: Meaning and Types | |
| **Unit 4** | **Supply and Production Analysis** | |
| 4.1 | Meaning, Definition and Determinants of Supply | 12 |
| 4.2 | The Law of Supply | |
| 4.3 | Elasticity of Supply: Meaning and Types | |
| 4.4 | The Production Function: Meaning and Definition | |
| 4.5 | Total, Average and Marginal Production | |

| 4.6 | The Law of Variable Proportions | |
| 4.7 | The Law of Returns to Scale | |
| 4.8 | **Producers' Equilibrium: Iso-quant curve and Iso-cost line, MRTS** | |

# DSE – 1B - Micro Economics II
## Semester IV

| Unit 1 | **Cost and Revenue Analysis** | |
|---|---|---|
| 1.1 | Cost Concepts : Fixed Costs, Variable Costs, Total Cost, Average Cost, Marginal Cost, Economic Cost and Accounting Cost, Opportunity Cost | 8 |
| 1.2 | Short-Run and Long Run Costs curves | |
| 1.3 | Revenue Concept: Total Revenue, Average Revenue & Marginal Revenue | |
| Unit 2 | **Market Structure** | |
| 2.1 | Meaning & Classifications of Market Structure | |
| 2.2 | Perfect Competition: Meaning, Characteristics, Equilibrium of Firm and Industry in Short Run and Long Run | |
| 2.3 | Monopoly: Meaning, Characteristics, Short and Long Run Equilibrium. Price Discrimination | 16 |
| 2.4 | Monopolistic Competition: Meaning, Characteristics, Short & Long Run Equilibrium of firm and Industry, Selling cost- Meaning | |
| 2.5 | Oligopoly: Meaning and Characteristics | |
| 2.6 | Duopoly: Meaning and Characteristics | |
| **2.7** | **Introduction to Game theory** | |
| Unit 3 | **Factor Pricing** | |
| 3.1 | Marginal Productivity Theory Of Distribution | |
| 3.2 | Rent: Ricardian Theory of Rent, Modern Theory of Rent, Quasi Rent | |
| 3.3 | Wages: Modern Theory of Wages, Supply Curve of Labour | 16 |
| 3.4 | Interest: Keynesian Liquidity Preference Theory, Loanable Fund Theory | |
| 3.5 | Profit: Risk and Uncertainty Theory, Innovation Theory | |
| Unit 4 | **Introduction to Welfare Economics** | |
| 4.1 | Welfare Economics: Definition and Meaning | |
| 4.2 | Pigovian Welfare Economics | 08 |
| 4.3 | Thought of Amartya Sen on Welfare Economics | |

**Reference Books:**

1. Mansfield, E., Microeconomics, W.W. Norton and Company, New York.
2. Koutsoyiannis, A., Modern microeconomics, Macmillan, London.
3. Lipsey& Cristal, Introduction to Positive Economics, Oxford Press.
4. Jack Hirshlifer, Price Theory and Applications, Prentice Hall of India Pvt. Ltd. Delhi
5. Ahuja H.L. : Modern Micro Economics, S. Chand & Company Ltd New Delhi
6. Jhingan M.L., Micro Economic Theory, Virinda Publication, Delhi.
7. K.K. Dewett, Modern Economics Theory, S. Chand Publications, New Delhi.
8. KPM Sundaram and E.N.Sundaram, Micro Economics, S.Chand Publication, New Delhi.
9. Seth M.L. : Micro Economics, Lakshmi NarainAgrawal Publisher

# DSE-2:  Macro Economics

**Subject Code: 23 A2312 & 23 A2412**
**Subject: Macroeconomics-I  &   I I   (3 Credit Course)**
**Total Lectures = 48 + 48**

## Preamble -

Macroeconomics is the branch of economics that deals with the functioning of an economy as a whole. Macroeconomic analysis involves theoretical, empirical as well as policy-related aspects. The theoretical aspect of macroeconomics involves the conceptual as well as theoretical framework of macroeconomics. It deals with various macroeconomic concepts as well as various macroeconomic theories. The theoretical  framework of macroeconomics focuses on  functioning of an economy in its totality, determination of the level of national income and employment in an economy, role of aggregate demand as well as aggregate supply, role of money, determination of value of money, determination of general price level as well as rate of inflation and business cycles. The empirical aspect of macroeconomics applies macroeconomic theories to the  study of real economies and  tests the validity of macroeconomic theories. The policy-related aspect focuses on the role of fiscal and monetary policy in achieving macroeconomic objectives with the help of various policy instruments.

This curriculum integrates conceptual, theoretical, empirical and policy-related aspects of macroeconomics. This curriculum introduces the undergraduate students to the field of macroeconomics and enables them to learn the functioning of the economy in a systematic manner.

## Course Outcomes –

- To introduce students to the historical background of the emergence of macroeconomics
- To familiarize students with the differences between microeconomics and macroeconomics
- To familiarize students with various concepts of national income
- To familiarize students with Keynesian macroeconomic theoretical framework of consumption and investment functions
- To introduce students to the role of money in an economy.
- To introduce students to the conceptual and theoretical frameworks of inflation, deflation and stagflation, Business Cycle.

- To familiarize students with the conceptual and theoretical framework of business cycles
- To introduce students to the role of monetary and fiscal policies in fulfilling the macroeconomic objectives of stability, full employment and growth.
- To introduce students to the various instruments of monetary and fiscal policies

<table>
<tr><td colspan="3" align="center"><strong>Semester III<br>DSE – 2A - Macro Economics I</strong></td></tr>
<tr><td><strong>Unit</strong></td><td><strong>Name and Contents of the Chapter</strong></td><td><strong>Number of Lectures</strong></td></tr>
<tr><td><strong>Unit 1</strong></td><td><strong>Introduction</strong></td><td rowspan="4">10</td></tr>
<tr><td>1.1</td><td>Meaning, Nature and Scope of Macro Economics</td></tr>
<tr><td>1.2</td><td>Importance and Limitations of Macro Economics</td></tr>
<tr><td>1.3</td><td>The difference between Micro Economics and Macro Economics, <strong>Emergence of Macroeconomics</strong></td></tr>
<tr><td><strong>Unit 2</strong></td><td><strong>National Income</strong></td><td rowspan="5">14</td></tr>
<tr><td>2.1</td><td>Meaning and Importance of National Income</td></tr>
<tr><td>2.2</td><td>Various Concepts of National Income <strong>and their relationship</strong>– GDP, GNP, NNP, <strong>NDP, at market price and factor cost,</strong> PCI, Personal Income, Disposable Income<br><br><strong>Real Income and Nominal Income</strong></td></tr>
<tr><td>2.3</td><td>Methods of National Income Measurement<br><br>Difficulties in the Measurement of National Income</td></tr>
<tr><td>2.4</td><td>Circular Flow of National Income – <strong>Two, Three and Four sector models,</strong></td></tr>
<tr><td><strong>Unit 3</strong></td><td><strong>Theory of Employment and Output</strong></td><td rowspan="5">10</td></tr>
<tr><td>3.1</td><td>Classical Theory of Employment, Say's Law of Market.</td></tr>
<tr><td>3.2</td><td>Keynes' Criticism on Classical Theory</td></tr>
<tr><td>3.3</td><td>Keynesian Theory of Employment – Aggregate Supply Price and</td></tr>
<tr><td></td><td>Aggregate Demand Price, Employment Determination</td></tr>
<tr><td><strong>Unit 4</strong></td><td><strong>Consumption and Investment</strong></td><td></td></tr>
</table>

| 4.1 | Consumption Function – Meaning, Various Concepts - APC, MPC, Psychological Law of Consumption, Factors Influencing Consumption Function | |
|------|------------------------------------------------------------------------------------------|----|
| 4.2 | Saving - APS, MPS.<br>Investment – Meaning, Types, Marginal Efficiency of Capital | 14 |
| 4.3 | The Concept of Multiplier;<br>The Principle of Acceleration | |
| 4.4 | **Introduction to IS-LM curve, Case studies** | |

### Semester IV
## DSE – 2B - Macro Economics II

| Unit 1 | **Money** | |
|--------|-----------|----|
| 1.1 | Money – Meaning and Functions, **Concepts of Money**<br>**Evolution of Money** | |
| 1.2 | Value of Money – Meaning, Quantity Theory of Money, Cash Balance Approach<br>**Time Value of money** | 12 |
| 1.3 | Supply of Money – Various Measures of RBI<br>Credit Creation | |
| Unit 2 | **Inflation** | |
| 2.1 | Inflation – Meaning, Types, Causes – Demand Pull and Cost Push Inflation, Effects | |
| 2.2 | Measures to Control Inflation | 12 |
| 2.3 | Deflation – Meaning, Causes and Effects<br>**Inflationary and Deflationary Gap** | |
| 2.4 | Philips Curve, Stagflation – Meaning **and causes** | |
| Unit 3 | **Business Cycles** | |
| 3.1 | Meaning, Features and Phases of Business Cycle | |
| 3.2 | Causes and Effects of Business Cycle | |
| 3.3 | Keynes' Theory of Business Cycle | 12 |
| 3.4 | Monetarist and Post Monetarist Approach to Business Cycle | |
| 3.5 | Control of Business Cycles – Monetary and Fiscal Controls | |

| Unit 4 | **Macroeconomic Policies** | 12 |
|---|---|---|
| 4.1 | Objectives of Macroeconomic Policies | |
| 4.2 | Monetary Policy - Meaning, Instruments, Advantages and Limitations | |
| 4.3 | Fiscal Policy - Meaning, Instruments, Advantages and Limitations | |

## Basic Reading List –

1 David Colander, Macro Economics, McGraw Hill Education Private Limited (LatestEdition)
2. D. N. Dwivedi, Macro Economics: Theory and Policy, McGraw Hill Education Private Limited (Latest Edition)
3. H. L. Ahuja, Macro Economics: Theory and Policy, S. Chand & Company Limited. (Latest Edition)
4. M. L. Jhingan, Macro Economic Theory, Vrinda Publications Private Limited (LatestEdition)
5. Wavare Anil Kumar & V.Kumbhar ,(2019)Macro Economics,Ruby Publisher,Kolhapur, MS, India.
6. N. Gregory Mankiw, Principles of Macroeconomics, Cengage Learning (LatestEdition)
7. Olivier Blanchard & David Johnson, Macroeconomics, Pearson (Latest Edition)
8. Rudiger Dornbusch, Stanley Fischer & Richard Startz, Macroeconomics, Tata McGraw Hill Education Private Limited (Latest Edition)
9. Sampat Mukherjee, Macroeconomics: A Global Text, New Central Book Agency Private Limited (Latest Edition)
10. Stephen Williamson, Macroeconomics, Pearson (Latest Edition)
11. Kute Santosh & Rithe M. , Macro Economics, Prashant Publication,Jalgaon,MS,India
12. Monetary Economics, S. B. Gupta, Himalaya Publication

## Advanced Reading List

1. Ben Fine & Ourania Dimakou, Macroeconomics: A Critical Companion, Pluto Press (Latest Edition)
2. Brian Snowdon & Howard Vane (2003), The Development of Modern Macroeconomics: A Rough Guide, in Macroeconomics: A Reader, (Ed.) Brian Snowdon and Howard Vane, Routledge

3.  Brian Snowdon& Howard Vane, Macroeconomics: A Reader, Routledge (Latest Edition)

4.  Brian Snowdon& Howard Vane, Modern Macroeconomics: Its Origins, Developments and Current State, Edward Elgar (Latest Edition)

4. David Romer, Advanced Macroeconomics, McGraw-Hill (Latest Edition)

5. DilipNachane, Critique of the New Consensus Macroeconomics and Implications for India, Springer (Latest Edition)

6. John McDonald, Rethinking Macroeconomics: An Introduction, Routledge (Latest Edition)

7. Michel De Vroey, A History of Macroeconomics: From Keynes to Lucas and Beyond, Cambridge University Press (Latest Edition)

8. N. Gregory Mankiw, Macroeconomics, Worth Publishers (Latest Edition)

9. Roger Backhouse, Interpreting Macroeconomics: Explorations in the History of Macroeconomic Thought, Routledge (Latest Edition)

10. Sampat Mukherjee, Analytical Macroeconomics: From Keynes to Mankiw, New Central Book Agency Private Limited

## Skill Enhancement Course (SEC)
## Basic Concept of Research Methodology

**Subject Code: 23 A2314 & 23 A2414**

**Subject: SEC-I & I I (2 Credit Course)**
**Total Lectures = 45 + 45**

**SKILL DEVELOPMENT ACTIVITIES**
**(Any Three of the following)**

**( IMPORTANT NOTES -** At the end of the course three point/ activities each should be selected for each semester (III & IV semester ) from the different points given in the appendix. The important questions and issue in your area should be considered and the issue / activities related to the subject should be given to the student accordingly. Such as Agriculture Sector, ,Cooperative Sector ,Small Scale Industries etc. **)**

1. Prepare a chart showing the steps of research.
2. Prepare a chart showing the sampling technique
3. Prepare Charts showing sources of primary data.
4. Prepare a chart showing sources of secondary data.
5. Construct a questionnaire to measure student's attitude towards the purchase of two wheelers / readymade garments etc.
6. Collect the data related to any schemes of your locality and present in front of the students.
7. Construct a questionnaire for collection of primary data on any Social issue.

| Credits: 02 | Periods: 45 | Marks: 50 |
|---|---|---|

**Course outline:**

       The course will be given in the form of lectures and practical work .Lectures will focus on research, especially with regard to sampling methods, data collection and data preparation. The course will focus on the practical implementation of diverse sample techniques. Students are expected to collect and classify the data.

**Aims and objectives of course:**
- To develop the understanding of the basic concept of research.
- To develop the understanding of the basic framework of sampling and data collection..
- To develop the understanding of various sampling methods and techniques.
- To identify various sources of information for data collection.
- To develop the understanding of the conducting survey on various issues.

**Learning outcomes of course :**

On completion of the course, the student shall be able to
- Demonstrate his/her understanding of sampling methods and the ability to use collection of data
- Identify the appropriate sample techniques for different kinds of research questions
- Identify the appropriate source of data in relation to the collection of research data.
- Able to classify and present the collected data in the form of graph, bar diagram, chart etc

# Semester III
## Skill Enhancement Course (SEC): I

## SYBA (Economics) - SEC -2A
## Basic Concept of Research Methodology

| Unit | Name and Contents | Number of Lectures |
|---|---|---|
| **Unit 1** | **Introduction Of Research** | |
| 1.1 | Meaning and Definition of Research | **10** |
| 1.2 | Types Of Research<br>i)Basic or Pure or Fundamental Research<br>ii) Applied Research<br>iii) Action Research | |
| 1.3 | Importance Of Economics Research | |
| **Unit 2** | **Research Design** | |
| 2.1 | Meaning of Research Design | |
| 2.2 | Need of Research Design | |
| 2.3 | Types of Research Design<br>i)Exploratory Design<br>ii)Descriptive Design<br>iii)Experimental Design | **10** |
| 2.4 | Concepts of Hypothesis and Importance | |
| **Unit 3** | **Data Collection** | |
| 3.1 | Meanings and Definition of Data Collection | **10** |
| 3.2 | Primary Data, Sampling | |
| 3.3 | Secondary Data Sources | |
| 3.4 | Research Ethics and Plagiarism | |
| **SKILL DEVELOPMENT ACTIVITIES** | **SKILL DEVELOPMENT ACTIVITIES**<br>**Continuous Assessment - (C. A.):**<br>To compete any Three Skill Development Activities from the prescribed syllabus, each activity for 05 marks | **15** |

## SEMESTER- IV
## SEC -2B - Skill Enhancement Course (SEC)-II

| Unit 1 | Data Analysis | |
|---|---|---|
| 1.1 | Meaning and Definition of Data Analysis | **8** |
| 1.2 | Nature And Importance | |
| 1.3 | Graphs, **Tabulations** | |
| 1.4 | Search Engines and Data Analytics Software | |

| Unit 2 | Measures of Central Tendencies | |
|---|---|---|
| 2.1 | Definition of Mean | **8** |
| 2.2 | Definition of Medium | |
| 2.3 | Definition of Mode | |
| 2.4 | Meaning of Dispersion Definition -Range, Median Deviation, Quartile Derivation, Standard Derivation | |
| 2.5 | Concept of Percentages | |
| 2.6 | Concepts:- i) Frequency Distribution ii)Cumulative Frequency iii) Class Boundaries iv) Midpoint v) Class Width | |
| | | |
| Unit 3 | Research Report | 14 |
| 3.1 | Meanings And Objective of Research Report | |
| 3.2 | Concepts Of Case Study | |
| 3.3 | Characteristics of Good Research Report Writing | |
| 3.4 | Objective of Research Report | |
| 3.5 | Types Of Research Report | |
| 3.6 | Concepts of i)Appendices ii) Review of Literature iii)Bibliography And References iv)Recommendation v)Hypothesis Testing vi)End Notes vii) Publications Indices and Journals viii) | |
| SKILL DEVELOPMENT ACTIVITIES | SKILL DEVELOPMENT ACTIVITIES Continuous Assessment - (C. A.): Project Writing | 15 |

**Recommended Books:**

1. P.H. Karmel and M. Polasek (1978), Applied Statistics for Economists, 4th edition, Pitman.
2. M.R. Spiegel (2003), Theory and Problems of Probability and Statistics (Schaum Series).
3. Cochran, William, G. (2008), Sampling Techniques, Third Edition, Wiley-India, ISBN 978 -81-265-1524-0.Reprint: 2008.
4. Bethlehem, J. (2009), Applied Survey Methods: A Statistical Perspective, Wiley.
5. Khandare V.B. and S.Yadav (2015) ,Statistical Methods,Chinmay Publication,Aurangabad.
6. Uwe Flick (2012), Introducing Research Methodology: A Beginner's Guide to Doing a Research Project, Sage Publications.
7. S.P.Gupta (2012), Statistical Methods, 42nd edition, Sultan chand and sons.
8. Ranjit Kumar (2014), Research Methodology: A Step-by-Step Guide for Beginners, 4 Edition, Sage Publications.

*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

# S. Y. B. A. (English)

## Introduction:

The Department of English envisions youth with love for literature, desiring to explore the world of aesthetic pleasure, kindle their spirit to understand the science of language, improve their power of expression and linguistic competency leading to successful careers in diverse fields.

The department aims to inspire, motivate and encourage students to excel in their academics, be good communicators, foster employability skills among them by providing a platform to identify and nurture their inherent talent, promote their creative pursuits, build their self-esteem and make them well-rounded personalities.

## Programme Objectives:

- Nurturing responsible citizens through socio-economic, linguistic and cultural engagement
- Identify and appreciate the real-world perspectives of knowledge through global understanding of texts and theories
- Promote professionalism and cultivate ethical behaviour
- Provide a plethora of avenues in career including higher studies, research and employment

## Programme Specific Outcomes (PSOs):

To create awareness about the importance of English as a global language
To cultivate research aptitude through comparative study of cultures and literatures
To acquaint students with catalytic effect of English in opening gateways to innumerable career opportunities
To make students comprehend, analyse and appreciate literary texts
To enhance their personality, build their confidence through training in English communication viz. social etiquette, manners, formal and informal conversations etc.

## Examination Pattern:

CIE- 30 Marks

ESE-70 Marks

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1.  Library notes
2.  Students Seminar
3.  Short Quizzes / MCQ Test
4.  Home Assignments
5.  Tutorials/ Practical
6.  Oral test
7.  Research Project
8.  Group Discussion
9.  Open Book Test
10. Study Tour
11. Written Test
12. PPT presentation
13. Field Visit
14. Industrial Visit
15. Viva

## Teaching Methodology:

1.  Classroom Teaching
2.  Guest Lectures
3.  Group Discussions
4.  Surveys
5.  Power Point Presentations
6.  Visit to Institutions / Industries
7.  Research Papers & Projects
8.  E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Theory | Practical | Total | |
| 1 | Discipline Specific Course - DSC-I A | **23-A2321** Discipline Specific Course-DSC-I A Appreciating Drama | 3 | | | 45 |
| 2 | Discipline Specific Course – DSC-2A | **23-A2322** Discipline Specific Course-DSC-2A Appreciating Poetry | 3 | | | 45 |
| 3 | Skill Enhancement Course – SEC-1A | **23-A 2323** Skill Enhancement Course-SEC-1A- Advanced Study of English Language | 3 | | 24 | 45 |
| 4 | Skill Enhancement Course-SEC-2A | **23-A 2324** Skill Enhancement Course SEC-2A A Certificate Course in Skill Development | 2 | | | 30 |
| 5 | CC | **23-A 2325** Compulsory English CC | 3 | | | 45 |
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## SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | **Theory** | **Practical** | **Total** | |
| 1 | Discipline Specific Course - DSC-I B | **23-A 2421** Discipline Specific Course- DSC-1B Appreciating Drama | 3 | | | 45 |
| 2 | Discipline Specific Course – DSC-2B | **23-A2422** Discipline Specific Course- DSC-2B Appreciating Poetry | 3 | | | 45 |
| 3 | Skill Enhancement Course – SEC-1B | **23-A2423** Skill Enhancement Course- SEC-1B- Advanced Study of English Language | 3 | | 24 | 45 |
| 4 | Skill Enhancement Course- SEC-2B | **23-A2424** Skill Enhancement Course SEC-2B A Certificate Course in Skill Development | 2 | | | 30 |
| 5 | CC | **23-A2425** Compulsory English CC | 3 | | | 45 |
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# Syllabus

Subject Code: 23-A 2325

Subject: Compulsory English I  (3 Credit Course)

Total Lectures=45

| Unit | Compulsory English I<br>Topics | No of  lectures<br>(45) |
|---|---|---|
| I | **Prose**<br>1. A Simple Philosophy- Seathl<br>2. The Homecoming- Rabindranath Tagore<br>3. The Verger- Somerset Maugham | 9 |
| II | **Poetry**<br>1. The Palanquin Bearers- Sarojini Naidu<br>2. On the Grasshopper and the Cricket- John Kea1s<br>3. Still I Rise- Maya Angelou | 9 |
| III | **Grammar**<br>I. The Passive Voice<br>2. Clauses<br>3. Common Errors | 9 |
| IV | **Vocabulary**<br>I. One-word substitutes<br>2. Idioms<br>3. Suffixes and prefixes | 9 |
| V | **Soft Skills**<br>I. Problem-solving skills<br>2. Time management | 9 |

**Prescribed Text:**
        Panorama: Values and Skills through Literature (Board of Editon- Orient BlackSwan)
**Recommended Books:**
        Literary Landscapes (Orient Blackwsan)
        Literary Vistas (Orient Blackwsan)

**Subject Code: 23-A 2323**

**Subject: Skill Enhancement Course- SEC-1A- Advanced Study of English Language I (3 Credit)**

**Total Lectures=45**

| Unit | Advanced Study of English Language I | No of lectures (45) |
|------|--------------------------------------|---------------------|
| **1** | **Phonology:**<br><br>1. Organs of speech, speech mechanisms,<br>2. Description and classification of consonants and vowels,<br>3. Concept of syllable,<br>4. Word accent, sentence accent,<br>5. Tone groups, placement of nuclear/tonic accent,<br>6. Concept of intonation, uses/types of tones | **15** |
| **II** | **Morphology:**<br><br>1. What is morphology?<br>2. Concept of morpheme, allomorph, zero allomorph, types of morphemes (free and -bound), Prefixes and Suffixes (class-changing and class-maintaining),<br>3. Inflectional and Derivational suffixes, borrowings | **15** |
| **III** | **Sociolinguistics:**<br><br>1. National varieties of English: British, American and Indian<br>2. Regional and social dialects, standard dialect, concept of register, formal and informalstyles<br>3. Pidgins and Creoles, code-switching and code mixing | **15** |

**Prescribed Text: Linguistics: An Introduction- (Ed. Board of Editors, Orient BlackSwan)**
 **Reference Books:**

 1. Study of Language: An Introduction – George Yule, (CUP, 1985)
 2. English Grammar for Today: A New Introduction – Margaret Deuchar, GeoffreyLeech, Robert Hoogenraad (Palgrave Macmillan, 1982)
 3. Semantics – F.R. Palmer (CUP, 1981)
 4. Pragmatics - George Yule, (OUP, 2000)
 5. Modern Linguistics: An Introduction - Verma and Krishnaswamy (OUP, 1989)
 6.Pragmatics and Discourse: A Resource Book for Students - Joan Cutting,(Routledge, 2002)
 7. Structure and Meaning in English – Graeme Kennedy (Pearson, 2011)

**Subject Code:  23-A 2321**

**Subject: Discipline Specific Course-DSC-l A- Appreciating Drama**

**(3 Credit Course)**

**Total Lectures=45**

| Sr. No | Appreciating Drama | Lectures |
|--------|--------------------|----------|
| I | **Theory of Drama:**<br><br>1. Drama, the Literary Form<br>2. Elements of Drama - Theme, Plot, Characters, Diction, Conflict, Setting etc.<br>3. Types of Drama: (Tragedy, Comedy, Tragicomedy, Problem play, Absurd drama)<br>4. An Introduction to Minor Forms of Drama: (One-act-play, Skit, Street play,  short Radio play, Pantomime etc.) | 20 |
| II | **Arms and the Man**  by George Bernard Shaw | 25 |

**Reference Books :**

1. Naik M.K, Punekar. Mokashi S.1977. Perspectives on Indian Drama in English. Madras and New York: Oxford University Press

2. Naik M.K., Narayan Shyamala. 2012. Indian English Literature 1980-2000: A critical Survey. India: Pencraft International
3. Abrams M.H. 1957. A Glossary of Literary Terms. Madras: Macmillan IndiaPress.

4. Anandlal. 2004. Ed. The Oxford Companion to Indian Theatre. New Delhi: OxfordUniversity Press.
5. Berthold M. 1999. The History of World Theatre. New York: Continuum.
6. Briggs J. & Jefferson N.C. 2003. Encyclopedia of Stage Lighting.  : McFarland
7. Brown J.R. 1972. Theatre Language. London: The Penguin Press.
8. Craig E.G. 1911. On the Art of the Theatre. London: William HeinemannLtd.

Subject Code: 23-A2322

Subject : Discipline Specific Course-DSC-2 A - Appreciating Poetry (3 Credit Course)

Total Lectures=45

| Units | Appreciating Poetry | Lectures (45) |
|---|---|---|
| 1 | **Theory of Poetry**<br><br>(a) What is poetry? Significant development in the art of poetry during major periods<br>(b) Elements of poetry: Rhythm, Meter, Sound Structure, Stanza Forms,<br>(c) Figures of Speech, Symbols, Imagery, Simile, Metaphor, Personification and otherPoetic Devices like Repetition and Contrast. | 20 |
| 2 | **Selected Poems from 16<sup>th</sup> Century to 18<sup>th</sup> Century**<br><br>**1. Philip Sidney** – The Nightingale<br>**2. William Shakespeare** - Sonnet 116 (Let me not to the marriage of true minds)<br>**3. John Donne** - The Sun Rising<br>**4. Andrew Marvell** – To His Coy Mistress<br>**5. William Blake** – The Lamb<br>                        The Tyger<br><br>**6. Alexander Pope** – The Rape of the Lock | 25 |

**Prescribed Text**:

*Mirage: An Anthology of English Poetry* Ed. Board of Editors, OrientBlackswan

*Poetry down the Ages* Ed. Board of Studies, English, Mizoram University, Aizawl, Orient Blackswan

**Reference Books:**

1. Padhi, Sangita. 2018. Indian Poetry in English – A Critical Study. Chennai: Atlantic Publishers
2. Abrams M.H. 1957. *A Glossary of Literary Terms*. Madras: Macmillan India Press.
3. Board of Studies, Mizoram University 2010. *Poetry Down the Ages*. Kolkata: Orient BlackSwan.

4. Drew Elizabeth. 1959. *Poetry- A Modern Guide to Its Understanding and Enjoyment*.Dell Publishing Co.
5. Lennard John. 2005. *The Poetry Handbook: A Guide to Reading Poetry for Pleasure andPractical Criticism*. OUP.
6. Moon Brian. 2001. *Studying Poetry: Activities, Resources and Texts.* NCTE.
7. Oliver Mary. 1994. *A Poetry Handbook*.  Harcourt Brace & Company.
8. Williams Rhian. 2009. *The Poetry Tool Kit: The Essential Guide to Studying Poetry*.Bloomsburry
9. Wolosky Shira. 2001. *The Art of Poetry: How to Read Poem*. OUP.

**Subject Code: 23-A 2324**

**Subject: Skill Enhancement Course SEC-2A- A Certificate Course in Skill Development**

**(2 Credit Course)**

**Total Lectures=30**

| Unit | A Certificate Course in Skill Development<br>Topics | No. of lectures |
|------|-----------------------------------------------------|-----------------|
| I    | 7 Cs of Communication                               | 6               |
| II   | Types of Communication                              | 6               |
| III  | Body Language                                       | 6               |
| IV   | Vocabulary Building                                 | 6               |

# Semester IV

Subject Code: 23-A2425

Subject: Compulsory English  (3 Credit Course)

Total Lectures=45

| Unit | Compulsory English Topics | No of lectures (45) |
|---|---|---|
| I | **Prose:**<br><br>**1.** The Chicago Speech- **Swami Vivekananda**<br>**2.** The Happy Prince – **Oscar Wilde**<br>**3.** The Necklace – Saki (H.H. Munro) | 9 |
| II | **Poetry**<br>**1.** On Another's Sorrow- **William Blake**<br>**2.** Purdah (1)- **Imtiaz Dharker**<br>**3.** The Rock and the Bubble- **Louisa May Alcott** | 9 |
| III | **Grammar**<br><br>1. Question tags<br>2. Simple, Compound and Complex sentences<br>3. Degrees of Comparison | 9 |
| IV | **Vocabulary**<br><br>1. Collocations: Words that go together<br>2. Phrasal Verbs<br>3. Commonly Confused Words | 9 |
| V | **Soft Skills**<br><br>1. Leadership skills<br>2. Teamwork skills | 9 |

**Prescribed Text:**
1. Panorama: Values and Skills through Literature (Board of Editon- Orient BlackSwan)

**Reference Books:**
1. Literary Landscapes (Orient Blackwsan)
2. Literary Vistas (Orient Blackwsan)

**Subject Code: 23-A2423**

**Subject: Skill Enhancement Course- SEC-1B- Advanced Study of English Language I (3 Credit)**

**Total Lectures=45**

| Unit | Advanced Study of English Language | No of lectures (45) |
|------|-----------------------------------|---------------------|
| 1 | **Syntax:**<br><br>1. Concept of Phrase, Phrase structure rules/ types of Phrases: Noun phrase, Adjective phrase, Adverb phrase, Prepositional phrase and Verb phrase.<br>2. Concept of Clause, Parts of Clauses: Subjects and objects, complements and Adverbials, Concept of Subject –verb Concord, Clause patterns.<br>3. Types of Sentences: Structural Classification - Simple Sentence, CompoundSentence and Complex sentence<br>4. Types of Sentences: Functional Classification - (affirmatives/interrogatives/imperatives) Wh –questions, Yes-No Questions, Tag Questions, Negative Sentences, Do-support, Imperatives) | 15 |
| II | **Semantics:** (Introductory)<br><br>1. What is Semantics? Difference between Denotative and Connotative meaning.<br>2. Lexical relations: Synonymy, Antonymy, Homonymy, Homography and Homophony, Polysemy, Difference between Homonymy and Polysemy, Superordinate terms and Hyponymy, Metonymy. | 15 |
| III | 3. **Pragmatics:** (Introductory)<br><br>1. What is Pragmatics?<br>2. Speech Acts: Types<br>   a. Austin's typology - locutionary, illocutionary, perlocutionary.<br>   b. Searle's typology – the six types<br>   c. Direct and Indirect Speech Acts<br>3. The Co-operative Principle and Its Maxims<br>4. The Politeness Principle and Its Maxims | 15 |

**Prescribed Text: Linguistics: An Introduction- (Ed. Board of Editors, Orient BlackSwan)**

**Reference Books:**

1. Study of Language: An Introduction – George Yule, (CUP, 1985)
2. English Grammar for Today: A New Introduction – Margaret Deuchar, GeoffreyLeech, Robert Hoogenraad (Palgrave Macmillan, 1982)

3. Semantics – F.R. Palmer (CUP, 1981)
4. Pragmatics - George Yule, (OUP, 2000)
5. Modern Linguistics: An Introduction - Verma and Krishnaswamy (OUP, 1989)
6. Pragmatics and Discourse: A Resource Book for Students - Joan Cutting,(Routledge, 2002)
7. Structure and Meaning in English – Graeme Kennedy (Pearson, 2011)
8. Making Sense of English: A Textbook of Sounds, Words and Grammar – M.A.Yadugiri (New Delhi: Viva Books Pvt. Ltd., 2006)

**Subject Code: 23-A 2421**

**Subject: Discipline Specific Course-DSC-l B- Appreciating Drama**

**(3 Credit Course)**

**Total Lectures=45**

| Sr. No | Appreciating Drama | Lectures |
|--------|--------------------|----------|
| I | 1. **Drama as a Performing Art Form -** Theatrical Elements: (Stage directions, Light effects, Music, Costumes, Stage property, Makeup etc.)<br><br>2. **Introduction to Indian Drama** | **15** |
| II | • **The Fire and the Rain – Girish Karnad**<br><br>• **Silence! The Court Is In Session – Vijay Tendulkar** | **30** |

**Reference Books :**

1. Naik M.K, Punekar. Mokashi S.1977. Perspectives on Indian Drama in English**.** Madras and New York: Oxford University Press

2. Naik M.K., Narayan Shyamala. 2012. Indian English Literature 1980-2000: A critical Survey. India: Pencraft International

3. Abrams M.H. 1957. A Glossary of Literary Terms. Madras: Macmillan IndiaPress.

4. Anandlal. 2004. Ed. The Oxford Companion to Indian Theatre. New Delhi: OxfordUniversity Press.
5. Berthold M. 1999. The History of World Theatre. New York: Continuum.
6. Briggs J. & Jefferson N.C. 2003. Encyclopedia of Stage Lighting. : McFarland
7. Brown J.R. 1972. Theatre Language. London: The Penguin Press.
8. Craig E.G. 1911. On the Art of the Theatre. London: William HeinemannLtd.

9. Crook T. 1999. Radio Drama. Routledge; 1st Edition
10. Dharwadkar A. 2005. Theatres of Independence. New Delhi: OxfordUniversity Press

11. Hughes M. 2013. A History of Pantomime. Remember When
12. Jagadale U.S. 2014. Communication in Drama:A Pragmatic Approach. PartridgeIndia
13. Mamet D. 1994. Goldberg Street: Short Plays and Monologues. Grove Press
14. Pease A. 1998. Body Language. London: Sheldon Press.
15. Srampickal J. 1994. Voice to the Voiceless: the Power of People's Theatre in India.London: Hurst & Company

16. Stanislavski C. 1981. Creating a Role. London: Methuen Publishing Ltd.

17. Zuber O. 1980. Ed. The Languages of Theatre. Oxford: Pergamon Press

**Subject Code:  23-A2422**

**Subject: Discipline Specific Course-DSC-2 B - Appreciating Poetry (3 Credit Course)**

**Total Lectures=45**

| Units | Appreciating Poetry | Lectures (45) |
|---|---|---|
| 1 | Types of Poetry: Elegy, Sonnet, Dramatic Monologue, Lyric, Ode, Ballad | 05 |
| 2 | **Selected Poems from Romantic to Modern Era** <br> **1.  John Keats** – Ode on a Grecian Urn <br> **2. George Byron –** She Walks in Beauty <br> **3. Robert Browning –** My Last Duchess <br> **4. Alfred Lord Tennyson –** Ulysses <br> **5. Thomas Hardy –** Afterwards <br> **6. Wilfred Owen –** Futility <br> 7. **W.B.Yeats –** Sailing to Byzantium | 20 |
| 3 | **Voices from the World** <br><br> 1. **James Weldon Johnson –** The Awakening <br> 2. **Dilip Chitre –** Father Returning <br> 3. **Gabriel Okara –** Once Upon a Time <br> 4. **Maya Angelou –** Caged Bird <br> 5. **Judith Wright –** Space Between <br> 6. **Kamala Das –** An Introduction | 20 |

**Prescribed Text**:

*Mirage: An Anthology of English Poetry* Ed. Board of Editors, OrientBlackswan

*Poetry down the Ages* Ed. Board of Studies, English, Mizoram University, Aizawl, Orient Blackswan

**Reference Books:**

1. Padhi, Sangita. 2018. Indian Poetry in English – A Critical Study. Chennai: Atlantic Publishers
2. Abrams M.H. 1957. *A Glossary of Literary Terms*. Madras: Macmillan India Press.
3. Board of Studies, Mizoram University 2010. *Poetry Down the Ages*. Kolkata: Orient BlackSwan.
4. Drew Elizabeth. 1959. *Poetry- A Modern Guide to Its Understanding and Enjoyment*.Dell Publishing Co.
5. Lennard John. 2005. *The Poetry Handbook: A Guide to Reading Poetry for Pleasure andPractical Criticism*. OUP.
6. Moon Brian. 2001. *Studying Poetry: Activities, Resources and Texts*. NCTE.
7. Oliver Mary. 1994. *A Poetry Handbook*.  Harcourt Brace & Company.
8. Williams Rhian. 2009. *The Poetry Tool Kit: The Essential Guide to Studying Poetry*.Bloomsbury
9. Wolosky Shira. 2001. *The Art of Poetry: How to Read Poem*. OUP.

**Subject Code: 23-A 2424**

**Subject: Skill Enhancement Course SEC-2B- A Certificate Course in Skill Development**

**(2 Credit Course)**

**Total Lectures=30**

| Unit | A Certificate Course in Skill Development Topics | No. of lectures |
|------|--------------------------------------------------|-----------------|
| I | Emotional Intelligence | 6 |
| II | Public Speaking | 6 |
| III | Digital Literacy | 6 |
| IV | Project Management | 6 |
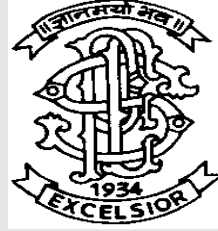
*Progressive Education Society's*

# Modern College of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

# Syllabus for

# S. Y. B. A Geography

## Introduction:

Department of Geography offers general and specialization in Geography for Undergraduate students of B.A. faculty. Geography program is designed to provide an understanding of changing interrelationship between man with his surroundings. Geography is the study of places and the relationship between people and their environment. Geographers explore both the physical properties and human societies spread across the globe. Interactions and responses of human beings with environment vary with time and space. Geographers study the distribution of living and nonliving things and seek answers to the 'Wh' types of questions like why, where, when, whom, who, what, how etc. Geography special opted (Major) Students may choose career specifically courses like Travel and Tourism, Regional Planning, Environment, GIS, Remote Sensing, Disaster Management etc.

## Programme Objectives:

1. To develop critical thinking skills, communication skills among students.
2. To motivate and help students for setting and achieving their career goals.
3. To inculcate sense of commitment towards set career goals.
4. To promote empathy, sensitive and compassionate about various ethnic, minor and immigrants Classmates among students.

## Programme Specific Outcomes (PSOs):

- Students will be able to identify major landforms around them and try to understand the impact of landforms on daily lives.
- Students understand the importance of resources and follow the simple steps to conserve resources in daily practices.
- Students know spatial variation in the distribution, composition of population and role of human resources in economic development.
- Students acquire basic skills of map making, map reading, surveying, collecting, handling, and analyzing of data etc.
- Students learn about various disasters, their causes and managing disasters.
- Students understand career opportunities in the fields of travel and tourism, Sustainable Development, Regional Planning, Teaching, Cartography, Surveying etc.

## Examination Pattern:

Examinations will be conducted at internal and external (End Semester Exam) level. Pattern will be 30 (Internal) + 70 (External). The internal exam will be in the form of Continuous and Comprehensive Evaluation (CCE) for 30 marks. End Semester Exam will be conducted at the end of semester for 70 marks. There will be individual (Separate) passing in both internal and external examination.

**12 marks in the Internal exam and 28 marks in External exam will be the passing criteria.  Max time given during End Semester Exam will be 2 ½ hours or 3 hours depending upon the credits of each course.**

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Short Quizzes / MCQ Test
3. Home Assignments
4. Tutorials/ Practical
5. Oral test
6. Research Project
7. Group Discussion
8. Open Book Test
9. Study Tour
10. Written Test
11. PPT presentation
12. Field Visit
13. Industrial Visit
14. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | DSE 1A Special 1 | 23-GG-A2331 Population Geography I | 3 | | | 48 |
| 2 | DSE 2A Special 2 | 23-GG-A2332 Practical Geography I | | 4 | 12 | 60 |
| 3 | CC 1C General 2 | 23-GG-A2333 Economic Geography I | 3 | | | 48 |
| 4 | SEC 2A Skill Development 1 | 23-GG-A2334 Remote Sensing | 2 | | | 30 |

## SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | DSE 1B Special 1 | 23-GG-A2431 Population Geography II | 3 | | | 48 |
| 2 | DSE 2B Special 2 | 23-GG-A2432 Practical Geography II | | 4 | 12 | 60 |
| 3 | CC 1D General 2 | 23-GG-A2433 Economic Geography II | 3 | | | 48 |
| 4 | SEC 2B Skill Development 2 | 23-GG-A2434 Geographic Information System | 2 | | | 30 |

# Syllabus

**Subject Code: 23-GG-A2331**

**Subject: Population Geography I  (3 Credit Course)**

**Total Lectures=48**

| Unit | Population<br>Geography I<br>Topic | No of  lecture<br>(48) |
|---|---|---|
| I | **Introduction**<br>    1. Definition, Nature, and Scope<br>    2. Significance of Population studies,<br>    3. Relation of Population Geography with other Social Sciences. | 12 |
| II | **Population Growth and Demographic Attributes**<br>    1. Distribution of Population<br>    2. Factors affecting Growth of Population<br>    3. Fertility, Mortality - (Concept, Measurement)<br>    4. Migration - Concept, Causes, Types | 12 |
| III | **Composition of Population**<br>    1. Age-Sex pyramid, Age Structure<br>    2. Occupational Structure, Dependency Ratio<br>    3. Longevity, Life Expectancy. (With Reference to India) | 12 |
| IV | **Population Data & Presentation**<br>    1. Census of India<br>    2. National Sample Survey, Sample Registration Survey, NFHS,<br>       DLHS,<br>    3. Presentation of Population Data – Maps, Graphical Presentation<br>       using computer software. | 12 |

**Reference books:**

1. Barrett H. R., 1995, Population Geography, Oliver and Boyd Publication,

2. Bhende A. and Kanitkar T., 2000, Principles of Population Studies, Himalaya Publishing House.

3. Chandna R. C. and Sidhu M. S., 1980, An Introduction to Population Geography, Kalyani Publishers.

4. Clarke J. I., 1965, Population Geography, Pergamon Press, Oxford.

5. Jones, H. R., 2000, Population Geography, 3rd ed., Paul Chapman, London.

6. Lutz W., Warren C. S. and Scherbov S.,2004, The End of the World Population Growth in the 21st Century, Earth scan

7. New bold K. B.,2009, Population Geography Tools and Issues, Rowman and Littlefield Publishers.

8. Pacione M., 1986, Population Geography-Progress and Prospect, Taylor and Francis.

9. Wilson M. G. A., 1968, Population Geography, Nelson Publishers.

10. Panda B P , 1988, Population Geography, Granth Academy, Bhopal (Hindi)

11. Maurya S D, 2009, Population Geography, Sharda Putak Bhawan, Allahabad (Hindi)

12. Chandna, R C, 2006, Population Geography, Kalyani Publishers, Delhi. (Hindi)

**Subject Code 23-GG-A2332**

**Subject: Practical Geography I (4 Credit Course)**

**Total Lectures=60**

| Unit | Practical Geography 1  Topic | No of lectures (60) |
|------|------------------------------|---------------------|
| 1 | **Introduction to Maps**<br>    1. Definition of Maps<br>    2. History of Maps<br>    3. Elements of Map<br>    4. Classification of Maps:<br>        a. On the basis of scale:<br>            i) Small scale<br>            ii) Large Scale<br>        b. On the basis of function:<br>            i) Physical<br>            ii) Cultural<br>    5. Use of maps | 08 |

| II | **Map Scale**<br>    1. Definition of Map Scale<br>    2. Types of Map Scale<br>        a. Verbal Scale<br>        b. Numerical Scale<br>        c. Graphical Scale<br>    3. Conversion of Scale (British and Metric System)<br>        a. Verbal Scale to Representative Fraction<br>        b. Representative Fraction into Verbal scale<br>    4. Construction of Simple Graphical scale (At least two<br>        examples from each) | 18 |
|---|---|---|
| III | **Basics of Map Projection**<br>    1.  Basic concepts of Projection: Latitude, Longitude, Parallel of latitude,<br>        Meridian of longitude, Prime meridian, Equator,<br>        Direction<br>    2.  Definition and types of map projection<br>    3.  Calculation of time based on meridian and GMT (Calculation<br>        of minimum four examples) | 12 |
| IV | **Construction of Map Projection**<br>    1. Zenithal Projection<br>        a. Zenithal Polar Gnomonic Projection<br>    2. Conical Projection<br>        a. Conical projection with one standard parallel/ Simple<br>            conical projection<br>    3. Cylindrical Projection<br>        a. Cylindrical equal area projection<br>    4. Mercator projection<br><br>    (Properties and Uses of Map Projection)<br>    (At least two examples from each projection) | 22 |

**Reference Books :**

1. Sharma J. P., 2010, Prayogic Bhugol, Rastogi Publishers, Meerut.

2. Singh R. L. and Singh R. P. B., 1999, Elements of Practical Geography, Kalyani

3. Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008, Thematic Cartography
                                    and

Geovisualization (3rd Edition), Prentice Hall.

4. Tyner J. A., 2010, Principles of Map Design, The Guilford Press.

5. Sarkar A., 2015, Practical Geography: A Systematic Approach, Orient Black
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Private Ltd., New Delhi

6. Singh R. L. and Duttta P. K., 2012, Prayogatama Bhugol, Central Book Depot,
Allahabad

7. Ahirrao Y., Karanjkhele E. K., 2002, Practical Geography, Sudarshan
Publication, Nashik

8. Saptarshi P. G., Jog S. R., Statistical Methods,

9. Karlekar S. N., 2008, Statistical Methods, Diamond Publication, Pune

10. Kanetkar T. P., Kulkarni S. V., 1986, Surveying and Leveling, Pune Vidyrthi
Griha

Publication, Pune

11. Kumbhare A., Practical Geography,

12. Saha P., Basu P., 2007, Advanced Practical Geography, Books and Allied (P)
Ltd, Kolkata

**Subject Code: 23-GG-A2333**

**Subject: Economic Geography I  (3 Credit Course)**

**Total Lectures= 48**

| Sr. No | Topic | Lectures |
|--------|-------|----------|
| **I** | **Introduction**<br>1. Definition, nature, and scope of Economic Geography<br>2. Need and significance of Economic Geography<br>3. Economic Geography and its relationship with Social Sciences<br>4. Approaches of the study of Economic Geography | **12** |
| **II** | **Economic Activities**<br>1. Introduction and concept of economic activity with problems and prospects<br>2. Primary Activities<br>3. Secondary Activities<br>4. Tertiary Activities | **12** |

| III | **Natural Resources** <br>      1. Concept of Natural resources <br>      2. Classification of Natural Resources <br>      3. Renewable and Non-Renewable Resources <br>         a. Mineral Resources- Iron Ore and Manganese <br>         b. Energy Resources- Coal, Mineral Oil, Natural Gas, <br>             Hydroelectricity, Solar Energy, Wind Energy, Geothermal <br>             Energy, Nuclear Energy. <br>      4. Conservation of Resources | 12 |
|---|---|---|
| IV | **Agriculture** <br>      1. Introduction to Agriculture <br>      2. Role of Agriculture in Indian economy <br>      3. Factors influencing agriculture in India. <br>         a. Physical <br>         b. Socio-economic <br>         c. Political and Cultural <br>      4. Agro-based industries in India <br>         a. Cotton Industries <br>         b. Sugar Industries <br>         c. Dairy Industries <br>      5. Agro –Tourism | 12 |

**Reference Books :**

1. Gautam A., 2010, Advance Economic Geography, Sharda Pustak Bhavan, Allahabad

2. Chauhan R. N., 2007, Basic Principles of Economic Geography, ABD Publishers, Jaipur

3. Padey P. N., Economic Geography, Nirali Publication, Pune

4. Sadhukhan S. K., 1994, Economic Geography An Appraisal of Resources, S Chand &amp; Company Ltd, New Delhi

5. Roy P., Mukherjee S., 1993, Economic Geography: Resource Appraisal of resources- New Central Book Agency, Calcutta

6. Mannur H. G., 2008, International Economics, Vikas Publishing House PvtLtd, Noida

7. Siddharth K., 2003, Economic Geography, Theories, Processes &amp;Patterns, Kisalaya Publications Pvt, Ltd, Noida

8. Husain M., 2008, Geography of India, Tata McGraw Hill, New Delhi

9. Bhat L. S., 1973, Regional Planning in India, Statistical Publishing Society, Kolkata

10. Desai V,1991, Fundamentals of Rural Development, Rawat Publications, New Delhi

11. Paranjape, Gupte, Karmarkar, 1974, Economic &amp; Commercial Geography, Nirali Publication, Pune.

12. More J. C., 2014, Geography &amp; Agriculture For MPSC Examination, Atharv Publication, Pune

13. Pagar S.D., Thorat A. M., More J. C., 2015, Agriculture Geography, Atharv Publication, Pune.

14. Sanjay Patil, Pacharane, Suryavanshi, Chaudhari, 2013, Economic Geography, Atharv Publication, Pune.

**Subject Code: 23-GG-A2334**

**Subject: Remote Sensing (2 Credit Course)**

**Total Lectures=30**

| Units | Metabolism Topic | Lectures (30) |
|---|---|---|
| 1 | **Introduction to Remote Sensing**<br>    1. Concept, Definition and Types of RS<br>    2. Development of RS in India<br>    3. Stages in RS<br>    4. Electromagnetic Spectrum<br>    5. Types of Remote Sensing Platform<br>    6. Types of Satellites<br>    7. Functions of Satellites<br>    8. Applications of RS | **10** |
| 2 | **Image Interpretation**<br>    1. Aerial Photographs<br>    2. Satellite Images<br>    3. Elements of Image Interpretation<br>    4. Visual Image Interpretation of Satellite Images i.e., IRS or LANDSAT | **10** |
| 3 | **Software Based Practical**<br>    1. Google Earth<br>    2. Google Map<br>    3. Image Downloading through Bhuvan/ USGS<br>    4. Layer Stacking<br>    5. Image Enhancement<br>        Image Classification – Supervised &amp; Unsupervised | **10** |

**Reference Books :**

1. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad.
2. Bhatta B., (2011): Remote Sensing and GIS, Oxford University Press, India.
3. Campbell, J. (2002): Introduction to Remote Sensing, Taylor &amp; Francis, London.
4. Cracknell, A.P. (1991): Introduction to Remote Sensing, Tylor &amp; Francis, London
5. Gupta, R.P. (1990): Remote Sensing Geology. Springer Verlag.
6. Heywood, I., Steve, C. and Cornelius, S. (2003): An Introduction to Geographical Information Systems, Pearson Education.
7. Jensen, J. R. (2000): Remote Sensing of the Environment: An Earth resource Perspective, Prentice Hall.
8. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey.
9. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India.
10. Karlekar, S. (2006): Doorsamvedan - Remote Sensing (Marathi), Diamond Publications, Pune.
11. Karlekar, S. (2017): Dursamvedan Aani Bhougolik Mahiti Pranali (Marathi), Diamond Publications, Pune.
12. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2016): Remote Sensing and Image Interpretation, 6 th Edition, Wiley India.
13. Rao R. M. (2002): Geographical Information Systems, Rawat Publication.
14. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W.H. Freeman and Company, San Francisco.

# Semester IV

**Subject Code: 23-GG-A2431**

**Subject: Population Geography II (3 Credit Course)**

**Total Lectures=48**

| Unit | Topic | No of lecture |
|------|-------|---------------|
| 1 | **Population Theories**<br>    1. Population as a Resource<br>    2. Population and space<br>        a. Over Population<br>        b. Optimum Population<br>        c. Under Population<br>    3. Theories of Population<br>        a. Malthusian Theory<br>        b. Marxian Theory | 12 |
| 2 | **Contemporary Issues**<br>    1. Health Indicator in India<br>    2. Education and Literacy<br>    3. Economic Status<br>    4. Concept of HDI | 12 |
| 3 | **Problems and Policies of Population**<br>    1. Population Problems in India.<br>    2. Population Problems in developed countries-<br>       Germany & Japan.<br>    3. Population Policies in India and China | 12 |
| 4 | **Urbanization**<br>    1. Concept of urbanization<br>    2. Trends of World urbanization.<br>    3. History of urbanization in India<br>    4. Problems of Urbanization in India. | 12 |

**Reference books:**

1. Barrett H. R., 1995, Population Geography, Oliver and Boyd Publication,

2. Bhende A. and Kanitkar T., 2000, Principles of Population Studies, Himalaya Publishing House.

3. Chandna R. C. and Sidhu M. S., 1980, An Introduction to Population Geography, Kalyani

Publishers.

4. Clarke J. I., 1965, Population Geography, Pergamon Press, Oxford.

5. Jones, H. R., 2000, Population Geography, 3rd ed., Paul Chapman, London.

6. Lutz W., Warren C. S. and Scherbov S.,2004, The End of the World Population Growth in the 21st

Century, Earth scan

7. New bold K. B.,2009, Population Geography Tools and Issues, Rowman and Littlefield Publishers.

8. Pacione M., 1986, Population Geography-Progress and Prospect, Taylor and Francis.

9. Wilson M. G. A., 1968, Population Geography, Nelson Publishers.

10. Panda B P , 1988, Population Geography, Granth Academy, Bhopal (Hindi)

11. Maurya S D, 2009, Population Geography, Sharda Putak Bhawan, Allahabad (Hindi)

12. Chandna, R C, 2006, Population Geography, Kalyani Publishers, Delhi. (Hindi)

13. Sawant, Athavale, Musmade, Population Geography, Mehta Pubication, Pune. (Marathi)

14. More J. C.,2014, Geography &amp; Agriculture For MPSC Examination, Atharv Publication,

Pune (Marathi)

15. Musmade A.H., Sonawane A.E., More J.C., 2015, Population &amp; Settlement Geography,
Diamond Publication Pune. (Marathi)

**Subject Code:  2 3 - G G - A 2 4 3 2**

**Subject: Practical Geography II (4 Credit Course)**

**Total Lectures=60**

| Unit | Topic | No of lectures |
|------|-------|----------------|
|      |       |                |

| I | **Introduction to Cartography**<br>    1. Definition of Cartography<br>    2. Development of cartography<br>        a. Traditional<br>        b. Modern<br>    3. Use of Cartography | **10** |
| II | **Cartographic Techniques**<br>    1. Techniques of representation of data techniques (Use and limitations)<br>        a. Simple line graph<br>        b. Simple bar Graph<br>        c. Pie diagram<br>        d. Choropleth Map<br>        e. Isopleth Method (Iso-height or Isothermal)<br>        f. Flow diagram<br>(At least 01 example of each manually and using computer) | **20** |
| III | **Surveying**<br>    1. Definition of Surveying.<br>    2. Types of North Direction (True, Magnetic and Grid North)<br>    3. Types of Survey (Any three)<br>        a. Plane Table Survey: (Radiation Method and Intersection Method)<br>        b. Prismatic Compass Survey.<br>        c. GPS Survey and plotting<br>        d. Demonstration of Total Station<br>        e. Introduction of Drone Survey<br>    4. Measurement of land:<br>        i)   Measurement of survey field<br>        ii)  Example on measurement of area (Circle, Square, Rectangle,<br>            Triangle, Uneven shape)<br>        iii) Conversion of area (hector into Acre, Square km into square meter, square meter to Square Feet) | **20** |
| IV | **Excursion / village/city survey and report writing**<br>    1.  Study tour to places of geographical interest anywhere in the country Or Socio- economic survey of village /city<br>    2   Report Writing | **10** |

**Reference Books:**

1. Sharma J. P., 2010, Prayogic Bhugol, Rastogi Publishers, Meerut.

2. Singh R. L. and Singh R. P. B., 1999, Elements of Practical Geography, Kalyani Publishers.

3. Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008, Thematic Cartography and

Geovisualization (3rd Edition),

Prentice Hall.

4. Tyner J. A., 2010, Principles of Map Design, The Guilford Press.

5. Sarkar A., 2015, Practical Geography: A Systematic Approach, Orient Black Swan Private Ltd., New Delhi

6. Singh R. L. and Duttta P. K., 2012, Prayogatama Bhugol, Central Book Depot, Allahabad

7. Ahirrao Y., Karanjkhele E. K., 2002, Practical Geography, Sudarshan Publication, Nashik

8. Saptarshi P. G., Jog S. R., Statistical Methods,

9. Karlekar S. N., 2008, Statistical Methods, Diamond Publication, Pune

10. Kanetkar T. P., Kulkarni S. V., 1986, Surveying and Leveling, Pune Vidyrthi Griha Publication, Pune

11. Kumbhare A., Practical Geography,

12. Saha P., Basu P., 2007, Advanced Practical Geography, Books and Allied (P) Ltd, Kolkata

13. Advanced Practical Geography: 2007, Saha P., Basu P.,Books and Allied (P) Ltd, Kolkata.

**Subject Code: 23-GG-A2433**

**Subject: Economic Geography II  (3 Credit Course)**

**Total Lectures=48**

| Unit | Topics | No. of lectures (48) |
|------|--------|----------------------|
|      |        |                      |

| I | Trade and Transport | |
|---|---|---|
| | 1.Modes of Transportation and their characteristics<br>   a) Road b) Rail c) Air d) Water e) Pipeline.<br>2. Importance of transportation for Economic Development<br>3. Types of Trade<br>   a) Domestic<br>   b) International<br>4. India's International Trade | 12 |
| II | Industries | |
| | 1. Factors influencing industries.<br>2. Weber's theory of industrial location<br>3. Major industrial regions in India<br>   a) Iron and steel Industry<br>   b) Automobile Industry<br>   c) IT Industry | 14 |
| III | Regional Planning | |
| | 1. Concept and Objectives of regional planning<br>2. Significance of regional planning<br>3. Regional and sectoral imbalance in India | 10 |
| IV | Rural Development in India | |
| | 1. Concept and parameters of rural development<br>2. Government schemes for rural development<br>   a) IRD Programme<br>   b) DPAD Programme<br>   c) MNREGA<br>3. Socio-economic Transformation in Rural India | 12 |

**Reference Books**

1. Gautam A., 2010, Advance Economic Geography, Sharda Pustak Bhavan, Allahabad

2. Chauhan R. N., 2007, Basic Principles of Economic Geography, ABD Publishers, Jaipur

3. Padey P. N., Economic Geography, Nirali Publication, Pune

4. Sadhukhan S. K., 1994, Economic Geography An Appraisal of Resources, S Chand & Company Ltd, New Delhi

5. Roy P., Mukherjee S., 1993, Economic Geography: Resource appraisal of Resources- New Central Book Agency, Calcutta

6. Mannur H. G., 2008, International Economics, Vikas Publishing House PvtLtd,Noida

7. Siddharth K., 2003, Economic Geography, Theories, Processes & Patterns, Kisalaya Publications Pvt, Ltd, Noida

8. Husain M., 2008, Geography of India, Tata McGraw Hill, New Delhi

9. Bhat L. S., 1973, Regional Planning in India, Statistical Publishing Society, Kolkata

10. Desai V,1991, Fundamentals of Rural Development, Rawat Publications, New Delhi

11. Paranjape, Gupte, Karmarkar, 1974, Economic &amp; Commercial Geography, Nirali Publication, Pune.

12. More J. C., 2014, Geography &amp; Agriculture for MPSC Examination, Atharv Publication, Pune

13. Pagar S.D., Thorat A. M., More J. C., 2015, Agriculture Geography, Atharav Publication, Pune.

14. Sanjay Patil, Pacharane, Suryavanshi, Chaudhari, 2013, Economic Geography, Atharv Publication, Pune.

**Subject Code: 23-GG-A2434**

**Subject: Geographical Information System  (2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | Lectures |
|------|--------|----------|
| I | Introduction to GIS<br>　　1. Definition of GIS<br>　　2. History of GIS Development<br>　　3. Objectives of GIS<br>　　4. Functions of GIS<br>　　5. Components of GIS<br>　　6. Applications of GIS | 8 |
| II | **Data Types and Models**<br>　　1. Spatial Data – Concept, Sources; Data Models –<br>　　Raster &amp; Vector<br>　　2. Non-spatial Data – Concept, Sources; Data Models –<br>　　Relational, Network, Hierarchical & Object- orientated | 8 |
| III | **Software Based Practical**<br>　　1. Types of GIS and GIS Soft wares<br>　　2. Geo-referencing of Topo sheet/Map<br>　　3. Digitization of Point, Line &amp; Polygon for map making<br>　　4. Data Attachment<br>　　Creation of Layout and Map | 14 |

**Reference Books:**

1. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York.
2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York.
3. Debashis, C. and Sahoo, R. N. (2015): Fundamentals of Geographic Information System, Viva Books Private Limited.
4. DeMers, M. N. (2008): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi.
5. Heywood, I., Cornelius, S. and Carver, S. (2011): An Introduction to Geographical Information Systems, Pearson Education, New Delhi.
6. Karlekar, S. (2007): Bhaugolik Mahiti Pranali (GIS), Diamond Publications, Pune.
7. Korte, G. B. (2001): The GIS Book, Onward Press, Bangalore.
8. Longley, P. A., Goodchild, M. F., Maguire, D. J. and Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester.
9. Lo Albert, C. P., Yeung and Albert K. W. (2002): Concepts and Techniques of Geographical Information Systems, Prentice Hall of India, New Delhi.
10. Pandey, J. and Pathak D. (2015): Geographic Information System, TERI Press, The Energy and Resources Institute, New Delhi.
11. Paul, A. L., Michel, F. G., Maguire, D. J. and Rhind, D.W. (2002): Introduction to Geographic Information Systems and Science, John Wiley and Sons Ltd.
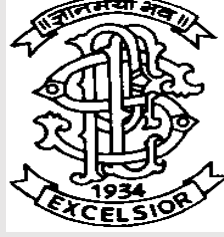
*Progressive Education Society's*

**Modern College Of Arts, Science and
Commerce, Ganeshkhind, Pune – 411 016
(Autonomous)**

Syllabus for

# S. Y. B.A- HINDI

## Introduction:

मॉडर्न महाविद्यालय में कला शाखा के अंतर्गत हिंदी विषय सामान्य स्तर पर पढ़ाया जाता है। इस पाठ्यकम के माध्यम से विविध साहित्यिक विधाओं को अध्ययन किया जाता है। कहानी, काव्य और साहित्येतर पाठ्यक्रम , लेखन कौशल और वाचन कौशल पर प्रभुत्व पाने के लिए विद्यार्थियों को प्रवृत्त किया जाता है। आधुनिक भारतीय भाषा- २ श्रेयांक का विशेष पाठ्यक्रम भी पढ़ाया जाता है और व्यक्तिमत्व विकास के लिए हिंदी के पाठ्यक्रम का उपयोग होता है। अध्ययन के मध्यम से भाषा में सृजनशील और वैचारिक लेखन, समाज की ओर सकारात्मक दृष्टिकोण के लिए विभाग की और से विविध कार्यक्रमों का आयोजन किया जाता है।

# द्वितीय वर्ष -कला [हिंदी]सामान्य स्तर

**Course Outcome - SYBA (G-2) Hindi**

आधुनिक काव्य,कहानी  तथा व्यवहारिक हिंदी(G2)
3 (credit)

## तृतीय सत्र (SEM-3)

1. छात्र काव्य और कहानी विधा से परिचित हो सकेंगे।

2.सर्जनात्मकता का विकास होगा।

3. संक्षेपन लेखन का प्रत्यक्ष बोध होगा।

4.शब्द-युग्म शब्द औरबकारक व्यवस्था समझ सकेंगे।

## चतुर्थ सत्र ( SEM -4)

आधुनिक हिंदी व्यंग्य साहित्य तथा व्यवहारिक हिंदी (G2)

(3 credit)

1. छात्र व्यंग्य पाठ से परिचित हो सकेंगे।
2. व्यंग्य कविता और कहानियों का बोध होगा।
3. साक्षात्कार कला से अवगत हो सकेंगे।
4. भाषा के विविध अॅप और पल्लवन कला से अवगत हो सकते है।

**Course Outcome - SYBA (G-2) Hindi MIL ( आधुनिक भारतीय भाषा )(2 CREDITS)**

हिंदी भाषा शिक्षण

 तृतीय सत्र (SEM-3)

1. छात्रों में हिंदी भाषा श्रवण और  संवाद कौशल का विकास होगा।

2. छात्रों में हिंदी भाषा वाचन और लेखन कौशल विकसित होगा।

3. हिंदी भाषा-विधि तथा भाषा व्यवहार से अवगत हो सकेंगे।

4. लघुकथा सृजन कौशल विकसित होगा।

हिंदी भाषा शिक्षण

चतुर्थ सत्र ( SEM -4)
1. छात्र वाक्य के भेद और विशेष प्रकार के वाक्यों से परिचित होंगे।
2. छात्रों में हिंदी भाषा श्रवण और संवाद कौशल विकसित होगा।
3. छात्र वाचन और लेखन कौशल से अवगत होंगे।
4. हिंदी काव्य - गीत सृजन कौशल विकसित होगा।

## Examination

**SYBA - Hindi G-2    INTERNAL -30 MARKS  AND EXTERNAL -70 MARKS**

**SYBA -MIL Hindi– 2 CREDIT   INTERNAL -25 AND EXTERNAL -25**

## Suggested internal assessment tools for

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Written Test

1. Classroom Teaching

2. Guest Lectures
3. Group Discussions
4. Surveys

<div align="center">

# Subject List

</div>

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S. Y. B. A. HINDI Syllabus

## द्वितीय वर्ष -कला [हिंदी]सामान्य स्तर G-2

(Semester & Choice Based Credit System)
</div>

विकल्पआधारित श्रयांक पद्धति

<div align="center">

(To be implemented from the Academic Year2023-24  )
</div>

| सत्र | विषय का नाम | सांकेतांक |
|------|-------------|-----------|
| सत्र -३ (Sem -3) | अधुनिक काव्य, कहनी तथा व्यवहारिक हिंदी (G2) 3 CREDITS | Subject code **23-A23H3** |
| सत्र ४ (Sem -4) | आधुनिक हिंदी व्यंग्य साहित्य तथा व्यवहारिक हिंदी (G2) 3 CREDITS | Subject code **23-A24H3** |

<div align="center">

S. Y. B. A. Hindi MIL Syllabus (2 CREDITS)

## द्वितीय वर्ष -कला [हिंदी]

(Semester & Choice Based Credit System)

विकल्प आधारित श्रेयांक पद्धति

(To be implemented from the Academic Year2023-24  )
</div>

| सत्र | विषय का नाम | सांकेतांक |
|------|-------------|-----------|
| सत्र -3 (Sem -3) | हिंदी भाषा शिक्षण | Subject code **23-A23H4** |

| सत्र ४ (Sem -4) | हिंदी भाषा शिक्षण | Subject code **23- A24H4** |
|---|---|---|

# Syllabus

\                     द्वितीय वर्ष -कला

हिंदी - सामान्य स्तर

तृतीय सत्र (SEM-3)
आधुनिक काव्य, कहानी तथा व्यवहारिक हिंदी (G2)
              Choice Based Credit System  (विकल्प आधारित श्रेयांक पद्धत)

उद्देश:
 1. छात्रों को काव्य साहित्य से परिचित कराना।
 2.छात्रों को कहानी साहित्य से परिचित कराना।
 3.छात्रों को हिंदी कारक व्यवस्था समझना।
 4.शब्द युग्म का अर्थ लिखकर प्रत्यक्ष वाक्य में प्रयोग समझना ।
 5 संक्षेपण लेखन का प्रत्यक्ष बोध करना।
6.सर्जनात्मकता का विकास करना।

| इकाई | पाठ्यविषय | श्रेयांक | तासिकाएं |
|---|---|---|---|
| १ | काव्य साहित्य<br>1.नाच -अज्ञेय<br>2.देश कागज़ पर बना नक्शा नहीं होता -सर्वेश्वर दयाल सक्सेना | १ | १५ |

| | | | |
|---|---|---|---|
| | 3. संयुक्त परिवार- राजेश जोशी<br>4. हॉकी खेलती लड़कियां कात्यायनी<br>5. चुनौती -उषा यादव<br>उक्त रचनाओं का कथ्यगत एवं शिल्पगत अध्यायन | | |
| २ | कहानी साहित्य<br>   1.  धरती अब भी घूम रही है- विष्णु प्रभाकर<br>   2.  दूसरे -कमलेश्वर<br>   3.  बोलनेवाली औरत- ममता कालिया<br>   4.  सलाम- ओमप्रकाश वाल्मिकी<br>   5.  अपना अपना भाग्य- जैनेंद्र कुमार<br>     उक्त रचनाओं का कथ्यगत एवं शिल्पगत अध्यायन | १ | ३० |
| ३ | साहित्येतर पाठयक्रम<br>   1.  हिंदी कारक व्यवस्था<br>   2.  शब्द युग्म (50)अर्थ लिखकर वाक्य में प्रयोग<br>   3.  संक्षेपन | १ | १५ |

संदर्भग्रंथ

1. हिंदी साहित्य और भाषा- संपादक हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे, राजकमल प्रकाशन नई दिल्ली।
2. काव्ययन- संपादक हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे ,राजकमल प्रकाशन नई दिल्ली।
3. गद्य परिमल -संपादक हिंदी अध्ययन मंडल, सावित्रीबाई फुले, पुणे विश्वविद्यालय पुणे, राजकमल प्रकाशन, नई दिल्ली।
4. हिंदी व्याकरण- पंडित कामता प्रसाद गुरु ,प्रकाश संस्थान, नई दिल्ली।
5. प्रयोजनमूलक हिंदी -डॉक्टर माधव सोनटके, लोक भारती प्रकाशन ,नई दिल्ली।
6. प्रयोजनमूलक हिंदी की नई भूमिका- कैलाश नाथ पांडे, लोक भारती प्रकाशन, नई दिल्ली।

# द्वितीय वर्ष -कला

## हिंदी - सामान्य स्तर ,

## चतुर्थ सत्र ( SEM 4)
## आधुनिक हिंदी व्यंग्य साहित्य तथा व्यवहारिक हिंदी (G2)
### Choice Based Credit System
(विकल्प आधारित श्रेयांक पद्धत )

उद्देश:
1. छात्रों को व्यंग्य पाठ से परिचित कराना।
2. छात्रों को कहानी व्यंग्य पाठ का बोध कराना।
3. साक्षात्कार कला से अवगत कराना।
4. भाषा का मोबाइल तंत्र समझना।
5. पल्लवन कल से अवगत कराना।

| इकाई | पाठ्यविषय | श्रेयांक | तासिका |
|------|-----------|---------|--------|
| १ | काव्यपाठ व्यंग्य<br>1.प्रेत का बयान नागार्जुन<br>2.गीत फरोश भवानी प्रसाद मिश्र<br>3. विद्वान लोग उदय प्रकाश<br>4. कितनी रोटी अशोक चक्रधर<br>5. देश के लिए नेता शैल चतुर्वेदी<br>उक्त रचनाओं का कथ्यगत एवं शिल्पगत अध्यायन | १ | १५ |
| २ | कहानी पाठ व्यंग्य<br>1. सदाचार का ताबीज - हरिशंकर परसाई<br>2. अतिथि तुम कब जाओगे- शरद जोशी<br>3. सावधान! हम ईमानदार है- लतीफ घोंघी<br>4. मुख्यमंत्री का डंडा- सुदर्शन मजीठिया<br>5. झोले- सुभाष काबरा<br>उक्त रचनाओं का कथ्यगत एवं शिल्पगत अध्यायन | १ | १५ |

| | | | |
|---|---|---|---|
| ३ | साहित्येतर पाठयक्रम<br>1.साक्षात्कार<br>2. भाषा से संबंधित ॲप्स<br>3. पल्लवन | १ | १५ |

**संदर्भ ग्रंथ :**

1. हिंदी साहित्य और भाषा- संपादक हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे, राजकमल प्रकाशन नई दिल्ली।
2. श्रेष्ठ हास्य व्यंग्य कविताएं- काका हाथरसी,गिरिराज शरण, प्रभात प्रकाशन।
3. युगंधारा (कविता संग्रह)- नागार्जुन
4. शरद जोशी– मेरी श्रेष्ठ व्यंग्य रचनाएं- 1980
5. परसाई रचनावली- राजकमल प्रकाशन, नई दिल्ली
6. प्रयोजनमूलक हिंदी के विविध रूप- डॉक्टर राजेंद्र मिश्रा ,राकेश शर्मा, तक्षशिला प्रकाशन , नई दिल्ली।
7. प्रयोजनमूलक हिंदी अधुनातन आयाम- डॉ. अंबादास देशमुख, शैलजा प्रकाशन, कानपुर।
8. स्वतंत्रता हिंदी व्यंग्य का मूल्यांकन- डॉक्टर सुरेश माहेश्वरी ,विकास प्रकाशन, नागपुर।

# द्वितीय वर्ष -कला

## हिंदी भाषा शिक्षण - MIL ( Modern Indian Languages Syllabus )

### Choice Based Credit System
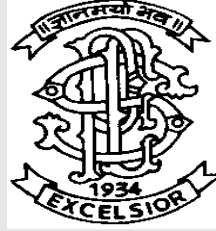(विकल्प आधारित श्रेयांक पद्धत )

### तृतीय सत्र (SEM-3)

2 (credit)

**उद्देश:**

1. छात्रों में हिंदी भाषा श्रवण कौशल विकसित करना।
2. छात्रों में हिंदी भाषा संवाद कौशल विकसित करना।
3. छात्रों में हिंदी भाषा वाचन कौशल विकसित करना
4. छात्रों में हिंदी भाषा लेखन कौशल विकसित करना।
5. हिंदी भाषा विधि तथा भाषा व्यवहार से अवगत।
6. लघु कथा सृजन कौशल विकसित करना।

| इकाई | पाठ्यविषय | श्रेयांक | तासिका |
|------|-----------|---------|--------|
| १ | वर्ण विचार:<br>1. हिंदी वर्णमाला -परिचय<br>2.लिपि -परिचय<br>3.वर्णों का उच्चारण और वर्गीकरण<br>4.स्वराघात<br>5.संधि- स्वर संधि, व्यंजन संधि, विसर्ग संधि। | १ | १५ |
| २ | भाषा कौशल शिक्षण: लघु कथाओं द्वारा भाषा कौशल शिक्षण ( श्रवण, संवाद, वाचन, लेखन)<br>ज्योति जैन:<br>1. शिक्षा<br>2.पानी के पेड़<br>3.पशु भाषा<br>4.अपशगुन<br><br>डॉ लता अग्रवाल<br>1. ममता<br>2.गरीब का लंच बॉक्स<br>3.मैं ही कृष्ण हूं | १ | १५ |

| | | | |
|---|---|---|---|
| | 4.सत्य की अग्निपरीक्षा | | |

संदर्भ ग्रंथ:

1. हिंदी भाषा शिक्षण -संपा. हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे राजकमल प्रकाशन नई दिल्ली।
2. हिंदी व्याकरण- पंडित कामता प्रसाद गुरु, प्रकाशन संस्थान नई दिल्ली।
3. प्रयोजनमूलक हिंदी- डॉक्टर माधव सोनटके, लोक भारती प्रकाशन नई दिल्ली।

# द्वितीय वर्ष -कला

## हिंदी भाषा शिक्षण- MIL(Modern Indian Languages Syllabus)

### Choice Based Credit System (विकल्प आधारित श्रेयांक पद्धत) 2(credit)

चतुर्थ सत्र ( SEM -4)

उद्देश:

1. छात्रों में वाक्य के भेद अवगत कराना।
2. छात्रों को विशेष प्रकार की वाक्य से परिचित कराना।
3. छात्रों में हिंदी भाषा श्रवण कौशल विकसित करना।
4. छात्रों में हिंदी भाषा संवाद कौशल विकसित करना।
5. छात्रों में हिंदी भाषा वाचन कौशल और लेखन कौशल विकसित करना।
6. हिंदी भाषा -विधि तथा भाषा व्यवहार से अवगत कराना।
7. हिंदी काव्य -गीत सृजन कौशल विकसित कराना।

| इकाई | पाठ्यविषय | श्रेयांक | तासिका |
|---|---|---|---|
| १ | वाक्य विचार: वाक्य और वाक्य के भेद<br>1. साधारण वाक्य<br>2. मिश्र वाक्य<br>3. संयुक्त वाक्य<br>4. संक्षिप्त वाक्य | 1 | 15 |

| | | | |
|---|---|---|---|
| | 5. विशेष प्रकार के वाक्य (विधनार्थक, प्रश्नार्थक, निषेधवाचक, अज्ञार्थक,विस्मयादिबोधक, इच्छा बोधक ,संदेश सूचक, संकेतार्थ)<br>6. विराम चिह्न | | |
| २ | भाषा कौशल शिक्षण :गोपालदास (नीरज) के काव्य गीत (०८गीत) द्वारा श्रवण, संवाद, वाचन, लेखन कौशल शिक्षण।<br>1. आदमी हूं आदमी से प्यार करता हूं।<br>2. राधा ने मीला जपी श्याम की<br>3. फूलों के रंग से<br>4. मिलते हैं गुल यहां<br>5. जीवन की बगिया महकेगी<br>6. लिखे जो खत तुझे<br>7. आज मदहोश हुआ जा रे<br>8. करवा गुजर गया गब्बर देखते रहे। | 1 | 15 |

संदर्भग्रंथ :

1. हिंदी भाषा शिक्षण- संपा. हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे, राजकमल प्रकाशन, नई दिल्ली।

2. हिंदी व्याकरण- पंडित कामता प्रसाद गुरु, प्रकाशन संस्थान नई दिल्ली।

3. प्रयोजनमूलक हिंदी -डॉक्टर माधव सोनटक्के, लोक भारती प्रकाशन नई दिल्ली।

*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

# S. Y. B. A. History

# Introduction:

Second Year B.A. syllabus for the History Semester 3 & 4

have four Discipline Specific Elective (DSE) Courses to be completed in the third and fourth semesters. A course on Skill Enhancement (SEC) is to be done by these students in both the semesters. There are two core courses (CC) that is compulsory for the students who are doing B.A. special History and this course can be opted by students from other department as well.

# Programme Objectives:

1. Adhere to values and ethics inculcated through the curricula in profession and personallife
2. Develop an understanding about the need and role as citizens and taking up individualresponsibilities.
3. Gain knowledge and skills essential for employability
4. Studying history enable us to develop a better understanding of the world in which we live.

# Programme Specific Outcomes (PSOs):

1. Understand The Importance of our Glorious Past
2. Understand the Meaning of Nationalism and they Respect toward Great National Personality.
3. Acquire conceptual knowledge of History.
4. Classified various phase in historical process & Developments
5. Take interest to discuss various debatable facts in subject of history

# Examination Pattern:

| SEM III & IV | CIA Marks | ESE Marks | Total Marks | Grand Total Marks |
|---|---|---|---|---|
| DSE and CC papers | 30 | 70 | 100 | |
| Total 6 papers | | | 600 | |
| SEC | 25 | 25 | 50 | |
| Total 2 papers | | | 100 | **700** |

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Study Tour
11. Written Test
12. PPT presentation
13. Field Visit
14. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Power Point Presentations
5. Visit to Institutions / Industries
6. Research Papers & Projects
7. E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---------|--------------|---------------------|---------|-----------|-------|----------------------|
| | | | Theory | Practical | Total | |
| 1 | Discipline Specific Elective Course (DSE-IA)- | 23-HS-A2341 Medieval India - Sultanate Period | 3 | | | 45 |
| 2 | Discipline Specific Elective Course (DSE-2A | 23-HS-A2342 Glimpses of the Modern World - Part 1 | 3 | | 11 | 45 |
| 3 | Core Course-I (CC-1C)- | 23-HS-A2343 History of the Marathas: (1630-1707) | 3 | | | 45 |
| 4 | Skill Enhancement Courses (SEC-2A) | 23-HS-A2344 Tourism Management | 2 | | | 30 |

**SEMESTER IV**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---------|--------------|---------------------|---------|-----------|-------|----------------------|
| | | | Theory | Practical | Total | |
| 1 | (DSE-IB) | 23-HS-A2441 Medieval India: Mughal Period | 3 | | | 45 |

| 2 | (DSE-2B) | 23-HS-A2442 Glimpses of the Modern World - Part 2 | 3 | | 11 | 45 |
|---|---|---|---|---|---|---|
| 3 | (CC-2D) | 23-HS-A2443 History of the Marathas: (1707-1818) | 3 | | | 45 |
| 4 | (SEC- 2B) | 23-HS-A2444 Travel Agency and Tour Business | 2 | | | 30 |

# Syllabus

**SEMESTER III**

**Subject Code: 23-HS-A2341**
**Subject: Medieval India - Sultanate Period**
**Total Lectures=45**

| Unit | Medieval India – Sultanate India | No of lecture (45) |
|------|----------------------------------|--------------------|
| I | **UnitI: Foundation of the Delhi Sultanate** <br> a) Sources of Historiography of Sultanate Period <br> b) Invasions of Muhammad Ghori <br> c) Foundation of Delhi Sultanate: Qutbuddin Aibak | 10 |
| II | **UnitII: The early Sultans of Delhi and their contributions** <br> a) Iltutmish <br> b) Raziyya <br> c) Balban. | 10 |
| III | **Unit III: Expansion of Sultanate** <br> a) Alauddin Khalji: Expansion and Administrative Reforms <br> b) Experiments of Muhammad-Bin-Tughlaq, Firuz Tughlaq <br> : Administrative Reforms. <br> c) The Saiyyids, the Lodis and the decline of the sultanate | 15 |
| IV | **Unit IV: Kingdoms of Vijayanagar and Bahamani** <br> a) Rise of Vijayanagar Empire: Harihar, Bukka, Krishndevray <br> b) The Emergence and expansion of the Bahamani Kingdom: Contribution of Muhmud Gawan <br> c) Disintegration of Bahamani Kingdom | 10 |

**Reference books:**

1. Banerjee A.C.,New History of Medieval India, New Delhi,S.Chand& Co., New Delhi, 1990.
2. ChitnisK.N.,Glimpses of Medieval Indian and Institutions, Poona, 1981.
3. ChitnisK N., Socio-Economic History of Medieval India, Atlantic Publishers and Distributors, New Delhi, 1990.
4. Chopra P.N., Puri B.N., Das M.N-A Social, Cultural and Economic History of India, Vol II. MacmillanIndia, Delhi, 1974.
5. Lane Poole Stanley, Medieval India, London, 1910
6. Majumdar R.C (ed).The History and Culture of the Indian People, Vol VI:The Delhi Sultanate,Bombay, 1967, Vol VII:The Moghul Empire, Bombay, 1974.
7. Mehta J.L, Advanced Study in the History of Medieval India Volll, New Delhi sterling Publishers, 1983.
8. PandyA.B.,EarlyMedieval India, Central Book Depot, Allahabad, 1970

9. Prasad Ishwari,History of Medieval India, Allahabad, 1952.
10. Raychaudhuri T,Irfan Habib (ed)The Cambridge Economic History of India, London, 1982.
11. Rizvi S.A., The Wonder that Was India, South Asia Books, 1996.
12. Salma Ahmed A Comprehensive History of Medieval India, Person, New Dehli,2011
13. Satish Chandra, History of Medieval India, orient BlackSwan, 2007.
14. Sherwani H. K. and Josh P.H.(ed) - History of Medieval Deccan (1295-1724 AD) VOI Hyderabad, 1973, Vol II, Hyderabad 1974.
15. Srivastava A. L The Sultanate of Delhi (711-1526 AD), Agra, 1974.
16. Mehta J.L., Advanced study in the history of medieval India, sterling Publishers Pvt.Ltd.
17. Singh Meera, Medieval History of India, Vikas Publishing House Pvt.Ltd.
18. MukhiaHarbans, Perspectives on medieval history, Vikas Publishing House Pvt.Ltd.
19. Tarachand, Influence of Islam on Indian Culture, Delhi.
20. Mahajan V.D. History of India, Madras
21. Irfan Habib, Delhi Sultanate
22. Percy Brown - Art & Architecture, Islamic Architecture
23. Farooqui, A Compressive History of Medieval India, Pearson, Delhi

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**Subject Code** 23-HS-A2342

**Subject : Glimpses of the Modern World - Part 1 (3 Credit)**

**Total Lectures=45**

| Unit | Glimpses of the Modern World - Part 1 | No of lectures (45) |
|------|--------------------------------------|---------------------|
| 1 | **Unit I. The Modern Age**<br>a) Renaissance-Background and Nature<br>b) Religious Movement-Martin Luther King 8 | **10** |
| II | **Unit II. The Age of Revolutions**<br>a) The American Revolution-Causes and Consequences<br>b) The French Revolution- Causes and Consequences<br>c) The Industrial Revolution Causes and Consequences | **15** |
| III | **Unit III. Nationalism**<br>a) Unification of Italy<br>b) Unification of Germany<br>c) Japan-The Meiji Revolution | **10** |
| IV | **Unit IV. World War I and Rise of Communism**<br>a) World War I-Causes and Consequences<br>b) Paris Peace Settlement, League of Nations<br>c) The Russian Revolution - Causes and Consequences | **10** |

**Reference Books :**

1. Carr E.H.. International Relations between the two World Wars. 2.Corwall R.D. World History in 20th Century, Longman, London, 1976.
3. Dev Arjun and Indira Dev, History of the World, Orient Black Swan, Delhi, 2009.
4.Gooch V.P, History of Modern Europe,
5. Grant and Temperley, Europe in the 19th and 20 centuries.
6. Hazen, Modern Europe 7. Jain H. and K. Mathur, A History of the Modern World 1500- 2000 A.D., Jain
Prakashan Mandir, Jaipur, 2014.
8. Rao B.V., World History (3rd edition) from early time to AD 2000, New Dawn Press  INC. V.S.A. UK., India, 2006.

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**Subject Code:  23-HS-A2343**

**Subject: History of the Marathas: (1630-1707)   (3 Credit Course)**

**Total Lectures=45**

| Sr. No | Topic | Lectures |
|--------|-------|----------|
| I | **Unit I: Sources and Rise of the Maratha Power**<br>a) Literary Sources: Marathi and Foreign Sources (Portuguese, English, French)<br>b) Background of the rise of Maratha Power<br>c) Shahaji Raje, Rajmata Jijabai and Early Life of Chhatrapati Shivaji Maharaj | **10** |
| II | **Unit II: Foundation of Swarajya to the Coronation, Karnataka Expedition**<br>a) Relations with Adilshahi: Javali and Afzal Khan episode and its importance<br>b) Relations with Mughals: Campaign of Shayasta Khan, Sack of Surat, expedition of Jaisingh, Visit to Agra<br>c) Coronation and Karnataka Expedition. | **15** |
| III | **Unit III: Administration under Chhatrapati Shivaji Maharaj** 08<br>a) Military<br>b) Civil | **08** |
| IV | **Unit IV: Chhatrapati Sambhaji Maharaj to the Maratha War of Independence**<br>a) Chhatrapati Sambhaji Maharaj: Consolidation of power, Relations with Mughals.<br>b) Chhatrapati Rajaram Maharaj, Maharani Tarabai and Mughals<br>c) Santaji Ghorpade, Dhanaji Jadhav and Ramchandrapant Amatya | **12** |

**Reference Books :**

1.Apte B.K., A History of the Maratha Navy and Merchant Ships, State Board for Literature and Culture, Bombay, 1973.

2. Apte B. K., ed. Chatrapati Shivaji's Coronation Tercentenary Commemoration. Bombay: University of Bombay, 1974-75.

3.Bakshi, S. R. & Sharma, Sri Kant, The Great Marathas-5, Marathas: The Administrative System, Deep & Deep Publications Pvt. Ltd., New Delhi, 2000.

4. Choksey, R.D., Economic Life in Bombay Deccan, Asia Publishing House, Mumbai, 1955.

5. Deshmukh, R.G.,History of Marathas, Nimesh Agencies, Bombay, 1993.

6. Chitnis, K.N., Glimpses of Medieval Indian Ideas & Institutions, 2nd edition, Mrs. RK Chitnis, Pune, 1981.

7. Chitnis, K. N., Glimpses of Maratha Socio- Economic History, Atlantic Publishers & Distributors, New Delhi, 1994.

8. Duff, James Grant, History of Mahrattas, Vol. I and Vol. II, R. Cambray& Co., Calcutta, 1912.

9. Fukazawa, Hiroshi, The Medieval Deccan-Peasants, Social Systems and States – Sixteenth to Eighteenth Centuries, Oxford University Press, New Delhi, 1991

10. Gordon, Stewart, The New Cambridge History of India, The Marathas, Cambridge University Press, New Delhi, 1998,

11. Gune, Vithal Trimbak, The Judicial System of the Marathas, Decean College, Pune, 1953

12. Kulkarni, A. R., Maharashtra in the Age of Shivaji, Deshmukh & Co., Poona, 1969.

13. Kulkarni, A. R., Maharashtra: Society and Culture, Books and Books, New Delhi, 2000.

14. Kumar, Raj (ed.), Maratha Military Systems, Commonwealth Publishers, New Delhi,2004.

15. Mahajan, T. T., Aspects of Agrarian and Urban History of The Marathas, Commonwealth Publishers, New Delhi, 1991.

16. Nadkarni, R. V., The Rise and Fall of the Maratha Empire, Popular Prakashan, Poona, 1966
17. PagadiSetuMadhavrao, Chhatrapati Shivaji, Continental Prakashan, Pune, 1974
18. Ranade, M.G., Rise of the Maratha Power, University of Bombay, 1961.
19. Sardesai, G.S., The Main Currents of Maratha History, Phoenix Publications, Bombay, 1959.
20. Sardesai, G.S., The New History of the Marathas, Vol I: Shivaji and his Times, Phoenix Publications, Bombay, 1971)
21. Sarkar, Jadunath, Shivaji and His Times, 6th edition, Sarkar & sons, 1973.
22. Sarkar, Jadunath, House of Shivaji, Orient Longman, Bombay, 1978.
23. Sen, Surendranath, Administrative System of the Marathas, K.P. Bagchi& Company, Calcutta,1923.
24. Sen, Surendranath, The Military System of the Marathas, Orient Longmans, Calcutta, 1958.
25. Sen, Surendranath, Administrative System of the Marathas, K.P. Bagchi& Company, Calcutta, 1923.
26. Sherwani, H. K. and Joshi P. M. History of Medieval Deccan. 2 Vols. Hyderabad: Govt. of Andhra Pradesh, 1973,

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Subject Code:  23-HS-A2344

Subject : Tourism Management  (2 Credit Course)

Total Lectures=30

| Units | Tourism Management | Lectures (30) |
|---|---|---|

| 1 | **Unit 1 Tourism**<br>a) Definition and Nature of Tourism<br>b) Important Components<br>c) Topology of Tourism. | 5 |
|---|---|---|
| 2 | **Unit II Tourism recent trends**<br>a) Concept of Domestic and International Tourism<br>b) Tourism Recent Trends. | 4 |
| 3 | **Unit III Tourism as Industry**<br>a) Tourism as an Industry<br>b) Visitor, Tourist, Excursionist | 6 |
| 4 | **Unit IV Tourism in India and Impact**<br><br>a) Growth and development of tourism in India<br>b) Economics and Social impact<br>    • c) Physical and environmental impact | 10 |
| 5 | **Field Trip and Report Writing** | 5 |

**Reference Books :**

1. Beaver and Allan (2002), A Dictionary of Travel and Tourism Terminology", CAB International Wallingford, pp. 313.
2. Bhatia A.K. (1983), Tourism Development' Sterling Publishers (P) Ltd. New Delhi
3.Bhatia A.K, Tourism development Principles and Practices, Streling Publisher(P) Ltd. New Delhi
4.Anand M.M., Tourism and Hotel Industry in India, Sterling Publishers(P) Ltd, New Delhi
5. Kaul R.H, Dynamics of Tourism, A Terilogy Sterling Publishers(P) Ltd, New Delhi 6. IITTM, Growth of Modern Tourism, Manogra IITTM, New Delhi, 1989
7. IITTM, Tourism as an Industry.Manogra IITTM, New Delhi, 1989
8. Burhat and Mandlik, Tourismn- Past, Present and Future Heinemann, London
9. Wahab S.K Tourism Management, International Press, London, 1986 10. Brymer Robert A. Introduction to Hotel and Restaurant Management, Hub Publication Company, Lawa, 1982
11. Pran Nath Seth (1997), 'Successful Tourism Management, Vikas Publishing House (P) Ltd.. New Delhi, pp. 329.
12. Riceline J.R. Brent, Travel and Tourism Hospitality Research, London, 1982
13. Aggarwal Surinder Travel Agency Management, Communication India, 1983 14 Tourism Planning: Gunn, Clare A.

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## <u>SEMESTER IV</u>

**Subject Code: 23-HS-A2441**

**Subject: Medieval India: Mughal Period (3 Credit Course)**

**Total Lectures=45**

| Unit | Medieval India: Mughal Period | No. of lectures (45) |
|------|-------------------------------|----------------------|
| I | **Unit I: Foundation of Mughal Empire**<br>a) Sources of Historiography of Mughal Period<br>b) Babur: The Foundation of Mughals Empire<br>c) Humayun Struggle with Sher Shah Suri. Sher Shah: administrative reforms | 10 |
| II | **Unit II : The Consolidation of the Mughal Empire**<br>a) Akbar: Extent of the Mughal Empire, Mansabdari System, Religious Policy<br>b) Expansion: Deccan Policy of Jahangir and Shah Jahan<br>c) The reign of Aurangzeb: Rajput Policy, Ahom conflicts, Sikh Policy, Deccan expeditions | 15 |
| III | **Unit III: Administrative systems**<br>a) Central and Provincial Administration<br>b) Revenue System<br>c) Judicial System, Military administration | 10 |
| IV | **Unit IV: Economy, Society and Culture**<br>a) Economy: Agriculture, trade and industry<br>b) Society: Caste system, position of women, Bhakti and Sufi movement.<br>c) Culture: Science and Technology. | 10 |

**Reference Books**

1. Banerjee A.C.,New History of Medieval India, New Delhi,S.Chand& Co., New Delhi, 1990.
2. ChitnisK.N., Glimpses of Medieval Indian and Institutions, Poona, 1981.
3. ChitnisK.N.,Socio-Economic History of Medieval India, Atlantic Publishers and Distributors, New Delhi, 1990..
4. Chopra P.N., Puri B.N., Das M.N-A Social, Cultural and Economic History of India, Vol II.Macmillan India, Delhi, 1974.
5. Lane Poole Stanley, Medieval India, London, 1910
6. Majumdar R.C(ed)-The History and Culture of the Indian People, Vol VII:The Moghul Empire, Bombay, 1974.
7. Mehta J.L-Advanced Study in the History of Medieval India Volll, New Delhi sterling Publishers,1983
8. Moreland W.H., From Akbar to Aurangzeb:Study in Economic History, London, 1923
9. Moreland E.H., India at the Death of Akbar:An Economic Study, London, 1920
10. Richards J.F., The Moghul Empire, Cambridge, 1994.
11. Salma Ahmed Farooqui, A Comprehensive History of Medieval India, Person, New Dehli, 2011
12. Sarkar Jadunath., Mughal Administration, Calcutta, 1963.
13. Sharna S.R., Mughal Empire in India, Agra, 1971.
14. Srivastava A. L., The Mughal Empire (1526-1803 AD), Agra 1974.
15. Mehta J.L., Advanced study in the history of medieval India, sterling Publishers
16. Varma Nirmala, History of India Mughal Period, ABCD Publishers.

17. Singh Meera, Medieval History of India, Vikas Publishing House Pvt.Ltd.
18. MukhiaHarbans, Perspectives on medieval history, Vikas Publishing House Pvt.Ltd.
19. Lanepule Stanley, Medieval India 20. Percy Brown - Art & Islamic Architecture
21. Satishchandra- History of Medieval India, Orient Blackswan, Hyderabad.

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**Subject Code: 23-HS-A2442**

**Subject: Glimpses of the Modern World - Part 2   (3 credit course)**

**Total Lectures=45**

| Units | Glimpses of the Modern World - Part 2 | Lectures |
|:---:|:---|:---:|
| 1 | **Unit 1. Nationalist Movements in Asia and Africa**<br>a) Dr. Sun-Yet-Sen<br>b) Mahatma Gandhi (Non-Cooperation Movement, Civil Disobedience Movement, Quit India Movement)<br>c) Dr. Nelson Mandela | 10 |
| 2 | **Unit II. Rise of Dictatorship 15**<br>a) Italy – Mussolini<br>b) Germany-Hitler<br>c) Turkestan - Kemal Pasha<br>d) Militarism in Japan | 15 |
| 3 | **Unit III. World War II and the Rise of World Power**<br>a) World War II-Causes and Consequences<br>b) United Nations Organization - Structure and Functions<br>c) The Rise of the World Powers US.A. and U.S.S.R. | 10 |
| 4 | **Unit IV. Cold War and Third World 10**<br>a) Cold War: Causes, Nature and Course<br>b) Third World: Non-Alignment Movement<br>c) End of the Cold War and Disintegration of U.S.S.R.. | 10 |

**Reference Books:**

1. Carr EH, International Relations Between the Two World Wars.
2. Corwall RD: World History in the 20th Century, Longman, London, 1976,
3.Dev Arjim and Indira Dev, History of the World Orient BlackSwan, Delhi, 2009.
4. Gooch VP, History of Modern Europe.
5. Grant and Temporally, Europe in the 19th and 20th centuriesx.
6. Hazen, Modern Europe
7. Jain H. and K. Mathur, A History of the Modern World 1500-2000 AD, Jain Prakashan Mandir, Jaipur, 2014,.
8. Rao BV: World History (Jrd edition) from early time to AD 2000, New Dawn Press. INC, VSA UK, India. 2006.

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**Subject Code:  23-HS-A2443**

**Subject: History of the Marathas: (1707-1818) (3 Credit Course)**

 **Total Lectures = 45**

| Units | History of the Marathas: (1707-1818) | Lectures |
|:---:|:---:|:---:|

| | | |
|---|---|---|
| 1 | **Unit I: Consolidation and Expansion of the Maratha Power**<br>a) Conflict between Maharani Tarabai and Chhatrapati Shahu Maharaj<br>b) Rise of the Peshwas: Balaji Vishwanath- Chauthai and Sardeshmukhi<br>c) Peshwa Bajirao 1: South and North Expedition | 12 |
| 2 | **Unit II: Strengthening of the Maratha Power**<br>a) Peshwa Balaji Bajirao (Nanasaheb)<br>b) Third Battle of Panipat: Causes and Consequences<br>c) Causes of the defeat of the Marathas | 10 |
| 3 | **Unit III: Post Panipat Revival and Downfall**<br>a) Peshwa Madhavrao I<br>b) Barbhai Council: Role of Mahadji Shinde and Nana Phadanvis<br>c) Downfall of Maratha Power | 11 |
| 4 | **Unit IV: Administration and Society during Peshwa Period**<br>a) Maratha Confederacy<br>b) Economic Condition<br>c) Society: Caste System and Position of Women. | 12 |

**References:**

Alavi, Seema (ed.), The Eighteenth Century in India, OUP, New Delhi, 2002

2. Ballhatchet, Kenneth, Social Policy and Social Change in Western India, 1817-1830, Oxford University Press, 1957.

3.Chandra, Satish, The Eighteenth Century in India: Its Economy and the Role of the Marathas, the Jats, the Sikhs and the Afghans, Kolkata, K.P. Bagchi, 1986

4. Desai S.V., Social Life in Maharashtra under the Peshwas, Popular Prakashan, Bombay, 1962.

5. Deshmukh, S, Shivakalin va PeshwakalinStree Jeevan, Tilak Maharashtra Vidyapeeth, Pune, 1973.

6. Deshmukh, R.G., History of Marathas, Nimesh Agencies, Bombay, 1993.

7. Dighe, V. G., Peshwa Bajirao I and Maratha Expansion, Karnatak Publishing House, Bombay, 1944.

8. Fukazawa, Hiroshi, The Medieval Deccan- Peasants, Social Systems and States -

Sixteenth to Eighteenth Centuries, Oxford University Press, New Delhi, 1991

9. Gawali, P. A., Society and Social Disabilities Under the Peshwas, National Publishing House, New Delhi, 1988.

10. Gokhale, B.G., Poona in the Eighteenth Century. An Urban Study, Oxford University Press, 1987.

11. Gordon, Stewart, Marathas, Marauders, and State Formation in Eighteenth Century India, Oxford University Press, Delhi, 1994.

12. Joshi, V.V., The Clash of Three Empires: A Study of British Conquests of India with Special reference to the Marathas, Kitabistan; Allahabad, 1941.

13. Kale, D.V., Social Life and Manners in Bombay Maharashtra (1750-1800), Bombay, 1972

14. Kotani, Hiroyuki, Western India in Historical Transition - Seventeenth to Early Twentieth Century's, Manohar Publishers & Distributors, New Delhi, 2002.

15. Kulkarni, Madhukar, PeshwaiteelNyayadaan, MansanmanPrakashan, Pune, 1998.

16 .Marshall,P.J. (ed.), The Eighteenth Century in Indian History: Evolution or Revolution? OUP, New Delhi, 2003

17. Mahajan, T. T., Industry, Trade and Commerce During Peshwa Period, Pointer Publishers, Jaipur, 1989.

18. Mahajan, T. T.. Maratha Administration in the 18th Century, Commonwealth Publishers, New Delhi, 1990.

19. Nadkarni, R. V. The Rise and Fall of the Maratha Empire, Popular Prakashan, Poona, 1966

20. Pagdi, S. M. Eighteenth Century Deccan. Bombay: Popular Prakashan, 1963.

21. Pawar, A. G., ed. Maratha History Seminar Papers. Kolhapur. Shivaji University, 1970,

22. Ranade, M. G. Rise of the Maratha Power. New Delhi: Publication Division, Govt. of India 1974

23. Sardesai, G.S., The New History of the Marathas, Vol II: The Expansion of the Maratha Power, Phoenix Publications, Bombay, 1958.

24. Sardesai, G.S., The New History of the Marathas, Vol III: Sunset Over Maharashtra, Phoenix Publications, Bombay,1968

25. Sen, Sailendra Nath, Anglo- Maratha Relations 1785-96, MacMillan, Delhi, 1974.

26. Sinha, H. N., Rise of the Peshwas, The Indian Press Ltd., Allahabad, 1931.

27. Srinivasan, C. K., Bajirao I, The Great Peshwa, Asia Publishing House, Bombay, 1961.

28. Wink, Andre, Land and Sovereignty in India - Agrarian Society and Politics under the Eighteenth Century Maratha Svarajya, Orient Longman, Hyderabad, 1986.

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**Subject Code: 23-HS-A2444**

**Subject:  Travel Agency and Tour Business (2 Credit Course)**

**Total Lectures = 30**

| Units | Travel Agency and Tour Business | Lectures |
|:---:|:---|:---:|
| 1 | **Unit I. Concept of Travel Agency**<br>a) Definition of travel agency<br>b) Main function of travel agency<br>c) Organizational Structure of a travel agency | 6 |
| 2 | **Unit II. Role of Travel Agent**<br>a) Types of Travel Agents<br>b) Responsibilities of Travel Agent<br>c) Procedure for Travel Agent and Tour Operators in India<br>d) Online Travel Agency | 9 |
| 3 | **Unit III. Role of Travel Agency**<br>a) Role of Indian Airlines, Indian Railway<br>b) Role of different Tour Companies<br>c) Tour Packages and Accommodation | 9 |
| 4 | **Unit IV: Field Visit and Report Writing** | 6 |

**Reference Books :**

1.Foster D.L. The Business of travel agency Operation and tour Management
2. Merissen Jome W, Travel Agent and Tourism
3. Howel David H, Principals and Methods of Scheduling Reservations
4. J.M.S. Negi Travel Agency & Tour Operations
5.Agarwal Surinder, Travel Agency Managements
6. Bhatia A.K, Professional Travel Agency Management
7 Bhatia A.K, Tourism Development
8. Pran Nath Seth (1997), Successful Tourism Management, Vikas Publishing House Lad, New Delhi.
9. Willaim Cordve, Travel in India
10 National Publisher.The World of Travel
11. Stephen F. Witt and Luiz Moutinho (1995), "Tourism Marketing and Management Hand Book, Prentice Hall, London, pp 3.
12. Webstar Susan, Group Travel Operating Procedure
13. Roger Carter (1990), Tourism-Exercise and Activities, Hodder & Stoughton, London
14. Sharma K.K. (1991), "Tourism in India', Classic Publishing House, New Delhi.
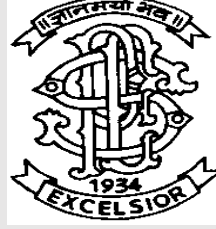
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*Progressive Education Society's*

**Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)**

Syllabus for

# S. Y. B. A- Marathi

मॉडर्न महाविद्यालयातील कला शाखेमध्ये मराठी हा विषय सामान्य स्तरावर शिकविला जातो . या अभ्यासक्रमाच्या माध्यमातून विशिष्ट साहित्य प्रकारचा अभ्यास शिकविला जातो. कादंबरी व ललितगद्य हा साहित्यप्रकाराचा अभ्यासक्रम असून लेखन ,वाचन ,वक्तृत्व या कौशल्य प्राप्तीसाठी विद्यार्थ्यांना प्रवृत्त केलं जातं. आधुनिक भारतीय भाषांसाठी २ श्रेयांकाचं विशेष अभ्यासक्रम राविला जातो. पारंपरिक समाजमाध्यमांचा व नवसमाजमाध्यमांचा भाषिक विकासासाठी व व्यक्तिमत्व विकासासाठी या अभ्यासक्रमाचा उपयोग होतो. एकूणच मातृभाषेतून सर्जनशील लेखन करणे व वैचारिक प्रगल्भता येणे या साठी विभागातर्फे वेगवेगळे उपक्रम वर्गात राबविले जातात.

**Programme Specific Outcomes (PSOs):**

# द्वितीय वर्ष –कला [मराठी] सामान्य स्तर

**Course Outcome - SYBA (G-2) Marathi**

**भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्य प्रकार : कादंबरी**
**तृतीय सत्र (SEM-3)**
१. कादंबरी या साहित्य प्रकाराची संकल्पना समजेल (आकलन )
२. कादंबरी या साहित्य प्रकाराचे विश्लेषण करता येईल. (आस्वाद व मूल्यमापन )
३. मराठी लेखन विषयक नियमांची माहिती होईल. लेखन कौशल्य विकसित होईल.

**चतुर्थ सत्र ( SEM -4)**
**भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्य प्रकार :ललित गद्य**
१. ललित गद्य या साहित्य प्रकाराची संकल्पना समजेल (आकलन )
२. ललित गद्य या साहित्य प्रकाराचे विश्लेषण करता येईल. (आस्वाद व मूल्यमापन )
३. वैचारिक व ललित निबंधाचे लेखन करता येईल

**Course Outcome - SYBA (G-2) Marathi MIL ( आधुनिक भारतीय भाषा ) (2 CREDITS)**
मराठी भाषिक संज्ञापन कौशल्ये
तृतीय सत्र (SEM-3)
१. व्यक्तिमत्व विकासात भाषेचे महत्व स्पष्ट होईल.
२. लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे यांचा परस्परसंबंधांचे आकलन होईल .
३. प्रसारमाध्यमांसाठी लेखन क्षमता विकसित होतील.

नवमाध्यमे आणि समाज माध्यमांसाठी मराठी
चतुर्थ सत्र ( SEM -4)
१. संज्ञापनातील नवमाध्यमे आणि समाज माध्यमांचे स्वरूप व स्थान स्पष्ट होईल.
२. नवमाध्यमे आणि समाज माध्यमांसाठी लेखन क्षमता विकसित होतील.
३. नवमाध्यमे आणि समाजमाध्यमांविषयक साक्षरता निर्माण होईल.

## Examination

**SYBA -MARATHI G-2     INTERNAL -30 MARKS  AND EXTERNAL -70 MARKS**

**SYBA -MIL MARATHI – 2 CREDIT   INTERNAL -25 AND EXTERNAL -25**

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1.      Library notes
2.      Students Seminar
3.      Short Quizzes / MCQ Test
4.      Home Assignments
5.      Written Test

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys

# Subject List

S. Y. B. A.Marathi Syllabus
द्वितीय वर्ष –कला ⌈मराठी⌉सामान्य स्तर G-2

(Semester & Choice Based Credit System)

निवड आधारित श्रेयांक पद्धत

(To be implemented from the Academic Year2023-24  )

| सत्र | विषयाचे नाव | सांकेतांक |
|---|---|---|
| सत्र –३रे (Sem -3) | भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्य प्रकार : कादंबरी 3 CREDITS | Subject code **23-MR-A23M3** |
| सत्र ४थे (Sem -4) | भाषिक कौशल्यविकास आणि आधुनिक मराठी साहित्य प्रकार :ललित गद्य 3 CREDITS | Subject code **23- MR-A24M3** |

### S. Y. B. A.Marathi MIL Syllabus (2 CREDITS)

## द्वितीय वर्ष –कला [मराठी]

(Semester & Choice Based Credit System)

निवडआधारित श्रेयांक पद्धत

(To be implemented from the Academic Year2023-24  )

| सत्र | विषयाचे नाव | सांकेतांक |
|---|---|---|
| सत्र –३रे (Sem -3) | मराठी भाषिक संज्ञापन कौशल्ये | Subject code **23-MR - A23M4** |
| सत्र ४थे (Sem -4) | नवमाध्यमे आणि समाज माध्यमांसाठी मराठी | Subject code **23-MR - A24M2** |

# Syllabus

## द्वितीय वर्ष –कला

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# मराठी – सामान्य स्तर तृतीय सत्र (SEM-3)
## Choice Based Credit System (निवडआधारित श्रेयांक पद्धत )

अभ्यासक्रमाची उद्दिष्टे
१ . कादंबरी या साहित्य प्रकाराची संकल्पना व वैशिष्ट्ये समजावून सांगणे
२ . कादंबरी या साहित्यप्रकाराच्या विविध घटकांची ओळख करून देणे
३ . मराठी कादंबरीची जडणघडण व वाटचाल समजावून सांगणे
४ . अभ्यासक्रमात नेमलेल्या कादंबरीचे आकलन ,आस्वाद आणि विश्लेषण करणे
५ . वाङ्मयीन अभिरुची विकसित करणे
६. भाषिक कौशल्य विकसित करणे
७ . मराठी लेखनविषयक नियमांची माहिती करून देणे .
८ . संगणकाच्या माध्यमातून मराठी मुद्रण करता येणे .

| घटक | तपशील | श्रेयांक | तासिका |
|---|---|---|---|
| १ | कादंबरी : संकल्पना <br> कादंबरी : घटक व वैशिष्ट्ये <br> मराठी कादंबरीची वाटचाल <br> कादंबरी : प्रकार आणि प्रवाह | १ | १५ |
| २ | अभ्यास पुस्तक <br> रारंग ढांग –प्रभाकर पेंढारकर (कादंबरी) <br> मौज प्रकाशन गृह ,मुंबई | १ | ३० |
| ३ | मराठी लेखन विषयक नियमांचा अभ्यास <br> (दिलेल्या उतारा मराठी लेखन नियमानुसार दुरुस्त करणे ) <br><br> संगणक व मोबाईलवर युनिकोडमधून मुद्रण करणे | १ | १५ |

संदर्भग्रंथ

१. साहित्य अध्यापन व प्रकार ,संपादक – श्री.पु.भागवत आणि इतर
२. आधुनिक मराठी वाङ्मयाचा इतिहास ,खंड ४,५,६ संपादक –रा .श्री .जोग
३. आधुनिक मराठी वाङ्मयाचा इतिहास – अ .ना.देशपांडे
४. मराठी कादंबरी : समाजशास्त्रीय समीक्षा,डॉ.रवींद्र ठाकूर

५. मराठी कादंबरीतील प्रादेशिकता – डॉ. भास्कर शेळके

६. मराठी ग्रामीण कादंबरी – डॉ.रवींद्र ठाकूर

७. मराठी कादंबरीचे पहिले शतक – कुसुमावती देशपांडे

८. कादंबरी आणि मराठी कादंबरी –उषा हस्तक

९. मराठी कादंबरी आस्वादयात्रा ,संपादक – डॉ. विजया राजाध्यक्ष

१०. मराठी कादंबरी :तंत्र आणि विकास – प्रा.वा. बापट ,ना .व.गोडबोले

११. मराठी प्रादेशिक कादंबरी : तंत्र आणि स्वरूप – डॉ. मदन गोडबोले

१२. मराठी कादंबरी : चिंतन आणि समीक्षा –डॉ. चंद्रकांत बांदिवडेकर

१३. कादंबरी :सार आणि विस्तार – डॉ .महेंद्र कदम

१४. कादंबरीविषयी – हरिश्चंद्र थोरात

१५. मराठी कादंबरी :आशय आणि आविष्कार –दत्ता घोलप

१६. मराठी कादंबरी : परंपरा आणि चिकित्सा –राजेंद्र सलालकर

१७. रारंग ढांग : एक आकलन – डॉ. राजेंद्रसिंग देवरे ,अक्षरवाङ्मय प्रकाशन ,पुणे

१८. सायबर संस्कृती– डॉ रमेश वरखेडे

१९. उपयोजित मराठी, संपादक –डॉ. केतकी मोडक, संतोष शेणई, सुजाता शेणई

२०. https://play.google.com/store/apps/details?id=org.mkcl.solar.itmarathi&hl

२१. http://www.youtube.com/watch?v=oXAWMH5PDxY

# द्वितीय वर्ष –कला

## मराठी – सामान्य स्तर , चतुर्थ सत्र ( SEM -4)
### Choice Based Credit System
(निवड आधारित श्रेयांक पद्धत )

**अभ्यासक्रमाची उद्दिष्टे**

१. ललित गद्य या साहित्यप्रकाराची संकल्पना व वैशिष्ट्ये समजावून सांगणे

२ मराठी ललितगद्याची वाटचाल समजावून सांगणे

३.ललितगाद्याची व्यापकता स्पष्ट करणे

४. नेमलेल्या अभ्यास पुस्तकाच्या आधारे ललित गद्य या साहित्यप्रकाराचा अभ्यास करणे

५. वैचारिक व ललित निबंधाचे लेखन करणे

६. भाषिक कौशल्य विकसित करणे

| घटक | तपशील | श्रेयांक | तासिका |
|---|---|---|---|
| १ | अ - निबंध लेखन - वैचारिक व ललित<br><br>ब- ललित गद्य : स्वरूप व संकल्पना<br><br>ललित गद्य - प्रकार व वैशिष्ट्ये<br><br>ललित गद्य : वाटचाल | १ | १५ |
| २ | अभ्यास पुस्तक<br>साहित्यरंग  (ललित गद्य)<br><br>संपादक<br><br>प्रा.डॉ.शिरीष लांडगे ,प्रा.  डॉ.दिलीप पवार ,प्रा.डॉ .जया कदम<br><br>अक्षरवाङ्मय प्रकाशन ,पुणे | २ | ३० |

संदर्भ ग्रंथ
१.  लघुनिबंध ते मुक्तछंद ,वि.शं .  चौगुले
२.  ग्रंथ संवाद ,वि.शं .  चौगुले
३.  मराठी लघुनिबंधाचा इतिहास ,डॉ.  आनंद यादव
४.  निबंध : शास्त्र व कला ,डॉ.  प्र.  न.  जोशी
५.  मराठी निबंध ,प्रा.  मा.वि.  फाटक
६.  प्रतिभासाधन , ना .सी .  फडके
७ .  प्रदक्षिणा खंड १ व २,कन्टिनेंटल प्रकाशन. ,पुणे
८.  मराठी वाङ्मयाचा इतिहास ,खंड ७,भाग-३ -,मसाप प्रकाशन ,पुणे
९.  मराठी प्रवास वर्णनाची वाटचाल - प्रा .डॉ.  नीला पांढरे
१०.  प्रवासवर्णन ,वसंत सावंत
११ .  वि.स.खांडेकर - पारिजात प्रस्तावना ,प्रथमावृत्ती १९५२,कन्टिनेंटल प्रकाशन,पुणे
१२.  वि.पा.  देऊळगावकर व चंद्रकांत देऊळगावकर ,मराठी लघुनिबंध -लघुनिबंध -स्वरूप व विवेचन
१३ .  गंगाधर गाडगीळ - पाण्यावरची अक्षरे
१४ .  आधुनिक वाङ्मयाचा इतिहास -अ .  ना.देशपांडे ,भाग-२
१५ .  शांता शेळके, "१९६० ते १९८५ मधील ललित गद्य",ललित (ललित लेखन विशेषांक )ऑगस्ट १९८८

१६ . माधव नारायण आचार्य ,"एका वाङ्मयाच्या मुक्ततेची कहाणी ,महाराष्ट्र साहित्य पत्रिका ,जुलै-
डिसेंबर १९७८

द्वितीय वर्ष –कला

मराठी –  MIL ( Modern Indian Languages Syllabus )

Choice Based Credit System

(निवड आधारित श्रेयांक पद्धत )

तृतीय सत्र (SEM-3)

अभ्यासक्रमाची उद्दिष्टे

१.प्रगत भाषिक कौशल्यांचा विकास करणे .

२. व्यक्तिमत्त्वविकास आणि भाषा यांचा सहसंबंध स्पष्ट करणे .

३. लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे यांचा परस्परसंबंध स्पष्ट करणे .

४.प्रसारमाध्यमांसाठी लेखनक्षमता विकसित करणे

| घटक | तपशील | श्रेयांक | तासिका |
|------|-------|---------|--------|
|      |       |         |        |

| १ | १ . भाषा आणि व्यक्तिमत्त्वविकास : सहसंबंध

२. लोकशाहीतील जीवनव्यवहार आणि प्रसारमाध्यमे | १ | १५ |
| २ | प्रसारमाध्यमांसाठी लेखन
१. वृत्तपत्रासाठी बातमीलेखन आणि मुद्रितशोधन
२. नभोवाणीवरील भाषणासाठी संहितालेखन
३. दूरचित्रवाणीसाठी माहितीपटाचे संहितालेखन | १ | १५ |

संदर्भ ग्रंथ

१. उपयोजित मराठी ,डॉ.केतकी मोडक,सुजाता शेणई ,संतोष शेणई
२. व्यावहारिक मराठी –डॉ.ल.रा.नसिराबादकर,फडके प्रकाशन ,कोल्हापूर
३. प्रसारमाध्यमांसाठी लेखन कौशल्य ,य. च. म. मुक्त विद्यापीठ ,नाशिक
४. व्यावहारिक मराठी ,डॉ.लीला गोविलकर ,डॉ.जयश्री पाटणकर ,स्नेहवर्धन प्रकाशन ,पुणे
५. व्यावहारिक मराठी : पुणे विद्यापीठ प्रकाशन ,पुणे
६. व्यावहारिक ,उपयोजित मराठी आणि प्रसारमाध्यमांची कार्यशैली ,संपादक: डॉ .संदीप सांगळे
७. प्रसारमाध्यमे आणि मराठी भाषा ,संपादक डॉ .भास्कर शेळके
८. वैखरी ,भाषा आणि भाषाव्यवहार ,अशोक केळकर
९. मराठी भाषेची संवादकौशल्ये [पुस्तक क्र. १ ते ८ ]य.च.म. मुक्त विद्यापीठ ,नाशिक
१०.व्यावहारिक मराठी आणि उपयोजित मराठी डॉ. मनोहर रोकडे
११. मराठी भाषा उपयोजन आणि सर्जन ,प्रा .सुहासकुमार बोबडे
१२. व्यावहारिक मराठी संपादक – डॉ. स्नेहल तावरे ,स्नेहवर्धन प्रकाशन ,पुणे

# द्वितीय वर्ष –कला
## मराठी – MIL(Modern Indian Languages Syllabus)
## Choice Based Credit System (निवड आधारित श्रेयांक पद्धत )
### चतुर्थ सत्र ( SEM -4)

अभ्यासक्रमाची उद्दिष्टे

१. संज्ञापनातील नवमाध्यमे आणि समाजमाध्यमांचे स्वरूप व स्थान स्पष्ट करणे .
२. भाषा ,जीवन व्यवहार ,नवमाध्यमे आणि समाजमाध्यमे यांचा परस्पर संबंध स्पष्ट करणे .
३. नवमाध्यमे आणि समाजमाध्यमांसाठी लेखनक्षमता विकसित करणे .
४. नवमाध्यमे आणि समाजमाध्यमांविषयक साक्षरता निर्माण करणे .
५. नवमाध्यमे आणि समाजमाध्यमांचा वापर आणि परिणाम या बद्दल चर्चा करणे .

| घटक | तपशील | श्रेयांक | तासिका |
|---|---|---|---|
| १ | १. भाषा ,जीवनव्यवहार ,नवमाध्यमे आणि समाजमाध्यमे <br> २. नवमाध्यमे आणि समाजमाध्यमांचे प्रकार : फेसबुक ,ब्लॉग आणि ट्विटर <br> ३. नवमाध्यमे आणि समाजमाध्यमांविषयक साक्षरता ,दक्षता ,वापर आणि परिणाम | १ | १५ |
| २ | १. वेबसाईट ,ब्लॉग आणि ट्विटर या नवमाध्यमांसाठी साठी लेखन <br> २. व्यावसायिक पत्रव्यवहार | १ | १५ |

## संदर्भग्रंथ

१. सायबर संस्कृती – डॉ. रमेश वरखेडे
२. ओळख माहिती तंत्रज्ञानाची – टिमोथी जे . ओ . लिअरी
३.  संगणक ,अच्युत गोडबोले ,मौज प्रकाशन ,मुंबई
४. इंटरनेट ,डॉ.प्रबोध चोबे , मनोरमा प्रकाशन ,मुंबई
५ . आधुनिक माहिती तंत्रज्ञानाच्या विश्वात ,दीपक शिक्रापूरकर ,उत्कर्ष प्रकाशन ,पुणे
६. उपयोजित मराठी ,डॉ.केतकी मोडक,सुजाता शेणई ,संतोष शेणई
७. व्यावहारिक मराठी –डॉ.ल.रा.नसिराबादकर,फडके प्रकाशन ,कोल्हापूर
८. प्रसारमाध्यमांसाठी लेखनकौशल्ये ,य . च .म . मुक्त विद्यापीठ ,नाशिक
९. व्यावहारिक मराठी ,डॉ.लीला गोविलकर ,डॉ.जयश्री पाटणकर ,स्नेहवर्धन प्रकाशन ,पुणे
१०. व्यावहारिक मराठी : पुणे विद्यापीठ प्रकाशन ,पुणे
११. व्यावहारिक ,उपयोजित मराठी आणि प्रसारमाध्यमांची कार्यशैली ,संपादक:डॉ .संदीप सांगळे
१२ . प्रसारमाध्यमे आणि मराठी भाषा ,संपादक: डॉ .भास्कर शेळके
१३. वैखरी ,भाषा आणि भाषाव्यवहार ,अशोक केळकर
१४. मराठी भाषेची संवाद कौशल्ये [पुस्तक क्र. १ ते ८ ]य.च.म. मुक्त विद्यापीठ ,नाशिक
१५. व्यावहारिक मराठी आणि उपयोजित मराठी डॉ. मनोहर रोकडे
१६. मराठी भाषा उपयोजन आणि सर्जन ,प्रा .सुहासकुमार बोबडे

*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

# S. Y. B. A. Psychology

## Introduction:

## Programme Objectives:

1. Get acquainted with various areas of adjustment.

2. Understand the importance, characteristics and concern in lifespan development.

3.  Understand the periods of development, the significance of age, and discuss developmental issues.

4. Understand health psychology and arrive at the introduction to the role of psychology in health.

5. Understand the concept of personality with various theories of personality on the basis of personality psychology

6. Understand causes, symptoms and overview of all disorders.

## Programme Specific Outcomes (PSOs):

1. Become familiar with modern ways of effective adjustment.

2. Obtain an empirical approach in adjustment psychology.

3. Understand biological, cognitive, and socio-emotional processes.

4. Understand Psychoanalytic, Cognitive, Behavioural and Social Cognitive, Ethological, Ecological and Eclectic theories of development

5. Understand methods of data collection and research designs used in Life-span development research

6. Understand the nature of stress and coping.

7. Understand various factors related to health and diseases.

8. Understand quality of life and promoting the good health.

9. Understand and observe, interpret individual differences in behaviour in the light of sound theoretical systems of personality.

10. Understand comprehensive overview of the major theories personality.

## Examination Pattern:

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Group Discussion
8. Open Book Test
9. Written Test
10. PPT presentation

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Power Point Presentations
5. Research Papers & Projects
6. E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Total No.of Lectures | | |
| --- | --- | --- | --- | --- | --- |
| | | | Theory | Total | |
| 1 | | 23-A2351<br><br>Psychology of Adjustment | 4 | | 48 |
| 2 | | 23-A2352<br><br>Developmental Psychology | 4 | 16 | 48 |
| 3 | | 23-A2353<br><br>Health Psychology | 4 | | 48 |
| 4 | | 23-A2354<br><br>Basic Counselling Skills I | 4 | | 24 |

**SEMESTER IV**

| Sr. No. | Subject Type | Subject Code & Title | Total No.of Lectures | | |
| --- | --- | --- | --- | --- | --- |
| | | | Theory | Total | |
| 1 | | 23-A2451<br><br>Psychology of Abnormal Behaviour | 4 | | 48 |
| 2 | | 23-A2452<br><br>Theories of Personality | 4 | 16 | 48 |
| 3 | | 23-A2453<br><br>Psychology and Gender | 4 | | 48 |
| 4 | | 23-A2454<br><br>Basic Counselling Skills II | 4 | | 24 |

# Syllabus

**Subject Code: 23-A2351**

**Subject: Psychology of Adjustment (4 Credit)**

**Total Lectures = 48**

| Unit | Topic | No of lectures |
|------|-------|----------------|
| 1 | **Adjusting To Modern Life**<br><br>1.1 Psychology of Adjustment<br><br>1.2 Psychodynamic Perspectives: Freud, Jung and Adler<br><br>1.3 Behavioural Perspectives: Pavlov, Skinner, Bandura<br><br>1.4 Roots of Happiness | **12** |
| II | **Marriage And Intimate Relationship**<br><br>2.1 Moving Towards Marriage<br><br>2.2 Marital Adjustment across the Family Life Cycle<br><br>2.3 Vulnerable Areas in Marital Adjustment and Divorce<br><br>    i.     Gaps in Role Expectation<br>    ii.    Work and Career Issues<br>    iii.   Financial Difficulties<br>    iv.   Inadequate Communication<br>    v.    Deciding On and Adjusting To Divorce<br><br> 2.4. Alternatives to Marriage: Remaining Single and Co-Habitation | **12** |
| III | **Interpersonal Communication**<br><br>3.1 Communication and Adjustment and Component of communication process<br><br>3.2 Technology and Interpersonal Communication<br><br>3.3 Interpersonal Conflict - Types of conflict, Style of managing conflict<br><br>3.4 Developing an Assertive Communication Style - Steps in Assertiveness Training | **12** |

| IV | Career And Work | |
|---|---|---|
| | 4.1 Choosing a Career | **12** |
| |    i.   Examining Personal Characteristics and Family Influences<br>   ii.  Researching Job Characteristics<br>  iii.  Using Psychological Tests for Career Decisions<br>  iv.  Taking Important Considerations in Account | |
| | 4.2 Models of Career Choice and Development: | |
| |    i.    Holland<br>  ii.    Super | |
| | 4.3 Coping with Occupational Hazards | |
| |    i.   Job Stress<br>  ii.  Sexual Harassment<br>  iii.  Unemployment | |
| | 4.4 Work-Life Balance: Work Holism, Family Roles, Leisure and Recreation | |

**Reference Books:**

1. Weiten, W. and Lloyd, M. (2007) Psychology Applied to Modem life: Adjustment in the 21st Century. India, 8th Edition, Thomson.
2. Coleman. J.C. Psychology and effective behaviour. D.B. Taraporwala Sons & Co. Bombay
3. Lazarus: R.S. Patterns of adjustment. N.D. McGraw Hill.
4. Martin L.G., Osborne. G. (1989) Psychology: Adjustment and everyday living N.J. Prentice-Hall, Englewood Cliffs.

**Subject Code: 23-A2352**

**Subject: Developmental Psychology  (4 Credit Course)**

**Total Lectures = 48**

| Sr. No | Topic | Lectures |
|:---:|:---|:---:|
| I | **Introduction to Lifespan Development**<br><br>1.1. The Life-Span Perspective: The Importance of Studying Life- Span Development, Characteristics of the Life-Span Perspective, Some Contemporary Concerns<br><br>1.2. The Nature of Development: Biological, Cognitive, and Socio emotional Processes, Periods of Development, The Significance of Age, Developmental Issues<br><br>1.3. Theories of Development: Psychoanalytic Theories, Cognitive Theories, Behavioral and Social Cognitive Theories, Ethological Theory, Ecological Theory, Eclectic Theoretical Orientation<br><br>1.4. Research in Life-Span Development: Methods for Collecting Data, Research Designs, Time Span of Research | **12** |
| II | **Biological Beginnings & Prenatal Development**<br><br>2.1. Genetic foundation of Development: The Collaborative Genes, Genes and Chromosomes, Genetic Principles, Chromosomal and Gene linked Abnormalities<br><br>2.2. Heredity and Environment interaction: The nature $\times$ Nurture Debate 6 SPPU, Psychology<br><br>2.3.a) The Teratology and Hazards to prenatal Development b) Reproductive Challenges and Choices<br><br>2.4.The Course of Prenatal Development and Birth Process,  Assessing the Newborn | **12** |
| III | **Infancy**<br>3.1. Physical growth and development in infancy<br>3.2. Motor, Sensory and Perceptual Development Cognitive Development<br>3.3. a) Piaget's Theory of Infant Development b) Learning, Remembering, and Conceptualizing<br>3.4. Language Development | **12** |

| IV | Early Childhood | 12 |
|---|---|---|
| | 4.1. Physical changes, Cognitive Changes | |
| | 4.2. a) Piaget's preoperational stages b) Vygotsky's Theory | |
| | 4.3. The Self, Emotional and Moral Development | |
| | 4.4. Families, Peer relations and Play | |

**Reference Books :**

1. Berk, L. E. (2004). Development through the lifespan. (3rd Ed). New Delhi: Pearson Education Dorling Kindersley India pvt ltd. Berk, L. E. (2006).
2. Child Development. (7 Ed). New Delhi: Pearson Education Dorling Kindersley India pvt ltd. Cook, J. L., & Cook, G. (2009).
3. Child Development: Principles and Perspectives. Boston: Pearson Education Crandell, T. L., Crandell, C. H., & Zanden, J. W. V. (2009).
4. Human Development Dacey, J. S. & Travers, J. F. (2004). Human Development across the lifespan. (5 Ed). McGraw Hill co. Feldman, R. S., & Babu, N. (2011).
5. Discovering the Life Span. Indian subcontinent adaptation, New Delhi: Dorling Kindersley India pvt ltd. Kail, R. V. (2007). Children and their Development. (4 Ed). New Jersey: Pearson Education Inc. McDevitt, T. M., & Omrod, J. E. (2007).
6. Child Development and Education. (3 Ed). New Jersey: Pearson Education Inc. Papalia, D. E., Olds, S. W., & Feldman, R. (2012).
7. Human Development. (12 Ed). McGraw Hill, international Edition Santrock, J.W. (2011).
8. Life-Span Development (13th Edition). NY: McGraw Hill. Shaffer, D. R., & Kipp, K. (2007).

**Subject Code: 23-A2353**

**Subject: Health Psychology (4 Credit Course)**

**Total Lectures = 48**

| Unit | Topic | No of lecture |
|------|-------|---------------|
| I | **An Introduction to Health Psychology**<br>1.1. Health Psychology - Definitions, Nature, Aims<br><br>1.2. Biopsychosocial Model of Health<br><br>1.3. Psychology's Role in Health - Problems in the HealthCare System, ''The Person'' in Health and Illness, How the Role of Psychology Emerged and Progress in Health Psychology's Goals.<br><br>1.4. Application: The Need of Health Psychology- Changing Patterns of Illness, Expanded Health Care Services, Increased Medical Acceptance<br><br>       i. | 12 |
| II | **Stress and Coping**<br>2.1.  Stress – Definitions, Nature & Types<br><br>2.2. Sources of Stress - (Sources within the Person, Sources in the Family & Sources in the Community and Society)<br><br>2.3. Responding to Stress (Physiological, Emotional & Behavioural Response)<br><br>2.4.  Coping Behavior – Problem Focused coping (Ellis's rational thinking, Positive reinterpretation & humor as a stress reducer) & Emotion Focused Coping (Using systematic problem solving, using time more effectively & improving self-control) | 12 |
| III | **Chronic Health Problems and Its Management**<br><br>3.1. Personal Issues in Chronic Health Disorders - The Physical Self, Achieving Self, Social Self & Private Self<br><br>3.2. Emotional Responses to Chronic Health Disorders – Denial, Anxiety & Depression<br><br>3.3. Major Chronic Health Problems- Heart Disease, Hypertension, Stroke, Cancer, Type II Diabetes & AIDS<br><br>3.4. Application: Psychological Interventions for Chronic Health Disorders (Pharmacological Interventions, Individual Therapy, Social Support Interventions and Relaxation, Stress Management after COVID | 12 |

| IV | **Primary Prevention & Health Promotion**<br><br>4.1. Quality of life and Health Behaviour - Changing Health Habits & Health Beliefs (Attitude change & Placebo Effect)<br><br>4.2. Health Compromising Behaviours (Characteristics) - Obesity, Smoking & Drinking.<br><br>4.3. Developmental, Gender, and Sociocultural Factors in Health - Development and Health, Gender and Health, Sociocultural Factors and Health<br><br>4.4. Health Promoting Behaviours - Diet, Exercise, Sleep, Rest, Vaccination and Screening, Accident prevention | 12 |
|----|----|----|

**Reference books:**

1. Sarafino, Edward P and Smith, Timothy W (2012).Health Psychology - Bio psychosocial Interaction (7th ed).
2. Wiley India Edition. Taylor, Shelley E. (2018). Health Psychology (10th ed). McGraw Hill Higher Education. Indian Edition
3. Weiten, W. and Lloyd, M. (2007). Psychology applied to modern life: Adjustment in the 21st century, Indian Edition 8th. Thomson Ogden, J. (2017).

**Subject Code:  23-A2354**

**Subject: Basic Counselling Skills I  (2 Credit Course)**

**Total Lectures = 24**

| Sr. No | Topic | Lectures |
|:---:|:---|:---:|
| **I** | **Nature and Scope of Counselling**<br><br>1.1 Conceptual Understanding of Key Concepts-Psychiatry, Psychology, Therapy, Counselling, Personality, Ideas, Emotions, Behaviour<br><br>1.2 The Requirements of Counselling Vocation<br><br>1.3 Modes of Counselling | **8** |
| **II** | **Areas of Counselling**<br><br>2.1 Possible areas<br><br>2.2 Issues in Counselling<br><br>2.3 Counselling for Special Groups | **8** |
| **III** | **Considerations in Counselling**<br><br>3.1 Ethical issues and dilemmas<br><br>3.2 Multicultural Helping<br><br>3.3 Gender sensitive helping | **8** |

**Reference Books:**

1.  Richard Nelson-Jones(2012).Basic Counselling skills: A helper's manual (3rd edition).Sage.

# Semester IV

**Subject Code: 23-A2451**

**Subject: Psychology of Abnormal Behaviour (4 Credit Course)**

**Total Lectures = 48**

| Units | Topic | Lectures (30) |
|:---:|:---|:---:|
| 1 | **Abnormal Psychology: An Overview**<br>1.1. Abnormality: Meaning, Definition, Nature.<br><br>1.2. Historical Background of Abnormality.<br><br>1.3. Criteria of Abnormal Behaviour (Biological, Psychological, Socio-cultural)<br><br>1.4- Current Classification Systems: DSM-5 & ICD-10/11 an Overview. | 12 |
| 2 | **Anxiety Disorders, Obsessive-Compulsive Disorders, Trauma & Stressor Related Disorders**<br><br>2.1. Generalized Anxiety Disorders: Nature, Types, Symptoms, and Diagnostic Criteria & Causes.<br><br>2.2. Panic & Agoraphobia, Social Anxiety (Phobia): Nature, Symptoms, Diagnostic Criteria & Causes<br><br>2.3. Obsessive-Compulsive Disorder and Body Dimorphic Disorders: Nature, Symptoms, Diagnostic Criteria & Causes<br><br>2.4. Post-Traumatic Stress Disorder & Acute Stress Disorder: Nature, Symptoms, Diagnostic Criteria & Causes | 12 |
| 3 | **Somatoform And Dissociative Disorders**<br><br>3.1. Somatic symptoms Disorder: Nature, Symptoms, Diagnostic Criteria & Causes<br><br>3.2. Illness Anxiety Disorder: Nature, Symptoms, Diagnostic Criteria & Causes<br><br>3.3. Conversion Disorders: Nature, Types, Symptoms, Diagnostic Criteria & Causes<br><br>3.4. Dissociative Identity Disorders: Nature, Types, Symptoms, Diagnostic Criteria & Causes | 12 |

| 4 | **Depressive And Bipolar Disorders** | 12 |
| --- | --- | --- |
| | 4.1. Disruptive Mood Dysregulation Disorder, Major Depressive Disorder: Nature, Symptoms, Diagnostic Criteria & Causes<br>4.2.Bipolar-I Disorder: Nature, Types, Symptoms, Diagnostic Criteria & Causes<br><br>4.3. Bipolar-II Disorder: Nature, Types, Symptoms, Diagnostic Criteria & Causes<br><br>4.4.Suicide and Cyclothymic Disorder: Nature, Symptoms, Diagnostic Criteria & Causes | |

**Reference Books :**

1. American Psychiatric Association (2013). Diagnostic and Statistical Manual of Mental Disorders (DSM-5) fifth Edition.
2. Butcher, J. N., Hooley, J. M., & Mineka, S., (2014). Abnormal Psychology. (16th ed.). Pearson education.
3. Comer, R. J. (2019). Fundamentals of Abnormal Psychology, (9th edi.). Macmillan Learning. Kring,
4. A.M., Johnson, S. L., Davison, G.C., & Neale, J.M. (2013). Abnormal Psychology. (12th ed.). International student version,
5. John Wiley & Sons, Singapore Nolen-Hoeksema, S. (2014).Abnormal Psychology. (6th ed.). New York: McGrawHill.
6. Nolen-Hoeksema, S. (2019). ISE Abnormal Psychology, (8th edi.). McGraw-Hill Education
7. Ray, W. J. (2019).Abnormal Psychology, (3rd edi.). SAGE Publications.
8. Whitbourne, S. K., & Halgin, R. P. (2014). Abnormal Psychology: Clinical Perspectives on Psychological Disorders. (7th ed.). McGraw-Hill (Indian reprint 2015).
9. World Health Organization. (1992). The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines. Geneva: World Health Organization.

**Subject Code: 23-A2452**

**Subject: Theories of Personality (4 Credit Course)**

**Total Lectures = 48**

| Unit | Topic | No. of lectures |
|:---:|:---|:---:|
| I | **Introduction to Personality**<br><br>1.1. Nature and Definitions<br>1.2. Misconceptions, Determinants of personality<br>1.3. Idiographic and nomothetic approach<br>1.4. Classification of personality theories | 12 |
| II | **Psychodynamic perspectives**<br>2.1. Introduction to Psychodynamic perspective<br>2.2. Freud's classical psychodynamic theory<br>2.3. Jung's Analytical Psychology<br>2.4. Adler's individual psychology | 12 |
| III | **Behavioral perspectives**<br>3.1. Pavlov's classical conditioning<br>3.2. Skinners operant conditioning<br>3.3. Bandura's social cognitive theory<br>3.4. Dollard and Millers stimulus- response theory | 12 |
| IV | **Trait & Motivation, Emotion perspectives**<br>4.1. Allport's Traits Theory, Cattell's Factor Theory<br>4.2. Eysenck , Costa & McCrae theory<br>4.3. Carl Rogers Person Centered Theory<br>4.4. Motivation and Emotion perspectives<br><br>    i.   Murrays Need theory<br>    ii.  Lazarus cognitive mediation theory | 12 |

**Reference Books**

1. Hall, C.S., Lindzey, G., & Campbell, J.B. (2007). Theories of Personality. 4th Edn.
2. Wiley: India. Hall, C.S., Lindzey, G. & Campbell, J. B. (1998). Theories of Personality. New York:
3. John Wiley & Sons. Frager, R. & Fadiman, J. (2007). Personality and personal growth. 6th Edn. Pearson Prentice Hall, India.
4. McCrae, R.R. & Allik, J. (eds) (2002).Five-factor model across cultures. Dordrecht: Netherlands: Kluver. Mischel, W.; Shoda, Y.; & Smith, R. E. (2004). Introduction to personality.
5. John Wiley & Sons. Pervin, L.A. (1996). The science of personality. NY: John Wiley & Co. Schultz, D.P & Schultz, E.S. (2005). Theories of personality. Delhi: Thomson Wadsworth.

6.  Weiten, W. and Lloyd, M. Indian Edition 8th (2007). Psychology applied to modern life: Adjustment in the 21st century. Thomson

**Subject Code: 23-A2453**

**Subject: Psychology and Gender (4 credit course)**

**Total Lectures = 48**

| Units | Topic | Lectures |
|:---:|---|:---:|
| 1 | **Basic Concepts in Psychology and Gender**<br><br>1.1. Difference between Sex and Gender<br><br>1.2. Meaning of Gender Roles, Gender Role Attitude, Gender Role Stereotype<br><br>1.3. Gender Discrimination, Gender Identity<br><br>1.4. Meaning of Intersectionality and Intersectional Feminism | 12 |
| 2 | **Developmental Psychology and Gender**<br><br>2.1 Families and Gender<br><br>2.2 Birth, Infancy, Childhood and Gender<br><br>2.3 Adolescence and Gender Disparity<br><br>2.4 Youth and Adulthood Challenges and Gender | 12 |
| 3 | **Relationships and Gender**<br><br>3.1 Friendships and Gender<br><br>3.2 Romantic relationships and Gender<br><br>3.3 Relationships at the workplace and Gender<br><br>3.4 Relationships, violence, and Gender | 12 |
| 4 | **Sexualities, Gender and Psychology**<br><br>4.1. Meaning of Sexuality and Sexual Orientation<br><br>4.2. LGBTIQA+ Relationships and Psychology<br><br>4.3. LGBTIQA+ Individuals and their Experiences<br><br>4.4. Social Marginalization and Psychological Vulnerability | 12 |

**Reference Books:**

1. Natu, S. A; (2021) Psychology and Gender: An Introduction, Sage International Publishers
2. Hegelson, V. S;(2020) Psychology of Gender, Routledge
3.

**Subject Code:  23-A2454**

**Subject: Basic Skills in Counselling II (2 Credit Course)**

**Total Practical = 24**

| Units | Topic | Lectures |
|:---:|:---|:---:|
| 1 | **Helping Process**<br><br>1.1. Counsellors and helpers<br><br>1.2. Helping relationship and<br><br>1.3. Helping process | 8 |
| 2 | **Counselling Process**<br><br>2.1 Starting, structuring and summarizing<br><br>2. 2 Facilitating problem solving<br><br>2. 3 Goal setting in counselling | 8 |
| 3 | **Feedback and Support**<br><br>3.1 Developing Case history<br><br>3.2 Improving client's feedback<br><br>3.3 Getting support and being supervised | 8 |

**References:**

1.  Richard Nelson-Jones(2012).Basic Counselling skills: A helper's manual (3rd edition).Sage.
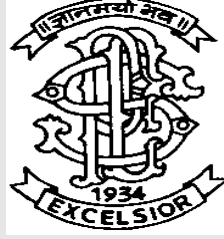
*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

# S. Y. B. A Sociology

## Introduction:

Sociology is a fascinating and diverse field of study, examining the dynamics of social life, social change and the underlying factors that drive and shape human behaviour. Sociology explores the causes and consequences of contemporary concerns such as poverty and wealth creation, social inclusion and exclusion, prejudice and discrimination, behaviour patterns, emerging trends of population, migration, social movements and development. Sociologists seek a critical understanding of the social institutions and processes that shape our lives. At this juncture, when technology is bringing rapid change in society and human life Sociology as a discipline provides holistic view to engage with society of 21$^{st}$ century.

Reach of Sociology as a discipline is associated with fields like development, sustainability, gender, education, public policy and legal studies, health, environment, human resource, globalization, peace and conflict, technology, public sociology, sociology of aging, tribal studies, media, cultural studies.

Sociology provides strong base for critical thinking, analysis, articulation and research.

Sociology as a leading social science discipline provides national and international opportunities in various professional, academic and research fields. Courses in Sociology are popular among students it offers you a real-world perspective to help you progress better.

## Programme Objectives:

- To develop the ability to attain the knowledge of terms, facts, techniques, concepts, processes and principles of subjects.

- To prepare students with critical thinking skills, articulation and foundation of knowledge with the courses of social sciences and humanities

- To acquaint students to different processes used in Research and their applications, NGOs, industries.

## Programme Specific Outcomes (PSOs):

PSO 1: Students will learn to think critically apply critical approach to understand different social processes.

PSO 2: Students will learn how humans develop social consciousness, self-concepts and values as a member of society.

PSO 3: Students will learn and demonstrate the understanding of the major concepts and theories developed by the theorists to analyse the social world

PSO 4: Student Can Understand Social Construction of Identities

PSO 5: Students will enhance the understanding of scientific methodology and their applicability and also in policy framing and social change.

## Examination Pattern:

**Total marks: 100**

**Final (External): 70**

**Internal: 30**

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose any of the methods given below for the assessment.

1.  Short Quizzes / MCQ Test
2.  Home Assignments
3.  Tutorials/ Practical
4.  Oral test
5.  Group Discussion
6.  Study Tour/ Field visit
7.  Written Test
8.  PPT presentation
9.  Field Visit
10. Role plays

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Power Point Presentations
5. Field Visit
6. Research Papers & Projects
7. E-content

# Subject List

**SEMESTER III**

| Sr. No. | Course Type | Program Code & Title | Credits | | | Total No. of Lectures |
|---|---|---|---|---|---|---|
| | | | **Theory** | **Practical** | **Total** | |
| 1 | DSE 1 A | 23-A2361 - Foundations of Sociological Thoughts | 3 | NA | 11 | 45 |
| 2 | DSE 2 A | 23-A2362 - Social Issues in Indian Society | 3 | NA | | 45 |
| 3 | CC 2 A | 23-A2363 - Introduction to Population and Society | 3 | NA | | 45 |
| 4 | SEC 1 A | 23-A2364 - Gender and Media | 2 | NA | | 30 |

**SEMESTER IV**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No. of Lectures |
| | | | Theory | Practical | Total | |
|---|---|---|---|---|---|---|
| 1 | DSE 1 B | 23-A2461 - Development of Sociology in India | 3 | NA | | 45 |
| 2 | DSE 2 B | 23-A2462 - Core Issues in India | 3 | NA | | 45 |
| 3 | CC 2 B | 23-A2463 - Population and Indian Society | 3 | NA | 11 | 45 |
| 4 | SEC 1 B | 23-A2464 - Research Projects : Steps and Protocols | 2 | NA | | 30 |

# Syllabus

**Subject Code: (23-A2361)**

**Subject:** Foundations of Sociological Thoughts (**3 Credit course**)

**Total Lectures = 45**

| Unit | Syllabus | No of lecture (30) |
|---|---|---|
| I | **The Emergence of Sociological Thought: Intellectual and Social Context**<br>    1. Enlightenment<br>    2. French Revolution<br>    3. Industrial Revolution | 15 |
| II | **The Positivist** School<br>**August Comte**<br>1. Positivism<br>2. Law of three stages<br>**Emile Durkheim**<br>1. Theory of social facts<br>2. Theory of suicide | 15 |

| III | **Other Important Schools**<br>**A. Conflict School: Karl Marx**<br>  1. Historical Materialism<br>  2. Theory of Alienation<br>**B. The Interpretative School: Max Weber**<br>  1. Theory of Social Action<br>  2. Ideal Types | 15 |
|---|---|---|

**Reference books:**

**Essential Readings**

1. Abraham, M.F. 1990. Modern Sociological Theory: An Introduction, New Delhi. OxfordUniversity Press, Pp 72- 143.
2. Abraham M.F. and Morgan J.H., 1996. Sociological Thought, Madras. MacMillan India, Pp 7-17, 28- 45,103-126, 156-183
3. Aron Raymond, 1982. Main Currents in Sociological Thought, Vol. 1 and 2, New York. Penguin Books. 4) Coser Lewis, 1979. Masters of Sociological thought, New York, Harcourt,Harcourt Brace Jovanovich, . Pp-7-13,129-139, 43-53, 217-224.
4. Cuff, E., Sharrock, W. and Francis, D. 1992. Perspectives in Sociology, London, Routledge3rd Ed.
5. Haralombus M and Holborn, 2000. Sociology: Themes and Perspectives, London. Collinspub, Pp 1035-1056.
6. Judge Paramjit, 2012. Foundations of Classical Theory, Delhi. Pearson Pub, Pp-42-46, 54-60, 92-103, 111-115, 116-119
7. Kundu Abhijit, 2012. Sociological Theory, Delhi. Pearson Pub, Pp-8-21, 66-74, 77-79 5
8. Ray Larry J., 2010. Theorizing Classical Sociology, New Delhi. Tata MaGraw-Hill, Pp 1-57
9. Ritzer George,1996. Sociological Theory, New Delhi. Tata-McGrew Hill, 6th.Ed.Pp 39-58,73-91,108- 121
10. Dhanagare D.N., 1999. Themes and Perspectives in Indian Sociology, Jaipur. RawatPublications, Pp 31-77
11. Nagla B. K., 2008. Indian Sociological Thought, Jaipur. Rawat Pub, Pp 8-28, 67-70, 93-111,138-153, 212-225, 303-327
12.Patel Sujata, (ed) 2011. Doing Sociology in India, New Delhi. Oxford, Pp- 11-29
13. Pramanik S. K. 2001. Sociology of G. S. Ghurye, Jaipur., Rawat, Pp-19-30

**Reference books:**

1. Das Veena, (ed), 2003. Oxford India Companion to Sociology and Social Anthropology, NewDelhi. Oxford University Press,
2. Morrison Ken, 1995. Marx, Durkheim, Weber: Formation of Modern Social Thought,London. Sage,
3. Oommen and Mukherji (ed) 1986. Indian Sociology: Reflections and Introspections, Bombay.Popular Prakashan, Pp 16 – 55
4. Singh Yogendra, 1986. Indian Sociology: Social Conditioning and Emerging Concerns, NewDelhi. Vistaar, Pp 1 – 31.
5. Vivek P.S., 2002. Sociological Perspectives and Indian Sociology, Mumbai. HimalayaPublishing House. 6) Speeches and Writings of Dr. B.R. Ambedkar, 1990. Education Department, Govt. of Maharashtra volume. 7., Pp-114-131, 156-185, 178-280, 370-379.

मराठी पुस्तके:
1. आगलावे प्रदीप, 2001.
2. सोमण, एम. एस., साबळे एस. D. 2016. समाजशास्त्रीय विचार, पुणे, डायमंड पब्लिकेशन्स
3. मोटे दादासाहेब, 2005. सोशियोलॉजिकल रिसर्च फाउंडेशन, औरंगाबाद, नक्षत्र प्रकाशन
4. वैद्य, N.S., 1987. समाजवादी, नागपूर. महाराष्ट्र विदयापीठ ग्रंथ निर्निमानंद.
5. गर्गे, एस. M. 1989. इंडियन एथनोलॉजिकल थिसॉरस, पुणे सोसायटी ऑफ सोशल सायन्सेस
6. आगलावे प्रदीप, 2001.
7. समाजशास्त्र डॉ. बाबासाहेब आंबेडकर, पुणे. सुगावा पब्लिकेशन्स, 51-132
8. गजेंद्रगड आणि मारुलकर, 2000, समकालीन भारतीय समाजशास्त्रज्ञ, कोल्हापूर, फडके प्रकाशन, ५७-१२३, १४६-१६९, २३६-२५८, ३१६-३२२.
9. गर्गे, एस. M. 1989. भारतीय सामान्य विज्ञान कोश, पुणे सामाजिक विज्ञान मंडळ
10. सहारे पद्माकर. 2015. भारतीय समाजशास्त्रीय दृष्टीकोन. औरंगाबाद, विद्या बुक्स

**Subject Code:** 23-A2362

**Subject :** Social Issues in Indian Society **(3 Credit Course)**

**Total Lectures = 45**

| Unit | Syllabus | No of lectures (45) |
|------|----------|---------------------|
| **1** | **Social Problems-Concept and Approaches**<br>    1. Concept, Definitions and Characteristics and consequence of Social Issues<br>    2. Approaches to social problems: structural functional, conflict, interactionist, recenttrends | **15** |
| **II** | **Issues related to Structural, Ethnic and religious dissonance**<br>    1 Caste Inequality and Discrimination: Definition, Causes and Consequences<br>    2 Issues of Religious minorities: Nature, Causes and Consequences | **15** |
| **III** | **Gender Inequality and Discrimination**<br>    1. Aspects of gender inequality and discrimination: Economic, Cultural, Political, And Familial.<br>    2. Violence against women : Domestic and Sexual violence, Human trafficking – Nature and Causes | **15** |

**Essential Readings**

*1)* Mills, C. Wright (2000). The Sociological  Imagination. Oxford University Press.

2) Nelson B. (1984) Making an Issue of Child Abuse. London. Chicago Press

3) Totten S., Pedersen J. (ed) Teaching and Studying Social Issues: Programs and Approaches. USA. Information Age Pub.

4) Manis, J. (1974) Assessing the Seriousness of Social Problems. *Social Problems*, Vol. 22, No. 1, (Oct., 1974), pp. 1-15 Published by University of California Press

5) Samaddar, R. and Samaddar R. (2009) State of Justice in India: Issues of Social Justice. Sage Publications.

6) Mooney , L., Knox, D. and Schacht C. (2011) Understanding Social Problems . USA. Wadsworth Publishing

7) Parrillo, V. (2008) Encyclopedia of Social Problems (Two Volume Set). SAGE Publications

8) Kornblum W., Julian J. (2011)  Social Problems (14th Edition) Prentice Hall

9) Heraud B. and Nursten J. (1970) Sociology and Social Work. Perspectives and Problems. Elsevier Ltd, Pergamon Press

10) AhujaRam, 1993. *Indian Social System*. Jaipur.Rawat Publications.

11) Ahuja Ram, 2000. *Social Problems in India*. Jaipur.Rawat Publications, pp- 1-26, 27-69,70-90, 193-217, 119-127, 308-341,

12) Deb,Sibnath., 2005. *Contemporary Social Problems in India*. New Delhi,Anmol Publications.

13) Tripathi. R. N., 2011. *Indian Social Problems*, Pinnacle Technology, New Delhi

14) Prasad B.K., 2004. *Social Problems in India*, Vol. I and II, New Delhi.Anmol Publications Pvt. Ltd.

15) Selwyn Stanley., 2004. *Social Problems in India*. New Delhi.Allied Publishers,

16) Jogan Shankar., 1992. *Social Problems and Welfare in India*. US South Asia Books.

17) Madan G. R., 2009. *Indian Social Problems*. Vol. I and II. New Delhi. Allied publishers,pp-

18) PandeyRajendra., 1994. *Social Problems in Contemporary India*. New Delhi. Ashish

Publishing House

19) Purushottam G. S., 2003. *Social Problems in India*, Mumbai.Himalaya Publishing House,
20) Murthy, V and Thakur, J., 2013. 'Scheduled Caste Women: Problems and Challenges'
D. Swarupa Rani, Sadu Rajesh,2014. March:'Socio - Economic Status of Dalit Women-AStudy In Andhra Pradesh', *Indian Streams Research Journal*, Vol 4, Issue 2, Pp 1- 6 Available at
http://www.isrj.net/UploadedData/4287.pdf

21) Ramnath Sharma ,1982 Indian Social Problems : A Sociological Perspective ,Atlantic Publisher and Distributors , New Delhi
22) Ramnath Sharma ,Bhartiya Samaj Samasyay aur Saskriti ,Atlantic Publisher and Distributors , New Delhi
*Indian Streams Research Journal*, Vol 3, Issue 11, Pp 1-7 (2013). Available at
http://www.isrj.net/UploadedData/3378.pdf

**Reference Books**

1) Dandanean Steven P., 2001. *Taking it Big: Developing Sociological Consciousness in PostmodernTimes*. New Delhi. London. Pine Edge Press.
2) GadgilMadhav and GuhaRamchandra, 1996. *Ecology and Equity*. New Delhi. Oxford University Press
3) Giddens Anthony (ed)., 2001. *Sociology: Introductory Readings*. Cambridge, Polity Press.
4) Gupta M. and Chen Martha Alter. 1996. *Health, Poverty and Development in India*. New Delhi. Sage Publications.
5) Mckinney Kathleen and Beck Frank (ed)., 2001. *Sociology through Active Learning*. New Delhi. Pine Edge Press. London.

6) Sen Amartya, 1992. *Inequality Reexamined*. Russell New York. Sage foundation,
7) Vivek P. S., 2002. *Sociological Perspectives and Indian Sociology*. Mumbai. Himalaya Publishing House.
8) Tribhuvan Robin D., 2014, Social Problems and Developmental Issues of Youth. New Delhi. Discovery Publishing House Pvt. Ltd

## मराठी पुस्तके
1) साळुंखे सर्जेराव. भारतीय समाज आणि सामाजिक समस्या.
२) खडसे भा. कि.. भारतातील सामाजिक समस्या.
3) लोटे रा. ज. २००३. भारतीय समाज आणि सामाजिक समस्या, पिंपळापुरे प्रकाशन नागपूर
4) पाटे सुमन, १९९१. भारतीय सामाजिक समस्या विद्या प्रकाशन, नागपूर
5) ओमन टी के २००५. भारतीय समाजातील समस्या व बाद, अनुवाद- संगीता फाटक, पुणे, डायमंड प्रकाशन.
6) माने माणिक, १९९९ गुन्हेगारीशास्त्र फडके प्रकाशन, कोल्हापूर
7) खडसे भा. कि. १९९९, भारतातील सामाजिक समस्या मंगेश प्रकाशन नागपूर
8) काळदाते सुधा, गव्हाणे गोटे शुभांगी, २००५. गुन्हा आणि समाज पिंपळापुरे प्रकाशन नागपूर
9) कोंडेकर ए. वाय मारुलकर विजय २०१२. भारतातील सामाजिक समस्या फडके प्रकाशन, कोल्हापूर 10) साळुंखे सर्जेराव जत्राटदार मारुलकर २०००. समकालीन भारतातील सामाजिक समस्या नरेंद्र प्रकाशन.

**Subject Code:** 23-A2363

**Subject:** -Introduction to Population and Society **(3 CreditCourse)**

**Total Lectures = 45**

| Sr. No | Syllabus | Lectures |
|--------|----------|----------|
| I | **Introduction, theories and perspectives related to population studies**<br><br>A) Introduction:<br>   **1.** Population Studies – Meaning, Scope and Importance<br>   **2.** Evolution of Population Studies - Micro Demography to Macro Demography.<br>B) Theories and perspectives:<br>   1. Malthusian theory<br>   2. Demographic Transition theory<br>   3. Marxist Thoughts on Population<br>   4. Feminist perspective on demography (it was there in earlier version) | 15 |
| II | **Sources of population data**<br>   **1.** Census – definition and importance<br>   **2.** Registration of vital events (birth, death, marriage, adoption, divorce)- meaning andimportance<br>   **3.** Recent trends in collection of population data – Adhar (Unique Identification Data),NPR, NRC and CAA and the debate around them | 15 |
| III | **Population and Development**<br>   1. Population as a constraint on and a resource for development<br>   2. Relationship between population and poverty | 15 |

**Essential Readings:**

- Bhende A. And Kanitkar T. 2003.Principles of Population Studies.Himalaya Publishing House.
- Bose Ashish. 1991. Demographic Diversity in India. Delhi. B.R.Publishing Corp.
- Chandna R. C. 1998. Population. Delhi. Kalyani Publications.
- Cox Peter. 1976. Demography. London. Cambridge University Press. (For 'why demography')
- Demeny Paul and McNicoll Geoffrey (eds). 1998. Population and Development. Earthscan Pub. Ltd. (For relationship between population growth and economic growth)
- Dreze Jean and SenAmartya. 2011. India: Development and Participation. New Delhi. Oxford University Press. (Chapter 6 and 7 for population, health and environment; and for gender inequality and women's agency)
- Nam Charles B. and Philliber Susan Gustavus. 1984. Population: A Basic Orientation. New Jersey: Prentice-Hall. (Chap 7 and 8 for population impact on education, economy, environment, polity, religion, family; Chap 9 for population policy)
- PerveenShama. 2004. Population Growth and Sustainable Development. Economic and Political Weekly. February 14, 2004. Pp. 629-633
- Poston Dudley L. and Micklin Michael (eds). 2006. Handbook of Population. Springer.
- RajuB.Joseph, Gadde Annie Anitha and Rao D.B. 2004.Population Education. New Delhi.

Sonali Publication.

- RathiPrateek, Mukherjee Arnab, Sen Gita. 2012. RashtriyaSwasthyaBimaYojana. Economic and Political Weekly. September 29, 2012. Pp. 57-64
- Shukla Ravi. 2010. Reimagining Citizenship: Debating India's Unique Identification Scheme. Economic and Political Weekly. January 09, 2010. Pp. 31-36 13.Trovato Frank (ed.). 2002. Population and Society – Essential Readings. Oxford University Press. (For Marxism and Population Question, political economy of fertility)

### References:

1. Agarwal S.N. 1989. Population Studies with Special Reference to India. New Delhi. LokSurjeet Publication.
2. Bloom David E. 2011. Population Dynamics in India and Implications for Economic Growth. PGDA Working Paper No. 65 http://www.hsph.harvard.edu/pgda/working.htm
3. Bose Ashish. 2000. North-South Divide in India's Democratic Scene. Economic and Political Weekly. May 13, 2000. Pp. 1698-1700
4. Bose Ashish. 2005. Beyond Hindu-Muslim Growth Rate: Understanding socio-economic reality. Economic and Political Weekly. January 29, 2005. Pp. 370-374
5. ChattopadhyayaAparajita. 2004. A Comprehensive Look at Ageing. Economic and Political Weekly. October 02.
6. Gender Development Reports (see UNDP websites)
7. Heer David M. And Grigsby Jill S. 1994. Society and Population. New Delhi. Prentice-Hall of India Pvt. Ltd.
8. Human Development Reports (see UNDP websites)
9. Krishnaraj M., SudarshanRatna M., ShariffAbusaleh. (eds) 1998. Gender, Population and Development. Delhi. Oxford University Press.
10. Kundu Amitabh. 2009. Exclusionary Urbanization in Asia: A Macro Overview. Economic and Political Weekly. Vol. 44, Issue No. 48, November 28, 2009. Pp. 48-58
11. National Population Policy 2000 (http://india.unfpa.org/drive/nationalpopulation-policy2000.pdf) http://conservancy.umn.edu/bitstream/11299/50283/1/Agrawal,%20Sandhya.pdf
12. SenAmartya. 2000. Development as Freedom. Delhi. Oxford University Press.
13. Srivastava O.S. 1994. Demography and Population Studies. New Delhi. Vikas Publishing House.12 14. World Devel
14. World Development Reports (see UNDP websites)

## मराठी पुस्तके
ब्रम्हे सुलभा . वाढत्या लोकसंख्येची भिती कोणाला ? पुणे . ब्रम्हे प्रकाशन

**Subject Code:** 23-A2364

**Subject :** - Gender and Media **(2 Credit Course)**

**Total Lectures=30**

| Units | Syllabus | Lectures (30) |
|---|---|---|
| **1** | **Need to study media.** | **08** |
| **2** | **Post Truth Politics and Media**<br>1. Capitalists and companies, Government, Market, Audience, Political parties and their intentions. (Why?)<br>**2.** The Filter Bubble, Fake News, Post Truth and Role of Psychological Factors. | **10** |
| **3** | **Gender and Media (construction of gender)**<br>1. Representation of Feminine identities in Indian cinema, TV and Advertisements<br>2. Representation of masculine identities in Media. Representation of Alternate sexualities in Media. | **12** |

**Reference Books :**

1. Gauntlett D. . 2002. Media, Gender and Identity: An Introduction. London. Routledge pub.

2. Cynthia Carter, Linda Steiner.2003. Media and Gender: Reader. England. Open University Press.

3. Rosemarie Buikema, Iris van der Tuin. 2009. Doing Gender in Media, Art and Culture. London. Routledge

4. Seth Stephens Davidowitz, 2017. *Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are,* Bloomsbury Publishing.

5. The Handbook of Gender, Sex, and Media. 2011. Wiley-Blackwell

6. Kosut Mary E. 2012. Encyclopedia of Gender in Media. UK. SAGE Publications

7. MissRepresentation- A documentary directed by Jennifer Siebel Newsom

8. Understanding Gender- Kamala Bhasin/ Trans. Shruti Tambe

9. Beasley, C., 2008. Rethinking Hegemonic Masculinity in a Globalizing World. Men and Masculinities, 11(1), pp.86-103.

10. Generation M: Misogyny in Media and Culture- A documentary by SAGE

# **Semester IV**

**Subject Code:** 23-A2461

**Subject:** Development of Sociology in India **(3 Credit Course)**

**Total Lectures = 45**

| Unit | Syllabus | No of lecture 45 |
|------|----------|------------------|
| 1 | **Emergence of Sociology in India**<br>1. The Colonial Background<br>2. Nationalism<br>3. Development of Sociology in India | 15 |
| 2 | **Perspectives to Study Indian Society**<br>**1. The Indological Perspective:**<br>G.S. Ghurye - Indology and Theory of Caste<br>**2. The Structural Functional Perspective:**<br>M. N. Srinivas - Dominant Caste and Sanskritization<br>**3. Feminist Perspective**<br>Sharmila Rege | 15 |
| 3 | **The Dialectical and The Marxist Perspective and Non Brahminical Perspective**<br>**1. The Dialectical and The Marxist Perspective.**<br>A. R. Desai – Social Background of Indian Nationalism<br>**2. The Non Brahminical Perspective: (Sociology from Below)**<br>B.R. Ambedkar - Theory of Origin of Caste<br>**3. Subaltern Perspective**<br>Ranjit Guha | 15 |

**Essential Readings**

14. Abraham, M.F. 1990. Modern Sociological Theory: An Introduction, New Delhi. OxfordUniversity Press, Pp 72- 143.
15. Abraham M.F. and Morgan J.H., 1996. Sociological Thought, Madras. MacMillan India, Pp 7-17, 28- 45,103-126, 156-183
16. Aron Raymond, 1982. Main Currents in Sociological Thought, Vol. 1 and 2, New York. Penguin Books. 4) Coser Lewis, 1979. Masters of Sociological thought, New York, Harcourt,Harcourt Brace Jovanovich, . Pp-7-13,129-139, 43-53, 217-224.
17. Cuff, E., Sharrock, W. and Francis, D. 1992. Perspectives in Sociology, London, Routledge3rd Ed.
18. Haralombus M and Holborn, 2000. Sociology: Themes and Perspectives, London. Collinspub, Pp 1035-1056.

19. Judge Paramjit, 2012. Foundations of Classical Theory, Delhi. Pearson Pub, Pp-42-46, 54-60, 92-103, 111-115, 116-119

20. Kundu Abhijit, 2012. Sociological Theory, Delhi. Pearson Pub, Pp-8-21, 66-74, 77-79 5

21. Ray Larry J., 2010. Theorizing Classical Sociology, New Delhi. Tata MaGraw-Hill, Pp 1-57

22. Ritzer George,1996. Sociological Theory, New Delhi. Tata-McGrew Hill, 6th.Ed.Pp 39-58,73-91,108- 121

23. Dhanagare D.N., 1999. Themes and Perspectives in Indian Sociology, Jaipur. RawatPublications, Pp 31-77

24. Nagla B. K., 2008. Indian Sociological Thought, Jaipur. Rawat Pub, Pp 8-28, 67-70, 93-111,138-153, 212-225, 303-327

25.Patel Sujata, (ed) 2011. Doing Sociology in India, New Delhi. Oxford, Pp- 11-29

26. Pramanik S. K. 2001. Sociology of G. S. Ghurye, Jaipur., Rawat, Pp-19-30

**Reference books:**

6. Das Veena, (ed), 2003. Oxford India Companion to Sociology and Social Anthropology, NewDelhi. Oxford University Press,

7. Morrison Ken, 1995. Marx, Durkheim, Weber: Formation of Modern Social Thought,London. Sage,

8. Oommen and Mukherji (ed) 1986. Indian Sociology: Reflections and Introspections, Bombay.Popular Prakashan, Pp 16 – 55

9. Singh Yogendra, 1986. Indian Sociology: Social Conditioning and Emerging Concerns, NewDelhi. Vistaar, Pp 1 – 31.

10. Vivek P.S., 2002. Sociological Perspectives and Indian Sociology, Mumbai. HimalayaPublishing House. 6) Speeches and Writings of Dr. B.R. Ambedkar, 1990. Education Department, Govt. of Maharashtra volume. 7., Pp-114-131, 156-185, 178-280, 370-379.

मराठी पुस्तके:
1. आगलावे प्रदीप, 2001.
2. सोमण, एम. एस., साबळे एस. D. 2016.  समाजशास्त्रीय विचार, पुणे, डायमंड पब्लिकेशन्स
3. मोटे दादासाहेब, 2005.  सोशियोलॉजिकल रिसर्च फाउंडेशन, औरंगाबाद, नक्षत्र प्रकाशन
4. वैद्य, N.S., 1987.  समाजवादी, नागपूर.  महाराष्ट्र विदयापीठ ग्रंथ निर्निमानंद.
5. गर्गे, एस. M. 1989.  इंडियन एथनोलॉजिकल थिसॉरस, पुणे सोसायटी ऑफ सोशल सायन्सेस
6. आगलावे प्रदीप, 2001.
7. समाजशास्त्र डॉ. बाबासाहेब आंबेडकर, पुणे.  सुगावा पब्लिकेशन्स, 51-132
8. गजेंद्रगड आणि मारुलकर, 2000, समकालीन भारतीय समाजशास्त्रज्ञ, कोल्हापूर, फडके प्रकाशन, ५७-१२३, १४६-१६९, २३६-२५८, ३१६-३२२.
9. गर्गे, एस. M. 1989.  भारतीय सामान्य विज्ञान कोश, पुणे सामाजिक विज्ञान मंडळ
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**Subject Code:** 23-A2462

**Subject: - Core Issues in India (3 Credit Course)**

**Total Lectures=45**

| Unit | Syllabus | No of lectures |
|------|----------|----------------|
| I | **Development: Idea and Issues**<br>1. Development: Meaning<br>2. Issues of Development: (growing inequality, displacement and Environment degradation)- Causes and Consequences<br>3 Poverty (Rural and Urban): Meaning, Causes and Consequences | 15 |
| II | **Issues of Youth and Senior Citizens**<br>1. Issues of Youth: unemployment, education, sexuality, drug abuse and suicide.<br>2. Issues of the Aged: Economic, social, psychological and Related to health | 15 |
| III | **Dealing with social Issues**<br>1. Role of Sociology (Critical analysis and dissemination)<br>2. Role of State: Policies, Planning and Legislations<br>3. Role of Civil Society Organizations:<br>    • social auditing and advocacy,<br>    • mobilizing, empowering and enabling good governance,<br>justice and democracy | 15 |

**Essential Readings**

*12)* Mills, C. Wright (2000). <u>The Sociological Imagination</u>. Oxford University Press.

13) Nelson B. (1984) Making an Issue of Child Abuse. London. Chicago Press
14) Totten S., Pedersen J. (ed) Teaching and Studying Social Issues: Programs and Approaches.USA. Information Age Pub.
15) Manis, J. (1974) Assessing the Seriousness of Social Problems. *Social Problems*, Vol. 22, No.1, (Oct., 1974), pp. 1-15 Published by University of California Press
16) Samaddar, R. and Samaddar R. (2009) <u>State of Justice in India: Issues of Social Justice</u>. SagePublications.
17) Mooney , L., Knox, D. and Schacht C. (2011) Understanding Social Problems . USA.Wadsworth Publishing
18) Parrillo, V. (2008) <u>Encyclopedia of Social Problems (Two Volume Set)</u>. SAGE Publications
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12) Deb,Sibnath., 2005. *Contemporary Social Problems in India*. New Delhi,Anmol Publications.
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25) Selwyn Stanley., 2004. *Social Problems in India*. New Delhi.Allied Publishers,
26) Jogan Shankar., 1992. *Social Problems and Welfare in India*. US South Asia Books.
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29) Purushottam G. S., 2003. *Social Problems in India*, Mumbai.Himalaya Publishing House,

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http://www.isrj.net/UploadedData/4287.pdf

31) Ramnath Sharma ,1982 Indian Social Problems : A Sociological Perspective ,Atlantic Publisher and Distributors , New Delhi

32) Ramnath Sharma ,Bhartiya Samaj Samasyay aur Saskriti ,Atlantic Publisher and Distributors , New Delhi
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http://www.isrj.net/UploadedData/3378.pdf

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9) Dandanean Steven P., 2001. *Taking it Big: Developing Sociological Consciousness in PostmodernTimes*. New Delhi. London. Pine Edge Press.

10) GadgilMadhav and GuhaRamchandra, 1996. *Ecology and Equity*. New Delhi. OxfordUniversity Press

11) Giddens Anthony (ed)., 2001. *Sociology: Introductory Readings*. Cambridge, Polity Press.

12) Gupta M. and Chen Martha Alter. 1996. *Health, Poverty and Development in India*. NewDelhi. Sage Publications.

13) Mckinney Kathleen and Beck Frank (ed)., 2001. *Sociology through Active Learning*. NewDelhi. Pine Edge Press. London.

14) Sen Amartya, 1992. *Inequality Reexamined.* Russell New York. Sage foundation,

15) Vivek P. S., 2002. *Sociological Perspectives and Indian Sociology*. Mumbai. HimalayaPublishing House.

16) Tribhuvan Robin D., 2014, Social Problems and Developmental Issues of Youth. New Delhi. Discovery Publishing House Pvt. Ltd

## मराठी पुस्तके

1) साळुंखे सर्जेराव. भारतीय समाज आणि सामाजिक समस्या.

२) खडसे भा. कि.. भारतातील सामाजिक समस्या.

3) लोटे रा. ज. २००३. भारतीय समाज आणि सामाजिक समस्या, पिंपळापुरे प्रकाशन नागपूर

4) पाटे सुमन, १९९१. भारतीय सामाजिक समस्या विद्या प्रकाशन, नागपूर

5) ओमन टी के २००५. भारतीय समाजातील समस्या व बाद, अनुवाद- संगीता फाटक, पुणे, डायमंड प्रकाशन.

6) माने माणिक, १९९९ गुन्हेगारीशास्त्र फडके प्रकाशन, कोल्हापूर

7) खडसे भा. कि. १९९९, भारतातील सामाजिक समस्या मंगेश प्रकाशन नागपूर

8) काळदाते सुधा, गव्हाणे गोटे शुभांगी, २००५. गुन्हा आणि समाज पिंपळापुरे प्रकाशन नागपूर

9) कोंडेकर ए. वाय मारुलकर विजय २०१२. भारतातील सामाजिक समस्या फडके प्रकाशन, कोल्हापूर 10) साळुंखे सर्जेराव जत्राटदार मारुलकर २०००. समकालीन भारतातील सामाजिक समस्या नरेंद्र प्रकाशन.

**Subject Code:** 23-A2463

**Subject :** Population and Indian Society

**Total Lectures = 45**

| Unit | Syllabus | No. of lectures (45) |
|---|---|---|
| I | **Population Growth, Distribution and Population dynamics in India**<br>1. Growth of population since 1901<br>2. Nature and characteristics of Indian population (Age, Sex, Missing Girl child,Education, Literacy, Religion)<br>3. Fertility - Definition and factors (Biological, Physiological, Social, Economic andCultural)<br>4. Mortality - (Mortality, Infant Mortality, Maternal Mortality, Sex Selective Abortions)Definition and factors<br>5. Migration - Definition, Causes, Types and Consequences<br>6. Socio-cultural factors of population dynamics- gender, religion, education, caste, classand tribe | 15 |
| II | **Population policy in India**<br>1. Population policy and Role of state<br>2. Population policy in India- Pre- and post-independence<br>  (i) Family planning – 1961; ii) Family welfare 1977; iii) National Population Policy2000  and development thereafter) | 15 |
| III | **Legislative measures to enhance the quality and quantity of population in India**<br>Ban on sex determination and sex-selective abortions<br>PCPNDT<br>National rural health mission | 15 |

**Essential Readings:**

- Bhende A. And Kanitkar T. 2003.Principles of Population Studies.Himalaya PublishingHouse.
- Bose Ashish. 1991. Demographic Diversity in India. Delhi. B.R.Publishing Corp.
- Chandna R. C. 1998. Population. Delhi. Kalyani Publications.
- Cox Peter. 1976. Demography. London. Cambridge University Press. (For 'why demography')
- Demeny Paul and McNicoll Geoffrey (eds). 1998. Population and Development. Earthscan Pub. Ltd. (For relationship between population growth and economic growth)
- Dreze Jean and SenAmartya. 2011. India: Development and Participation. New Delhi. Oxford University Press. (Chapter 6 and 7 for population, health and environment; and for gender inequality and women's agency)
- Nam Charles B. and Philliber Susan Gustavus. 1984. Population: A Basic Orientation. New Jersey: Prentice-Hall. (Chap 7 and 8 for population impact on education, economy, environment,

polity, religion, family; Chap 9 for population policy)

- PerveenShama. 2004. Population Growth and Sustainable Development. Economic and Political Weekly. February 14, 2004. Pp. 629-633
- Poston Dudley L. and Micklin Michael (eds). 2006. Handbook of Population. Springer.
- RajuB.Joseph, Gadde Annie Anitha and Rao D.B. 2004.Population Education. New Delhi. Sonali Publication.
- RathiPrateek, Mukherjee Arnab, Sen Gita. 2012. RashtriyaSwasthyaBimaYojana. Economic and Political Weekly. September 29, 2012. Pp. 57-64
- Shukla Ravi. 2010. Reimagining Citizenship: Debating India's Unique Identification Scheme. Economic and Political Weekly. January 09, 2010. Pp. 31-36 13.Trovato Frank (ed.). 2002. Population and Society – Essential Readings. Oxford University Press. (For Marxism and Population Question, political economy of fertility)

## References:

15. Agarwal S.N. 1989. Population Studies with Special Reference to India. New Delhi.LokSurjeet Publication.
16. Bloom David E. 2011. Population Dynamics in India and Implications for Economic Growth.PGDA Working Paper No. 65 http://www.hsph.harvard.edu/pgda/working.htm
17. Bose Ashish. 2000. North-South Divide in India's Democratic Scene. Economic and PoliticalWeekly. May 13, 2000. Pp. 1698-1700
18. Bose Ashish. 2005. Beyond Hindu-Muslim Growth Rate: Understanding socio-economicreality. Economic and Political Weekly. January 29, 2005. Pp. 370-374
19. ChattopadhyayaAparajita. 2004. A Comprehensive Look at Ageing. Economic and PoliticalWeekly. October 02.
20. Gender Development Reports (see UNDP websites)
21. Heer David M. And Grigsby Jill S. 1994. Society and Population. New Delhi. Prentice-Hall ofIndia Pvt. Ltd.
22. Human Development Reports (see UNDP websites)
23. Krishnaraj M., SudarshanRatna M., ShariffAbusaleh. (eds) 1998. Gender, Population andDevelopment. Delhi. Oxford University Press.
24. Kundu Amitabh. 2009. Exclusionary Urbanization in Asia: A Macro Overview. Economic and Political Weekly. Vol. 44, Issue No. 48, November 28, 2009. Pp. 48-58
25. National Population Policy 2000 (http://india.unfpa.org/drive/nationalpopulation-policy2000.pdf) http://conservancy.umn.edu/bitstream/11299/50283/1/Agrawal,%20Sandhya.pdf
26. SenAmartya. 2000. Development as Freedom. Delhi. Oxford University Press.
27. Srivastava O.S. 1994. Demography and Population Studies. New Delhi. Vikas Publishing House.12 14. World Devel
28. World Development Reports (see UNDP websites)

## मराठी पुस्तके
ब्रम्हे सुलभा . वाढत्या लोकसंख्येची भिती कोणाला ? पुणे . ब्रम्हे प्रकाशन

**Subject Code:** 23-A2464

**Subject :** - Research Projects : Steps and Protocols  **(2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | Lectures |
|------|--------|----------|
| I | Basic Concepts: Research, Methodology, Technique, Concept, and Variable | 10 |
| II | Steps in Research: Formulation of Research Problems, Secondary Source Analysis, Research Questions, Data/Narrative- Collection and Analysis, Report Writing, Bibliography, References. | 10 |
| III | Thinking Through Process: Socio-Historical Context, Research Ethics and protocol - Permissions of Authority, Privacy and Protection of respondents, Copyright issues. | 10 |

**Essential Readings:**

1. Young P., 1984, Scientific Surveys and Research, New Delhi Prentice Hall ofIndia.
2. Bryman, A., 2001, Social Research methods, Oxford.
3. Babby E., 2012. The Practice of Social Research, Wadsworth.
4. मालशे, स.ग., १९७०, शोधनिबंधाची लेखनपद्धती, मराठी साहित्य परिषद, पुणे.
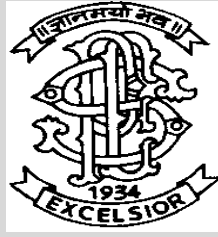
*Progressive Education Society's*

# Modern College Of Arts, Science and

# Commerce, Ganeshkhind, Pune – 411 016

# (Autonomous)

Syllabus for

# S. Y. B.B.A(CA)

## Introduction:

The degree shall be titled as Bachelor of Business Administration (B.B.A.)( Computer Application) under the Faculty of Commerce and Management. First Year B.B.A.(CA) Based on Credit System is implemented w.e.f. the academic year 2022-2023 , Second Year B.B.A.(CA) is implemented w.e.f. 2023-2024 , Third Year B.B.A.(CA) will be w.e.f. 2024-2025.

## Programme Objectives:

BBA (CA) Graduate's will be able to

**Po1:** The BBA (CA) Programme provides sound academic base to develop an advanced career in Computer Application with various Management and Business skills.

**Po2:** This course focus on conceptual grounding of computer usage as well as its practical Business Application.

**Po3:** BBA (CA) inculcates basic programming ability amongst students which can help them to become a good programmer.

**Po4:** This course nurtures good Soft Skills and Managerial Skill in the students which create noble IT Professionals.

**Po5:** Students get excellent exposure to learn the process of Software development in the Vth and VIth semester by developing their own projects which helps them in campus placement.

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva
14.

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

# Subject List

**SYBBA(CA) Sem III**

| Course Type | Sr. No. | Course(Subject) Title | Course (Subject) code | Credits | Weightage for Internal Marks | Weightage For External Marks | Weightage for practical | Total Marks |
|---|---|---|---|---|---|---|---|---|
| CCT-1 | 1 | **Digital Marketing** | 23-BBACA231 | 3 | 30 | 70 | | 100 |
| CCT-2 | 2 | **Data Structures** | 23-BBACA232 | 3 | 30 | 70 | | 100 |
| CCT-3 | 3 | **Software Engineering** | 23-BBACA233 | 3 | 30 | 70 | | 100 |
| CCT-4 | 4 | **Angular** | 23-BBACA234 | 3 | 30 | 70 | | 100 |
| CCT-5 | 5 | **Big Data Analytics** | 23-BBACA235 | 3 | 30 | 70 | | 100 |
| PR-1 | 6 | **Computer Laboratory based on 232,234 & 235** | 23-BBACA236 | 6 | | | 100 | 100 |
| AECC-1 | 7 | **Environmental Awareness** | 23-BBACA237 | 2 | 50 | | | 50 |

| Course Type | Sr. No. | Course(Subject) Title | Course(Subject) code | Credits | Weightage for Internal Marks | Weightage for External Marks | Weightage for practical | Total Marks |
|---|---|---|---|---|---|---|---|---|
| | | | **SYBBA(CA) Sem IV** | | | | | |
| CCT-1 | 1 | **Networking** | 23-BBACA241 | 3 | 30 | 70 | | 100 |
| CCT-2 | 2 | **Object Oriented Concept Through CPP** | 23-BBACA242 | 3 | 30 | 70 | | 100 |
| CCT-3 | 3 | **Operating System** | 23-BBACA243 | 3 | 30 | 70 | | 100 |
| CCT-4 | 4 | **Node JS** | 23-BBACA244 | 3 | 30 | 70 | | 100 |
| PJ-1 | 5 | **Mini Project** | 23-BBACA245 | 4 | | | 100 | 100 |
| PR-1 | 6 | **Computer Laboratory based on 242 & 244** | 23-BBACA246 | 4 | | | 100 | 100 |
| SEC-1 | 7 | **Add-On (Jquery)** | 23-BBACA247 | 2 | 50 | | | 50 |

**Credit Allocation: -** CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses,    SEC-Skill Enhancement Courses.

**Total - 132 Credits for Three years Programme.**

**Subject Code: -  23-BBACA231**

**Subject Name -: Digital Marketing (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topic | No. of Lectures |
|---|---|---|
| 1. | **E-Commerce**<br>1.1 Introduction<br>1.2 Understanding Internet Marketing<br>1.3 Search Engine Optimization<br>1.4 Search Engine Marketing<br>1.5  Digital Display Marketing | 4 |
| 2. | **Introduction to New Age Media (Digital) Marketing**<br>2.1 Types of Digital Marketing -Affiliate Marketing(Niche Product List, Amazon Affiliate Program, Flipkart Affiliate Program, Posting on social Media, Google Trends)<br>2.2 Overview of Internet Marketing<br>,Social Media Marketing, Mobile Marketing<br>2.3  Digital vs. Real Marketing<br>2.4  Digital Marketing Channels | 4 |
| 3. | **Creating Initial Digital Marketing Plan**<br>3.1 Content management<br>3.2 SWOT analysis: Strengths, Weaknesses, Opportunities, and Threats.<br>3.3 Freelancing(Introduction about Freelancing, Branch in Freelancing- Designing, Video Making,Writing,Programming,Fun and Life Stylish, Social media Marketing, Business<br>3.4 Target group analysis<br>EXERCISE: Define a target group | 4 |
| 4. | **Marketing using Web Sites**<br>4.1 Web design<br>4.2  Optimization of Web sites<br>4.3  MS Expression Web<br>EXERCISE: Creating web sites, MS Expression | 4 |
| 5. | **Search Engine Optimization**<br>5.1 SEO Optimization<br>5.2Writing the SEO content EXERCISE: Writing the SEO content | 4 |
| 6. | **Customer Relationship Management**<br>6.1 Introduction to CRM<br>6.2 CRM platform<br>6.3 CRM models EXERCISE: CRM strategy | 4 |
| 7. | **Social Media Marketing**<br>7.1 Social Networking (Facebook, LinkedIn, Twitter, etc.) Social Media (Blogging, Video Sharing - YouTube, Photo sharing – Instagram, Podcasts)<br>7.2 Web analytics - levels<br>7.3 Modes of Social Media Marketing-<br>7.3.1Creating a Facebook page Visual identity of a Facebook page , Types of publications, Facebook Ads , Creating Facebook Ads , Ads Visibility<br><br>    1. Creating Content For Facebook and Social Media<br>• Why Content is the Foundation of SMW?<br>• Psychology of Social Sharing | 17 |

| Unit | Topic | No. of Lectures |
|---|---|---|
| | • Building Content that is Inherently Shareable | |
| 2 | 7.3.2 Business opportunities and Instagram options Optimization of Instagram profiles , Integrating Instagram with a Web Site and other social networks ,Keeping up with posts<br>7.3.3 Business tools on LinkedIn Creating campaigns on LinkedIn , Analyzing visitation on LinkedIn<br>7.3.4 Creating business accounts on YouTube YouTube ,Advertising , YouTube Analytics<br>7.3.5 LinkedIn as a Marketing Platform<br>7.3.6 Twitter and Snapchat Marketing<br>7.4 Digital Marketing tools: Google Ads, Facebook Ads, Google Analytic, Zapier, Google Keyword Planner<br>EXERCISE: Social Media Marketing plan.<br>EXERCISE: Making a Facebook page and Google Ads | |
| 8. | **Digital Marketing Budgeting**<br>8.1 Resource planning<br>8.2 Cost estimating<br>8.3 Cost budgeting<br>8.4 Cost control<br>EXERCISE: Marketing Planning & Marketing Research | **4** |
| **Total** | | **45** |

**Reference Books:**

1) Digital Marketing for Dummies By Ryan Deiss and Russ Hennesberry
2) Advertising and Promotion: An Integrated Marketing Communications Perspective,George Belch, San Diego University Michael Belch, San Diego University
3) Advertising Management: Rajeev Batra, John G. Myers, David A. Aaker
4) Belch: Advertising & Promotions (TMH)
5) The Social Media Bible: Tactics, Tools, & Strategies for Business Success by Lon Safko
6) Web Analytics 2.0 – Avinash Kaushik

**Subject Code-23-BBACA232**

**Subject Name : Data Structures (3 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No. of Lectures |
|---|---|---|
| 1 | **Introduction**<br>1.1 Types of Data structures<br>1.2 Abstract Data Types (ADT)<br>1.3 Pointers and Dynamic Memory Allocation<br>1.4 Algorithm- Definition and characteristics,<br>Space Complexity -Time Complexity -Asymptotic Notation | 4 |
| 2 | **Arrays and Structures**<br>2.1 Introduction to Arrays - array representation<br>2.2 Polynomial - Polynomial Representation - Evaluation of Polynomial - | 3 |

| | | |
|---|---|---|
| | Addition of Polynomial<br>2.3 Introduction to Structures, Self Referential Structure | |
| 3 | **Sorting Techniques**<br>3.1 Sorting algorithms with efficiency<br>- Bubble sort, Insertion sort, Merge sort, Quick Sort, Selection Sort<br>3.2 Searching techniques –Linear Search, Binary search | **8** |
| 4 | **Linked Lists**<br>4.1 Introduction to Linked List<br>4.2 Implementation of Linked List – Static & Dynamic representation,<br>4.3 Types of Linked List<br>  - Singly Linked list(All type of operation)<br>  - Doubly Linked list (Create , Display)<br>  - Circularly Singly Linked list (Create, Display)<br>  - Circularly Doubly Linked list (Create, Display) | **6** |
| 5 | **Stacks**<br>5.1 Introduction<br>5.2 Representation- Static & Dynamic<br>5.2 Primitive Operations on stack<br>5.4 Application of Stack<br>5.5 Conversion of Infix, prefix, postfix , Evaluation of postfix andprefix | **6** |
| 6 | **Queues**<br>6.1 Introduction<br>6.2 Representation - Static & Dynamic<br>6.3 Primitive Operations on Queue<br>6.4 Circular queue, priority queue ,Concept of doubly ended queue<br>6.5 Applications of Queues | **6** |
| 7 | **Trees**<br>7.1 Concept & Terminologies<br>7.2 Binary tree, binary search tree<br>7.3 Representation – Static and Dynamic<br> 7.4 Operations on BT and BST – create, Insert, delete, , counting leaf,non-<br> leaf & total nodes ,<br>7.5 Tree Traversals (preorder, inorder, postorder)<br>7.6 Application - Heap sort<br>Height balanced tree- AVL trees- Rotations, AVL tree examples. | **6** |
| 8 | **Graphs**<br>8.1 Concept & terminologies<br>8.2 Graph Representation – Adjacency matrix, adjacency list, inverse<br>    Adjacency list<br>8.3 Degree of Graph<br>8.4 Traversals – BFS and DFS<br>8.5 Dijkstras Shortest Path Algorithm<br>Applications – AOV network – topological sort, AOE network –critical Path | **6** |
| | | **45** |

**Reference Books:**
1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C and C++---- By YedidyahLangsam, 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.

**Subject Code:  23 BBACA233**

**Subject: Software Engineering (3 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No. of Lectures |
|------|-------|-----------------|
| 1 | **Introduction to System Concepts and  Software Engineering**<br><br>1.1 Definition<br>1.2 Basic Components of system<br>1.3 Elements of the System<br>1.4 Types of System<br>1.5 System Characteristics<br>1.6 Definition of Software<br>1.7 Characteristics of Software<br>1.8 Definition of Software Engineering<br>1.9 Need for Software Engineering<br>1.10 Mc Call's Quality factors | 10 |
| 2 | **Software Development Life Cycle**<br><br>2.1  Introduction<br>2.2  Activities of SDLC<br>2.3  SDLC<br>2.4  Waterfall Model<br>2.5  Incremental Process Models<br>2.6  Prototyping Model<br>2.7  Spiral Model<br>2.8  V& V Model | 8 |
| 3 | **Agile Software Development**<br><br>3.1 Introduction to Agile Model<br><br>3.2 Agile methodology of software development<br><br>3.3 Principles of Agile Model<br><br>3.4 Advantages of  Agile Software Development | 3 |

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|---|---|---|
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| 4 | **Requirement Engineering** | **5** |
| | 4.1 Introduction<br>4.2 Requirement Elicitation<br>4.3 Requirement Elaboration<br>4.4 Requirement Gathering<br>   4.5 Feasibility study Fact Finding Techniques | |
| 5 | **Analysis And Design Tools (with case studies)** | **6** |
| | 5.1  Decision Tree and Decision Table<br>5.2  Data Flow Diagrams (DFD) (Up to $2^{nd}$ level)<br>5.3  Data Dictionary<br>5.4  Elements of DD<br>5.5  Advantages and Disadvantages of DD<br>5.6  Input and Output Design<br>5.7  Structured Design Concepts<br>5.8  Structure Chart<br>5.9  Coupling and Cohesion | |
| 6 | **Software Testing** | **7** |
| | 6.1  Definition<br>6.2  Need for Software Testing<br>6.3  Software Testing Process<br>6.4  Unit Testing<br>6.5  Integration Testing<br>6.5  System Testing | |
| 7 | **Software Maintenance and Software Re-Engineering** | **6** |
| | 7.1  Maintenance definition and types<br>7.2  Software reengineering<br>7.3  Reverse Engineering<br>7.4 Restructuring and forward Engineering. | |
| | | **45** |

**Reference Books:**

   1. Software Engineering: A Practitioner's Approach- Roger S. Pressman,
McGraw hill International Editions 2010(Seventh Edition)

   2. System Analysis, Design and Introduction to Software Engineering (SADSE) - S.
      Parthsarthy,
   B.W. Khalkar

   3. Analysis and Design of Information Systems(Second Edition) - James A. Senn, McGraw
      Hill

4. System Analysis and Design- Elias Awad, Galgotia Publication, Second Edition

**5.**https://www.w3schools.in/sdlc/agile-model

**Subject Code: 23-BBACA234**

**Subject : Angular (3 Credit Course)**

**Total Lectures=45**

| Unit | Topics | No. of Lectures |
|------|--------|-----------------|
| 1 | **Introduction to Angular:**<br>1.1 What is Angular?<br>1.2 What is AngularJS?<br>1.3 Difference between JavaScript and AngularJS.<br>1.4 Difference between Angular with AngularJS.<br>1.5 Advantages and disadvantages of Angular<br>1.6 Introduction to OOP's Concept<br>1.6 Angular MVC Architecture<br>1.7 Introduction to SPA<br>1.8 Setting up the environment<br>1.9 First App using MVC architecture | 8 |
| 2 | **Understanding Angular and Directives:**<br>2.1Components:<br>2.1.1 Components Overview<br>2.1.2 Components Lifecycle<br>2.1.3 View Encapsulation<br>2.1.4 Communication between components<br>2.1.5 Component Styles<br>2.2 Directives: 2.2.1. Built in services<br>2.2.2. Attribute Directives<br>2.2.3 Structural Directives | 10 |
| 3 | Angular Modules, Component View and Scope:<br>3.1 Angular Modules<br>3.2 Angular Component<br>3.3 Angular View<br>3.4 Scope hierarchy<br>3.5 Introduction to Routing | 8 |

| 4 | **Angular Template and Binding:** | |
|---|---|---|
| | 4.1 Angular Template | |
| | 4.1.1 Introduction of template syntax | |
| | 4.1.2 Text Interpolation | 2 |
| | 4.1.3 Template Statements | |
| | 4.2 Angular Binding | |
| | 4.2.1 Understanding Binding | |
| | 4.2.2 Attribute binding | |
| | 4.2.3 Class & style binding | |
| | 4.2.4 Event Binding | |
| | 4.2.5 Property Binding | |
| | 4.2.6 Two-way Binding | |
| 5 | **Dependency Injection and Services: -** | |
| | 5.1 Dependency Injection in Angular | 7 |
| | 5.2 Understanding Dependency injection | |
| | 5.3. Understanding Services | |
| | 5.4 Creating an injectable service. | |
| | 5.5 Defining dependency providers. | |
| | 5.6 Hierarchical Injectors | |
| Total | | 45 |

**Reference Books:**
1. Beginning Angular with Typescript (updated to Angular 5) by   Greg Lim
2. Mastering Web Application Development with AngularJS by Pawel Kozlowski, Peter Bacon Darwin
3. **https://www.tutorialsteacher.com/angularjs/angularjs-scope**
4. **https://www.angular.io**
5  http://w3school.com

**Subject Code:  23-BBACA235**

**Subject: Big Data Analytics (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topic | No. of lectures |
|:---:|:---|:---:|
| 1 | **INTRODUCTION TO BIG DATA**<br>1.1 Introduction to Big Data<br>1.2 Types of Digital Data<br>1.3 Big Data Analytics<br>1.4 Application of Big data | **5** |
| 2 | **INTRODUCTION TO STATISTICAL CONCEPTS**<br>2.1 Basics of Data Analytics<br>2.2 Types of Analytics –<br>    2.2.1  Descriptive,<br>    2.2.2 Predictive,<br>    2.2.3 Prescriptive<br>    2.2.4 Statistical Inference<br>2.3 Populations and samples<br>    2.3.1 Statistical modelling,<br>    2.3.2 Probability<br>    2.3.3 Distribution<br>    2.3.4 Correlation<br>    2.3.5 Regression | **10** |
| 3 | **INTRODUCTION TO R PROGRAMING**<br>3.1 Basics of R Programming<br>3.2 Interaction /Features of R<br>3.3 Installation of R<br>3.4 Basic Computations in R<br>3.5 Objects, Attributes<br>3.6 Data Types in R with application<br>    3.6.1 Vector<br>    3.6.2 List<br>    3.6.3 Matrices<br>    3.6.4 Data Frame, Functions of Data Frame<br>3.7  Control Structures in R<br>3.8 String and functions in R<br>3.9  Examples<br>3.10 Introduction of Machine Leaning with reference to R Programing<br>    3.10.1  Types of Machine learning | **20** |
| 4 | **DATA ANALYTICS WITH R/ WEKA**<br>4.1 Introduction<br>4.2 Data Manipulation<br>4.3 Data Visualization<br>4.4 Data Analysis<br>4.5 | **07** |
| 5 | **BIG DATA ANALYSIS IN PRACTICE**<br><br>5.1 Case study | **03** |

| | 5.2 Preparation of Case study report<br>5.3  Case Study Presentation | |
|---|---|---|
| | **Total no of lectures** | **45** |

**Reference Books:**

1. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRCpress (2013)
3. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game",MC Press, 2012
4. Hands-On Programming with R. by Garrett Grolemund.
5. R for Data Science by Hadley Wickham.

**Subject Code: 23-BBACA236**

**Subject : Computer lab based on 232,234 & 235**

**(2 Credit each= 06 credit course)**

**(Total Practical= 30 P (30x2hrs. for each course)**

| Sr. No. | Assignment Name | No. of lectures |
|---|---|---|
| 1 | Array | **4** |
| 2 | Sorting Techniques (Non-Recursive) | **3** |
| 3 | Sorting Techniques (Recursive) | **4** |
| 4 | Searching Techniques | **4** |
| 5 | Linked List | **3** |
| 6 | Stack | **4** |
| 7 | Queue | **3** |
| 8 | Trees | **2** |
| 9 | Graph | **3** |
| | Total | **30** |

| Sr. No. | Assignment Name | No. of lectures |
|---|---|---|
| 1 | Introduction to Angular , Angular Components  Directives , Expressions, Events | 12 |
| 2 | Angular Modules, Controller, View and Scope | 10 |
| 3 | Forms Validation | 5 |
| 4 | Angular Services | 3 |
| Total | | 30 |

| Sr. No. | Assignment Name | No. of lectures |
|---|---|---|
| 1 | Basic R Programming | 5 |
| 2 | Decision making and loop control structures | 4 |
| 3 | String and Function in R Programming | 4 |
| 4 | Vector and List in R Programming | 3 |
| 5 | Array and Matrices in R Programming | 4 |
| 6 | Factor and Data Frame in R Programming | 3 |
| 7 | Data Analysis | 4 |
| 8 | Data Visualization | 3 |
| Total | | 30 |

**Subject Code: 23-BBACA237**

**Subject: Environmental Awareness (2 Credit Course)**

**Total Lectures = 30**

**Syllabus is designed under board of EVS at college level**

   **(under commerce faculty)**

# Semester IV

**Subject Code: 23-BBACA241**

**Subject: Networking (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topic | No. of Lectures |
|------|-------|------|
| 1 | **Computer Network Basics**<br>1.1 Basics of Computer Network:<br>   Definition , Goals ,Applications, Network Hardware – 1) Broadcast,<br>   2) Point to Point, Components of Data Communication<br> 1.2 Network Topologies, Types and Communication :<br>    Mesh , Star, Bus,Ring , LAN, MAN, WAN, Internetwork, Wireless<br>    Network, Simplex, Half Duplex, Full Duplex<br> 1.3 Server Based LANs & Peer-to-Peer LANs<br> 1.4 Protocols and Standards<br> 1.5 Network Software :Protocol Hierarchies, Layers, Peers, Interfaces,<br>    Design Issues of the Layers, Connection Oriented and<br>    Connectionless Service | **10** |
| 2 | **Network Models**<br>2.1 OSI Reference Model : Functions of each Layer, working of physical<br>    layer and working of data link layer<br>2.2 TCP/IP Reference Model, Comparison of OSI and TCP/IP<br>     Reference Model<br>2.3 TCP/IP Protocol Suite<br>2.4 Addressing<br>   2.4.1Physical ddresses<br>   2.4.2 Logical Addresses<br>   2.4.3Port Addresses,<br>   2.4.4 Specific Addresses<br>2.5 IP Addressing<br>   2.5.1 Classfull Addressing<br>   2.5.2 Classless Addressing | **8** |
| 3 | **Transmission Media**<br>3.1 Introduction, Types of Transmission Media<br>3.2 Guided Media:<br>3.2.1 Twisted Pair Cable- Physical<br>Structure,Categories,Connectors&Applications<br>3.2.2 Coaxial Cable – Physical Structure, Standards, Connectors<br>&Applications<br>3.2.3 Fiber Optic Cable- Physical<br>Structure,PropagationModes,Connectors &<br>Applications | **8** |

| | | |
|---|---|---|
| | 3.3 Unguided Media:<br>　　Electromagnetic Spectrum for Wireless Communication<br>　　3.3.2Propagation Modes Ground,Sky,Line-of-Sight<br>　　3.3.3Wireless Transmission:Radio Waves,Microwaves, Infrared | |
| 4 | **Wired and Wireless LAN**<br>4.1 IEEE Standards<br>4.2 Standard Ethernet MAC Sublayer,Physical Layer<br>4.3 Fast Ethernet – Goals, MAC Sublayer,Topology, Implementation<br>4.4 Gigabit Ethernet – Goals, MAC Sublayer,Topology,Implementation<br>4.5 Ten-Gigabit Ethernet – Goals, MAC Sublayer, Physical Layer<br>4.6 Backbone Networks -Bus Backbone, Star Backbone<br>4.7 Virtual LANs Membership, IEEE standards advantages<br>4.8 Wireless LAN<br>　4.8.1 IEEE 802.11 Architecture,<br>　Bluetooth Architecture (Piconet, Scatternet) | **9** |
| 5 | **Network Devices**<br>5.1 Active and Passive Hubs<br>5.2 Repeaters<br>5.3 Bridges- Types of Bridges<br>5.4 Switches<br>5.5 Router<br>5.6 Gateways | **8** |
| 6 | **Basics Network Security**<br>6.1 Defination of cryptography<br>6.2 Encryption, decryption<br>6.3 Public Keys, Private Keys, Symmetric and Asymmetric Keys | **2** |
| | **Total** | **45** |

**Reference Books:**

1. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
2. Data Communication and Networking by BehrouzForouzan, TATA McGraw Hill. .[4thEdition]

**Subject Code:  23-BBACA242**

**Subject: Object Oriented Concepts Through CPP (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topic | No. of Lectures |
|:---:|---|:---:|
| 1 | **Introduction to C++**<br>1.1 Basic concepts, features, advantages and applications of OOP<br>1.2 Introduction, applications and features of C++<br>1.3 Input and Output operator in C++<br>1.4 Simple C++ program<br>1.5 Overview of OOP principles- encapsulation, inheritance and databinding polymorphism,abstraction | 2 |
| 2 | **Beginning with C++**<br>2.1 Data type and Keywords<br>2.2 Declaration of variables, dynamic initialization of variables, reference variable<br>2.2.1 Scope resolution operator<br>2.2.2 Memory management operators<br>2.3 Manipulators<br>2.4 Functions:<br>2.4.1 Function prototyping, call by reference and return by reference<br>2.4.2 Inline functions<br>2.5 Default arguments | 6 |
| 3 | **Classes and Objects**<br>3.1 Structure and class, Class, Object<br>3.2 Access specifiers, defining data member<br>3.3 Defining member functions inside and outside class definition.<br>3.4 Simple C++ program using class<br>3.5 Memory allocation for objects<br>3.6 Static data members and static member functions<br>3.7 Array of objects, objects as a function argument<br>3.8 Friend function and Friend class<br>3.9 Function returning objects | 7 |
| 4 | **Constructors and Destructors**<br>4.1 Constructors<br>4.2 Types of constructor : Default, Parameterized, Copy<br>4.3 Multiple constructors in a class<br>4.4 Constructors with default argument<br>4.5 Dynamic initialization of constructor<br>4.6 Dynamic constructorDestructor | 6 |

| 5 | **Inheritance** | 6 |
|---|---|---|
| | 6.1 Introduction | |
| | 6.2 Defining Base class and Derived class | |
| | 6.3 Types of Inheritance | |
| | 6.4 Virtual Base Class | |
| | 6.5 Abstract class | |
| | 6.6 Constructors in derived class | |
| 6 | **Polymorphism** | 6 |
| | Static and Dynamic binding | |
| | 7.1 Compile TimePolymorphism | |
| |   7.1.1 Introduction, rules for overloading operators | |
| |   7.1.2 Functionoverloading | |
| |   7.1.3 Operator Overloading unary and binary | |
| |   7.1.4 Operator Overloading using friendfunction | |
| |   7.1.5 Overloading insertion and extractionoperators | |
| |   7.1.6 String manipulation using operator overloading | |
| | 7.2 Runtime Polymorphism | |
| |   7.2.1 this Pointer, pointers to objects, pointer to derived classes | |
| |   7.2.2 Virtual functions and pure virtual functions | |
| 7 | **Managing console I/O operations** | 3 |
| | 8.1 C++ streams and C++ stream classes | |
| | 8.2 Unformatted I/O operations | |
| | 8.3 Formatted console I/O operations | |
| | 8.4 Output formatting using manipulators | |
| | 8.5 User defined manipulators | |
| 8 | **Working with Files** | 6 |
| | 9.1 Stream Classes for File operations | |
| | 9.2 File operations - Opening, Closing and updating | |
| | 9.3 File updating with random access. | |
| | 9.4 Error handling during File operations | |
| | 9.5 Command Line arguments | |
| 9 | **Templates** | 3 |
| | 10.1 Introduction | |
| | 10.2 ClassTemplate and class template with multiple parameters,static class member in class template | |
| | 10.3 FunctionTemplate and function template with multiple parameter,overloading of function template | |
| | 10.4 ExceptionHandlingIntroduction | |
| | **Total** | **45** |

**Reference Books:**

1) Object Oriented programming with C++ by EBalagurusamy
2) Object Oriented Programming with C++ by RobertLafore
3) The Complete Reference C++ by Herbert Schildt

**Subject Code: 23-BBACA243**

**Subject-: Operating System (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topic | No. of Lectures |
|------|-------|-----------------|
| 1 | **Introduction to Operating System**<br>1.1 What is operating system<br>1.2 Computer system architecture<br>1.3 Services provided by OS<br>1.4 Types of OS<br>1.5 Operating System Structure –<br>- Simple structure<br>-Layered approach<br>-Micro kernels<br>-Modules<br>1.6 Virtual Machines – Introduction, Benefits | 3 |
| 2 | **System Structure**<br><br>2.1 User operating system Interface<br>2.2 System Calls–<br>-Process or job control<br>-Device Management<br>    - File Management<br>2.3 System Program | 3 |

| 3 | **Process Management**<br>3.1 Process Concept –<br>    - The process<br>    - Process states<br>    - Process control block<br>3.2 Process Scheduling –<br>    - Scheduling queues<br>    - Schedulers<br>    -Context Switch 3.3Operation on<br>Process –<br>    - Process Creation<br>    -Process Termination<br>3.4 Interprocess Communication – Shared<br>   memory system<br>   Message passing systems | 4 |

| 4 | **CPU(Process) Scheduling**<br>4.1 What is scheduling<br>4.2 Scheduling Concepts –<br>    - CPU- I/O Burst Cycle<br>    - CPU Scheduler<br>    -Preemptive and Non-preemptive scheduling<br>    - Dispatcher<br>4.3 Scheduling criteria<br>4.4 Scheduling Algorithms –<br>- FCFS<br>- SJF ( Preemptive& non-preemptive)<br>- Priority Scheduling (Preemptive& Non- preemptive)<br>- Round Robin Scheduling<br>    - Multilevel Queues<br>    - Multilevel Feedback queues<br>  4.5-   Algorithm evaluation | 6 |
| 5 | **Process Synchronization**<br>5.1 Introduction<br>5.2 Critical section problem<br>5.3 Semaphores –<br>    - Concept<br>    - Implementation<br>    - Deadlock & Starvation<br>    - Types of Semaphores<br>5.4 Classical Problems of synchronization –<br>    -Bounded buffer problem<br>    - Readers & writers problem<br>    - Dining Philosophers problem | 6 |
| 6 | **Deadlock**<br>6.1 Introduction<br>6.2 Deadlock Characterization<br>6.3 Necessary Condition<br>6.4 Deadlock Handling Technique–<br>-Deadlock Prevention<br>- Deadlock Avoidance –<br>- Safe State<br>- Resource allocation graph algorithm<br>- Bankers algorithm<br>    - Deadlock Detection<br>    - Recovery from Deadlock –<br>-Process Termination<br>-Resource Preemption | 6 |

| 7 | **Memory Management**<br>7.1. Background –<br>    -Basic hardware<br>    - Address binding<br>    - Logical versus physical address space<br>    - Dynamic loading<br>    - Dynamic linking and shared libraries<br>7.2 Swapping<br>7.3 Contiguous Memory Allocation –<br>    - Memory mapping and protection<br>    -Memory allocation<br>    - Fragmentation<br>7.4 Paging –<br>    - Basic Method<br>    - Hardware support<br>    - Protection<br>    - Shared Pages<br>7.5 Segmentation –<br>    - Basic concept<br>    - Hardware<br>7.6 Virtual Memory Management –<br>    - Background<br>    - Demand paging<br>    - Performance of demand paging<br>    - Page replacement –<br>    - Allocation of frames<br>    - thrasing<br>- FIFO<br>- OPT<br>- LRU<br>- Second chance page replacement<br>- MFU<br>- LFU | 7 | |

| 8 | **File System**<br>8.1 Introduction & File concepts (file attributes,<br>Operations on files)<br>8.2 Access methods –<br>- Sequential access<br>- Direct access<br>8.3 File structure –<br>- Allocation methods<br>- Contiguous allocation<br>- Linked Allocation<br> - Indexed Allocation<br> 8.4 Free Space Management –<br>- Bit Vector<br>- Linked List<br>- Grouping<br>- 8.5 Directory and Disk Structure – Storage structure, Directory<br>- overview, Single level directory,<br>- Two level directory, Tree structure directory, Acyclic graph<br>- directory, General graph directory, Counting | 6 | |

| | | |
|---|---|---|
| | | |
| 9 | **I/O System**<br>9.1 Introduction<br>9.2 I/O Hardware<br>9.3 Application of I/O Interface<br>9.4 Kernel I/O Subsystem<br>9.5 Disk Scheduling –<br>- FCFS<br>- Shortest Seek time first<br>-  SCAN<br>- C- SCAN<br>C- Look | 4 |
| | Total | 45 |

## Reference Books:-

1. Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition).

2. Operating Systems : Principles and Design – Pabitra Pal Choudhary
(PHI Learning Private Limited)

**Subject Code:  23-BBACA244**

 **Subject-: NodeJS (3 Credit Course)**

**Total Lectures = 45**

| Unit | Topics | No. of Lectures |
|---|---|---|
| **1** | **Introduction to Node JS**<br>1.1 Introduction<br>1.2 What is Node JS?<br>1.3 Advantages of Node JS<br>1.4 Traditional Web Server Model<br>1.5 Node.js Process Model<br>1.6 Install Node.js on Windows<br>1.7 Working in REPL | **8** |
| **2** | **Node JS Modules**<br>2.1 Functions<br>2.2 Buffer<br>2.3 Module<br>2.4 Module Types<br>2.5 Core Modules<br>2.6 Local Modules | **7** |

| | | |
|---|---|---|
| | 2.7 Module. Exports | |
| **3** | **Node Package Manager**<br>3.1 What is NPM ?<br>  3.2 Installing Packages Locally<br>  3.3 Adding dependency in package.json<br>  3.4 Installing packages globally<br>  3.5 Updating packages | **6** |
| **4** | **Web server**<br>  4.1 Creating web server<br>  4.2 Handling http requests<br>  4.3 Sending requests | **6** |
| **5** | **File System**<br>  5.1  Fs.readFile<br>  5.2 Writing a File<br>  5.3 Writing a file asynchronously<br>  5.4 Opening a file<br>  5.5 Deleting a file<br>  5.6 Other IO Operations | **7** |
| **6** | **Events**<br>6.1 Event Emitter class<br>6.2 Returning event emitter<br>6.3 Inhering events | **4** |
| **7** | **Database connectivity**<br>7.1 Connection string<br>7.2 Configuring<br>7.3 Working with select command<br>7.4 Updating records<br>7.5 Deleting records<br>7.6 Template Engines<br>   1.1 Why template engine<br>   1.2 What is Jade<br>   1.3 what is vash<br>   1.4 Example | **6** |
| **Total** | | **45** |

**Reference Books:**
1) Node.js complete reference guid , velentin Bojinov, David Herron, DiogeResende, packt Publishing ltd
2) Mastering Nod.js By Sandro Pasquali , packt Publishing
3) Smashing Node.js Javascript Everywhere , Guillermo Rauch, John wiley& Sons

**Subject Code: 23-BBACA245**

**Subject : Mini Project( 04 credit course)**

**Guidelines:**
- Students should work in a team of maximum 2 students.
- Students can choose a project topic without any restriction on technology or domain.
- The student group will work independently throughout the project work including: problem identification, information searching, literature study, design and analysis, implementation, testing, and the final reporting.
- Project guide must conduct project presentations (minimum 4) to monitor the progress of the project groups.
- At the end of the project, the group should prepare a report which should conform to international academic standards. The report should follow the style in academic journals and books, with clear elements such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report.
- The final project presentation with demonstration (UE) will be evaluated by the project guide (appointed by the college) and one external examiner (appointed by the University).

**Evaluation guidelines:**

| CI (30 marks) | | | CE (70 marks) | | |
|---|---|---|---|---|---|
| First presentation | Second presentation | Documentation | Project Logic/Presentation | Documentation | Viva |
| 10 | 10 | 10 | 40 | 10 | 20 |

**Recommended Documentation contents:**

**Abstract**

**Introduction**

      -motivation
      -problem statement
      -purpose/objective and goals
      -literature survey
      -project scope and limitations

**System analysis**

          -Existing systems
          - scope and limitations of existing systems
          -project perspective, features
          - stakeholders
          -Requirement       analysis   -   Functional    requirements,
                   performance requirements, security requirements etc.

**System Design**

          - Design constraints
          - System Model: DFD
          - Data Model
          -User interfaces

**Implementation details**

          -Software/hardware specifications

**Outputs and Reports Testing**

          Test Plan, Black Box Testing or Data Validation Test Cases, White Box
          Testing or Functional Validation Test cases and results

**Conclusion and Recommendations**

**Future Scope**

**Bibliography and References**

**Subject Code: 23-BBACA246**

**Subject : Computer lab based on 242 & 244**

**(2 Credit each= 04 credit course)**

**(Total Practical= 30 P (30x2hrs. for each course)**

| Sr. No. | Assignment Name | No of Practical's |
|---------|-----------------|-------------------|
| 1 | Beginning with C++ | 3 |
| 2 | Operators and Functions in C++ | 4 |
| 3 | Classes and Objects | 3 |
| 4 | Constructors and Destructors | 5 |
| 5 | Inheritance | 4 |
| 6 | Polymorphism | 4 |
| 7 | Managing Console I/O operations | 3 |
| 8 | Working with Files | 2 |

| | | |
|---|---|---|
| 9 | Templates | **2** |
| | Total | **30** |

| Sr. No. | Assignment Name | No of Practical's |
|---|---|---|
| 1 | Node.js web server, modules & npm | **7** |
| 2 | File system | **6** |
| 3 | Events in node.js | **8** |
| 4 | Node.js with database | **9** |
| | Total | **30** |

**Subject Code:  23-BBACA247**

**Subject-: JQuery (2 Credit Course)**

**Total Lectures = 30**

| Unit No | Contents | Lectures |
|---|---|---|
| **1.** | **Introduction**<br>1.1 jQuery Introduction<br>1.2 Install and Use jQuery Library<br>1.3 Un-Obstructive JavaScript<br>1.4 First jQuery Example<br>1.5 jQuery Syntax<br>1.6 How to escape a special character<br>1.7 Basic Selectors<br>1.8 Traversal Functions | **5** |
| **2.** | **HTML Manipulation**<br>2.1 Getting Setting values from elements<br>2.2 Handling attributes<br>2.3 Inserting New elements<br>2.4 Deleting/Removing elements<br>2.5 CSS manipulations<br>2.6 Dimensions<br>2.7 Positioning | **5** |
| **3.** | **Effects and Events Effects:**<br>3.1 Showing/Hiding elements<br>3.2 Sliding elements<br>3.3 Fading elements<br>3.4 Deleting animation elements<br>3.5 Custom animation Events:<br>3.6 Working with events. | **5** |
| **4** | **Practical Session/ Assignments:**<br><br>1. Write a jQuery code to check whether jQuery is loaded or not.<br>2. Write a jQuery code to scroll web page from top to bottom and vice versa.<br>3. Write a jQuery code to disable right click menu in html page.<br>4. Write a jQuery code to disable the submit button until the visitor has clicked a check box.<br>5. Write a jQuery code to fix broken images automatically. | **15** |

6. Write a jQuery code to blink text continuously.
7. Write a jQuery code to create a zebra stripes table effect.
8. Write a jQuery code to print a page.
9. Write a jQuery code to allow the user to enter only 15 characters into the textbox.
10. Write a jQuery code to make first word of each statement to bold.
11. Write a jQuery code to create a division (div tag) using jQuery with style tag.
12. Write a jQuery code to select values from a JSON object.
13. Write a jQuery code to add list elements within an unordered list element.
14. Write a jQuery code to remove all the options of a select box and then add one option and select it.
15. Write a jQuery code to underline all the words of a text.
16. Write a jQuery code to demonstrate how to get the value of a textbox.
17. Write a jQuery code to remove all CSS classes from an application.
18. Write a jQuery code to distinguish between left and right mouse click.
19. Write a jQuery code to check if an object is a jQuery object or not.
20. Write a jQuery code to detect whether the user has pressed 'Enter key' or not.
21. Write a jQuery code to count number of rows and columns in a table.
22. Write a jQuery code to display form data onto the browser.
23. Write a jQuery code to find absolute position of an element.
24. Write a jQuery code to remove a specific value from an array.
25. Write a jQuery code to change button text.
26. Write a jQuery code to add options to a drop-down list.
27. Write a jQuery code to set background-image to the page.
28. Write a jQuery code to get the selected value and currently selected text of a dropdown box.
29. Write a jQuery code to disable a link.
30. Write a jQuery code to Restrict "number"-only input for textboxes including decimal points.
31. Write a jQuery code to set value in input text.

| Total Lectures | 30 |
|---|---|

**References:**

1. jQuery pocket reference by David Flanagan
2. Learning jQuery by Jonathan Chaffer
3. JavaScript and jQuery by David Sawyer McFarland
4. w3schools.com website
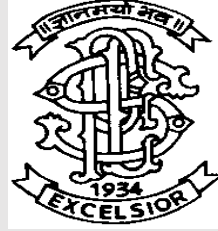
*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

## Syllabus for

# S. Y. B. C. A. (Science)

## Introduction:

The Program is of Three Years duration with six semesters. It is a Full Time Degree Program. The program will be based on Choice-based credit system comprising 132+8 (140) credit points.

## Programme Objectives:

- To produce knowledgeable and skilled human resources that is employable in IT and ITeS.
- To impart knowledge required for planning, designing and building Complex Application Software Systems as well as to provide support for automated systems or applications.
- It helps students analyse the requirements for system development and exposes students to business software and information systems.
- This course provides students with options to specialize in legacy application software, system software or mobile applications.
- To produce entrepreneurs

## Programme Specific Outcomes (PSOs):

- To produce skill oriented human resource.
- To import practical skills among students.
- To make industry ready resource.
- Students get the knowledge of relational databases.

## Examination Pattern:

**CIE- 30 Marks**

**ESE-70 Marks**

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Study Tour
11. Written Test
12. PPT presentation
13. Field Visit
14. Industrial Visit
15. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content

# Subject List

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | | 23-BCA-231 Data Structures | 4 | | | 60 |
| 2 | | 23-BCA-232 Database Management Systems – II | 4 | | 16 | 60 |
| 3 | | 23-BCA-233 Web Technology using PHP | 4 | | | 60 |
| 4 | | Environmental Science I | 2 | | | 30 |
| 8 | | Language –I | 2 | | | 30 |
| 9 | | 23-BCA-234 Data Structures Laboratory | | 2 | | 8P |
| 10 | | 23-BCA-235 Database Management Systems - II Laboratory | | 2 | 6 | 7P |
| 11 | | 23-BCA-236 Web Technology using PHP Laboratory | | 2 | | 10P |

### SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | | 23-BCA-241 Core Java | 4 | | | 60 |
| 2 | | 23-BCA-242 Object Oriented Programming in Python | 4 | | | 60 |
| 3 | | 23-BCA-243 Object Oriented Software Engineering | 4 | | 16 | 60 |
| 7 | | Environmental Science Awareness Course –II | 2 | | | 60 |
| 8 | | Language –II | 2 | | | 60 |
| 9 | | 23-BCA-244 Core Java Laboratory | | 2 | | 6P |
| 10 | | 23-BCA-245 Object Oriented Programming in Python Laboratory | | 2 | 6 | 9P |
| 11 | | 23-BCA-246 Object Oriented Software Engineering Laboratory | | 2 | | 7P |

# Syllabus

**Subject Code: 23-BCA-231**

**Subject: Data Structures**

**Total Lectures=60**

| Unit | Data Structures<br>Topic | No of lecture (60) |
|---|---|---|
| I | **Introduction to data structure**<br><br>   i.   Data types and data objects<br><br>   ii.   Abstract Data Types (ADT)<br><br>   iii.   Data structure<br><br>   iv.   Algorithm analysis: Frequency counts, Space and Time complexity,<br><br>   v.   Asymptotic notation : BigO, Omega ($\Omega$)<br><br>   vi.   Algorithms and its complexity using simple example algorithms | |
| II | **Arrays**<br><br>   i.   Introduction and definition<br><br>   ii.   Matrix representation using arrays: Row and column major, operations onmatrices, Sparse Matrix<br><br>   iii.   Sorting techniques with time complexity: Bubble sort, Insertion sort,Merge sort, Quick sort<br><br>   iv.   Searching techniques with time Complexity: Linear search, Binary search | |
| III | **Linked Lists**<br><br>   i.   Introduction and Definition<br><br>   ii.   Representation: Static & Dynamic<br><br>   iii.   Types of linked lists: singly, doubly, circular<br><br>   iv.   Operations on link list: create, display, insert, delete, reverse, search, sort,concatenation, Merge | |

| | | |
|---|---|---|
| | v.    Real world applications of Link list (implementation not expected) | |
| IV | **Stacks and Queues**<br><br>i.    Representation of Stack: Using arrays and Linked Lists<br><br>ii.    Operations on stack: push, pop<br><br>iii.    Applications of Stack : Recursion, Infix to postfix, postfix to infix<br><br>iv.    Representation of Queues : Static & Dynamic<br><br>v.    Operations on queue: insert, delete<br><br>vi.    Types of queue: Circular queue and Priority queue<br><br>vii.    Real world Applications of queue (Implementation not expected) | |
| V | **Trees**<br><br>i.    Introduction and Tree terminologies: Definitions: Tree, root, child, leaf, level,height, depth<br><br>ii.    Binary trees: Types: Rooted, full, complete and skewed.<br><br>iii.    Representation of Trees: Using arrays and Linked List<br><br>iv.    Types of Traversal: Preorder, Inorder, Postorder, Applications of Binary Tree-Expression Tree, Huffman Encoding<br><br>v.    Binary Search Tree (BST): Introduction and definition<br><br>vi.    Search Trees-AVL, rotations in AVL Tree, operations on AVL Tree,<br><br>vii.    Introduction of B Tree, B+ Tree. | |
| VI | **Graphs**<br><br>i.    Introduction and Graph terminologies.<br><br>ii.    Representation of a Graph – Adjacency matrix, Adjacency list, Adjacency multi-list<br><br>iii.    Graph Traversals – DFS, BFS<br><br>iv.    Applications of graphs - Topological sort | |

**Reference Books:**

1. Fundamentals of Data Structures by Horowitz Sahani (Galgotia)
2. Introduction to Data Structures using C by Ashok Kamthane
3. Data Structures using C by Bandopadhyay & Dey(Pearson)
4. Data Structures using C by Srivastava BPB Publication

**E-Books and online resources:**

1. https://www.academia.edu/5900697/C_and_Data_Structures_Balaguruswamy
2. https://www.javatpoint.com/tree
3. https://www.simplilearn.com/tutorials/data-structure-tutorial/graphs-in-data-structure
4. https://www.andrew.cmu.edu/course/15-121/lectures/Stacks%20and%20Queues/Stacks%20and%20Queues.html

**Subject Code 23-BCA-232**

**Subject: Database Management Systems-II**

**Total Lectures=60**

| Unit | Database Management Systems-II<br>Topic | No of lectures (30) |
|---|---|---|
| 1 | **Relational Database Design**<br><br>  i.   PL/Postgre SQL: Language structure<br><br>  ii.  Controlling the program flow, conditional statements, loops<br><br>  iii.  Views<br><br>  iv.  Functions and Procedure<br><br>  v.  Handling errors and exceptions<br><br>  vi.  Cursors<br><br>  vii.  Triggers<br><br>  viii.  Packages | |
| II | **Transaction Concepts**<br><br>  i.  Transaction, properties of transaction, states of transactions<br><br>  ii.  Concurrent execution of transactions and conflicting operations<br><br>  iii.  Schedules, types of schedules, concept of serializability, precedence graph for serializability | |
| III | **Concurrency Control**<br><br>  i.  Ensuring serializability by locks, different lock modes<br><br>  ii.  2PLand its variations<br><br>  iii.  Multiple Granularity locking protocol<br><br>  iv.  Basic timestamp method for concurrency, Thomas Write Rule<br><br>  v.  Locks with multiple granularity, dynamic database concurrency (Phantom Problem)<br><br>  vi.  Timestamps versus locking<br><br>  vii.  Optimistic concurrency control algorithm, multi version concurrency control | |

| | | |
|---|---|---|
| | viii. Deadlock handling methods –<br><br>ix. Detection and Recovery (Wait for graph).<br><br>x. Prevention algorithms (Wound-wait, Wait-die)<br><br>xi. Deadlock recovery techniques (Selection of Victim, Starvation, Rollback) | |
| IV | **Crash Recovery**<br><br>   i.   Transaction Failure classification<br><br>  ii.  Recovery concepts<br><br> iii.  Checkpoints<br><br> iv.  Recovery with concurrent transactions (Rollback, checkpoints, commit)<br><br>  v.  Log base recovery techniques (Deferred and Immediate update)<br><br> vi.  Buffer Management<br><br>vii.  Database backup and recovery from catastrophic failures<br><br>viii.  Shadow paging | |
| V | **Database Security**<br><br>  i. Introduction to database security concepts<br><br> ii. Methods for database security<br><br>iii. Discretionary access control method<br><br>iv. Mandatory access control and role based access control for multilevel security<br><br> v. Use of views in security enforcement<br><br>vi. Overview of encryption technique for security<br><br>vii. Statistical database security | |

| VI | Database System Architectures | |
|---|---|---|
| | i. Centralized and Client – Server Architectures <br> ii. Server System Architectures <br> iii. Introduction to Parallel Systems <br> iv. Introduction to Distributed Systems <br> v. SIntroduction to Object Based Databases | |

**Reference Books:**

1. Database System Concepts – Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 6<sup>th</sup> edition-McGraw-Hill
2. Fundamentals of Database Systems- Ramez Elmasri, Shamkant B. Navathe, 6<sup>th</sup> edition–Pearson.
3. Database Management Systems -Raghu Ramakrishnan, Johannes Gehrke, 3<sup>rd</sup> edition, TataMcGraw Hill
4. Introduction to Database Management System- Bipin Desai, 3<sup>rd</sup> edition, Galgotia Publication
5. An Introduction to Database Systems - C.J. Date, 7<sup>th</sup> edition, Addison-Wesley
6. Practical PostgreSQL- Joshua D. Drake, John C Worsley, O'Reilly Publications

**E-Books and online resources:**

1. https://link.springer.com/content/pdf/bfm:978-3-540-48399-1/1.pdf
2. https://diblokdcma.files.wordpress.com/2009/10/springer-fundamentals-of-relational-database-management-systems-apr-2007.pdf
3. https://industri.fatek.unpatti.ac.id/wp-content/uploads/2019/03/162-Introduction-to-Database-Management-System-Satinder-Bal-Gupta-Aditya-Mittal-Edisi-2-2017.pdf

   https://ebooks.lpude.in/management/mba/term_3/DCAP204_MANAGING_DATABASE_DCAP402_DATABASE_MANAGEMENT_SYSTEMS.pdf

Subject Code:  23-BCA-233

Subject: Programming using PHP

Total Lectures=60

| Sr. No | Programming using PHP Topic | Lectures |
|:---:|:---|:---:|
| I | **Introduction to PHP** <br><br> i.   Introduction to php, Features of PHP, PHP Fundamentals <br><br> ii.   Use of PHP, Lexical structure, Language basics. <br><br> iii.   Basic Syntax, echo & print statement <br><br> iv.   Variables: Local, global & static <br><br> v.   Data Types, Operators, Control Statements | |
| II | **Functions and Array** <br><br> i.   PHP Functions <br><br> ii.   Parameterized Function <br><br> iii.   PHP Call By Value, Call By Reference <br><br> iv.   PHP Default Arguments, Variable Arguments <br><br> v.   PHP Recursive Function, Anonymous Functions <br><br> vi.   PHP Array <br><br> vii.   Types of array: Indexed Arrays, Associative Arrays, Multidimensional Arrays <br><br> viii.   Traversing Array Sorting Arrays | |
| III | **Introduction to OOPS** <br><br> i.   Classes, Objects <br><br> ii.   Introspection, Serialization, Inheritance <br><br> iii.   Polymorphism, Overloading Interfaces and Abstraction, <br><br> iv.   Encapsulation, Constructor, Destructor | |

| IV | **Introduction to Web Techniques** | |
|---|---|---|
| | i. HTTP Basics, Variables, Server Information, | |
| | ii. Processing Forms, File uploading | |
| | iii. Setting Response Headers, Maintaining State, SSL, PHP Error handling | |
| V | **Database Connectivity** | |
| | i. Introduction to SQL | |
| | ii. Using PHP to access a database | |
| | iii. Relational databases and SQL | |
| | iv. PEAR DB basics | |
| | v. Advanced database techniques | |
| VI | **Ajax and XML** | |
| | 1. Understanding java scripts for AJAX | |
| | 2. AJAX web application model | |
| | 3. AJAX –PHP framework | |
| | 4. Performing AJAX validation | |
| | 5. Handling XML data using php and AJAX | |
| | 6. What is XML? | |
| | 7. XML document Structure | |
| | 8. PHP and XML | |
| | 9. XML parser | |
| | 10. The document object model | |
| | 11. The simple XML extension | |
| VII | **PHP Framework** | |
| | 1. CodeIgniter - Overview, Installing CodeIgniter | |
| | 2. CodeIgniter Features | |
| | 3. CodeIgniter Architecture | |
| | 4. MVC Framework , Basic concept of CodeIgniter, Libraries | |
| | 5. Working with databasess | |

**Reference Books:**

1. Programming PHP By Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication, ISBN-13978-1565926103
2. Beginning PHP5, Wrox publication
3. "Beginning PHP5, Apache, and MySQL Web Development (Programmer to Programmer)", byElizabethNaramore,JasonGerner,YannLeScouarnec,JeremyStolz,MichaelK.Glass,Wrox;2nd edition (27 January 2005),
4. PHP for Beginners, SPD publication
5. PHP web sevices, Wrox publication.
6. AJAX Black Book, Kogent solution
7. Mastering PHP , BPB Publication.
8. PHP cookbook, O'Reilly publication

**E-Books and online resources:**

https://www.invezzatechnologies.com/best-php-frameworks/

https://www.tutorialspoint.com/cakephp/cakephp_overview.htm

https://www.tutorialspoint.com/laravel/laravel_overview.html

www.php.net

https://www.w3schools.com/php/

https://www.tutorialspoint.com/php/index.htm

**Subject Code:  23-BCA-234**

**Subject: Data Structure Laboratory**

**Total Lectures=30**

| Sr.no. | Topic | Practical |
|--------|-------|-----------|
| **Section I : Cell Biology** | | |
| 1 | Study of Prokaryotic and Eukaryotic cell structure. Study of Electron Micrographs of all  important cell organelles | 1 |
| 2 | Micrometry- Measurement of cell size taking different types of cells. | 2 |
| 3 | Staining and Observation of human cheek epithelial cells | 1 |
| | Isolation and characterization of the following subcellular components, using appropriate samples, by differential centrifugation:<br>   i.    Nuclei : staining  and counting<br>   ii.   Mitochondria : Succinate Dehydrogenase assay<br>   iii.  Chloroplast : Microscopic Observation<br>   iv.  Lysosomes: Acid Phosphatase assay | 4 |
| 4 | Methods of cell lysis and confirmation | 1 |
| **Section II : Genetics** | | |
| 7. | **Problem Sets of** –<br>  &bull; Mendalian inheritance and Non Mendalian inheritance Monohybrid cross. Dihybrid cross and Trihybrid cross<br>  &bull; Incomplete Dominance, Co-dominance.<br>  &bull; Epistasis.<br>  &bull; Gene interactions | 3 |
| 8 | **Problems set of Linkage and Pedigree analysis**<br>  &bull; 2 point cross. 3 point cross and genetic mapping.<br>  &bull; Tetrad analysis: Chromosome interference, analysis of ordered and unordered tetrads.<br>  &bull; Sex linked inheritance<br>  &bull; **Observation and staining of barr body** | 3 |
| 9 | Studies on karyotype analysis | 1 |

**References:**

1. Cell biology and genetics lab manual Boğaziçi University Department of Molecular Biology and Genetics 2007-2008
2. Cell Biology Laboratory The University of Toledo Department of Biological Sciences/Natural Sciences and Mathematics
3. Principals of Genetics: Robert H. Tamarin, 7th Edition.
4. Genetics, (2006) Strickberger MW - (Prentice Hall, India.)

**Subject Code: 23 BBT -310**

**Subject:  Practical in Bio Analytical Technique and Metabolism (2 Credit Course)**

**Total Practical = 15 P(15x3hrs)**

| Sr. No. | Topic | Practical |
|---|---|---|
| **Section I – Biochemical & Biophysical Techniques** | | |
| 1 | Quantitative determination of free amino acid content from biological sample. | 1 |
| 2. | The separation of amino acids by ion exchange chromatography | 2 |
| 3 | separation of pigments using column chromatography | 1 |
| 4. | SDS-polyacrylamide Slab gel electrophoresis of proteins | 2 |
| 5. | Native gel electrophoresis of proteins | 1 |
| 6 | Determine λ max of DNA, protein, bromophenol blue solutions using spectrophotometer | 1 |
| **Section II – Metabolism** | | |
| 7. | Estimation of glucose by Benedict's method | 1 |
| 8 | Estimation of amylase activity from given sample. | 1 |
| 9 | Estimation of reducing sugar by DNSA (dinitrosalicylic acid) method | 1 |
| 10 | Estimation of alkaline phosphates activity from given sample. | 1 |
| 11 | Estimation of creatinine in urine or Preparation of lactalbumin from milk or Chlorophyll from plant source | 1 |
| 12 | Estimation of cholesterol by ZAK's method | 1 |

**Reference Books :**

1. Jayaram T. 1981. Laboratory manual in Biochemistry, Wiley Estern Ltd. New Delhi.
2. Plummer D. 1988. An Introduction to Practical Biochemistry. 3rd ed. Tata McGraw Hill, New Delhi.
3. Nath RL. 1990. Practical Biochemistry in Clinical Medicine. Academic Pub.
4. Sadasivam S and Manickam A. 1996. Biochemical Methods. 2nd ed. New Age International (P) Ltd. Publisher, New Delhi.
5.

**Subject Code: 23 BBT**

**Subject : Practical in Molecular Biology  and Environmental Biotechnology (2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Sr. No | Topic | Practical |
|---|---|---|
| | **Molecular Biology** | |

| 1 | Reagent and buffer preparation | 1 |
|---|---|---|
| 1 | Estimation of Nucleic acids by UV-Vis spectrophotometry | 1 |
| 2 | Determination of melting temperature of DNA | 1 |
| 3 | Bacterial DNA isolation by alkaline lysis/ lysozyme method and purity check by using A 260/280. | 2 |
| 4 | Bacterial DNA agarose gel electrophoresis | 1 |
| 5 | Estimation of DNA by diphenylamine method | 1 |
| 6 | Isolation of RNA from Yeast or Yeast Tablets | 1 |
| | | |
| | **Environmental Biotechnology** | |
| 1 | Study of pollution indicator plants in terms of morphology and anatomy (any 5-7 plants) | 1 |
| 2 | Community sampling-By Quadrate method for plants : Percentage of frequency, density, abundance . frequency class diagram and comparison with Raunkiaers frequency chart, Simpson's index of dominance. | 2 |
| 3 | Microbial (Bacterial, Algal and Fungal) community estimation | 1 |
| 4 | Study of polluted and unpolluted soil by<br> i) Physical properties : Colour, Texture, Water holding capacity | 1 |
| | ii) Chemical properties: pH, Organic content, chlorides and Alkalinity | 2 |
| 5 | Testing genotoxicity of water sample : Polluted and non Polluted | 1 |

**Reference Books :**

1     Introduction to Environmental Biotechnology (2007) Chattergy PHI Learning Pvt. Ltd, Delhi

2     Textbook of environmental studies for undergraduate courses (2005) Erach Bahrucha Universities Press, Hyderabad

3     Scragg A. Environmental Microbiology Oxford Univ Press. (2005).

4     Evans & Furlong. Environmental Biotechnology.Theory & Applications 2nd ed 2011. Wiley-Blackwell.

6.     Lab manual on molecular biology January 2016 Edition: First Edition, Media Associates Delhi-53Editor: Ruhi Dixit, KartikayBisen, Ashwani Kumar, Ashim Borah, Chetan KeswaniISBN: 978-81-909182-7-5

# Semester IV

**Subject Code: 23 BBT -401**

**Subject: Cell Biology II (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No of lecture |
|------|-------|---------------|
| 1 | **Cell Cycle** <br> • Introduction to cell cycle <br> • Phases and Check points of cell cycle | 4 |
| 2 | **Cell Division in Plant & Animal** <br> • Mitosis <br> • Meiosis | 7 |
| 3 | **Cell Signaling** <br> • Signaling molecules <br> • Signaling receptors: Cell surface receptors <br> • Autocrine, syncrine & paracrine signaling <br> • G-protein signaling (one example) <br> • Calcium Signaling | 12 |
| 4 | **Cell Death** <br> • Aging, Apoptosis and Necrosis <br> • Neoplasia <br> • Autophagy <br> • Ferroptosis <br> • Pyroptosis | 7 |

**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)BruceAlberts, 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
5. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.Lippincott Williams and Wilkins, Philadelphia.
7. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press& Sunderland, Washington, D.C.; Sinauer Associates, MA.
8. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

**Subject Code:  23 BBT-402**

**Subject: Molecular Biology II (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No of lectures |
|------|-------|------|
| I | **Synthesis of RNA:   Transcription:**<br>• Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination<br>• Transcription in Eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing.<br>• Splicing mechanisms, Splicing of tRNA precursors, Splicing of rRNA precursors | 8 |
| II | **Synthesis of Protein: Translation**<br>• Structure of ribosome and assembly<br>• Protein Synthesis in Prokaryotes: properties of the prokaryotic Initiator tRNA-fMet, Charging of tRNA, amino acyl tRNA synthetases<br>• Protein Synthesis in Eukaryotes: Mechanism of initiation, elongation and termination of polypeptides,<br>• Fidelity of translation, Inhibitors of translation.<br>• Posttranslational modifications of proteins | 10 |
| III | **DNA damage and repair**<br>• Causes and types of DNA damage<br>• Mechanism of DNA repair: Photo reactivation, base excision repair, nucleotide excision repair, mismatch repair, SOS repair, recombination repair | 5 |
| IV | **Regulation of activity of Genes and Gene products in Prokaryotes**:<br>a) General aspects of gene Regulation: inducible and repressible system<br>b) The lactose operon : Catabolite repression<br>c) The Arabinose operon: Positive , negative regulation<br>d) The Tryptophan operon : Regulation by attenuation. | 7 |

**Reference Books :**

1. Genes X, 10th edition (2009), Benjamin Lewin, Publisher - Jones and Barlett PublishersInc. 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-McGrew Hill Science.USA
4. Fundamentals of Molecular Biology, (2009), Pal J.K. and Saroj Ghaskadbi, Oxford University Press. India
5. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. JohnWiley & Sons. Inc.

6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIIIEdition. Lippincott Williams and Wilkins, Philadelphia.
7. Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.
8. Principles of Gene manipulation and Genomics. - S.B. Primrose and R.M. Twyman.BlackwellPublication

**Subject Code: 23 BBT 403**

**Subject : Immunology (2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | No. of lectures (30) |
|------|--------|----------------------|
| I | **Immunology: Basic definitions and fundamentals of the immune system**<br>• Definitions - Infection, Invasion, Pathogen, Immunity, Antigen, Antibody<br>• Concept of Host pathogen interaction<br>• Organization of Immune system:<br>  a) Structure and function of the cells and tissues of immune system.<br>  b) Structure and function of Primary and Secondary lymphoid organs<br>• Types of immunity:<br>    a) Innate and Acquired immunity<br>    b) Cell mediated and Humoral immunity<br>• Immune Response: Primary and Secondary<br>• Phagocytosis | 07 |
| II | **Components of the immune system:**<br>• Antigens: Types and properties of an antigen. Factors affecting immunogenicity.<br>• Immunoglobulin: Structure and their types. Properties and function of different Immunoglobulin classes.<br>• Complement system: Components, function and pathways.<br>• Major Histocompatibility Complex: Types, structure and function<br>• Cytokines: Types, properties and their function | 08 |

| | | | |
|---|---|---|---|
| III | **Antigen-Antibody Interactions** <br> • General characteristics of Antigen-Antibody reaction <br> • Concept of Lattice hypothesis and Zone phenomenon <br> • Principle and example of different diagnostic tests: <br>    i. Precipitation, Agglutination, Immunodiffusion and Complement fixation test <br>    ii. Radioimmunoassay, Immunofluorescence, ELISA <br>    iii. Western blotting | | 07 |
| IV | **Clinical Immunology** <br> • Hypersensitivity reactions: Types of Hypersensitivity and clinical manifestation. <br> • Autoimmunity: Mechanisms, Types of autoimmune diseases <br> • Concept of Immunotherapy <br> • Vaccine Technology: <br> • Adjuvant- Properties and role with suitable example <br> • Concept with suitable example of Killed and Live attenuated vaccines, Combined vaccines <br> • Modern Techniques: Concept of Subunit vaccines, Recombinant DNA Vaccines, Conjugate vaccines, Polyvalent vaccines, Monoclonal antibodies, Chimeric antibodies with suitable example | | 8 |

**Reference Books**

1. Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. University PressPublication.
2. Roitt I. Essential Immunology. 10th Ed. Blackwell Science.
3. Kuby. Immunology. 4th edition. W. H. Freeman & company.
4. Sudha Gangal and ShubhangiSontakke, Textbook of basic and clinical immunology,1st edition (2013), University Press, India

**Subject Code: 23 BBT- 404**

**Subject : Animal Development (2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | Lectures |
|---|---|---|
| I | • History of developmental biology, <br> • Model organisms in study of developmental biology: frog, chick, mouse, Drosophila, Sea urchin, Zebra Fish , *Caenorhabditis elegans* | 2 |

| | | |
|---|---|---|
| II | **Reproduction and Development**:<br>• Basics of gametogenesis: Oogenesis, spermatogenesis and spermiogenesis<br>• Detailed structure of gametes<br>• Fertilization process in sea urchin and mammals<br>• Types of eggs, types and patterns of cleavage<br>• Morphogenetic movements | 9 |
| III | **Gastrulation**<br>• In frog, chick, *Drosophila* up to formation of threegerminal layers | 8 |
| III | **Basics of neurulation** | 2 |
| IV | **Concept of pattern formation**<br>• Maternal effect genes and their role in Drosophila pattern formation | 2 |
| V | • Concept of Stem cells, Progenitor cells, cell lineages, determination, commitment and differentiation, re differentiation and trans-differentiation | 1 |
| VI | **Different types of regeneration with one example of each type** | 2 |
| VII | **Theories of ageing** | 1 |
| VIII | • Apoptosis during Embryonic development, intrinsic an extrinsic pathways | 2 |
| IX | **Abnormal development and teratogenesis in animals** | 1 |

**Reference Books:**

1. Development Biology, 9<sup>th</sup> edition, (2010),Gilbert S.F.(Sinauer Associates, USA)
2. Principles of Development, 5<sup>th</sup>edition (2018), Wolpert L and Tickle C, Publisher: OxfordUniversity Press, USA.

3. An introduction to embryology, 5<sup>th</sup> edition, B. I. Balinsky, B.C. Fabian (2012) CengageLearning India

**Subject Code: 23 BBT-405**

**Subject: Plant Development (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No. of lectures |
|---|---|---|
| **1** | **Plant as a living system**<br>• Principles and Unique features of plant development<br>• Comparison of Plant and animal development, | 3 |

| 2 | **Plant development at:**<br>• Cellular, organ and whole-plant levels<br>• Whole plant as an interacting dynamic system | 2 |
|---|---|---|
| 3 | **Major phases of plant development**<br>　**i) Vegetative development:**<br>• Zygote to seed embryo to seedling till vegetative maturity<br>• Pattern formation in plants- vegetative | 3 |
|   | **ii) Reproductive development:**<br>• Shift from vegetative to reproductive phase<br>• Structure of flower<br>• Induction- perception of inductive stimuli and subsequent changes,<br>• Pattern formation in plants- flowering | 4 |
| 4 | • Microsporogenesis, development of male gametophyte and male gamete<br>• Megasprogenesis, development of female gametophyte and female gamete<br>• Double fertilization and triple fusion<br>• Development of endosperm | 5 |
| 5 | **Concept of**<br>• competence,<br>• Determination,<br>• Commitment,<br>• Differentiation,<br>• De-differentiation and<br>• Re-differentiation (partial/ terminal) *in vivo* with one example each | 3 |
| 6 | **Model systems to understand plant development :**<br>• *Arabidopsis* Molecular regulation of development in *Arabidopsis* | 6 |
| 7 | **Parthenogenesis-**<br>• Haploid , Diploid<br>• Parthenocarpy – Natural , Induced<br>• Importance of seed and seed dispersal<br>• Applications of Plant development in Biotechnology | 4 |

**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: OxfordUniversity 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)

8 The molecular life of plants by Jones et al Wiley

9. Biochemistry and Molecular Biology of Plants, 2nd Edition - Bob Buchanan et al Wiley

10. Plant Physiology, Taiz and Zeiger Sixth edition Sinaeur

**Subject Code:  23 BBT : 406**

**Subject : Microbial Biotechnology  (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No. of Lectures |
|------|-------|-----------------|
| I | **History and Scope of Microbial Biotechnology** | 1 |

| II | **Food and Dairy Microbiology** | 7 |
|----|----------------------------------|---|
|    | **A) Food Microbiology** | |
|    | • Role of microorganisms in food spoilage, Factors affecting growth of microbes in food (intrinsic and extrinsic factors), Spoilage of meat and poultry, Fruits and vegetable, Canned food. | |
|    | • Principles of Food Preservation. | |
|    | • Methods of preservation Chemical and Physical methods. | |
|    | **B) Dairy Microbiology** | |
|    | • Milk: Definition, Composition of milk, Normal and abnormal microflora of milk, Sources of contamination of milk, International standards of Milk. | |
|    | • Milk Spoilage- Flavour and colour defects, Stormy fermentation, Sweet curdling, Ropiness. | |
|    | • Grading of milk- Direct and Indirect Tests | |
|    | • Preservation of Milk- Pasteurization and efficiency of pasteurization. | |
|    | • Microbial processing of milk- Curd, Yogurt, Butter, Kefir, Cheese. | |
|    | • Food borne diseases- Food infection and intoxication | |
| III | **Medical Microbiology** | 7 |
|    | • Medical Microbiology: Normal flora, | |
|    | • Diseases of various systems Tuberculosis, Leprosy, Typhoid, Polio, Syphilis, Tetanus, causative agent, symptoms, morphology, pathogenesis, diagnosis and treatment. | |
| IV | **Microbes in Waste treatment Processes** | 8 |
|    | • Water borne diseases: 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) | |
|    | • Sewage and Industrial waste water: Types of wastes, relevance of COD and BOD determination in analysis of waste water | |
|    | • Methods and principles of treatment of sewage (primary, secondary and tertiary treatment methods | |
|    | • Microbial consortium for effluent treatment. | |

| V | **Applications of Microbial Biotechnology** | 7 |
|---|---|---|
| | • Geomicrobiology-Ore leaching (methods and examples), MEOR. <br> • Bioweapons <br> • Biofertilizers and Biopesticides and Microbial plant growth Promoters( gibberellins and IAA) <br> • GMOs-Norms and applications <br> • Microbial Sweeteners (Thaumatin, Monelin) <br> • Microbial toxins and their applications <br> • Microbial Polysaccharide production: any 2 examples <br> Concept of Synthetic Biology and Bio metabolite Production | |

**References Books :**

1. Food Microbiology, Frazier & Westhoff, 4th edition, Tata McGraw Hill Publications
2. Modern Food Microbiology, James Jay, 7th edition, Springer Publications
3. Advances in Biotechnology, S. N. Jogdand, Himalaya Publishing House
4. Milk & Milk Products, C. Eckles, 4th edition, Tata McGraw Hill Publications
5. Prescott, S.C. and Dunn, C.G., (1983) Industrial Microbiology, Reed G. AVI tech books
6. General Microbiology - Stanier R.Y., 5th edition, ( 1987)Macmillan Publication, UK.
7. Fundamental Principles Of Bacteriology**,** Salle,A.J.,McGraw Hill Company, New York
8. Tortora, G.J., Funke, B.R., Case, C.L, 1992. Microbiology: An introduction 5th Edition,Benjamin Pub. Co. NY
9. Davis B.D., Delbacco, 1990 Microbiology 4th edition, J.B. Lippincott Co. NY
10. Wolfgang K. Joklik, 1992, Zinsser Microbiology 20th Edition, McGraw-Hill ProfessionalPublishers
11. Dey, N.C and Dey, TK. 1988, Medical Bacteriology, Allied Agency, Calcutta, 17thEdition
12. Ananthnarayana, R. and C.E, Jayaram Panikar, 1996 Text book of microbiology, 5th edition, Orient Longman. .Park and Park, Preventive and Social medicine. 2013, Publisher: Banarsidas Bhanot, Jabalpur
13. Ingraham J.L. and Ingraham C.A. (2004) Introduction to Microbiology. 3nd Edition. Thomson Brooks / Cole.
14. Madigan M.T, Martinko J.M. (2006) Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
15. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Publishing Co.
16. 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.Satyanarayan, U. Biotechnology(2008), Books and

Allied Ltd.Kolkata

17. Singh, B. D. Biotechnology,(2010), Kalyani Publishers, New Delhi

**Subject Code: 23 BBT: 409**

**Subject : Practicals in Molecular Biology and  Microbial Biotechnology (2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Sr. No. | Title of Experiment | No. of Practical |
|---------|---------------------|------------------|
| | **Molecular Biology** | |
| 1 | Preparation of Reagents | 1 |
| 2 | Isolation of Eukaryotic( Plant)  DNA and analysis by Agarose gel electrophoresis | 2 |
| 3 | Isolation of Eukaryotic( Animal)  DNA and analysis by Agarose gel electrophoresis | 2 |
| 4 | Estmation of RNA by Orcinol method | **1** |
| 5 | Estimation of proteins by Bradford method | **1** |
| | **Microbial Biotechnology** | |
| 6 | Food and Dairy Microbiology: <br> a. Isolation and identification (Genus level) of spoilage causing microorganisms from spoiled foods <br> b. Grading of raw milk (Dye reduction test, DMC) <br> c. Determination of efficiency of Pasteurization by phosphatase test | **3** |
| 7 | Study of Normal flora of humans (Skin and oral cavity) | **1** |
| 8 | Assessment of potability of water: <br> a. Presumptive <br> b. Confirmed and <br> c. Completed test. <br> d. Eijkman's teste. <br> e. IMViC tests | **3** |
| 9 | Visit to Dairy/ Effluent treatment plant / Sewage Treatment /Biofertilizer plant/ any other relevant industry and report writing. | **1** |

**Reference books :**

1 Lab manual on molecular biology January 2016 Edition: First Edition, Media  AssociatesDelhi-53Editor: Ruhi Dixit, KartikayBisen, Ashwani Kumar, Ashim                                                Borah, Chetan KeswaniISBN: 978-81-909182-7-5

2   Modern Food Microbiology, James Jay, 7th edition, Springer Publications
3   Madigan M.T, Martinko J.M. (2006) Brock's Biology of
    Microorganisms. 11th Edition.Pearson Education Inc
4   Ananthnarayana, R. and C.E, Jayaram Panikar, 1996 Text book of
    microbiology, 5th edition, Orient Longman. .Park and Park, Preventive
    and Social medicine. 2013, Publisher: Banarsidas Bhanot, Jabalpur

**Subject Code: 23 BBT -410**

**Subject : Practicals in Animal & Plant Development  (2 Credit Course)**

**(Total Practical= 15 P (15x3hrs.)**

| Sr. no. | Topic of practical | Practical No |
|---------|--------------------|--------------|
|  | **Animal development** |  |
| 1 | Study of frog development, observation of different development stages (Permanent slides or fixed embryos) | 1 |
| 2 | Study of amphioxus development, observation different development stages (Permanent slides) | 1 |
| 3 | Study of staging & staining of Chick embryos (24 h, 48h, 72 h) | 2 |
| 4 | Effect of teratogen on development of chick embryo by window technique | 2 |
| 5 | Demonstration of any one technique of chick embryo culturing | 1 |
| 6 | Demonstration of regeneration in *Hydra* | 1 |
|  |  |  |
|  | **Plant Development** |  |
| 1 | Methods of studying plant development (any suitable plant material) a) Dissection b) Sectioning    c) Staining d ) Mounting | 1 |
| 2 | Study of apices and meristem- RAM, SAM, florally induced meristem | 2 |
| 3 | Microsporogenesis- anther squash technique | 1 |
| 4 | Development of male and female gametophytes | 1 |
| 5 | Developmental stages during plant embryogenesis in dicots and monocots | 1 |
| 6 | Dissection of seed and excision of young embryo and endosperm (Two dicotyledon and Two  monocotyledon example) | 1 |

**Reference Books:**

1. Burgess J. (1985) An Introduction to Plant Cell Development (Cambridge Univ Press, UK)
2. Taiz L, Zeiger E (2010) – Plant physiology (Sinauer Associates, USA).
3. Sharma HP (2009) – Plant embryology: Classical and experimental (alpha sci)
4. Development Biology, 9thedition, (2010), Gilbert S.F.(Sinauer Associates, USA)
5. Principles of Development, 5thedition (2018), Wolpert L and Tickle C,

Publisher: OxfordUniversity Press, USA.
6. An introduction to embryology, 5th edition, B. I. Balinsky, B.C.
Fabian (2012) CengageLearning India

**Subject Code: 23 BBT -411**

**Subject :Practical in Cell Biology and Immunology(2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Unit | Topic | Practical |
|------|-------|-----------|
| **Section I : Cell Biology** | | |
| 1 | Study of different stages of Mitosis | 2 |
| 2. | Effect of colchicine on mitosis | 1 |
| 3 | Study of different stages of Meiosis in *Tradescantia* | 2 |
| 4 | Study of polytene chromosomes (*Drosophila/Chironomus* larva) | 2 |
| **Section II – Immunology** | | |
| 5. | Determination of blood group using slide agglutination Reaction | 1 |
| 6 | To determine total leukocyte of given blood sample | 1 |
| 7 | Determine Differential count of given blood sample | 1 |
| 8 | Immunodiffusuion:<br>a) Single Radial immunodiffusion<br>b) Ouchterlony double diffusion technique (pattern of identity) | 2 |
| 9 | Determination of antibody titer by tube agglutination test (Widal Test) | 2 |
| 10 | Detection of presence of antigen by qualitative ELISA(Dot ELISA) | 1 |

**Reference Books** :

1   Cell biology and genetics lab manual Boğaziçi University Department of
    MolecularBiology and Genetics 2007-2008
2   Cell Biology Laboratory The University of Toledo Department of
    BiologicalSciences/Natural Sciences and Mathematics
3   Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. University
    PressPublication.
4   Roitt I. Essential Immunology. 10th Ed. Blackwell Science.
5   Kuby. Immunology. 4th edition. W. H. Freeman & company.

*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

# Syllabus for

# S. Y. B. Com.

## Introduction:

Commerce education provides a foundation of knowledge, skills, and attitude perspectives required to enter professional world. Commerce education is different from other disciplines. This education stresses on developing the people and making effective use of available resources. It equips students to deal with the complexities of the business environment, make informed decisions, and contribute to the success of organization. So the commerce education needs to be more dynamic, skill based and incorporate all changes at global and local level. The curriculum for Commerce faculty should be adapted and re-structured to meet the future challenges of the economic, manufacturing and service sectors.

## Programme Objectives:

1 To develop diverse skills of students like critical thinking, problem solving, decision making, communication and leadership.

2 To equip students with necessary knowledge and skill to start and run a business.

3 To make students aware about global economic trends, international business concepts and cultural understanding.

4 To teach students importance of ethical behavior in business world.

5 To enhance employability skills of students to pursue careers in finance, marketing, human resources, or any other business-related field.

6 To encourage students to stay updated about industry trends, new technologies, and evolving business practices.

## Programme Specific Outcomes (PSOs):

1 To develop students verbal and written communication skills.

2 To make students aware about corporate accounting principles, rules and regulations.

3 To make them understand business environment and equip them with necessary skill to start their own venture.

4 To familiarize the students to the basic theories and concepts of Macro Economics and their application.

5 To provide basic knowledge and understanding about various concepts of Business Management and help the students to develop cognizance of the importance of management principles.

6 To create awareness among the students about legal environment relating to the company law.

7 To create the awareness about the role of banking in economic development and functioning of private and public sector banking in India.

**Examination Pattern:**

## Second Year B. Com.    Semester – III

| Course  Code | Course / Title of Paper | Total No. of Credits | Internal Assessment | Semester End Assessment | | Total Marks |
|---|---|---|---|---|---|---|
| | | | | Semester End Exam | Practical Exam | |
| 23-COB231 | Corporate Accounting- I | 3 | 30 | 70 | __ | 100 |
| 23-COB232 | Principles & Functions of Mangement | 3 | 30 | 70 | -- | 100 |
| 23-COB233 | Business Economics - I (Macro) | 3 | 30 | 70 | -- | 100 |
| 23-COB234 | Business Communication - I | 4 | 30 | 50 | 20 | 100 |
| 23-COB235 | Elements of Company Law- I | 3 | 30 | 70 | -- | 100 |
| 23COB236(a) | Cost and Works Accounting- I | 4 | 30 | 50 | 20 | 100 |
| 23-COB236(b) | Banking & Finance I | 4 | 30 | 50 | 20 | 100 |
| 23-COB236(c) | Business Entrepreneurship I | 4 | 30 | 50 | 20 | 100 |
| 23-COB236(d) | Marketing Management   I | 4 | 30 | 50 | 20 | 100 |
| 23-COBEA1 | Environmental Awareness course -I | 2 | - | - | - | Grade |

## Second Year B. Com.    Semester – IV

| Course No. | Course / Title of Paper | Total No. of Credits | Internal Assessment | Semester End Assessment | | Total Marks |
|---|---|---|---|---|---|---|
| | | | | Semester End Exam | Practical Exam | |
| 23-COB241 | Corporate Accounting- II | 3 | 30 | 70 | - | 100 |
| 23-COB242 | Principles & Functions of Management II | 3 | 30 | 70 | -- | 100 |
| 23-COB243 | Business Economics - II (Macro) | 3 | 30 | 70 | -- | 100 |
| 23-COB244 | Business Communication - II | 4 | 30 | 50 | 20 | 100 |
| 23-COB245 | Elements of Company Law-II | 3 | 30 | 70 | -- | 100 |
| 23COB246(a) | Banking and Finance II | 4 | 30 | 50 | 20 | 100 |
| 23-COB246(b) | Cost and Works Accounting II | 4 | 30 | 50 | 20 | 100 |
| 23-COB246(c) | Business Entrepreneurship II | 4 | 30 | 50 | 20 | 100 |
| 23-COB246(d) | Trends in Marketing II | 4 | 30 | 50 | 20 | 100 |
| 23-COBEA2 | Environmental Awareness course -I | 2 | - | - | - | Grade |

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Students Seminar
2. Short Quizzes / MCQ Test
3. Home Assignments
4. Tutorials/ Practical
5. Oral test
6. Research Project
7. Group Discussion

8. Study Tour
9. Written Test
10. PPT presentation
11. Field Visit
12. Industrial Visit
13. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content

# Subject List

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | Core | **23-COB231** Corporate Accounting-I | 3 | | | 45 |
| 2 | Core | **23-COB232** Principles & Functions of Management-I | 3 | | | 45 |
| 3 | Core | **23-COB233** Business Economics (Macro)-I | 3 | | | 45 |
| 4 | Core | **23-COB234** Business Communication-I | 3 | | | 45 |
| 5 | Core | **23-COBP234** Business Communication-I | 1 | | | |
| 6 | Core | **23-COB235** Elements of Company Law –I | 3 | | | 45 |
| 7 | Elective | **23-COB236(a)** Cost &Works Accounting (Paper-I)-I | 3 | | 22 | 45 |
| 8 | Elective | **23-COBP236(a)** Cost &Works Accounting (Paper-I)-I | | 1 | | |
| 9 | Elective | **23-COB236(b)** Banking & Finance (Paper-I)-I | 3 | | | 45 |
| 10 | Elective | **23-COBP236(b)** Banking & Finance (Paper-I)-I | | 1 | | |
| 11 | Elective | **23-COB236(c)** Business Environment & Entrepreneurship (Paper-I)-I | 3 | | | 45 |
| 12 | Elective | **23-COBP236(c)** Business Environment & Entrepreneurship (Paper-I)-I | | 1 | | |
| 13 | Elective | **23-COB236(d)** Marketing Management(paper-I)-I | 3 | | | 45 |
| 14 | Elective | **23-COBP236(d)** Marketing Management(paper-I)-I | | 1 | | |

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 15 | Core | 23-COBEA1 Environment Awareness Course-I | 2 | | | |

SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | Core | 23-COB241 Corporate Accounting-II | 3 | | | 45 |
| 2 | Core | 23-COB242 Principles & Functions of Management-II | 3 | | | 45 |
| 3 | Core | 23-COB243 Business Economics (Macro)-II | 3 | | | 45 |
| 4 | Core | 23-COB244 Business Communication-II | 3 | | | 45 |
| 5 | Core | 23-COBP244 Business Communication-II | | 1 | | |
| 6 | Core | 23-COB245 Elements of Company Law – II | 3 | | | 45 |
| 7 | Elective | 23-COBP246(a) Cost &Works Accounting (Paper-I)-II | 3 | | 22 | 45 |
| 8 | Elective | 23-COBP246(a) Cost &Works Accounting (Paper-I)-II | | 1 | | |
| 9 | Elective | 23-COB246(b) Banking & Finance (Paper-I)-II | 3 | | | 45 |
| 10 | Elective | 23-COBP246(b) Banking & Finance (Paper-I)-II | | 1 | | |
| 11 | Elective | 23-COB246(c) Business Environment & Entrepreneurship (Paper-I)-II | 3 | | | 45 |
| 12 | Elective | 23-COBP246(c) Business Environment & Entrepreneurship (Paper-I)-II | | 1 | | |
| 13 | Elective | 23-COB246(d) Trends in Marketing (paper-I)-II | 3 | | | 45 |
| 14 | Elective | 23-COBP246(d) Trends in Marketing (paper- | | 1 | | |

| | | I)-II | | | | |
|---|---|---|---|---|---|---|
| 15 | Core | **23-COBEA1** Environment Awareness Course-II | 2 | | | |

# Syllabus

## Semester III

**Subject Code: 23-COB231**

**Subject: Corporate Accounting I (3 Credit Course)**

**Total Lectures = 45**

| Unit | Corporate Accounting I | No of lecture (45) |
|------|------------------------|--------------------|
| I | **Accounting Standards**<br><br>• Meaning, Definition, Objectives, Advantages and Applicability of accounting Standards-7, 10, 14, and 21 with Practical Examples. | 10 |
| II | **Profit Prior to Incorporation**<br>• Introduction to the Process on incorporation of a company.<br>• Difference between incorporation and commencement of a company.<br>• Accounting of incomes and expenses during Pre- and Post-Incorporation period.<br>• Basis of allocation and apportionment of income and expenses for the Pre-and Post-Incorporation period | 11 |
| III | **Company Final Accounts**<br>• Preparation of company final Accounts Forms and content as per Provisions Schedule III of the Companies Act 2013 with the amendments for the relevant academic year.<br>• Related adjustments and their treatment. | 16 |
| IV | **Valuation of Shares**<br>• Meaning, Definition, Need and Importance of Valuation,<br>• Special Factors affecting Valuation of Shares,<br>• Methods of Valuation<br>• Net Assets Method Yield Basis Method Fair Value Methods | 8 |

**Reference books:**

1. Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd.)

2. Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers)

3. Advanced Accountancy: By R.L.Gupta & M. Radhaswamy (Sultan Chand & Sons)

4. Company Accounts: By S.P. Jain & K.L. Narang

5. Advanced Accounts: By Paul Sf.

6. Corporate Accounting: By Dr. S. N. Maheshwari & S.K. Maheshwari

7. Corporate Accounting: By Mukharji & Hanif

8. Accounting Standards -as issued by Institute of Chartered Accountants ofIndia.

**Subject Code: 23-COB232**

**Subject: Principles and functions of Management I (3 Credits)**

**Total Lectures = 45**

| Unit | Corporate Accounting I | No of  lecture (45) |
|------|------------------------|---------------------|
| I | **Introduction to Management**<br>• Meaning definition of Management<br>• Need for Management study<br>• Process and Functions of management<br>• Levels of management<br>• Management is an Art, Science and Profession | 10 |
| II | **Management Thoughts**<br><br>• Introduction,<br><br>• Evaluation of Management thoughts<br>Contribution of F.W. Taylor, Henry Fayol, Peter Drucker, C.K.Pralhad in development of management thoughts | 10 |
| III | **Understanding Management : Planning and Decision Making**<br>• Meaning, definition and nature of Planning<br>• Forms and types of Planning<br>• Process of Planning<br>• Advantages and Limitations of Planning<br>• Meaning and techniques of Forecasting<br>• Meaning, Types and Process of decision making<br>. | 10 |
| IV | **Management at Work : The process of organizing and staffing**<br>• Meaning, Process and Principles of Organizing<br>• Concept of Authority and Responsibility<br>• Delegation of Authority- Meaning, Difficulties in delegation of authority<br>• Staffing-Meaning and Process of staffing<br>• Recruitment: Meaning, Sources of recruitment | 10 |
| V | **Result orientation:**<br>• Direction and Team Work<br>• Direction- Meaning, Elements, Principles, Techniques<br>Concept of Team Work, principles regarding interpersonal communication | 5 |

**Reference books:**

1. Essentials of Management - Horold Koontz and Iteinz Weibrich - McGrawhillsInternational
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.Parasad, Sultan Chand & Sons - NewDelhi
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 McGraw Hill
9. Business Environment and Policy – A book on Strategic Management By FrancisCherunilam Himalaya Publishing House
10. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - NewDelhi
11. Business Organization & Management - Dr. Y.K. Bhushan
12. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
13. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
14. Business organization and Management by Talloo by Tata McGraw Hill
15. Business Environment and Policy – A book on Strategic Management By FrancisCherunilam Himalaya Publishing House

Subject Code: 23-COB233

Subject: Business Economics (Macro) I 3 Credits

Total Lectures = 45

| Unit | Topic | No of lectures |
|------|-------|----------------|
| I | **Introduction to Macro Economics**<br><br>• Meaning and Definition of Macro Economics.<br><br>• Nature of Macro Economics.<br><br>• Scope of Macro Economics.<br><br>• Significance of Macro Economics.<br><br>• Limitations of Macro Economics.<br><br>• Macro-Economic Objectives. | 15 |
| II | **National Income**<br>• Meaning<br>• National Income.<br>• Importance of Various Concepts of National Income and their relationship– GDP, GNP, NNP, NDP, at market price and factor cost, PCI, Personal Income, Disposable Income<br>• Real Income and Nominal Income<br>• Measurement of National Income: I<br>• Methods and Difficulties<br>• Circular Flow of Income: Two and Three sector model | 10 |
| III | **Theories of Output and Employment:**<br><br>• The    Classical Employment: J.B. Say Theory of Employment<br><br>• Keynes Criticism on Classical Theories of Employment.<br><br>• Keynesian Employment | 10 |

| IV | **Consumption, Saving and Investment:** | 10 |
|---|---|---|
| | • The Consumption Function: | |
| | • Meaning | |
| | • Marginal Propensity to Consume (MPC) | |
| | • Keynes's Psychological Law of Consumption. . | |
| | • Determinants of Consumption. | |
| | • The Saving Function: | |
| | • Meaning, | |
| | • Marginal Propensity to Save (MPS) | |
| | • Determinants of Savings | |
| | • Relationship between Consumption and Saving Function | |
| | • (MPC and MPS) | |
| | • Meaning and Types of Investment: Gross, Net, Induced and Autonomous. | |
| | • Marginal Efficiency of Capital and its Determinants. | |
| | • Concepts of Investment Multiplier and Acceleration Principal. | |

**Reference books:**

1. Economics: Paul A Samuelson and William D Nordhaus. McGRAW - HIILL international Edition.
2. Macroeconomics: N. Gregory Makiw, Worth Publishers, New York.
3. Macro- Economic Theory: ML Zingan, Vrinda Publications (P) Limited.
4. Samashti Arthshstriy Vishleshan : Shridhar Deshpande, Vinayak Deshpande, Himalaya Publication House.
5. Theories of value: output and employment - John Eatwell, Thames Polytechnic, 1979
6. Businss Economics, Dr. J. P. Mishra, Sahitya Bhavan Publications, Agra.
7. Macroeconomics: A Global Text Sampat Mukherjee, New Central Book Agency Private Limited (Latest Edition), New Delhi
8. Macroeconomics: A Rough Guide, in Macroeconomics: A Reader, (Ed.) Brian Snowdon and Howard Vane, Routledge
9. Business Economics (Macro): Dr. Rasal, Bhadane, Fernandes, Idol Publication, Pune-2
10. Macroeconomics: Theory and Policy, S. Chand & Company Limited. (Latest Edition)
11. Ben Fine & Ourania Dimakou, Macroeconomics: A Critical Companion, Pluto Press (Latest Edition)
12. Michel De Vroey, A History of Macroeconomics: From Keynes to Lucas

andBeyond, Cambridge University Press (Latest Edition)

13. Sampat Mukherjee, Analytical Macroeconomics: From Keynes to Mankiw, New Central Book Agency Private Limited

14. Macroeconomics- KR Gupta, R. K. Mandal, Arnita Gupta, Atlantic Publishers and distributor's pvt. ltd.

15. Money, Inflation, and Business Cycles the Cantillon Effect and theEconomy, Arkadiusz Sieron. Abingdon, Routledge, 2019. New York

16. Macroeconomics: N. Gregory Maki Worth Publishers, New York

17. Macro Economics: Rudiger Dornbusch, Stanley Fisher & Richard Startz Tata McGraw Hill Education Private Limited (Latest Edition), US

18. The General Theory of Employment, Interest, and Money- John Maynard Keynes,General Press

19. An Analysis of John Maynard Keynes The General Theory of Employment, Interestand Money- John Collins, CRC Press, 2017.

**Subject Code: 23-COB234**

**Subject: Business Communication-I  (3 Theory + 1 Practical = 4 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No of  lectures |
|------|-------|-----------------|
| I | **Basics of Business Communication :**<br><br>• Introduction, Meaning, Definition, Characteristics, Importance and Principles<br><br>• Process of communication<br><br>• Barriers to communication & Remedies to overcome barriers. | 10 |
| II | **Methods and Channels of Communication :**<br>• **Methods of Communication :** Verbal (Oral and Written Communication), Non-Verbal Communication (Graphs, Charts, Diagrams, Sign, Symbol, Colour, Gesture, Posture, Facial expression, Eye contact)<br><br>• **Channels of Communication :** Formal Channels (Vertical, Horizontal, Diagonal Channels) Informal Channels (Grapevine, Single Strand, Gossip Chain, Probability Chain, Cluster Chain) | 10 |
| III | **Presentation Skills and Life Skills**<br><br>• **Presentation Skills :** Principles of effective public speaking, Formal Speech, Oral Presentations, Presentations using visual aids, Group discussion, Interview techniques, Dos and Don'ts of Public Speaking<br><br>• **Life Skills :** Meaning, Need, Importance, Elements...<br>a) Manners & Etiquettes, Grooming.<br>b) Listening Skills<br>c) Problem-solving skills<br>d)Time management abilities<br>e) Negotiation Skills<br>f) Decision Making Skills<br>g) Interpersonal Skills | 15 |

| | | |
|---|---|---|
| | h) Creative thinking | |
| IV | **Internal Correspondence :**<br><br>• Meaning, importance and types of internal correspondence (Office Memorandum, Office Circular, Office Order) Drafting of internal correspondence. Collecting specimen of internal correspondence. | 10 |

**Reference books:**

1. Business Communication ,K.K.Sinha, Gelgotia Publishing,New Delhi
2. Business Correspondence & Report writing ,R.C.Sharma & Krishnan Mohan, Tata Mc Graw Hill Publishing Co.Ltd. ,New Delhi.
3. Communication ,C.S.Rayudu,Himalaya Publication, Mumbai.
4. Business Communication,Asha Kaul, Prentice hall of India, New Delhi.
5. Business Communication,Vasisthb Neeru & Rajput Namita,Kitab Mahal, Allahabad.
6. Soft skills, Dr.Alex ,S..Chand publication ,Delhi.
7. Essentials of Business Communication,Rajendra Pal & Korlahalli,Sultan Chand & sons,
   New Delhi.
8. Managerial Communication, P.D.Chaturvedi & Mukesh Chaturvedi,, Pearson, Delhi.

**Subject Code : 23-COB235**

**Subject: Elements of Company Law I (3 Credit Course)**

**Total Lectures = 45**

| Unit | Elelments of Company Law I | No of lectures (45) |
|---|---|---|
| 1 | **Company and its Formation**<br>• Background and **Features of company the Companies Act, 2013**<br>• **Company:** Meaning, Nature and Characteristics of Company.<br>• **Types of Companies:** On the basis of mode of formation, Number of members, liability and Control,<br>• **Public and Private Companies**:<br>Distinction between Public and Private Companies,<br>Privileges<br>Conversion of Public into Private Company.<br>Conversion of Private into Public Company.<br><br>**Types of Companies**:<br>Public Company<br>Private Company<br>One Person Company<br>Charitable Companies<br>DormantCompany<br>Sick Company,<br>Small Company,<br>Listed Company,<br>Company,<br>• Foreign Company and its business in India etc. | 12 |
| II | **Formation and Incorporation of aCompany:**<br>Stages in the Formation and Incorporation.<br>• Promotion: Meaning of the term 'Promoter' / Promoter Group – Legal Position of Promoters, Pre-incorporation contracts<br>• Registration/ Incorporation of a company : - Procedure, Documents to befiled with ROC. Certificate of Incorporation<br>• Effects of Certificate of Registration<br>• Capital Subscription/Raising of Capital Commencement of business | 13 |

| III | **Principal Documents:** **Documents relating to Incorporation and Raising of Capital:** <br> • **Memorandum of Association**: Meaning and importance- Form and contents- Alteration of memorandum. <br> • **Articles of Association:** Meaning- Contents and form of Articles- Alteration of articles- Doctrine of constructive notice- Doctrine of Indoor Management. <br> • **Prospectus:** Meaning, contents, Statutory requirements in relation to prospectus- Deemed Prospectus- <br> • Shelf prospectus – Statement in lieu of prospectus- Misstatement in a prospectus and Liabilities for Mis-statement. | 10 |
|---|---|---|
| IV | **E Governance and CSR** <br> • E Governance –meaning, Importance of E Governance <br> • E Filing – Basic concept of MCA, E Filing <br> • Corporate Social Responsibility (CSR) [U/S 135] – Concept who is Accountable, CSR Committee, Activitiesunder CSR, | 10 |

**Reference books:**

1. The Companies Act with Rules, Taxmann, Tan Prints (India) Pvt. Ltd. Jhajjar, Chandigad

2. The Companies Act, 2013,Bharat, Bharat Law House Pvt. Ltd., Delhi

3. Company Law-A Comprehensive Text Book on Companies Act 2013, Dr. G.K. Kapoor & Dr. Sanjay Dhamija, Taxmann Publications Pvt. Ltd, Delhi

4. Company Law, Dr S R Meyani, Asia Law House, Mumbai

5. Company Kaydyachi Olakha, K Shriram, Aarti & Co.       Mumbai

6. Guide to Memorandum, Articles & Incorporation of Companies, Bhandari        & Makheeja Lexis Nexis, Mumbai

7. Elements of Company Law,  Arun Gaikawad , Chandrakant Chaudhari & Devendra Bhawari Bibha, Pune

8. Elements of Company Law, Prakash N. Chaudhary, Nirali Prakashan, Pune

9. E-Commerce: Legal  Compliance    Pratima Narayan Eastern Book Company, Mumbai

**Subject Code: 23-COB236 (a)**

**Subject: Cost & Works Accounting -I (3 Theory + 1 Practical = 4 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No of lectures |
|------|-------|----------------|
| I | **Basics of Cost & Management Accounting:** <br> • Origin of Costing. <br> • Concept of Cost, Costing, Cost Accounting and Cost Accountancy <br> • Objectives of Cost Accounting. <br> • Advantages & Limitations of Costing. <br> • Difference between Financial Accounting and Cost Accounting. <br> • Introduction of Management Accounting. | 15 |
| II | **Elements of Cost:** <br> • Cost Units, Cost Centers and Revenue Center <br> • Role of a Cost accountant in an organisation <br> • Meaning of Material, Labour and other Expenses. <br> • Classification of Costs. | 10 |
| III | **Direct Cost and Cost sheet** <br> • Direct cost concepts <br> • Preparation of Cost Sheet <br> • Tender,Quotation and Estimates. | 10 |
| IV | **Material Management** <br> • Need and Essentials of Material Control. <br> • Methods of Inventory control <br> • Stock Levels & Economic Order Quantity (EOQ). <br> • ABC analysis <br> • Perpetual and Periodic Inventory Control <br> • Physical verification <br> • Inventory Turnover Ratio. | 10 |

**Reference books:**

1. Cost Accounting-Principles & Practices,Jawahar Lal & Seema Shrivastava,Tata Mcgraw
   Hill, New Delhi.
2. Advanced Cost Accounting And Cost Systems,Ravi M Kishor,Taxmann,New Delhi.
3. Cost Accounting Theory And Problems, S. N. Maheshwari, Mittal Shree, Mahavir Book Depot.,New Delhi
4. Advanced Cost Accounting,Jain and Narang, Kalyani Publication,New Delhi.
5. Horngren's Cost Accounting- A Managerial Emphasis,Srikant M Datar & Madhav V Rajan  Pearson,Noida UP
6. Cost Accounting-Principles & Practices, Dr. M.N. Arora,      Vikas Publishing House,New Delhi.
7. Advanced Cost Accounting     ,Dr. D. M.Gujarathi    ,Idol Publication,Pune
8. Advanced Cost Accounting     ,Dr. Kishor. M. Jagtap,Tech-Max Publication,Pune
9. Cost Accounting Principles And Practice,Jain and Narang,Kalyani Publication, New Delhi
10. Principles and Practice of Cost Accounting,N.K Prasad,Booksyndicate Private Ltd,Kolkata.
11. Cost Accounting: Methods  and problems,      B.K.Bhar,Academic Publications,Kolkata.

**Subject Code: 23-COB236(b) (3 Theory + 1 Practical = 4 Credit Course)**

**Subject: Banking and Finance-I (Indian Banking System - I)**

**Total Lectures = 45**

| Unit | Corporate Accounting I | No of lecture (45) |
|------|------------------------|--------------------|
| I | **Indian Banking Structure :**<br>• Meaning, Features and Evolution of Banking in India<br>• Structure of Banking in India<br>• Role of Banking in Economic Development<br>• Scheduled Banks and Non- scheduled Banks<br>• Challenges before Banking in India<br>• Recent Trends in Indian Banking System | 10 |
| II | **Reserve Bank of India**<br>• Definition of 'Central Banking'<br>• Evolution of Reserve Bank of India<br>• Department and Functions of Reserve Bank of India<br>• Present currency system in India<br>• Understanding of concepts : Bank Rate, Cash Reserve Ratio(C.R.R.),Statutory Liquidity Ratio (S.L.R.), Repo Rate – Reverse Repo Rate | 10 |
| III | **Private Banking :**<br>• Meaning and features of Private Banking<br>• Classification of Private Banking:<br>• Indian Private Banks – Old and New<br>• Foreign Banks<br>• Role of Private Banking in Economic Development<br>• Performance of Private Banks in India<br>• Challenges before Private Sector Banks in India | 12 |
| IV | **Public Sector Banking:**<br>• Definition and Features of Public Sector Banks<br>• Classification of Public Sector Banks<br>• State Bank of India – Evolution , Functions and<br>• Performance<br>• Nationalized Banks – Social control , Meaning of Nationalization, Arguments for and against<br>• Nationalization – Merger of the Banks<br>• 4.5Regional Rural Banks – Objectives , Functions Capital, Problems before<br>• Regional Rural Banks<br>• Lead Bank Scheme<br>• Challenges before Public Sector Banks in India | 13 |

**Reference books:**

1. Deb Joyeeta (2019), 'Indian Banking System', Evince Publishing.
2. Desai Vasant (2007), 'Indian Banking-Nature and Problems', Himalaya Publishing House.
3. Gopinath M.N. (2017), 'Banking Principles and Operations', Snow White Publisher.
4. Joshi, Vasant and other (2002), Managing Indian Banks – The Challenges Ahead, Response Books, New Delhi.
5. Mallik, Chaudhury and Sarkar (2018), 'Indian Banking System- Growth, Challenges and Government Initiatives', Kalpaz Publications.
6. Nararajan and Parameswaran (2007), 'Indian Banking', S. Chand Company Ltd. New Delhi.
7. ShahiUjjwala (2013), 'Banking in India: Past, Present and Future', New Century Publications
8. Trivedi, Chaudhary and other (2015), 'Indian Banking System', RBD Publication, Jaipur.
9. Trivedi I.V. and JatanaRenu (2010), 'Indian Banking System', RBSA Publisher.
   'Report on Trend and Progress of Bank

**Subject Code: 23-COB236(c) (3 Theory + 1 Practical = 4 Credit Course)**

**Subject:  Business Entrepreneurship Special paper I**

**Total Lectures = 45**

| Unit | I  Topic | No of  lecture (45) |
|------|----------|---------------------|
| I | **Creativity and Innovation:**<br>• Creativity- Meaning, Creativity Process, Techniques and Tools of          Creativity.<br>• Innovation- Meaning, Sources of Innovation-    Peter Drucker's Principles of Innovation- Do's and Don'ts of Innovation. | 10 |
| II | **Business Ethics and Social Responsibilities of  Business:**<br>• Business Goals-Types of Goals<br>• Business Ethics- Importance<br>• Social Responsibilities –  Meaning, Responsibilities towards Stakeholders, Investors, Employees-Government and Society at Large.<br>• Social Audit – Concept, Advantages and Limitations.<br>• Brief Introduction to Corporate Governance | 11 |
| III | **Group Entrepreneurship:**<br>• Concept- Meaning and Significance-<br>• Individual Entrepreneurship V/s Group Entrepreneurship.<br>• Advantages and Disadvantages of Group Entrepreneurship.<br>• Self Help Group- Definition, Meaning and Evolution-Administration Functions and Operation of SHG's | 12 |
| IV | **Women Entrepreneurship and Social Entrepreneurship:**<br>• Qualities of a Good Social Entrepreneur<br>• Social Innovation<br>• Management of Social Enterprises<br>• Promises and Perils of Social Enterprises<br>• Role of women in society<br>• Government Schemes<br>• Benefits of Women Entrepreneurs<br>• Challenges to Women Entrepreneurs<br>• Women Empowerment through Entrepreneurship | 12 |

**Reference books:**

1. Business Environment, Francis Cherunilam Himalaya Publishing House New Delhi
2. Dynamics of Entrepreneurship Development and Management Desai Vasant Himalaya Publishing House New Delhi
3. Entrepreneurial Development, Khanka S.S.S. Chand, New Delhi
4. Entrepreneurial Development, Gupta, Shrinivasan S. Chand, New Delhi
5. Udyog- UdyogSanchalaya, Mumbai
6. Indian Economy RuddarDatt, K.P.M. Sundharam, S. Chand    New Delhi

**Subject Code: 23-COB236(d) (3 Theory + 1 Practical = 4 Credit Course)**

**Subject: Marketing Management (4 Credit Course)**

**Total Lectures = 45**

| Unit | Corporate Accounting II | No of lectures (45) |
|------|--------------------------|---------------------|
| 1 | **Elements of Marketing Management:**<br>• Introduction<br>• Meaning of Marketing Management<br>• Nature & Scope of Marketing Management<br>• Features of Marketing Management<br>• Functions of Marketing Management<br>• Components of Marketing Management<br>• Problems of Marketing Management<br>• Marketing Management Philosophy<br>• Marketing Characteristics in Indian Context<br>• Marketing Management Process | 12 |
| II | **Marketing Planning:**<br>• Introduction<br>• Meaning of Marketing Planning<br>• Definition of Marketing Planning<br>• Nature of Marketing Planning<br>• Scope of Marketing Planning<br>• Elements of Marketing Planning<br>• Importance of Marketing Planning<br>• Types Marketing Planning<br>• Principles behind Successful Planning<br>• Steps in Marketing Planning Process<br>• Constraints to Effective Marketing Planning | 13 |
| III | **Marketing Strategy:**<br>• Introduction<br>• Concept of Strategy<br>• Meaning of Marketing Strategy<br>• Significance of Marketing Strategy<br>• Aim of Marketing Strategy<br>• Marketing Strategy Formulation<br>• Bases of Formulating Marketing Strategy<br>• Types of Marketing Strategy | 10 |
| IV | **Marketing Research:**<br>• Introduction<br>• Meaning of Marketing Research<br>• Definition of Marketing Research<br>• Scope of Marketing Research<br>• Role of Marketing Research | 10 |

| | |  |
|---|---|---|
| | • Marketing Research Agencies<br>• Marketing Information Vs. Marketing Research<br>• Objectives of Marketing Research<br>• Marketing Research Procedure<br>• Research Problem Definition<br>• Research Design<br>• Data Collection<br>• Sampling and Sampling Designs<br>• Probability Sampling Techniques<br>• Data Analysis<br>• Method of Reporting Research Findings | |

**Reference books:**

1.  Marketing Management, Philip Kotler        Pearson Publication
2.  Marketing Management, Rajan Saxena        McGraw Hill, Education
3.  Principles of Marketing, Philip Kotler        Pearson Publication
4.  Marketing Planning & Strategy, Subhash Jain & George Haley, Cengage Learning India Pvt. Ltd
5.  Marketing Strategy, Anil Mishra & Amit Kumar Mishra, Excel Books
6.  Consumer Behaviour : Insight from Indian Market, Ramanuj Muzumdar PHI Learning Pvt. ltd. (2009)
7.  Retail Management, Gibson Vedamani, Jayco Publication
8.  Marketing Management, V. S. Ramaswamy & S. Namakumari, Macmillan Publication
9.  Marketing Research S. L. Gupta, Excel Books India, 2004
10. Marketing Research, Naresh K. Malhotra, Pearson Publication

# Semester IV

**Subject Code: 23-COB241**

**Subject: Corporate Accounting II (3 Credit Course)**

**Total Lectures = 45**

| Unit | Corporate Accounting II | No of lectures (45) |
|------|-------------------------|---------------------|
| 1 | **Holding Company Accounts**<br>• Meaning, Definition of Holding Company<br>• calculations of Capital Profit, Revenue profit, Cost of Control.<br>• Preparation of consolidated Balance sheet of Holding Company with one subsidiary only.<br>• Adjustment of intercompany transactions, unrealized profit of stock. | 12 |
| II | **Absorption of Companies**<br>• Meaning and Definition of **Absorption**<br>• Meaning of Vendor and Purchasing Companies<br>• Purchase Consideration, Accounting entries in the books of vendor Company and Journal entries and Preparation of Balance Sheet after Absorption in the books of Purchasing Company | 13 |
| III | **Accounting for Liquidation of Companies**<br>• Meaning and Definition of Liquidation<br>• Modes of winding up<br>• Preparation of Liquidator final statement of Account<br>• Preparation of Statement of<br>• **Affairs.** | 10 |
| IV | **Issue of Shares**<br>• Buyback of Shares<br>• Concept of Sweat Equity Shares<br>• Right Shares<br>• Issue of Bonus Shares<br>• Redemption of Preference Shares & Debentures (Theory Only) | 10 |

**Reference books:**

1. Advanced Accounts: By M.C. Shukla & S.P. Grewal (S.Chand & Co. Ltd.)

2. Advanced Accountancy: By S.P. Jain & K.N. Narang (Kalyani Publishers)

3. Advanced Accountancy: By R. L. Gupta & M. Radhaswamy
                                    (Sultan Chand &Sons)

4. Company Accounts: By S.P. Jain & K.L. Narang

5. Advanced Accounts: By Paul Sf.

6. Corporate Accounting: By Dr. S. N. Maheshwari & S.K.
                                    Maheshwari

7. Corporate Accounting: By Mukharji & Hanif

**Subject Code: 23-COB242**

**Subject: Principles and functions of Management II (3 Credits)**

**Total Lectures = 45**

| Unit | Corporate Accounting I | No of lecture (45) |
|---|---|---|
| I | **Improving peoples' performance : Motivating the staff**<br>• Meaning, Importance and Theories of motivation<br>• Maslow's Need Hierarchy Theory<br>• Herzberg's Two Factor Theory<br>• Douglas MC Gregor's Theory of X and Y<br>• Ouchi's Theory Z<br>• McClelland's Theory | 10 |
| II | **Organizing from front- Leadership Skills**<br>• Meaning, Importance, Qualities and Functions of a leader<br>• Leadership styles for effective management<br>• Contribution of Mahatma Gandhi, Dr. Babasaheb Ambedkar in leadership.<br>• Contribution of business Leaders:<br>Ratan Tata<br>Dhirubhai Ambani<br>Narayan Murthy | 10 |
| III | **Achieving success at work : Coordination and Control**<br>• Meaning and need of co-ordination and control<br>• Techniques and difficulties in establishing coordination and control<br>• Steps in the process of control and it's techniques<br>. | 10 |
| IV | **Emerging trends in Business management**<br>• Management of Change<br>• Disaster Management<br>• Ethics in Management<br>• Corporate Governance<br>• And Corporate Citizenship,<br>• Conflict Management | 10 |

**Reference books:**

1. Management Theory & Practice - J.N.Chandan

2. Essential of Business Administration - K.Aswathapa Himalaya Publishing House

3. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi

4. Business Organization & Management - Dr. Y.K. Bhushan

5. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing

6. Principles of Management, By Tripathi, Reddy Tata McGraw Hill

7. Business organization and Management by Talloo by Tata McGraw Hill Business Environmentand Policy – A book on Strategic Management By Francis Cherunilam Himalaya Publishing House

8. Essentials of Management - Horold Koontz and Iteinz Weibrich - McGrawhills International

9. Management Theory & Practice - J.N.Chandan

10. Essential of Business Administration - K.Aswathapa Himalaya Publishing House

11. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi

12. Business Organization & Management - Dr. Y.K. Bhushan

13. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing

14. Principles of Management, By Tripathi, Reddy Tata McGraw Hill

15. Business organization and Management by Talloo by Tata McGraw Hill

16. Business Environment and Policy – A book on Strategic Management By Francis CherunilamHimalaya Publishing House

Subject Code: 23-COB243

Subject: Business Economics (Macro) II 3 Credits

Total Lectures = 45

| Unit | Topic | No of lectures |
|------|-------|----------------|
| I | **Money** <br><br> • Meaning and Functions of Money, Concepts of Money Evolution of Money <br> • Demand for Money: <br> • Classical Approach. <br> • Keynesian Approach. <br> • Supply of Money: <br> • Credit Creation of Commercial Banks <br> • Money Measure of RBI (M1, M2, M3, M4). <br> • Credit Control Methods. <br> • Value of Money: <br> • Quantity Theory of Money. <br> • 1.4.2 Cash Balance Approach : Marshall, Pigou, Robertson and Keynes | 15 |
| II | **Inflation and Deflation** <br> • Meaning and Definition <br> • Causes of inflation <br> • Consequences of Inflation <br> • Demand Pull and Cost Push Inflation <br> • Stagflation: Meaning and Causes | 10 |
| III | **Business Cycle:** <br><br> • Meaning and Definition of Business Cycle <br> • Characteristics of Business Cycle <br> • Phases of Business Cycle <br> • Control of Business Cycle: Monetary Measures and Fiscal Measures | 10 |

| IV | **Public Finance:** | 10 |
|---|---|---|
| | • Meaning and Definitions. | |
| | • Scope of Public Finance. | |
| | • Importance of Public Finance. | |
| | • Meaning and Types of Tax. | |
| | • Public Expenditure: Meaning and Causes of Increasing Public Expenditure. | |
| | • Public Debt: Meaning and Importance. | |
| | • Budget: Meaning and Types, Union Budget. | |

**Reference books:**

1. Economics: Paul A Samuelson and William D Nordhaus. McGRAW Hill Publication .
2. Macroeconomics: N. Gregory Makiw, Worth Publishers, New York.
3. Macro- Economic Theory: M L Zingan, Vrinda Publications (P) Limited.
4. Samashti Arthshstriy Vishleshan : Shridhar Deshpande, Vinayak Deshpande, HimalayaPublication House.
5. Theories of value: Output and Employment - John Eatwell, Thames Polytechnic, 1979
6. Businss Economics, Dr.J.P.Mishra, Sahitya Bhavan Publications, Agra.
7. Macroeconomic̄s: A Global Text, Sampat Mukherjee, New Central Book Agency PrivateLimited (Latest Edition), New Delhi
8. Macroeconomics: A Rough Guide, in Macroeconomics: A Reader, (Ed.) Brian Snowdonand Howard Vane, Routledge
9. Paisa, Mahagaie Aani Rajasva: Dr. Rasal, Shelar and Bhadane, Idol Publications, Pune.
10. Macroeconomics: Theory and Policy, S. Chand & Company Limited. (Latest Edition)
11. Ben Fine & Ourania Dimakou, Macroeconomics: A Critical Companion, Pluto Press(Latest Edition)
12. Michel De Vroey, A History of Macroeconomics: From Keynes to Lucas and Beyond,Cambridge University Press (Latest Edition)
13. Sampat Mukherjee, Analytical Macroeconomics: From Keynes to Mankiw, New CentralBook Agency Private Limited
14. Macroeconomics- K R Gupta, R. K. Mandal, Amita Gupta, Atlantic Publishers distributor's pvt.ltd. and
15. Money, Inflation, and Business Cycles The Cantillon Effect and the Economy, Arkadiusz Sieroń. Abingdon, Routledge, 2019. NewYork
16. Macroeconomics: N. Gregory Maki Worth Publishers, New York

17. Macro Economics: Rudiger Dornbusch, Stanley Fisher & Richard Startz Tata McGrawHill Education Private Limited (Latest Edition), US

18. The General Theory of Employment, Interest, and Money- John Maynard Keynes,General Press

19. An Analysis of John Maynard Keynes The General Theory of Employment, Interest andMoney- John Collins, CRC Press,2017

**Subject Code: 23-COB244**

**Subject: Business Communication-II  (3 Theory + 1 Practical = 4 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No of  lectures |
|------|-------|-----------------|
| 1 | **External Correspondence :**<br><br>• Meaning, importance, Principles, Qualities or essentials of a good business letter.<br><br>• Types of External correspondence, Layout (parts of business letters), Physical appearance, Forms of Business Letters (Full Block Form, Modified Block Form, Semi Block Form, Indented form and Hanging Indentation form) | 10 |
| II | **Types and Drafting of Business Letters :**<br><br>• Enquiry Letters<br>• Replies to Enquiry Letters<br>• Order Letters<br>• Credit and Status Enquiries<br>• Sales Letters<br>• Complaint Letters<br>• Collection Letters<br>• Purpose, importance and points to be considered while drafting above business letters. Collection of specimen business letters. | 15 |
| III | **Job Application letters and Resume writing :**<br><br>• Introduction, Meaning & Drafting of Job Application letter, essential elements of Bio data, Resume writing, Curriculum Vitae. | 10 |

| IV | Recent Trends in Business Communication : | 10 |
|---|---|---|
| | • Internet: Email, Websites, Social Media Network (Twitter, Face book, LinkedIn, You tube, WhatsApp), Google Doc, Google Form, Google Sheet, Google Slide, Google Class Room, Online Conference, Video conferencing, Meeting through Zoom App, Google meet App, Cisco Webex meetings App. | |

**Reference Books :**

1. Business Communication ,K.K.Sinha, Gelgotia Publishing,New Delhi
2. Business Correspondence & Report writing ,R.C.Sharma & Krishnan Mohan, Tata Mc Graw Hill Publishing Co.Ltd. ,New Delhi.
3. Communication ,C.S.Rayudu,Himalaya Publication, Mumbai.
4. Business Communication,Asha Kaul, Prentice hall of India, New Delhi.
5. Business Communication,Vasisthb Neeru & Rajput Namita,Kitab Mahal, Allahabad.
6. Soft skills, Dr.Alex ,S..Chand publication ,Delhi.
7. Essentials of Business Communication,Rajendra Pal & Korlahalli,Sultan Chand & sons,
   New Delhi.
8. Managerial Communication, P.D.Chaturvedi & Mukesh Chaturvedi,, Pearson, Delhi.

**Subject : Code  23-COB245**

**Subject : ELEMENTS OF COMPANY LAW-II     (4 Credit)**

**Total Lectures = 45**

| Unit | Elements of Company Law<br>I  Topic | No of lectures (45) |
|------|------|------|
| 1 | **Capital of the Company:**<br>• Equity Share Capital: Meaning, Structure – Definition,<br>• Preference share capital: Meaning, Nature and Kinds Preference Shares.<br>• Various Modes for Raising of Share Capital including private placement, public issue, rights issue, Bonus shares, ESOP, Sweat Equity Shares, Buy-back of shares. | 10 |
| II | **Management of Company:**<br>• Board of Directors: Definition, Powers, Restrictions, Prohibition on Board.<br>• Director: Meaning and Legal position of Directors,. Types of Directors, Related Party Transactions(Sec.188)<br>• Appointment of Directors, Qualifications and Disqualifications, Powers, Duties, Liabilities of Directors, Loans to Directors, Remuneration of Directors | 11 |
| III | **Key Managerial Personnel (KMP) (U/S 203)**<br>• Meaning, Definition and Appointments of<br>• Managing Director, Whole Time Director, Manager, CS 2.Company Secretary (CS)- Term of office/ Tenure of appointment, Role of Company secretary<br>• Distinction between Managing Director, Manager and Whole Time Director - Role (Powers, Functions of above KMP) | 12 |
| IV | **Company Meetings:**<br>• Board Meeting – Meaning and Kinds<br>• Conduct of Meetings - Formalities of valid meeting [Provisions regarding agenda, notice, quorum, proxies, voting, resolutions (procedure and kinds) minutes, filing of resolutions, Virtual Meeting]<br>• Meeting of Share Holders General Body Meetings, Types of Meetings<br>• Annual General Meeting (AGM), (Ss.96 to 99)<br>• Extraordinary General Meeting (EOGM).(Sec.100)<br>• Provisions regarding convening, constitution, conducting of General Meetings contained in Ss.101 to 114 | 12 |

**Reference Books :**

4. The Companies Act with Rules, Taxmann, Tan Prints (India) Pvt. Ltd. Jhajjar, Chandigad

5. The Companies Act, 2013,Bharat, Bharat Law House Pvt. Ltd., Delhi

6. Company Law-A Comprehensive Text Book on Companies Act 2013, Dr. G.K. Kapoor & Dr. Sanjay Dhamija, Taxmann Publications Pvt. Ltd, Delhi

4. Company Law, Dr S R Meyani, Asia Law House, Mumbai

5. Company Kaydyachi Olakha, K Shriram, Aarti & Co.      Mumbai

6. Guide to Memorandum, Articles & Incorporation of Companies, Bhandari      & Makheeja Lexis Nexis, Mumbai

7. Elements of Company Law,  Arun Gaikawad , Chandrakant Chaudhari & Devendra Bhawari Bibha, Pune

8. Elements of Company Law, Prakash N. Chaudhary, Nirali Prakashan, Pune

9. E-Commerce: Legal  Compliance   Pratima Narayan Eastern Book Company, Mumbai

**Subject Code**: **23-COB246(a)**

**Subject: Cost & works Accounting –II  (3 Theory + 1 Practical = 4 Credit Course)**

**Total Lectures=45**

| Unit | Topic | No of  lectures |
|------|-------|-----------------|
| I | **Material Accounting  :**<br><br>• Functions of the Purchase Department.<br><br>• Purchase Procedure /Policy<br><br>• Store Location and Layout.<br><br>• Classification and Codification of Material.<br><br>• Stores and Material Records.<br><br>• Bin Card & Store Ledger etc.<br><br>• Issue of Material and Pricing Methods for Issue of Material:<br><br>• FIFO. LIFO, Simple Average,    weighted Average<br><br>• Use of computer in store Accounting. | 15 |
| II | **Labour cost and Payroll:**<br>• Meaning and definition of wages. Difference Between Wages and Salary<br><br>• Records and methods - time keeping and time booking.<br><br>• Methods of Wage Payment Time rate system., Piece rate system.<br><br>• Taylor's differential piece rate system. Incentive Plan.<br><br>• Halsey Plan. Rowan Plan,Group Bonus scheme. Performance based incentive plan. Payroll meaning and components | 15 |
| III | **Other Aspects of Labour Presentation Skills :**<br>• Labour Turnover.<br>• Job Analysis & Job Evaluation.<br>• Merit Rating. | 10 |

| IV | **Introduction to JIT, CAM and ERP** : | 5 |
|----|------|---|
| | • Introduction to- Just In Time(JIT | |
| | • CAM (Computer Aided Manufacturing) Enterprise Resource Planning (ERP) | |
| | • Contract manufacturing. | |

**Reference books:**

1. Cost Accounting-Principles & Practices,Jawahar Lal & Seema Shrivastava,Tata Mcgraw
    Hill, New Delhi.
2. Advanced Cost Accounting And Cost Systems,Ravi M Kishor,Taxmann,New Delhi.
3. Cost Accounting Theory And Problems, S. N. Maheshwari, Mittal Shree, Mahavir Book Depot.,New Delhi
4. Advanced Cost Accounting,Jain and Narang, Kalyani Publication,New Delhi.
5. Horngren's Cost Accounting- A Managerial Emphasis,Srikant M Datar & Madhav V Rajan  Pearson,Noida UP
6. Cost Accounting-Principles & Practices, Dr. M.N. Arora,     Vikas Publishing House,New Delhi.
7. Advanced Cost Accounting      ,Dr. D. M.Gujarathi    ,Idol Publication,Pune
8. Advanced Cost Accounting      ,Dr. Kishor. M. Jagtap,Tech-Max Publication,Pune
9. Cost Accounting Principles And Practice,Jain and Narang,Kalyani Publication, New Delhi
10. Principles and Practice of Cost Accounting,N.K Prasad,Booksyndicate Private Ltd,Kolkata.
11. Cost Accounting: Methods  and problems,      B.K.Bhar,Academic Publications,Kolkata.

**Subject Code: 23COB246 (b)** (3 Theory + 1 Practical = 4 Credit Course)

**Subject: Banking and Finance-II (Indian Banking System - II)**

**Total Lectures=45**

| Unit | | No of lectures (45) |
|---|---|---|
| 1 | **Co-operative Banking in India:** <br>• Meaning, and principles of Cooperation <br>• Evolution of Cooperative Baking in India. <br>• Structure of Co-operative Banking in India <br>• Challenges before Co-operative Baking in India | 12 |
| II | **Bank Indicators** <br>1 2.1 Meaning of bank indicators <br>2 2.2 Various categories of Bank indicators <br>3 2.3 Review of bank indicators | 11 |
| III | **Selective Important Concepts of Banking** <br>• Branch Banking <br>• Unit Banking <br>• Wholesale Banking <br>• Retail Banking <br>• Social Banking <br>• Merchant Banking <br>• Investment Banking <br>• Digital Banking | 10 |

| | | |
|---|---|---|
| | • International banking | |
| IV | **Banking Sector Reforms**<br><br>• Need, Meaning and Goals of Banking Sector Reforms in India<br><br>• Recommendation of M. Narsimhan Committee – I (1991)<br><br>• Recommendation of M. Narsimhan Committee – II (1998)<br><br>• Framework of Basel Committees on BankingSupervision<br><br>    o Basel – I<br><br>    o Basel – II<br><br>    o Basel – III | **12** |

**Reference Books:**

1. Debaprosanna Nandy (2010), 'Banking Sector Reforms in India

   and PerformanceEvaluation of Commercial Banks, Universal

   Publishers

2. Deb Joyeeta (2019), 'Indian Banking System', Evince Publishing.
3. Desai Vasant (2007), 'Indian Banking-Nature and Problems', Himalaya Publishing House.
4. Gopinath M.N. (2017), 'Banking Principles and Operations', Snow White Publisher.
5. Joshi, Vasant and other (2002), Managing Indian Banks – The

   Challenges Ahead,Response Books, New Delhi.

6. Mallik, Chaudhury and Sarkar (2018), 'Indian Banking System- Growth, Challenges and
7. Nararajan and Parameswaran (2007), 'Indian Banking', S. Chand Company Ltd. New Delhi.
8. ShahiUjjwala (2013), 'Banking in India: Past, Present and
   Future', New CenturyPublications

9. Singh Sultan (2008), 'Banking Sector Reforms in India', Kanishka
   Publishing House10.Thirunarayanan R., 'Co-operative Banking in
   India', Mittal Publication
   11.Trivedi, Chaudhary and other (2015), 'Indian Banking System', RBD
   Publication, Jaipur.12.Trivedi I.V. and JatanaRenu (2010), 'Indian Banking
   System', RBSA Publisher.
   13. 'Report on Trend and Progress of Banking in India'2017-18,

   2018-19, 2019-20-Reserve Bank of India

**Subject Code: 23-COB246(c)**

**Subject: Business Entrepreneurship II (3 Credit Course)**

**Total Lectures = 45**

| Unit | Corporate<br>Accounting II | No of<br>lectures (45) |
|---|---|---|
| 1 | **Role of Service Sector in National Economy**<br>• Types of Service Ventures<br>• Service Industry Management<br>• Success Factors in Service Ventures<br>• Opportunities in Service Industry in Rural and Urban Areas<br>• Distinction between Service Industry and Manufacturing Industries | 12 |
| II | **Challenges in Entrepreneurship Development**<br>• Social, Cultural, Educational, Political, Economical, challenges. International Situation, Cross Cultural Aspects, Challenges of Globalization<br>• Effect of Corona Virus on Entrepreneurship | 13 |
| III | **Theories of Entrepreneurship**<br>• Schumpeter – Theory of Innovation<br>• Peter Drucker- Theory of opportunity<br>• Max Weber- Theory of Entrepreneurial Growth<br>• Economic Theory of Entrepreneurship | 10 |
| IV | **Stories of Successful Entrepreneurs.**<br>• Mr. Radhakishan Damani (D Mart)<br>• Mr. Ritesh Agarwal (OYO Hotels)<br>• Mr. Sanjeev Bhikchandani (Naukri.com)<br>• Mumbaiche Dabewale<br>• Mr. Ratan Tata**.** | 10 |

**Reference books:**

1. Business Environment, Francis Cherunilam Himalaya Publishing House New Delhi

2. Dynamics of Entrepreneurship Development and Management Desai Vasant Himalaya Publishing House New Delhi

3. Entrepreneurial Development, Khanka S.S.S. Chand, New Delhi

4. Entrepreneurial Development, Gupta, Shrinivasan S. Chand, New Delhi

5. Udyog- UdyogSanchalaya, Mumbai

6. Indian Economy RuddarDatt, K.P.M. Sundharam, S. Chand    New Delhi

Subject Code:  :  **23-COB246(d)**

**Subject: Trends in Marketing II (3 Credit Course)**

**Total Lectures = 45**

| Unit | Corporate Accounting II | No of lectures (45) |
|---|---|---|
| 1 | **Consumer Behaviour** <br> • Introduction <br> • Meaning of Consumer Behaviour <br> • Definition of Consumer. <br> • Scope of Consumer Behaviour <br> • Determinants of Consumer Behaviour. <br> • Concept of Motivation <br> • Multivariable Models of Consumer Behaviour Behaviour <br> • Buying Motives & Consumer Importance of Buying Motives | 12 |
| II | **Introduction to International Marketing** <br> • Introduction <br> • Meaning of International Marketing <br> • Definition of International Marketing <br> • Scope of International Marketing <br> • Objectives of International Marketing <br> • Facts of International Marketing <br> • Benefits of International Marketing <br> • Limitation of International Marketing <br> • Forces influencing International Marketing <br> • Forces restraining International Marketing <br> • Case Studies | 10 |
| III | **Digital Marketing** <br> • Introduction <br> • Meaning of Digital Marketing <br> • Definition of Digital Marketing <br> • Difference between Traditional Marketing & Digital Marketing <br> • Digital Marketing Channels <br> • Search Engine Optimisation   (SEO)Off- age Optimisation On- Page Optimization <br> • Social Media Marketing Facebook Marketing Twitter Marketing Google Marketing Video Promotion YouTube Marketing Pinterest Marketing Instagram Marketing <br> • Online Paid advertisement Google AdWords Facebook Ads Twitter Ads | 13 |

| | | |
|---|---|---|
| | • Email Marketing<br>• E-marketing: Meaning, Advantages and limitations<br>• Mobile App Marketing<br>• Web Analytics<br>• Content Marketing<br>• Affiliate Marketing<br>• Case studies<br><br>• | |
| **IV** | **Green Marketing**<br>• Introduction<br>• Meaning of Green Marketing<br>• Definition of Green Marketing<br>• Objectives of Green Marketing<br>• Importance of Green Marketing<br>• Strategies of Green Marketing<br>• Green marketing and consumer accountability<br>• Marketing mix of green marketing<br>• Principles of success of green products<br>• Case studies | **10** |

**Reference books:**

1. Marketing Management, Philip Kotler, Pearson Publication

2.Marketing Management Rajan Saxena McGraw Hill Education

3. Principles of Marketing Philip Kotler Pearson Publication

4. Sales & Distribution Management Tapan K Panda  Oxford  Publication

5. Advertising Management Rajiv Batra Pearson Publication

6. Retail Management, Swapna Pradhan , McGraw Hills

7. Retail Management Gibson Vedamani    Jayco Publication

8. Marketing ManagementV. S. Ramaswamy & S. Namakumar

9. Supply Chain Management, Sunil Chopra, Peter Meindl
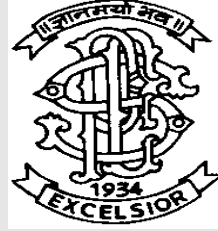
*Progressive Education Society's*

# Modern College of Arts, Science and Commerce

# Ganeshkhind, Pune – 411 016

# (Autonomous)

Syllabus for

# S. Y. B. Sc. Biotechnology

Biotechnology has expanded and established as an 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 work force 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.

The newly developed syllabus is a choice-based credit system with semester pattern. Biotechnology has grown extensively in last couple of decades. 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 economic aspects of modern biology. The proposed credit-based

curriculum ensures the requirement of academia and industry. 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 college itself will be developing the trained and skilled man-power. Biotechnology being an interdisciplinary subject, this restructured syllabus will combine the principles of different 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. The basic aim of the revised course curriculum is to integrate various disciplines of life sciences which will cater the needs of human resources in academia and industry. The Overall objective of the Program is to promote education and research in biotechnology and provide academic and professional excellence for immediate productivity in academics, government organization, biomedical sectors, health and nutrition settings for ultimate benefit of society and sustainable development.

## Program Objectives:

- To introduce the concepts in various allied subjects
- To enrich students' knowledge in basic and applied aspects of life sciences.
- To help the students to build interdisciplinary approach in teaching/learning & in research.
- To inculcate the sense of scientific responsibilities and social awareness
- To help the students build-up progressive and successful careers in academia and industry.

## Program Specific Outcomes (PSOs):

### Program Outcomes:

After successful completion of B.Sc. Biotechnology program, the students should be able:

PO1:  to have competencies in the area of basic and applied biological sciences.

PO2:  to learn and explore various fields and specializations of Biotechnology such as molecular biology, genetic engineering, large-scale manufacturing processes, environmental biotechnology and tissue culture

PO3:  to get engaged and carry out biotechnological research independently and in team

PO4:  to develop and explore the biotechnological tools with keeping in mind the social and ethical responsibilities

PO5:  to prepare and pass competitive exams like GAT-B for higher studies


### Program-specific / Course outcomes

### 23 BBT-301 Cell Biology I

After successfully completing this course, the students should be able to:

CO1: understand the basics of cell and its components besides detailed knowledge about cell and its different types.

CO2: understand and explore the insights on cell theory and origin of cell.

CO3: gain knowledge of structure and functions of various cell organelles and their interaction within cell to promote cell growth, division and development.

CO4: gain an in-depth understanding about cellular architecture and cytoskeletal organization.

CO5: get a strong foundation about cellular theories functions of diverse organelles and the significance of cellular diversity.


### 23 BBT -302 Molecular Biology I

After successfully completing this course, the students should be able to:

CO1: learn and explore the basics of central dogma of molecular biology and significance of its study.

CO2: understand the chemical and molecular processes that occur in and between the cells.

CO3: understand the structure and functions of nucleic acids proteins and their interaction within cell to promote cell growth, division and development.

CO3: illustrate the structural organization of genes and understand the organization of genomes.

CO4: understand the concept of genetic code and its features.

CO5: understand the insights of replication of genetic material in prokaryotes and eukaryotes.

**23 BBT -303 Genetics**

After successfully completing this course, the students should be able to:

CO1: understand the basic concept of transmission of genetics.
CO2: enrich with the knowledge of Mendelian and Non-Mendelian genetics.
CO3: understand the concepts of gene interactions and its applications in knowing genetic disorders.
CO4: learn and explore the chromosomal aberrations and structure of chromosomes.

**23 BBT -304 Metabolism**

After successfully completing this course, the students should be able to:

CO1: understand the relevance, basic concepts and theories of chemistry as relevant to a biological system.
CO2: understand the properties of biomolecules and their nature of existence in the living system.
CO3: understand the relevance and basic concepts of experimental biochemistry.
CO4: understand integration of metabolism with the help of different cycles.

**23 BBT -305 Environmental Biotechnology**

After successfully completing this course, the students should be able to:

CO1: understand and analyze environmental relationships with a better assessment of the mechanisms of environmental components like atmosphere, hydrosphere and lithosphere.
CO2: get skilled at basic theoretical concepts highlighting in the field of ecology, and how these are applied to different ecological approaches.
CO3: understand the distribution and abundance of species and the changes in their distribution and abundance over time and climatic impact.
CO4: understood the concept of environmental pollution, types of pollutants and related hazards, disaster management methods and policies.
CO5:  acquire knowledge of bioremediation and its applications in environmental clean-up
CO5: understand current global environmental issues, causes and measures required to tackle.

**23 BBT -306 Bio analytical Techniques**

After successfully completing this course, the students should be able to:

CO1: diagnose a specific biochemical genetic disorder.
CO2: develop technical aspects of analyses for a diagnostic biochemical laboratory.

CO3: handle various equipment's used in biochemical analysis and troubleshoot them.
CO4: develop competence in handing chromatographic techniques and apply them in isolating and characterizing biological molecules.
CO5: understand the applications of instruments like centrifugation and chromatography in biological investigations.

## 23 BBT -307 AECC-I (Environment)

After successfully completing this course, the students should be able to:

CO1: build awareness about environment, scope, and importance for sustainable development.
CO2: understand ecology, biogeography, and ecosystem structure.
CO3: learn importance of Natural resources i.e renewable and non-renewable.
CO4: gain knowledge to assess the conditions and trends of biodiversity globally or sub- globally and to understand it's necessity to measure the abundance of all organisms over space and time.

## 23 BBT -308 AECC-II (Language Communication)

After successfully completing this course, the students should be able to:

CO1: enable speaking and writing grammatically correct sentences in English. CO2: To develop effective writing skills.
CO3: build fluency in English.
CO4: build spoken and written competency in English.

## 23 BBT -309 Practical in Cell Biology and Genetics

After successfully completing this course, the students should be able to:

CO1: get familiarized with basic principles of working of Microscopy.
CO2: acquire practical skills in preparation and observation of slides of all prokaryotes and eukaryotes.
CO3: demonstrate proficiency in understanding the basic structure of gene and interpret the inheritance of characters by using linkage and crossing over.
CO4: understand and demonstrate the pedigree and karyotyping analyses
CO5: acquire knowledge about the gene mapping methods, correlation between linkage and recombination.
CO6: learn how phenotypes are observed based on the genotypes of the organism.
CO7: observe and/or differentiate the cells of various living organisms, cell types, cellular structures using different microscopic techniques.

**23 BBT -310 Practical in Bio-analytical Techniques**

After successfully completing this course, the students should be able to:

CO1: understand the basics of conventional spectroscopic and separative analytical techniques
CO2: select the most appropriate analytical method to solve a given analytical question.
CO3: apply an analytical protocol and to analyze and interpret analytical results.
CO4: get exposed to various biological techniques and their applications in identification, isolation of different biological molecules.

**23 BBT -311 Practical in Molecular Biology and Environmental Biotechnology**

After successfully completing this course, the students should be able to:

CO1: understand functional significance of DNA technology.
CO2: acquire laboratory skills to perform, interpret and analyze basic molecular biology techniques.
CO3: apply the techniques for research applications.
CO4: gain a hands-on experience in techniques used in molecular biology & their applications.
CO5: learn biomonitoring of air pollutants with plants
CO6: get trained on sampling, collection of data to measure biodiversity index in a community.
CO7: understand physical and chemical properties of polluted and non-polluted soil.
CO8: have practical knowledge on microbial community estimation by studying different methods.
CO9: learn the testing of genotoxicity of water sample.

**23 BBT -401 Cell Biology II**

After successfully completing this course, the students should be able to:

CO1: understand the concepts of cell biology.
CO2: understand the structural and functional aspects of cell.
CO3: understand the concepts on cell death and concept of ageing.
CO4: learn the cell division and its mechanism in plants and animals.
CO5: understand the concept of cell signaling and communication.

**23 BBT -402 Molecular Biology II**

After successfully completing this course, the students should be able to:

CO1: understand the molecular events of transcription and processing of transcripts, RNA editing.
CO2: understand the regulation of gene expression in prokaryotes using operon concept and Eukaryotes.
CO3: learn and explore the knowledge on molecular events of translation leading to protein synthesis

and post-translational modification.

### 23 BBT -403 Immunology

After successfully completing this course, the students should be able to:

CO1: understand and demonstrate the basic knowledge of immunological processes at a cellular and molecular level.
CO2: demonstrate a capacity for problem-solving about immune responsiveness.
CO3: apply basic techniques for identifying antigen-antibody interactions.
CO3: identify the cellular and molecular basis of immune responsiveness.
CO4: elucidate the reasons for immunization and aware of different vaccination.
CO5: describe the roles of the immune system in both maintaining health and contributing to disease.
CO6: transfer knowledge of immunology into clinical decision-making through case studies presented in class.

### 23 BBT -404 Animal Development

After successfully completing this course, the students should be able to:

CO1: acquire knowledge about model organisms to understand the concepts of embryology.
CO2: understand the basic concepts of steps in the development of an organisms.
CO3: understand about patterning in few models' organism (Drosophila).
CO4: understand the role of teratogens on abnormal development of an embryo.
CO5: understand the mechanisms on limb regeneration with gaining knowledge on few important concepts like differentiation, trans differentiation, commitment, developmental plasticity with reference to apoptosis.

### 23 BBT -405 Plant Development

After successfully completing this course, the students should be able to:

CO1: understood the principles and unique features of developmental process in plants.
CO2: get skilled at basic theoretical concepts about pattern formation in plants at vegetative and reproductive phases.
CO3: gain the knowledge of all the stages of development and are able to identify specimen easily.
CO4: learn and explore development pathway using model systems.
CO5: understand the concept of microsporogenesis, megasporogenesis, double fertilization, endosperm development
CO6: co-relate the knowledge of developmental biology with other subjects like Molecular biology, Biochemistry, physiology and Genetics.

**23 BBT -406 Microbial Biotechnology**

After successfully completing this course, the students should be able to:

CO1: understand the significance of microorganisms in milk and other food processing, food spoilage, utilization of factors affecting microbial growth in food in developing preservation methods.

CO2: describe the characteristics of important food borne pathogens, pathogenesis and prevention of food borne diseases.

CO3: learn effective utilization of microbes for waste water treatment and test to check microbiological quality of water.

CO4: acquire knowledge about application of microorganisms in bioleaching of metals, agriculture, and biosynthetic material production

CO5: learn the norms and regulations of GMO and its responsible use.


**23 BBT -407 AECC-III (Environment)**

After successfully completing this course, the students should be able to:

CO1: understand the concept of environmental pollution, types of pollutants and related hazards.

CO2: acquire the knowledge on environment protection acts and understand the need to conserve environment by implementing policies with the help of different organizations.

CO3: understand the structure, growth and the interactions of populations in the environment.

CO4: get skilled in techniques for documenting assets, study local polluted sites and ecosystem structure and estimating their environmental impacts.


**23 BBT -408 AECC- IV (Language Communication)**

After successfully completing this course, the students should be able to:

CO1: learn the nuances of the English language which includes proficiency in grammar and its effective usage in speaking and writing.

CO2: get themselves prepared for various competitive exams and to keep up with the increasing demand for English in Indian society and at the global level.

CO3: develop their overall confidence and personality.


**23 BBT -409 Practical in Molecular Biology and Microbial Biotechnology**

After successfully completing this course, the students should be able to:

CO1: learn the techniques for isolation and identification of spoilage causing microorganisms.

CO2: determine microbiological quality of milk and milk product.

CO3: get hands-on experience of various test used to determine potability of water.

CO4: get live experience of observing wastewater treatment processing stepwise in field visit, besides milk processing in a dairy plant.

## 23 BBT -410 Practical in Animal and Plant Development

After successfully completing this course, the students should be able to:

CO1: learn methods like dissection, sectioning and staining.

CO2: gain knowledge of RAM, SAM and florally induced meristem by learnings various staining techniques.

CO3: understand how to perform various practical on microsporogenesis and female development by employing suitable technique.

CO4: understand the basic concepts of embryogenesis and well able to differential in dicots and monocot plants at embryo development stage.

CO5: get hands-on training how to do seed dissection and excision of embryo and endosperm.

## 23 BBT -411 Practical in Cell biology and Immunology

After successfully completing this course, the students should be able to:

CO1: acquire laboratory skills to perform, interpret and analyze core/ widely used immunotechniques.

CO2: perform the techniques and relate to health care.

CO3: integrate the skill into to research and development.

CO4: observe and prepare slides to study cell division from onion root tip.

CO5: get hands-on training to prepare slides to study role of colchine on mitosis.

## Examination Pattern:

30:70 [Continuous Internal Evaluation: Formative, Summative and End semester exam (ESE)]

Evaluation of Students:

1) The Internal evaluation will be in form of continuous assesement format of 15 marks and End-Semester examinations will be of 35 marks making total to 50.

2) Student has to obtain 40% marks in the examination of In-Semester and End-Semester assessment. Separate passing is mandatory

4) Internal marks remain unchanged and internal assessment cannot be repeated. If student remain absent during internal assessment examination, he/she will have chance with the permission of the competent authority. But it will not be right of the student. It will be under the discretion of the competent authority and internal departmental assessment committee. In case he/she wants to

repeat Internal, he/she can do so only by registering for the said courses.

In-semester Examination: Internal assessment for each course would be continuous and dates for each tutorials/practical tests etc. 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.

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Students Seminar
2. Short Quizzes / MCQ Test
3. Home Assignments
4. Tutorials/ Practical
5. Oral test
6. Research Project
7. Group Discussion
8. Open Book Test
9. Study Tour
10. Written Test
11. PPT presentation
12. Field Visit
13. Industrial Visit
14. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries

7.  Research Papers & Projects
8.  E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | | 23 BBT-301 Cell Biology I | 2 | | | 30 |
| 2 | | 23 BBT -302 Molecular Biology I | 2 | | | 30 |
| 3 | | 23 BBT 303 Genetics | 2 | | | 30 |
| 4 | | 23 BBT -304 Metabolism | 2 | | 16 | 30 |
| 5 | | 23 BBT -305 Environmental Biotechnology | 2 | | | 30 |
| 6 | | 23 BBT -306 Bio analytical Techniques | 2 | | | 30 |
| 7 | | 23 BBT -307 AECC-I (Environment) | 2 | | | 30 |
| 8 | | 23 BBT -308 AECC-II (Language Communication) | 2 | | | 30 |
| 9 | | 23 BBT -309 Practical in Cell Biology and Genetics | | 2 | 6 | 15 P |
| 10 | | 23 BBT 310 | | 2 | | 15 P |

| Sr. No. | | Subject Code & Title | | | |
|---|---|---|---|---|---|
| | | Practical in Bio analytical Techniques | | | |
| 11 | | 23 BBT 311 Practical in Molecular Biology andEnvironmental Biotechnology | | 2 | 15 P |

## SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | | 23 BBT -401 Cell Biology II | 2 | | | 30 |
| 2 | | 23 BBT -402 Molecular Biology II | 2 | | | 30 |
| 3 | | 23 BBT -403 Immunology | 2 | | | 30 |
| 4 | | 23 BBT -404 Animal Development | 2 | | | 30 |
| 5 | | 23 BBT -405 Plant Development | 2 | | 16 | 30 |
| 6 | | 23 BBT -406 Microbial Biotechnology | 2 | | | 30 |
| 7 | | 23 BBT -407 AECC-III (Environment) | 2 | | | 30 |
| 8 | | 23 BBT -408 AECC- IV  (Language  Communication) | 2 | | | 30 |
| 9 | | 23 BBT -409 Practical in  Molecular Biology and Microbial Biotechnology | | 2 | 6 | 15 P |

| | | | | | |
|---|---|---|---|---|---|
| 10 | | 23 BBT -410<br>Practical in Animal and Plant<br>Development | | 2 | 15 P |
| 11 | | 23 BBT -411<br>Practical in Cell biology and<br>Immunology | | 2 | 15 P |

# Syllabus

**Subject Code:** 23 BBT **- 301**

**Subject: Cell Biology I (2 Credit Course)**

**Total Lectures=30**

| Unit | Cell Biology<br>I Topic | No of lecture (30) |
|---|---|---|
| I | **Introduction To Cell**<br>• Cell Theory<br>• Types of Cell:<br>    i. Prokaryote & Eukaryotic Cell<br>    ii. Plant & animal cell<br>    iii. Cellular Diversity: Cell structure & related functions | 5 |

| | | | |
|---|---|---|---|
| II | **Cell Membrane**<br>  i Chemical components of biological membranes<br> ii. Organization and Fluid Mosaic Model, membrane as a<br>   dynamic entity<br> iii. Functions of cell membrane<br> iv Transport – Active and Passive transport with one<br>   exampleBulk transport: Exocytosis, endocytosis. | 6 | |
| III | **Cell Organelle**<br> • Structure, components and function of :<br>   i.     Nucleus,<br>   ii.    Mitochondria<br>   iii.   Chloroplast<br>   iv.   Lysosomes and Vacuoles<br>   v.    ER & SER<br>   vi.   Golgi Bodies | 12 | |
| IV | • Cell Junctions<br> • Extracellular Matrix<br> • Cytoskeleton & Basal Bodies | 7 | |

**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 andCo., USA
2. Molecular Biology of the Cell, 5th Edition (2007)BruceAlberts, 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
5.  Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. JohnWiley & Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8thedition.Lippincott Williams and Wilkins, Philadelphia.
7. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition.ASMPress& Sunderland, Washington, D.C.; Sinauer Associates, MA.
8.  Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

**Subject Code** 23 BBT **-** 302

**Subject : Molecular Biology I (2 Credit)**

**Total Lectures=30**

| Unit | Molecular Biology I  Topic | No of lectures (30) |
|------|----------------------------|---------------------|
| 1 | **Historical and conceptual Background-**<br>☐ Molecular basis of heredity & Central dogma of Molecular Biology<br>☐ Discovery of DNA as genetic material: Griffith's experiment, Hershy and Chase warring blender experiment, Miescher to Watson and Crick- historic perspective<br>☐ Nucleic acids- structure, properties and function, Nucleoside and nucleotide<br>☐ Structure of DNA: DNA forms; A, B & Z<br>☐ Salient features of double helix, Chargaff's rule<br>☐ Types and structure of RNA : tRNA, rRNA , mRNA and non-coding RNA (miRNA, SiRNA)<br>• **Molecular Biology-Definition, scope & importance in Biotechnology** | 8 |
| II | **Concept and Organization of Genome**<br>• Chromosomal organization and structure.<br>• Chromatin structure: Euchromatin, heterochromatin (nucleosomes)- histone, non-histone proteins<br>• Organization of DNA: Prokaryotes, Viruses<br>• Organelle DNA – mitochondria and chloroplast DNA<br>• Definition of gene – introns/exons, Regulatory sequences, promoters, enhancers and suppressors | 8 |
| III | **Genetic Code**<br>• Concept of codon, reading frame, frame shift, Major scientific contributions to decipher genetic code<br>• Properties of genetic code | 4 |
| IV | **Replication of DNA**<br>• DNA synthesis: general principles, bidirectional replication, Semiconservative nature of DNA replication, Rolling circle replication<br>• The replication complex:<br>  Enzymes involved in DNA replication,<br>  Unique aspects of eukaryotic & prokaryotic DNA replication,<br>  Fidelity of replication.<br>• **Inhibitors of replication process** | 10 |

**Reference Books :**

1. Genes X, 10th edition (2009), Benjamin Lewin, Publisher - Jones and Barlett PublishersInc. USA

2. Molecular Biology of the Gene, 6th Edition (2008), James D. Watson, Tania Baker,
3. Stephen P. Bell, Alexander Gann, Michael Levine, Richard Lodwick, Pearson Education,Inc. and Dorling Kindersley Publishing, Inc. USA
4. Molecular Biology, 5th Edition (2011), Weaver R., Publisher-McGrew Hill Science.USA
5. Fundamentals of Molecular Biology, (2009), Pal J.K. and Saroj Ghaskadbi, Oxford University Press. India
6. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. JohnWiley & Sons. Inc.
7. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
8. Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.
9. . Principles of Gene manipulation and Genomics. - S.B. Primrose and R.M. Twyman. Blackwell Publication
10. Biotechnology - Fundamentals and applications. - S.S. Purohit and S.K. Mathur. Agrobotanica publications.Gene Cloning and DNA analysis. - T.A. Brown. Blackwell Publication.
11. Recombinant DNA - Genes and Genomes. - James D. Watson, Any A candy, RichardM.M, Jan A Witkowski. W.H. Freeman and Company Publication.
12 Genomes: T A Brown, John Wiley & Sons

**Subject Code:** 23 BBT **-** 303

**Subject : Genetics  (2 Credit Course)**

**Total Lectures=30**

| Sr. No | Topic | Lectures |
|--------|-------|----------|
|        |       |          |

| I | • **Mendalism and Mendalian Genetics :** Genetic basis of Inheritance: Variations,Heridity, Pre- Mendelian Concept, Importance of Genetics <br> • **Mendelian Genetics:** Mendel Experiments <br> • **Mendel's Law:** Law of Segregation , Mono Hybrid. <br> • **Law Of Independent Assortment**- Di Hybrid and Tri Hybrid <br> • **Deviation From Mendel's Law-** Partial or Incomplete Dominance, Co Dominance, Epistasis <br> • **Penetrance and expressivity-**Pleiotropism <br> • **Gene Interaction-**Modified Di Hybrid Ratio, Multiple Allele <br> • **Extranuclear and Polygenic traits.** <br> • **Introduction to epigenetics** | **8** |
|---|---|---|
| II | • **Chromosomal aberrations and Mutations. :** <br> i) Variation in chromosome number – types, dosage compensation and barr bodies (Human). <br> ii) Variation in chromosome structure – types, generation of variation, <br> iii) Mutations Classification and types, molecular basis of mutations, <br> iv) Mutagens and their action, hot spot mutations. | **9** |
| III | • **Sex Determination and Recombination:** <br> i) **Linkage and Recombination-** Discovery of Linkage, Complete and incomplete linkage, crossing over, Cytological Proof Of Crossing Over, three point cross ,Recombination Frequency and Map Distance. Coincidence and interference, <br> • **Mechanism of Sex Determination**- <br> i) Homo and Heterogametic Theory, <br> ii) X-Linked Inheritance <br> **iii)Pedigree Analysis** | **9** |
| IV | • **Genetic Disorders** <br> Sickle Cell Anemia, Hemophilia, Colour Blindness, Albinism, Down's and Kleinfelter's Syndrome. <br> • Genetic Counseling | **4** |

**Reference Books :**

1. Genetics, by  Strickberger M W (2006) (Prentice Hall, India)
2.  Fundamentals of Genetics. B.D Singh
3. Genetics: analysis of genes and genomes by Hartl DL, Jones EW (2001) –(Jones and Bartlett,Massachusetts)
4. Introduction to genetic analysis by Griffiths AJ, Wessler SR, Carroll SB, Doebley J (2012) – (Freeman & Co, New York) tenth edition.
5. Molecular genetics of bacteria (ASM Press, Washington) Snyder L, Champness W (2007)
6. Textbook of  Cell Biology, Genetics, molecular biology , Ecology and Evolution.: P.S. Verma and V.K Agarwal

(2001)

7. Principals of Genetics: Robert H. Tamarin, 7th Edition.
8. GENES IX (2006): Benjamin Lewin.
9. Concepts of genetics (2011) : Robert Brooker.
10. Genetics: A Mendelian Approach (2006) :Peter J. Russell

**Subject Code:  23 BBT- 304**

**Subject : Metabolism (2 Credit Course)**

**Total Lectures=30**

| Units | Metabolism Topic | Lectures (30) |
|---|---|---|
| 1 | **Introduction to Metabolism**<br>• **Biochemistry-Definition, scope & importance in Biotechnology**<br>• ATP energy cycle,<br>• Chemistry of Metabolism: Oxidation–reduction reaction, Group transfer reactions etc,<br>• Concept of Bioenergetics, ATP & Phosphoanhydride bond. | 4 |
| 2 | **Lipid Metabolism** –<br>• Outline of lipid synthesis,<br>• Catabolism of Fatty acid: beta oxidation, Oxidation of unsaturated fatty acids, Oxidation of odd chain fatty acids, Cholesterol, ketone bodies. | 6 |
| 3 | **Carbohydrate Metabolism** –<br>• Aerobic & Anaerobic glycolysis, sequence of reactions in glycolysis, regulation in glycolysis,<br>• Pyruvate metabolism, citric acid cycle & its regulation, Electron transport Chain, & oxidative phosphorylation, chemiosmotic hypothesis<br>• glycogenesis, glycogenolysis (sequence of reactions & regulation),<br>• Pentose-phosphate pathway (sequence of reactions & regulation, significance), | 8 |
| 4 | **Amino acid Metabolism** –<br>• Essential & non essential amino acids, Brief outline of amino acid synthesis,<br>• General reactions of amino acid metabolism- Transamination, deamination & decarboxylation.<br>• Metabolism of amino acids- Broadly based on metabolic precursors for anabolism and as  glucogenic  o r  ketogenic  for | 7 |

| | catabolism) | |
|---|---|---|
| | • Urea Cycle- reactions, energetics & regulation<br>• Amino acids as biosynthetic precursors.<br>• Disorders related to amino acid metabolism-Phenylketonuria, albinism, Maple syrup urine disease, Tyrosinemia, Homocystinuria with reactions.<br>• Metabolic network - Interrelationship of metabolisms, Krebs cycle, amino acid synthesis | |
| 5 | **Nucleotide Metabolism** –<br>• Biosynthesis of purine & pyrimidine (de novo & salvage pathway); Degradation of purine & pyrimidine. | **5** |

**Reference Books :**

1. Conn EE and Stump PK. 2010. Outlines of Biochemistry. 5th Ed. John Wiley Publications.
2. Voet D and Voet JG. 2011. Biochemistry. 4th Ed. John Wiley and Sons, Inc. NY, USA
3. Nelson DL and Cox MM. 2012. Lehninger"s Principles of Biochemisry, 6th Ed . Macmillan Learning, NY, USA.
4. Berg JM, Tymoczko JL, Stryer L and Gatto GJ. 2002. Biochemistry, 7th Ed. W.H. Freeman and Company, NY, USA
5. Stryer, L., "Biochemsitry", 4th Edition, W.H. Freeman & Co., 2000.
6. Murray, R.K., etal "Harper's Biochemistry", 23rd Edition, Prentice Hall International, 1993.

**Subject Code: 23 BBT -305**

**Subject: Environmental Biotechnology (2 Credit Course)**

**Total Lectures=30**

| Unit | Environmental Biotechnology Topic | No. of lectures |
|---|---|---|
| I | • **Foundations of Environment**<br>Environment: Definitions, Components - Atmosphere, Hydrosphere, Lithosphere, Biosphere) and Inter-relationships,<br>• **Ecosystem: Principles and its concepts- Introduction. Characteristics, Components of ecosystem and Homeostasis** | 2 |

| | | |
|---|---|---|
| II | • **Biotechnology and value addition**<br>  **Bio processes in waste treatment - Production of value added products from waste – ethanol, methane and hydrogen, lipids and fatty acids,    amino acids, vitamins -Enzyme production from wastes** | 5 |
| III | • **Threats to Environment and Ecosystem**<br>  Global Threats to Environment<br>  Environmental  pollution : Types, sources and consequences of : Air, Water, Soil, Radiation<br>• **Pollution impact Assessment - Ecological footprints, Carbon Footprints and Carbon Credits** | 3 |
| IV | • **Biotechnology and Environment Monitoring**<br>  **Biotechnological approaches for pollution control**<br><br>  **Bioindicators –Biomarkers –Biosensors**<br><br>  **Biomonitoring of Polluted environment – Short and long term monitoring of remediated sites** | 5 |
| V | • **Global Environmental Priorities**<br>  i)**Global approach for environment management (Earth summit, Stockholm convention**<br>  ii)Environmental Impact Assessment (EIA case study),<br>  iii)Red data book<br>  iv)TRAFIC | 3 |
| VI | • **Waste and Disaster Management:**<br>  i) Biomedical waste management<br>  ii) Integrated waste management<br>  iii)Hazardous waste management | 3 |
| VII | • **Biotechnology in Protection and Restoration of Ecosystem**<br>  Bioremediation: Importance of bioremediation,<br>  Use of microorganisms for Bioremediation**,**<br>  i)Plastic (**micro-plastic and nano-plastic**)<br>  ii)Hydrocarbons<br>  iii)Dyes, pesticides/ insecticides and herbicides<br>  iv)Phytoremediation | 5 |

| VIII | • **Recent analytical tools in environment monitoring**<br>**HPLC**<br>**GC-MS**<br>**Metagenomics**<br>**AAS**<br>**FTIR**<br>**IC** | 4 |
|------|------------------------------------------------------------------------------------|---|

**Reference Books**

1. Ecology and environment (2005) Sharma PD Rastogi Publication, New Delhi
2. Ecology and environmental biology (2011) Saha T K Books & Allied (p) Ltd, Kolkata
3. Ecology science and practice (2001) Faurie et al Oxford & IBH Publ. Co. Pvg. Ltd, New Delhi
4. Ecology: Principles and Applications (1998) J. L. Chapman, M. J. Reiss Cambridge University Press, Cambridge
5. Environmental Biology (2000) Varma&Agarwal S. Chand Limited, New Delhi
6. Environmental biology and toxicology (2011) Sharma PD Rajpal And Sons Publishing, Delhi
7. Environmental biotechnology(2010) Rana Rastogi Publications, New Delhi
8. Environmental Science (2011) Santra S.C. New Central Book Agency, Kolkata
9. Fundamentals of Ecology (2005) Eugene Pleasants Odum, Gary W. Barrett Brooks and Coel, USA
10. Fundamentals of Ecology (2009) Dash 3rd edition, Tata McGraw-Hill Education, New Delhi
11. Introduction to Environmental Biotechnology (2007) Chattergy PHI Learning Pvt. Ltd, Delhi
12. Textbook of environmental studies for undergraduate courses (2005) Erach Bahrucha Universities Press, Hyderabad
13. Evans & Furlong. Environmental Biotechnology.Theory& Applications. 2nd ed 2011. Wiley-Blackwell.
14. Scragg A. Environmental Microbiology Oxford Univ Press. 2005.
15. Bhattacharya & Banerjee. Environmental Biotechnology. Oxford Univ Press 2008.

**Subject Code: 23 BBT - 306**

**Subject: Bio analytical Techniques  (2 credit course)**

**Total Lectures=30**

| Units | Bio analytical Techniques Topic | Lectures |
|---|---|---|
| 1 | **Introduction:**<br>Lab safety, Scientific notation & Units, errors & accuracy in experimentation, Biochemical Calculations, Buffer solutions, Measurement of pH, Calibration of pipettes & balance | 2 |
| 2 | **Spectroscopy:**<br>• The electromagnetic spectrum<br>• Concept &Measurement of transmittance and absorbance<br>• Beers Lamberts law, molar extinction coefficient, limitations of Beers Lamberts law<br>• Types of spectrometers – UV & visible; Principles, Instrumentation and applications<br>• **Micro volume UV-Vis Spectrophotometer : Principle and applications** | 8 |
| 3 | **Centrifuge:**<br>• General principle- sedimentation velocity, sedimentation equilibrium<br>• Types of centrifuges: preparative and analytical centrifugation, differential centrifugation, density gradient, ultracentrifuge<br>• Applications | 6 |
| 4 | **Chromatographic Techniques:**<br>• Introduction to chromatography, General principles Planar Chromatography<br>Partition chromatography: Thin layer chromatography, paper chromatography<br>• Column chromatography–columns, stationary phases. Packing of columns, application of sample, column development, fraction collection and analysis.<br>• Adsorption chromatography: Ion Exchange Chromatography, Size exclusion chromatography<br>• **HPLC :Principle and applications.** | 8 |
| 5 | **Electrophoresis:**<br>• General principle, factors affecting electrophoresis voltage, current, resistance, buffer, composition, concentration, pH.<br>• Agarose Gel electrophoresis<br>• SDS-PAGE – Native and denaturing gels,<br>• Applications | 6 |

**Reference Books:**

1. Wilson K and Goulding K.H., A biologist's guide to Principles and Techniques of Practical Biochemistry.
2. Willard and Merrit, Instrumental Methods and Analysis
3. Ewing GW, Instrumental Methods of Chemical analysis.
4. Vogel's, Text Book of Quantitative Chemical Analysis, 6th Edition, 2004.
4. Raymond P. W. Scott, Techniques and Practice of Chromatography –Vol. 70.
6. Sethi P.D, DilipCharegaonkar, Chromatography –2nd Edition.
7. Hanes, Gel Electrophoresis of Proteins- A Practical Approach,
8. Biophysical chemistry by Upadhyay, Upadhyay and Nath, Himalaya publication house.

**Subject Code:  23 BBT -309**

**Subject: Practical in Cell Biology and Genetics (2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Sr.no. | Topic | Practical |
|---|---|---|
| **Section I : Cell Biology** | | |
| 1 | Study of Prokaryotic and Eukaryotic cell structure. Study of Electron Micrographs of all  important cell organelles | 1 |
| 2 | Micrometry- Measurement of cell size taking different types of cells. | 2 |
| 3 | Staining and Observation of human cheek epithelial cells | 1 |
| | Isolation and characterization of the following subcellular components, using appropriate samples, by differential centrifugation:<br>　i.　　Nuclei : staining  and counting<br>　ii.　 Mitochondria : Succinate Dehydrogenase assay<br>　iii.　 Chloroplast : Microscopic Observation<br>　iv.　 Lysosomes: Acid Phosphatase assay | 4 |

| 4 | Methods of cell lysis and confirmation | 1 |
|---|---|---|
| **Section II : Genetics** | | |
| 7. | **Problem Sets of** – <br> • Mendalian inheritance and Non Mendalian inheritance Monohybrid cross. Dihybrid cross and Trihybrid cross <br> • Incomplete Dominance, Co-dominance. <br> • Epistasis. <br> • Gene interactions | 3 |
| 8 | **Problems set of Linkage and Pedigree analysis** <br> • 2 point cross. 3 point cross and genetic mapping. <br> • Tetrad analysis: Chromosome interference, analysis of ordered and unordered tetrads. <br> • Sex linked inheritance <br> • **Observation and staining of barr body** | 3 |
| 9 | Studies on karyotype analysis | 1 |

**References:**

1. Cell biology and genetics lab manual Boğaziçi University Department of Molecular Biology and Genetics 2007-2008
2. Cell Biology Laboratory The University of Toledo Department of Biological Sciences/Natural Sciences and Mathematics
3. Principals of Genetics: Robert H. Tamarin, 7th Edition.
4. Genetics, (2006) Strickberger MW - (Prentice Hall, India.)

**Subject Code: 23 BBT -310**

**Subject:  Practical in Bio Analytical Technique and Metabolism (2 Credit Course)**

**Total Practical = 15 P(15x3hrs)**

| Sr. No. | Topic | Practical |
|---|---|---|
| **Section I – Biochemical & Biophysical Techniques** | | |
| 1 | Quantitative determination of free amino acid content from biological sample. | 1 |
| 2. | The separation of amino acids by ion exchange chromatography | 2 |
| 3 | separation of pigments using column chromatography | 1 |
| 4. | SDS-polyacrylamide Slab gel electrophoresis of proteins | 2 |

| | | |
|---|---|---|
| 5. | Native gel electrophoresis of proteins | 1 |
| 6 | Determine λ max of DNA, protein, bromophenol blue solutions using spectrophotometer | 1 |
| **Section II – Metabolism** | | |
| 7. | Estimation of glucose by Benedict's method | 1 |
| 8 | Estimation of amylase activity from given sample. | 1 |
| 9 | Estimation of reducing sugar by DNSA (dinitrosalicylic acid) method | 1 |
| 10 | Estimation of alkaline phosphates activity from given sample. | 1 |
| 11 | Estimation of creatinine in urine or Preparation of lactalbumin from milk or Chlorophyll from plant source | 1 |
| 12 | Estimation of cholesterol by ZAK's method | 1 |

**Reference Books :**

1. Jayaram T. 1981. Laboratory manual in Biochemistry, Wiley Estern Ltd. New Delhi.
2. Plummer D. 1988. An Introduction to Practical Biochemistry. 3rd ed. Tata McGraw Hill, New Delhi.
3. Nath RL. 1990. Practical Biochemistry in Clinical Medicine. Academic Pub.
4. Sadasivam S and Manickam A. 1996. Biochemical Methods. 2nd ed. New Age International (P) Ltd. Publisher, New Delhi.
5.

**Subject Code: 23 BBT**

**Subject : Practical in Molecular Biology  and Environmental Biotechnology (2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Sr. No | Topic | Practical |
|---|---|---|
| | **Molecular Biology** | |
| 1 | Reagent and buffer preparation | 1 |
| 1 | Estimation of Nucleic acids by UV-Vis spectrophotometry | 1 |
| 2 | Determination of  melting temperature of DNA | 1 |
| 3 | Bacterial DNA isolation by alkaline lysis/ lysozyme method and purity check by using A 260/280. | 2 |
| 4 | Bacterial DNA  agarose gel electrophoresis | 1 |
| 5 | Estimation of  DNA by diphenylamine method | 1 |
| 6 | Isolation of RNA from Yeast or Yeast Tablets | 1 |

| | Environmental Biotechnology | |
|---|---|---|
| 1 | Study of pollution indicator plants in terms of morphology and anatomy (any 5-7 plants) | 1 |
| 2 | Community sampling-By Quadrate method for plants : Percentage of frequency, density, abundance . frequency class diagram and comparison with Raunkiaers frequency chart, Simpson's index of dominance. | 2 |
| 3 | Microbial (Bacterial, Algal and Fungal) community estimation | 1 |
| 4 | Study of polluted and unpolluted soil by i) Physical properties : Colour, Texture, Water holding capacity | 1 |
| | ii) Chemical properties: pH, Organic content, chlorides and Alkalinity | 2 |
| 5 | Testing genotoxicity of water sample : Polluted and non Polluted | 1 |

**Reference Books :**

1    Introduction to Environmental Biotechnology (2007) Chattergy PHI Learning Pvt. Ltd, Delhi
2    Textbook of environmental studies for undergraduate courses (2005) Erach Bahrucha Universities Press, Hyderabad
3    Scragg A. Environmental Microbiology Oxford Univ Press. (2005).
4    Evans & Furlong. Environmental Biotechnology.Theory & Applications 2nded 2011. Wiley-Blackwell.
6.   Lab manual on molecular biology January 2016 Edition: First Edition, Media Associates Delhi-53Editor: Ruhi Dixit, KartikayBisen, Ashwani Kumar, Ashim Borah, Chetan KeswaniISBN: 978-81-909182-7-5

# Semester IV

**Subject Code: 23 BBT -401**

**Subject: Cell Biology II (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No of lecture |
|------|-------|---------------|
| 1 | **Cell Cycle**<br>• Introduction to cell cycle<br>• Phases and Check points of cell cycle | 4 |
| 2 | **Cell Division in Plant & Animal**<br>• Mitosis<br>• Meiosis | 7 |
| 3 | **Cell Signaling**<br>• Signaling molecules<br>• Signaling receptors: Cell surface receptors<br>• Autocrine, syncrine & paracrine signaling<br>• G-protein signaling (one example)<br>• Calcium Signaling | 12 |
| 4 | **Cell Death**<br>• Aging, Apoptosis and Necrosis<br>• Neoplasia<br>• Autophagy<br>• Ferroptosis<br>• Pyroptosis | 7 |

**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)BruceAlberts, 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
5. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.Lippincott Williams and Wilkins, Philadelphia.

7. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press& Sunderland, Washington, D.C.; Sinauer Associates, MA.
8. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

**Subject Code:  23 BBT-402**

**Subject: Molecular Biology II (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No of lectures |
|------|-------|----------------|
| I | **Synthesis of RNA:   Transcription:** <br> • Transcription in prokaryotes: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination <br> • Transcription in Eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing. <br> • Splicing mechanisms, Splicing of tRNA precursors, Splicing of rRNA precursors | 8 |
| II | **Synthesis of Protein: Translation** <br> • Structure of ribosome and assembly <br> • Protein Synthesis in Prokaryotes: properties of the prokaryotic Initiator tRNA-fMet, Charging of tRNA, amino acyl tRNA synthetases <br> • Protein Synthesis in Eukaryotes: Mechanism of initiation, elongation and termination of polypeptides, <br> • Fidelity of translation, Inhibitors of translation. <br> • Posttranslational modifications of proteins | 10 |
| III | **DNA damage and repair** <br> • Causes and types of DNA damage <br> • Mechanism of DNA repair: Photo reactivation, base excision repair, nucleotide excision repair, mismatch repair, SOS repair, recombination repair | 5 |
| IV | **Regulation of activity of Genes and Gene products in Prokaryotes**: <br> a) General aspects of gene Regulation: inducible and repressible system <br> b) The lactose operon : Catabolite repression <br> c) The Arabinose operon: Positive , negative regulation <br> d) The Tryptophan operon : Regulation by attenuation. | 7 |

**Reference Books :**

1. Genes X, 10th edition (2009), Benjamin Lewin, Publisher - Jones and Barlett PublishersInc. 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-McGrew Hill Science.USA
4. Fundamentals of Molecular Biology, (2009), Pal J.K. and Saroj Ghaskadbi, Oxford University Press. India
5. Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition.
   JohnWiley & Sons. Inc.

6.  De Robertis, E.D.P. and De Robertis,  E.M.F. (2006). Cell and Molecular Biology.VIIIEdition. Lippincott Williams and Wilkins, Philadelphia.
7.  Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press, Pearson Pub.
8.  Principles of Gene manipulation and Genomics. - S.B. Primrose and R.M. Twyman.BlackwellPublication

**Subject Code: 23 BBT 403**

**Subject : Immunology  (2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | No. of lectures (30) |
|------|--------|----------------------|
| I | **Immunology: Basic definitions and fundamentals of the immune system**<br>    • Definitions - Infection,  Invasion, Pathogen, Immunity,  Antigen, Antibody<br>    • Concept of Host pathogen interaction<br>    • Organization of Immune system:<br>    a) Structure and function of the cells and tissues of immune system.<br>    b) Structure and function of Primary and Secondary lymphoid organs<br>    • Types of immunity:<br>    a) Innate and Acquired immunity<br>    b) Cell mediated  and Humoral immunity<br>    • Immune Response: Primary and Secondary<br>    • Phagocytosis | 07 |
| II | **Components of the immune system:**<br>    • Antigens: Types and properties of an antigen. Factors affecting immunogenicity.<br>    • Immunoglobulin: Structure and their types. Properties and function of different Immunoglobulin classes.<br>    • Complement system: Components, function and pathways.<br>    • Major Histocompatibility Complex: Types, structure and function<br>    • Cytokines: Types, properties and their function | 08 |

| Unit | Topics | Lectures |
|------|--------|----------|
| III | **Antigen-Antibody Interactions**<br>• General characteristics of Antigen-Antibody reaction<br>• Concept of Lattice hypothesis and Zone phenomenon<br>• Principle and example of different diagnostic tests:<br>  i. Precipitation, Agglutination, Immunodiffusion and Complement fixation test<br>  ii. Radioimmunoassay, Immunofluorescence, ELISA<br>  iii. Western blotting | 07 |
| IV | **Clinical Immunology**<br>• Hypersensitivity reactions: Types of Hypersensitivity and clinical manifestation.<br>• Autoimmunity: Mechanisms, Types of autoimmune diseases<br>• Concept of Immunotherapy<br>• Vaccine Technology:<br>• Adjuvant- Properties and role with suitable example<br>• Concept with suitable example of Killed and Live attenuated vaccines, Combined vaccines<br>• Modern Techniques: Concept of Subunit vaccines, Recombinant DNA Vaccines, Conjugate vaccines, Polyvalent vaccines, Monoclonal antibodies, Chimeric antibodies with suitable example | 8 |

**Reference Books**

1. Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. University PressPublication.
2. Roitt I. Essential Immunology. 10th Ed. Blackwell Science.
3. Kuby. Immunology. 4th edition. W. H. Freeman & company.
4. Sudha Gangal and ShubhangiSontakke, Textbook of basic and clinical immunology,1st edition (2013), University Press, India

**Subject Code: 23 BBT- 404**

**Subject : Animal Development  (2 Credit Course)**

**Total Lectures=30**

| Unit | Topics | Lectures |
|------|--------|----------|
|      |        |          |

| | | | |
|---|---|---|---|
| I | • History of developmental biology,<br>• Model organisms in study of developmental biology: frog, chick, mouse, Drosophila, Sea urchin, Zebra Fish , *Caenorhabditis elegans* | 2 |
| II | **Reproduction and Development**:<br>• Basics of gametogenesis: Oogenesis, spermatogenesis and spermiogenesis<br>• Detailed structure of gametes<br>• Fertilization process in sea urchin and mammals<br>• Types of eggs, types and patterns of cleavage<br>• Morphogenetic movements | 9 |
| III | **Gastrulation**<br>• In frog, chick, *Drosophila* up to formation of threegerminal layers | 8 |
| III | **Basics of neurulation** | 2 |
| IV | **Concept of pattern formation**<br>• Maternal effect genes and their role in Drosophila pattern formation | 2 |
| V | • Concept of Stem cells, Progenitor cells, cell lineages, determination, commitment and differentiation, re differentiation and trans-differentiation | 1 |
| VI | **Different types of regeneration with one example of each type** | 2 |
| VII | **Theories of ageing** | 1 |
| VIII | • Apoptosis during Embryonic development, intrinsic an extrinsic pathways | 2 |
| IX | **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, 5thedition (2018), Wolpert L and Tickle C, Publisher: OxfordUniversity Press, USA.

3. An introduction to embryology, 5th edition, B. I. Balinsky, B.C. Fabian (2012) CengageLearning India

**Subject Code:  23 BBT-405**

**Subject: Plant Development (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No. of lectures |
|---|---|---|
| 1 | **Plant as a living system**<br>• Principles and Unique features of plant development<br>• Comparison of Plant and animal development, | 3 |
| 2 | **Plant development at:**<br>• Cellular, organ and whole-plant levels<br>• Whole plant as an interacting dynamic system | 2 |
| 3 | **Major phases of plant development**<br>  **i) Vegetative development:**<br>• Zygote to seed embryo to seedling till vegetative maturity<br>• Pattern formation in plants- vegetative | 3 |
|  | **ii) Reproductive development:**<br>• Shift from vegetative to reproductive phase<br>• Structure of flower<br>• Induction- perception of inductive stimuli and subsequent changes,<br>• Pattern formation in plants- flowering | 4 |
| 4 | • Microsporogenesis, development of male gametophyte and male gamete<br>• Megasprogenesis, development of female gametophyte and female gamete<br>• Double fertilization and triple fusion<br>• Development of endosperm | 5 |
| 5 | **Concept of**<br>• competence,<br>• Determination,<br>• Commitment,<br>• Differentiation,<br>• De-differentiation and<br>• Re-differentiation (partial/ terminal) *in vivo* with one example each | 3 |
| 6 | **Model systems to understand plant development :**<br>• *Arabidopsis* Molecular regulation of development in *Arabidopsis* | 6 |
| 7 | **Parthenogenesis-**<br>• Haploid , Diploid<br>• Parthenocarpy – Natural , Induced<br>• Importance of seed and seed dispersal<br>• Applications of Plant development in Biotechnology | 4 |

**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: OxfordUniversity 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)
8. The molecular life of plants by Jones et al Wiley
9. Biochemistry and Molecular Biology of Plants, 2nd Edition - Bob Buchanan et al Wiley
10. Plant Physiology, Taiz and Zeiger Sixth edition Sinaeur

**Subject Code:  23 BBT : 406**

**Subject : Microbial Biotechnology  (2 Credit Course)**

**Total Lectures=30**

| Unit | Topic | No. of Lectures |
|------|-------|-----------------|
| I | **History and Scope of Microbial Biotechnology** | 1 |

| II | **Food and Dairy Microbiology**<br>    **A) Food Microbiology**<br>    • Role of microorganisms in food spoilage, Factors affecting growth of microbes in food (intrinsic and extrinsic factors), Spoilage of meat and poultry, Fruits and vegetable, Canned food.<br>    • Principles of Food Preservation.<br>    • Methods of preservation Chemical and Physical methods.<br>    **B) Dairy Microbiology**<br>    • Milk: Definition, Composition of milk, Normal and abnormal microflora of milk, Sources of contamination of milk, International standards of Milk.<br>    • Milk Spoilage- Flavour and colour defects, Stormy fermentation, Sweet curdling, Ropiness.<br>    • Grading of milk- Direct and Indirect Tests<br>    • Preservation of Milk- Pasteurization and efficiency of pasteurization.<br>    • Microbial processing of milk- Curd, Yogurt, Butter, Kefir, Cheese.<br>    • Food borne diseases- Food infection and intoxication | 7 |
|---|---|---|
| III | **Medical Microbiology**<br>    • Medical Microbiology: Normal flora,<br>    • Diseases of various systems<br>    Tuberculosis, Leprosy, Typhoid, Polio, Syphilis, Tetanus, causative agent, symptoms, morphology, pathogenesis, diagnosis and treatment. | 7 |
| IV | **Microbes in Waste treatment Processes**<br>    • Water borne diseases: Indicators of faecal pollution, Routine bacteriological analysis of water for potability: Presumptive, Confirmed, Completed test, Membrane Filter Technique and Eijkman tests.<br>    • Bacteriological standards of drinking water.(WHO, BSI)<br>    • Sewage and Industrial waste water: Types of wastes, relevance of COD and BOD determination in analysis of waste water<br>    • Methods and principles of treatment of sewage (primary, secondary and tertiary treatment methods<br>    • Microbial consortium for effluent treatment. | 8 |

| | | | |
|---|---|---|---|
| V | **Applications of Microbial Biotechnology**<br>• Geomicrobiology-Ore leaching (methods and examples), MEOR.<br>• Bioweapons<br>• Biofertilizers and Biopesticides and Microbial plant growth Promoters( gibberellins and IAA)<br>• GMOs-Norms and applications<br>• Microbial Sweeteners (Thaumatin, Monelin)<br>• Microbial toxins and their applications<br>• Microbial Polysaccharide production: any 2 examples<br>Concept of Synthetic Biology and Bio metabolite Production | 7 | |

**References Books :**

1. Food Microbiology, Frazier & Westhoff, 4th edition, Tata McGraw Hill Publications
2. Modern Food Microbiology, James Jay, 7th edition, Springer Publications
3. Advances in Biotechnology, S. N. Jogdand, Himalaya Publishing House
4. Milk & Milk Products, C. Eckles, 4th edition, Tata McGraw Hill Publications
5. Prescott, S.C. and Dunn, C.G., (1983) Industrial Microbiology, Reed G. AVI tech books
6. General Microbiology - Stanier R.Y., 5th edition, ( 1987)Macmillan Publication, UK.
7. Fundamental Principles Of Bacteriology, Salle,A.J.,McGraw Hill Company, New York
8. Tortora, G.J., Funke, B.R., Case, C.L, 1992. Microbiology: An introduction 5th Edition,Benjamin Pub. Co. NY
9. Davis B.D., Delbacco, 1990 Microbiology 4th edition, J.B. Lippincott Co. NY
10. Wolfgang K. Joklik, 1992, Zinsser Microbiology 20th Edition, McGraw-Hill ProfessionalPublishers
11. Dey, N.C and Dey, TK. 1988, Medical Bacteriology, Allied Agency, Calcutta, 17thEdition
12. Ananthnarayana, R. and C.E, Jayaram Panikar, 1996 Text book of microbiology, 5th edition, Orient Longman. .Park and Park, Preventive and Social medicine. 2013, Publisher: Banarsidas Bhanot, Jabalpur
13. Ingraham J.L. and Ingraham C.A. (2004) Introduction to Microbiology. 3nd Edition. Thomson Brooks / Cole.
14. Madigan M.T, Martinko J.M. (2006) Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.
15. Salle A.J. (1971) Fundamental Principles of Bacteriology. 7th Edition. Tata MacGraw Publishing Co.
16. 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.Satyanarayan, U. Biotechnology(2008), Books and Allied Ltd.Kolkata

17. Singh, B. D. Biotechnology,(2010), Kalyani Publishers, New Delhi

**Subject Code: 23 BBT: 409**

**Subject : Practicals in Molecular Biology and  Microbial Biotechnology (2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Sr. No. | Title of Experiment | No. of Practical |
|---|---|---|
| | **Molecular Biology** | |
| 1 | Preparation of Reagents | 1 |
| 2 | Isolation of Eukaryotic( Plant)  DNA and analysis by Agarose gel electrophoresis | 2 |
| 3 | Isolation of Eukaryotic( Animal)  DNA and analysis by Agarose gel electrophoresis | 2 |
| 4 | Estmation of RNA by Orcinol method | **1** |
| 5 | Estimation of proteins by Bradford method | **1** |
| | **Microbial Biotechnology** | |
| 6 | Food and Dairy Microbiology:<br>    a. Isolation and identification (Genus level) of spoilage causing microorganisms from spoiled foods<br>    b. Grading of raw milk (Dye reduction test, DMC)<br>    c. Determination of efficiency of Pasteurization by phosphatase test | **3** |
| 7 | Study of Normal flora of humans (Skin and oral cavity) | **1** |
| 8 | Assessment of potability of water:<br>        a. Presumptive<br>        b. Confirmed and<br>        c. Completed test.<br>        d. Eijkman's teste.<br>        e. IMViC tests | **3** |

| 9 | Visit to Dairy/ Effluent treatment plant / Sewage Treatment /Biofertilizer plant/ any other relevant industry and report writing. | **1** |
|---|---|---|

**Reference books :**

1. Lab manual on molecular biology January 2016 Edition: First Edition, Media  AssociatesDelhi-53Editor: Ruhi Dixit, KartikayBisen, Ashwani Kumar, Ashim                                                        Borah, Chetan KeswaniISBN: 978-81-909182-7-5
2. Modern Food Microbiology, James Jay, 7th edition, Springer Publications
3. Madigan M.T, Martinko J.M. (2006) Brock's Biology of Microorganisms. 11th Edition.Pearson Education Inc
4. Ananthnarayana, R. and C.E, Jayaram Panikar, 1996 Text book of microbiology, 5th edition, Orient Longman. .Park and Park, Preventive and Social medicine. 2013, Publisher: Banarsidas Bhanot, Jabalpur

**Subject Code: 23 BBT -410**

**Subject : Practicals in Animal & Plant Development  (2 Credit Course)**

**(Total Practical= 15 P (15x3hrs.)**

| Sr. no. | Topic of practical | Practical No |
|---|---|---|
| | **Animal development** | |
| 1 | Study of frog development, observation of different development stages (Permanent slides or fixed embryos) | 1 |
| 2 | Study of amphioxus development, observation different development stages (Permanent slides) | 1 |
| 3 | Study of staging & staining of Chick embryos (24 h, 48h, 72 h) | 2 |
| 4 | Effect of teratogen on development of chick embryo by window technique | 2 |
| 5 | Demonstration of any one technique of chick embryo culturing | 1 |
| 6 | Demonstration of regeneration in *Hydra* | 1 |
| | | |
| | **Plant Development** | |
| 1 | Methods of studying plant development (any suitable plant material) a) Dissection b) Sectioning    c) Staining d ) Mounting | 1 |
| 2 | Study of apices and meristem- RAM, SAM, florally induced meristem | 2 |
| 3 | Microsporogenesis- anther squash technique | 1 |

| | | | |
|---|---|---|---|
| 4 | Development of male and female gametophytes | | 1 |
| 5 | Developmental stages during plant embryogenesis in dicots and monocots | | 1 |
| 6 | Dissection of seed and excision of young embryo and endosperm (Two dicotyledon and Two monocotyledon example) | | 1 |

**Reference Books:**

1. Burgess J. (1985) An Introduction to Plant Cell Development (Cambridge Univ Press, UK)
2. Taiz L, Zeiger E (2010) – Plant physiology (Sinauer Associates, USA).
3. Sharma HP (2009) – Plant embryology: Classical and experimental (alpha sci)
4. Development Biology, 9th edition, (2010), Gilbert S.F.(Sinauer Associates, USA)
5. Principles of Development, 5th edition (2018), Wolpert L and Tickle C, Publisher: OxfordUniversity Press, USA.
6. An introduction to embryology, 5th edition, B. I. Balinsky, B.C. Fabian (2012) CengageLearning India

**Subject Code: 23 BBT -411**

**Subject :Practical in Cell Biology and Immunology(2 Credit Course)**

**Total Practical= 15 P (15x3hrs.)**

| Unit | Topic | Practical |
|---|---|---|
| **Section I : Cell Biology** | | |
| 1 | Study of different stages of Mitosis | 2 |
| 2. | Effect of colchicine on mitosis | 1 |
| 3 | Study of different stages of Meiosis in *Tradescantia* | 2 |
| 4 | Study of polytene chromosomes (*Drosophila/Chironomus* larva) | 2 |
| **Section II – Immunology** | | |
| 5. | Determination of blood group using slide agglutination Reaction | 1 |
| 6 | To determine total leukocyte of given blood sample | 1 |
| 7 | Determine Differential count of given blood sample | 1 |
| 8 | Immunodiffusuion: <br> a) Single Radial immunodiffusion <br> b) Ouchterlony double diffusion technique (pattern of identity) | 2 |

| 9 | Determination of antibody titer by tube agglutination test (Widal Test) | 2 |
|----|---|---|
| 10 | Detection of presence of antigen by qualitative ELISA(Dot ELISA) | 1 |

**Reference Books** :

1   Cell biology and genetics lab manual Boğaziçi University Department of MolecularBiology and Genetics 2007-2008
2   Cell Biology Laboratory The University of Toledo Department of BiologicalSciences/Natural Sciences and Mathematics
3   Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. University PressPublication.
4   Roitt I. Essential Immunology. 10th Ed. Blackwell Science.
5   Kuby. Immunology. 4th edition. W. H. Freeman & company.

# P.E. Society's
## Modern College of Arts, Science & Commerce
### (Autonomous) Ganeshkhind, Pune-16.

**Three Year B.Sc. Degree Program in Computer Science**

**(Faculty of Science & Technology)**

# S.Y.B.Sc. (Computer Science)

Choice Based Credit System Syllabus
To be implemented from Academic Year
2022-2023

# S. Y. B. Sc. (Computer Science)

## Semester III
### *(Total credits=22)*

| Course type | Paper Code | Paper title | Credits | Evaluation | | |
|---|---|---|---|---|---|---|
| | | | | CA | CE | TOTAL |
| CC-VIII | 23 - CS - 231 | Introduction to Data Structures | 2 | 15 | 35 | 50 |
| | 23 - CS 232 | Software Engineering | 2 | 15 | 35 | 50 |
| | 23 - CS- 233 | Practical course on CS 231 And 23- CS 232 | 2 | 15 | 35 | 50 |
| CC-IX | 23-MTC - 231 | Mathematics - I | 2 | 15 | 35 | 50 |
| | 23-MTC - 232 | Mathematics - II | 2 | 15 | 35 | 50 |
| | 23-MTC - 233 | Practical course in Mathematics | 2 | 15 | 35 | 50 |
| CC-X | 23-ELC - 231 | Electronics - I | 2 | 15 | 35 | 50 |
| | 23-ELC - 232 | Electronics - II | 2 | 15 | 35 | 50 |
| | 23-ELC - 233 | Practical course in Electronics | 2 | 15 | 35 | 50 |
| AECC-I | 23-23921 | Environment Science – I | 2 | | | |
| AECC-II | 23-23922 | Language Communication – I | 2 | | | |

# Semester IV

## *(Total credits=22)*

| Course type | Paper Code | Paper title | Credits | Evaluation | | |
|---|---|---|---|---|---|---|
| | | | | CA | CE | TOTAL |
| CC-XI | 23-CS 241 | Advanced Data Structures | 2 | 15 | 35 | 50 |
| | 23-CS 242 | Computer Networks and Communications | 2 | 15 | 35 | 50 |
| | 23-CS 243 | Practical course on 23-CS 241 and 23-CS 242 | 2 | 15 | 35 | 50 |
| CC-XII | 23-MTC 241 | Mathematics – I | 2 | 15 | 35 | 50 |
| | 23-MTC 242 | Mathematics - II | 2 | 15 | 35 | 50 |
| | 23-MTC 243 | Practical course in Mathematics | 2 | 15 | 35 | 50 |
| CC-XIII | 23-ELC 241 | Electronics - I | 2 | 15 | 35 | 50 |
| | 23-ELC 242 | Electronics - II | 2 | 15 | 35 | 50 |
| | 23-ELC 243 | Practical course in Electronics | 2 | 15 | 35 | 50 |
| AECC-I | 23-24921 | Environment Science – II | 2 | | | |
| AECC-II | 23-24922 | Language Communication –II | 2 | | | |

- Each theory Lecture time for S.Y. B.Sc. Computer Science is of 50 min (3 lectures/ week for 2 credit course)
- Each practical session time for S.Y. B.Sc. Computer Science is of 4 hrs. 20 minutes (260 min)
- Practical batch size =12

| **Modern College of Arts, Science & Commerce. (Autonomous)** <br> **S.Y.B.Sc. (Computer Science) Computer Science Paper - I** <br> **Course Code: 23-CS 231** <br> **Title: Introduction to Data Structures** | | | |
|---|---|---|---|
| Teaching Scheme <br> 3 Lectures / week (50 mins duration) | No. of Credits 2 | Examination Scheme IE: 15 marks CE: 35 marks | |
| **Prerequisites**: <br> Basic knowledge of algorithms and problem-solving Knowledge of C Programming Language | | | |
| **Course Objectives** <br> 1. To learn the systematic way of solving problem <br> 2. To understand the different methods of organizing large amount of data <br> 3. To efficiently implement the different data structures <br> 4. To efficiently implement solutions for specific problems <br> 5. To apply linear data structures. | | | |
| **Course Outcomes:** On completion of the course, student will be able to <br> 1. To use well-organized data structures in solving various problems. <br> 2. To differentiate the usage of various structures in problem solution. <br> 3. Implementing algorithms to solve problems using appropriate data structures. | | | |
| **Course Contents** | | | |
| **Chapter 1** | **Introduction to Data Structures and Algorithm Analysis** | **4 lectures** | **7 mark** |
| 1.1 Introduction <br>      1.1.1 Need of Data Structure <br>      1.1.2 Definitions - Data and information, Data type, Data object, ADT, Data Structure <br>      1.1.3 Types of Data Structures <br> 1.2 Algorithm analysis <br> 1.2.1 Space and time complexity, Graphical understanding of the relation between different functions of n, examples of linear loop, logarithmic, quadratic loop etc. <br> 1.2.2 Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω, Theta θ ), Problems on time complexity calculation. | | | |
| **Chapter 2** | **Array as a Data Structure** | **10 lectures** | |

2.1 ADT of array, Operations    2.2Array applications                -

Searching

2.2.1 Sequential search, variations - Sentinel search, Probability search,
        ordered list search
        2.2.2 Binary Search
        2.2.3 Comparison of searching methods

2.3 Sorting Terminology- Internal, External, Stable, In-place Sorting

        2.3.1 Comparison Based Sorting - Lower bound on comparison-based
        sorting, Methods- Bubble Sort, Insertion Sort, Selection Sort, Algorithm
        design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort,
        Radix sort, Bucket sort complexity analysis of sorting methods.

2.3.2 Non-Comparison Based Sorting: Counting Sort, Radix Sort, complexity analysis.

2.3.3 Comparison of sorting methods

| Chapter 3 | Linked List | 10 lectures | 12 maek |
|---|---|---|---|

3.1 List as a Data Structure, differences with array.

3.2 Dynamic implementation of Linked List, internal and external pointers

3.3 Types of Linked List – Singly, Doubly, Circular

3.4 Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, time complexity of operations.

3.5 Applications of Linked List – polynomial representation, Addition of two polynomials

Multiplication of two polynomials

3.6 Generalized linked list – concept, representation, multiple-variable polynomial representation using generalized list.

| Chapter 4 | Stack | 6 mark | 6 lectures | 8 mark |
|---|---|---|---|---|

4.1 Introduction

4.2 Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations.

4.3 Implementation- Static and Dynamic with comparison

4.4 Applications of stack

        4.4.1 Function call and recursion, String reversal, palindrome checking

        4.4.2 Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix to infix) 4.4.3Backtracking strategy - 4 queens problem (implementation using stack)

| Chapter 5 | Queue | 6 mark | 6 lectures | 8 mark |
|---|---|---|---|---|

5.1 Introduction

5.2 Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(),time complexity of operations, differences with stack.

5.3 Implementation - Static and Dynamic with comparison

5.4 Types of Queue - Linear Queue, Circular Queue, Priority Queue, Double Ended Queue (with implementation)

5.5 Applications – CPU Scheduling in multiprogramming environment, Round robin algorithm, disk scheduling

**Reference Books:**

1. Classic Data Structures-D. Samanta, Prentice Hall India Pvt. Ltd.
2. Fundamentals of Data Structures in C- Ellis Horowitz, SartajSahni,Susan Anderson- Freed, 2nd Edition, Universities Press.
3. Data Structures using C and C++-YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
4. Data Structures: A Pseudocode approach with C, Richard Gilberg ,Behrouz A. Forouzan, Cengage Learning.
5. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education
6. Algorithms and Data Structures, Niklaus Wirth, Pearson Education

<table>
<tr><td colspan="3" align="center"><b>Modern College of Arts, Science & Commerce. (Autonomous)</b><br><b>S.Y.B.Sc. (Computer Science) Computer Science Paper -II</b><br><b>Course Code:   23-CS 232</b><br><b>Title : Software Engineering</b></td><td></td></tr>
</table>

| Teaching Scheme | No. of Credits | Examination Scheme IE : 15 | |
|---|---|---|---|
| 3 lectures / week (50 mins duration) | **2** | marks CE: 35 marks | |

**Prerequisites**
 ER Modeling

**Course Objectives**

1. To get knowledge and understanding of software engineering discipline.
2. To learn analysis and design principles for software project development.


**Course Outcomes**
On completion of the course, student will be able to-
   1. Compare and choose a process model for a software project development.
   2. Identify requirements, analyze and prepare models.
   3. Prepare the SRS, Design document, Project plan of a given software system.

**Course Contents**

| **Chapter 1** | **Title : Introduction To Software Engineering and Process Models** | **8 lectures** | **8 Marks** |
|---|---|---|---|

  1.1    Definition of Software
  1.2 Nature of Software Engineering
  1.3 Changing nature of software
  1.4  Software Process
        1.4.1    The Process Framework
        1.4.2    Umbrella Activities
        1.4.3    Process Adaptation
  1.5 Generic Process Model
  1.6  Prescriptive Process Models
        1.6.1    The Waterfall Model
        1.6.2    Incremental Process Models
        1.6.3    Evolutionary Process Models
        1.6.4    RAD Model
        1.6.5    Concurrent Models
        1.6.6   The Unified Process

| Chapter 2 | Title : Agile Development | 5 lectures | 6 Marks |
|---|---|---|---|

2.1 What is Agility?

2.2 Agile Process

    2.2.1 Agility Principles

    2.2.2 The Politics Of Agile Development

    2.2.3 Human Factors

    2.2.4 Agile Management

2.3 Extreme Programming(XP)

    2.3.1XP Values

    2.3.2 XP Process

    2.3.3  Industrial XP

    2.4   Adaptive Software Development(ASD)

    2.5   Scrum

    2.6   Dynamic System Development Model (DSDM)

    2.7   Agile Unified Process (AUP)

| Chapter 3 | Title : Requirements Analysis | 7 lectures | 6 Marks |
|---|---|---|---|

 3.1 Requirement Elicitation,

 3.2 Software requirement specification (SRS)

    3.2.1  Developing Use Cases (UML)

 3.3 Building the Analysis Model

    3.3.1 Elements of the Analysis Model

    3.3.2 Analysis Patterns

    3.3.3 Agile Requirements Engineering

 3.4 Negotiating Requirements

 3.5 Validating Requirements

 3.6 Modularization In Requirement Analysis

| Chapter 4 | Title : Requirements Modeling | 10 lectures | 8 Marks |
|---|---|---|---|

4.1 Introduction to UML

4.2 Structural Modeling

    4.2.1 Use case model

    4.2.2 Class model

4.3 Behavioral Modeling

    4.3.1 Sequence model

    4.3.2 Activity model

    4.3.3 Communication or Collaboration model

      4.4 Architectural Modeling

      4.5 Component model

    4.5.1 Artifact model

    4.5.2 Deployment model

    4.5.3 Archetype pattern

| Chapter 5 | Title :Design Concepts | 6 lectures | 7 Marks |
|-----------|------------------------|------------|---------|

5.1 Design Process

    5.1.1 Software Quality Guidelines and Attributes

    5.1.2 Evolution of Software Design

    5.1.3 Design Concepts

    5.1.4 Abstraction

    5.1.5 Architecture Patterns

    5.1.6 Separation of Concerns

    5.1.7 Modularity

    5.1.8 Information Hiding

    5.1.9 Functional Independence

    5.1.10    Refinement

    5.1.11    Aspects

    5.1.12 Refactoring

    5.1.13 Object Oriented Design Concepts

    5.1.14 Design Classes

    5.1.15 Dependency Inversion

    5.1.16 Design for Test

5.2 The Design Model

    5.2.1 Data Design Elements

    5.2.2 Architectural Design Elements

    5.3.3 Interface Design Elements

    5.3.4 Component-Level Diagram

    5.4.5 Deployment-Level Diagram

    5.4.6 HIPO Diagram (Hierarchical Input Process Output)

**Reference Books:**

1. Software Engineering : A Practitioner's Approach - Roger S. Pressman, McGraw hill(Eighth Edition) ISBN-13: 978-0-07-802212-8, ISBN-10: 0-07-802212-6
2. A Concise Introduction to Software Engineering - Pankaj Jalote, Springer ISBN: 978-1-84800-301-9
3. The Unified Modeling Language Reference Manual - James Rambaugh, Ivar Jacobson, Grady Booch ISBN 0-201-30998-X

| **Modern College of Arts, Science & Commerce. (Autonomous)**<br>**S.Y.B.Sc. (Computer Science) Computer**<br>**Science Paper - III Course Code: 23-CS**<br>**233**<br>**Title : Practical course on CS 231 (Introduction to Data Structures) and 23-CS 232**<br>**(Software Engineering)** | | |
|---|---|---|
| Teaching Scheme<br>4 hrs 20 mins / week<br>Batch Size : 12 | No. of Credits<br>2 | Examination Scheme IE : 15<br>marks CE: 35 marks |

**Operating Environment:**
For Data Structures:

- **Operating system:** Linux
- **Editor:** Any linux based editor like vi, gedit etc.
- **Compiler** : cc or gcc

**Lab Book:**
The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.

**Programming Assignments:**
 Programs should be done individually by the student intheir respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment. **Assessment:**
Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include-timely completion, performance, innovation, efficient codes and good programming practices.

- **Internal Evaluation:**
  - o 10 marks will be given based on a mini project of Software Engineering.
  - o 5 marks will be allocated for Assignment completion and practical attendance.
- **College Evaluation:**
  - o The Practical slip will be of 35 Marks which will be based on Data structures.

**Course Contents:**

**Suggested Assignments for Data Structures – I**

**Assignment1: Searching Algorithms**
Implementation of searching algorithms to search an element using: Linear Search, Sentinel Search, Binary Search (with time complexity)

**Assignment 2:**        **Sorting Algorithms - I**
Implementation of sorting algorithms: Bubble Sort, Insertion Sort, Selection Sort

**Assignment 3:**        **Sorting Algorithms - II**
Implementation of sorting algorithms: Quick Sort, Merge Sort , Counting Sort

**Assignment 4:        Singly Linked List**
1.        Dynamic implementation of Singly Linked List to perform following operations: Create, Insert, Delete, Display, Search, Reverse
2. Create a list in the sorted order.

**Assignment 5:        Doubly Linked List**
    1.        Dynamic implementation of Doubly circular Linked List to perform following operations: Create, Insert, Delete, Display, Search

**Assignment 6:        Linked List Applications**
    1.        Merge two sorted lists.
Addition of two polynomials in a single variable.

**Assignment 7:        Stack**
1.        Static and Dynamic implementation of Stack to perform following operations: Init, Push, Pop, Peek, Isempty, Isfull

**Assignment 8:        Applications of Stack**
1.        Implementation of an algorithm that reverses string of characters using stack and checks whether a string is a palindrome.
2.        Infix to Postfix conversion.
3.        Evaluation of postfix expression.

**Assignment 9:        Linear Queue**
1.        Static and Dynamic implementation of linear Queue to perform following operations: Init, enqueue, dequeue Peek, IsEmpty, IsFull.

**Assignment 10:        Circular and Priority Queue**
1.        Implementation of circular queue
2.        Implementation of priority queue

**virtual lab practicals ( any three)**

Using Virtual Lab IIT Hyderabad:https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
3.Searching Algorithms
4. Sorting Algorithms – Bubble, Insertion, Selection
5. Sorting Algorithms – Counting, Merge, Quick
6. Singly Linked List – Dynamic Implementation
7. Doubly Linked List - Dynamic Implementation
8. Linked List Applications
9. Stack and. Applications on Stack

| **Suggested Assignments for Software Engineering mini Project** | **3** |

1. Prepare detailed statement of problem for the selected mini project
2. Identify suitable process models for the same.
3. Develop Software Requirement Specification for the project.
4. Identify scenarios and develop UML Use case
5. Other artifacts: Class Diagram, activity diagram, sequence diagram, component diagram and any other diagrams as applicable to the project.

Sample project titles: (These are just samples, students are suggested to take up different case studies)

1. Online mobile recharge system
2. Credit calculation system
3. Image sharing and editing system
4. Internal examination system
5. e-learning management system
   OR
   Enterprenal courses (Online Certificate Courses) like
   Business Fundamentals, Freelancing, Blogging,Startup, Online business etc.

| Modern College of Arts, Science & Commerce. (Autonomous) S.Y.B.Sc. (Computer Science) Computer Science Paper - I Course Code: 23 - CS 241 Title : Advanced Data Structures | |
|---|---|

| Teaching Scheme 3 Lectures / week (50 mins. duration) | No. of Credits 02 | Examination Scheme IE : 15 marks CE: 35 marks | |
|---|---|---|---|

**Prerequisites :**
- Knowledge of C Programming Language
- Basic knowledge of algorithms
- Basic knowledge of linear data structures

**Course Objectives**
- To learn the systematic way of solving problems
- To design algorithms
- To understand the different methods of organizing large amount of data
- To efficiently implement the non-linear data structures

**Course Outcomes:** On completion of this course students will be able to
- Implementation of different data structures efficiently
- Usage of well-organized data structures to handle large amount of data
- Usage of appropriate data structures for problem solving

| **Course Contents** | |
|---|---|

| **Chapter 1** | **Tree** | **10 lectures** | **10 mark** |
|---|---|---|---|

1.1 Concept and Terminologies

1.2 Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree, Heap

1.3 Representation – Static and Dynamic

1.4 Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search, Tree traversals– preorder, inorder, postorder ( recursive implementation), Level-order traversal using queue, Counting leaf, non-leaf and total nodes, Copy, Mirror.

1.5  Applications of trees

    1.5.1  Heap sort, implementation

    1.5.2 Introduction to Greedy strategy, Huffman encoding (implementation using priority queue)

| Chapter 2 | Efficient Search Trees | 8 lectures | 8 mark |
|---|---|---|---|

2.1 Terminology: Balanced trees - AVL Trees, Red Black tree, splay tree, Lexical search tree -Trie,Decision tree

2.2 AVL Tree- concept and rotations

2.3  Red Black trees - concept, insertion and deletion.

2.4  Multi-way search tree - B and B+ tree - Insertion, Deletion

| Chapter 3 | Graph | 12 lectures | 12 mark |
|---|---|---|---|

3.1 Concept and terminologies

3.2 Graph Representation –Adjacency matrix, Adjacency list, Inverse Adjacency list, Adjacency multilist

3.3 Graph Traversals – Breadth First Search and Depth First Search (with implementation)

3.4  Applications of graph ,Graph Coloring problem

    3.4.1 Topological sorting

    3.4.2 Use of Greedy Strategy in Minimal Spanning Trees (Prims and Kruskals algorithm)

    3.4.3 Single source shortest path - Dijkstra's algorithm

    3.4.4 Dynamic programming strategy, All pairs shortest path - Floyd Warshall algorithm

    3.4.5 Use of graphs in social networks

| Chapter 4 | Hash Table | 6 lectures | 5 mark |
|---|---|---|---|

4.1 Concept of hashing

4.2 Terminologies – Hash table,Hash function, Bucket, Hash address, collision, synonym, overflow etc.

4.3 Properties of good hash function

4.4 Hash functions : division function, MID square , folding methods

4.5 Collision resolution techniques

    4.5.1 Open Addressing - Linear probing, quadratic probing, rehashing

    4.5.2 Chaining - Coalesced , separate chaining

**Reference Books:**

1. Fundamentals of Data Structures in C- Ellis Horowitz, SartajSahni,Susan Anderson-Freed, 2nd Edition, Universities Press.
2. Data Structures using C and C++-YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
3. Data Structures: A Pseudo code approach with C, Richard Gilberg ,Behrouz A. Forouzan, Cengage Learning.
4. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education
5. Algorithms and Data Structures, Niklaus Wirth, Pearson Education
6. Introduction to Algorithms—Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein--MIT Press
7. Fundamentals of Computer Algorithms-- Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Universities Press
8. The Algorithm Design Manual - Steven S Skiena, Springer

| **Modern College of Arts, Science & Commerce. (Autonomous)**<br>**S.Y.B.Sc. (Computer Science) Computer**<br>**Science Paper - I**<br>**Semester II**<br>**Course Code: 23 - CS 242 Title :**<br>**Computer Networks and Communications** | | | |
|---|---|---|---|
| Teaching Scheme<br>3 lectures / week (50 mins. duration) | No. of Credits<br>**02** | Examination Scheme IE<br>: 15 marks<br>CE: 35 marks | |
| **Prerequisites**<br>Principles of Digital Electronics Communication Principles | | | |
| **Course Objectives**<br>To prepare students with basic networking concepts: data communication, protocols and standards, various topologies and applications of network. | | | |
| **Course Outcomes**<br>1. Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers.<br>2. Understand the working of various protocols.<br>3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies | | | |
| **Course Contents** | | | |
| **Chapter 1** | **Introduction to Networks and Network Models** | **4 lectures** | **6 Marks** |

1.1 Data communication, components, data representation

1.2 Networks, network criteria, network types - LAN, WAN, Switching, The Internet, Accessing the Internet

1.3 Topologies - bus, star, ring, mesh, hybrid

1.4 Network Software- Protocol hierarchies, Design Issues of the layer, Connection Oriented and Connectionless Services,

1.5 Reference models - OSI Reference Models, TCP/IP Reference model, Connection devices in different layers, Comparison of OSI and TCP/IP Reference Models.

| Chapter 2 | Lower Layers | 10 lectures | 12 Marks |
|-----------|--------------|-------------|----------|

2.1 Communication at the physical layer, data rate limits - Noiseless channel (Nyquist bit rate), noisy channel (Shannon capacity), Performance - bandwidth, throughput, latency, bandwidth-delay product, jitter

2.2 Design issues of Data Link Layer, Services - Framing, flow control, error control, congestion control, Link layer addressing

2.3 Framing Methods - Character Count, Flag bytes with Byte Stuffing, Flags bits with Bit Stuffing, Physical Layer Coding Violations

2.4 The Channel allocation problem, Static and dynamic allocation, Media Access Methods - Taxonomy of multiple-access protocols

2.5 Switching and TCP/IP layers, Types - circuit switching, packet switching and message switching

2.6 Wired LANs - Standard Ethernet characteristics, Addressing, Access method, implementation, Fast and Gigabit Ethernet

2.7 Wireless LANs - Architectural comparison, Characteristics, Access control, IEEE 802.11

| architecture, Physical layer, MAC sublayer, Bluetooth architecture, Layers | |
|---|---|

| Chapter 3 | Network Layer | 12 lectures | 10 Marks |
|-----------|---------------|-------------|----------|

3.1 Network layer services - Packetizing, Routing and forwarding, other services

3.2 Open and closed loop congestion control

3.3 IPv4 addressing- Address space, classful addressing, Subnetting, Supernetting, classless addressing, Network address resolution (NAT)

3.4 Forwarding of IP packets- based on destination address, based on label

3.5 Network Layer Protocols- Internet Protocol (IP), IPv4 datagram format, Fragmentation, options

3.6 Mobile IP-addressing, agents, Three phases

3.7 Next Generation IP- IPv6 address representation, address space, address types, IPv6 protocol, packet format, extension header, Difference between IPv4 and IPv6

3.8 Routing - General idea, Algorithms - Distance vector routing, link state routing, path- vector routing

3.9 Network address translation

| Chapter 4 | Transport Layer | 10 lectures | 8 Marks |
|-----------|-----------------|-------------|---------|

4.1 Transport layer Services- Process-to-process communication, Addressing, Encapsulation and decapsulation, Multiplexing and demultiplexing, Flow control, Pushing or pulling, Flow control, Buffers, Sequence numbers, Acknowledgements, sliding window, congestion control

4.2 Connectionless and Connection-oriented service, Port numbers

4.3 Transport layer protocols- User datagram protocol, user datagram, UDP services

4.4 Transmission Control Protocol - TCP Services, TCP Features, TCP Segment format, three-way handshake for connection establishment and termination, State transition diagram, windows in TCP.

**Reference Books:**

1. Computer Networks-Andrew S. Tanenbaum, 5th Edition, Pearson Education
2. Data Communication and Networking- Behrouz Fourouzan, 5th Edition, McGraw Hill Pvt. Ltd.

| Modern College of Arts, Science & Commerce. (Autonomous) |
|---|
| **S.Y.B.Sc. (Computer Science)** <br> **Computer Science Paper - III** <br> **Course Code: 23 - CS 243** <br> **Title : Practical course on CS 241(Advanced Data Structures ) and 23-CS 242 (Computer Networks and Communications)** |

| Teaching Scheme <br> 4 hrs 20 mins / week <br> Batch size : 12 | No. of Credits <br> 2 | Examination Scheme <br> IE : 15 marks <br> CE: 35 marks |
|---|---|---|

**Lab Book:**

The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.

**Programming Assignments:**

Programs should be done individually by the student in the respective login. The codes should be uploaded on either the local server, Moodle, Github or any open source LMS. Print-outs of the programs and output may be taken but not mandatory for assessment. **Assessment:**

Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include-timely completion, performance, innovation, efficient codes and good programming practices.

- **Internal Evaluation :**
  - o 10 marks will be given based on Networking assignments.
  - o 5 marks will be allocated for Assignment completion and practical attendance

- **College Evaluation :**
  - o The Practical slip will be of 35 Marks which will be based on Advanced Data structures.

**Operating Environment:**

For Data Structures:

- **Operating system:**    Linux
- **Editor:**    Any linux based editor like vi, gedit etc.
- **Compiler** : cc or gcc

**Course Contents :-**

### Assignment 1 Binary Search Tree and Traversals
1. Implement Binary Search Tree (BST) to perform following operations on BST– Create, Recursive Traversals - Inorder, Preorder, Postorder
2. Perform following operations: insert, delete

### Assignment 2 Binary Search Tree Operations
1. Implement Binary Search Tree (BST) to perform following operations on BST–copy and mirror image of BST, counting leaf, non-leaf and total nodes.
2. Level-order traversal of binary search tree using queue.

### Assignment 3 Applications of Binary Tree
1. Sort set of elements using Heap sort
2. Encode a set of characters using Huffman encoding

### Assignment 4 Graph implementation
1. Implement Graph as adjacency matrix and adjacency list
2. Calculate indegree and outdegree of vertices
3. Graph traversals: BFS and DFS.

### Assignment 5 Graph Applications - I
1. Implementation of Topological sorting
2. Implementation of Prims/Kruskals Minimum spanning tree algorithm

### Assignment 6 Graph Applications - II
1. Implementation of Dijkstra's shortest path algorithm for finding Shortest Path from a given source vertex using adjacency cost matrix.
2. Implementation of Floyd Warshall algorithm for all pairs shortest path.

### Assignment 7 Hash Table
1. Implementation of static hash table with Linear Probing.
2. Implementation of static hash table with chaining.

### Assignment 8 Hash Table-2
1. Implementation of linked hash table with chaining.

### virtual lab

Using Virtual Lab IIT Hyderabad:https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html
1 Binary Search Tree and Traversals
2. Graph implementation- Graph traversals: BFS and DFS.
3  Hash Table-Linear Probing.

### Assignment 9 Networking Assignment Assignment 10

### Networking Assignment

# P.E. Society's
## Modern College of Arts, Science & Commerce
### (Autonomous) Ganeshkhind, Pune-16.

# RULES AND REGULATIONS

### for

## UG Choice Based Credit System Programme
## Under Faculty of Science

# Effective from June 2022

**Mandatory Credit Courses for Award of B.Sc. Degree**

**In addition to compulsory credits of 132, the students has to earn additional 8 credits** from following groups by taking /participating/conducting respective activities.

**Courses in EXTCR- Group I are compulsory.**
The students can earn maximum 04 credits from an individual group from EXTCR-Group 2 to EXTCR-Group 9 .

These extra credits will not be considered for GPA calculation , however these are mandatory for the completion and award of B.Sc. Degree.

EXTCR-Group 1: Physical Education (at F.Y.B.Sc. Sem -I ) – 01 credit
        Physical Education (at F.Y.B.Sc. Sem -II ) – 01 credit
  (Note : Group I is compulsory for all students as stated above)

EXTCR-Group 2 : Sports representation at College level – 01 credit
       Sports representation at University/State level – 02 credits

EXTCR-Group 3 : National Social Service Scheme (participation in camp) – 01 credit
       NCC (with participation in annual camp) - 01 credit
       NCC (with B certificate/ C certificate award) – 02 credits
       NSS /NCC Republic Day Parade participation – 04 credits

EXTCR-Group 4 : Avishkar participation ; Extension Activity participation , Cultural
       activity participation – 01 credit
       Avishkar selection at college level – 02 credits
       Avishkar winner at state Level – 04 credits

EXTCR-Group 5 : Research paper presentation at State/National level – 01 credit
       Research paper presentation at International level – 02 credits

EXTCR-Group 6 : Participation in summer school/programme; short-term course (not
       less than 1 -week duration) – 03 credit

EXTCR-Group 7 : Scientific Survey, Societal Survey – 02 credits.

EXTCR-Group 8 : Field Visits; Study Tours, Industrial Visits,; Participation in curricular/co curricular competitions – 01 credit

EXTCR-Group 9 : Online certificate Courses/MOOC Courses/ career Advancement Courses up to 04 credits (Minimum 10 Hrs./credit)

**MODERN COLLEGE OF ARTS,
SCIENCE AND COMMERCE
GANESHKHIND, PUNE-16
(AUTONOMOUS)**

**Second Year B.Sc. Degree Program
in ZOOLOGY
(Faculty of Science)**

**As per the National Education Policy
To be implemented from Academic Year
2024-2025**

**BOARD OF STUDIES IN ZOOLOGY**

**Progressive Education Society's
MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE, GANESHKHIND,
PUNE- 16
(AUTONOMOUS)**

**Introduction**

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honours) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCsto assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintainglobally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different field's right from classical to applied Zoology.

## GRADUATE ATTRIBUTES IN B.Sc. (Hons.) ZOOLOGY

Some of the characteristic attributes a graduate in Zoology should possess are:

• Disciplinary knowledge and skills:

• Skilled communication:

• Critical thinking and problem solving capacity:

• Logical thinking and reasoning:

• Team Spirit & Leadership Quality:

• Digital efficiency:

• Ethical awareness / reasoning:

• National and international perspective:

• Lifelong learning

## Flexibility

• The programmes are flexible enough to allow liberty to students in designing them according to their requirements.Students may choose a single Major, one Major or two Majors during third year ($5_{th}$ semester onwards). Teacher
Education or Vocational courses may be chosen in place of Minor/s. Below listed are the various options students maychoose from.

• One discipline, Two Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational coursesincluding Extracurricular Activities.

• One discipline along with Languages, Generic Electives, Ability Enhancement, Skill Development and Vocationalcourses including Extracurricular Activities.

## AIMS AND OBJECTIVES OF UG PROGRAM IN ZOOLOGY

- The Programme offers both classical as well as modern concepts of Zoology in higher education.

- It enables the students to study animal diversity in both local and global environments.

- To make the study of animals more interesting and relevant to human studies more emphasis is givento branches like behavioral biology, evolutionary biology and economic Zoology.

- More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, geneticengineering and bioinformatics have also been included.

- Equal importance is given to practical learning and presentation skills of students.

- The lab courses provide the students necessary skills required for their employability.

- Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skillsof students.

- The global practices in terms of academic standards and evaluation strategies.

- Provides opportunity for the mobility of the student both within and across the world.

- The uniform grading system will benefit the students to move across institutions within India tobegin with and across countries.

- It will also enable potential employers in assessing the performance of the candidates across the world.

| Weightage for assessments Type of Course | Formative Assessment / IA Marks (in Percentage) | Summative Assessment Marks (in percentage) |
|---|---|---|
| **Theory** | **40** | **60** |
| **Practical** | 40 | 60 |
| **Projects*** | **40** | **60** |
| **Experiential Learning (Internships** | | |

## About the course

The course is a walk for the Bachelor's entrant through the amazing diversity of living forms from simple to complexone. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their morphology and anatomy which led to their grouping into taxa and clades.

**Learning outcomes**

**After successfully completing this course, the students will be able to:**

- Develop understanding on the diversity of life with regard to protists, non-chordates and chordates.
- Group animals on the basis of their morphological characteristics/ structures.
- Develop critical understanding how animals changed from a primitive cell to a collection of simplecells to form a complex body plan.
- Examine the diversity and evolutionary history of a taxon through the construction of a basicphylogenetic/ cladistics tree.
- Understand how morphological change due to change in environment helps drive evolution over along period of time.
- The project assignment will also give them a flavor of research to find the process involved in studyingBiodiversity and taxonomy besides improving their writing skills. It will further enable the students to think and interpret individually due to different animal species chosen.

## ELIGIBILITY CRITERIA:

**First Year B.Sc.:** A student who has passed the Higher Secondary SchoolCertificate (10+2) Science stream with Biology

or its equivalent examinationas per the University of Pune eligibility norms.

**Second Year B.Sc.:** Keeping terms of First Year of B. Sc. with zoology asone of the subjects. Other students if they

fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Puneare also

eligible.

**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 subjects.


## PROGRAMME OUTCOMES:

PO1: Demonstrate and apply the fundamental knowledge of the basic principles of majorfields of Zoology;

PO2: Apply knowledge to solve the issues related to animal sciences

PO3: Take appropriate steps towards conservation of endemic and endangered animalspecies

PO4: To foster curiosity in the students for Zoology

PO5: To create awareness amongst students for the basic and applied areas ofZoology

PO6: To orient students about the importance of abiotic and biotic factors ofenvironment and their conservation

PO7: To provide an insight to the aspects of animal diversity.

PO8: To inculcate good laboratory practices in students and to train them aboutproper handling of lab instruments.


## Programme Specific Outcomes

PSO1 - Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology

PSO2 - Analyse the relationships among animals with their ecosystems

PSO3 - Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology,

Ecology, Cell biology, Genetics, Applied Zoology, Clinical science, tools and techniques of

Zoology, Toxicology, Sericulture, Biochemistry, Fish biology, Animal biotechnology, Immunologyand research methodology

PSO4 - Understand the applications of Zoology in Agriculture, Medicine and daily life

PSO5 - Gains knowledge about research methodologies, effective communication and skills ofproblem solving methods

PSO6 - Contributes the knowledge for Nation building

| Course Type | Course Code | SEMESTER III | Course Code | SEMESTER IV | Credits |
|---|---|---|---|---|---|
| Mandatory Major | ZOO23101 | Animal Physiology (2C) (T) | ZOO24101 | Neuroscience (2C) (T) | 2+2 |
| Mandatory Major | ZOO23102 | Mammalian Histology (2C) (T) | ZOO24102 | Animal Ecology (2C) (T) | 2+2 |
| Mandatory Major | ZOO23103 | Economic Zoology | ZOO24103 | Indian Natural History – Animal Kingdom (Subject specific IKS) | 2+2 |
| Mandatory Major | ZOO23104 | Zoology Major Practical 3 (P)-(2C) | ZOO24104 | Zoology Major Practical 4 (P)-(2C) | 2+2 |
| Minor | ZOO23201 ZOO23202 | Applied Zoology(2C) (T) Applied Zoology(2C) (P) | ZOO24201 ZOO24202 | Toxicology (2C) (T) Toxicology (2C) (P) | 2+2 2+2 |
| OE | ZOO23301 | Fascinating world of Animals (2C) (T) | ZOO24301 | Animal Behaviour (2C) (T) | 2+2 |
| VSC | ZOO23401 | Bee keeping (2C) (P) | - | - | 2 |
| SEC | - | - | ZOO24401 | Sericulture (2C) (P) | 2 |
| AEC | ZOO23501 | Language-English/Marathi(2C) (T) | ZOO24501 | Language-English/Marathi(2C) (T) | 2+2 |
| VEC | | | ZOO24502 | Global climate change (2C) (T) | 2 |
| CC | ZOO23601 | Scientific photography (2C) (T) | ZOO24601 | Computer applications (2C) (P) | 2+2 |
| FP | ZOO23602 | Field project (2C) | - | - | 2 |
| CEP | - | - | ZOO24602 | Community Engagement project | 2 |
| | Total credits | | | Total credits | 44 |

**Course Code and Course Name:**

**ZOO23101: Animal Physiology (2 Credits: 30 Lectures)**

**Semester III**

After successfully completing this course, students will be able to:

CO1: Define basic terms and concepts related to animal physiology.

CO2: Explain the structure and function of various organs systems in human body.

CO3: Explain the physiology of human reproduction and its hormonal control.

CO4: Explain the structure and function of endocrine glands.

| S. No. | Name of the topic | Lecture allotted |
|---|---|---|
| 1 | **Nutrition and digestion:**<br>1.1 **Nutrition;** Nutritional requirement & balanced diet.<br>1.2 **Human Digestive system**; Digestion and absorption of carbohydrates, proteins and lipids. | 05L |
| 2 | **Respiration:**<br>2.1 **Human Respiratory system**<br>2.2. Mechanism of respiration: Regulation of ventilation in lungs, exchange of gases at respiratory surface.<br>2.3 Respiratory pigments in animals: Haemoglobin, Hemocyanin,<br>Hemerythrin, Chlorocruorin. | 05L |
| 3 | **Circulation:**<br>3.1 Blood: Definition and its constituents, functions of blood.<br>3.2 Heart: Structure of human heart, Pace maker, Cardiac Cycle. | 05L |
| 4 | **Excretion:**<br>4.1 **Excretory system; structure and function of kidneys.**<br>4.2 Mechanism of urine formation.<br>4.3 Normal and abnormal constituents of urine, Elementary idea of dialysis. | 05L |
| 5 | **Reproduction:**<br>5.1 Physiology of male reproduction, hormonal control of spermatogenesis.<br>5.2 Physiology of female reproduction, hormonal control of menstrual cycle. | 05L |
| 6 | **Endocrine Glands:**<br>6.1 Structure and functions of hypothalamus, pituitary, thyroid, parathyroid, pancreas and adrenal glands. | 05L |

**Reference Books**
1. Textbook of Medical Physiology, Guyton A. C. & Hall J. E., 2006, 11th Edition, Hercourt Asia Pvt. Ltd. / W. B. Saunders Company

2. Principles of Anatomy & Physiology, 2006, 11th Edition, Tortora G. J. & Grabowski S., John Wiley & sons, Inc.

3. Haematology: De Gruchi.

4. Human physiology, Vol. I & II, 1980, 12th Edn. Dr. C. C. Chatterjee, Medical Applied Agency, Kolkata

5. Text book of Animal Physiology, 2008, 2nd Edn. Nagabhushanam, S. V. S. Rana, S. Kalavathy, Oxford University Press, India.

6. Animal Physiology: Adaptation and Environment, 1997, Schmidt-Nielsen, Knut, Cambridge University Press.

7. General and Comparative Physiology, 1983, 3rd Edn., Hoar W. S., Prentice Hall, UK.7.

8. Medical Physiology, 2006, Asis Das, Books and Allied Pvt. Ltd., Kolkata.

9. Endocrinology, 2005, Lohar P. S., M J P Publishers, Chennai.

10. Vander, Sherman, Luciano's Human Physiology: The Mechanisms of Body Function, 2003, 9th Edn., Eric P. Widmaier, Hershel Raff, Kevin T. Strang, Mc Graw H.

11. Tortora, G. J. and Derrickson, B. H. (2009) Principles of Anatomy and Physiology (12th edition) John Wiley and Sons, Inc.

12. Widmaier, E. P., Raff, H. and Strang, K. T. (2008) Vander's Human Physiology (9th edition) McGraw Hill.

13. Human Anatomy and Physiology, (1998) Marieb, E. (4th edition) Addison-Wesley.

14. Experimental Physiology, (2007) Kesar, S. and Vashisht, N., Heritage Publishers.

## Course Code and Course Name:

## ZOO23102: Mammalian Histology (2 Credits)

### Semester III

**Course outcomes:**

1. The students will be able to understand the basic knowledge of Histology and Histopathology.
2. The students will be able to understand the causes, gross and microscopic findings in different pathological conditions.
3. The students develop skills of interpretation of macroscopic and microscopic findings of pathological changes in cells.
4. The students develop skills of various techniques and tools used in Histopatthology.

| S. No. | Name of the topic | Lecture allotted |
|--------|-------------------|------------------|
| 1 | **Introduction to Histology and Pathology:**<br>1.1 Importance of Histology and Histopathology<br>1.2 Scope of Histopathology.<br>1.3 Overview of Microscopic Anatomy: Cells, Tissues & Organs. | 03L |
| 2 | **Definitions and Review of Types of Tissues:** | 04L |

| | | |
|---|---|---|
| | 2.1 Epithelial tissue.<br>2.2 Connective tissue.<br>2.3 Nervous tissue.<br>2.4 Muscular tissue. | |
| 3 | **Histological study of following mammalian organs**<br>3.1 Liver (C. S.).<br>3.2 Kidney (L. S.).<br>3.3 Pancreas (C. S.) | 03L |
| 4 | **Techniques and tools used in Histopathology:**<br>4.1 Introduction to histopathology<br>4.2 Reception, recording and labeling of histology specimens<br>4.3 Fixation and various fixatives.<br>4.4 Processing of histological tissues for paraffin bedding.<br>4.5 Embedding, Decalcification various types<br>4.6 Microtomy and section cutting<br>4.7 Staining Procedures, mounting and mounting media<br>4.8 Laboratory hazards and safety precautions | 10L |
| 5 | **Diseases**<br>5.1 Definition and Causes<br>5.2 In animate factors and Animate factors<br>5.3 Signs and symptoms of Bacterial Disease<br>5.4 Signs and symptoms of viral Disease<br>5.5 Signs and symptoms of fungal Disease | 05L |
| 6 | **Necrosis/ Gangrene**<br>6.1 Necrosis / Gangrene –Definition and Causes<br>6.2 Apoptosis -Types of necrosis -Features of necrosis –<br>6.3 Gangrene - Def Dry/wet/gas. | 05L |

**Reference Books: -**

1. A Text Book of Histology, 2014, 5th Edn. Krishna Garg, Indira Bahl & Mohini Kaul CBS Publication & Distributors, Delhi.
2. Histology, 1987, 9th Edn., Arthur W. Ham, David H. Cormack, J. B. Lippincott Co. Philadelphia.
3. Histology, 1977, 4th Edn., R. O. Greep and L. Weiss, McGraw Hill Int. Book Co., New York.
4. Hand Book of Histo-pathogical & Histo-chemical Techniques, 1983, 3rd Edn. reprint, Butterworth & Co. (Publishers) Ltd, UK.

**Course Code and Course Name:**

**ZOO23103: Economic Zoology (2 Credits)**

**Semester III**

**Course outcomes:**

1. The student will be able to understand about silkworms its types, rearing and their products.

2. Understand the basic concept of Management of Poultry and fishery

3. To encourage young learners for job opportunities in various types covered under Economic zoology.

4. Acquire skill on the production of pearl and its marketing for economic gain

| S. No. | Name of the topic | Lecture allotted |
|--------|-------------------|------------------|
| 1 | **Sericulture**<br>1.1 Introduction, Definition, Scope of Sericulture.<br><br>1.2 Silk worm rearing.<br><br>1.3 Cultivation and Harvesting of mulberry.<br><br>1.4 Preparation of cocoons for marketing.<br><br>1.5 Post harvest processing of cocoons | 05L |
| 2 | **Apiculture**<br><br>2.1 Introduction, Scope, Definition of Apiculture<br><br>2.2 External Morphology, and Body parts of honeybee, types.<br><br>2.3 Bee keeping equipments<br><br>2.4. Study of Bee products and Marketing. | 05L |
| 3 | **Fisheries**<br><br>3.1 Definition and History of Fish culture.<br><br>3.2 Role of fish culture in economic development<br><br>3.3 Preparation and management of fish farm<br><br>3.4 Conventional and Unconventional methods of fishing gears and crafts<br><br>3.5 Harvesting and post harvesting technology in fisheries<br><br>3.6 Fishery products and byproducts | 06L |

| 4 | **Vermiculture:** 4.1 Scope of Vermiculture. 4.2 Species of earthworms used in vermicomposting 4.3 Methodology of vermicomposting 4.4 Diseases and pests ofearthworms 4.5 Advantages of vermicomposting | 03L |
|---|---|---|
| 5 | **Poultry Management** 5.1 Introduction, Scope, Definition of Poultry 5.2 Poultry Development Programmes in India 5.3 Poultry Housing and Management 5.4 Poultry Feed and Feeding 5.5 Poultry byproducts. 5.6 Economics and Marketing in poultry | 06L |
| 6 | **Pearl Culture** 6.1 Overview of Pearl oyster 6.2 Process of Pearl formation 6.3 Pearl oyster culture 6.4 Pearl culture Economy (Diseases and Predators of Pearl oysters' Present status, prospects and problems of pearl industry in India.) | 05L |

## Course Code and Course Name:

## ZOO23104: Zoology Major Practical 3 (2 Credits)

### Semester III

**Section I: Practical in Animal Physiology**

1. Haemoglobin estimation using Sahli's haemoglobinometer. (C)          E

2. Preparation of haemin and haemochromogen crystals. (C)          E

3. To estimate the blood glucose level from given sample. (C)          E

4. Estimation of bleeding and clotting time. (C)          E

5. Study of disorders caused by endocrine glands with the help of photographs.          D

6. Detection of blood groups in human being.          E

7. Differential count of blood.          E

8. Estimation of haemoglobin percentage with the help of haemometer.                    E

9. Qualitative detection of nitrogenous waste products (Ammonia, urea, uric acid) in                    E

given sample. (C)

10. Demonstration of kymograph unit, Respirometer through available resources.                    D


**Section II: Practical in Histology**

1. Study of the different types of tissues with the help of permanent slides – Epithelial tissue,

Connective tissue, Muscular tissue and Nervous tissue.                    D

2. Study of permanent histological slides of T. S. of skin, V. S. of tooth and C. S. of

tongue.                    D

3. Study of permanent histological slides of digestive parts – T. S. of Stomach, T. S. of

Duodenum, T. S. of Rectum, C. S. of Liver.                    D

4. Study of permanent histological slides of glands - T. S. of Pituitary gland, T. S. of Thyroid

gland, T. S. of Adrenal gland, C. S. of Pancreas.                    D

5. Study of permanent histological slides of reproductive organs- T. S. of Testis,

C. S. of Ovary.                    D

6. Study of human blood smear to observe different types of blood cells. (C)                    E

7. Temporary mounting of tissues of any mammal (freshly dissected or preserved) - Striated

Muscle Fibre. (C)                    E

8. Temporary mounting of tissues of any mammal (freshly dissected or preserved) - Smooth

Muscle Fibre. (C)                    E

9. Microtomy technique- tissue procuring, killing, fixation and block making                    E


**Section III: Practicals in Economic Zoology**

1. Study of external morphology life cycle of Bombyx mori.                    D

2. Preparation of map showing sericulture practices in India.                    E

3.  Identification of External Body Parts of a Poultry Bird.                    D

4. Study of external morphology of Fish.                    E

5. Study of Pearl formation process and techniques                    D

6. Prawn culture Process and techniques                    D

7.Preparation of vermicomposting unit                    E

8.Visit to any one farm                    E

**Course Code and Course Name:**

**ZOO23201: Applied Zoology (2 Credits: 30 Lectures)**

**Semester III**

After successfully completing this course, students will be able to:

CO1:  Define the basic information about fishery, cultural and harvesting methods of fishes and fish crafts & gears.

CO2: Explain the fish byproducts & fish preservation techniques.

CO3: Explain the types of agricultural pests, their life cycle and control methods.

CO4: Explain Major insect pests of agricultural importance and Pest control practices and plant protection appliances.

| S. No. | Name of the topic | Lecture allotted |
|--------|-------------------|------------------|
| 1 | 1. **Fisheries :**<br>1.1 **An introduction to fisheries and its types (in brief) : Freshwater fisheries, Marine fisheries, Brackish water fisheries**.<br><br>1**.2 Culture methods of following freshwater forms:**<br>**a)** Rohu (*Labeo rohita*) ,<br><br>**b)** Catla (*Catla catla*) ,<br><br>**c)** Mrigal (*Cirrhinus mrigala*).<br><br>**1.3 Crafts and Gears in Indian Fishery:**<br>**a)** Crafts – Catamaran, Machwa, Dinghi.<br>**b)** Gears – Gill net, Dol net, Rampani net, Cast net.<br><br>**1.4 Post Harvesting technology of fishes**<br>**Fish preservation and processing techniques with reference to industries:**<br>   a) Chilling<br>   b) Freezing<br>   c) Salting<br>   d) Drying<br>   e) Canning<br>   f) Smoking<br><br>**1.5 Fish transportation marketing strategies:** | 03L<br><br><br><br><br><br><br><br><br><br><br>03L<br><br><br><br><br><br>03L<br><br><br><br><br><br><br><br><br>03L |

| | | |
|---|---|---|
| | **Open system (transport units, cans, trucks)**<br>**Fish transport vehicles**<br>**Closed system** | |
| | **1.6 Fishery products and byproducts:**<br>a) Fish meal<br>b) Fish flour<br>c) Fish Liver oil<br>d) Fish manure | 02L |
| | **1.7 Fishery Economics:** | 01L |
| 2 | **Agricultural Pests and their control:**<br>**2.1 An introduction to Agricultural Pests, types of pests (agricultural, store grain, veterinary).** | 02L |
| | **2.2 Major insect pests of agricultural importance** (Marks of identification, life cycle, nature of damage and control measures).<br>a) Jowar stem borer,<br>b) Red cotton bug,<br>c) Brinjal fruit borer,<br>d) Mango stem borer,<br>e) Rice weevil,<br>f) Pulse beetle,<br>g) Tick. | 06L |
| | **2.3 Non insect pests:** Rats, Crabs, Snails, and Squirrels | 02L |
| | **2.4 Pest control practices in brief:** Cultural control, Physical control, Mechanical control, Chemical control, Biological control, Pheromonal control, Autocidal control and Concept of IPM in brief. | 03L |
| | **2.5 Plant protection appliances:** Shoulder type Rotary duster, Knapsack sprayer, Cynogas Pump. | 02L |

**Reference Books**

1. Entomology & Pest Management. Pedigo L. P. Prentice Hall, India 1996.

2. General & Applied Entomology, Nayar K. K. & T. N. Ananthkrishnan& B. V. Davis, Tata McGraw Hill Publication, New Delhi.

3. Insects. M. S. Mani, National Book Trust, India, 2006.

4. Insects & Mites of Crops in India. M. R. G. K. Nair – by ICAR, New Delhi.

5. The Science of Entomology. W. S. Romosor and J. G. Stoffolano, McGraw Hill Publication, 1988.

6. Agricultural Insect Pests of India and their Control, Dennis S. Hill, Cambridge University Press.

7. Applied Entomology. Vol. I & II. K. P. Srivastava. Kalyani Publication, Ludhiana, New Delhi.

8. Principles of Insect Pest Management. G. S. Dhaliwal and Ramesh Arora, Kalyani Publications, Ludhiana.

9. Pest Management and Pesticides: Indian Scenario. Editor- B. Vasantaraj David, Namrutha Publications, Madras (Chennai).

10. Concepts of Insect Control. Ghosh M. R. Wiley Eastern Ltd. New Delhi.

11. Destructive and useful Insects, their habit and Control, 1973. C.L. Metcalf and W. P. Flint, Tata McGraw Hill Publications, New Delhi.

12. A Text Book of Entomology, 1974. V. K. Mathur and K. D. Upadhayay, Goel Printing Press, Barani.

13. Imm's general Text Book of Entomology, Vol I & II, Richard and Davis Owen.

14. Biology of Insects, 1992. S. C. Saxena. Oxford and IBH Publishing Co., New Delhi, Bombay, Calcutta.

15. Fishes. Mary Chandy. National Book Trust India, 2005.

16. Economic Zoology, Shukla Upadhyay, Rastogi Publication, Meerut, India, 1998.

17. Fisheries Developments, K. K. Trivedi, Oxford and IBH Pub. Co.

18. Marine Fishes in India, 1990, D.V. Bal & K. Virabhdra, Tata McGraw Hill Publication.

19. Fishery Management, 1990, S. C. Agarwal, Avinash Publication House, New Delhi.

## Course Code and Course Name:

## ZOO23202: Zoology Minor Practical (2 Credits)

### Semester III

**Fisheries –**
1. Identification, Classification and study of habit, habitat and economic importance of
**a)** Rohu (*Labeo rohita*), **b)** Catla (*Catla catla*), **c)** Mrigal (*Cirrhinus mrigala*).          (D)
2. Identification, Classification and study of habit, habitat and economic importance of
**a)** Prawn, **b)** Crab, **c)** Lobster, **d)** Pearl Oyster.          (D)
3. Study and maintenance of Aquarium.          (D)
4. Study of crafts: **a)** Catamaran, **b)** Machwa, **c)** Dinghi (Photographs/models/
line drawings).          (D)
5. Study of gears in fishing: **a)** Gill net, **b)** Dol net, **c)** Rampani net, **d)** Cast net.
(Photographs/models/line drawings).          (D)
6. Study of nutritional value of fish: Biochemical estimation of fish muscle proteins by using
Biuret method.          (E)
7. Compulsory study tour/field visit to Fish farm/ Aquarium.          (E)

**Agricultural Pests and their control -**

1. Study of following insect pests with respect to marks of identification, nature of damage, economic importance and control measures. (D)
a) Jowar stem borer,
b) Red cotton bug,
c) Brinjal fruit borer,
d) Mango stem borer.

2. Study of following pests with respect to marks of identification, nature of damage, economic importance and control measures. (D)
a) Blister beetle,
b) Rice weevil,
c) Pulse beetle,
d) Tick.

3. Study of any two non-insect pests corresponding to theory course. (D)

4. Compulsory submission of at least five Insect Pests/ Photographs/ Sketches. (E)

5. Study of pest control appliances (as per theory course). (D)

6. Compulsory field visit to Agricultural farm, report writing and submission.

**Course Code and Course Name:**

**ZOO23301:** Fascinating World of Animals (2 Credits: 30 Lectures)

**Semester III**

After successfully completing this course, students will be able to:

CO1: Define the basic information about differences between the vertebrate and invertebrate world.
CO2: Understand the interesting facts about the invertebrate animals.
CO3: Knowledge of the interesting features of the vertebrate animals.
CO4: Apply the knowledge of animals in the real world.

| Sr. no. | Name of the topic | No. of Lectures |
|---------|-------------------|-----------------|
|         |                   |                 |

| 1. | **Amazing facts of the invertebrate world -I**<br>World in a drop of water<br>Use of bath sponge/ Portuguese man of war | 02 L |
|---|---|---|
| 2. | **Amazing facts of the invertebrate world -II**<br>Budding in Hydra<br>Stinging in Jellyfish<br>Coral reefs<br>Bioluminescence in Ctenophora<br>Earthworms- friend of farmers | 04 L |
| 3. | **Amazing facts of the invertebrate world -III**<br>Use of Honey bees for honey, wax, royal jelly, propolis, pollinators<br>Harvesting of silkworms in making silk garments<br>World of butterflies<br>Use of insects as bioindicators and in Forensic Science<br>Web formation in spiders/ venomous scorpions and spiders | 04 L |
| 4. | **Amazing facts of the invertebrate world -IV**<br>Octopus as Devilfish<br>Shells and pearls | 02 L |
| 5. | **Amazing facts of the invertebrate world -V**<br>Regeneration in Starfish<br>Parasites- worms and diseases caused | 03 L |
| 6. | **Amazing facts of the vertebrate world -I**<br>World of fishes<br>Nesting behaviour in Turtles<br>Venomous and non venomous snakes<br>Camouflage in Chameleon | 04 L |
| 7. | **Amazing facts of the vertebrate world -II**<br>Winter sleep and summer sleep in frogs<br>Parental care in Animals | 02 L |
| 8. | **Amazing facts of the vertebrate world -III**<br>Migration in birds<br>Nest building behaviour in birds<br>Echolocation in bats | 03 L |
| 9. | **Amazing facts of the vertebrate world -IV**<br>Porpoising in penguins<br>Interesting features about whales, dolphins and walruses | 02 L |
| 10. | **Amazing facts of the vertebrate world -V**<br>Animals as pets<br>Police dog squad- K9 dog<br>Facts about big cats | 02 L |

| 11. | **Amazing facts of the vertebrate world -VI** <br> Animal Human coexistence <br> Similarities between monkeys, apes and man | **02 L** |

**Reference Books**

1. Barnes, R. S. K.; Calow, P.; Olive, P. J. W.; Golding, D. W.; Spicer, J. I. (2002) The Invertebrates: a Synthesis, Blackwell Publishing.

2. Hickman, C.; Roberts, L.S.; Keen, S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
3. Holland, P. (2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
4. Kardong, K.V. (2006) Vertebrates: Comparative Anatomy, Function, Evolution (4th edition), McGraw- Hill.
5. Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S.and Nelson.

6. Integrated Principles of Zoology, Eleventh Edition, Hickman CP, Roberts LS & Larson A. International Edition ISBN 0–07–118077–X, The McGraw-Hill Companies, Inc.,

7. Modern Text Book of Zoology, Vertebrates. R. L. Kotpal, 3rd edn. Rastogi Publications, Meerut.

8. Chordate Zoology, 1982, P.S.Dhami and J.K.Dhami, R. Chand and Co., New Delhi.

9. Biology, Campbell nand Reece. 7th Edn. Pearson Education in South Asia, Delhi.

10. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

11. Pough H. Vertebrate life, VIII Edition, Pearson International.

12. Integrated Principles of Zoology, Eleventh Edition, Hickman C. P., Roberts L. S.& Larson A. International Edition ISBN 0–07–118077–X, The McGraw-Hill Companies, Inc.,

13. Arora M.P. Chordates I. Himalya Publications.

14. Organic Evolution. R.S. Lull. Light & Life Publishers.

15. Jordan E. L.&Verma P. S. 2003. Chordates Zoology. S. Chand & Company Ltd. New Delhi.

**Course Code and Course name**

**ZOO23401 Beekeeping (2Credit- Practical)(VSC)**

**Semester III**

1. Study of external morphology, life cycle and polymorphism in Honey Bee. (D)

2. Temporary mounting of mouth parts, legs, wings and sting apparatus of worker bee. (E)

3. Study of Bee keeping Equipment: Bee box, Honey extractor, Smoker, Bee-veil, queen excluder. (D)- Compulsory

4.Study of Bee products: Honey, Wax, Venom, Royal jelly, Pollen. (D)

5.Estimation of carbohydrates from Honey in different samples. (D)- Compulsory

6.Study of Bee enemies: Wax moth, Bee eater, ant, King crow, Wasp, Lizard. (D)

7.Determination of Honey Purity and Quality

**AEC: Language:  English/Marathi (2C)**

**Course Code and Course name**
**ZOO23601 Fundamentals of Scientific Photography (2 Credit-3 Lectures**
**Semester III**
**Course Outcomes:**
After completing the course, students will be able:
CO:1 Students will learn techniques in field ecology with reference to scientific photography.
CO:2 Students will learn application of wildlife photography for public domain.
CO:3 Students will learn conservation and Awareness through citizen science.
CO:4 Students will learn Environmental laws &amp; policies

| Sr. No. | Topic | Lectures allotted |
|---------|-------|-------------------|
| 1 | Introduction to Scientific Photography<br><br>Scope of Scientific Photography | 02 |
| 2 | Techniques in Field Ecology with reference to Scientific photography | 03 |
| 3 | Camera and Lens used for scientific photography.<br><br>Different types of cameras and Lenses. | 04 |

| | Working principle of Camera | |
|---|---|---|
| 4 | Cameras used for Wildlife Photography | 03 |
| 5 | Types of Documentaries | 03 |
| 6 | Wildlife   Documentaries | 03 |
| 7 | Application of Wildlife Photography for Public domain | 03 |
| 8 | Conservation and Awareness through Citizen science | 03 |
| 9 | Environmental laws & Ethics | 03 |
| 10 | Wildlife  and Biodiversity Protection Act | 03 |

**Reference Books:**
1. The Wildlife Protection Act, 1972 (No. 53 of 1972) manual
2. Forest Rights Act, 2009, Manual
3. Environmental Law : its development and Jurisprudence – Madan B. Lokur
4. Know the Biological Diversity Act (2002) and the Rules (2004) , National Biodiversity Authority
5. Handbook for scientific photography- Blaker, Alfred A.
6. Langford's Basic photography- Andrew Bruce and Marie Josainne


**ZOO23602 – Field project (2C)**

**Course Code and Course Name:**

**ZOO24101: Neuroscience (2 Credits: 30 Lectures)**

**Semester IV**

**Course outcomes**
After successfully completing this course, the students will be able to:

CO1: Understand the structure of brain and improved methods to study it.

CO2: Develop treatments for neurodegenerative diseases (such as Alzheimer's

and Parkinson'sdiseases) and mental illnesses.

CO3: Understand the structure of different lobes of the brain and their corresponding
functions.

CO4: Understand intricacies of nerve impulse conduction.

| Sr. no. | Name of the topic | Required Lectures |
|---------|-------------------|-------------------|
| **1.** | **Introduction to Neuroscience and its scope.**<br>1.1 Early and 19th century views of the Brain.<br>1.2Latest advances in Neuroscience today.<br>1.3Brain cells, types: Neurons – types and structure<br>1.4 Glia- types and structure; Neuronal circuit**.** | **07** |
| **2.** | **Evolution and development of brain**<br>2.1 Evolution and Adaptation of Brain: Theories of brain evolution.<br>2.2Evolution of brain in vertebrates and associated behavioral adaptation.<br>2.3Organization and development of brain in human.<br>2.4Divisions of the brain. Structure-function relationship.<br>2.5Neuroimaging- CT and MRI. | **08** |
| **3** | **Neurotransmitters and mechanism of neurotransmission**<br>3.1Neurotransmitters and neurotransmission: Noradrenergic, serotonergic, dopaminergic and cholinergic system.<br>3.2Mechanism of neurotransmission and drug action.<br>3.3Learning and memory. Types, mechanism, disorders. | **07** |
| **4** | **Managing brain health**<br>4.1 Brain aging: Structural ,chemical changes,functional changes.<br>4.2 Maintenance of healthy brain.<br>4.3 Brain disorders: Neurodegenerative diseases- Epilepsy, Stroke, Alzheimer's, Parkinsons. Neuropsychiatric disorders- Anxiety, Depression, Mood disorders, Schizophrenia. | **08** |

**Reference Books:**

1. Baer, M.F. and Connors B.W. (2015) Neuroscience: Exploring the brain.

2. Byrne, J.H.; Heidelberg, R. and Waxham, M.N. (2014) From Molecules to Networks: AnIntroduction to Cellular and Molecular Neuroscience.

3. Kandel, E.R.; Schwartz, J.H. and Jessell, T.M. (2000) Principles of Neural Science (4th edition) McGraw Hill Companies

4. Simmons, J. and Young, D. (2003) Nerve Cells and Animal Behaviour (2nd edition) Peter.CUP.

5. Stahl, S.M. (2000) Essential Psychopharamacology-Neuroscientific Basis and PracticalApplications (2nd edition) CUP

6. Vilayanur, S.R. and Blakeslee S. (1998) Phantoms in the Brain. Probing the Mysteries ofthe Human Mind.

7. Squire, L. et al. (2003) Fundamental Neuroscience, Academic Press.

8. Kandel, E. (2000) Principles of Neural Science, McGraw Hill

**Course Name and Course Code**

**ZOO24102 Animal Ecology (2 Credits: 30 Lectures)**

**Semester IV**

**Course Outcomes**

CO1: The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.

CO2: To understand anticipate, analyse and evaluate natural resource issues and act on a lifestyle that conserves nature.

CO3: The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.

CO4: The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.

| Sr.No | Topics | Lectures |
|---|---|---|
| 1. | **Introduction to Ecology**<br>1.1 Concepts of Ecology, Environment, Population, Community, Ecosystem, Biosphere, Autecology and synecology. | 02 |
| 2. | **Ecosystem**<br>2.1 Types of ecosystems: Aquatic (Freshwater, estuarine, Marine and terrestrial (Forest, Grassland and Desert)<br>2.2 Structure and Composition of Ecosystem (Abiotic components and biotic components).<br>2.3 Food chain: Detritus and grazing food chains, Food web, Energy flow through the ecosystem, Ecological pyramids: Number, Biomass, and Energy.<br>2.4 Concept of Eutrophication in lakes and rivers. | 08 |
| 3. | **Population**<br>3.1 Characteristic of population: Density, Natality, Mortality, Fecundity tables, survivorship curves, age ratio, sex ratio, dispersal and dispersion.<br>3.2 Exponential and logistic growth.<br>3.3 Population regulation – density-dependent and independent factors. Population interactions, Gause's Principle with laboratory and field interactions.<br>3.4 Quadrate, line and belt transect methods. | 08 |
| 4. | **Community**<br>4.1 Community characteristics: species richness, dominance, diversity, abundance, vertical stratification, Eco tone and edge effect; Ecological succession with one example. | 07 |

| 5. | **Animal interactions**<br>5.1 Introduction to Animal interactions.<br>5.2 Types of Animal interactions with at least to suitable examples of each.<br>5.2.1-Competition: Interspecific and intraspecific.<br>5.2.2- Beneficial Associations: Commensalism (remora fish on shark, Cattle egrets on livestock), Mutualism (Termite and Trichonymph, bees and flowers, cleaning symbiosis in fish by prawns.<br>5.3 Antagonistic associations: Parasitism (Ascaris and man, lice and humans), Prey predation (Lion and deer). | 05 |
|----|----|----|

**Recommended Books :**

1. Fundamentals of Ecology by P.D. Sharma

2. Animal Ecology and Distribution of animals by Veer Bala Rastogi.

3. Environmental Biology by Dr. P.S. Verma.

4. Animal Ecology by Dr. Veer Bala Rastogi & Dr. M.S. Jayaraj

## Course Title: Indian Natural History-
## Animal Kingdom (T)

Course code: **ZOO24103**

**Semester IV (2 credits-30 lectures)-Subject specific**
**IKS**

**Course Outcomes**

1) Students will be able to learn most of the essential aspects of Evolutionary Biology indetail which will help them in acquiring better understanding regarding the subject.

2) Explain important processes, principles and concepts and critically evaluate theories and empirical research within evolutionary biology

3) Apply evolutionary theory and concepts to address empirical and theoretical questions inevolutionary biology.

4) Independently investigate evolutionary questions using literature and analyses of empiricaldata.

5) Communicate the principles, theories, problems and research results associated with questionsthat lie within the evolutionary framework to students

| Sr. no. | Unit | No. of Lectures |
|---|---|---|
| 1. | The origin of life begins with the origin of the universe | 02 |
| 2. | Tools and methods in evolutionary biology | 02 |
| 3. | Life in the Precambrian | 02 |
| 4. | The Cambrian explosion Bilaterian phylaThe Cambrian world | 02 |
| 5. | The Ordovician and Silurian Tetrapods / The Carboniferous | 02 |
| 6. | Land at last / the Devonian | 02 |
| 7. | Amniotes and the attainment of full territoriality / The Permian | 02 |
| 8. | The marine Mesozoic, The CenozoicThe Pleistocene | 02 |
| 9. | Theories of evolution and Darwinism and the Origin of Life | 02 |
| 10. | Zoogeographical Realms With reference to fauna | 03 |
| 11. | Geologic time scale, Division of geologic time Eons,Eras,Periods, Epochs and Age | 04 |
| 12. | Indian Natural History Museums | 02 |
| 13. | Human evolution | 03 |

Recommended readings

1. Mark Ridley. Evolution. 3rd Edition. Blackwell Publishing. (2004).

2. Mathur, Tomar, Singh. Evolution and Behaviour. Rastogi Publication, Merrut.

3. Mohan P. Arora. Evolutionary Biology, Himalaya Publishing House, Bombay.

4. P. S. Vermin and V. K. Agarwal. Cell Biology, Genetics, Molecular Biology, Evolution andEcology, Revised Edition. S. Chand Publication (2004).

5. Strickberger. Evolution. Prentic Hall. (2002).

6. Theodore H., Jr Eaton. Evolution. 1st Edition. W. W. Norton Publication. (1970).

7. Organic Evolution, Richard Swann Lull, Light & Life Publishers.

**Course Code Course name**
**ZOO24104 Zoology Major Practical**
**Semester IV**

| Sr. No. | Name of the practical | No. of practicals |
|---|---|---|
| 1 | Structure of human brain using models/charts | 1P |
| 2 | Preparation of mind maps | 1P |
| 3 | Study of invertebrate nervous system using suitable animal | 2P |
| 4 | Study of vertebrate nervous system using suitable animal | 1P |
| 5 | Estimation of Dissolved oxygen from given water sample. | 1P |
| 6 | Estimation of dissolved and free carbon dioxide from water sample. | 1P |
| 7 | Study of any five microscopic zooplanktons of freshwater ecosystem (pond. | 1P |
| 8 | Study of physiochemical properties of given soil sample. Any 2 physical and any two chemical. | 1P |
| 9 | Study of Eutrophication in lake/river. | 1P |
| 10 | Study of animal community structure by quadrat method (Field or Simulation. Determination of density, frequency and abundance of species by quadrant method. | 1P |
| 11 | Study of diversity indices-Shannon and Simpson. | 2P |
| 12 | Visit to pond or lake ecosystem/ field trip/Zoological excursion and report submission, | 2P |

**Course Code Course name**
**ZOO24201 Toxicology Theory (2 Credits-30 Lectures)**

**Semester IV**

**Learning Outcomes of the course:**

1. The student will be able to understand role and Concepts, understand the different principles of Toxicology.

2. The student will be able to understand the body systems against toxic occupational, industrial and domestic chemicals, poisons.

3. The student will be able to understand different types of toxicology.

4. The student will be able to understand OECD and Principals of GLP.

| Sr. No. | Name of the topic | Lectures allotted |
|---|---|---|
| 1 | **Principles and Methods in Toxicology**<br><br>1.1 Introduction, definition, scope and sub-divisions of toxicology<br><br>1.2 Classification of toxins, natural toxins, animal toxins, plant toxins, food toxins, chemical toxins | 01 |
| 2 | **Introduction to Regulatory Toxicology**<br><br>2.1 Schedule Y: Design non-clinical toxicity studies and clinical development<br><br>2.2 Animal to human extrapolation: Flow chart<br><br>2.3 Preclinical development<br><br>2.4 Animal welfare requirements,CPCSEA,<br><br>2.5 OECD-GLP Guidelines | 05 |
| 3 | **Pathophysiology**<br><br>3.1 Factors influencing the disease conditions such as sex, age, nutritional status, genetic make up etc**.** | 02 |
| 4 | **Bioethics**<br><br>4.1 Ethics moral and laws relative to animals.<br><br>4.2 Social pressure and friendly use of animals in higher research.<br><br>4.3 Precautions in biological experiments.<br><br>4.4 Labeling: Identification, cage cards.<br><br>4.5 Handling of experimental animals.<br><br>4.6 Disposal of dead animals after experiments. | 04 |
| 5 | **Target Organ Toxicology**<br><br>5.1 Definition and concepts of –Cutaneous toxicity, pulmonary toxicity, Hepatotoxicity, Renal toxicity, Reproductive toxicity, Endocrinal toxicity, Immunotoxicology, Haematotoxicity, Bone marrow toxicity, Mutagenicity | 03 |
| 6 | **GLP in Regulatory Toxicology**<br><br>6.1 Good Laboratory Practices (GLP), Quality control and Quality Assurance, SOP writing and implementation:,GLP Establishment<br><br>6.2 Study plans: Study protocols,Master schedule: Responsibility of study directors,Multisite management and principles investigators | 04 |

| | | |
|---|---|---|
| | responsibility,Reporting of study results, Storage and retention of records and materials, GLP audits and inspections. | |
| 7 | **General Laboratory Practices**<br><br>7.1 Route of administration<br><br>7.2 Blood collection and plasma separation, isolation of plasma, Slide preparation<br><br>7.3 urine analysis,<br><br>7.4 Blood cell counting<br><br>7.5 Tissue isolation and fixation.<br><br>7.6 Tissue processing and histological slide preparation.<br><br>7.7 Blood smear and histological slide staining | 04 |
| 8 | **General Laboratory Routine –**<br><br>   8.1 .Health check-ups, acclimatization, grouping and randomization, cage rotation, animal marking, dose calculation for mice and rats; Common solvents, uses, storage conditions,<br><br>   8.2. Common toxic symptoms, and observations, feed intake measurements, water intake measurements, anaesthesia and gross necropsy; anticoagulants, Separation and.<br><br>Body weight, organ weight, fixative, preservations, autolysis,<br><br>   8.3 Raw data collection, computation, statistics and report preparation. | 07 |

**Recommended Books:**

1. Principles of Toxicology by Karen Stine, Thomas M. Brown
2. Regulatory Toxicology by Shayne C. Gad Taylor & Francis
3. Principles and Methods of Toxicology by A. Wallace Hayes
4. CPCSEA guidelines (http://cpcsea.nic.in)
5. Good Laboratory Practice, 2nd Edition, by Jurg P Seiler, Springer
6. WHO/TDR Manual for Good Laboratory Practice, WHO/TDR, Geneva, Switzerland
7. Robins Basic Pathology, by Saunders, Elsevier
8. Text Book of Pathology, by Harish Mohan, Jaypee
9. Animal bioethics Principles and Teaching Methods, edited by M. Marie, S. Edwards, G. Gandini, M.

**Course Code Course name**
**ZOO24202 Toxicology (P)**

| 1 | **Good Laboratory Practice in Regulatory Toxicology** | **1P** |
|---|---|---|
|   | Flow chart and Roles of Good Laboratory Practices (GLP), | |
|   | SOP writing and implementation | **1P** |
| 2 | **General Laboratory Experience** | |
|   | 1. Blood collection and plasma separation. | **1P** |
|   | 2. Blood cell counting | **1P** |
|   | 3. Tissue isolation and fixation. | **1P** |
|   | 4. Tissue processing and histological slide preparation. | **1P** |
|   | 5. Blood smear and histological slide staining (manual and automation). | **1P** |
|   | 6. Cell culture techniques. | **1P** |

**Course Code and Course name**
**ZOO24301 Animal Behaviour (Theory) (2 credit -3 Lectures**
**Semester IV**

**Course outcomes**

CO1: The learner understands meaning, branches, scope and concept of Ethology.

CO2: The learner demonstrates methods of studying animal behavior

CO3: The learner understands meaning, type, theories and laws of learning.

CO4: The learner understands role of hormones on behavior and biological rhythms.

| Sr. no. | Unit | Required Lectures |
|---------|------|-------------------|
| 1. | **Introduction to the study of Animal Behaviour-** Meaning, Branches of Ethology and Scope of Ethology | 02 |
| 2. | **Concepts of Ethology-** Concept of Motivation; Concept of Fixed Action Patterns (FAP); Concept of Sign or key stimulus or Releasers; Concept of Innate Releasing Mechanism (IRM); Concept of Physiological basis; Concept of Imprinting; Concept of Evolution of behaviour | 05 |
| 3. | **Methods of studying Behaviour-** Introduction; Studies in Laboratory; Studies in Wild; Identification and Naming of Individuals; Locating Individuals in Wild. | 05 |
| 4 | **Learning and Memory-** Introduction; types of learning; theories and laws of learning | 06 |
| 5 | **Hormones and behavior-** Introduction: Hormones of Gonads; Hormones of adrenal gland; Hormones of Pituitary; Effects of hormones on different behavioural patterns; Paternal-Maternal behavior; Parent-young one bond. | 06 |
| 6 | **Social Organisation, Social behavior and Communication-** Introduction; Social organization in Honey bees, termites, monkeys. and Lions; Altruism and Kin selection. | 04 |
| 7 | **Biological rhythms-** Biological clocks, circadian rhythms, circumlunar rhythms, circannual rhythms | 02 |

**References**
1."Animal Behavior: An Evolutionary Approach" by John Alcock.
2."The Behavior of Animals: Mechanisms, Function And Evolution" by Luc–Alain Giraldeau and Johan Bolhuis.
3. "Animal Behaviour": A textbook by Reena Mathur.
4. Animal Behaviour : A textbook by S. Chand.

**Course Code Course Name**
**ZOO24401 Sericulture (2 Credit-P) (SEC)**

1.Study of external morphology of *Bombyx mori*.                    (D)

2. Study of life-cycle of *Bombyx mori*.                    (D)

3. Study of different types of silk moths *Mulberry, Tassar, Eri and Muga* silk moths    (D)

3. Study of five equipments in Sericulture.                    (D)

4. Study of the silkworm diseases                    (D)

5. Study of silkworm pests and predators/parasites                    (D)

6. Study of different varieties of mulberry                    (D)

7. Preparation of a map showing distribution of silk moth and rearing/ sericulture practices in India.                    (E)

8. Compulsory study tour/field visit to sericulture institute and report writing         (E)

**AEC: Language : English / Marathi (2C)**

**Course Code Course Name**
**ZOO24502 Global Climate Change (2 Credit-30 Lectures)**
**Course Outcomes:**

CO:1 The learner understands climate systems and climate change ·

CO:2 Assess impacts of climate change on global, regional, and local scales

CO: 3 analyse and interpret climate data as well as learn prediction methods.

CO: 4 Effect of climate change and Government efforts to mitigate climate change.

CO:5 Engage themselves towards bringing awareness on the cause and effect of climate change among the people of their own community and beyond ·

| Sr. no. | Unit | Required Lectures |
|---------|------|-------------------|
| 1. | **Concept of Environment, weathers, and climate**<br>**1.1** Types of Climates | 02 |
| 2. | **Climate of India**<br>2.1 Koppen's climatic scheme, India | 05 |
| 3. | **Climate Change and factors responsible for climate change**<br>3.1 Global environmental problems - ozone depletion<br>3.2 UV-B, greenhouse effect and acid rain due to anthropogenic activities | 05 |

| | | |
|---|---|---|
| | 3.3 Fisheries depletion, Ocean acidification<br>3.4 Eutrophication, their impact and biotechnological approaches for management | |
| 4 | **Effects of climate change with examples**<br>1) intense drought,<br>2) storms,<br>3) heat waves,<br>4) rising sea levels,<br>5) melting glaciers and warming oceans | 06 |
| 5 | Effects of climate change on Biodiversity | 02 |
| 6 | **Government efforts**<br>• 1980 : Setting up of Ministry for Environment<br>• 1985 : Changed to Ministry for Environment and Forests<br>• 2005 : Portal under National E-governance Scheme<br>• 2006: National Environment Policy<br>• 2014: Ministry for Environment, Forests and Climate Change | 04 |
| 7 | Application of Remote sensing and GIS in Climate Change studies Models for climate prediction. | 04 |
| 8. | Sustainable development<br>Three pillars of Sustainability.<br>UN 17 Sustainable Development Goals (SDGs). | 02 |

**Reference books**

1 Environment and Ecology – Biodiversity, Climate Change and Disaster Management – Majid Husain (Access Publishers)

2 Efforts Towards Green India – Environment & Ecology by Arihant Experts

Additional books for extra reference.

3 Glasson, J., Therivel, R. (2019) Introduction to Environmental Impact Assessment. Routledge. London.

4 Judith, P. 1999. Handbook of Environmental Impact Assessment. Blackwell Science.

5. Marriott, B. 1997. Environmental Impact Assessment: A Practical Guide. McGraw-Hill, New York, USA.

**CC: Course Code Course Name**
**ZOO24601:** Computer applications (2C) (P)

**ZOO24602 :** Community Engagement project (2C)

Progressive Education Society's

# Modern college of Arts, Science and Commerce,

## Ganeshkhind,Pune-16

# Autonomous

### Three year B.Sc.(Regular)

### (Under Faculty of Science and Technology)

## S.Y.B.Sc.(Regular)  : Mathematics

### Choice Based Credit System Syllabus
### To be implemented from Academic Year 2023-2024

Page 1

**S.Y.B.Sc. [Regular] (Autonomous)**

**MATHEMATICS**

# Introduction:

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  of P. E. Society's Modern College of Arts , Science and Commerce , Ganeshkhind , Pune-16 has prepared the syllabus of S.Y.B.Sc. Mathematics. To develop the syllabus the U.G.C. Model curriculum is followed.

# Program Objectives:

• 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.

• A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.

 • A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.

• 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.

• A student should be made aware of history of mathematics and hence of its past, present and future role as part of our culture.

# Program Specific Outcomes(PSOs) :

A student completing second year B.Sc.  with Mathematics will be able to

• know  mathematical ideas and tools and how to use them by modelling ,solving and     interpreting.

• develop mathematical tools for continuing further study in various fields of science.

• use mathematical concepts in mathematical modelling , problem solving , creative talent and power of communication necessary for various kinds of employment .

• develop a positive attitude towards mathematics as an interesting and valuable subject of study.

## Examination Pattern :

**A) Pattern of Examination :** Semester

**B)** Each course is of 50 marks (35 marks theory end semester examination & 15 marks internal examination).

**C) Standard of passing  :** 20 marks out of 50 marks for each paper. Student should obtain minimum 14 marks out of 35 in the theory end semester examination and 6 marks for  internal examination out of 15.

**D) Pattern of Question Papers for papers 23- MT-231, 23- MT-232(A), 23- MT-232(B), 23- MT-241, 23- MT-242(A), 23- MT-242(B).**

Q.1 Attempt any 5  out of 7 each of 2 marks [10 marks]

Q.2 Attempt any  3 out of 5 each of 5 marks [15 marks].

Q.3 Attempt any 1 out of 2 each of 10 marks [10 marks].

**E) External students:** Not Allowed

## Suggested Internal Assessment tools for courses :

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Student's seminar
3. Short Quizzes / MCQ Test
4. Home Assignment

5. Tutorials / Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Study Tour
11. Written Test
12. Power Point Presentations
13. Field Visit
14. Industrial Visit
15. Viva

## Teaching Methodology :

1. Classroom Teaching

2. Guest Lectures

3. Group Discussion

4. Surveys

5. Power Point Presentations

6. Visit to Institution / Industries

7. Research Papers and Projects

8. E-content

## Subject List :

### SEMESTER III

| Sr. No. | Subject Type | Subject Code and Title | Credits | | | Total no. of lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | Theory | 23-MT-231 Calculus of Several Variables | 2 | -- | | 30 |
| 2 | Theory | 23-MT-232 (A) Numerical Methods and it's Applications | 2 | -- | 4 | 30 |
| | | 23-MT-232 (B) Graph Theory | | -- | | 30 |
| 3 | Practical | 23-MT-233 MathematicsPractical based on 23-MT-231 and 23-MT-232 | -- | 2 | 2 | 15 Practicals |

### SEMESTER IV

| Sr. No. | Subject Type | Subject Code and Title | Credits | | | Total no. of lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | Theory | 23-MT-241 Linear Algebra | 2 | -- | | 30 |
| 2 | Theory | 23-MT-242 (A) Vector Calculus | 2 | -- | 4 | 30 |
| | | 23-MT-242 (B) Discrete Mathematics | | -- | | 30 |
| 3 | Practical | 23-MT-243 MathematicsPractical based on 23-MT-241 and 23-MT-242 | -- | 2 | 2 | 15 Practicals |

• All three above courses are compulsory.

• In Semester-III, select any one from 23-MT-232(A) and 23-MT-232(B).

• In Semester-IV, select any one from 23-MT-242(A) and 23-MT-242(B).

**Medium of Instruction:** English.

# Syllabus

## Semester – III

**Subject Code : 23-MT-231**
**Subject : Calculus of Several Variables**
**Theory  : 2 Credits**
**Total Lectures : 30**

### Course Learning Outcomes

**CO1:** Student will learn  functions of several variables.

**CO2:**  Student will learn the notion of Continuity and Differentiability of

multivariate functions.

**CO3:** Student will be able to find extreme values of multivariable functions

using derivatives.

**CO4:** Student will  learn evaluation of double and triple integration and its

application to area and volume

**CO5:**  Student will be able to use change of variables effectively  for evaluation

of integrals.

### Course Contents

**Unit-1 Limits and Continuity                                [04 lectures]**

1.1 Functions of Several Variables :- Functions of two variables,

Domain and Range,Graphs, Level Curves, Functions of Three

or More Variables

1.2 Limits and Continuity.

### Unit-2  Partial Derivatives and Differentiability          [08 lectures]

**2.1** Definition and examples.

**2.2** Higher Derivatives, Clairaut's Theorem (Statement Only) ,

Partial DifferentialEquations, Wave equation.

**2.3** Differentiable function, Differentials

**2.4** Chain Rule, Homogeneous Functions, Euler's theorem

### Unit-3 Extreme Values                                       [06 lectures]

**3.1** Extreme values of functions of two variables.

**3.2** Necessary conditions for extreme values.

**3.3** Second Derivative Test (without proof).

**3.4** Lagrange Multipliers ( with one constraints)

### Unit-4 Multiple Integrals                                    [12 lectures]

**4.1** Iterated Integrals, Fubini's Theorem (Statement only)

**4.2** Double integral over general regions, Change of order of integration for two variables.

**4.3** Double integral in Polar coordinates.

**4.4** Triple integrals , Evaluation of triple integrals. Triple integrals in spherical coordinates

**4.5** Jacobians , Change of variables in multiple integrals .(Results without proofs)

### Text book:

Multivariable Calculus 7th Edition By James Stewart, Brooks/Cole, Cengage Learning, 2012, 2008.

Unit 1:- Chapter 14: Sec- 14.1, 14.2

Unit 2:- Chapter 14: Sec- 14.3(except the Cobb-Douglas production function), 4.4 (except Tangent Planes and Linear Approximations), Sec-14.5

Unit 3:- Chapter 14: Sec 14.7, 14.8 (except two constraints)

Unit 4:- Chapter 15: Sec 15.2, 15.3, 15.4, 15.7 (without Riemann sum and Application), 15.9, 15.10

### Reference Books:

**1.** Basic Multivariable Calculus, J. E. Marsden, A. J. Tromba , A.

Weinstein, SpringerVerlag (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).

**Subject Code : 23-MT-232(A)**
**Subject : Numerical Methods and it's Applications**
**Theory  : 2 Credits**
**Total Lectures : 30**

### Course Learning Outcomes

**CO1:** Problem solving skills of students are enhanced.

**CO2:** Students learn how to apply mathematical concepts to practical and real

life problems.

**CO3:** The problems which cannot be solved by usual formulae and methods can

be solved approximately by using numerical techniques.

**CO4:** Student will be able to solve the integration problems which cannot be solved by usual formulae and methods using  numerical techniques.

**CO5:** Student will learn  curve fitting  to the data  using 3 different methods of interpolation

### Course Contents

**Unit1: Solution of Algebraic and Transcendental Equations   [10 Lectures]**

1.1 Errors and their computations
1.2 Bisection method.
1.3 The method of False position
1.4  Newton- Raphson method

**Unit 2: Interpolation                                 [10 Lectures]**

2.1 Finite Difference Operators and their relations
   (Forward, Backwarddifference and Shift operator).
2.2  Differences of a polynomial
2.3  Newton's Interpolation Formulae (Forward and Backward ) : Without proof
2.4  Lagrange's Interpolation Formula : Without proof

**Unit 3: Numerical Differentiation and Integration : Only Examples**
                                                                **[04 Lectures]**
    3.1 Numerical Differentiation (Derivatives using Newton's forward
       difference formula)
    3.2 Numerical Integration, General quadrature formula.
    3.3 Trapezoidal rule.
    3.4 Simpsons's  1/3rd rule.
    3.5 Simpsons's 3/8th rule.

**Unit 4: Numerical solution of first order ordinary differential equations :**
     **Only  Examples**                                   **[06 Lectures]**
    4.1 Taylor's Series method
    4.2 Picard's method of successive approximations
    4.3  Euler's method.
    4.4  Modified Euler's methods.
    4.5  Runge - Kutta Methods.

**Text book:**
**1. S.S. Sastry, Introductory Methods of Numerical Analysis, 5th edition, Prentice Hall ofndia.**

   Unit 1: Chapter 1: section 1.3, Chapter 2:  section 2.2, 2.3, 2.5
   Unit 2: Chapter 3: section 3.3, 3.5, 3.6, 3.9(3.9.1 only)
   Unit 3: Chapter 4: section  6.2 (excluding 6.2.1 to 6.2.3), 6.4
   Unit 4: Chapter 5: section 8.2, 8.3, 8.4 (excluding 8.4.1).

**Reference Books:**
1. C.F. Gerald and O.P. Wheatley, Applied Numerical Analysis,

   Addison Wesley;7thedition (2003).

2. K.E. Atkinson; An Introduction to Numerical Analysis, Wiley Publications.
3. T. Sauer, Numerical analysis, 3rd edition, Pearson.
4. M. K. Jain, SRK Iyengar and R.K. Jain, Numerical Methods For

   Scientific & Engg 5e,New  Age International (P) Ltd (2008).


**Subject Code : 23-MT-232(B)**
**Subject : Graph Theory**
**Theory  : 2 Credits**
**Total Lectures : 30**
<div align="center">

**Course Contents**

**Course Learning Outcomes**
</div>

**CO1:** Student will earn basic concepts in Graph theory.

**CO2:** Student will develop the skill of converting mathematical problem

graphically and vice versa

**CO3:** Student will learn suitable techniques of analysis of problems

**CO4:** Student will learn various tools for solving real life problems

**CO5:** Student will develop a positive attitude towards mathematics as an

interesting and valuable subject to study.

## Course Contents

### Unit 1. Introduction                                      [04 Lectures]

1.1 What is a Graph?
1.2 Application of Graphs
1.3 Finite and Infinite Graphs
1.4 Incidence and Degree
1.5 Isolated Vertex, Pendant Vertex and Null Graph

### Unit 2. Paths and Circuits                               [10 Lectures]

2.1 Isomorphism
2.2 Subgraphs
2.4 Walks, Paths, and Circuits
2.5 Connected Graphs, Disconnected Graphs, and Components
2.6 Euler Graphs
2.7 Operations on Graphs
2.8 More on Euler Graphs
2.9 Hamiltonian Paths and Circuits
2.10 The Traveling Salesman Problem

### Unit 3. Trees and Fundamental Circuits                   [10 Lectures]

3.1 Trees
3.2 Some Properties of Trees
3.3 Pendant Vertices in a Tree
3.4 Distance and Centers in a Tree
3.5 Rooted and Binary Trees
3.6 On Counting Trees
3.7 Spanning Trees
3.8 Fundamental Circuits

3.9 Spanning Trees in a Weighted Graph

**Unit 4. Cut-Sets and Cut-Vertices**                    **[06 Lectures]**

    4.1 Cut-Sets
    4.2 Some Properties of a Cut-Set
    4.3 All Cut-Sets in a Graph
    4.4 Fundamental Circuits and Cut-Sets
    4.5 Connectivity and Separability

**Text book:**

1. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science"Printice-Hall, of India Pvt. Lt. New Delhi.

    Unit 1 : Chapter 1: Sec.1.1 to 1.5
    Unit 2: Chapter 2: Sec. 2.1 to 2.10 (Excluding 2.3)
    Unit 3: Chapter 3: Sec. 3.1 to 3.10 (Excluding 3.9)
    Unit 4: Chapter 4 : Sec. 4.1 to 4.5

**Reference books:**

    1. John Clark and Derek Holton, A First Look at Graph Theory (Allied Publishers)
    2. Robin J. Wilson, Introduction to Graph Theory, Fourth Edition (low price edition)
    3. Introduction to Graph Theory, Douglas West 2nd edition.
    4. A Textbook of Graph Theory, Balakrishnan, R., Ranganathan, K.

**Subject Code : 23-MT-233**
**Subject : Mathematics Practical**
**2 Credits**

**(Practical based on the applications of 23-MT231 and 23-MT-232)**

**List Of Practicals**

**Practical 1:** Problems on Unit 1 (Written) from 23-MT231
**Practical 2:** Problems on Unit 2 (Written) from 23-MT231
**Practical 3: P**roblems on Unit 2 (Written) from 23-MT231
**Practical 4:** Problems on Unit 3 (Written) from 23-MT231
**Practical 5:** Problems on Unit 4 (Written) from 23-MT231
**Practical 6:** Problems on Unit 4 (Written) from 23-MT231
**Practical 7:** Applications using Mathematical software
**Practical 8:** Problems on Unit 1 (Written) from 23-MT232
**Practical 9:**Problems on Unit 2 (Written) from 23-MT232
**Practical 10:**Problems on Unit 2 (Written) from 23-MT232

**Practical 11:**Problems on Unit 3 (Written) from 23-MT232
**Practical 12:**Problems on Unit 3 (Written) from 23-MT232
**Practical 13:**Problems on Unit 4 (Written) from 23-MT232
**Practical 14:**Applications using Mathematical software
**Practical 15:**Miscellaneous

## Semester IV

**Subject Code : 23-MT-241**
**Subject : Linear Algebra**
**Theory  : 2 Credits**
**Total Lectures : 30**

## Course Learning Outcomes

**CO1:** Student will  be able to formulate , solve and interpret properties of linear

systems .

**CO2:** Student gets introduced to the  concepts of vector space which is used in

other pure mathematical subjects and engineering

**CO3:** Student will be able to identify the subspaces of a given vector space.

**CO4:** Student will  learn the importance and applications of linear

transformation.

**CO5:** To get well equipped with Mathematical Modelling abilities.

## Course Contents

### Unit-1: Matrices and System of Linear Equations          [06 lectures]

1.1 Row echelon form of a matrix, reduced row echelon form of a matrix.
1.2 Definition of rank of a matrix using row echelon or row reduced echelon
   form.
1.3 System of linear equations- Introduction, matrix form of linear
   system, definition of row equivalent matrices.

1.4 Consistency of homogeneous and non-homogeneous system
of linear equationsusing rank, condition for consistency.

1.5 Solution of System of Equations: Gauss elimination and Gauss-
Jordan eliminationmethod, examples.

## Unit-2: Vector Spaces-I                                    [10 lectures]

2.1 Definition and Examples.
2.2 Subspaces.
2.3 Linear Dependence and Independence.
2.4 Basis of Vector Space

## Unit-3: Vector Spaces-II                                    [06 lectures]

3.1 Dimension of a Vector Space.
3.2 Row, Column and Null Space of a matrix.
3.3 Rank and nullity.

## Unit-4: Linear Transformations                             [08 lectures]

4.1 Definition and Examples, Properties, Equality.
4.2 Kernel and range of a linear Transformation
4.3 Rank-Nullity theorem.
4.4 Composite and Inverse Transformation.
4.5 Matrices and Linear Transformation.
4.6 Basic Matrix Transformations in $R^2$ and $R^3$
4.7 Linear Isomorphism.

**Text Book**::

**Howard Anton, Chris Rorres, Elementary Linear Algebra, Application Version, NinthEdition, Wiley, 11$^{th}$ edition.**

Unit-1: Chapter-1: Sec. 1.1, 1.2.  ,  Unit-2: Chapter- Sec. 4: 4.1 to 4.4.

Unit-3: Chapter- Sec. 4: 4.5, 4.7, 4.8   ,  Unit- 4: Chapter-  Sec.8: 8.1 to 8.4, 1.8, 4.9.

**Reference Books:**

**(1)** K. Hoffman and R. Kunze, Linear Algebra, 2$^{nd}$ edition(2014), Prentice Hall of India, NewDelhi

**(2)** Steven J. Leon, Linear Algebra with Applications, 4$^{th}$ edition(1994), Prentice Hall ofIndia. New Delhi

(**3**) Vivek Sahai, Vikas Bist, Linear Algebra, 4ᵗʰ Reprint 2017, Narosa Publishing House, NewDelhi

(**4**) Promode Kumar Saikia, Linear Algebra, 2009, Pearson, Delhi

(**5**) S. Lang, Introduction to Linear Algebra, 2ⁿᵈ edition,1986, Springer-Verlag, New York,Inc.

**Subject Code : 23-MT-242(A)**
**Subject : Vector Calculus**
**Theory : 2 Credits**
**Total Lectures : 30**

## Course Learning Outcomes

**CO1:** Student will learn how to compute the derivatives of vector functions

**CO2:** Student will learn to evaluate the line integrals of vector functions

**CO3:** Student gets the knowledge of central concepts in multivariable analysis such as space curves, directional derivative, gradient etc.

**CO4:** Student will be able to evaluate surface integrals.

**CO5**: Student will be able to apply techniques from multivariable analysis to set up and solve Mathematical models, to deduce simple mathematical results and to calculate integrals.

## Course Contents

**Unit 1**: **Vector-Valued Functions**                    **[06 lectures]**

1.1 Curves in Space, Limits and Continuity, Derivatives and Motion, DifferentiationRules for Vector Function, Vector Functions of Constant Length.

1.2 Integrals of Vector Functions.

1.3 Arc Length along a Space Curve, Speed on a Smooth Curve, Unit TangentVector.

1.4 Curvature of a Plane Curve, Circle of Curvature for Plane Curves, Curvature andNormal Vectors for a Space Curve.

**Unit 2**: **Integrals**                                           **[10 Lectures]**

2.1 Line Integral of Scalar Functions, Additivity, Line integral in the Plane.

2.2 Vector Fields, Gradient Fields, Line Integral of Vector Fields,
    Line Integrals withrespect to dx, dy, dz .

2.3 Work done by a Force over a Curve in Space, Flow Integrals
    and Circulation forVelocity Fields, Flow across the Simple
    Closed Plane Curve.

2.4 Path Independence, Conservative and Potential Functions.

2.5 Divergence, Two forms for Green's Theorem, Green's
    Theorem in the Plane(Proof for special regions),

**Unit 3**: **Surface Integrals**                          **[06 Lectures]**

3.1 Parameterizations of Surfaces, Implicit surfaces.

3.2 Surface integrals, Orientation of Surfaces.

3.3 Surface Integrals of Vector Fields.

**Unit 4: Applications of Integrals**                  **[08 Lectures]**

4.1 The Curl Vector Field, Stokes' Theorem(without proof),
    Conservative Fields andStokes' Theorem.

4.2 Divergence in three Dimensions, Divergence Theorem (without proof).

4.3 Unifying the Integral Theorems.

**Text Book:**

Thomas' Calculus (14th Edition) by Hass, Heil, Weir, Pearson Indian
Education ServicesPvt. Ltd.
Unit 1: Chapter 13: Sec- 13.1, 13.2, 13.3, 13.4
Unit 2: Chapter 16: Sec-16.1, 16.2, 16.3, 16.4
Unit 3: Chapter 16: Sec- 16.5, 16.6
Unit 4: Chapter 16: Sec- 16.7, 16.8

**Reference books:**

(1) Basic Multivariable Calculus byJ.E.Mardson, A.J.Tromba, A. Weinstein,
   Sppriger Verlag(Indian Edition)

(2) Advanced Calculus by M.R. Spiegel, Schaum Series.

(3) Advanced Calculus (IInd Edition) byD.V. Widder, Prentice Hall of India,
   New Delhi(1944).

(4) Advanced Calculus by John M. H. Olmsted, Eurasia Publishing House,
   New Delhi(1970)

(5) Calculus Vol. II (IInd Edition) by T.M. Apostol, John Wiley, New York
   (1967).

**Subject Code : 23-MT-242(B)**
**Subject : Discrete Mathematics**
**Theory  : 2 Credits**
**Total Lectures : 30**

## Course Learning Outcomes

**CO1:** The student develops theoretical, applied and computational skills.
**CO2:** The student gains confidence in proving theorems and solving problems.
**CO3:** Student will learn fundamental and advanced tools of counting

**CO4:** Student will be able to solve recurrence relations

## Course Contents

### Unit 1: Logic and Proofs [10 Lectures]

   1.1  Propositional Logic
   1.2  Propositional Equivalences
   1.3  Predicate and Quantifiers
   1.4  Nested Quantifiers
   1.5  Rules of Inference
   1.6  Introduction to Proofs

### Unit 2: Counting [12 Lectures]

   2.1  The Basics of Counting
   2.2  Permutations and Combinations
   2.3  Binomial Coefficients
   2.4  Generalized Permutations and Combinations
   2.5  The Pigeonhole Principle

### Unit 3: Advanced Counting Techniques [08 Lectures]

   3.1  Inclusion Exclusion
   3.2  Recurrence Relations
   3.3  Solving Linear Recurrence Relations

**Textbooks :**

   **Discrete Mathematics and Its Applications : Kenneth Rosen, Seventh**

   **Edition** Unit 1: Chapter 1 : Section  - 1.1 to 1.6.

Unit 2: Chapter 5 : Section, 5.1 to 5.5.

Unit 3: Chapter 6 : Section 6.1,6.2,6.5.

**Reference Books :**

1. Applied Combinatories By Alan Tucker.
2. Discrete Mathematical Structures By Kolman, Busby and Ross

**Subject Code : 23-MT-243**
**Subject :Mathematics Practical**
**2 Credits**

**(Practical based on the applications of 23-MT241 and 23-MT-242)**

**List Of Practicals**
**Practical 1:** Problems on Unit 1 (Written) from 23-MT241
**Practical 2:** Problems on Unit 1 (Written) from 23-MT241
**Practical 3:** Problems on Unit 2 (Written) from 23-MT241
**Practical 4:** Problems on Unit 3 (Written) from 23-MT241
**Practical 5:** Problems on Unit 4 (Written) from 23-MT241
**Practical 6:** Problems on Unit 4 (Written) from 23-MT241
**Practical 7:** Applications using Mathematical software
**Practical 8:** Problems on Unit 1 (Written) from 23-MT242
**Practical 9:** Problems on Unit 2 (Written) from 23-MT242
**Practical 10:** Problems on Unit 2 (Written) from 23-MT242
**Practical 11:** Problems on Unit 3 (Written) from 23-MT242
**Practical 12:** Problems on Unit 3 (Written) from 23-MT242
**Practical 13:** Problems on Unit 4 (Written) from 23-MT242
**Practical 14:** Applications using Mathematical software
**Practical 15:** Miscellaneous

**Modalities for conducting practicals and  practical Examination :**

1.  There will be one 3 hours practical session for each of batch of 15 students per week for each practical course.
2.  External examiner shall be appointed by the college for Mathematics Practical Examination.
3.  The duration of practical examination is 3 hours.

4. The practical examination is of 35 marks which consist of written examination of 30 marks & 05 marks oral examination.
5. The internal 15 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practical .
6. Study tours may be arranged at  place having important mathematical institutes or historical places.
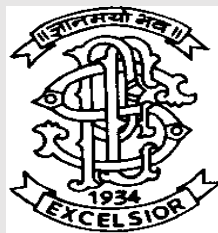
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*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

## Syllabus for

# S. Y. B. Sc. (Physics)

## Introduction:

Physics is the basic discipline in natural science. The word Physics comes from a Greek word meaning nature. The Sanskrit equivalent word *Bhautika* is used to refer the physical world. Thus Physics is a study of basic laws of nature and its manifestation in different natural phenomena. Physicist observes the phenomena of nature and tries to find pattern and principles that relate the phenomena. These patterns are called physical theories. When the theories are very well established and are of broad use, they are referred as physical laws or principles.

The scope of Physics is in two domains: Microscopic and Macroscopic.The Macroscopic domain includes the phenomenon in the laboratory, terrestrial and at astronomical scales. Classical physics deals with macroscopic phenomena. The microscopic domain includes the atomic, molecular and nuclear phenomena. Presently the domain intermediate between these two dealing with few hundreds of atoms has emerged as an exciting field of research. This is termed as mesoscopic physics. Nanomaterials come under mesoscopic physics.

Students need to know physics to understand todays core science and technology issues. From the Physics of energy to climate change and from spy technology to quantum computers, the modern physics has impact on the life of every citizen.

## Programme Objectives:

To promote Physics Education through:

1. Master Texts: It helps in understanding the theoretical and mathematical development of the subject and to create interest in the subject.
2. Experimentation: It helps in general to improve scientific attitude. So emphasis is given on the development of experimental skills, data analysis, calculations, and also on the limitations of the experimental method and data and, results obtained.
3. Problem Solving: It helps in understanding the concepts of physics. It underlines the strength of equations, formulae, graphs, mathematical tools to tackle the problems. So accordingly, we have introduced compulsory problem part in the question paper.
4. History and Philosophy: It helps in understanding the conceptual development of the subject and thereby increase the interest in the subject. A topic on this is introduced in the Physics Course.

## Programme Specific Outcomes (PSOs):

1. **Awareness of Misconceptions**: It improves the scientific awareness among the students.

2. **Proto-research**: It creates interest in the subject and improves technological aspect. Accordingly, mini projects, hands-on activities, projects, models and demonstrations etc. is included in the syllabi.

3. **Qualitative Overview**: It creates interest in the subject to continue to work in the field of science in general and physics in particular. Accordingly future directions and frontiers of the subject are included in the syllabi.

## Examination Pattern:

Semester Examination

1. 50 Marks for each course
   (35 Marks End Semester Examination and 15 Marks Internal Assessment)

2. ATKT Rules: Existing rules shall apply

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Study Tour
11. Written Test
12. PPT presentation
13. Field Visit
14. Industrial Visit
15. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Power Point Presentations
5. Visit to Institutions / Industries
6. Research Papers & Projects
7. E-content

# Subject List

## SEMESTER III

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Theory | Practical | Total | |
| 1 | Compulsory Subject | 23-PHY-231 Mathematical Methods in Physics-I | 2 | | | 36 |
| 2 | Compulsory Subject | 23-PHY-232A Electronics I | 2 | | 6 | 36 |
| 3 | Compulsory Subject | 23-PHY-232B Instrumentation | 2 | | | 36 |
| 4 | Compulsory Subject | 23-PHY-233 Physics Laboratory-2A | | 2 | | 10 P |

## SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Theory | Practical | Total | |
| 1 | Compulsory Subject | 23-PHY-241 Waves and Oscillations | 2 | | | 36 |
| 2 | Compulsory Subject | 23-PHY-241 Optics | 2 | | 6 | 36 |
| 3 | Compulsory Subject | 23-PHY-241 Physics Laboratory-2B | | 2 | | 10 P |

# Syllabus

## SEMISTER-III

**Subject Code: PHY-231**

**Subject: Mathematical Methods in Physics-I** (2 Credit Course)

**Total Lectures=36**

**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 concept of singular points of differential equations.

## 1. Complex Numbers                                                      (9L)

  **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 Argand diagram

  **1.5** De-Moivre's Theorem (Statement only)

  **1.6** Power, root and log of complex numbers

  **1.7** Trigonometric, hyperbolic and exponential functions

  **1.8** Applications of complex numbers to determine velocity and

    acceleration incurved motion.

  **1.9** Problems.

## 2. Partial Differentiation                                                  (9L)

  **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** Problems.

## 3. Vector Algebra (6L)

**3.1** Introduction to scalars and vectors, dot product and cross product of two vectors and their physical significance. (Revision)

**3.2** Scalar triple product and its geometrical interpretation

**3.3** Vector triple product and its proof

**3.4** Scalar and vector fields

**3.5** Problems.

## 4. Vector Analysis and its applications (12L)

**4.1** Differentiation of vectors with respect to scalar

**4.2** Vector differential operator and Laplacian operator

**4.3** Gradient of scalar field and its physical significance

**4.4** Line Integration, Surface Integration and Volume Integration

**4.5** Divergence of scalar field and its physical significance

**4.6** Gauss' Diversions Theorem

**4.7** Curl of vector field and its physical significance.

**4.8** Stokes Theorem, Maxwell's Equation of Electrodynamics: Differential and Integral Forms

**4.9** Vector Identities.

    a. $\nabla \times (\nabla \Phi) = 0$
    b. $\nabla \cdot (\nabla \times V) = 0$
    c. $\nabla \cdot (\nabla \Phi) = \nabla^2 \Phi$
    d. $\nabla \cdot (\Phi A) = \nabla \Phi \cdot A + \Phi(\nabla \cdot A)$
    e. $\nabla \times (\Phi A) = \Phi (\nabla \times A) + (\nabla \Phi) \times A$
    f. $\nabla \cdot (A \times B) = B \cdot (\nabla \times A) - A(\nabla \times B)$

**4.10** Problems.

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 Arfkenand Weber. ( 5th Edition )
7. Fundamentals of Mathematical Physics by A.B.Gupta.
8. Vector Analysis by Seymour Lipschutz and Dennis Spellman.

**Subject Code: PHY-232**

**Subject: Electronics- I   (2 Credit Course)**

**Total Lectures=36**

**N.B:** This course is for students **who have not taken Electronic Science as one of the subjects at  F. Y. B. Sc.**

## Learning outcomes:

On successful completion of this course the students will be able to

• Apply different theorems and laws to electrical circuits.

• Understand the relations in electricity.

• Understand the parameters, characteristics and working of transistors.

• Understand the functions of operational amplifiers.

• Design circuits using transistors and applications of operational amplifiers.

• Understand the Boolean algebra and logic circuits.

## 1. Network Theorem                                                            (6L)

   **1.1** Krichhoff's Law

   **1.2** Voltage and Current Divider Circuit

   **1.3** Thevenin's Theorem

   **1.4** Norton's Theorem

   **1.5** Superposition Theorem

**1.6** Maximum Power transfer theorem (With proof)

**1.7** Problems

## 2. Study of Transistor (12L)

**2.1** Bi-junction Transistor

a) Electronic components, Metals, semiconductors (intrinsic and extrinsic), insulators and their applications, P-n junction diode.

b) Revision of Bipolar Junction Transistor, Types, Symbol and Basic action.

c) Configuration (Common Base, Common Emitter and Common Collector)

d) Current Gain Factors ($\alpha$ and $\beta$) and their relations

e) Input, Output and transfer Characteristic of CE Configuration

f) Biasing method and Voltage Divider

g) DC Load line (CE), Operating Point (Q- point)

h) Transistor as a switch

**2.2** Uni-Junction Transistor

a) Symbol, Types, Construction, Working Principle, I-V characteristics, Specifications andParameters of Uni-Junction Transistor (UJT)

b) UJT as a relaxation Oscillator.

**2.3** Problems.

## 3. Operational Amplifiers and Application (12 L)

**3.1** Operational Amplifiers

a) Introduction

b) Ideal and practical Characteristics

c) Operational Amplifier: IC741- Block Diagram and Pin diagram

d) Concept of Virtual Ground

e) Inverting and Non-inverting operational amplifiers with concept of gain

f) Operational amplifier as an adder and subtractor

**3.2** Oscillators

      a) Concept of Positive and negative feed back

      b) Barkhausein Criteria for an oscillator

      c) Construction, working and application of phase shift oscillator using IC741

**3.3** Problems

## 4. Number System and Logic Gates               (6 L)

**4.1** Number System: Binary, Binary coded Decimal (BCD), Octal, Hexadecimal

**4.2** Addition and Subtraction of binary numbers and binary fractions using one's and two'scomplement

**4.3** Basic Logic gates (OR, AND, NOT)

**4.4** Derived gates: NOR, NAND, EXOR, EXNOR, with symbols and truth table

**4.5** Boolean Algebra

**4.6** De Morgan's theorem and its verification

**4.7** Problems

### Reference Books-

1. **Electronic Principles**, Malvino, 7th Edition Tata Mc-Graw Hills publication.
2. **Principles of Electronics**, V.K. Mehta, S. Chand publication.
3. **Op-amp and Linear Integrated Circuit**, Ramakant Gaikwad, Prentice Hall of Indiapublication.
4. **Integrated Circuit,** Botkar, Khanna Publication, New Delhi.
5. **Digital Principles and Application**, Malvino and Leech, Tata Mc-Graw Hills publication.

**Subject Code: PHY-232 B**

**Subject: Instrumentation**    (2 Credit Course)

**Total Lectures=36**

**N.B:** This course is for students **who have taken Electronic Science as one of the subjects at F. Y. B. Sc.**

### Learning Comes

After successful completion of this course, the student will be able to

- Understand the concept of measurement.

- Understand the performance of measuring instruments.
- Design experiments using sensors.

## 1. Fundamental of measurement, Calibration and Error Analysis (8L)

**1.1** Aims of measurement

**1.2** Functional elements of typical measurement system (Block diagram and its explanation).

**1.3** Standards of measurement and its classification. (International, primary or national, secondary and working standards).

**1.4** Calibration

**1.5** Static characteristics: Accuracy, Precision, Sensitivity, Linearity, Resolution, Drift and Hysteresis.

**1.6** Dynamic characteristics: Types, First and Second order instruments, Examples of first order: Resistance thermometer and thermal element, Example of $2^{nd}$ order: U–tube Manometer.

**1.7** Errors in measurement and its classifications.

**1.8** Problems

## 2. Introduction to Transducers
### (12L)

**2.1** Classification of Transducers and its characteristics

**2.2** Displacement Transducer
 **a)** Resistive Type: Linear and Angular (Rotary) Potentiometer, Strain Gauge: Bonded andUnbonded

 **b)** Capacitive Type

 **c)** Inductive Type: Self inductive: Variable number of turns, Variable Reluctance, MutualInductive: LVDT

 **d)** Piezoelectric Type: Quartz Crystal

### 2.3 Temperature Measurement

Scales for temperature: Celsius, Kelvin and Fahrenheit

Temperature Measurement Techniques

  a) Thermistor: PTC and NTC with characteristics

b) Thermocouple: Seebeck effect and Peltier effect,

**2.4 Elastic Transducer-** Diaphragm, Corrugated Diaphragm, Bellows, Bourdon Tube

**2.5** Problems.

## 3. Measurement of Pressure (8L)

**3.1** Unit of pressure, Concept of vacuum, Absolute gauge and differential pressure,

**3.2** Vacuum pumps, Rotary and Diffusion type

**3.3** Flow measurement, Electromagnetic flow

**3.4** Problems

## 4. Signal Conditioning and Processing (8L)

**4.1** Current to voltage, Voltage to current convertors, buffer amplifier, S/H Amplifier andCharacteristics, Acquisition time, Aperture time, Drop rate

**4.2** Filters: First order LPF and HPF with design,

**4.3** Instrumentation Amplifier (Using 3 op-amp)

**4.4** Photodiode , Photomultiplier

**4.5** Problems

### Reference Books:

1. **Instrumentation Device and System**, Rangan,Mani and Sarma, Tata Mc Graw Hill

2. **Instrumentation Measurement and Analysis**, Nakra, Choudhari, Tata Mc GrawHill India publication.

3. **Sensors and Transducers**, D. Patranabis, PHI publications.

4. **Op-Amps and Linear Integrated Circuits**, by Ramakant A. Gayakwad, Pearson Indiapublications.

5. **Process control Instrumentation Technology**, C.D. Johnson, PHI publications.

Subject Code: **23-PHY-233**

Subject: **Practical Course (Laboratory 2A)** (2 Credit Course)

**Total Practical =10**

## Learning Outcomes:                                    (Credits-02)

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 of an experiment.

- Setup experimental equipment to implement an experimental approach.

- Analyze the data, plot appropriate graphs and reach conclusions from data analysis.

- Work in a group to plan, implement and report on a project/experiment.

- Keep a well-maintained and instructive laboratory logbook.

**Total Experiments to be performed by a student:** (A) **10** OR (B) **8** + **Two**

**Activities(A)**: At least **6** experiments from **Section I** and **2** experiments from

**Section II**

**(B)** : At least **4** experiments from **Section I** and **2** experiments from **Section II** +
**Any TwoActivities**

## Section I: Electronics/Instrumentation

1. Circuit Theorems (Thevenin's, Norton's and Maximum Power Transfer Theorems)

2. Transistor Characteristics(Input and Output characteristics of CE Configuration)

3. Single Stage Transistor Amplifier

4. I-V Characteristics of UJT/ UJT as Relaxation Oscillator

5. Zener as a Regulator (Line and Load Regulation)

6. Op-amp as inverting and non-inverting amplifier

7. Study of Wein Bridge / Phase Shift Oscillator using 741

8. Op-amp as an adder and subtractor

9. Study of logic gates and verification of de Morgan's theorems

10. To measure displacement using potentiometer/variable inductor/ variable capacitor

11. Use of CRO(AC/DC Voltage measurement, Frequency measurement)

12. To measure force using load cell

13. To measure pressure using elastic diaphragm(In Variable Capacitor / Bourdon Tube)

## Section II: Use of Computer

1. Plotting of various trigonometric functions using spread sheet/any graphic software viz.Microsoft Excel, Origin: sin x, cos x, tan x, $e^X$, $e^{-X}$, log x, ln x, $x^n$

2. Plotting of conic sections using spreadsheet /any graphic software viz. Microsoft Excel,Origin: circle, ellipse, parabola, hyperbola

3. Inverse, determinant of matrix, solution of linear equations using Microsoft Excel orOrigin software

## Additional Activities (Any two)

1. Plotting of any **two** graphs using spreadsheets (of data obtained from various experimentsperformed by the student)

2. Any **two** computer aided demonstrations (Using computer simulations or animations)

3. Demonstrations-Any **two** demonstrations

4. Study tour with report

5. Mini project

# SEMISTER-IV

**Subject Code: 23-PHY-241**

**Subject: Oscillations, Waves and Sound** (2 Credit Course)

**Total Lectures=36**

## Learning Outcomes:

On completion of this course, the learner will be able:

- To study underlying principles of oscillations and it's scope in development.
- To understand and solve the equations / graphical representations of motion forsimple harmonic, damped, forced oscillators and waves.
- To explain oscillations in terms of energy exchange with various practical applications.
- To solve numerical problems related to undamped, damped, forced oscillationsand superposition of oscillations.
- To study characteristics of sound, decibel scales and applications.

## 1. Undamped Free Oscillations                                          (7L)

**1.1** Different types of equilibria (static, dynamic, stable, unstable, and metastable equilibrium) – definitions only with examples.

**1.2** Definitions of linear Simple Harmonic Motion (S.H.M) and angular S.H.M.

**1.3** Differential equation for linear S.H.M. and it's solution.

**1.4** Composition of two perpendicular linear S.H.Ms. for frequency ratio 1:1 and 2:1(analytical method).

**1.5** Lissajous figures, their demonstration (Electrical method) and applications.

**1.6** Problems.

## 2. Damped Oscillations                                          (7L)

**2.1** Introduction

**2.2** Differential equation for damped harmonic oscillator and it's solution,discussion of different cases.

**2.3** Logarithmic decrement.

**2.4** Average energy of damped harmonic oscillator.

**2.5** Quality factor.

**2.6** Application: LCR series circuit.

**2.7** Problems.

## 3. Forced Oscillations (8L)

**3.1** Introduction.

**3.2** Differential equation for forced oscillations and it's solution .

**3.3** Resonance: mechanical, acoustic and electrical.

**3.4** Velocity and Amplitude resonance.

**3.5** Sharpness of resonance and half width.

**3.6** Average energy of forced oscillator.

**3.7** Quality factor of forced oscillator.

**3.8** Relation between quality factor and bandwidth.

**3.9** Application of forced oscillations- LCR series circuit.

**3.10** Problems.

## 4. Wave Motion (8L)

**4.1** Introduction.

**4.2** Equation 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** Different modes ( Normal and mixed mode)of oscillations in coupled oscillator

**4.6** Qualitative discussion of seismic waves and gravitational waves.

**4.7** Problems.

## 5. Sound and Doppler Effect (6L)

**5.1** Definition of sound Intensity, Loudness, Pitch, Quality and timbre.

**5.2** Reverberation time and reverberation of a hall.

**5.3** Sabine's formula (without derivation).

**5.4** Doppler effect in sound, Expression for apparent frequency in different cases.

## Reference Books:

1. **Waves and Oscillations** by Stephenson.

2. **The Physics of Waves and Oscillations** by N. K. Bajaj, Tata McGraw- Hill, publication.

3. Fundamentals of Vibrations and Waves by S. P. Puri, Tata McGraw-Hill publication.

4. **A Text Book of Sound** by Subramanyam and Brijlal, Vikas Prakashan.

5. **Sound** by Mee, Heinmann Edition, London.

6. Waves and Oscillations - R.N. Chaudhari, New Age International (p) ltd.

7. **A Textbook on Oscillations, Waves and Acoustics** by M. Ghosh, and D. Bhattacharya, S.Chand and Company Ltd.

**Subject Code: 23-PHY-242**

**Subject: Optics (2 Credit Course)**

**Total Lectures=36**

## Learning Outcomes:

On successful completion of this course the students will be able to

- Acquire the basic concept of wave optics.

- Describe how light can constructively and destructively interfere.

- Explain why a light beam spread out after passing through an aperture

- Summarize the polarization characteristics of electromagnetic wave

- Understand the operation of many modern optical devices that utilize wave optics

- Understand optical phenomenon such polarization, diffraction and interference in terms ofthe wave model

- Analyze simple example of interference and diffraction.

1. **Geometrical optics** (8L)

   **1.1** Introduction to lenses and sign conventions, Thin lenses: lens equation for convex lens

   **1.2** Lens maker equation

   **1.3** Concept of magnification, deviation and power of thin lens

   **1.4** Equivalent focal length of two thin lenses

   **1.5** Fermat's Principle of least time

   **1.6** Laws of reflection and refraction from Fermat's Principle.

   **1.7** Total Internal Reflection

   **1.8** Concept of cardinal points

   **1.9** Problems.

2. **Lens Aberrations** (8 L)

   **2.1** Introduction to aberrations

   **2.2** Types of aberration: Monochromatic and chromatic

   **2.3** Types of monochromatic aberrations and their reductions

   **2.4** Types of chromatic aberrations

   **2.5** Achromatism: lenses in contact and separated by finite distance

   **2.6** Problems.

3. **Optical Instruments** (6L)

   **3.1** Introduction, Parts of optical instruments

   **3.2** Simple Microscope

   **3.3** Compound Microscope

   **3.4** Ramsden's eye piece

   **3.5** Huygens eye piece

   **3.6** Telescope

   **3.7** Problems.

4. **Wave Optics** (8L)

   **4.1** Introduction: Interference and Diffraction

   **4.2** Phase change on reflection. (Stokes treatment)

   **4.3** Interference due to wedge shaped thin film

**4.4** Newton's ring

**4.5** Diffraction types: Fresnel diffraction and Fraunhoffer diffraction

**4.6** Fraunhoffer diffraction at single slit

**4.7** Plane diffraction grating, Rayleigh criterion for resolution

**4.8** Problems

## 5. Polarization                                                     (6L)

**5.1** Introduction

**5.2** Brewster's law

**5.3** Law of Malus

**5.4** Polarization by double refraction.

**5.5** Optical Activity, Polarimeter, Polaroid

**5.6** Nicol's Prism

**5.7** Problems

### Reference Books:

**1. Optics** by A. R. Ganesan, IV$^{th}$ edition, Pearson Education, E. Hetch.

**2. A Textbook of Optics** by N Subhramanyam, Brijlal, M. N. Avadhanulu, S. ChandPublication

**3. Physical Optics** by A.K. Ghatak, McMillan, New Delhi

**4. Fundamental of Optics** by F. A. Jenkins, H. E. White Mc Graw-Hilll International edition

**5. Principles of Optics**, by D. S. Mathur, Gopal Press, Kanpur.

**Subject Code: PHY-243**

**Subject: Practical Course (Laboratory 2B) (2 Credit Course)**

**Total Lectures=36**

### Learning Outcome: (Credits-02)

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 of an experiment.

- Setup experimental equipment to implement an experimental approach.

- Analyze the data, plot appropriate graphs and reach conclusions from data analysis.

- Work in a group to plan, implement and report on a project/experiment.

- Keep a well-maintained and instructive laboratory logbook.

**Total Experiments:** (A) **10** OR (B) **8 + Two Activities**

**(A)** : **5** experiments from **Section I** and **5** experiments from **Section II**

**(B)** : **4** experiments from **Section I** and **4** experiments from **Section II + Any Two**

## ActivitiesSection I: Oscillations, Waves and Sound

1. Logarithmic decrement (in air and water).
2. Demonstration of laws of reflection and refraction using Fermat's principle.
3. Study of coupled oscillators comprising two simple pendulum (Mechanical) anddetermination of coupling coefficient.
4. Study of musical scales using a signal generator.
5. Measurement of coefficient of absorption of sound for different materials (cork,mica, paper etc.).
6. Study of Lissajous figures and determination of unknown frequency.
7. Directional characteristics of Microphone.
8. Determination of speed of sound by Quink's method interferometer
9. Velocity of sound by Phase shift method.
10. To determine the frequency of an electrically maintained tuning fork by stroboscopicmethod.

11. To Determine the velocity of sound in air at room temperature with Kundt's Tube.

## Section II: Optics

1. Newton's Ring: Determination of wavelength of monochromatic light source ($\lambda$).

2. Dispersive power of glass prism.

3. Total internal reflection using LASER beam and glass prism.

4. Diffraction at the edge of a razor blade.

5. Optical activity of sugar solution using polarimeter.

6. Goniometer to determine cardinal points and focal length.

7. Double refracting prism.

8. Study of Interference of light by using Biprism

### 1.3 Additional Activities (Any two)

1. Plotting of any **two** graphs using spreadsheets (of data obtained from various experimentsperformed by the student).

2. Any **two** computer aided demonstrations (Using computer simulations or animations).

3. Demonstrations –Any **two** demonstrations.

4. Study tour with report.

5. Mini Project

Progressive Education Society's

# Modern College of Arts, Science and Commerce (Autonomous)

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## 2022-23

### S.Y. B. Sc. Microbiology

Structure of the B. Sc. course

### Choice Based Credit System

**S.Y.B.Sc. Microbiology**

| Semester | Code | Paper | Paper title | Credit |
|---|---|---|---|---|
| III | 23-MB-231 | I | Medical Microbiology and Immunology | 2 |
| | 23-MB-232 | II | Bacterial Physiology and Fermentation Technology | 2 |
| | 23-MB-233 | III | Practical Course based on theory papers 23-MB-231 and 23-MB-232 | 2 |
| IV | 23-MB-241 | I | Bacterial Genetics | 2 |
| | 23-MB-242 | II | Air, Water and Soil Microbiology | 2 |
| | 23-MB-243 | III | Practical Course based on theory papers 23-MB-241 and 23-MB-242 | 2 |

## Semester III

### 23-MB-231: Medical Microbiology and Immunology

### [2 Credits; 36 Lectures]

### [1 credit=15 hrs x 60 mins 900mins/50mins= 18 lectures]

## Course Outcomes:

Students will be able to
CO1: Describe anatomy and physiology of human systems with associated
pathogens.
CO2: Explain the concept of epidemiology of infectious diseases
CO3: Explain concept of chemotherapy, antibiotics, antagonism and synergism in drug
administration,antibiotic sensitivity and route of drug administration
CO4: Explain the process of Hematopoiesis, innate immunity and adaptive immunity, concept
underlyingAntigens and Antibodies.
CO5: Relate genetics, biochemistry and inheritance of ABO and Rh blood group systems, medico
legal applications of blood groups.
CO6: Differentiate between active and passive immunization, explain immunization schedule in India
and theconcept of immunization with examples of types of vaccines.

| Unit I | Medical Microbiology | 18 |
|--------|----------------------|----|
| **1** | **Introduction to infectious diseases of following-** <br><br> (Overview of pathogens associated with different systems and <br><br> common symptoms) <br><br> a) Respiratory System <br><br> b) Gastrointestinal System and Liver <br><br> c) Urinary System <br><br> d) Central Nervous System <br><br> e) Skin | 8 |

| | | |
|---|---|---|
| **2** | **1. Introduction to Epidemiology -**<br>a) Definition of epidemiology and scope<br>b) Definition of epidemic, endemic and pandemic diseases<br>c) Modes of transmission of infection<br>d) Sources and reservoirs of infection<br>e) Disease prevention and control measures | **5** |
| **3** | **Introduction to Chemotherapy**<br>a) Definition of antibiotic, antiseptic, disinfectant drug<br>b) Characteristics of ideal chemotherapeutic agent<br>c) Routes of drug administration<br>d) Antagonism and synergism in drug administration<br>e) Antibiotic sensitivity testing | **5** |
| **Unit II** | **Immunology** | **(18)** |
| **1** | **Immunity**<br>Definition, Types (Innate and acquired, active and passive, humoraland cell mediated) | 2 |
| **2** | **Formation of blood cells (Hematopoiesis)**<br>a) Myeloid and lymphoid lineages and differentiation process<br>b) Cells involved in innate immunity and adaptive immunity,their structure and function. | 5 |
| **3** | **Antigens and antibodies: Definition and Concept**<br>a) Antigens: Examples of different antigens<br>b) Structure of antibody<br>c) Introduction to cytokines and MHC molecules | 2 |
| **4** | **Immunohematology**<br>a) ABO and Rh blood group systems<br>b) Bombay blood group<br>c) Biochemistry of blood group substances<br>d) Inheritance of ABH antigens - Problems based on ABO andRh blood group system<br>e) Medico legal applications of blood groups | 7 |

| 5 | **Active and Passive Immunization** <br><br> a) Active Immunization and Passive Immunization <br><br> b) Types of vaccines: whole organism, inactivated, toxoid, combined, cellular fractions, recombinant and synthetic. <br><br> c) Latest Immunization schedule in India | 4 |
|---|---|---|

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### 23- MB-232: Bacterial Physiology and Fermentation Technology
### [2 Credits; 36 Lectures]
### [1 credit=15 hrs x 60 mins = 900mins/50mins= 18 lectures]

**Course Outcomes:**

Students will be able to -

CO1: Describe the components of holoenzyme, nomenclature and classification of enzymes, models of catalysis and effect of various parameters on enzymes.

CO2: Explain various glucose metabolic pathways with details such as structures and names of metabolites, names of enzymes and cofactors

CO3: Describe application of fermentation technology, screening, selection and maintenance of microbial strains, design of fermentation media and fermenters, types of fermentations, working of fermenters, consequences of contamination.

| Unit I | Bacterial Physiology | (18) |
|--------|----------------------|------|
| 1 | **Enzymes**<br>i. Introduction to Enzymes: Properties of enzymes, Nature of active site, Structure ofactive site, commonly occurring amino acids at active site. Ribozymes, coenzymes, apoenzymes, prosthetic group and cofactors. | 2 |
|   | ii. Nomenclature and classification as per IUB (up to class level). | 2 |
|   | iii. Models for catalysis–<br>a) Lock and key<br>b) Induced fit<br>c) Transition state. | 1 |
|   | iv. Effect of pH and temperature, substrate concentration and enzyme concentration,activators and inhibitors of enzyme | 3 |
| 2 | **Bacterial Physiology**<br> i. Definitions of Metabolism, catabolism, anabolism, respiration and fermentation | 1 |
|   | ii. Metabolic pathways (with structures)<br>a) Embden-Meyerhof-Parnas pathway (Glycolysis). Entry of fructose and lactosein glycolysis. Substrate level phosphorylation.<br>b) Hexose monophosphate pathway<br>c) Entner-Doudoroff pathway<br>d) Phosphoketolase pathway (Hexose)<br>e) TCA cycle (with emphasis on amphibolism) and Glyoxylate bypass<br>f) Glycolysis and TCA cycle as central metabolic pathways. | 2<br>2<br>1<br>1<br>2<br>1 |

| Unit II | Fermentation Technology | (18) |
|---------|-------------------------|------|
| 1 | **Concept of fermentation technology**<br>i. Microbial biomass- based fermentation (Biofertilizer, biopesticide and Probiotics)<br>ii. Production of Primary metabolites (Organic acids, amino acids, vitamins and enzymes)<br>iii. Production of Secondary metabolites (Antibiotics)<br>iv. Production of recombinant products (insulin and growth hormones)<br>v. Production of Fermented food products (Cheese, yoghurt)<br>vi. Microbial biotransformation (Steroid transformation) | 4 |
| 2 | **Strains of industrially important microorganisms:**<br>i. Desirable characteristics of industrial strain<br>ii. Principles and methods of primary and secondary screening<br>iii. Master, working and seed culture; development of inoculum<br>iv. Preservation and maintenance of industrial strains. | 5 |
| 3 | **Design of a Fermenter (typical CSTR Continuous stirred Tank Reactor):** Different parts and their working | 2 |
| 4 | **Monitoring of different fermentation parameters**<br>(Temperature, pH, aeration, agitation, foam) | 2 |
| 5 | **Types of fermentations: Batch, continuous and dual** | 2 |
| 6 | **Media for industrial fermentations:**<br>Constituents of media (Carbon source, nitrogen source, amino acids, vitamins, minerals, water, buffers, antifoam agents, precursors, inhibitors and inducers) | 2 |
| 7 | **Contamination: Sources, precautions and consequences** | 1 |

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## 23-MB-233: Practical Course based on

## 23-MB-231: Diagnostic Microbiology and Immunology

## and
## 23-MB-232: Bacterial Physiology and Fermentation Technology
## [2 Credits: 78 Lectures]

## [1 credit=15hrs x 130 mins = 1950 mins/50 mins=39 lectures]

78 L distributed as 60 L for performing practicals and 18 L for internal evaluation

## 12 Practicals x 5 lectures = 60 Lectures

**COURSE OUTCOMES:**

Students will be able to -

CO1: Measure cell dimensions by micrometry

CO2: Identify the blood group of blood sample

CO3: Demonstrate screening of organic acid/ antibiotic and amylase producing microorganisms.. **.**

CO4: Enrich and isolate *Azotobacter* and *Rhizobium* or Cyanobacteria and prepare biofertilizer

| Expt. No. | Topics | No. of Practicals |
|---|---|---|
| 1 | Measurements of cell dimension by micrometry using 10x, 45x and 100x Objectives | 1 |
| 2 | Blood grouping: ABO, Rh and Bombay blood group (anti H Lectin test) | 1 |
| 3 | Cultural and Biochemical characteristization of bacteria<br>Gram staining & motility<br>Sugar utilization test,<br>Sugar fermentation test,<br>Enzyme detection – Gelatinase, Catalase, Oxidase | 4 |
| 4 | Staining techniques: i. Endospore staining        ii. Metachromatic granules | 1 |
| 5 | **Primary screening of industrially important organisms:**<br><br>Screening and isolation of antibiotic **and** organic acid producing organism from soil by Crowded plate and **Giant colony method**<br><br>Microorganisms producing industrially important enzyme-amylase | 2<br><br><br><br>1 |
| 6 | Enrichment, Isolation, Preparation and Application of Bioinoculants<br>a) *Azotobacter* species and b) *Rhizobium* species | 2 |
| | **Total** | **12** |

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## S. Y. B. Sc. Microbiology Syllabus (Semester IV)
### 23-MB-241: Bacterial Genetics
### [2 Credits; 36 Lectures]
### [1 credit=15 hrs x 60 mins = 900mins/50mins= 18 lectures]

**Course Outcomes:**

Students will be able to

CO1: Explain how the nature of genetic material was discovered and comprehend the structure of Nucleic acids

CO2: Comprehend the modes, rules and steps of DNA replication

CO3: Explain various types of mutations, types of mutagenic agents and their mechanism of action

CO4: Get an overview of gene expression and plasmid genetics

| Unit I | Topics | (18) |
|---|---|---|
| **1** | **Understanding DNA:**<br><br>**i.  Experimental evidence for nucleic acid as genetic material.**<br>a.  Discovery of transforming material (hereditary material):<br>b.  Griffith's experiment<br>c.  Avery and MacLeod experiment<br>d.  Gierer and Schramm<br>e.  Fraenkel-Conrat and Singer experiment (TMV virus)<br>f.  Hershey and Chase experiment | 7 |
| | **ii. Types of nucleic acids (DNA and RNAs)** | 1 |
| | **iii. Structure of DNA**<br>a.  Structure of Nitrogen bases, Nucleoside, Nucleotide and polynucleotide chain<br>b.  Bonds involved in DNA structure<br>c.  Different forms of DNA | 2 |
| **2** | **iv.  Prokaryotic DNA replication**<br>a.      Models of DNA replication (Conservative, semi- | 8 |

| | | |
|---|---|---|
| | conservative and Dispersive) | |
| | b. Meselson and Stahl's experiment (semi-conservative) | |
| | c. Basic mechanism of DNA replication | |
| | d. Enzymes, proteins and other factors involved in DNA replication. | |
| | e. Modes of DNA replication Rolling circle mechanism, theta and linear DNA replication | |
| **Unit II** | **Topics** | **(18)** |
| 1 | **i. Gene expression**<br><br>a. Concept of Genetic code and its properties<br><br>b. Concept of transcription and translation<br><br>c. Levels of genome organization in prokaryotes<br><br>d. Levels of genome organization in eukaryotes | **4** |
| 2 | **ii. Mutations and reversions**<br><br>Concept of Mutation and Types of mutations: Nonsense, Missense, Silent, Conditional lethal-temperature sensitive, Amber, Reverse, suppressor<br><br>a. Spontaneous Mutation<br><br>• Mechanism of spontaneous mutation<br><br>b. Concept of Induced Mutations<br><br>• Base pair substitution (Transitions, Transversions), Insertions and deletions-Frame / Phase shift mutations<br>• Physical Mutagenic agent: UV and X-ray<br><br>• Chemical mutagenic agents<br><br>• Base analogues (2 amino purine, 5 bromouracil) –Keto and Enol forms of Nitrogen bases.<br><br>• $HNO_2$, Alkylating agents<br><br>• Intercalating agents (EtBr, acridine orange) | **9** |
| 3 | **Plasmid genetics**<br><br>a. Types and properties of plasmids.<br><br>b. Concept of plasmid incompatibility, plasmid curing and amplification.<br><br>c. Plasmid replication Importance of plasmids in recombinant DNA Technology and other fields. | **5** |

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**S. Y. B. Sc. Microbiology Syllabus (Semester IV)**

## 23-MB-242: Air, Water and Soil Microbiology

### [2 Credits; 36 Lectures]

### [1 credit=15 hrs x 60 mins = 900mins/50mins= 18 lectures]

## Course Outcomes:

CO1: The course will help them to get knowledge of the Air Microbiology, methods of air sampling,different types of air samplers, air sanitation and airborne infections.

CO2: Deals with water microbiology including bacteriological analysis of water, methods of waterpurification, water borne infections and bacteriological standards of water quality.

CO3: Understand Soil Microbiology, rhizosphere, composting and humus formation, biofertilizers,biocontrol agents and microbial interactions.

CO4: Acquire knowledge of carbon and nitrogen cycles with role of microorganisms.

| Unit I | Air Microbiology and Water Microbiology | 18 |
|---|---|---|
| | **i. Air Microbiology** | |
| | a. Air flora<br>• Transient nature of air flora<br>• Droplet, droplet nuclei and aerosols | 1 |
| | b. Methods of Air sampling and types of air samplers<br>• Impaction on solids<br>• Impingement in liquid<br>• Sedimentation<br>• Centrifugation | 3 |
| **1** | c. Air sanitation: Physical and chemical methods | 2 |
| | d. Airborne infections | 1 |
| | **ii. Water Microbiology** | |
| | a. Types of water: surface, ground, stored, distilled, mineral andde-mineralized water | 1 |

| | | |
|---|---|---|
| **2** | b. Recommended Bacteriological standards of Water Quality<br><br>• Maharashtra Pollution Control Board<br>(MPCB) Main Functions of MPCB<br>Water quality standards for best designated usages<br>• Central Pollution Control Board<br>(CPCB) Main Functions of CPCB<br>Designated Best Use Water Quality Criteria | 1 |
| | c. Water purification methods | 2 |
| | d. Water borne Infections | 1 |
| | e. Indicators of faecal pollution:<br><br>*Escherichia coli*, *Bifidobacterium*, *Streptococcus faecalis*,<br>*Clostridium perfringens*,<br>New indicators: *Campylobacter* and *Pseudomonas* | 2 |
| | f. **Bacteriological analysis of water for potability**<br><br>    i. Bacteriological standards of potable water: Bureau of Indian standards (BIS)<br>    ii. World Health Organization (WHO)<br>    iii. Presumptive coliform count<br>    iv. Confirmed test<br>    v. Completed test<br>    vi. Eijkman test<br>    vii. Membrane filter technique | 4 |
| **Unit II** | **Soil Microbiology** | **18** |
| | a. Rhizosphere microflora and its role in the rhizosphere | 1 |
| | b. Role of microorganisms in composting and humus formation | 2 |
| | c. Biofertilizers: Bacterial, Cyanobacterial, fungal and their large-scale production | 3 |
| | d. Biocontrol agents: Bacterial, Viral, Fungal and their large-scale production | 3 |
| | e. Brief account of microbial interactions:<br>Symbiosis, Neutralism, Commensalism, Competition, Ammensalism, Synergism, Parasitism and Predation | 5 |

| | f. Role of microorganisms in elemental cycles in nature: Carbon, Nitrogen | 4 |
|---|---|---|

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## S.Y. B. Sc. Microbiology Syllabus(Semester IV)

### 23-MB-243: Practical Course based on
### 23-MB-241: Bacterial Genetics and MB-242: Air, Water and Soil   Microbiology

### [2 Credits: 78 Lectures]

### [1 credit=15hrs x 130 mins = 1950 mins/50 mins=39 lectures]

### 78 L distributed as 60 L for performing practicals and 18 L for internal evaluation

### 12 Practicals x 5 lectures = 60 Lectures

**Course Outcomes:**

Students will be able to

CO1: Estimate the diversity of microorganism by statistical analysis
CO2: Determine potability of drinking water using MPN test and membrane filtration

technique.

CO3: Isolate and identify pathogens E. coli, Staphylococcus aureus and Candida

from clinicalsample and characterize them by Gram staining, motility, cultural and

biochemical tests Demonstrate the use of physical and chemical mutagen to isolate

mutants.

| Expt.No | Topics | No. of Practicals |
|---|---|---|
| 1 | Air Flora:<br><br>a. Diversity determination Simpson index.<br><br>b. Determination of sedimentation rate | 2 |
| 2 | Bacteriological tests for potability of water<br><br>a. MPN, Confirmed and Completed test.<br>b. Membrane filter technique (Demonstration)<br>c. Identification of *E. coli* from water sample as fecal indicator | 3 |
| 3 | Tests for Biochemical characterization of bacteria<br><br>i.  Triple Sugar iron agar<br><br>ii. IMViC test | 4 |

| | | |
|---|---|---|
| | iii. Oxidative-fermentative test [Baird Parker's modification of Hugh and Leifson's oxidative- fermentative (OF) basal medium for Gram Positive and Hugh and Leifson's oxidative- fermentative (OF) basal medium for Gram negative; Public Health England, 2019] | |
| 4 | i. UV- survival curve<br>ii. Induction of mutation by using physical mutagen (e.g. U V rays)<br>iii. Isolation of auxotrophic mutants by Replica Plate | 2 |
| 5 | i. Visit to Industry/ Drinking Water treatment plant | 1 |
| | **Total** | **12** |

**References:**

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4. WHO Guidelines for Indoor Air Quality: Dampness and Mould. (2009). Philippines: WHO.

5. Aneja K. R. (2007). Experiments in Microbiology, Plant Pathology and Biotechnology.New Age International, New Delhi, India

6. Cox C. C. and Wathes C. M. (2020). Bioaerosols Handbook. United States: CRC Press.

7. Bisen P. S. (2014). Laboratory Protocols in Applied Life Sciences. United Kingdom: CRCPress.

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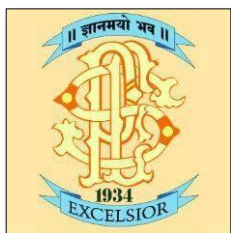
**Progressive Education Society's**

**Modern College of Arts, Science andCommerce Pune 16**

**(An Autonomous College Affiliated to Savitribai Phule Pune University)**

**Three Year B.Sc. Degree Program in Statistics**

**(Faculty of Science & Technology)**

**S. Y. B. Sc. Statistics**

**Choice Based Credit System Syllabus**

**To be implemented from Academic Year 2023-2024**

**Notes:**
1. A student of the three year B. Sc. Degree course will not be allowed to offer Statistics and Statistical Techniques simultaneously in any of the three years of the course.
2. Students offering Statistics at the first year of the three year B. Sc. course may be allowed to offer Statistical Techniques as one of their subjects in the second year of the three year $B.Sc.$ Course in the place of Statistics.
3. Students offering Statistical Techniques at the first of the three year B. Sc. course may be allowed to offer Statistics as one of their subjects in the second year of the three year B. Sc. Course in place of Statistical Techniques provided they satisfy other requirements regarding subject combinations, if any.
4. Students must complete all the practical to the satisfaction of the teacher concerned. At the time of practical examination, a student must produce the laboratory journal along with the completion certificate signed by the Head of the Department.
5. **Study Tour**: In order to acquaint the students with applications of Statistical methods in various fields such as industries, agricultural sectors , Government Institutes etc. study tour may be arranged and the report be attached in practical journal.

## Structure of the S. Y. B. Sc. Statistics Course

| Sem. No. | Paper No. | Paper code and paper title | Credits | Lectures per Week | Marks | |
|---|---|---|---|---|---|---|
| | | | | | Internal | External |
| III | 1 | 23-ST-231 Discrete Probability Distributions and Time Series | 02 | 03 | 15 | 35 |
| | 2 | 23-ST-232 Continuous Probability Distributions | | | | |
| | 3 | 23-ST-233 StatisticsPractical I | | | | |
| IV | 1 | 23-ST-241 Tests of Significance And Statistical Methods | 02 | 03 | 15 | 35 |
| | 2 | 23-ST-242 Continuous Probability Distributions And Exact tests | | | | |
| | 3 | 23-ST-243 StatisticsPractical II | | | | |

**\*\*\*** (each lecture of 50 minutes)

**Objectives:**

1. **To fit various discrete and continuous probability distributions and to study various** real life situations.
2. To identify the appropriate probability model that can be used.
3. To use forecasting and data analysis techniques in case of uni-variate and multivariate datasets.
4. To use statistical software packages.
5. To test various hypotheses of significance like means, proportions, independence ofattributes, variance etc. included in theory (using calculators, software).
6. To compute probabilities of discrete and continuous probability distributions usingMS-Excel and/or R software (whichever is applicable).
7. To study applications of statistics in the field of demography etc.

### Structure of evaluation of practical paper at $S.Y.$ B. Sc.

A) Continuous Internal Assessment for practical CIA)

| Section | Marks |
|---|---|
| 1) Journal | 05 |
| 2) Viva-voce | 05 |
| 3) Project | 05 |
| **Total of A** | **15** |

B) End of Semester Examination (ESE)

| Section | Nature | Marks | Time |
|---|---|---|---|
| I | Note: Question No.1 is compulsory. | 5 | 10 Min |
| II | Using R-software: Note : Any two questions out of 4 Questions) | 26 (13 Marks per Question) | 1 Hr. 30 Min |
| III | Viva -Voce | 4 | 10 Min |
| Total of B | | 35 | 1 Hr. 50 Min |
| Total of A+ B | | | |

**Preparation by Internal Examiner:**
1. Keep at least 15 **computers** with latest configuration ready with battery backup and necessary software, printers, at the examination laboratory.
2. Any other types of data required as per slip also be entered in computer spreadsheet.

**Instructions to Examiners:**
1. Students are not expected to fill data items at the time of examination. They are expected to use MS Excel and $R$ −commands (whichever is applicable) to operate on the data set which are already fed.
2. The questions on section I (On line examination Using $Ms - EXCEL$ / R−commands (whichever applicable)) are compulsory and there is no internal option.
3. The slips made available for Section I shall be allotted to the candidate's at random.

**Instruction for theory Examination:**

1. The theory question paper for each paper shall cover all the topics in the pertaining syllabus with proportional weightage to the number of hours of instruction prescribed.
2. The practical are to be conducted in batches as per the University norms for the faculty of science.
3. Medium of Instruction: English.
4. Pattern of examination: Semester wise.
5. Standard of passing : As per norms of University

# SEMESTER – III
## PAPER - I
### 23-ST – 231: DISCRETE PROBABILITY DISTRIBUTIONS AND TIME SERIES

**Course Outcomes:-**
CO1) Students will learn new distributions like Negative binomial, multivariate, truncated distribution.
CO2) Students learn new concept of time series and their components.
CO3) Students learn exploratory data analysis in time series.
CO4) Students learn the application of the techniques like fitting of curve and their statistical analysis for time series.

**1. Time Series:**         **(08L)**

1.1 Meaning and utility of time series, components of time series: trend, seasonal variations, cyclical variations, irregular (error) fluctuations or noise.

1.2 Exploratory data analysis: Time series plot to (i) check any trend and seasonality in the timeseries (ii) identify the nature of trend .

1.3 Methods of trend estimation and smoothing: (i) moving average, (ii) linear parabolic, exponential, curve fitting by least squares principle (iii) exponential smoothing, Choosing parameters for smoothing and forecasting. Forecasting based on exponential smoothing.

1.4 Measurement of seasonal variations: i) simple average method, ii) ratio to moving average method, iii) ratio to trend where linear trend is calculated by method of least squares. (Numericalexamples with heavy computations are to be asked preferably in practicals).

1.5 Fitting of autoregressive model $AR(p)$, where $p = 1,2$.

**2. Negative Binomial Distribution:**         **(08L)**

**2.1 Probability mass function (p. m. f.), Notation: $X \sim NB(k, p)$.**

2.2 Graphical nature of p. m. f., negative binomial distribution as a waiting time distribution,

2.3 Momentgenerating function (MGF), cumulant generating function (CGF), mean, variance, skew-ness, kurtosis (recurrence relation between moments is not expected),

2.4 Additive property of NB (k, p).

2.5 Relation between geometric distribution and negative binomial distribution.

2.6 Poisson approximation to negative binomial distribution. Real life situations.

## 3. Multinomial Distribution: (12L)

3.1 Probability mass function (p. m. f.))
   Notation: $\underline{X} = (X_1, X_2 \dots X_k), p = (p_1, p_2 \dots p_k),\ \underline{X} \sim (n,)$,
3.2 Joint MGF of $(X_1, X_2, \dots, X_k)$, use of MGF to obtain means, variances, covariance
3.3 Total correlation coefficients, variance – covariance matrix, rank of variance – covariance matrix and its interpretation,
3.4 Additive property of multinomial distribution, uni-variate marginal distribution, distribution of Xi+Xj, conditional distribution of $Xi \mid Xj = r$, conditional distribution of Xi given Xi+ Xj $= r$, real life situations and applications.

## 4. Truncated distributions (08L)

4.1 Concept of truncated distribution, truncation to the right, left and on both sides.
   1. Binomial distribution left truncated at $X = 0$ (value zero is discarded), its p. m. f., mean and variance.
   2. Poisson distribution left truncated at $X = 0$ (value zero is discarded), its p. m. f., mean and variance. Real life situations and applications.

## SEMESTER – III
## PAPER - II
## 23-ST 232: CONTINUOUS PROBABILITY DISTRIBUTIONS

**Course Outcomes:**
CO1) Students will understand the concept of continuous random variable and its probability distribution.
CO2) Students will able to describe and study the different kinds of continuous probability distributions such as Uniform distribution, Normal distribution and Exponential distribution.
CO3) They can find relations among aforesaid continuous random variables.
CO4) Students can implement these probability distributions in handling the real life Data.

## 1. Continuous Uni-variate Distributions: (08L)

1.1 Continuous sample space: Definition, illustrations.
   Continuous random variable: Definition, probability density function (p. d. f.), cumulative distribution function (c. d. f.), properties of c. d. f. (without proof), and probabilities of events related to random variable.
1.2 Expectation of continuous r. v., expectation of function of r. v. [$g(X)$], mean,

variance, geometric mean, harmonic mean, raw and central moments, skewness, kurtosis, mean deviation about mean.

**1.3** Moment generating function (MGF): Definition, properties. Cumulant generating function (CGF): Definition.

**1.4** Mode, partition values: quartiles, deciles, percentiles.

**1.5** Probability distribution of function of r. v. : $Y = g(X)$ using i) Jacobean of transformationfor $g(.)$ monotonic function and one-to-one, on to functions, ii) Distribution function for $Y = X^2, Y = |X|$ etc., iii) M.G.F. of $g(X)$.

## 2. **Continuous Bivariate Distributions:** (07L)

**2.1** Continuous bivariate random vector or variable $(X, Y)$: Joint p. d. f., joint c. d. f, properties (without proof), probabilities of events related to random variables (events in terms ofregions bounded by regular curves, circles, straight lines). Marginal and conditional distributions.

**2.2** Expectation of r. v.(X,Y), expectation of function of r. v. $E[g(X, Y)]$, joint moments, $Cov(X, Y), Corr (X, Y)$, conditional mean, conditional variance, $E[(X|Y = y)] = E(X)$ & $E[(Y/X = x) = (Y), regression as a conditional expectation.Theorems on expectation: i) $E(X + Y) = E(X) + (Y)$, (ii) $(XY) = E(X) (Y)$, if X $and$ Y are independent, generalization to k variables. $(aX + bY + c), Var (aX + bY + c)$ (statement only proofnot expected).

**2.3** Independence of random variables X $and$ Y and also its extension to $k$ random variables.

**2.4** Moment generating function (MGF):$M_{X,Y} (t_1, t_2)$ , properties, MGF of marginal distribution ofrandom variables, properties i) $M_{X, Y} (t_1, t_2) = M_X (t_1, 0) M_Y (0, t_2)$ if X and Y are independent random variables

**2.5** Probability distribution of transformation of bivariate r. v. $U = \phi_1 (X, Y)$, $V = \phi_2(X, Y)$.

## 3. **Standard Uni-variate Continuous Distributions:**

### 3.1 **Uniform or Rectangular Distribution:** (03L)

3.1.1Probability density function (p. d. f.)
Notation: X ~ U (a, b), p. d. f., sketch of p. d. f., c. d. f.,

3.1.2 mean, variance, symmetry, MGF.

3.1.3 Distributions of i)$\frac{X-a}{b-a}$, ii)$\frac{b-X}{b-a}$, iii) Y= F(x) where F(x) is the c. d. f. of continuous r. v.

3.1.4 Application of the result to model sampling. (Distributions of X+Y, X–Y, X/Y and XY are not expected)

### 3.2 **Normal Distribution:** (10L)

3.2.1 Probability density function (p. d. f.)
Notation: X~ N (μ, σ2)

3.2.2 P. d. f. curve, identification of scale and location parameters, nature of probability curve, Points of inflexion of probability curve, computations of normal probabilities using normal probability integral tables.

3.2.3 mean, variance, mode, quartiles (Q1, Q2, Q3), mean deviation, ,

3.2.4 MGF, CGF, additive property, central moments, cumulants, skewness, kurtosis,

3.2.4 Probability distribution of: i), standard normal variable (S.N.V.), ii) aX+b iii) aX+bY+ c, where X and Y are independent normal variates. Probability distribution of the mean of n. r. v s.,

3.2.5 Central limit theorem (CLT) for r. v. s with finite positive variance (statement only), its illustration for Poisson and Binomial distributions.

***(Box-Muller transformation and normal probability plot to be covered in practical)

### 3.3 Gamma Distribution: (05L)

3.3.1 Notation: X~ G ($\alpha$, $\lambda$)

3.3.2 Nature of probability curve,

3.3.3 MGF, CGF, moments, cumulants, skewness, kurtosis, additive property.

3.3.4 Relation between distribution function of Poisson and Gamma variates.

### 3.4 Exponential Distribution (03L)

3.4.1 Exponential Distribution as a special case of Gamma distribution

3.4.2 Distribution function, quartiles ($Q_1$, $Q_2$, $Q_3$), Lack of memory property,

3.4.3, mean deviation about mean,

3.4.4 M.g.f., distribution of sum of two i.i.d exponential random variables.

3.4.5.Distribution of $min(X, Y)$ and $max(X, Y)$ with $X, Y$ as $i.i.d.$ standard exponential random variables.

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# SEMESTER – III
# PAPER - III
# 23-ST-233: PRACTICAL

| Sr. No. | Title of the Practical | No. of Practicals |
|---|---|---|
| 1 | Introduction to R:<br>1. c function, scan  2. data Frame, edit () 3. Matrix form  4.importing data file, accessing the data from R library  5.seq() , rep() functions 6.subset and transform 7.Basic commands (summary(), fivenum(), length()) | 1 |
| 2 | Representation of data using R commands:<br>1. Diagrams (Simple, multiple, subdivided bar diagram)<br>2. Graphs (Histogram, ogive curves, boxplot diagram) | 1 |
| 3. | Calculations of measures of<br>1.Central tendency 2. Dispersion 3. Skewness 4. Kurtosis for raw data. | 1 |
| 4. | Calculations of using R<br>1. Probabilities 2. Quantiles<br>Model sampling  from probability distribution using R<br>Understanding location, scale parameter using R (For Normal and Gamma distribution) | 1 |
| 5 | Fitting of negative binomial distribution and computation of expected frequencies and testing the goodness of fit graphically using R | 1 |
| 6 | Fitting of normal distribution and computation of expected frequencies. and testing the goodness of fit graphically using R | 1 |
| 7 | Fitting of Exponential distribution and computation of expected frequencies and testing the goodness of fit graphically using R | 1 |
| **Practicals based on MS-EXCEL** | | |
| 8 | Computation of Moving average | 1 |
| 9 | Computation of seasonal indices | 1 |
| 10 | Project: Project based on analysis of data collected by students in groups of Maximum 6 students. | 3 |
| **** Study tour Report (if any) | | |

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## SEMESTER – III
## PAPER - I
## 23-ST – 241: TESTS OF SIGNIFICANCE AND STATISTICAL METHODS.

**Course Outcomes:**

CO1) Students will learn new techniques like testing of hypotheses.

CO2) Students will learn multiple regression which is the extension of simple linear regression.

CO3) Students learn Demography and the various rates of vital statistics.

CO4) Students will learn new application which is queuing model.

1. **Tests of Significance:** **(14L)**

   **1.1** Random sample from a distribution as i. i. $d.$ r.vs. $X_1, X_2, X_3, \ldots, X_n.$

   **1.2 Statistic and Parameter**. Sampling distribution of a statistic, standard error of a statistic with illustrations. **Statistical Inference**: Introduction to problem of Estimation and testing of hypothesis. Estimator and estimate. Unbiased estimator (definition and simple illustrations only). Point and interval estimation. Statistical hypothesis, null and alternative hypothesis, simple and composite hypothesis, one sided and two sided alternative hypothesis, critical region, $type - I$ and $type - II$ error, level of significance, $p - value$. Two sided confidence interval. Tests of hypotheses using i) critical region approach, ii) $p - value$ approach and iii) confidence interval approach.

   **1.3** Tests for population means (large sample / approximate tests):

   i) single population( two sided, one sided test, variance known)

   ii) two populations( two sided, one sided test, variance known)

   iii) Construction of two sided confidence interval for $\mu$ and $\mu_1 - \mu_2$

   **1.4** Tests for population proportions:

   i) single population( two sided, one sided test)

   ii) two population( two sided, one sided test).

   iii) Construction of two sided confidence interval for $P \ and \ P_1 - P_2.$

2. **Multiple Linear Regression Model:** **(08L)**

   **2.1** Notion of multiple linear regression. Yule's notation (trivariate case) (statement only). Fitting of regression plane of Y on $X_1$ and $X_2$, $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + s$ by the method of least squares; obtaining normal equations, solution of normal equations. Definition and interpretation of partial regression coefficients $\beta_1$ and $\beta_2$. (relations between partial regression coefficients and multiple correlations on are not expected ). Residual: Definition, order, derivation of variance, properties. Finding multiple and partial correlation coefficients if ( $X_1, X_2, X_3$) ~> MD( n, $P_1$, $P_2$ ,$P_3$)

**2.2** Definition of multiple correlation coefficient. Derivation of the expression formultiple correlation coefficient. Properties of multiple correlation coefficient.
i)range  ii) relation between multiple and total correlation coefficient
**2.3** Coefficient of determination. Interpretation of coefficient of multiple determination
**2.4** Partial correlation coefficient: Definition and derivation of partial correlation coefficient Property of partial correlation coefficient
i)range  ii) relation between multiple and partial correlation coefficient

## 3. Demography: (08L)

**3.1** Vital events, vital statistics, methods of obtaining vital statistics, rates of vital events,sex ratios, dependency ratio.
**3.2** Death/Mortality rates: Crude death rate, specific (age, sex etc.) death rate, standardizeddeath rate (direct and indirect), infant mortality rate.
**3.3** Fertility/Birth rate: Crude birth rate, general fertility rate, specific (age, sex etc.)fertility rates, total fertility rate.
**3.4** Growth/Reproduction rates: Gross reproduction rate, net reproduction rate. (Numerical examples with heavy computations  are to be asked preferably in practicals).
**3.5** Interpretations of different rates, uses and applications.
**3.6** Trends in vital rates as revealed in the latest census.

## 4. Queuing Model: (06L)

**4.1** Introduction to queueing model. as an application of exponential distribution, Poissondistribution and geometric distribution.
**4.2** Kendall's notation $M/M/1: FIFO$.
4.3 Inter arrival rate, service rate, traffic intensity, queue disciplines.
4.4 Probability distribution of number of customers in queue, average queue length, average waitingtime
In  i) queue, ii) system. (Without derivations) statement of Little's formula / relations.

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## SEMESTER – III
## PAPER - II

### 23-ST-242: CONTINUOUS DISTRIBUTIONS AND EXACT TESTS.

**Course Outcomes:**
CO1) Students will understand the concept of testing of hypothesis.
CO2) Students will able to describe and study the different kinds of continuous probability distributions such as Chi square distribution, t and F distributions.
CO3) They can find relations among aforesaid continuous random variables.
CO4) Students can implement the tests based on sampling distributions in  the real life situations

1. **Chi-square Distribution:** (06L)
   1.1 Definition of chi-square r.v. as a sum of squares of i.i.d. standard normal variables, Notation.
   1.2 Derivation of the p.d.f. of Chi-square variable with n degrees of freedom (d.f.).
   1.3 Chi square distribution as a special case of Gamma distribution.
      mean, variance, MGF, CGF, central moments skewness, kurtosis, mode, additive property.
   1.4 Use of chi-square  tables for calculations  of probabilities. Normal approximation of Chi square random variable to standard normal variate (   statement only)
   1.5 Distribution  of  $\bar{X}$  and  $S^2$ for  a  random sample taken from normal distribution using orthogonal transformation, independence of  $\bar{X}$  and $S^2$.

2. **Student's $t$ −distribution:** (05L)
   2.1 Definition of $t$ r.v. with n d.f.,  Notation: $t \sim t_n$
   2.2 Derivation of the p.d.f of $t$ distribution, nature of probability curve, mean, variance, moments, Mode
   2.3 Use of t-tables for calculations of probabilities, statement of normal approximation.

3. **Snedecore's $F$ −distribution:** (05L)
   3.1 Definition of F random variable as a ratio of two independent standard normal variates.
      Notation: $F \sim F_{n_1, n_2}$
   3.2 Derivation of the p.d.f, nature of probability curve,
   3.3  mean, variance, moments, mode.
   3.4 Distribution of $\frac{1}{F_{n1,n2}}$ ,
   3.5 use of tables for calculation of probabilities
   3.6 Interrelationship between Chi-square, $t$ and $F$ distributions.

### 4. Test of Hypothesis: (12L)

**4.1 Tests based on chi-square distribution**:

a) Test for independence of two attributes arranged in $2 \times 2$ contingency table(with Yate'scorrection)

b) Test for independence of two attributes arranged in $r \times s$ contingency table, Mc Nemar'stest

c) Test for goodness of fit.

d) Test for variance (Ho: $\sigma^2 = \sigma_o^2$ )against one-sided and two-sided alternatives
   i) for known mean, ii) for unknown mean.

**4.2 Tests based on d distribution**:

a) Tests for population means:

   (i) Single sample with unknown variance and two sample for unknown equal variances testsfor one-sided and two-sided alternatives.

   (ii) $100(1 - \alpha)$ % two sided confidence interval for population mean and difference of meansof two independent normal populations.

b) Paired t-test for one-sided and two-sided alternatives.

**4.3 Test based on $F -$distribution**:

Test for equality of two population variances with
   i) population means are known ii) Population means are unknown.

### 5. Bivariate normal distribution: (08L)

5.1 P. d. f. of a bivariate normal distribution
   Notation :(, $Y) \sim BN (\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho), X \sim Np (\mu, \Sigma)$

5.2 Nature of surface of p. d. f., marginal and conditional distributions, identification of parameters,

5.3 Regression of Y on X and of X on Y, independence and un-correlatedness,

5.4 MGF and moments.

5.5 Distribution of $aX + bY + c, X/Y$.

5.6 Applications and real life situations

# SEMESTER – III
# PAPER - III

## 23-ST-243: PRACTICALS

**Pre-requisites:** Knowledge of the topics in theory.
**Objectives**:

1. To conduct various tests of significance like averages, population proportions, independence of attributes, variance etc. included in theory (using calculators, R software).

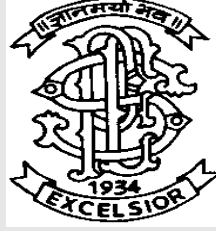2. To compute probabilities of discrete and continuous probability distributions using R software.

| Sr. No. | Title of the Practical | No. of Practical |
|---|---|---|
| 1 | Computations of GRR and NRR using R | 1 |
| 2 | Large sample tests using R<br>1. testing population proportion (single population, two populations)<br>2. Testing population mean (single population, two populations, variance known, unknown) | 2 |
| 3 | Small sample tests using R<br>1. Testing population mean (single population, two populations, variance known, unknown)<br>2. Paired t-test<br>3. Testing population variance (single population, two populations, mean known, unknown.) | 2 |
| 4. | Tests based on chi-square distribution<br>1. Goodness of fit<br>2. Independence of attributes | 1 |
| 6 | Fitting of regression model using R<br><br>1. Simple regression model 2. Multiple regression model 3.Quadratic regression model | 3 |
| 7. | **Writing the comment using if… then statement**<br>**Finding frequency distribution using for() statement** | 1 |
| 10 | **Project**: Project based on analysis of data collected by students in groups of maximum **6** students. (Project is equivalent to three practical's) | 3 |
| | Study tour report (if any) | - |

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**Books Recommended:**

1. Brockwell P.J.and Davis R.A. (2003), Introduction to Time Series and Forecasting (Second Edition),Springer Texts in Statistics.
2. Chatfield C. (2001), The Analysis of Time Series An Introduction, Chapman and Hall / CRC, Texts inStatistical Science.
3. Goon A. M., Gupta, M. K. and Dasgupta, B. (1986), Fundamentals of Statistics, Vol. 2, World Press,Kolkata.
4. Gupta, S. C. and Kapoor, V. K. (2002), Fundamentals of Mathematical Statistics, (Eleventh Edition), SultanChand and Sons, 23, Daryaganj, New Delhi, 110002.
5. Gupta, S. C. and Kapoor V. K. (2007), Fundamentals of Applied Statistics (Fourth Edition), Sultan Chandand Sons, New Delhi.
6. Gupta, S. P. (2002), Statistical Methods (Thirty First Edition), Sultan Chand and Sons, 23, Daryaganj, NewDelhi 110002.
7. Hogg, R. V. and Craig, A. T., Mckean J. W. (2012), Introduction to Mathematical Statistics (TenthImpression), Pearson Prentice Hall.
8. Kulkarni, M. B., Ghatpande, S. B. and Gore, S. D. (1999), Common Statistical Tests, Satyajeet Prakashan,Pune 411029
9. Medhi, J., Statistical Methods, Wiley Eastern Ltd., 4835/24, Ansari Road, Daryaganj, New Delhi – 110002.
10. Meyer, P. L., Introductory Probability and Statistical Applications, Oxford and IBH Publishing Co. NewDelhi.
11. Mood, A. M., Graybill F. A. and Bose, F. A. (1974), Introduction to Theory of Statistics (Third Edition,Chapters II, IV, V, VI), McGraw - Hill Series G A 276
12. Mukhopadhya Parimal (1999), Applied Statistics, New Central Book Agency, Pvt. Ltd. Kolkata
13. Purohit S. G., Gore S. D. and Deshmukh S. R. (2008), Statistics using R, Narosa Publishing House, NewDelhi.
14. Ross, S. (2003), A first course in probability (Sixth Edition), Pearson Education publishers, Delhi, India.
15. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers and Scientists (Third Edition, Chapters 4, 5, 6, 8, 10), Macmillan Publishing Co. Inc. 866, Third Avenue, New York 10022.
16. Weiss N., Introductory Statistics, Pearson education publishers.

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*Progressive Education Society's*

# Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

# S.Y.B.Sc. (English)

## Introduction:

The Department of English envisions youth with love for literature, desiring to explore the world of aesthetic pleasure, kindle their spirit to understand the science of language, improve their power of expression and linguistic competency leading to successful careers in diverse fields.

The department aims to inspire, motivate and encourage students to excel in their academics, be good communicators, foster employability skills among them by providing a platform to identify and nurture their inherent talent, promote their creative pursuits, build their self-esteem and make them well-rounded personalities.

## Programme Objectives:

- Nurturing responsible citizens through socio-economic, linguistic and cultural engagement
- Identify and appreciate the real-world perspectives of knowledge through global understanding of texts and theories
- Promote professionalism and cultivate ethical behaviour
- Provide a plethora of avenues in career including higher studies, research and employment

## Programme Specific Outcomes (PSOs):

To create awareness about the importance of English as a global language
To cultivate research aptitude through comparative study of cultures and literatures
To acquaint students with catalytic effect of English in opening gateways to innumerable career opportunities
To make students comprehend, analyse and appreciate literary texts
To enhance their personality, build their confidence through training in English communication viz. social etiquette, manners, formal and informal conversations etc.

## Examination Pattern:

CIE- 30 Marks

ESE-70 Marks

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Study Tour
11. Written Test
12. PPT presentation
13. Field Visit
14. Industrial Visit
15. Viva

## Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content

# Subject List

**SEMESTER III**

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
|---|---|---|---|---|---|---|
| | | | Theory | Practical | Total | |
| 1 | AECC- (Ability Enhancement Core Course) | **23-23321** English -AECC-11-A Language- English | 3 | | | 45 |
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### SEMESTER IV

| Sr. No. | Subject Type | Subject Code & Title | Credits | | | Total No.of Lectures |
| --- | --- | --- | --- | --- | --- | --- |
| | | | Theory | Practical | Total | |
| 1 | AECC- (Ability Enhancement Core Course) | **23-24321** English-AECC-IV-A Language-English | 3 | | | 45 |
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# Syllabus

**Subject Code: 23-23321**

**Subject: English -AECC-11-A- Language-English (SYBSc General) (3 credit course)**

**Total Lectures=45**

| Units | Language-English Topics | Lectures |
|---|---|---|
| 1 | Short Story:<br>    i) 'A Shadow': R. K. Narayan | 05 |
| 2 | Poetry:<br>    i) La Belle Dame sans Merci: John Keats<br>    ii) Where the Mind is without Fear: Rabindranath Tagore | 10 |
| 3 | **English for Research Purposes:**<br><br>1. Writing a Research Proposal<br>2. Writing a Research Paper<br>3. Scientific Report Writing | 15 |
| 4 | **INTERVIEW TECHNIQUES:**<br><br>• Job Application Letter<br>• Résumé Writing<br>• Group Discussion & Personal Interview<br>• Presentations | 15 |

**Prescribed Text:**

1. Horizons: English in Multivalent Contexts (Board of Editors- OrientBlackSwan)

2. Aspirations: English for Careers (Board of Editors- Orient BlackSwan)

# Semester IV

**Subject: English -AECC-1V-A- Language-English (SYBSc General) (3 credit course)**
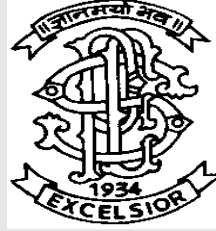
**Total Lectures=45**

| Units | Language-English Topics | Lectures |
|---|---|---|
| 1 | Short Story:<br>   i) My Lost Dollar: Stephen Leacock | 05 |
| 2 | Poetry:<br>  2. The Bird Sanctuary: Sarojini Naidu<br>  3. Stopping by Woods on a Snowy Evening: Robert Frost | 10 |
| 3 | WRITING SKILLS:<br>   1. Notices<br>   2. Agenda<br>   3. Minutes<br>   4. Content Writing | 15 |
| 4 | SOFT SKILLS AND PERSONALITY DEVELOPMENT:<br><br>1. An Introduction to Soft Skills<br>2. SWOC Analysis<br>3. Goal Setting<br>4. Project Management | 15 |

**Prescribed Text:**

1. Horizons: English in Multivalent Contexts (Board of Editors- OrientBlackSwan)

2. Aspirations: English for Careers (Board of Editors- Orient BlackSwan)

**Reference Books:**

1. Adair, John. Effective Communication, London: Pan Macmillan Ltd. 2003.

2. Amos, Julie-Ann. Handling Tough Job Interviews. Mumbai: Jaico Publishing, 2004.

3. Baron, N.S., (2008).Always On: Language in an Online and Mobile World. Oxford UniversityPress. Oxford.

4. Borg, James.(2010). Body Language: 7 Easy Lessons to Master the Silent Language. FT Press.

5. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.

6. Kroehnert, Gary. Basic Presentation Skills. Sidney: McGraw Hill, 2010.

7. Linda B., Iris V. (2001). Intercultural Communication in the Global Workplace. 2nd Edition.Tata McGraw

8. Mitra, B. (2011). Personality Development & Soft Skills.1st edition. Oxfor.

*Progressive Education Society's*

# Modern College of Arts, Science and Commerce

# Ganeshkhind, Pune – 411 016

# (Autonomous)

Syllabus for

# S. Y. B. Voc. Food Processing Technology

## Introduction:

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college education, leading to Bachelor of Vocation (B. Voc.) degree with multiple exits such as Diploma/Advanced Diploma under the National Skill Qualification framework (NSQF). The B. Voc. Programme is focused on providing undergraduate studies which would also incorporate specific jobs and their NOSs (National Occupational standards) along with broad based general education. This would enable the graduates completing B. Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

Under National Skills Development Corporation, many Sector Skill Council representing respective industries have/are being established. One of the mandates of Sector Skill Councils is to develop National Occupational Standards (NOSs) for various jobs in their respective industries. It is important to embed the competencies required for specific jobs roles in the higher education system for creating employable graduates.

This course will identify and fill the skill gaps. The mandate of this program is to create a course with industry-academia collaboration that will produce skilled workforce satisfying specific needs of the industry. This course will offer multiple needs of the industry. The structure will allow offer multiple needs of the industry. The structure will allow students to have thorough theoretical knowledge coupled with rigorous hands on training in both laboratory and industry.

Unique Features of the Course:

• The skill development component is to equip students with appropriate knowledge, practice and attitude, so they are ready to work.

• The skill development components will be relevant to the industries as per their requirements.

• The curriculum is embed with National Occupational Standards (NOSs) of specific job roles within the industry sector(s).

• The overall design of the skill development component along with technologies in food process engineering.

• The curriculum should also focus on work-readiness skills in each of the three years. Curriculum should also focus on work-readiness skills in each of the three years. Curriculum is designed to match industrial needs with greater emphasis on pratical work, on the job training and industrial internship.

## Program Objectives:

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are ready to work at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

## Program Specific Outcomes (PSOs):

**Program Outcomes:**

After successful completion of B.Voc (Food Processing Technology) program, the students should be able:

PO1: to have competencies in the area of basic and applied food processing technology.
PO2: to explore and have in depth knowledge of all food processing technology related sectors.
PO3: to set up their own processing unit or should engage in research.
PO4: to develop new products.

**Program-specific / Course outcomes**

### FPT 13: Post Harvest management of fruit and vegetables (4 credits)

After successfully completing this course, the students should be able to:

CO1: to understand about different preservation techniques and its role in food industry.
CO2: to learn about processing of different fruits and preservation by preparation of different

beverages, like RTS, squash, cordial, nectar, concentrate and fruit powder
CO3: to learn processing of jam, jelly, marmalade and defects in preparation of products.
CO4: to have in depth knowledge about drying and dehydration of fruit and vegetable.
CO5: to learn processing of tomato and different tomato products.

### FPT 14: Food Safety and Quality Control (4 Credit)

After successfully completing this course, the students should be able to:

CO1: to understand microorganisms responsible for spoilage, assessment of food based on microbial quality, microbial assessment of foods..
CO2: to understand the basic of food safety, implementation of HACCP, importance of TQM in food industry, different ISO series and their uses, importance of auditing

and accreditation in food industry

CO3:  to have in depth knowledge regarding hazards present in foods.

CO4: understand concept of AGMARK, BIS

**FPT 15: Food Analysis (4 Credit)**

After successfully completing this course, the students should be able to:

CO1: understand different physical, chemical and rheological properties of foods.

CO2: understand the techniques of food analysis viz. gravimetric colorimetric, chromatographic with their working principles and application.

CO3: acquire knowledge about sensory attributes, facilities for sensory evaluation sensory evaluation methods of food.

CO4: learn about proximate analysis of foods and different instruments application

CO5: learn about sampling procedure and types of sampling, its uses for sensory evaluation.

**FPT 16: Practical on Post-Harvest management of fruit and vegetables**

After successfully completing this course, the students should be able to:

CO1: will understand the preservation of fruits and vegetable by pickling.

CO2: will learn to preserve the fruit by sugar by preparing squash.

CO3: to understand the drying of fruit and vegetables

CO4: have knowledge control the enzymatic browning in fruit and vegetables by using different method like blanching, salt solution, acid solution, normal water solution, refrigeration

**FPT 17: Practical on Food Safety and Quality Control**

After successfully completing this course, the students should be able to:

CO1: understand to prepare different types of media with its importance.

CO2: learn different methods for microbial examination in food sample and detection methods.

CO3: knowledge about water analysis, personal hygiene, surface analysis and methods used in it.

CO4: learn implementation of HACCP and ISO.
CO5:  acquire knowledge of adulteration.


**FPT 18: Practical on Food Analysis**

After successfully completing this course, the students should be able to:

CO1: understand preparation of various types of solutions.
CO2: understand about basic chromatographic principles.
CO3: handle various equipment's used food analysis.
CO4: learn about proximate analysis of foods and different instruments application


**FPT 19: Processing of Spices and Flavoring Agents**

After successfully completing this course, the students should be able to:

CO1: understand the basic concepts, Production and processing scenario of spices, flavour & plantation crops and its scope in India.
CO2: understand the Major and Minor spices, herbs and leafy vegetables: processing and utilization.
CO3: understand about Spice oils, packaging of spices and processing of spice products, Separation, purification and identification of natural flavoring.
CO4: They will know Standards specification of spices and flavors.


**FPT 20: Food Packaging Technology**

After successfully completing this course, the students should be able to:

CO1: understand basic concepts of food packaging, shelf life and evaluation of packaging.
CO2: learn about methods of packaging and types of packaging materials.
CO3: understand about legal and management aspects of packaging.
CO4: Evaluation of quality and safety of packaging materials and different testing procedures


**FPT 21: Computer Applications in Food Industry**

After successfully completing this course, the students should be able to:

CO1: will understand a brief history of computing, data processing and information, anatomy of computers, input and output devices and various types of memories.

CO2: learn about personal computers, types of processors, booting of computer, warm and cold booting, computer viruses, worms and vaccines

CO3: learn about Windows, MS Power Point and MS Word.

CO4: will learn E-Commerce.

**FPT 22: Practical on Processing of Spices and Flavoring Agents**

After successfully completing this course, the students should be able to:

CO1: will understand the Identification and characterization of flavoring compounds of spices

CO2: acquire the knowledge about Packaging study of spices

CO3: understand preparation of curry powder and preparation of Indian Masala for different foods

CO4: gain a hands-on experience for preparation flavored oils and Preparation of various marinades.

**FPT 23: Practical on Food Packaging Technology**

After successfully completing this course, the students should be able to:

CO1: understand about Identification of different types of packaging and packaging materials and measurement of thickness of packaging materials.

CO2: learn about performing destructive and non-destructive test on glass container.

CO3: study determination of shelf life of packaged foods and determination of ERH of foods.

CO4: learn about recent trends in food packaging.

**FPT 24: Practical on Computer Applications**

After successfully completing this course, the students should be able to:

CO1: understand study of computer components; booting of computer and its shut down.

CO2: Practice of some fundamental DOS Commands.

CO3: They will study MS-Word, MS-Access, MSEXCEL and MS Power Point

CO4: will get introduced to f Computer Networking Tools and E-Commerce platform used in Food Industry

## Examination Pattern:

50:50 [Continuous Internal Evaluation: Formative, Summative and End semester exam (ESE)]

Evaluation of Students:

1) The Internal evaluation will be in form of continuous assessment format of 50 marks and End-Semester examinations will be of 50 marks making total to 100 (4CREDIT).

2) The Internal evaluation will be in form of continuous assessment format of 75 marks and End-Semester examinations will be of 75 marks making total to 150 (6 CREDIT).

2) Student has to obtain 30% marks in the examination of In-Semester and End-Semester assessment. Separate passing is mandatory and total passing marks is 40%.

In-semester Examination: Internal assessment for each course would be continuous and dates for each tutorials/practical tests etc. 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.

## Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Short Quizzes / MCQ Test
2. Term Paper
3. Lecture/ Library Notes
4. Home Assignments
5. Group Discussion
6. Open Book Test
7. Written Test
8. PPT presentation
9. Viva

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. E-content

# Subject List

**SEMESTER III**

| Subject Code | Name of the Subject | TH/PR | Credits | Contact Hrs. |
|---|---|---|---|---|
| FPT13 | Post-Harvest Management of Fruits and Vegetables | TH | 4 | 60 |
| FPT14 | Food Safety and Quality Control | TH | 4 | 60 |
| FPT15 | Food Analysis | TH | 4 | 60 |
| FPT16 | Practical on Post Harvest Management of Fruits and Vegetables | PR | 6 | 90 |
| FPT17 | Practical on Food Safety and Quality Control | PR | 6 | 90 |
| FPT18 | Practical on Food Analysis | PR | 6 | 90 |
| **Total** | | | **30** | **450** |

## SEMESTER IV

| Subject Code | Name of the Subject | TH/PR | Credits | Contact Hrs. |
|---|---|---|---|---|
| FPT19 | Processing of Spices and Flavoring Agents | TH | 4 | 60 |
| FPT20 | Food Packaging | TH | 4 | 60 |
| FPT21 | Computer applications in Food Industry | TH | 4 | 60 |
| FPT22 | Practical on Processing of Spices and Flavoring Agents | PR | 6 | 90 |
| FPT23 | Practical on Food Packaging | PR | 6 | 90 |
| FPT24 | Practical on Computer applications in Food Industry | PR | 6 | 90 |
| **Total** | | | **30** | **450** |

# Syllabus

**Subject Code:** FPT 13

**Subject:** Post Harvest management of fruit and vegetables (4 credits)

**Total Lectures=60**

| Sr. No. | Topic | Lectures (60L) |
|---|---|---|
| 1. | **Introduction** | 12 |
| | 1. Importance of fruits and vegetables<br>2. Classification of fruits and vegetables<br>3. History and need of preservation, Reasons of spoilage<br>4. Current status of production and processing of fruits and vegetables. Structural, compositional and nutritional aspects.<br>5. Post-harvest physiology, handling, losses and conservation of fruits and vegetables<br>6. Methods of preservation ( short and long term) | |
| 2. | **Canning and bottling of fruits and vegetables** | 8 |
| | 1. Selection of fruits and vegetables<br>2. Process of canning<br>3. Factors affecting the process: time and temperature<br>4. Containers for packing<br>5. Lacquering<br>6. Syrups and brines for canning<br>7. Spoilage of canned foods | |
| 3. | **Fruit beverages** | 10 |
| | 1. Introduction<br>2. Processing of fruit juices ( selection, juice extraction, deaeration, straining, filtration, clarification and bottling | |

| | | | |
|---|---|---|---|
| | 3. Preservation of fruit juices ( pasteurisation, chemical preservation with sugars, freezing, drying, tetra packing, carbonation) <br> 4. Processing of RTS, cordials, nectars, squashes, concentrates and powders. | |
| 4. | **Jams, Jellies and marmalades** | 10 |
| | 1. Jams: constituents, selection of fruits, processing technology, defects <br> 2. Jelly : essentials of constituents (role of pectin and ratio), theory of jelly formation, processing and technology, defects <br> 3. Marmalades: types, processing technology, defects | |
| 5. | **Pickles, chutney and sauces** | 7 |
| | 1. Types <br> 2. processing technology <br> causes of spoilage | |
| 6. | **Tomato products** | 6 |
| | 1. Introduction <br> 2. Selection of tomatoes <br> 3. pulping and processing of different tomato products- tomato puree, sauces, ketchup, soup and paste | |
| 7. | **Dehydration of foods and vegetables** | 7 |
| | 1. Sun drying and mechanical dehydration factors affecting drying operations, Industrial drying operations. <br> 2. Spray drying. Drum drying, vacuum, fluidized beds and freeze drying. <br> 3. Quality and stability of dried foods, Rehydration properties. Sensory and nutritive aspects <br> 4. process variation of fruits and vegetables <br> packing and storage | |

**References:**
1. Food science by B.Srilakshami;New Age International.
2. Fundamentals of Foods and Nutrition by R. Madambi& M.V. Rajgopal.
3. Foods :Facts and Principles by N Shakuntalamanay;New Age International (P) Ltd.
4. Preservation of Fruits and Vegetable by Girdharilal and Sidappa; CBS Publications
5. Food Science and Processing Technology,Vol., 2 by Mridula and Sreelata
6. Food Preservation by Sandeep Sareen
7. Fruit and Vegetable Preservation by Shrivastava and Kunal.
8. Post-Harvest Physiology & Handling of Fruits & Vegetables by Wills, Lee, Graham, Mc Glasson& Hall (AVI)
9. Literature from Spice Board of India, etc.

10. Girdharilal, Siddappaa, G.S and Tandon, G.L., Preservation of fruits &Vegetables, ICAR, New Delhi, 1998
11. W B Crusess. Commercial Unit and Vegetable Products, W.V. Special IndianEdition, Pub: Agrobios India
12. Manay, S. &Shadaksharaswami, M., Foods: Facts and Principles, New AgePublishers, 2004

**Subject Code** FPT 14

**Subject :** Food Safety and Quality Control (4 Credit)

**Total Lectures=60**

| Chapter No | Content | Lectures (60L) |
|---|---|---|
| 1. | **Introduction to Food Safety :** Definition**,** Types of hazards, Factors affecting Food Safety**,** Importance of Safe Foods | **15** |
| | **Food Hazards of Physical and Chemical Origin** <br>• Introduction <br>• Physical Hazards with common examples <br>• Chemical Hazards (naturally occurring ,environmental and intentionally added ) <br>• Impact on health and Control measures | |
| 2. | **Food Hazards of Biological Origin** <br>• Introduction <br>• Indicator Organisms <br>• Food borne pathogens: bacteria, viruses, eukaryotes, Seafood and Shell fish poisoning, Mycotoxins | **15** |
| 3. | **Management of hazards:** Control of parameters**,** Temperature control**,** Food storage, Sources of food contamination, Pest Control, Personal hygiene , Control methods using physical and chemical agents, Waste Disposal | **12** |
| 4. | **Microbiological criteria** <br>• MRA <br>• Microbiological Assessment and categories of food based on microbial Quality <br>• Sampling <br>• Basic steps in detection of food borne pathogens <br>• Water Analysis | **08** |
| 5. | **Laws:** <br>GMP/GHP; GLP, GAP <br>HACCP <br>ISO <br>FSSA <br>TQM | **10** |

| | certification and quality assurance (PFA, FPO, MPO, AGMARK, BIS)<br>Codex | |
| --- | --- | --- |

**References:**

1. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook , RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 &Sons; USA, 1987

| Chapter No | Content | Lectures (60L) |
|---|---|---|
| 1. | Introduction to Food Analysis- Food composition and Factors affecting food composition. Physical properties: Colour, viscosity, size and shape: & Chemical properties of foods. rheological properties of food Sampling techniques; Sample collection and preparation for analysis, Evaluation of GRAS aspect of food additives; | **15** |
| 2. | **p**H meter : Theory, Principle, types and application Moisture Meter: Theory, Principle, types and application Centrifuge : Theory, Principle, types and application Methods of analysis: Proximate constituents: Total fat, crude fiber, protein, moisture, minerals analysis; adulterations | **15** |
| 3. | Spectroscopic analysis- Principle, instrumentation & application Colorimetric (colorimeter), Titrimetric analysis : Principle, types and application Gravimetric analysis : Principle, types and application Chromatographic techniques : Principle, types and application | **12** |
| 4. | Sensory attributes of foods: mechanisms of sensation and perception of colour, taste, odour, and flavour; importance and use of sensory evaluation, methods of sensory evaluation, facilities required for sensory evaluation. Shelf life study of foods. | **10** |
| 5. | Analysis of sensory data; Statistical testing; correlating instrumental and sensory measurements. Nutritional labelling of foods. | **08** |

**Subject Code:** FPT 15

**Subject :** Food Analysis (4 Credit)

**Total Lectures=60**

**References:**

1. A. V. Sathe, A First Course in Food Analysis, New Age International Pvt. Ltd. 1999
2. S. S. Nielsen, Food Analysis, 3rd ed., Kluwer Academic Publishers, 2003
3. S. S. Nielsen, Food Analysis Laboratory Manual, Kluwer Academic Publishers, 2003
4. R.Wood, L.Foster, A.Damant and P.Key, Analytical Methods for Food Additives, Wood head Publishing, 2004
5. Y. Pomeranz and C.E.Meloan, Food Analysis: Theory and Practice, 3rd ed., Chapman & Hall, 1994

| S.No. | Post - Harvest management of fruit and vegetables (6 credits) | Practical (30P) |
|---|---|---|
| 1. | Determination of moisture content of fruit and vegetable | 2 P |
| 2. | Quality parameter evaluation of fresh fruit and vegetable. | 2 P |
| 3. | Controlling enzymatic browning in fruit and vegetable | 3 P |
| 4. | Asses the adequacy of blanching. | 1 P |
| 5. | Pre-treatment and drying of fruit and vegetable | 2 P |
| 6. | Experiment on dried product quality evaluation. | 1 P |
| 7. | Preparation of mixed fruit jam | 2 P |
| 8. | Preparation of jellies | 2 P |
| 9. | Preparation of RTS, squash | 3 P |
| 10. | Preparation of sauce and ketchup | 2 P |
| 11. | Carry out the preservation of fruits and vegetables by pickling | 3 P |
| 12. | Sensory evaluation of processed products. | 2 P |
| 13. | Osmotic dehydration of fruits and vegetables. | 2 P |
| 14. | Bottling of peas. | 1 P |
| 15. | Examination of canned pineapple. | 1 P |
| 16. | Identification of different types of packaging material used in the food industry. | 1 P |

**Subject Code:  FPT 16:**

**Subject : Practical on Post-Harvest management of fruit and vegetables (6 Credit Course)**

**Total Practical =30**

**Subject Code: FPT 17**

**Subject: Practical on Food Safety and Quality Control (6 credit course)**

| Sr. No. | Practical on Food Safety and Quality Control (6 Credits) | Practical (30P) |
|---|---|---|
| 1 | Preparation of different types of media (complex, differential and selective) | 2P |
| 2 | Enumeration of aerial micro flora using PDA | 2P |
| 3 | Microbiological Examination of different food samples | 2P |
| 4 | Bacteriological Analysis of Water | 2P |
| 5 | Assessment of surface sanitation by swab/rinse method | 2P |
| 6 | Assessment of personal hygiene | 2P |
| 7 | Biochemical tests for identification of bacteria | 2P |
| 8 | Scheme for the detection of food borne pathogens | 2P |
| 9 | Implementation of FSMS – HACCP, ISO : 22000 | 2P |
| 10 | Qualitative tests for fats and oils, spices and condiments | 2P |
| 11 | Inspection of quality as per National and International standards for various food stuffs- pulses, spices, etc. | 2P |
| 12 | Analysis of edible common salt for MC, MIW and total chlorides. | 2P |
| 13 | Detection of adulteration in various foods | 2P |
| 14 | Study of National and Codex microbial quality standards | 2P |
| 15 | Activities of Quality Department and Studies on bar codes | 2P |

**Subject Code: FPT 18**

**Subject: Practical on Food Analysis (6 Credit Course)**

**Total Practical= 30 P (30x3hrs.)**

| S.No | Practical on Food Analysis (6 Credits) | Practical (30P) |
|---|---|---|
| 1. | Basic Instruments/ Equipments used in biochemical laboratories and important working | 1 |
| 2. | Preparation of Solutions : Normality, Molarity, Percent solutions, Buffers | 1 |
| 3. | Physical examination of various food grains | 1 |
| 4. | Quality analysis of milk | 1 |
| 5. | Experiments on fat tests. | 1 |
| 6. | Determination of gluten content and water absorption capacity | 2 |
| 7. | Quality analysis of water | 1 |
| 8. | Separation and identification of amino acids by paper chromatography | 2 |
| 9. | Separation and identification of molecules by Thin Layer Chromatography | 1 |
| 10. | Determination of total ash content in food products. Preparation of ash solution for mineral estimation. | 2 |
| 11. | Determination of Titratable acidity and pH of fruit juice | 2 |
| 12. | Sensory analysis of food products | 2 |
| 13. | Determination of impurities of oil samples | 2 |
| 14. | Free fatty acids in fats and oils | 2 |
| 15. | Qualitative analysis of Carbohydrates and Amino acids | 2 |
| 16. | Determination of protein in foods | 2 |
| 17. | Determination of Reducing Sugars | 2 |
| 18. | Estimation of fat by Soxhlet extraction method. | 1 |

| Chapter No. | Topics | Lectures |
|---|---|---|
| 19. | Qualitative detection of adulterants in Atta, Maida, Besan, Biscuit, Black pepper, Butter, Ghee, Chilli Powder, Honey, Tea, Turmeric powder, soft drink | 2 |

# Semester IV

**Subject Code: FPT 19**

**Subject: Processing of Spices and Flavoring Agents (4 Credit Course)**

**Total Lecture: 60**

| Chapter No. | Topics | Lectures (60L) |
|---|---|---|
| 1 | Production and processing scenario of spices, flavour & plantation crops and its scope | 4 |
| 2 | Major Spices: (1) Post Harvest Technology composition, processed products of following spices (2) Ginger (3) Chilly (4) Turmeric (5) Onion and garlic (6) Pepper (7) Cardamom (8) Cashew nut | 12 |
| 3 | Minor spices, herbs and leafy vegetables: processing and utilization, All spice, Annie seed, sweet Basil, Caraway seed, Cassia, Cinnamon, Clove, Coriander, cumin, Dill seed Fern seed nutmeg mint marjoram, Rose merry, saffron, sage, thyme, Ajowan, Curry leaves, Asafoetida | 10 |
| 4 | Spice oils and oleoresins packaging of spices and spice products, Functional packaging of spices and spice products By-products of plantation crops and spices | 8 |
| 5 | Overview on flavouring compounds used in Food,  Synthetic flavouring agents and their stability (Wines, spirits, MSG and vinegars) | 8 |
| 6 | Flavour Flavours of minor spices; Flavour of major spices , Flavours of soft drinks, Baking and confectionery industry | 10 |

| Sr No. | Topics | Lectures |
|--------|--------|----------|
| | Natural flavouring agents and their stability(Vanilla, Cocoa beans, Olive oil, mustard oil and walnut oil) | |
| 7 | Separation, purification and identification of natural flavouring Marinades and types of marinades(cooked and raw) | 8 |

## Reference:

1. Spices and Plantation Crops  K.G. Shanmugavelu  Agrotech Publication, Delhi

2. Spice and Condiments Pruthi J.S. National Book Trus, 1996

**Subject Code: FPT 20**

**Subject :  Food Packaging Technology**

**Total Lecture: 60**

| Sr No. | Topics | Lectures (60L) |
|--------|--------|----------------|
| 1 | **Introduction To Packaging**<br>Introduction- evaluation of packaging- economics- packaging operations- packaging terminology. Need of packaging, Hazards in distribution- functions of package- design of packages for various foods. | 7 |
| 2 | **Packaging materials:**<br>Classification of packages,<br>Paper (corrugated and paper board boxes etc.), Glass, Metal, Aluminium and  as package material its manufacture, types, advantages, disadvantages,<br>plastic as package material, classification of polymers, properties, uses and chemistry of each plastic such as polyethylene, polypropylene, polystyrene, polycarbonate, PVC, PVDC, cellulose acetate, nylon. Lamination, need of lamination, types, properties, advantages & disadvantages. | 17 |
| 3 | **Special packaging methods-**<br>MAP, CAP, Vacuum and gas packaging, shrink package, retort pouches- Bio degradable packages.<br>Permeability – theoretical consideration permeability of gases and vapours, permeability of multilayer packages, permeability in relation to products. | 10 |
| 4 | **Canning Operations** | 08 |

| | | | |
|---|---|---|---|
| | Canning of food products- types of cans- open top sanitary cans- tin plate grades- lacquering and sealing compounds for OTS cans- canning operations- can washing and sterilization- exhausting- seaming- reforming and flanging operations- retorting of cans. | |
| **5** | **Selection Of Packaging Materials** Special problems of packaging food stuffs- packaging of various foods- compatibility- toxicity- packaging equipments- packaging standards and regulations. | 08 |
| **6** | **Legal And Management Aspects Of Packaging** Laws and policies behind packaging, safety and legislative aspects of packaging. Testing and evaluation of packaging media- retail packs (including shelf life evaluation)and transport packages, Food marketing and role of packaging, packaging Aesthetic and graphic design, labelling in packages, coding and marking including bar coding. | 10 |

**REFERENCE BOOKS**
1. Sachrow & Griffin, "Food packaging"
2. Heiss R., "Principles of food packaging"
3. Paine E.A, "Fundamentals of packaging".
4. Day P.T., "Packaging of food beverages"
5. Brody AL, "Flexible packaging of Foods"
6. Gordon L. Robertson Food Packaging principles & practice, New york, Marcell DekkerInc.
7. Ronald H. Schmidt Gary E. Roderick Handbook of Food packaging, Food safety Technology by NIIR Board of consultants & Engineers
8. Bureau of G and Multon J.K Food Packaging technology, (Vol.1 and 2) – VCH publishers, INC, New York.
9. Kadoya, T. (1994), Food Packaging, Academic Press, New York

**Subject Code: FPT 21**

**Subject: Computer Applications in Food Industry (4 credit)**

**Total Lectures=60**

| Sr.No | Topic | Lectures |
|---|---|---|
| 1 | **Computer Fundamental**<br>• Introduction to Computer system<br>• Anatomy of Computer<br>• A Brief History of Computer<br>• Computer Memory and its Unit<br>• Various types of Computer Memory<br>• Classification of Computer<br>• Computer hardware used in food industry (Monitor screen, Touch Screens, Palm Tops, various Printers, Barcode Printers and Scanners, RFID Tags, etc.)<br>• Software and Types of Software for their application in food industry (Like SAP, justFoodERP, FoodWorks, SERVE, etc.) | **8** |
| 2 | **Data Processing and Concept of Operating System**<br>• **Introduction of Data Processing**<br>• Data Processing Lifecycle<br>• Difference between Data and Information •<br>**Introduction to Operating System**<br>• Functions of Operating System<br>• Types of Operating System<br>• Processor, Types of Processor, and its application • Basic Input output System (BIOS) and type of Booting<br>• Typical DOS Internal and External Commands | 8 |
| 3 | **Window Operating System**<br>Introduction of Window Operating System •<br>Introduction of Graphical User Interface<br>• Anatomy of Windows | 8 |

| | | • Desktop and its Elements<br>• Introduction of File Explorer<br>  • Organizing folders and files, multitasking, recycle bin, my computer.<br>• Control Panel and its elements. | |
|---|---|---|---|
| 4 | **MS-Office Package**<br>  • Introduction of MS-Office<br>  • Introduction of Spread Sheet Software<br>  • Introduction of MS-Power Point<br>  • Introduction of MS-Access | 14 |
| 5 | • **Introduction of Problem-Solving Techniques** • Steps for Problem Solving<br>  • **Introduction of Algorithm**<br>  • Characteristics of Algorithm<br> • Types of Order used in Algorithm with Examples (Minimum 3 Examples to each Order)<br>  • Advantages and disadvantages of Algorithm •<br>**Introduction of Flowchart**<br>  • List of Notation used in flowchart<br> • Types of Order used in Flowchart with Examples (Minimum 3 Examples to each Order)<br>  • Advantages and disadvantages of Flowchart • Basic Introduction of Programming Languages Like (C, HTML, JAVA, PHP, Python, R-Software, MATLAB etc.) | 12 |
| 6 | **Computer Networking and Communications, E Commerce**<br> • Computer Networks Goals and applications like Business Application, Home Application, and Mobile User.<br> • Computer Transmission Medium (Guided and Unguided)<br> • Network Types LAN, MAN, WAN, Wireless Networks, Home Networks, Internetwork.<br> • Network Hardware (Router, Switches, Hub) • Network Topology (Star, Ring, Bus, Mesh, Tree, Hybrid, etc.)<br> • Concept of Intranet, Extranet, and Internet • Network Protocols like (TCP/IP, IP, FTP, PPP, HTTP and HTTPS)<br> • Network Security and firewall<br> • Introduction to World Wide Web (WWW)<br> • Introduction of E-Commerce<br> • Types of E-Commerce<br> • Features of E-Commerce<br> • Use of E-Commerce in Food Industry | 10 |

**Book References:**

1. Computer Fundamental by P.K. Sinha & Priti Shinha

2. Computer Fundamental by Anita Goel

3. Computer Networks (Fourth Edition) by Andrew S. Tanenbaum

4. Problem Solving with C by Somashekara, M. T. Guru D. S.

**Subject Code: FPT 22**

**Subject: Practical on Processing of Spices and Flavoring Agents (6 Credits)**

**Total Practical: 30 x 3hrs**

| S. No. | TOPICS | Practicals (30 P) |
|---|---|---|
| 1 | A. Identification and characterization of flavouring compounds of spices<br>B. Nomenclature of spices | 2<br>2 |
| 2 | Study of different grinding methods of spices | 2 |
| 3 | Preparation of Rajasthani curry powder | 1 |
| 4 | Preparation of Asian curry powder and south Indian curry powder | 2 |
| 5 | Preparation of flavoured oils(Garlic oil, Green chilli oil and Basil oil) | 2 |
| 6 | Preparation of Indian (Garam) Masala for different foods | 2 |
| 7 | Preparation of chat masala | 1 |
| 8 | Preparation of Tea masala | 1 |
| 9 | Preparation of Pavbhaji masala | 1 |
| 10 | Study on Curing of ginger | 2 |
| 11 | Detection of adulteration in spices | 2 |
| 12 | Steam distillation of spices for essential oil | 2 |
| 13 | Preparation of various marinades<br>Chicken marinades<br>Paneer marinades | 2 |
| 14 | Study of standard specification of spices, ESA, ASTA, FSSAI | 2 |
| 15 | Study of Spices Board of India, Study of spices research institutes in India | 2 |
| 16 | Packaging study of spices | 2 |

**Subject Code: FPT 23**

**Subject : Practical on Food Packaging Technology (6 credits)**

**Total Practical =30**

| Sr. No. | Topic | Practical (30P) |
|---|---|---|
| 1. | Identification of different types of packaging and packaging materials | 2 |
| 2. | Determination of tensile strength of given material | 2 |
| 3. | Performing destructive and non-destructive test on glass container: determination of wax weights, | 2 |
| 4. | Determination of bursting strength | 2 |
| 5. | Determination of WVTR of packaging materials | 1 |
| 6. | Measurement of thickness of packaging materials; | 2 |
| 7. | Testing of chemical resistance of packaging materials | 1 |
| 8. | Determination of shelf life of packaged foods; determination of ERH of foods | 2 |
| 9. | Determination of drop test of food packages | 2 |
| 10. | Determination of Box compression test; | 2 |
| 11. | Determination of coding on package materials | 2 |
| 12. | Pre-packaging practices followed for packing of fruits and vegetables | 2 |
| 13. | Study on nutritional labelling of different food materials. | 2 |
| 14. | Study of vacuum packaging machine, bottle filling machine and form-fill-seal machine | 2 |
| 15. | Shelf life calculations for food products in different packaging materials | 2 |
| 16. | Introduction to students with the latest trends in packaging consulting the websites and magazines | 2 |

**Subject Code:  FPT 24**

**Subject : Practical on Computer Applications**

**Total Practical = 30**

| S. No. | TOPICS | Practicals (30 P) |
|--------|--------|-------------------|
| 1 | Study of Computer Components | 2 |
| 2 | Study of Hardware and Software Components used in Food Industry | 2 |
| 3 | Study of Operating System | 2 |
| 4 | Practice of some fundamental DOS Commands | 2 |
| 5 | Practice of Basic MS-Word Operation as Word Processing Software | 2 |
| 6 | Practice of Advanced MS-word Operation as Word Processing Software | 2 |
| 7 | Practice of Basic MS-Excel function as Statistical tool | 2 |
| 8 | Practice of Advanced MS-Excel function as Statistical tool | 2 |
| 9 | Practice of Basic MS-PowerPoint Operation | 2 |
| 10 | Practice of Advanced MS-PowerPoint Operation | 2 |
| 11 | Practice of Basic MS-Access functions | 2 |
| 12 | Practice of some Basic and Advance Algorithm using MS-Word | 2 |
| 13 | Practice of some Basic and Advance Flowchart using MS-Word | 2 |
| 14 | Introduction of Different Programming Language | 2 |
| 15 | Introduction of Computer Networking Tools and E-Commerce platform used in Food Industry | 2 |