Selvamm Arts & Science College
(Autonomous)

Nationally Re-Accredited at the Highest Grade “A” by NAAC

UGC Recognized 2(f) and 12(B) Institution

Affiliated to Periyar University, Salem-11
Namakkal - 637003.

Master of Commerce (M.Com.)
Choice Based Credit System (CBCS)

Regulations / Syllabus
(From the Academic Year 2017 -2018)
Vision:
Providing value based, society oriented Principles and practice of commerce and management which produce leaders competitive scholars talented students globally.

Mission:
Organizing industrial visits, projects to help the students apply the principles and concepts learnt in the classroom. Developing leadership and employability skills among the students. Exposing the students to get global business and professional practices. Sensitizing on the need of value based life and social responsibilities. Embedding global strategy in the courses taught in the programme caring for the creation and to become eco-friendly.

Programme Outcomes (PG)

**PO 1: Application** : Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

**PO 2: Analysis** : Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

**PO 3: Solution Finding** : Facilitate to enter multidisciplinary path to solve day-to-day problems.

**PO 4: Progression in Career** : Prepare students for prominent career in industry, banks offices and for further academic study.

**PO 5: Research Capability** : Able to do the experiments with proper procedure, appropriately record and Analyze the results.

**PO 6: Expressing their talents** : Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.
PO 7: Individual sustainability: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: Competency: Attain competency in job market / entrepreneurship.
<table>
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<th>S. No</th>
<th>Core / Elective</th>
<th>Paper Code</th>
<th>Title Of The Course</th>
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*Hrs = Hours; *Crs = Credits; *CIA = Continuous Internal Assessment;

*Note: Extension Activities 60 Hours (Semester II& III) per semester 30 hours to outside the class hours.

*Note: Skills Through English (LSRW) 80 Hour (Sem I, II, III and IV) Per Semester 20 Hours to inside the class hours.

* Part – I: Core, Elective, Non-major Elective and Extra – Disciplinary Courses.

* Part – II: Extension Activities (ERP).
Program Specific Outcomes (PSOs)
1. The students will develop an ability to apply knowledge acquired in problem solving.
2. Ability to work in teams with enhanced communication and interpersonal skills.
3. The students will be ready for employment in functional areas like Accounting, Taxation, Banking, Insurance and Corporate Law.
4. Ability to start entrepreneurial activities and to create awareness in human rights and economic rights.
5. To inculcate ethical values, team work, leadership and managerial skills.
6. Students will exhibit inclination towards pursuing professional courses such as CA/ CS/ CMA/CFA etc.
7. To inculcate the knowledge of business and the techniques of managing the business with special focus on marketing, Insurance, banking theory, law and practices and stock exchange.
8. To impart the knowledge basic accounting principles and the latest application oriented corporate accounting methods and cost accounting.
9. To develop the decision making skill through costing methods and practical application of management accounting principles.
10. To enhance the horizon of knowledge in various field of commerce through advertising and sales promotion, auditing and entrepreneurial development.
11. To enhance the computer literacy and its applicability in business through latest version on tally and e-commerce principles.
12. To create awareness in application oriented research through research for business decisions.
13. To enhance the direct tax, GST and time and value of supply.
Semester – I

Core paper - I

Marketing Management

Paper Code: 17P1CM01

Objective: To enable the Students to gain deep knowledge in marketing

Unit I Concept of Marketing (17 hours)


Unit II Product Development (17 hours)


Unit III Buyer Behaviour (16 hours)


Unit IV Pricing (15 hours)


Unit V Promotional Aspects (15 hours)

Selvann Arts and Science College (Autonomous), Namakkal
Department of Commerce
B.Com

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<td>CO-I</td>
<td>To Realize about Concept of Marketing.</td>
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<td>CO-II</td>
<td>To Learn Product Development.</td>
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<td>CO-III</td>
<td>To know about Buyer Behaviour.</td>
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<td>CO-IV</td>
<td>To Understand Pricing Decision - Factors Affecting Price Determination – Pricing Policies and Strategies.</td>
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<td>CO-V</td>
<td>To know about Promotional Aspects.</td>
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**Text Books:**

**Reference Books:**
Semester – I

Core paper - II

Accounting for Managerial Decisions

Paper code: 17P1CM02

Objectives: To make the students, to know the tools and techniques for analysis and interpretation of financial statements and management reporting;
To enable the students to be well equipped with decision making as managers.

Unit I Basics Concepts (17 hours)

Unit II Financial Statements and Ratio Analysis (17 hours)
Analysis and Interpretation of Financial Statements – Ratio Analysis – Classification of Ratios - Significance of Ratios - Uses and Limitations.

Unit III Fund Flow and Cash Flow Analysis (16 hours)
Fund Flow Analysis – Meaning – Importance – Limitations - Cash Flow Analysis(As Per Revised As) – Meaning – Sources and Application of Funds – Managerial Uses

Unit IV Budgeting (15 hours)
Budgeting - Meaning and Concept - Essentials of Good Budgeting - Types of Budgets - Sales, Production, Material, Purchase Budgets - Flexible Budgets - Cash Budget - Zero Based Budgeting- Capital Budgeting –Types.

Unit V Standard Costing (15 hours)

Note: The question may be asked from theory and problem shall be 20% and 80% respectively
Upon completion of this course, students will be able to

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Text Book:
1) Maheswari S.N.,(2011), Management Accounting, Sultan Chand & Sons, New Delhi.

Reference Books:
2) MY Khan and PK Jain,(2009), Management Accounting, Mc Graw Hill, New Delhi.
Semester - I
Core Paper - III

Advanced Business Statistics
Paper Code: 17P1CM03

Objective: To understand and apply Statistical tools in Business and Solve the problems.

Unit I Statistical Analysis (17 hours)

Unit II Probability Distributions (15 hours)
Probability Distributions - Binomial, Poisson and Normal Distributions - Characteristics and Applications.

Unit III Testing of Hypothesis (15 hours)
Testing of Hypothesis - Standard Error and Sampling Distribution - Errors in Testing Hypothesis – Large Samples Test-Tests of Significance - Z Test-Small Samples Test - t Test.

Unit IV Parametric Tests (17 hours)
Testing of Hypothesis - Parametric Tests - F -Test - One - way - Two - way - x2 Test and Goodness of fit - Yates Correction - Uses of x2 Test - Introduction of SPSS.

Unit V Multivariate Analysis (16 hours)
Multivariate Analysis - Partial and Multiple Correlation and Regression - Factor Analysis - Cluster Analysis - Discriminant Analysis.

Note:
The question may be asked from theory and problem shall be 20% and 80% respectively.

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Selvam Arts and Science College (Autonomous), Namakkal
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**Text Book:**


**Reference Books:**

Corporate Laws

Paper Code: 17P1CM04

Objectives: To enable the students to understand the procedures in company law at appropriate places;
To enable them to acquire skills needed for socially relevant and good corporate governance.

Unit I Introduction to Company Law (18 hours)

Introduction to Company Act 2013, Importance Highlights -

Unit II Share Capital and Membership (16 hours)


Unit III Meetings and Resolutions (15 hours)


Unit IV FEMA (15 hours)


Unit V Corporate Responsibilities to Consumers (16 hours)

Corporate Responsibilities towards Consumers; Definition of Consumer - Consumerism - Consumer Rights - Consumer Protection and

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**Text Book:**

**Reference Books:**
Semester – I

(To choose any one out of three)

Elective Paper – I.A

Organisational Behaviour

Paper Code: 17P1CME01

Objectives: To make the students to understand and manage people’s behaviour in the organizational setting;
To expose the students to organizational principles and practices;
To offer some practical hints to integrate the efficient management with the persons concerned.

Unit I Introduction to Organizational Behaviour (17 hours)

Concept - Nature - Features - Importance - Role of OB – Models of OB – Custodial Model – Supportive Model-Team and Team Dynamics.

Unit II Perception (17 hours)


Unit III Personality (16 hours)


Unit IV Communication(15 hours)


Unit V Organisation Change (15 hours)


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Selvamun Arts and Science College (Autonomous), Namakkal
Department of Commerce
B.Com

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<td>CO-IV</td>
<td>To Understand Communication, Functions, Process and Barriers</td>
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<td>To know about Organisation Change ,Goals ,Approaches ,Perspectives.</td>
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Text Books:

Reference Books:
Semester – I

(To choose any one out of three)

Elective Paper – I .B  
**Business Environment**

**Paper Code: 17P1CME05**

**Objectives:** To know the changes in socio-cultural, economic and geographic dynamics;
To give the students the tools effectively and systematically to analyze the various facets of the business environment, and how they affect internal organization.

**Unit: I Concepts of Business Environment (17 hours)**


**Unit: II Economic Environment (17 hours)**


**Unit: III Consumer Protection (16 hours)**


**Unit: IV Policy Environment (15 hours)**


**Unit: V Social Responsibilities of Business (15 hours)**

Selvann Arts and Science College (Autonomous), Namakkal
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B.Com

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<td>Understand the concepts of Globalization.</td>
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Text Book:


Reference Books:

(To choose any one out of three)

Elective Paper – I .C

**Environmental Accounting**

**Paper code:** 17P1CME09

**Objective:** To gain basic knowledge in environmental accounting

**Unit - I Introduction to Environment**

Environment as the basis of life-meaning of environment, components of environment, structure of environment, functioning of environment, levels of organization in nature- types of environment- physical & cultural. General Account of the environment- atmosphere: composition and structure, light and temperature factors, isolation, terrestrial radiation, heat balance, hydrological cycle, weather and climate-human impact on climate and atmosphere, vegetation, animals, soil and water.

**Unit - II Environment Management**


**Unit - III Environment Legislation**

1. Constitutional provisions for environmental protection: Specific provision for environmental protection in the constitution of India, provision in the directive principles of state policy.

2. Environmental acts, Rules and notifications: the following environmental acts/Rules will be discussed
a) Water (prevention & control of pollution) act and the corresponding Rule
b) Water (prevention & control of pollution) cess Act the corresponding Rule
c) Air (prevention & control of pollution) Act and the corresponding Rule
d) Environment (protection) Act and Rule
e) Hazardous Waste (Management & Handling) Rules
f) Manufacture, storage and import of Hazardous chemicals Rules
g) Public liability insurance Act and Rule

Unit - IV Environmental Pollution


Unit - V Environmental Economics & Indian Environmental Scenario

Environmental Economics: Introduction to WTO and International Trade, Environmental trade Barriers, Green GDP, Natural Resource Accounting, Green Accounting, Environmental communication- state of Environment in India- survey of the environment by Hindu, state government environmental status reports. Environmental compliance status of Industries, State of the Environment in major cities of India, Air and water Quality Standards of CPCB, state Governments and WHO.- Major Environmental organizations and events: Green peace movement-

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<th>Co.No</th>
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<tbody>
<tr>
<td>CO-I</td>
<td>Understand about Introduction to Environment</td>
<td>9</td>
</tr>
<tr>
<td>CO-II</td>
<td>Introduction about Environment Management</td>
<td>1</td>
</tr>
<tr>
<td>CO-III</td>
<td>Understand Environment Legislation</td>
<td>8</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To know Environmental Pollution</td>
<td>3</td>
</tr>
<tr>
<td>CO-V</td>
<td>Understand about Environmental Economics &amp; Indian Environmental Scenario</td>
<td>4</td>
</tr>
</tbody>
</table>

**Reference Books:**

Advanced Cost Accounting

**Paper Code: 17P2CM05**

**Objective:** To enable the students to find out the cost per unit of a product and control the cost of a product in manufacturing concern.

**Unit – I Cost Accounting Concepts (17 hours)**


**Unit – II Material Cost Control (17 hours)**


**Unit – III Overheads (15 hours)**

- Overheads – Meaning, Classification According to Functions and Variability – Apportionment and Reapportionment of Overheads – Absorption of Overheads – Machine Hour Rate - Reconciliation of Cost and Financial Profits.

**Unit – IV Job, Contract and Process Costing (16 hours)**


**Unit – V Marginal Costing (15 hours)**

Note:
The question may be asked from theory and problem shall be 20% and 80% respectively.

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<tr>
<th>Co.No</th>
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<tr>
<td>CO-I</td>
<td>To Understand about Final Accounts.</td>
<td>6</td>
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<tr>
<td>CO-II</td>
<td>To Study Amalgamation and Absorption.</td>
<td>8</td>
</tr>
<tr>
<td>CO-III</td>
<td>To know about Liquidation of Companies and Modes.</td>
<td>10</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Know about Banking Companies.</td>
<td>9</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Insurance Companies.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
Semester – II

Core Paper - VI

Investment Management

Paper Code: 17P2CM06

Objectives: To gain the basic knowledge of investment pattern of India; To present the students an integrated account of the working of the capital market.

Unit – I Investments Concepts (15 hours)

Investment - Definition – Classification – Speculation – Distinction Between Investment and Speculation -Factors Favouring Investments – Features of Sound Investment.

Unit – II SEBI and Financial System in India (15 hours)


Unit – III Risk and Return (15 hours)


Unit – IV Investment Alternatives (15 hours)


Unit – V Investment Companies in India (15 hours)


Note: The questions may be asked from theory only.
Upon completion of this course, students will be able to

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<tr>
<td>CO-I</td>
<td>To Understand about Investments Concepts</td>
<td>7</td>
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<td>CO-II</td>
<td>To Study SEBI and Financial System in India</td>
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<tr>
<td>CO-III</td>
<td>To know about Risk and Return</td>
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<tr>
<td>CO-IV</td>
<td>To Know about Investment Alternatives</td>
<td>10</td>
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<tr>
<td>CO-V</td>
<td>To know about Investment Companies in India</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:


Reference Books:

Semester – II
Core Paper - VII

Hours/week: 6
Credits: 4

Financial Management
Paper Code: 17P2CM07

Objectives: To understand the application of financial management concepts;
To Teach the Students about the Managing and Optimizing of Working capital, Cash, Inventory, Bills Receivables in a company.

Unit – I Introduction to Financial Management (17 hours)


Unit –II Cost of Capital (17 hours)


Unit – III Capital Structure (15 hours)


Unit-IV Investment Decision (16 hours)


Unit – V Working Capital, Cash, Receivable, Inventory Management (15 hours)

Needs – Management of Receivable and Management of Inventory – Objectives and Various Methods of Inventory Valuation.

**Note:** The question may be asked from theory and problem shall be 40% and 60% respectively.

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<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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<td>CO-I</td>
<td>To Know about Introduction to Financial Management.</td>
<td>7</td>
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<tr>
<td>CO-II</td>
<td>To Learn about Customer Relationship Management in Manufacturing Industries Policies, Practices and Training.</td>
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<td>CO-III</td>
<td>To Identify Capital Structure.</td>
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<tr>
<td>CO-IV</td>
<td>To Understand about Investment Decision.</td>
<td>12</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Working Capital, Cash, Receivable, Inventory Management.</td>
<td>3</td>
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</tbody>
</table>

**Text Books:**


**Reference Books:**

Semester – II

Core Paper - VIII

E-Commerce

Paper Code: 17P2CM08

Objectives: To enable students gain knowledge about E-commerce and its various components; To help students learn the importance and application of electronic media for marketing of goods and services.

Unit – I Evolution of E-Commerce (15 hours)


Unit – II Business Modes for E–Commerce (15 hours)


Unit – III Web Technologies (15 hours)


Unit – IV E–Marketing (15 hours)


Unit – V E–Security (15 hours)

Cheque – Risk and E – Payment System – Planning the E – Commerce Project.

Co.No | Upon completion of this course, students will be able to | PSO addressed
--- | --- | ---
CO-I | Practical Knowledge about the various field of Business. | 7
CO-II | Comprehend the knowledge about Banking transaction and to fill the Challan. | 7
CO-III | Grasp about Co – Operative Societies Functions, to fill the loan and deposit challan. | 7
CO-IV | To know about Secretarial practice and Stores control. | 8
CO-V | Filling up of an Application on Insurance policy, preparation of audit report and make creative advertisement copy. | 10

**Text Book:**

**Reference Books:**
Semester - II

Hours/Week: 4
Credits: 4

(To choose any one out of three)

Elective Paper – II .A

Resource Management Techniques

Paper Code: 17P2CME02

Objectives: To Acquire working knowledge in operation research and resource management techniques; To help students to learn decision making techniques for cost minimization and profit maximization;

Unit – I Introduction to Quantitative Techniques (15 hours)


Unit- II Transportation Problem (15 hours)


Unit – III Decision Theory (15 hours)


Unit – IV Decision Theory under Risk (15 hours)


Unit – V Demand Forecasting (15 hours)

**Note**: The question may be asked from theory and problem shall be 20% and 80% respectively.

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<th>Co.No</th>
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<tbody>
<tr>
<td>CO-I</td>
<td>To Know about Introduction to Quantitative Techniques.</td>
<td>1</td>
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<tr>
<td>CO-II</td>
<td>To Learn about Transportation Problem.</td>
<td>4</td>
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<tr>
<td>CO-III</td>
<td>To Identify Decision Theory.</td>
<td>12</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Decision Theory under Risk.</td>
<td>12</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Demand Forecasting.</td>
<td>6</td>
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</table>

**Text Book:**

**Reference Books:**
Objective: To provide a detailed insight into the business and global business.

Unit – I Introduction to International Business (15 hours)

Unit – II Foreign Exchange (15 hours)

Unit – III Structure of India’s Foreign Trade (15 Hours)
   Structure of India’s Foreign Trade: Composition and Direction, EXIM Bank, EXIM Policy of India, Regulation and Promotion of Foreign Trade.

Unit- IV FDI and MNC’s (15 hours)
   Foreign Direct Investment and Multinational Corporations – MNC’s Culture, MNCs and Less Developed Countries.

Unit- V International Financial Institutions (15 hours)
Text Book:

Reference books:
Objective: To make the students to gain knowledge in various logistics in business.

Unit – I Introduction to Supply Chain Management (17 hours)

Unit - II Designing the Supply Chain Network (16 hours)

Unit – III Designing and Planning Transportation Networks (17 hours)
Role of Transportation - Modes and Their Performance – Transportation Infrastructure and Policies - Design Options and Their Trade-Offs – Sourcing – In-House or Outsource- Sourcing Planning and Analysis

Unit – IV Information Technology in the Supply Chain (15 hours)

Unit-V Dimensions of Logistics (15 hours)
Introduction: A Macro and Micro Dimension – Logistics Interfaces with Other Areas – Approach to Analyzing Logistics Systems – Logistics and
Systems Analysis – Techniques of Logistics System Analysis – Factors Affecting the Cost and Importance of Logistics.

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<tr>
<td>CO-I</td>
<td>To Know about Introduction to Supply Chain Management</td>
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<tr>
<td>CO-II</td>
<td>To Learn about Designing the Supply Chain Network</td>
<td>6</td>
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<tr>
<td>CO-III</td>
<td>To Identify Designing and Planning Transportation Networks</td>
<td>11</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Information Technology in the Supply Chain.</td>
<td>7</td>
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<tr>
<td>CO-V</td>
<td>To know about Dimensions of Logistics.</td>
<td>9</td>
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</table>

**Text books:**


**Reference books:**

Financial Management  
**Paper Code: 17P2CSED01**

**Objectives:** To understand the application of financial management concepts;  
To Teach the Students about the Managing and Optimizing of Working capital, Cash, Inventory, Bills Receivables in a company.

**Unit – I Introduction to Financial Management (17 hours)**


**Unit –II Cost of Capital (17 hours)**


**Unit – III Capital Structure (15 hours)**


**Unit- IV Investment Decision (16 hours)**


**Unit – V Working Capital, Cash, Receivable, Inventory Management (15 hours)**

Needs – Management of Receivable and Management of Inventory – Objectives and Various Methods of Inventory Valuation.

Note: The question may be asked from theory and problem shall be 40% and 60% respectively.

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<tr>
<td>CO-I</td>
<td>To Know about Introduction to Financial Management.</td>
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<tr>
<td>CO-II</td>
<td>To Learn about Customer Relationship Management in Manufacturing Industries Policies, Practices and Training.</td>
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<td>CO-III</td>
<td>To Identify Capital Structure.</td>
<td>8</td>
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<td>CO-IV</td>
<td>To Understand about Investment Decision.</td>
<td>12</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Working Capital, Cash, Receivable, Inventory Management.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Books:
2. S.N.Mageswari, Financial Management, Sultan Chand and Sons, Delhi.

Reference Books:
Semester – II

Non- Major Elective Paper

Human Rights

Paper Code: 17P2HR01

Objective: To be aware of and to know about the human rights.

Unit – I Introduction to Human Rights (6 hours)


Unit - II Universal Declaration of Human Rights (6 hours)


Unit – III Constitutional Guarantee on Human Rights (6 hours)


Unit – IV Economic Rights (6 hours)


Unit – V Children’s Rights (6 hours)


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<td>CO-I</td>
<td>To Know about Introduction to Human Rights .</td>
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<tr>
<td>CO-II</td>
<td>To Learn about Universal Declaration of Human Rights .</td>
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<tr>
<td>CO-III</td>
<td>To Identify Constitutional Guarantee on Human</td>
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Text Book:


Reference book:

Business Research Methods

Paper code: 17P3CM09

Objectives: To enable the students to understand the Basic concepts of Research methods
To make students to acquire skills for social sciences research.

Unit – I Introduction to Research (18 hours)

Unit – II Sampling Techniques(16 hours)

Unit – III Collection of Data (16 hours)

Unit – IV Analysis and Interpretation of Data (15 hours)

Unit – V Report Writing (15 hours)

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<tr>
<td>CO-I</td>
<td>To Realize about Introduction to Research and</td>
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Text Book:

Reference Books:
Semester – III
Core Paper - X

Advanced Corporate Accounting
Paper code: 17P3CM10

Objective: To enable the students to have working knowledge in corporate accounts.

Unit – I Final Accounts (18 hours)
Final Accounts – Statutory Requirement – Provisions and Reserves as per Companies Act – Managerial Remuneration – Balance Sheet

Unit – II Integrations (16 hours)

Unit – III Liquidation (15 hours)

Unit – IV Banking Companies (16 hours)

Unit – V Insurance Companies (15 hours)

Note: The question may be asked from theory and problem shall be 20% and 80% respectively.

Upon completion of this course, students will be able to

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<tr>
<td>CO-III</td>
<td>7</td>
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</tbody>
</table>
Text Book:

Reference Books:
1. Tulsian .P.C, (2009), Corporate Accounting, S.Chand &Co Ltd, New Delhi
Human Resources Management

Paper code: 17P3CM11

Objectives: To enable the students to understand the important concepts of personnel management; To create awareness about the existing HR practices of the companies in India.

Unit – I Evolution of HRM (17 hours)

Unit – II Human Resources Planning (17 hours)

Unit – III Motivation, Recruitment and Selection (16 hours)

Unit – IV Leadership (15 hours)

Unit – V Performance Appraisal (15 hours)

Upon completion of this course, students will be able to

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To Know about HRM and Function.
Text Book:

Reference Books:

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<th>Course</th>
<th>Objective</th>
<th>Credit</th>
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<tr>
<td>CO-II</td>
<td>To Study Human Resources Planning and Job Analysis</td>
<td>5</td>
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<tr>
<td>CO-III</td>
<td>To Learn about Types of Motivation, Recruitment and Selection.</td>
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<tr>
<td>CO-IV</td>
<td>To Know about Leadership, Leadership Styles and Characteristics.</td>
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<tr>
<td>CO-V</td>
<td>To Know about Performance Appraisal.</td>
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</table>
Semester – III  
Core Paper - XII  

Project Management  
Paper code: 17P3CM12

Objectives: To make the study gains expand knowledge on project management.

Unit - I Introduction of Project Management (16 hours)
Features – Establishment of a New Project – Project Organization – Innovative Project – Need for Project Management – Duties and Responsibly of Project Manager

Unit - II Project Festive Study (17 hours)
Market or Demand Analysis – Technique Analysis – Financial Analysis of Project

Unit - III Decision Model (17 hours)

Unit - IV Project Cost Control (15 hours)
Cost Forecasting – Cost Monitoring and Control – Cost Estimation Techniques – Man Hour Unit Rate and Operational Cost Estimation.

Unit - V Project Performance (15 hours)

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<tr>
<td>CO-I</td>
<td>Understanding the Introduction of Project Management.</td>
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<tr>
<td>CO-II</td>
<td>Knowledge on Project Festive Study.</td>
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<tr>
<td>CO-III</td>
<td>Analyses of Decision Model.</td>
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<tr>
<td>CO-IV</td>
<td>Classification of Project Cost Control</td>
<td>8</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Project Performance.</td>
<td>5</td>
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</table>
Reference Book:
Semester – III

Hours/Week: 6

Credits: 4

(To choose any one out of three)

Elective Paper – III .A

Direct Taxes

Paper code: 17P3CME03

Objectives: To help the students to compute income individuals under various Heads of income.

Unit – I Basic Concepts (17 hours)


Unit – II Computation of Salary Income (17 hours)


Unit – III Income from Business and Profession (16 hours)


Unit – IV Computation of Income from Other Sources (16 hours)

Computation of Income from Other Sources – Incomes Chargeable Under Other Source – Deductions From Other Source Income – Set Off and Carry Forward of Losses.

Unit – V Deductions (15 hours)

Deductions from Gross Total Income – Clubbing of Income – Assessment of Individual – Rates of Income Tax.

Note: The question may be asked from theory and problem shall be 25% and 75% respectively
Upon completion of this course, students will be able to

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<td>CO-III</td>
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**Reference Books:**

Semester – III

(To choose any one out of three)

Elective Paper – III .B

Customer Relationship Management

Paper code: 17P3CME07

Objective: To provide basic knowledge in theory and practice of CRM in India.

Unit - I Introduction to CRM (17 hours)


Unit – II CRM in Manufacturing Industry (15 hours)

CRM in Manufacturing Industries- Policies- Practices - Evaluation of CRM in Manufacturing Industries- Training of Managers in CRM.

Unit - III CRM in Service Institutions (17 hours)

CRM in services – Education - Hospital - Banking -Transport – Insurance.

Unit- IV Emerging Trends in CRM (16 hours)

CRM Emerging Trends and Issues – CRM and Knowledge Management.

Unit- V E – CRM (15 hours)


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<tr>
<td>CO-I</td>
<td>To Know about Introduction to Customer Relationship Management.</td>
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<td>CO-II</td>
<td>To Learn about Customer Relationship Management in Manufacturing Industries Policies,</td>
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<td>Practices and Training.</td>
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<td><strong>CO-III</strong> To Identify Customer Relationship Management in Service Institutions.</td>
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<tr>
<td><strong>CO-IV</strong> To Understand about Emerging Trends in Customer Relationship Management.</td>
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<td><strong>CO-V</strong> To know about e-. Customer Relationship Management</td>
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**Text Books:**


**Reference Book:**

Semester – III

(To choose any one out of three)

Elective Paper – III .C

**CO-Operation**

**Paper code: 17P3CME11**

**Objective:** To enable the students to know the fundamentals of Co-operation.

**Unit: I Evolution of Co-operation (18 hours)**

Co-operation – Meaning – Definition – Formulated and Re-Formulated in ICA- Origin and Growth of Co-Operative Movement in India – Co-Operative Societies – Classification – Role of Co-Operatives in Five Year Plans.

**Unit: II Structure of Co-operative Societies (16 hours)**

Co-Operative Organization Structure – Credit Societies – Primary, Central and Apex Banks – Employee Credit Societies, Scope, Objectives and Achievement Multipurpose Co-Operatives —. RBI and Co-Operatives – NABARD- Weaknesses of Indian Co-Operating Movement.

**Unit: III Non-Credit Co-Operative Structure (15 hours)**


**Unit: IV Government and Co-operation (15 hours)**

Unit: V Co-operative Movement in Foreign Countries (16 hours)


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<td>CO-I</td>
<td>To Evolution of Co-Operative Societies and Classification.</td>
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<tr>
<td>CO-II</td>
<td>To Learn Structure of Co-operative Societies and Function.</td>
<td>5</td>
</tr>
<tr>
<td>CO-III</td>
<td>To Knowing Non-Credit Co-Operative Structure and Types of services.</td>
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</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Government and Co-operation Policy and Function.</td>
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<tr>
<td>CO-V</td>
<td>To know about Co-operative Movement in Foreign Countries.</td>
<td>3</td>
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Text Book:

Reference Books:
Semester – IV

Hours/ Week: 6

Core Paper – XIII

Credits: 5

Indirect Taxation

Paper Code: 17P4CM13

Objectives: To expose the Students to the Concepts of Indirect Taxes; To gain the Knowledge about the different types of Indirect Taxes which exist in India.

Unit – I Introduction to Indirect Taxes (17 hours)

Indirect Taxes – Introduction – Meaning and Definition – Objectives- Special Features- Types – Canon of Taxations – Merits and Demerits – Difference between Direct Tax and Indirect Tax.

Unit – II Customs Act (17 hours)


Unit – III Goods and Services Tax (GST) (16 hours)


Unit – IV Supply and Charge of GST (15 hours)


Unit – V Exemptions and GST Council (15 hours)

Power of Grant Exemptions from tax CGST – Goods Exempt from GST - GST Council – Functions of GST Council.

Note: The question may be asked from theory only.
Co.No | Upon completion of this course, students will be able to | PSO addressed
--- | --- | ---
CO-I | To Evolution of Introduction to Indirect Taxes | 13
CO-II | To Learn Customs Act, 1962 | 3
CO-III | To Knowing Goods and Services Tax (GST) | 13
CO-IV | To Understand Supply and Charge of GST | 13
CO-V | To know Power of Grant Exemptions from tax CGST | 13

Text Book

Reference Books:
3. Tadey, Indirect Taxation, Taxman, New Delhi.
Objective: To make students to gain knowledge about law and practices of Banking

Unit – I Introduction to Banking (17 hours)


Unit – II Types of Deposits and E-Banking (17 hours)


Unit – III Negotiable Instruments (16 hours)


Unit – IV Payment of Cheques (15 hours)

Payment of Cheques – Precautions to be taken by Paying Banker – Statutory Protection – Payment in Due Course – Refusal of Payment – Consequences of Wrongful Dishonour – Collection of Cheques – Legal Status, Statutory Protection - Liability and Duties of Collecting Banker.
Unit – V Loans and Advances (15 hours)


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-I</td>
<td>To learn about Introduction to Banking and its Function.</td>
<td>7</td>
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<tr>
<td>CO-II</td>
<td>To Learn about types of banking and kinds of banking services.</td>
<td>7</td>
</tr>
<tr>
<td>CO-III</td>
<td>To Know about Negotiable Instruments Act, 1881.</td>
<td>7</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Payment of Cheques.</td>
<td>1</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Loans and Advances, Stock Exchange Securities, Life Insurance Policies, Fixed Deposit Receipts.</td>
<td>7</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
Semester- IV

Services Marketing

Paper code: 17P4CM15

Objectives: To make students to gain knowledge of services provided by service sectors; To enable the Students to acquire a deep knowledge in marketing of services.

Unit I Introduction to Services and Service Marketing (17 hours)


Unit II Banking Services (17 hours)


Unit III Transport Services (15 hours)


Unit IV Tourism Services (16 hours)

Tourism Marketing – The Concept – Users of Tourism Services – Product Planning and Development – Marketing Mix for Tourism Marketing – Merits and Demerits of Tourism Marketing

Unit V Courier Services (15 hours)

Courier Service Marketing – Conceptual Frame Work – Rationale Behind Courier Service – Marketing Mix for Courier Service –
Telecommunication Service Marketing – Concept – Importance – Marketing Mix for Telecommunication Service.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-I</td>
<td>To Know about Introduction to Services and Service Marketing.</td>
<td>7</td>
</tr>
<tr>
<td>CO-II</td>
<td>To Learn about Banking Services and banking product mix.</td>
<td>7</td>
</tr>
<tr>
<td>CO-III</td>
<td>To Identify Transport Services, Product planning, Development and Electronic Fund Transfer System.</td>
<td>9</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Tourism Services and Product development.</td>
<td>10</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about various kinds of services and function like as Courier Services, Telecommunication Service.</td>
<td>11</td>
</tr>
</tbody>
</table>

**Text Book:**

**Reference Books:**
3. Dr.L.Natarajan,(2017), Services Marketing , Margham Publications, Chennai.
Semester- IV

(To choose any one out of three)

Elective Paper – IV .A

Portfolio Management

Paper code: 17P4CME04

Objective: To make the students understand the investment management techniques

Unit- I Introduction to Investment Management (17 hours)


Unit II Security Analysis (18 hours)


Unit III Financial Statement Analysis (15 hours)


Unit IV Capital Market Theory (15 hours)


Unit V Portfolio Evaluation (15 hours)

Selvamm Arts and Science College (Autonomous), Namakkal  
Department of Commerce  
B.Com

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-I</td>
<td>To Know about Introduction to Investment Management</td>
<td>8</td>
</tr>
<tr>
<td>CO-II</td>
<td>To Learn about Security Analysis</td>
<td>9</td>
</tr>
<tr>
<td>CO-III</td>
<td>To Identify Financial Statement Analysis</td>
<td>8</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Capital Market Theory</td>
<td>3</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know about Portfolio Evaluation</td>
<td>7</td>
</tr>
</tbody>
</table>

Reference Books:

1. Gupta L.C. - Return of Equities the Indian experience  
2. Bhala V.K. - Investment management and portfolio management  
3. Fisher & Jodon - Security analysis and portfolio management
Semester- IV

Hours/Week: 6
Credits: 4

(To choose any one out of three)

Elective Paper – IV .B

Strategic Management

Paper code: 17P4CME08

Objectives: To enable the students to acquire basic knowledge in strategic management process and implementation.

To make the students to know the competitors actions in business

Unit: I Introduction to Strategic Management (17 hours)


Unit: II Strategy Formulation (16 hours)


Unit: III Functional Strategies (17 hours)


Unit: IV Strategy Implementation (15 hours)


Unit: V Evaluation and Control (15 hours)

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-I</td>
<td>To Understand about Introduction to Strategic Management and Environment Analysis.</td>
<td>7</td>
</tr>
<tr>
<td>CO-II</td>
<td>To Learn about Strategy Formulation and Choice of Alternatives.</td>
<td>5</td>
</tr>
<tr>
<td>CO-III</td>
<td>To Identify Functional Strategies.</td>
<td>7</td>
</tr>
<tr>
<td>CO-IV</td>
<td>To Understand about Strategy Implementation.</td>
<td>5</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know Evaluation and Control.</td>
<td>9</td>
</tr>
</tbody>
</table>

**Text Books:**


**Reference Book:**

Semester- IV  

Hours/Week: 6  

Credits: 4  

(To choose any one out of three)  

Elective Paper – IV .C  

Managerial Economics  

Paper code: 17P4CME12  

Objectives: To relate economic theory with modern business practices. To predict the demand, cost, price and profit variables for a firm in short run and the long run.  

Unit – I Introduction to Managerial Economics  


Unit – II Demand Analysis and Forecasting  


Unit – III Production and Cost Analysis  


Unit – IV Market Structure  


Unit – V Decision Making Theories  

Upon completion of this course, students will be able to:

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-I</td>
<td>To Understand about Introduction to Managerial Economics.</td>
<td>4</td>
</tr>
<tr>
<td>CO-II</td>
<td>To Learn about Demand Analysis and Forecasting.</td>
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<tr>
<td>CO-III</td>
<td>To Identify Production and Cost Analysis.</td>
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<tr>
<td>CO-IV</td>
<td>To Understand Market Structure.</td>
<td>7</td>
</tr>
<tr>
<td>CO-V</td>
<td>To know Decision Making Theories.</td>
<td>7</td>
</tr>
</tbody>
</table>

**Text Book:**

**Reference Books:**
Selvamm Arts & Science College
(Autonomous)
Nationally Re-Accredited at the Highest Grade “A” by NAAC
UGC Recognized 2(f) and 12(B) Institution
Affiliated to Periyar University, Salem-11
Namakkal - 637003.

Question Paper Pattern for
Theory Subjects

Time: 3 Hours Max. Marks: 75

PART – A (10 x 1 = 10 Marks)
Answer All Questions
(Two questions from each unit)

PART – B (5 x 5 = 25 Marks)
Answer All Questions
(One Question from each unit with internal choice)

PART – C (5 x 8 = 40 Marks)
Answer All Questions
(One Question from each unit with internal choice)
Selvamm Arts & Science College
(Autonomous)
Nationally Re-Accredited at the Highest Grade “A” by NAAC
UGC Recognized 2(f) and 12(B) Institution
Affiliated to Periyar University, Salem-11
Namakkal - 637003.

Question Paper Pattern for
Accounts Subjects

Time : 3 Hours                                                   Max. Marks: 75

PART – A (10 x 1 = 10 Marks)
Answer All Questions
(Two questions from each unit)

PART – B (5 x 5 = 25 Marks)
Answer All Questions
(One Question from each unit with internal choice)

PART – C (5 x 8 = 40 Marks)
Answer All Questions
(One Question from each unit with internal choice)
Selvamm Arts and Science College (Autonomous), Namakkal

Department of English

M.A English

Selvamm Arts & Science College (Autonomous)

Nationally Re-Accredited at Grade “A” by NAAC

Affiliated to Periyar University, Salem

Department of English

PG Syllabus

M.A., English Literature

Choice Based Credit System (CBCS)

(Effective From 2017 - 2018)
Vision

To enrich the young minds with great literary works and enhance the moral values of the students.

Mission

To impart education with the virtues of ethical values, sense of equality and peace in young minds and enable them to reach intellectual maturity to become inspired leaders nationally and globally.

Programme Outcomes (PG)

PO 1: Application: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

PO 2: Analysis: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

PO 3: Solution Finding: Facilitate to enter multidisciplinary path to solve day-to-day problems.

PO 4: Progression in Career: Prepare students for prominent career in industry, banks offices and for further academic study.

PO 5: Research Capability: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

PO 6: Expressing their talents: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.
**PO 7: Individual sustainability:** Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

**PO 8: Competency:** Attain competency in job market / entrepreneurship
<table>
<thead>
<tr>
<th>Sem</th>
<th>Title of the Course</th>
<th>Course Code</th>
<th>Hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>I</td>
<td>Core -The Age of Chaucer</td>
<td>17P1EN01</td>
<td>6</td>
<td>5</td>
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<td></td>
<td>Core - The Age of Jacobean</td>
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<td>Core - The Augustan Age</td>
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<td>Core – The Romantic Age</td>
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<td>Elective-I - Modern Literature - I</td>
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<td>Core - Canadian Literature</td>
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<td>Core - Research Methodology</td>
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<td>Core – Feminist Writing</td>
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<td>Core – Language and Linguistics</td>
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<td>Elective- III Literary Theory and Criticism</td>
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<td><strong>30</strong></td>
<td><strong>23</strong></td>
<td><strong>500</strong></td>
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<td><strong>IV</strong></td>
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<td>Core - Comparative Literature</td>
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<td>Core - Post Colonial Literature</td>
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<td>Core – 20th Century Literature</td>
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<td>Elective-IV- English Language Teaching</td>
<td>17P4ENE04</td>
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<td>Skills (LSRW) Through English (STE)</td>
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Programme Specific Outcomes

<table>
<thead>
<tr>
<th>Pso</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pso-1</td>
<td>Students will demonstrate an appropriate level of expertise in literary history, literary theory, and rhetoric.</td>
</tr>
<tr>
<td>Pso-2</td>
<td>Students will demonstrate high-level proficiency in literary research and in the synthesis of research.</td>
</tr>
<tr>
<td>Pso-3</td>
<td>Understanding of the development of the English language as used in works of literature. Students will demonstrate a command of written academic English, including the abilities to organize and present material in a cogent fashion, formulate and defend original arguments, employ effectively the language of their discipline and write under time constraints.</td>
</tr>
<tr>
<td>Pso-4</td>
<td>To gain a working knowledge of a range of literary terms and critical approaches, applicable to Chaucer's works and other literature</td>
</tr>
<tr>
<td>Pso-5</td>
<td>Reading: Students will become accomplished, active readers who appreciate ambiguity and complexity, and who can articulate their own interpretations with an awareness and curiosity for other perspectives.</td>
</tr>
<tr>
<td>Pso-6</td>
<td>Writing skills and process: Students will be able to write effectively for a variety of professional and social settings. They will practice writing as a process of motivated inquiry, engaging other writers’ ideas as they explore and develop their own. They will demonstrate an ability to revise for content and edit for grammatical and stylistic clarity. And they will develop an awareness of and confidence in their own voice as a writer.</td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>Pso-7</td>
<td>Sense of Genre: Students will develop an appreciation of how the formal elements of language and genre shape meaning. They will recognize how writers can transgress or subvert generic expectations, as well as fulfill them. And they will develop a facility at writing in appropriate genres for a variety of purposes and audiences.</td>
</tr>
<tr>
<td>Pso-8</td>
<td>Culture and History: Students will gain knowledge of the major traditions of literatures written in English, and an appreciation for the diversity of literary and social voices within—and sometimes marginalized by—those traditions. They will develop an ability to read texts in relation to their historical and cultural contexts, in order to gain a richer understanding of both text and context, and to become more aware of themselves as situated historically and culturally.</td>
</tr>
<tr>
<td>Pso-9</td>
<td>Critical Approaches: Students will develop the ability to read works of literary, rhetorical, and cultural criticism, and deploy ideas from these texts in their own reading and writing. They will express their own ideas as informed opinions that are in dialogue with a larger community of interpreters, and understand how their own approach compares to the variety of critical and theoretical approaches.</td>
</tr>
<tr>
<td>PSO-10</td>
<td>Research Skills: Students will be able to identify topics and formulate questions for productive inquiry; they will identify appropriate methods and sources for research and evaluate critically the sources they find; and they will use their chosen sources effectively in their own writing, citing all sources appropriately.</td>
</tr>
</tbody>
</table>
Core I - The Age of Chaucer

Semester: I  Credits: 5
Course Code: 17P1EN01  Hours/Week: 6

Objectives:

1. To help students study and appreciate the literary works of different authors
2. To help students appreciate the different literary styles of different authors

Unit - I  Poetry - I

Geoffrey Chaucer (1340-1400) : Prologue to the Canterbury Tales

Unit - II  Poetry II

Edmund Spenser (1552-1599) : Prothalamion & Epithalamion

George Herbert (1593-1633) : The Pulley

Unit - III  Prose

Francis Bacon (1561-1626) : Of Truth & Of Friendship
Sir Philip Sidney (1554-1586) : Apology for Poetry

Unit - IV  Drama - I

Christopher Marlowe (1564-1593) : Edward - II

Unit - V  Drama - II

Ben Johnson (1573-1637) : The Alchemist
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To gain a broad familiarity with several of Chaucer's works</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>To gain a reading fluency in Chaucer's language</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>To gain a working knowledge of a range of literary terms and critical approaches, applicable to Chaucer's works and other literature</td>
<td>10</td>
</tr>
<tr>
<td>CO-4</td>
<td>To examine Chaucer's innovative and playful experimentation with literary texts and his fascination with issues of literary authority</td>
<td>10</td>
</tr>
</tbody>
</table>

Text Books:

Bacon, Francis London, Oxford University Press.

Reference Books:


CORE II - The Age of Jacobean

Semester : I          Credits:5
Course Code : 17P1EN02 Hours/Week: 6

Objectives :
1. To help students study and appreciate the literary works of different authors
2. To help students appreciate the different literary styles of different authors

Unit - I

John Marston (1576-1634) : Antonio's Revenge

Unit - II

Ben Johnson (1572-1637) : Every Man in His Humour

Unit - III

Thomas Middleton (1570-1627) : Women Beware Women

Unit - IV

John Webster (1580-1634) : The White Devil

Unit - V

Thomas Dekker (1572-1632) : The Shoemaker's Holiday
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Demonstrate a comprehensive range of knowledge relating to major dramatic works from the pre-modern canon and the historical periods from which major works of drama have emanated (i.e. Ancient Greece, Renaissance Europe, Elizabethan and Jacobean England)</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Demonstrate a current understanding of major dramatic works from the premodern canon and to discuss these works from the actor’s point of view, contrasting approaches to modern realistic texts with the actor’s analysis of period plays</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Demonstrate the ability to use specific skills in stage movement for classical acting, including movement in period costume</td>
<td>01</td>
</tr>
</tbody>
</table>

Text Books

1. Ben Jonson's Every Man in His Humour Edited by Percy Simpson
Reference Books:


Selvamm Arts and Science College (Autonomous), Namakkal
Department of English
M.A English

CORE III - The Augustan Age

Semester : I
Course Code : 17P1EN03
Credits:5
Hours/Week: 6

Objectives :

1. To help the students study the representative works of the 17th century in detail.
2. To appreciate the verity of genres practiced in this age and the richness of the Literary.

Unit I – Poetry – I
John Milton (1608-1674) : Paradise Lost - Book -IX

Unit II – Poetry – II
Thomas Gray (1716-1771) : Elegy Written in a Country Churchyard
Alexander Pope (1688-1744) : An Epistle to Dr. Arbuthnot
John Donne (1572-1631) : No Man Is An Island

Unit III – Prose
Dr. Johnson (1709-1784) : Life of Milton
John Bunyan (1628-1688) : The Pilgrim’s Progress

Unit IV – Drama
R.B. Sheridan (1751-1816) : The School for Scandal

Unit V – Novel
Oliver Goldsmith (1728-1774) : The Vicar of Wakefield
Jonathan Swift (1667-1745) : Gulliver’s Travels (Part I & II)
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Critique contradictory versions in ancient sources.</td>
<td>1, 5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Evaluate differing versions of major events in a historical period.</td>
<td>1, 9, 3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Identify the development of broad trends in the Augustan period.</td>
<td>9, 2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Analyses major developments in the Augustan period.</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:
3. Oliver Goldsmith, Arthur Friedman (Editor), Robert L. Mack (Editor)
CORE IV - The Romantic Age

Semester : I  
Credits: 5
Course Code : 17P1EN04  
Hours/Week: 6

Objective:

1. To enable students to study the different writers of the age and distinguish different literary styles

Unit I – Poetry – I

Wordsworth (1770-1850) : Ode on the Intimations of Immortality 
Coleridge (1772-1834) : Kubla Khan 
Keats (1795-1821) : Ode on a Grecian Urn

Unit II – Poetry – II

Keats (1795-1821) : Ode to Autumn 
Shelley (1792-1822) : Ode to the West Wind

Unit III – Prose-I

Charles Lamb (1775-1834) : a) Dream Children- A Reverie 
b) New Year’s Eve

Unit IV – Prose-II

Shelley (1792-1822) : Defense of Poetry

Unit V – Novel

Jane Austen (1775-1817) : Pride and Prejudice 
Charles Dickens (1812-1870) : A Tale of Two Cities
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Tells the significant features of the Romantic poetry (Romanticism).</td>
<td>7,8</td>
</tr>
<tr>
<td>CO-2</td>
<td>Recalls the historical and social events of the Romantic Period.</td>
<td>8,9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Determines the importance of the particular poem in its historical and social context.</td>
<td>1, 2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Explains the life and the significance of the poet of the poem to be analyzed.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Text Book:**
An exact reprint of the text of the original edition of the essays of Elia,' 1823
Andy, Mark.

**Reference Books:**
1. Dickens, Charles: Oliver Twist London, Every Man's Library.
Elective I – Modern Literature-I

Semester: I
Course Code: 17P1ENE01
Credits: 4
Hours/Week: 6

Objective:

1. To provide an advanced course in the study of English Literature and Language with reference to representative Authors in the 19th and 20th centuries.

Unit I – Poetry (Detailed)

Tennyson (1809-1892) : Ulysses
Browning (1812-1889) : Andrea Del Sarto
Arnold (1822-1888) : Dover Beach

Unit II – Prose - I

Thomas Carlyle (1795-1881) : The Hero as a Man of Letters

Unit III – Prose – II

Mathew Arnold (1822-1888) : The Study of Poetry

Unit IV – Drama

G. B. Shaw (1856-1950) : Pygmalion

Unit V – Novel

E. Bronte (1818-1848) : Wuthering Heights
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Tells the significant features of the Romantic poetry (Romanticism).</td>
<td>7, 8</td>
</tr>
<tr>
<td>CO-2</td>
<td>Recalls the historical and social events of the Romantic Period.</td>
<td>8, 9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Determines the importance of the particular poem in its historical and social context.</td>
<td>1, 2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Explains the life and the significance of the poet of the poem to be analyzed.</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Book:

Reference Books:
Core V - Shakespeare

Semester: II  Credits: 4
Course Code: 17P2EN05  Hours/Week: 6

Objectives:

1. To introduce the learner to Shakespeare
2. To develop in the student an interest in and appreciation of Shakespeare’s plays

Unit-I (Introduction to Shakespeare)

The Elizabethan and Jacobean Stage – Conditions, Theatre and Audience
Shakespeare’s source and Pre-Shakespearean dramatists
Characteristics of Shakespearean comedy, Tragedy, Historical plays, Problem Plays, Last Romances

Unit-II

Measure for Measure

Unit-III

The Tempest

Unit-IV

Antony and Cleopatra

Unit-V

Shakespeare’s sonnets – 18, 30, 60, 116, 120
Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Demonstrate knowledge of some of the major authors and texts of the Modernist period as well key debates in Modernist studies</td>
<td>1 , 2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Critically analyze modernist texts.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the broad cultural and historical context behind the various literary and artistic movements known as Modernism.</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Books:
2. William Shakespeare, David Bevington (Editor)

Published by Longman Pub Group, 1997
VI - American Literature

Semester: II
Course Code: 17P2EN06
Credits: 4
Hours/Week: 6

Objectives:

1. To introduce to the students the literature of the United States of American and familiarize them with the important literary movements that influenced the literary works.
2. To enhance the learner’s awareness right from the colonial background to the present day history. African-American and Jewish American Literature texts are included to give a survey of the holistic nature of American culture.

Unit I – Poetry
Walt Whitman (1819-1892) : Out of the Cradle Endlessly Rocking.
Emily Dickenson (1830-1886) : Because I could not stop for Death
Sylvia Plath (1932-1963) : Daddy
Robert Frost (1874-1963) : West Running Brooks

Unit II – Prose
R. Emerson (1803-1882) : The American Scholar
Thoreau (1817-1862) : Walden (chapter I&II)

Unit III – Drama
Arthur Miller (1915-2005) : Death of a Salesman
O. Neill (1925-1991) : The Hairy Ape

Unit IV – Short Story
Guy De Maupassant (1850-1892) : The Necklace,
Oscar Wilde (1854 – 1900) : The Nightingale and the Rose

Unit V – Novel
Hawthorne (1804-1864) : The Scarlet Letter
E. Hemingway (1899-1961) : The Old Man and the Sea
Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Analyze verbally and in writing Shakespeare as a product of his society.</td>
<td>7,8</td>
</tr>
<tr>
<td>Co-2</td>
<td>Analyze verbally and in writing the relationship of Shakespearean literature to society.</td>
<td>9</td>
</tr>
<tr>
<td>Co-3</td>
<td>Analyze verbally and in writing the relationship of the individual reader to Shakespearean literature.</td>
<td>10</td>
</tr>
</tbody>
</table>

Text Book:
An Anthology of American Literature Vol 2

Reference Books:


CORE VII - Indian Writing in English

Semester: II
Course Code: 17P2EN07
Credits: 4
Hours/Week: 6

Objective:

1. To provide an advanced course in the study of English Literature and Language with reference to representative Authors in the 19th and 20th centuries.

Unit I – Poetry
Sarojini Naidu (1879-1949) : The Coromandal Fishers
Toru Dutt (1856-1877) : My Vocation
Rabindranth Tagore (1861 – 1941) : Gitanjali (1-10)
R.Parathasarathy (1934-) : River Once

Unit II – Prose
Ananda Commarasamy (1877-1947) : The Dance of Shiva

Unit III – Drama
Girish Karnad (1938-Present) : Tughlag
Vijay Tendulkar (1928 – 2008) : Silence! The Court is in Session

Unit IV – Fiction – I
Raja Rao (1908-2006) : Kanthapura
Mulk Raj Anand (1905 – 2004) : The Untouchable

Unit V – Fiction – II
Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Trace the origin and growth of Indian English literature in India.</td>
<td>2</td>
</tr>
<tr>
<td>Co-2</td>
<td>Analyse the major writers in Indian English Literature.</td>
<td>5</td>
</tr>
<tr>
<td>Co-3</td>
<td>Evaluate the different genres available in Indian literature.</td>
<td>7</td>
</tr>
</tbody>
</table>

Text Books:
1. The Dance of Shiva (Fourteen Indian Essays) Hardcover – April 30, 2010
   By Ananda Coomaraswamy (Author), Fomain Rolland


Elective II – Modern Literature-II

Semester : II  
Credits: 4  
Course Code : 17P2ENE02  
Hours/Week: 6

Objective:

1. To provide an advanced course in the study of English Literature and Language with reference to representative Authors in the 19th and 20th centuries.

Unit I – Poetry

G.M. Hopkins (1844-1889) : Wreck of the Deutschland  
Mathew Arnold (1822-1888): The Scholar Gypsy  
W. B. Yeats (1865-1939) : Sailing to Byzantium

Unit II – Prose

Bertrand Russell (1817-1970) : Science and Tradition

Unit III – Drama

Sheridan (1751-1816) : The Rivals  
John Osborne (1929-1984) : Look Back in Anger

Unit IV – Novel – I

Charlotte Bronte (1816-1855) : Jane Eyre  
Joseph Conrad (1857-1924) : Lord Jim

Unit V – Novel – II

James Joyce (1882-1941) : Portrait of an Artist as a Young Man
## Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Demonstrate knowledge of some of the major authors and texts of the Modernist period as well key debates in Modernist studies.</td>
<td>6, 7, 8</td>
</tr>
<tr>
<td>Co-2</td>
<td>Critically analyze modernist texts.</td>
<td>4</td>
</tr>
<tr>
<td>Co-3</td>
<td>Understand the broad cultural and historical context behind the various literary and artistic movements known as Modernism.</td>
<td>1</td>
</tr>
</tbody>
</table>

### Text Books:

Practical-Effective Communication

Semester: II  
Course Code: 17P2ENP01  
Credits: 4  
Hours/Week: 6

Objectives:

1. To develop the LSRW Skills in students
2. To train students to converse in English in day to day situations
3. To hone the writing skills in students by regular practical exercises
4. To expose the students to various personal and social skills, to make them understand their individual behaviour
5. To develop, creativity, thinking skills and oratorical skills.

Unit I - Writing Skills
Letter writing formal- application for jobs and informal letter writing, circular writing, report writing, minutes recording, preparation of agenda, dialogue writing, essay writing and writing simple speeches e.g. Welcome Address, Vote of Thanks etc.,

Unit II - Power Point Presentation
   a. Preparation
   b. Usage of PPT
   c. Dress code
   d. Body Language
   e. Knowledge of the Subject
   f. Clarity of Expression & Modulation
Unit III - Group Discussion & Public Speaking

a) Group Discussion

a. Dress & Appearance
b. Motivation
c. Importance of being calm, friendly & cool
d. Importance of Listening
e. Leadership qualities
f. Knowledge of the subject
g. Delivery
   i. Body language
   ii. Voice modulation
   iii. Language: simple, specific, intelligible, concrete & sensuous
   iv. Brevity
   v. Humour

Note: Students are to be trained to group-discuss current affairs, National Issues, International developments, Social Issues, Systems of Government, Human rights etc.

B) Public Speaking Skills:

a. Preparation
b. Knowledge of the subject
c. Dress and Appearance
d. Delivery: Body Language, Brevity, Brevity, Humor, Accuracy and Eloquence
e. Use of Anecdotes
f. Sensing the Audience
g. Overcoming fear
h. Time-management
i. Encountering a hostile atmosphere

j.

**Unit IV - Mini Project**

Viva : 15 Marks

(Defending the Thesis and establishing its authenticity)

Total 15 Marks.

**Unit V**

Interview and Preparation of a CV (Curriculum Vitae)

**Course Outcomes**

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Learners should have Improved Communication skills</td>
</tr>
<tr>
<td></td>
<td>Knowing the various pros and cons of its theories and</td>
</tr>
<tr>
<td></td>
<td>rules.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Co-2 Learners should have an idea of Preparation skills</td>
</tr>
</tbody>
</table>
|        | and ready to indulge themselves in the group discussions.
|        |                                                         |
|        | Co-3 They are eligible to attend the interview successfully |

<table>
<thead>
<tr>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>4, 5</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>
Reference Books:

1. V. Syamala, Effective English Communication for You, Chennai: Emerald Publishers, 2002. (From pg. 171 onwards)
5. MLA Handbook 7th Edition
Core VIII - Canadian Literature

Semester: III
Course Code: 17P3EN08
Credits: 5
Hours/Week: 6

Objectives:

1. To introduce the learners to the social, cultural and linguistic experience of Canada
2. To help them explore the interior journey into the mindscape of the immigrants and the impact of the exterior landscape on their survival.

Unit I – Social and Cultural Background
Social History of Canada
The mosaic culture and bilingualism

Unit II – Poetry
John Mc Crae (1872-1918) : In Flanders Fields
F. R. Scott (1899 –1985) : The Canadian Authors Meet
W. W. E. Ross (1894-1966) : The Snake Trying
A. M. Klein (1909-1972) : Portrait of the poet as landscape

Unit III – Prose
Margaret Atwood (1939- ) : Survival: A Thematic Guide to Canadian Literature (Chapter 1)

Unit IV – Drama
George Ryga (1932-1989) : The Ecstasy of Rita Joe

Unit V – Fiction
Margaret Lawrence (1926-1987) : The Stone Angel
Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>The students will become familiar with central aspects of Canadian culture and society through a study of the country's literature.</td>
<td>8</td>
</tr>
<tr>
<td>Co-2</td>
<td>The syllabus texts will be studied both for their unique features in terms of the national literature, and their place in a larger Anglo-American context.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Books:

1. An Anthology of Commonwealth Poetry - C.D. Narasimhaiah
2. Canadian Literature: Recent Essay - Trikha Manorama
3. Critical Essays on Canadian Literature - K. Balachandran
Core IX - Research Methodology

Semester : III  
Course Code : 17P3EN09  
Credits: 5

Objectives:

1. To expose students to the theory and mechanics of Research Writing
2. To provide students with knowledge on the fundamental aspects of Research
3. To prepare students to take up Research Projects

Unit - I

The fundamentals of Research
Types of Research
Literary Research

Unit - II

Choosing the Topic
Library and its uses

Unit - III

Data Collection
Primary and Secondary Sources
Organization of the materials

Unit - IV

Format of a Thesis
Language and Style Suitable for a Thesis

Unit - V

Footnotes
Bibliography
Parenthetical Documentation
## Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Students should be familiar with current uses of the terms reliability and validity in English literature</td>
<td>3</td>
</tr>
<tr>
<td>Co-2</td>
<td>Students should know the types of descriptive statistics typically reported in literary research studies.</td>
<td>4</td>
</tr>
</tbody>
</table>

### Text Books:

1. M.L.A : Hand Book (7\textsuperscript{th} ed)
2. M.L.A : Hand Book (8\textsuperscript{th} ed)
Core X - Feminist Writing

Semester : III  
Credits: 5

Course Code : 17P3EN10  
Hours/Week: 6

Objectives :

1. To introduce the students to the tradition of women’s writing drawing mainly from representative writing of Feminist writings of British, American and Indian.

2. To focus attention on important issues related to Women’s lives and Women’s writings.

Unit-I – Feminism Theory
Definition of Feminism
Definition of Feminism Criticism

Unit II – Poetry
Sarojini Naidu (1879–1949) : Queen’s Rival
Toru Dutt (1856 – 1877) : Our Casuarina Tree

Unit III – Prose
Virginia Woolf (1882 – 1941) : A Room of One’s Own

Unit IV – Drama
Lorraine Hansberry (1930 – 1965) : A Raisin in the Sun
Sharon Pollack (1936 - ) : Blood Relations

Unit V – Novel
George Eliot (1888-1956) : The Mill on the Floss
Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Know some of the developments, themes, and narrative strategies of English-language feminist fiction</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>Can analyse literary texts through the perspective of gender</td>
<td>3</td>
</tr>
<tr>
<td>Co-3</td>
<td>Know the central points of a selection of feminist theory, and can use it as a context for reading literary texts</td>
<td>1</td>
</tr>
<tr>
<td>Co-4</td>
<td>Can analyse and engage in theoretical and scholarly debates about feminist fiction</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Books:

Reference Book:
Core XI - Language and Linguistics

Semester: III  Credits: 4
Course Code: 17P3EN11  Hours/Week: 6

Objective:

1. To draw the attention of the students of the area of Language and Linguistics which form an internal part of Literature and which help in understanding both literature and Language.

Unit-I:
Origin of Language
The growth of Vocabulary
Change of Meaning
Characteristics of American English
Characteristics of Indian English

Unit-II:
What is Language?
Spoken and Written Language
Human Language and Animal Communication
Social aspects of Language
Standard and non standard varieties of Language

Unit-III:
What is linguistics?
Levels of Linguistics
Co-ordination and subordination
Phrase structure
TG grammar
Unit-IV:
Phonology – Classification and Description of i) Vowels ii) consonants
Syllable, Word Stress, Sentences stress and Intonation

Unit-V:
Phonetic Transcription
Stress Marking of Individual Words

Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>A parallel reading on the history of the language and its pronouncing technicalities enables one to master the language.</td>
<td>3</td>
</tr>
<tr>
<td>Co-2</td>
<td>To gained acquired knowledge comprehend and analyze the features, structure and mechanism of human language,</td>
<td>5</td>
</tr>
<tr>
<td>Co-3</td>
<td>To gained acquired knowledge have and use the knowledge to comprehend and analyze the concepts and processes related to language teaching.</td>
<td>6</td>
</tr>
</tbody>
</table>

Text Books:
1. F.T. Wood: An Outline History of English Language
2. A.C. Baugh: History of English language
Elective III – Literary Theory and Criticism

Semester : III
Course Code : 17P3ENE03
Credits: 4
Hours/Week: 6

Objective:

1. To enable students to study the different writers of the age and distinguish different literary styles, Theory and Criticism

Unit I
Aristotle (384–322 BC) : Poetics

Unit II
Johnson (1709 –1784) : Preface to Shakespeare
Wordsworth (1770 – 1850) : The Preface to the Lyrical Ballads

Unit III
Coleridge (1772 – 1834) : Biographia Literaria: Chapters 4, 13, 14
Arnold (1822 –1888) : “The Function of Criticism at the Present Time”

Unit IV:
Roland Barthes (1915 –1980) : The Death of the Author

Unit V:
I.A.Richards (1893 – 1979) : Four Kinds of Meaning
Course Outcomes

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Demonstrate familiarity with a wide range of representative literary and rhetorical texts, including influential criticism of and commentary on those texts</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>Examine the theoretical premises underlying the critical analysis of literature, rhetoric and/or the teaching of reading and writing</td>
<td>2, 4</td>
</tr>
<tr>
<td>Co-3</td>
<td>Analyze the functions of texts and their relations with historical, social and political contexts</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:
1. David Lodge: (ed.) Modern Criticism and Theory- A Reader (Pearson, 2005)
3. M.S. Nagarajan, English Literary Criticism and Theory, Orient blackswan pvt. Ltd.
Core XII - Comparative Literature

Semester : III  
Course Code : 17P3EN12  
Credits:5  
Hours/Week: 6

Objectives:
1. To enable students to understand terms, methods, approaches and techniques used in the field of comparative studies.
2. To obtain clear concepts of the theories, with a view to develop the ability to apply it practically

Unit - I
Definition, Scope and Methodology of Comparative Literature
Influence and Literary Fortune
Reception and Survival

Unit II
Themes
Genres
Translation

Unit III
General, Comparative and National Literature
Literary History

Unit IV
Literature and Society
Literature and Religion
Literature and Psychology

Unit V
A Short History of Comparative Literature in India
**Course Outcomes**

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Demonstrate broad knowledge in the interdisciplinary field of comparative and world literature.</td>
<td>5</td>
</tr>
<tr>
<td>Co-2</td>
<td>Demonstrate particular expertise in two or three literary traditions as defined by language; period, region, genre, theme, or movement.</td>
<td>6</td>
</tr>
<tr>
<td>Co-3</td>
<td>Evaluate theory and research in various subfields pertaining to two or more literary traditions in a comparative framework, which is to say across national, regional, and disciplinary boundaries.</td>
<td>9</td>
</tr>
</tbody>
</table>

**Text Books:**

1. Harry Levian Grounds for Comparison Cambridge/Harvard University
2. Ulrich Weisseten Comparative Literature and Literary Theory Survey and Introduction Indiana University
Core XIII – Post Colonial Literature

Semester : IV  
Course Code :17P4EN13  
Credits:5  
Hours/Week:  6

Objectives :

1. To study the evolution of Post-Colonial Literature
2. To study the themes and forms of Post-Colonial Literature
3. To introduce the style of the various writers of the Post-Colonial countries

Unit I – Poetry
David Diop (1927 – 1960) : Africa  
A. D. Hope (1907 – 2000) : Australia  
Bernard Dadie (1916 – 1987) : I Thank You God  
Derek Walcott (1930 - ) : Far Cry from Africa

Unit II – Prose
Chinua Achebe (1930-2013) : The Novelist as Teacher  
Ashcroft, Bill : The Empire Writes Back  
(1st chapter)

Unit III – Drama
Wole Soyinka (1934- ) : The Lion and the Jewel

Unit IV – Novel
Chinua Achebe (1930-2013) : Things Fall Apart  
V.S. Naipaul (1932- ) : A House for Mr. Biswas

Unit V – Short Story
Margaret Laurence (1926 – 1987) : The Loons  
James Sinclair Ross (1908 – 1996) : The Lamb at Noon
Course Outcome

<table>
<thead>
<tr>
<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
<th>Psos addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>Identify key questions, authors, and literary forms in postcolonial literature.</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>Think critically about these texts in relation to postcolonial theory.</td>
<td>2, 3</td>
</tr>
<tr>
<td>Co-3</td>
<td>Develop interpretative skills of close reading.</td>
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<tr>
<td>Co-4</td>
<td>Situate these works in their larger cultural contexts.</td>
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Text Books:
1. An Anthology of Commonwealth Poetry - C.D. Narasimhaiah

Reference Books:
Core XIV – 20th Century Literature

Semester : IV
Course Code : 17P4EN14
Credits: 5
Hours/Week: 6

Objectives:
1. At the end of the course, the student is able to appreciate the versatility of the 20th century writers.
2. To differentiate the language and style used in the different genres.

Unit I – Poem
T.S. Eliot (1888-1956) : The Wasteland

Unit II – Poetry
W. H. Auden (1907-1973) : In Memory of W. B. Yeats
W. B. Yeats (1865-1939) : The Second Coming
Philip Larkin (1922-1985) : Church Going

Unit III – Prose - I
T.S. Eliot (1888-1956) : Tradition and Individual Talent
E. M. Foster (1879 – 1970) : A Passage to India

Unit IV – Drama
Bernard Shaw (1856-1950) : The Apple Cart

Unit V – Fiction
Virginia Woolf (1882-1941) : To the Lighthouse
Graham Greene (1904-1991) : The Power and the Glory
Course Outcome

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<th>Co no.</th>
<th>Upon completion of this course students will be able to</th>
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<td>Co-1</td>
<td>Study of essays in the period as a vehicle of representing personal experiences, moved into literary, social and cultural criticism and engaged in polemic and persuasion.</td>
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<tr>
<td>Co-2</td>
<td>Discussion on variety of contemporary issues.</td>
<td>8,3</td>
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Text Books:

1. Shaw, Bernard - The Apple Cart, the Orient Longmans Edition

Elective IV – English Language Teaching

Semester : IV  
Course Code : 17P4ENE04

Credits: 5

Hours/Week: 6

Objectives:
1. To introduce students to applied Linguistics, English language structures and English language teaching.
2. To help students to understand the Linguistic concepts and theories
3. To help students acquire a theoretical background of ELT and to expose them to practice teaching with an application of various testing techniques and teaching methodologies.

Unit – I - Theories of Language learning
1. Behaviourist theory
2. Cognitive theory

Unit – II English Language and Structure:
2. Free and Bound Morphemes – Inflexion, Derivation.
4. General Linguistic Concepts
   a) Diachronic versus Synchronous study
   b) Theories of cognition and learning with reference to the second language situation.
5. Error Analysis.

Unit III – English Language Teaching
1. Background to Teaching of English in India
2. English Teaching Method
   - Grammar Translation Method
   - Direct Method
   - Situational Language Teaching
   - Structural Approach
   - Bilingual Method
   - Multi-Skill Approach
   - Communicative Language Teaching Method

**Unit-IV- Teaching of Language and Literature in Practice:**

1. Teaching of Skills
   - Vocabulary
   - Listening
   - Speaking
   - Reading
   - Writing

2. Teaching of Literature
   - Drama
   - Prose
   - Poetry
   - Fiction

3. Teaching of Grammar and Composition

**Unit V – Practical**

1. Teaching Techniques
2. Practice Teaching
Course Outcomes

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<tr>
<td>Co-1</td>
<td>To gained acquired knowledge comprehend and analyze the features, structure and mechanism of human language,</td>
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<td>Co-2</td>
<td>To gained acquired knowledge analyze language learning concepts and processes,</td>
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<td>Co-3</td>
<td>To gained acquired knowledge have and use the knowledge to comprehend and analyze the concepts and processes related to language teaching,</td>
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<td>Co-4</td>
<td>It will enable the student’s positive attitude towards language learning.</td>
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Text Book:
1. Nagarajan, Geetha: English Language Teaching Approaches, Methods and Techniques, Calcutta; Orient Longman Limited.

Reference Books:
1. Books introduced by CIEFL – Applied Linguistics and English Language Teaching.


Njrpa; ju kWkjg;gPl;by; “A” rhd;wpjo; ngw;wJ
gy;fiyf;of khdpaf;FOthy; 2(f) kw;Wk; 12(B) mq;fPfhuK; ngw;wJ
ehkf;fy; - 3

KJfiyj; jkpo;g; ghlj;jpl;lK;
njupTrhu; ghlKiw (CBCS)
KONEug; ghlj;jpl;lk; khztu; Nru;t;f;f 2019 – 2020
Vision

khztu;fspilNa Njrgw;W jkpo; nkhopapd; njhd;ik kw;Wk; rpwg;ig jkpo;nkhop thapyhf
fw;gpj;jy;:

Mission

khztu;fSf;F jha;nkhopg; gw;iw tsu;j;jy;,,iza top jkpo; Nritiag; gpd;gw;w Cf;Ftpj;jjy;; jkpo;
nkhopapd; tsu;r;rpiaAk; rpwg;igAk; mjpfg;gLj,Jjy;:

PO : 1 : tpz; zg; gk;;:

tpQ;Qhdj; Jiwapy; mbg;gilf; fUj;Jfs; gw;wpa mwpitg; gad;gLj,Jjy; kw;Wk; gy;NtW
rpf;fy;fSf;F jPh;T fhZjy;.

PO : 2 : Ma; T:

,d;iwa rpf;fiy kjpg;gpLtjw;Fk; tspf;Ftjw;Fk; GJikahdtw;iw cUthf;Ftjw;Fk; gFg;gha;T
nra;Aq;fs;.

PO : 3 : jPh;T fhZjy;;:

md;whl gpur;ridfis jPh;f;f gyjug;gl;l ghijapy; Eioe;J jPh;Tfhd cjTq;fs;.

PO : 4 : njhopy; Kd;Ndw;wk;;:

njhopy;> tq;fp> mYtyq;fs; kw;Wk; Nkw;g;gl;l fy;tpg;gbg;G Mfpatw;wp; khzth;fisj;
jahh;gLj;jjy;.

PO : 5 : Muha;r;rp jpwk;:

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gad;glk; tifapy; ntspapljy;.

PO : 6 : ntspg;gLj;Jk; jpwd;:
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njhlu; G jpwd; kw; Wk; mwpT gupkhw; wj; ij Nkk; gLj; Jjy;

PO : 7 : jdp; gl; l epiyj; jd; ik

fsg; gzpfs; kw; Wk; jpl; lq; fis RakhfTk; kw; wtu; fSld; ,ize; J Mf; fg; g+u; tkhd Kiwapy; 
\( xUkpj; jfUj; jld; ,Uj; jy; . \)

PO : 8 : Nju; r; rp

Ntiy kw; Wk; njhopy; KidNthu; Mfpaw; wpy; Nju; r; rp ngWq; fs; .
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Programme : MA.,
Course Code : 19P1TA01
Semester : I
No.of hrs : 6
Core Paper : I
No.of Credits : 5

Nehf;fk; : kuGf;ftpijapd; Kiwfis gz;ila ftpQHfs; %yk; mwpar; nra;jy;.

Nehf;fk; : kuGf;ftpijapd; tsh;r;rp epiyNa GJf;ftpij jw;thy ftpQh;fspd;
ftpijfs; %ykhf r%jhaj;jpy; Vw;gl;I khw;wq;fis czh;j;jly;.

Nehf;fk; : kdpj rKjhaj;iij topelj;Jtjpy; ehlfj;jpd; Kf;fpaj;Jt;iij gz;ila
ehlfk; top czHjy;.

Nehf;fk; : gy;NtW fhyfl;l;jjpy; vOe;j rpWfij MrphpaHfspd; fifjis ikakhf
nfhz;L rKjha khw;wj;ij ntspg;gLj;Jly;.

Nehf;fk; : rpWfijapd; tsHj;rp epiyahd Gjpijd;jpd; fl;likg;Gfis kzhth;fSf;F
czh;j;jly;.

myF: 1 kuGf;ftp
1. ghujpahh; - ghQ;rhyf rgjk; (KOtJk;)
2. ghujpjhrd; - FLk;g tpsf;F (KOtJk;)

myF: 2 GJf;ftp
1. rpw;gp - fz;zhbr; rpwFs;s gwit
2. K.Nkj;jh – fz;zPu;g; G+f;fs; (KOtJk;)
Upon completion of this course, students will be able to

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<td>CO-1 kuGf;ftpjapd; mikg;G Kiwfis Kw;fhy ftpQHfspd; top fw;W czHe;jdH</td>
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</tr>
<tr>
<td>CO-2 GJf;ftpjapd; top rKjha epiyfis mwpe;J nfhz;IdH.</td>
<td>11</td>
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<tr>
<td>CO-3 kdpj czHtpd; ntspg;gilahdJ ehlfk; vd;gij mwpe;J nfhz;IdH.</td>
<td>11</td>
</tr>
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<td>CO-4 fhye;NjhWk; rpWfij MrphpaHfspd; vOj;J Kiwfis mwpe;J nfhz;IdH</td>
<td>11</td>
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<tr>
<td>CO-5 Gjpdj;jpd; tiuKiwfisAk; fUj;J nrwpitAk; mwpe;J nfhz;IdH.</td>
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ghh;it E}y;fs;:

1. fp.th. [fe;ehjd; - ftpghlyhk;
2. GJf;ftpjapd; NjhW;Kk; tsh;r;rpAk;> 1992 ty;ypf;fz;zd;> md;dk; ntspaPL> rptfq;if.
3. GJf;ftpij xU GJg;ghh;it> 1999 ghyh> mfuk; ntspaPL> Fk;gNfhzk;.
4. ftpijapay;> f. G+h;zre;jpud;> cyf;jkpohuha;r;r epWtdk;> nrd;id.
5. jkpopj; rpWfijapd; Njhw;wKk; tsh;r;rAk;> 1967 fh. rptj;jk> gp> jkpo;g;Gj;jfhyak;> nrd;id.
6. jkpo; ehty; ,ayi;> 1986 jh. Nt. tPuhrhkpk> jkpo;g; Gj;jfhyak;> nrd;id.
7. ,Ugjhk; E}w;whZj kpo; ,yf;fpak; 1973 kh.,uhkypq;fk;> jkpo;g;Gj;jfhyak;> nrd;id.
8. GJf;ftpij Kw;NghFk; gpw;NghFk;> 1978. eh.thdhhkkiy> kf;fs; ntspaPL> nrd;id.

jhst;: 2
njhy;fhg;gpak; vOj;jjpfhuk;:

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Nehf;fk;: vOj;Jf;fspd; tiffis mwpjy;.
Nehf;fk;: vOj;Jf;fs; gpwf;Fk; Kiwia mwpjy;.
Nehf;fk;: vOj;Jf;fs; GzUk; tiffis mwpjy;.
Nehf;fk;: capH> nka;naOj;Jf;fs; kaq;Fk; Kiwfs mwpjy;.
Nehf;fk;: vz;Zg;ngahpd; tiffis mwpjy;.

myF : 1
E}d; kuG> nkhop kuG> gpwg;gpay;

myF : 2
Gzupay;> njhif kuG> cUgpay;.

myF : 3
capu; kaq;fpay;.

myF : 4
Gs;sp kaq;fpay;.
myF : 5
Fw;wpaYfug; Gzhpay;

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<td>vOj;Jf;fspd; gpwg;G Kiwfis xyp &gt; thp tbtpy; khzh;fs; mwpe;J nfhz;ldh;</td>
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<tr>
<td>CO-2</td>
<td>vOj;Jf;fs; vt;thnwy;yhk; GzUfpd;wJ vd;gij mwpjy;.</td>
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<tr>
<td>CO-3</td>
<td>caph; vOj;Jf;fs; kaq;Fk; Kiwfis mwpjy;</td>
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<td>CO-4</td>
<td>nka; vOj;Jf;fs; kaq;Fk; Kiwfis mwpjy;</td>
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<td>CO-5</td>
<td>vz;fs; GzUk; Kiwia mwpe;J nfhz;ldH.</td>
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ghI}y;fs;:

1. njhy;fhg;gpak; vOj;jjpfhuk;; Muha;r;rp fhz;;bifAiu njhFjp-3, 1989 ghtNyW rh.ghyRe;juk;; jhkiu ntspaPl;lfk;; jQ;ir.

ghh;it E}y;fs;:

1. njhy;fhg;gpa vOj;jjpfhu Muha;r;rp Ntq;fluhRY nul;bah; nrd;idg; gy;fiyf;fofk; 1944
2. ,yf;fzr; rpe;jid 1998 m. rPdpthrd;> J}. NrJghz;bad; (njhFg;ghrpupah;fs;)
3. ,yf;fzj;Jiw> jkpopaw;Gyk;> kJiuf; fhkuhrh; gy;fiyf;fofk;;> kJiu. vOj;jpay;> 1975> R+. ,d;dhrp> jkpourd; gjpg;gfk;> ghisaq;Nfhj;il.
4. vOj;jpyf;fzf; Nhfl;ghLfs;> 1980> nr.it.fz;Kfk;;> midj;jpe;jpa jkpo; nkhopapay; fofk;;> mz;zhkiy efu;;> rpjk;guk;.
5. jkpo; ,yf;fz Ez;ik 2000> rh.ghyr;re;jpud;;> jhkiu ntspaPl;lfk;;> 367 NkytPjp> jQ;rhT+u;.
Programme : MA.,
Course Code : 19P1TA03
Semester : I
No.of hrs : 6
Core Paper : III
No.of Credits : 5

Nehf;fk; : ,yf;fz Ejy;fspd; Njhw;wk; tsHr;rp> Kjy; ,yf;fz ciuahrphpHfs;
Fwpj;J mwpe;J nfhs;Sjy;

Nehf;fk; : mfk;> Gwk; ,yf;fz tuyhw;W Kiwfis mwpar; nra;jy;.

Nehf;fk; : rkak; rhh;ej ,yf;fz tuyhw;W Ejy;fis mwpar; nra;jy;.

Nehf;fk; : 12 Mk; Ejw;whz;by; vOe;j ,yf;fz MrphpaHfis ikakhff; nfhz;L
Ejy; tuyhw;iw mwpar; nra;jy;.

Nehf;fk; : jw;fhy ,yf;fz tuyhW Fwpj;J mwpar; nra;jy;.

myF - 1 goe;jkpo;; ,yf;fzq;fs;

,yf;fzk; - tiuaiw - nrhy; tuyhW NtW nrhw;fs; (Fwp> Ejy;> Gyd;> vOj;J> ,ay;G> Kiw>
kuG) - tl nrhy; kuG - ,yf;fz ,ay;Gfs; - Ke;JEjy; kuG - gdk;ghudH ghapuk; - Ke;JEjy; -
ciuahrpupaHfs; jUk; tiuaiwfs; - njhy;fhg;gpaKk; Ke;JEjy; kuG Nghw;wYk;.
CO No. | Upon completion of this course, students will be able to | PSOs addressed
--- | --- | ----
CO-1 | nkhopia tsg;gLj;Jk; ,yf;fzj; Nhjw;wj;ijAk; MrphpaH tuyhw;iwAk; mwpe;J nfhz;ldh; | 2
CO-2 | jkpo; ,yf;fz ,yf;fpaq;fSf;fh ciutuyhw;iw khzth;fs; njupe;J nfhz;ldh; | 1
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<td>19P1TA04</td>
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<td>5</td>
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<td>4</td>
<td>12 Mk; Ejw;whz;bw;F gpe;ija ,yf;fz MrphpaHfis mwpe;Jf; nfhz;ldH.</td>
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<td>2</td>
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<tr>
<td>5</td>
<td>,yf;fz tuyhw;NwhL ciuahrphpaHfspd; fhyepiyiaAk; mwpe;Jf; nfhz;ldH.</td>
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ghE}y; : 

1. ,yf;fz tuyhW> 1963. Nrhk.,stuR> njhy;fhg;gpaH gjpg;gfk;> rpjk;guk;.

ghHit E}y;fs;

,yf;fz tuyhW> 1999> ,uh. ,sq;Fkud;> kzpthrfH gjpg;gfk;> nrd;id.
,sk;g+uzH - nhHzhk;khs; epidTr; nrhw;ngho;pTfs;> 1981. K.mUzhryk;> mz;zhkiyg; gy;fiyf;fofk;> mz;zhkiyefh;> rpjk;guk;

jhs;; 4

rpw;wpfyf;fpaq;fs;

Programme : MA.,
Semester : I
Core Paper : IV

Nehf;fk; : 96 tif rpw;wpfyf;fpaq;fspy; J)J ,yf;fpaj;ij ikakhff; nfhz;L

mikj;jy;.

Nehf;fk; : cyh ,yf;fpa eaj;ij mwpar; nra;jy;.

Nehf;fk; : guzp ,yf;fpaj;jpd; ctik eaq;fis mwpar; nra;jy;.

Nehf;fk; : gps;isj;jkpo; ,yf;fpaj;ij mwpar; nra;jy;.

Nehf;fk; : gs;S ,yf;fpa tiffis mwpar; nra;jy;.

myF : 1 jkpo; tpL J)J (20 Kjy; 70 fz;zpfs;)

nry;tk; fiy kw;Wk; mwtpay; fy;Y}up> (jd;dhl;rp) ehkf;fy;.-3
jkpo;j; Jiw
KJfiy jkpo; (vk;.V)
Upon completion of this course, students will be able to

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<td>CO-3</td>
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<td>CO-4</td>
<td>6</td>
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<td>CO-5</td>
<td>6</td>
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1. Fbik ! ngUik!
   
   fhtyu; NjtiuKd;........Kjy;
   
   fUneLk; Gayofu;..... $tha; FapNy .... tiu (6 - 31 ghly;fs;)

2. tsik ! nrOik!
   
   fhhp; gphd; Gjy;tu;.....Kjy;
   
   rpw;wh nwd;gJ ... rpi;jpuk; ghUk; gs;sPNu (32 – 52 ghly;fs;)
Elective Paper – I-A

Programme: MA.
Semester: I
Elective Paper: I-A
Course Code: 19P1TAE02
No. of hrs: 4
No. of Credits: 4

Nehf;fk;: irtj;nhj;dkia gy;NtW ,yf;fpak; top mwpyj;.
Nehf;fk;: ehad;khh;fs; %ykhf irtj;jpd; topgLk; Kiwia mwpyj;.
Nehf;fk;: rpj;hje;j Ejy;fspd; nk;fz;l rhj;ju Kiwia mwpyj;.
Nehf;fk;: tPu irt tsHr;rpapid mwpyj;.
Nehf;fk;: irt mbahh;fspd; tuyhw;iw mwpyj;.

myF: 1
irtj;jpd; njhd;ik - rpe;Jntsp - `ug;gh nkhfQ;jrhNuh> GijngUl; rpd;dq;fspy; .ypq;fk; - njhy;fhg;gpak;> rq;f,y;fs;fspy; irtk; gw;wpa Fwpg;Gfs;> jpUKufhw;Wg;gil> ghpghly;> nrt;Nts; ghly;fs; - gpw rq;f E}j;fspy; irtf;ftTs; Fwpg;Gfs;> rpyg;gjpfhuk;> kzpNkfiy> jpUj;Fws; E}y;fspy; irtkaf; fUj;Jf;fs;.

myF: 2
jpUKiws; - %th; Njthuk;> jpUthrfk;> xd;gjhk; jpUKiw> jpUke;jpuk;> gjpNdhuhk; jpUKiw> nghpaGuhzk; gw;wpa mwpyKfk;> nra;jpfs; - tw;wpd; NfhL;ghLfs; - irtj; jpUj;jyq;fs;> jyGuhzq;fs;> mbahh;fs; topghL> ghbNahh; tuyhW.

myF: 3
rpj;jhe;j E}j;fs; - mwpyKfk;> ghbNahh; - rpj;jhe;jf; fUj;Jf;fs; - nka;fz;l rhj;jpuk; gw;wpa mwpyKfk; - tw;iw tifg;glj;jpAs;s newp - mfg;Gwr; rkaq;fs; Fwpj;j tpsf;fq;fs;.

myF: 4
tPuirtk; - fhRkPu irtk; - mWtifr; rkaq;fs; Fwpj;j tpsf;fq;fs; - it tYtpoe;jjw;fhd fhuzq;fs; - ghly;ngw;w jyq;fs; - irtj;jpUkIq;fs; - gzpfs;.

myF: 5
gpw;fhyr; irt rpj;jhe;jg; Gyth;fs; - jhAkhdth; - rptQhd Kdpth; - fr;rpag;g Kdpth; - FkuFUguh; - mUzfphehj;GilGfsy; ,lk; ngw;Ws;s Kg; nghUs; nfhs;iff; > kwiwiy mbfs;> jpU.tp.f MfpNahhpd; irtg; GilGfs;.

ghh;it E}j;fs;:
   1. irt rkak; - kh. ,uhrkhzpf;fdhh.;
   2. irt rkak; - nkhopngah;g;G E}j; (my;iyad;R ntspaPL).
   3. gd;dpU jpUKiw tuyhw - f. nts;isthudh.;
   4. mWtifr; rkaq;fs; - fofntspaPL.
Upon completion of this course, students will be able to

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<td>irt mbahh;fspd; tuyhw;NwhL ,iw rpwg;gpidAk; mwpe;J nfhz;ldH.</td>
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<td>CO-3</td>
<td>mfg;Gwrkaq;fs; irtf; fUj;Jf;fs; $Wk; E}y;fis mwpe;J nfhz;ldH.</td>
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<td>CO-4</td>
<td>tPuirtj;jpd; Njhy;tpiaAk; mWtifrkJ;jpd; ,d;wpaikahikAk; mwpe;J nfhz;ldH.</td>
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<td>CO-5</td>
<td>irt rkaj;jpy; Kg; nghUs; nfhs; iffis mwpe;J nfhz;ldH.</td>
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Elective Paper – 1. B

Programme : MA.,
Semester : I
Elective Paper : I .B

Course Code : 19P1TAE05
No.of hrs : 6
No.of Credits : 4
Upon completion of this course, students will be able to

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<td>CO-2</td>
<td>jskoH thhL xd;wpa topghL;L Kiwfs vLj;Jiu;jy;</td>
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<td>CO-3</td>
<td>kdpjd; ;jwthDhL xd;WgLk; topghL;L Kiwfs mwpar; nra;jy;</td>
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<td>CO-4</td>
<td>;khztHfs; fs epfo;Tfs; %yk; Ntstfz;ik; mikj;jiy mwpyj;</td>
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<tr>
<td>CO-5</td>
<td>NtstpfNshL gf;jp epiyiaAk; mwptpay; Kiwfs mwpyj;</td>
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ghu;it Efjy;fs;

1. jpuUnewpa jkpoftujuj; jpuFtl ed;dPuhl;L – Ng&uhjPd ntrspaPL.
2. jpuUKiw newpainp; tho;toppy; topghLfs;.
3. tho;topy; efo;Tj; njhFg;G – kzpthrFU; mL;gzp kd;w ntrspaPL.
4. nre;jsko; Ntstf tp – rj;jpNty; KUfdhu;.
5. mUspay; epfo;Tj; njhFg;G – kzpthrFU; mL;gzp kd;w ntrspaPL.
6. jkpo; topghL;L Kiwfs; - rz;BRtuu; ew;gzp kd;w ntrspaPL.

,uz;lhk; gUtk;
jhs;: 5
fhg;gpaq;fs;
Nehf;fk; : goq;fhy kJiuapd; rpwg;GfisAk; fz;zfpapd; tPuj;jd;ikiaAk;
        tpsf;Fjy;?>
Nehf;fk; : rPtfdpd; jdpj;jpwd; %ykhf RukQ;rhpia kzf;Fk; Kiwia $Wjy;.
Nehf;fk; : fk;guhkahzk; Njhd;w fhuzkhf ,Ue;j ifNfap> ke;jiu R+o;r;rpfis
czh;j;jiy;.
Nehf;fk; : irt ehad;khh;fspd; tuyhWfis czh;j;jiy;.
Nehf;fk; : gpw rka ,yf;fpaq;fshd fpwp];jt> .};yhkpa ,yf;fpaq;fis
        mwpar; nra;jy;.

myF  : 1  rpyg;gpjpfhuk;   - kJiu;fhz;lk; (KOTJk;)

myF  : 2  kzpNkfiy   - 1 Kjy; 3 fhijfs;
        ,ukhD[u; fhtpak; - fhl;Ltop ghij

myF  : 3  fk;guhkhaizk;   - ke;jiu R+o;r;rpg; glyk;
        - ifNfap R+o;r;tpidg; glyk;

myF  : 4  nghpaGuhzk;
        1. fz;zg;gehadhh; Guhzk;
        2. ,isahd;Fb khwehadhh; Guhzk;

myF  : 5 ,NaR fhtpak; - ghLfspd; ghij(4-k; ghfk;)
        rPwhg;Guhzk;   - khDf;Fg; gpiz epd;w glyk;
Upon completion of this course, students will be able to

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<td>CO-5</td>
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1. fhg;gpag; ghh;it> 1987> t.Rg. khzp;fk;> kzpthrfh; gjpg;gfk; rpkj;guk;.
2. fhg;gpag; ghh;itfs;> 1983> nrh. rpq;fuNtyd;> QhdNty; gjpg;gfk; kapyhLjiw.
3. rpyg;gjpfhuk; kzpNkfiy fhg;gpakuG> 1977> Nfh. ,yl;Rkzrhp> mz;zhkiyg; gy;fiyf;fofk;> mz;zhkiy efh;.
4. jkpou; gz;ghL fk;gd; fhtpak;> 1993> v];. itahGhp;gps;is> itahGhp;gps;is epidT kd;wk;> itafk; 2> ehyhtJ FWF;Fj;NJU> ,uh[h mz;zhkiyGuk;> nrk;id.
5. jkpou; ,yf;fpa rhpjj;jpy; fhtpa fhyk; jpuhtpl nkhopfspy; Muha;r;rp;> 1991> v];. itahGhp;gps;is> itahGhp;gps;is epidT kd;wk;> itafk; 2 ehyhtJ FWF;Fj;NJU> ,uh[h mz;zhkiyGuk;> nrk;id.
6. jkpou; ,yf;fhg;gpaf; nfhs;if (Kjy; njhFjp) kw;Wk; ,uz;lhk; njhFjp> Jiu. rPdpr;rhpk> jkpou; ,yf;gy;fiyf;fofk;> jQ;rhT+h;.
7. kzpNkfiy fhg;gpaf; fijAk; gpw ,iaGf; fijfSk;> Xh; xg;gha;T 2001. xa;. nlk;dpdr;> nkhp; gjpg;gfk;> jPUr;ruhg;gs;sp.
Programme: MA.
Course Code: 19P2TA06
Semester: II
Core Paper: VI
No. of hrs: 6
No. of Credits: 4

Nehf;fk;: jpiz> ghy;gFg;G> %tplk; ,tw;iw mwpy;.
Nehf;fk;: nrhw;fs; NgRk; Kiwfis njspthf mwpy;.
Nehf;fk;: nrhw;fs; nghUs; jUk; KiwfisAk; Kf;fhyj;iijAk; mwpy;.
Nehf;fk;: nrhy;ypd; ,ilr;nrhw;fis mwpy;.
Nehf;fk;: mwpag;glhjr; nrhw;f nghUs; mwpy;.
myF – 1 fpstpahf;fk;> Ntw;Wikapay;
myF – 2 Ntw;Wik kaq;fpay;> tspspkuG
myF – 3 ngahpay;> tpidapay;
myF – 4 ,ilapay;> caphpay;
myF – 5 vr;rtpay;

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<td>CO-1</td>
<td>kdpjDf;Fk; tpyq;FfSf;Fk; cs;s jpiZg;ghy;fis mwpe;J nfhz;IdH</td>
<td>2</td>
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<td>CO-2</td>
<td>Ntw;Wik cUGfs; khzth;fs; mwpe;J nfhs;Sjy</td>
<td>2</td>
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<td>CO-3</td>
<td>,yt;fzk; fhye;NjhWk; khWk; ,ay;GilaJ vd;gij njhy;fhg;gpa mbg;gilapy; khzth;fs; mwpe;J nfhs;Sjy:</td>
<td>1</td>
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<td>CO-4</td>
<td>njhy;fhg;gpahpd; nrhy;yjpfhuj;ij mbg;gilahff; nfhz;L goe;jkpopd; nrhy;ypzf;fij kkhzth;fs; mwpe;J nfhs;Sjy;:</td>
<td>2</td>
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<td>CO-5</td>
<td>njhy;fhg;gpahpd; nrhy;yjpfhuj;ij mbg;gilahff; nfhz;L goe;jkpopd; nrhy;ypzf;fij kkhzth;fs; mwpe;J nfhs;Sjy;:</td>
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ghlE}y;fs;::

njhy;fhg;gpak; nghUsjpfhuk:, Muha;r;rpf; fhz;;bifu njhFjp-3. 1989 ghtNyW rh.ghyRe;juk:, jhkiu ntspaPl;lfk:, jQ;ir

ghh;it E}y;fs;::

1. njhy;fhg;gpak;> nrhy; Nrdhtiuah; ciu fof ntspaPL.
2. njhy;fhg;gpak;> nrhy; Kidth; r. jpUQhdrk;ge;jk; fjph; gjpg;gfk; njw;F tPjp jpUitahW – 04 nry;: 9443190379
Programme: MA,
Course Code: 19P2TA07
Semester: II
No. of hrs: 4
Core Paper: VII
No. of Credits: 4

Nehf;fk;: %th; Njthuj;j mwpe;J nfhs;Sjy;.
Nehf;fk;: Mo;thh;fspd; gf;jpj;jpjw;ij mwpar; nra;jy;.
Nehf;fk;: %th; Njthuj;j mwpe;J nfhs;Sjy;.
Nehf;fk;: rpjjh;fspd; tuyhWfis czh;jjy;.
Nehf;fk;: md;G> ,iwnewpfis czh;jjy;.

myF: 1

Njthuk; - jpUQhdrk;ge;jh; - 97>98 Mk; gjpfq;fs;

(97) jpUf;Nfhspyp
ehsha NfhfhNk eQ;rzpAq; Kjy;
ek;gidey; mbahu;fs; ehKilkh .. tiu (1-11 ghly;fs;)

(98) jpUtha;%u;
jspups tsnud cikghj; .... Kjy;
jpq;;fnsh IUtiug; nghopw;Nfhitj .. tiu (1-11 ghly;fs;)

ehTf;furh; - 32> 33 Mk; gjpfq;fs;
(32) jpUthizf; fh
  Nfhidf; htpf; Fspu; e;j...Kjy;
  xj khfly; #o; ,yq; .. tiu (1-10) ghly;fs;.

(33) jpUg;igq;QPyp
  cilau; Nfh tz nkhd; Wq; ...Kjy;
  JUf;fr; nrd; W jltiu .... tiu (1-10) ghly;fs;

Re;juh; 1> 2 Mk; gjpfq;fs;

1. Nfhapjy;
   kbj;jhLk; mbikf;fz;...Kjy;
   gh&Uk; muty;Fy; ... tiu (1-10) ghly;fs;)

2. jpUf;fog;ghit
   nrbNad; jPt pidapy; jLkhf; ...Kjy;
   gopN r upy;Gf ohd; gukd;... tiu (1-10) ghly;fs;)

myF : 2 Mo;;thh;fs; ghly;fs; (11 – 30 ghly;fs;)
  Mz;lhs; - jpUg;ghit KOtJk;
  nghpaho;;thh; - mk;Gyp> nrq;fPiu gUtk;.

myF : 3
  jpUthrfk; - jpUr;rjfk; 1 Kjy; 50 ghly;fs;
  jpUke;jpuk; - ahf; if> nry;tk;> ,sik epiyahik

myF: 4rpj;jh;fs;
  1. ,ilf;fhl;Lr; rpjjh; - 1 Kjy; 20 ghly;fs;
  2. rptthf;fpah; - 1 Kjy; 20 ghly;fs;
  3. gl;bdj;jh; - fr;rpf;fyk;gfk; 1 Kjy; 20 ghly;fs;

myF: 5fpwpj;jt ,Ryhkpa rka ,yf;fpaq;fs;
  1. Njk;gh tsp - lak; ePq;F glyk;
  2. ,ul;rzpa ahhj;phpfk; - caph; ePjj glyk;
  3. Fzq;Fb k;jh;hd; rhpG - guhgu;f;zp nfhs;Sjy;
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<td>CO-1</td>
<td>gf;jp ,yf;fpak; fhye;NjhWk; tsh;e;Js;spij;iij khzth;fs; mwpe;J nfhs;Sjy;</td>
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<td>CO-2</td>
<td>jkpo; rkaq;fspd; nfhs;iffis khzth;fs; Gupe;J nfhs;Sjy;</td>
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<td>CO-3</td>
<td>gf;jp ,yf;fpajjpd; %yk; rKjha kWkyh;r;rgp; Nghf;Ffis nju;pe;J nfhs;sy</td>
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<td>CO-4</td>
<td>rpj;jh;fspd; tuyhWfis mwpe;J nfhz;ldh;;</td>
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<td>CO-5</td>
<td>fpwpj;jt ,Ryhkpa gf;jp;jpwj;iij mwpe;J nfhz;ldh;</td>
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</table>

ghh;it E}y;fs;:

1. Mo;thh;fspd thh;fspd; fhypeiy> 1981 K. ,uhfitaq;fhh;> kzpthrfh; gjpj;gfk;> rpjk;guk;
2. rpj;jh; jj;Jtk; 1988> f. ehuhazd; kWhpgfpg;gfk;> GJr;Nrhp.
3. jkpo; ,yf;fpajjpy; kjKk; khDIKk;>2001 fhh;j;jp NfRrptj;jk;gp;> kf;fs; ntspaPL> nrd;id.
4. jkpo;r; rka tuyhW> 1980> M. NtYg;gps;is> jkpo;++;g;Gjjfhya;> nrd;id.
5. jkpo; kjk; 2000> Qh. NjtNeag;ghthzh;> jkpo;++;khd; gjpg;gfk;> nrd;id.
6. jkpo; nka;apay;> 1980> FspnghJik ntspaPL> nrd;id.
7. jkpo; jj;Jtk; 1976> Nrh. fe;jrhkp> kzpthrfh; gjpg;gfk;> nrd;id.
8. jpUKiw ,yf;fpak; 1995> Nrh. fe;jrhkp cyfj; jkpohuha;r,rp epiyak;.
9. jkpou; kjk; - kiwkiyabfs;
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<th>Programme</th>
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<th>No. of Credits</th>
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Nehf;fk: Kg;ghy; ngUikia mwpanra;jy;.

Nehf;fk: ehybahh; czh;Jk; mnewpf; fUj;Jf;fisf; fw;Wf;nfhLj;jy;
Upon completion of this course, students will be able to

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<td>cyfg; nghJkiw $Wk; mwf;fUj;ij mwpar; nra;jy;</td>
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<td>CO-2</td>
<td>jdpkdpj tho;Tf;F Njitahd xOf;fq;fis khztHfs; mwpar; nra;jy;</td>
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<td>CO-3</td>
<td>fhye;NjhWk; khwptUk; gonkhop ,yf;fpaj;ij kHZth;fs; mwpyj;</td>
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<td>CO-4</td>
<td>kUe;JnghUl;fisf; nfhz;L mwf;fUj;Jf;fis kHZth;fs;; kdjpy; tpijj;ijy;</td>
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<td>CO-5</td>
<td>mwk;&gt; mwkw;WJ vit vd;gjid kHZth;fs; mwpar;nra;jy;</td>
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ghh;it E}y;fs;:

1. gjpndz; fPo;;f;fzf;F E}y;fs;.

2. jkpo; ,yf;fpaj;jpy; fhyKk; fUj;Jk; (mwnewpf;fhyk; kl;Lk;) 1985> m .NtYg;gps;is> ghupGj;jfg;gz;iz nrd;id.

3. jpUf;Fws; xU rKjhag;ghu;it> 1980> vj;: uhkfpU;\;zd; kPdhl;rp Gj;jf epiyak;> kJiu.
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**Nehf;fk:**
- khzth;fspd; gilg;ghw;wiy tsh;jjy;
- r%f; rpf;fy;fs; Fwpj;J khzth;fspd; gilg;ghw;wiy tsh;jjy;
- ,jpfhrk; gw;wpa fUj;J nrwpit tsh;jjy;
- khzth;Ffbjk; vOJk; Kiwia czh;j;Jjy;
- ,jo;fs; jpiug;glq;fs; kpd; Clfq;fs; kjpg;gLfs; fsg;gzpiaf; ifahSk;
  - tpjj;ij vLj;Jiu;jjy;.

**myF:** 1
- kuGf;ftpj> GJf;ftpj> i`f; $ ftpj vOJjy;.
- nfhLf;fg;gl;l jiyg;G my;yJ Fwpg;gp;l nghUs; Fwpj;Jf; ftpj vOJjy;.

**myF:** 2
- r%f; rpf;fy;fs; , r%f tpopg;Gzh;Tfs; Kjyhd Fwpg;gp;l nghUs;ikakhff; nfhz;L> rpWfij vOJjy;>
  - xUgf;f fij> FWq;fij giljjy;.

**myF:** 3
- Xuq;f ehlfk; vOJjy;> tuyhw;W ehlfk;> ,jpfhr ehlfk;> eifr;Rit ehlfk;> fhg;gpaf; $Wfis mbg;gilahff; nfhz;L ehlfk; giljjy;.

**myF:** 4
- fl;;Liu vOJjy;> ,yf;fpaq; fl;;Liu> tuyhw;Wf;fl;Liu> r%f tpopg;Gzh;Tf; fl;Liu> jiyaq;ff;
  - fl;Liu> gazf; fl;Liu> Md;kJf; fl;Liu giljjy;.

**myF:** 5
- E)j; kjpg;gL nra;jy;> ,yf;fpaq;fs;> Ma;T E)j;fs;< ,jo;fs; - jpiug;glq;fs; - kpd;
  - Clfq;fs; kjpg;gLfs; fsg;gzp nra;jp Nrfupj;jy; - ntspapLjy; - Neu;fhzy; fhzy;.
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<td>CO-1</td>
<td>nghpahhpdp; gFj;jwpTitAk; &gt; murpay; nfhs;ifAk;&gt; jkpo; kf;fSf;fhf mth; ghLgl;lijAk; khzth;fs; mwpe;J nhhz;ldh;</td>
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<td>CO-2</td>
<td>r%f tpLjyf;Fk;&gt; jPz;lhik xopg;Gf;Fk; mth; ghLgl;lij khzth;fs; njhpe;J nhhz;ldh;</td>
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<td>CO-3</td>
<td>ghLg;ghdpau; ,y;yj;jpUkzk;&gt; Rakupahij ,af;fk;&gt; ngz;zpzd; kWzkz;&gt; vd gy Nghuhl;lq;fis elj;jp jPz;lhikia xopf;f ghLgl;Lhh; vd;gij Ghphe;J nhhz;ldh;</td>
<td>7</td>
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<td>CO-4</td>
<td>ngz;fspd; eyDj;fhhfTk;&gt; ngz;fSk; r%fj;jpy; rk chpiik ngw;W thoTk; mauhJ cioj;jhh; vd;gij khzth;fs; mwpe;J nhhz;ldh;</td>
<td>7</td>
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<td>CO-5</td>
<td>tlnkhop vjpu;g;G&gt; .e;jp vjpu;g;G&gt; .e;jp vjpu;g;Gg; Nghuhl;;lk;&gt; jkpo;nkhop;fyg;G&gt; fiyr;nrhy;yhf;fk;&gt; vOj;Jr; rPu;jpUj;jk; Mfpatw;Wf;F nghpJk; ghLgL;lhh; vd;gij mwpyj;</td>
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**It** E}y;fs;

1. ahg;gUq;fyf;fhupif- irt rpj;hhe;j E}w;gjps;Gf;fot nspl. PL.
2. mhp];lhl;bypd; ftpij ,ay;-- Kidth; m.R. kzhds;.
3. ftpQuhf - m.fp. gue;jhkdhh;.
4. ey;y jkpo;;; vOj Ntz;Lkh - m.fp. gue;jhkdhh;.
Elective Paper – II - B
ehl;Lg;Gwtpay; Nfhl;ghLfs;

Programme : MA., Course Code : 19P2TAE06
Semester : II No.of hrs : 4
Elective Paper : II - B No.of Credits : 4

Nehf;fk; : ehl;Lg;Gwr; rlq;Ffs; ek;gpf;iff; Fwpj;j tpopg;Gzh;T Vw;gLj;jy;.
Nehf;fk; : ehl;Lg;Gwf;fijfs; - ehl;Lg;Gwg; ghly;fs; Fwpj;j tpopg;Gzh;T Vw;gLj;jy;.
Nehf;fk; : ehl;Lg;Gwf; fijfs;> tpLfijfs;> gonkhopfis mwpanra;jy;.
Nehf;fk; : ehl;Lg;Gwf; N;fhl;ghLfs; - Njhw;wk; - tsHr;rp epiyfs; vLj;Jiuj;jy;
Nehf;fk; : jkpopay; Ma;Tf;F ehl;Lg;Gwtpaypd; gq;fspg;Gf; Fwpj;j tpsf;fkspj;jy;.

myF - 1
ehl;Lg;Gwtpay; vd;w nrhy;ypd; tpsf;fk; - Folk, lore vd;w nrhw;fspd; tpsf;fk; - jkpo;r;;
#oypy; ,r;nrhy; gad;gLj;j ngWk; Kiwfs; - ehl;Lg;Gwtpaypd; tiffs; - ehl;Lg;Gwtpay Yk; tuyhWk;

myF - 2
tha;nkhop ,yf;fpak; - ehl;Lg;Gwf;fijfs; - ehl;Lg;Gwg; ghly;fs; (jhyhl;L> rpWtH tpisahl;Lg; ghly;fs;> xg;ghupg; ghly;fs;) - fijg;ghly;fs; (tuyhW> r%f; fijg;ghly;fs;)

myF - 3
gonkhopfs; - tpLfijfs; - tpisahl;Lfs; - fsha;T - ehl;Lg;Gwf;fijfs; - fufk; - fhtb - njUf;$j;J.

myF - 4
#oypay; Nfhl;ghL - tpsf;fk; - tsHr;rp epiyfs; - mikg;gpay; Nfhl;ghL – cstopay; Nfhl;ghL - ,dtiutpay; Nfhl;ghL - tha; nkhop tha;ghl;Lf; Nfhl;ghL.

myF - 5
ek;gpf;iff; - rlq;fs; ehl;Gw nja;tq;fs; - jkpopay; Ma;Tf;F ehl;Lg;Gwtpaypd; gq;fspg;G Nfhl;ghLfs; - tpsf;fk; - Njhw;wk; - tsHr;rp epiyfs;.

nr,d;id. 2010.
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<td>CO-2</td>
<td>ehl;Lg;Gwf;fijs; - ehl;Lg;Gwg; ghly;fs; gw;wp njhpe;Jf; nfhz;ldh.;</td>
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<tr>
<td>CO-3</td>
<td>ehl;Lg;Gwf; fijs;&gt; tpLfijfs;&gt; gonkhopfisf; Nfl;Lg; gadile;jdh.;</td>
<td>12</td>
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<tr>
<td>CO-4</td>
<td>ehl;Lg;Gwf; N;fhl;gLfs; - Njhw;wk; - tsHr;rp epiyfs; njhpe;Jf; nfhz;ldh.;</td>
<td>11</td>
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<tr>
<td>CO-5</td>
<td>jkpopay; Ma;Tf;F ehl;Lg;Gwtpaypd; gq;fspg;Gfis mwpe;J gadile;jdh</td>
<td>12</td>
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ghI€}y;fs;

1. ehl;Lg;Gwtpay; Ma;T> R. rf;jpNty;> kzpthrfH gjpg;gfk;> rpjk;guk;. 1992.

gHIt E}y;fs;

1. ehl;Lg;Gw ,ay;> MW. ,uhkehjd;> kzpthrfH gjpg;gfk;> rpjk;guk;> 1992.
2. ehl;Lg;Gw ,yf;fpa tuyhW> R. rz;KfRe;juk;> kzpthrfH gjpg;gfk;> rpjk;guk;> 1988.
3. jkpof ehl;Lg;Gw Ma;Tfs;> epa+ nrQ;Rup Gf; `Tj; gpiuNtl; ypkpnl;>
NON MAJOR ELECTIVE COURSE

HR - kdpj chpikfs;

Programme : MA,
Semester : II
NMEC Paper – I
Course Code : 19P2HR01
No.of hrs : 2
No.of Credits : 2

Nehf;fk; : kdpj chpikfs;> tho;Thpik kw;Wk; murpay; chpikfs; Fwpj;J

Nehf;fk; : kdpj chpikfs;> murpay; rhrd chpikfs; Fwpj;J vLj;Jiu;jjy;.

Nehf;fk; : tYf;fl;lhak; kw;Wk; nfhj;jbik ciog;gpid jil nra;jy; Fwpj;J

Nehf;fk; : l.eh rig kw;Wk; kdpj chpik kPwy;fs;; Fwpj;J vLj;Jiu;jjy;.

Nehf;fk; : kdpj chpikfs;> tho;Thpik kw;Wk; murpay; chpikfs; Fwpj;J

myF: 1
kdpj chpikfs; tuyhW - kdpj chpik ,ay;Gfs; tiff; - fyhr;rhub; - Nhhl;ghLfs; - kdpj chpikfs; gw;wpa midj;Jyf khehl;bd; gpufldk;> kdpj chpik nghJr; rigapd; Kfg;Giu - tho;Thpik kw;Wk; murpay; chpikfs; gw;wpa rh;Njr mwptpg;Gfs; - nghUshjhu r%f kw;Wk; fyhr;rhu chpikfs;.

myF: 2
dkpj chpikfs; kPJ murpay; rhrdj;jpd; ghJfhg;G mwq;fs;; mbg;gil chpikfs;> muRtpjpKiwfs;; murpay; kw;Wk; tho;Thpikfs;.

myF: 3
nghUshjhu chpikfs;; Ntiy nra;Ak; chpikfs;; Nghjpa $yp ngWk; chpik> Nghjpa gzpf;fhy chpik> Rje;jpukhf $Wk; chpik> tYf;fl;lhak; kw;Wk; nfhj;jbik ciog;gpid jil nra;jy;.
Upon completion of this course, students will be able to address the following PSOs:

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<td>kdpj chpikfs; tho;Thpik kw;Wk; murpay; chpikfis njhpe;Jnhfz;ldh;</td>
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<tr>
<td>CO-2</td>
<td>kdpj chpikfs; tho;Thpik kw;Wk; murpay; chpikfis njhpe;Jnhfz;ldh;</td>
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<td>CO-3</td>
<td>l.eh rig kw;Wk; kdpj chpik kPwy;fs; gw;wp njhpe;Jnhfz;ldh;</td>
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<td>CO-4</td>
<td>l.eh rig kw;Wk; kdpj chpik kPwy;fs; gw;wp njhpe;Jnhfz;ldh;</td>
<td>7</td>
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<tr>
<td>CO-5</td>
<td>l.eh rig kw;Wk; kdpj chpik kPwy;fs; gw;wp njhpe;Jnhfz;ldh;</td>
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</table>
EXTRA DISCIPLINARY COURSE

gad:ghl:Lj; jkpo;;;;;

<table>
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<tr>
<th>Programme</th>
<th>Course Code</th>
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<tbody>
<tr>
<td>MA.</td>
<td>19P2TAED01</td>
</tr>
<tr>
<td>Semester</td>
<td>II</td>
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<tr>
<td>No.of hrs</td>
<td>4</td>
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<tr>
<td>No.of Credits</td>
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Nehf;fk; : re;jpg;gpio ,y;yhky; vOjg; gapw;rpaspj;jy;
Nehf;fk; : epWj;jw; Fwpfspd; gad;ghL Fwpj;J tpsf;Fjy;
Nehf;fk; : khzth;Fsf;F fbjk; vOjKk; Kiwia mwpiy;
Nehf;fk; : fbjk; kw;Wk; gj;jphpifffspy; vOj;Jg;giofs; ,y;yhky; vOj
   fw;Wj;jUjy;
Nehf;fk; : mYtyff; fbjq;fis jkpo;eilapy; vOjg; gapw;rpaspj;jy;

myF: 1
   ,f;fhyj; jkpopd; ,ay;Gfs; - re;jp tpjpfs>; re;jp - tiuaiw> re;jpapd; Njit> re;jp tifg;ghLfs;
   - mfr;re;jp> Gwr;re;jp> nrhw;re;jp> re;jp tUifaplq;fs>; ty;ypdk; kpFk; ,lq;fs;> kpfh ,lq;fs; >
   rpy jdpf; Fwpq;Gfs; - goQ;re;jp ,f;fhyr; re;jp NtWghLfs;> rpwq;Gr; re;jptpjps;> epWj;jf;
   Fwpq;gad;ghLk; re;jpAk;.

myF: 2
   epWj;jw; Fwpfspd; gad;ghL> nrhw;fisr; Nrh;Jk; gphpj;Jk; vOJk; Kiwfs; Ngr;Rk; fhy
   ,lntspAk;> epWj;jw;FwpFsk;> epWj;jw; Fwpfs; - fhy;Gs;sp> miug;Gs;sp> Kf;fhw;Gs;sp>
   Kw;Wg;Gs;sp> Nfs;tpf;Fwpfs;> czh;r;rpf; Fwpfs;> ,ul;il xw;iw Nkw;Nfhs; Fwpfs;>
Upon completion of this course, students will be able to

<table>
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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tr>
<td>CO-1</td>
<td>re;jpg;gpio ,y;yhky;; vOJk; Kiwiaj; njhpe;Jnfhz;ldh;</td>
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<tr>
<td>CO-2</td>
<td>epWj;jw; Fwpfspd; gad;ghl;ilj; njhpe;Jnfhz;ldh</td>
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<td>CO-3</td>
<td>khzth;fs; fbjk; vOJk; Kiwia fw;Wf;nfhz;ldh;</td>
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<td>CO-4</td>
<td>xt;nthU nrhy;ypYk; vOj;Jg; gpiosf; ,y;yhky; vOj fw;Wj;Ujy</td>
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<td>CO-5</td>
<td>mYtyff; fbjq;fs; jkpo;eilapy; vOJk; Kiwiaj; njhpe;Jnfhz;ldh;</td>
<td>2</td>
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</tbody>
</table>

ghlE}y;fs;;

1. jkpo;;;eilf; ifNaL  - gh.uh. Rg;gpukzpad;> t. QhdRe;juk;
2. jkpopy; ehKk; jtwpy;yhky; vOjyhk; - nghw;Nfh
3. ey;y jkpo;;; vOj Ntz;Lkh? - m.fp. gue;jhkdhh;.

Programme       : MA.,
Course Code      : 17P3TA09
Semester         : III
Core Paper       : IX
No.of hrs        : 6
No.of Credits    : 5

Nehf;fk; : jiypapd; gz;G eyd;fis mwpy;.
Nehf;fk; : jiypdpd; Fzq;fisg; gw;wp mwpe;J nfhs;Sjy;.
Nehf;fk; : Njhopahdts; ey;yit jPait $Wtij mwpy;.
Nehf;fk; : rq;ffhy gofi;fof;f;fs; ek;gpfi;ffis kyh; tiffis mwpy;.
Nehf;fk; : kioapd; fhuzkhf epfo;Tfs; itia gw;wp mwpy;.

myF: 1
  lq;FWE}W - Kjy; ehw;gJ ghly;fs; (kJj;jpiz)

myF:2
  FWenjif-guzh; ghly;fs; (14):
  19>24>36>60>73>89>120>128>165>258>292>328>393>399.
  ew;wpiz Ky;iy;jpiz ghly;fs; (14):
Upon completion of this course, students will be able to

<table>
<thead>
<tr>
<th>CO No.</th>
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</tr>
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<tbody>
<tr>
<td>CO-1</td>
<td>jkpohpd; ,y;yw tho;tpaiy mwpe;J nfhz;ldH.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>mwj;njhL epw;wiy fw;W czHe;jdH.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>jiypapd; xOf;f epiyia Nkk;grl; nra;tiij mwpe;J nfhz;ldH.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>rq;fhy kf;fspd; gof;ftof;fq;fs; ek;gpf;fiffis mwpe;J nfhz;ldH.</td>
<td>3</td>
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<tr>
<td>CO-5</td>
<td>%Nte;jh; rpwg;Gk; fhyr;R+o;epiyiaAk; mwpe;J nfhz;ldH.</td>
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</table>
1. FNshwpah Re;jukjp gFg;gha;T> newspapy; rq;f ,yf;fpak;> cyfj; jkpohuha;r;r p epWtdk;> nrn;id.

2. FNshwpah Re;jukjp - ,yf;fp fpa fypAk; gFg;gha;Tk;> kzpthrfrh; E}yfk;> rpjk;guk;

3. .uh. rhuq;fghzp> rq;fj; jkpo;;tsk;> nk;aag;gd; gjpg;gfk;> rpk;guk;

4. t.Rg. khzp;fk; - jkpo;; fhjy;> kzpthrfrh; gjpg;gfk;> rpk;guk;

5. M. ,uhkfpU\;zd; - mfj;jpiz khe;jh; Xh; Ma;T> rh;Nthja ,yf;fpag; gz;iz> kJiu.

6. j. Rg;Gnul;bahh;> mfj;jpizf; nfhs;ifff;.

7. rush uh[Nfhghy;> rq;f ,yf;fpaj;jpy; Njhop.

8. gjpndz; fPo;f;fzf;F E}y;fs;

9. Kj;jhsh;shapuk; (njspTiu)> M. euhaz NtYg;gps;is> tu;jjkhd; gjpg;gfk;> nrn;id.

Programme: MA.,
Course Code: 17P3TA10
Semester: III
No.of hrs: 6
Core Paper – X
No.of Credits: 5

Nehf;fk: jkpohpd; mfg;Gw thof;iifia tpsf;Fjy;
Nehf;fk: jkpohpd; mftho;f;iifia tpsf;Fjy;
Nehf;fk: nra;Aspy; cktkTUGfspd; gad;gLfiis tpsf;Fjy;.
Nehf;fk: nra;Aspy; vOj;J> mir>rPh;> jis gad;gLfiis tpsf;Fjy;.
Nehf;fk: caphpdq;fspd; tifg;gL ciuj;jy;.

myF: 1 mfj;jpizpay;
Upon completion of this course, students will be able to

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<tr>
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</tr>
<tr>
<td>CO-2</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>ctkTUGfspd; gad;ghLfis Ghpe;J nfhz;ldh;:</td>
</tr>
<tr>
<td>CO-4</td>
<td>nra;Aspy; vOj;J&gt; mir&gt;rPh;&gt; jis gad;ghLfis fw;Wf;nfhz;ldh;:</td>
</tr>
<tr>
<td>CO-5</td>
<td>caphpdq;fspd; tifg;ghLfisj; njhpe;J nfhz;ldh;:</td>
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ghl E}y;:

1. njhy;fhg;gpak; nghUsjpfhuk; , Muha;r;rp fhz;;bifAiu njhFjp-3, 1989 ghtNyW rh.ghyRe;juk; , jhkiu ntspaPl;lfk; , jQ;ir

ghh;it E}y;fs;:

2. njhy;fhg;gpak; - ,sk;G+udhh; ciu fof ntspaPL.
   njhy;fhg;gpak; nghUsjpfhuk; - Nguhrphpak;

jhs;; 11

, yf;fpaj; jpwdha;tpay;

Programme : MA., Course Code : 17P3TA11
Semester : III No.of hrs : 6
Core Paper – XI No.of Credits : 5

Nehf;fk; : khzh;fs; jpwdhAk; Kiwia tsh;jJf; nfhs;Sjy;
Nehf;fk; : khzh;fs; fw;gidj;; jpwid tsh;jJf; nfhs;Sjy;
Upon completion of this course, students will be able to

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<tbody>
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</table>

Nehf;fk; ; ,yf;fpa E}ypd; tbtk;> eilapid mwpe;J nfhs;Syj;  
Nehf;fk; ; fhg;gpak;> ehlfk;> Gjpdp;jpd; Najhw;wKk; tsHr;rpAk; mwpe;J nfhs;Sjy;  
Nehf;fk; ; ciuahrphpah;fspd; Najhw;wKk; tsHr;rpAk; mwpe;J nfhs;Syj;  

myF: 1 ,yf;fpa tiffs; - ghLnghUl;fs; - ,yf;fpa ,af;fq;fs;:  
, yf;fpa tiffs;> ftpijapd; Najhw;wKk; tsh;r;rpAk; - fhg;gpak;fspd; Najhw;wKk; tsh;r;rpAk; - Guhzq;fspd; Najhw;wKk; tsh;r;rpAk; - rpw;wpypf;fpaq;fspd; Najhw;wKk; tsh;r;rpAk; - rpwFfijapd; Najhw;wKk; tsh;r;rpAk; - Gjpdj;jpd; Najhw;wKk; tsh;r;rpAk; - ehlfj;jpd; Najhw;wKk; tsh;r;rpAk; - fl;Liua;fspd; Najhw;wKk; tsh;r;rpAk;.

ghLnghUl;fs;: rq;f ,yf;fpaq;> ghujp> ghujpjhrd; ghly;fspy; ,aw;if mfk; - Gwk;> ,yf;fpaq; Nfhl;ghLfs; - jkpou;gz;ghl;bd; jdpr;rpwg;Gfs;> gy;NtW fhjyf;fLlq;fspy; ,yf;fpaq;fspy; gad;gLj;jg;gL;S;gz;ghL vd;w nrhy;Yf;Fhpa tpsf;fq;fs;  

myF: 2 jpwdha;Tk; jpwdha;thsUk;  
jpwdha;tpd; tpsf;fk; - jpwdha;Tk; kjpg;Giu - Muha;r;rp NtWghL - jpwdha;tpd; gad;> jpwdha;Tk Fwpj;J l.u. hpr;rh;I;> K.t> m.r.Qh fUj;Jf;fs;>; ,Utf jpwdha;Tk - tpsjKiw - kjpg;gLk;L Kiw - kjpg;gLk;L by; Vw;gLk; rpf;fy;fs; - jPh;Tfs; - ,yf;fpar; rpwg;gpay;Gfs kjpg;gLk;L Kiw - cz;ikj; jpwdha;thsd; jFjpf;fs;  

myF: 3 ,yf;fpaq;$WfSk;> jpwdha;Tk;F cl;gLj;jg;gL;l Gqy;fSk;:  
,yf;fpaq; $WfSk;> czh;r;rp - fw;gid - fUj;J - tbtk; Ma;Tg;Gqy;fs;: Fwpq;Gg;ngUUs; (Suggestia;n) - nrhy;yhl;rP (Pa;etie dictia)n - eil(Style) - gbkk; (Image) - ctik (simple) - cUfik; (Mataphor) - njhd;kk; (Myth) Nehf;F  

myF: 4 jpwdha;Tk mZFKiws;:  
cstpay; mZFKiw - mwtpay; mZFKiw - njhd;ktpay; mZFKiw - r%fpay; mZFKiw - tuyhw;wpay; mZFKiw jpwdha;tpd; gad;  

myF: 5 jkpo;; ,yf;fpaq; jpwdha;Tk tuyhW;  
,yf;fpaq; ,yf;fzq;fspy; jpwdha;Tk; Fwpq;Gfs; - ciuahrphpah;fspd; jpwdha;Tk; Nghf;F - ,Ugjhk; E}w;whz;by; jpwdha;tpd; tsh;r;rp.
| CO-1 | jpwdhAk; fiyia tsh;j;Jf;nhhz;ldh;; | 5 |
| CO-2 | fw;gid jpwdAk; fiyia tsh;j;Jf;nhhz;ldh;; | 1 |
| CO-3 | jpwd;E}ypad gilf;Fk; jpwd tsh;j;Jf;nhhz;ldh;; | 1 |
| CO-4 | gilg;ghw;wy; jpwd tsh;j;Jf;nhhz;ldh;; | 11 |
| CO-5 | ciuahrphpah;fspd; Njhw;wKk; tsHr;rpAk; mwpe;J nfhz;ldh;; | 2 |

ghI}y;fs;
1. ,yf;fpaj; jpwdha;tpay; - Kidth; jh.V. Qhd%h;j;jp.
2. jpwdha;Tk; jkpo;;pyf;fpaf; nfh;iffSk; - e. gpr;rKj;J

jpwdha;Tf;fiy - jp.R. eluhrd;

ghh;it E}y;fs;:
1. ,yf;fpaj; tifAk; tbTk;; cyfj; jkpo;;; Muha;r;rp; epWtdk;; nrd;id.
2. ,yf;fpaj; jpwd; - K.t
3. ,yf;fpaj ,af;fq;fs; - e. gpr;rKj;J.
4. ,yf;fpaj kuG - K.t
5. njhy;fhg;gpahpd; ,yf;fpaf; nfh;iffS; - nka;g;gL> ,iwr;rp> Nehf;F - jkpoz;zy;;
6. jkpopyf;fpaj; jpwdha;T tuyhW - f. gQ;rhq;fk;.
7. ciuahrphpah;fs; - K.it. mutpe;jd;.

jhs;; 12
Muha;r;rp newpKiwfs;
Programme: MA.
Course Code: 17P3TA12
Semester: III
No. of hrs: 6
Core Paper – XII
No. of Credits: 4

Nehf;fk: khzth;fsplk; Ma;Tf;Fwpj;j rpe;jidia tsh;j;jy;
Nehf;fk: khzth;fsplk; juTfs; Nrfhpq;G> E}yfg; gad;ghL tsh;j;jy;
Nehf;fk: Ma;T tiffs;> mZFKiwfis vLj;Jiu;j;jy;;
Nehf;fk: khzth;fsplk; xg;gPl;LKiwia Xq;fr;nra;jy;
Nehf;fk: Ma;Ntl;bd; mikg;G Kiwia vLj;Jiu;j;jy;

myF: 1
Ma;T mwpKfk:: Muha;r;rp nrhw; nghUs; tspf;fk; - Muha;r;rg; nghUs; -
Ma;thsUf;Fhpa jFjpfs; - Ma;T ehfhpfk; - fUJNFhs; - Ma;Tr; rpf;fy;fs; Ma;Tg; nghUlfsj;-
njspthfr; Rl;ly;.

myF: 2
juTfs; Nrfhpq;G: Fwpq;ngLj;jy; - E}yfg; gad;ghL - fzpg; nghwp> ,izak; cs;spl;l etPdf;
fUpfisg; gad;gLj;jy; - fs Ma;T - tpdhepuy; - Neh;f;fhzy;.

myF: 3
Ma;T tiffs;> mZFKiwfSk;: Ma;T tiffSf;F cs;is NtWghLfs; - mwptpay; Kiw - mikg;G Kiw - tpjpAzh; Kiw - Gs;sp tptuKiw jdpepiy Ma;T - tspf;f Kiw.

myF: 4
Ma;tpay; mZF Kiwfs;; mwptpay; mZFKiw - cstpay; njhy; nghUspay; -
xg;gpyf;fpak; - r%ftpay; - nhkopapay; - tuyhw;wpay; mZFKiwfs;

myF: 5
Ma;Ntl;bd; mikg;Gk;> tiuT KiwAk;: Ma;Ntl;bd; mikg;G - jfty; jpu;ly; - jpl;lkpLjy; - Ma;T
nkhoepil - Kjy;gb - jpUij;jg;gb - mbf;Fwpq;G JizjE}w;gl;bay; - RUf;f tspf;fk; - Kd;Diu -
KbTiu - ml;ltizfs; - nghUl;Fwpq;G mfuhp - gpd;dpizg;Gs; - tiuglq;fs; - nrhy;yiTfs;.
<table>
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<th>PSOs addressed</th>
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<tr>
<td>CO-1</td>
<td>khzth;fs; Ma;Tf;Fwpj;j rpe;jidia tsh;j;Jf;nfhz;ldh</td>
<td>11</td>
</tr>
<tr>
<td>CO-2</td>
<td>juTfs; NrfhpG;G;}yfg; gad;ghLfisj; njhpe;Jnhz;ldh;</td>
<td>12</td>
</tr>
<tr>
<td>CO-3</td>
<td>Ma;T tiffs;&gt; mZFKiws; gw;wp njhpe;Jnhz;ldh;</td>
<td>11</td>
</tr>
<tr>
<td>CO-4</td>
<td>xg;gPl;L MAk; jpwd tsh;j;Jf;nfhz;ldh</td>
<td>12</td>
</tr>
<tr>
<td>CO-5</td>
<td>Ma;Ntl;L mikf;Fk; Kiwiaf; fw;Wf;nfhz;ldh;</td>
<td>11</td>
</tr>
</tbody>
</table>

**ghIE}y;**
1. Kidth; F.nt. ghyRg;gpukzpad; - Ma;tpay; newpfs;> jQ;rhT+h;> ckh ntspaPl;lfk;.

**ghh;it E}y;fs;;**
1. lhf;lh; jkpo;zty; - Ma;tpay; mwpKfk;> kJiu kPdhl;rp Gj;jfepiyak;> 1977
2. Kidth; mW. ,uhkehjd; - ehl;Lg;Gwtpay; fsha;T newpKiws;> jQ;rhT+h;.
3. lhf;lh; <.rh. tpRtehjd; - Ma;T newpKiws;> nrd;id jkpo;>;g; Gj;jfhyak;> 1986
4. Kidth; Mh.; rzKfk; - Muha;r;rp Kiwikfs;> kJiu Kj;Jg; gjpg;gfk;> 1979
5. lhf;lh; nghw;Nfh - Muha;r;rp newpKiws;> nrd;id le;jpizg;gjpg;gfk;> 2005
Programme : MA.,  
Course Code : 17P3TAE03  
Semester : III  
No.of hrs : 6  
Elective Paper : III - A  
No.of Credits : 4

Nehf;fk; : khzth;fspd; gilg;ghw;wiy tsh;j;jy;
Nehf;fk; : r%fr; rpf;fy;fs; FwpJ J khzth;fspd; gilg;ghw;wiy tsh;j;jy;
Nehf;fk; : ,jpfhrk; gw;wpa fUj;J nrwpit tsh;j;jy;
Nehf;fk; : khzth;FSf;F fbjk; vOJkJ; Kiwia czh;j;Jjy;
Nehf;fk; : ,jo;fs; jpiug;glq;fs; kpd; Clfq;fs; kjpg;gPLfs; fsg;gzpiaf; ifahSk;
   tpij;ij vLj;Jiu;jjy;.

myF : 1
   kuGf;ftpij> GJf;ftpij> i`f;$ ftpij vOJjy;. nfhLf;fg;gl;l jiyg;G my;yJ Fwpg;gpl;I nghUs; Fwpj;Jf; ftpij vOJjy;.

myF : 2
   r%fr; rpf;fy;fs; , r%f tpopg;Gzh;Tfs; Kjyhd Fwpg;gpl;I nghUs is ikakhff; nfhz;L> rpWfij vOJjy;> xUgf;f fij> FWq;fij gilj;jy;.

myF : 3
   Xuq;f ehlfk; vOJjy;> tuyhw;W ehlfk;> ;,jpfhr ehlfk;> eifr;Rit ehlfk;> fhg;gpaf; $Wfis mbg;gilahff; nfhz;L ehlfk; gilj;jy;.

myF : 4
   fl;;Liu vOJjy;> ,yf;fpaf; fl;Liu> tuyhw;Wf;fl;Liu> r%f tpopg;Gzh;Tf; fl;Liu> jiyaq;ff; fl;Liu> gazf; fl;Liu> Md;kPff; fl;Liu gilj;jy;.

myF: 5
   Ejy; kjpg;gPL nra;jy;> ,yf;fpaq;fs;> Ma;T Ejy;fs; - ,jo;fs; - jpiug;glq;fs; - kpd;
   Clfq;fs; - kjpg;gPLfs; - fsg;gzp; nra;jp Nrfupj;jy; - ntspapLjy; - Neu;fhzy; fhzy;.
<table>
<thead>
<tr>
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</tr>
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<tr>
<td>CO-1</td>
<td>kuGf;ftpij GJf;ftpij&gt; i`f;$ ftpij vOJkJ; jpwid tsh;j;Jf;nfhz;l dh;</td>
<td>11</td>
</tr>
<tr>
<td>CO-2</td>
<td>rpWfij vOJkJ; jpwid tsh;j;Jf;nfhz;l dh;</td>
<td>11</td>
</tr>
<tr>
<td>CO-3</td>
<td>ehlfk; vOJkJ; jpwid tsh;j;Jf;nfhz;l dh;</td>
<td>11</td>
</tr>
<tr>
<td>CO-4</td>
<td>khzth;fs; fbjk; vOJkJ; Kiwia fw;Wf;nfhz;l dh;</td>
<td>02</td>
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<tr>
<td>CO-5</td>
<td>.jo;fs; jpiug;glq;fs; kpd; Clfq;fs; kjpg;gPLfs; fsg;gzp kdpjh; fis topelj;Jk; Cj;fpahfr; nray;gLtijg; Ghpe;J nfhz;l dh;</td>
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ghh;it E}y;fs;

1. ahg;gUq;fyf;fhupif- irt rpj;jhe;j E}w;gjpg;Gj;fof ntspaPL.
2. mhp];lh;bypd; ftpij ,ay;- Kidth; m.R. kzthsd;.
3. ftpQuhf - m.fp. gue;jhkdhh;.
4. ey;y jkpo;;; vOj Ntz;Lkh - m.fp. gue;jhkdhh;.
5. vOJkJ vg;gb - k.R. rk;ge;jk;.
Elective Paper – III - B
mfuhjpapay;

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<tr>
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Nehf;fk; : mfuhjp tuyhw;iw vLj;Jiu;jy;
Nehf;fk; : nrhy;Yk; nghUSk; - tpsf;fk; Kiwia  czh;j;Jiy;
Nehf;fk; : mfuhjp tiffs; gw;wp czh;j;Jiy;
Nehf;fk; : nrhy; cUthf;fk; - nrhy; njspT Kiwia czh;j;Jiy;
Nehf;fk; : mfuhjp nrhw; nghUs; fisAk;; nghUs; khWghLfisAk;  cUthf;fk; - nrhy; njspT Kiwia czh;j;Jiy;

myF: 1 mfuhjp tuyhWk; nkhopapaYk;;
mfuhjpapay; - nrhw; nghUs;pay; - mfuhjpapay; nkhopapaYk; - cyF mfuhjp tuyhW - ,yf;fz kugpy; nrhw; nghUs; kuG> epfz;L kuG.

myF: 2 nrhw; nghUz; ikapay;;
nrhy;Yk; nghUSk; - tpsf;fk; - cyfg; nghUs; njhlh;G - nghUs; Nfhl; ghLfis; - nghUs; Kf; Nhzhf; nfhs; if - nghUL; $Wfs; - nrhy; tifg; ghLfis;

myF: 3 mfuhjp tiffs;;
tifg; ghL;Lf; fhuzq;fs; - fiyf; fsQ; rpak; - mfuhjpfs; xUnkhop > ,Unkhop> gd; nkhop mfuhjpfs; - fhy mbg; gilapyhd mfuhjpfs; - mfuhjpfs; Fwpj; fhyepiy mfuhjp - tuyhw;W mfuhjp - xg; gpay; mfuhjp - kP tpsf;f mfuhjp - jFnhkop tpsf;f mfuhjp - rpwg; G mfuhjpfs;

myF: 4 mfuhjp cUthf; f mbg; gilfs;;
Upon completion of this course, students will be able to

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<td>mfuhjp tuyhw;iw njhpe;Jnfhz;ldh</td>
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<td>CO-2</td>
<td>nrhy;Yk; nghUSk; - tspf;fk; Kiwia  fw;Wf;nfhz;ldh</td>
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<td>CO-4</td>
<td>nrhy; cUthf;fk; - nrhy; njspT Kiwia  fw;Wf;nfhz;ldh.;</td>
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<td>CO-5</td>
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ghi E\(\text{y}\);::
1. ng. khijad;> mfuhjpapay; - jkpo;;;g; gy;fiyf;fofk;> jQ;rT+h;

ghh;it E\(\text{y}\);fs::
1. t. n[aNjtd]> jkpo;;; mfuhjpapay; tsh;r;rp tuyhwW> le;jpiz gjp;gfk;> nrd;id.
2. Reiju rz;Kfdhh;> jkpo;;; mfuhjpf; fiy> nka;ag;gd; jkpo;a;fk;> rpjk;guk;.
3. jh.Nt. tPuhrhkp> mfuhjpf;fiy> jkpo;;;g; Gj;jfhyak; > nrd;id.
4. vr.; rpljpuGj;jd;> mfuhjpapay;> mdd;ah gjpg;gfk;> jQ;rhT+h;.
5. kh. rw;Fzk;> jkpo;; ; epfz;Lfs;> ,stofd; gjpg;gfk;> nrd;id.
6. njhy;fhg;gpak; - nrhy;yjpfhuk; (ilapay;> chpapay;)
7. njhy;fhg;gpak; - nghUsjpfhuk; (kugpay;)
Programme: MA.  
Course Code: 17P4TA13  
Semester: IV  
No. of hrs: 6  
Core Paper: XIII  
No. of Credits: 4

Nehf;fk;: ngz; Gyuhd xsitahpd; ftpj;jpwd mwpe;J nfhs;Sjy;.
Nehf;fk;: Nghh; epfo;Tfspd; fhuzq;fisAk; rpwg;GfisAk; mwpe;J nfhs;Sjy;.
Nehf;fk;: Nrukd;dHfspd; tuyhWfisAk; jpkhy; rpwg;gpid mwpe;J nfhs;Sjy;.
Nehf;fk;: ghzh; tho;tpay;> murh;fs; pfhil czh;jjy;
Nehf;fk;: %Nte;jfspd; rpwg;gpidAk; ahidgilapd; Nkd;ikAk; tpsf;Fjy;

myF: 1  GwehD}W - xsitahh; ghly;fs;::
   (87>104>140>187>206>231>232>235>269>286>290>295>
   315>367>390>392)

myF: 2  GwehD}W - kfl;ghw; fhQ;rp: 336>341>342>345>347>349 (6 ghly;fs;)
   nghUz;nkhopf;fhQ;rp: 75>121>185>190>192>214 (6 ghly;fs;)
   ghpghly; fIhepiy: 196>199>200>201>205>206 (6 ghly;fs;)
   Fjpiu kwk;:: 273>299>302>303>304> (5 ghly;fs;)

myF: 3  gpwp;Wg;gJ - .uz;lhk; gJ (KOTJk;)
   ghpghly; 4 - jpUkhy; fLtid; ,sntapddhh;

myF: 4  gj;Jg;ghl;L - rpWghzwh;Wg;gil (KOTJk;)
myF: 5  Kj;njhs;shapuk; Gwg;ghly;fs;

Nrud;  
   mUk;gtpo;jhu;f; Nfhij ...Kjy;
   NtuWif gk;gpr; ... ghly; tiu (18 -23) 6 ghly;fs;

Nhod;  
   me;jzu; MnthL nghd;ngw;whu; ...Kjy;
   ,upay; kfspu; ,iyQkYs; .. ghly;tiu (46 -52) 7 ghly;fs;

ghz;bad;  
   mLkjpy; gha mope;jjd; ...Kjy;
   njhopy;Njw;whg; ghyfjd ... ghly; tiu (102-108) 7 ghly;fs;
**CO No.** | Upon completion of this course, students will be able to | PSOs addressed
--- | --- | ---
CO-1 | goe;jkpoHfspd; tPu tho;tpid mwpe;J nfhz;ldh; | 01
CO-2 | Jiwj;nhlHghd tho;tpay; rpwg;gpid mwpe;J nfhz;ldh; | 03
CO-3 | gz;> ,ir nhlHghd ,yf;fpar; rpwg;gpid mwpe;J nfhz;ldh; | 06
CO-4 | ghzh; tho;tpay;> murh;fspd; nfhi nhpe;J nfhz;ldh; | 06
CO-5 | %Nte;jhfspd; ,d;wpaiakahAk; gilfspy; rpwe;j ahidgilAk; Nghh; jd;ikAk; mwpe;J nfhz;ldh; | 06

**ghh;it E}y;fs;::**
1. Nrh.e. fe;jrhp> Gwj;jpiz tho;tpay;.
2. F.nt. ghyRg;gpukzpad;> Gwg;ngU;.
3. F.nt. ghyRg;gpukzpad;> thif.
4. rhuq;fgiz> Fws;newp.
5. rhuq;fgiz> ghpghly; jpwd;.
6. Re;ju khypq;fk;> Gwj;jpiz tpUe;J.
Programme: MA.
Course Code: 17P3TA14
Semester: IV
No. of hrs: 6
Core Paper: XIV
No. of Credits: 5

Nehf;fk;: xg;gPl;bd; gz;G> jd;ik kw;Wk; rpwg;igAk; mwpjy;.
Nehf;fk;: ,yf;fpa tsHr;rpia xg;gPL nra;a mwpjy;
Nehf;fk;: gz;ila ,yf;fz ,yf;fpaf; nfhs;fis mwpjy;.
Nehf;fk;: jpUf;FwNshL gpwehl;L E}y;fis xg;gPl;L mwpjy;.
Nehf;fk;: xg;gpaypd; Nehf;fKk; Nehf;Fk; gw;wp mwpjy;

myF: 1

xg;gpyf;fpa mwpKfk; - xg;gpyf;fpaj;jpd; Njhw;wKk; tsh;r;rpAk; - xg;gpyf;fpaj;jpd; gz;Gk; gaDk; - kdpj .dg; nghJik - .yf;fpag; nghJik - jdpj;jpwd; - nghJj;jpwd; - KOik Nehf;fk.; jkpo;;; xg;gpyf;fpa tsh;r;rpapd; epiy - xUnkhop ,yf;fpa xg;gPL - gd;nhkop ,yf;fpa xg;gPL mnkhpf;f> gpnuQ;Rf; Nfhl;ghLfs;.

myF: 2

cyf ,yf;fpa mwpKfk;> rq;f ,yf;fpak; - tlnkhop ,yf;fpak; - fpNuif;f ,yf;fpak; - ,yj;jPd; ,yf;fpak; - xg;gPl;Lr; nra;jpfs;.

myF: 3
Upon completion of this course, students will be able to

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<td>CO-1</td>
<td>xg;gpyf;fpaj;jpd; Njhw;wk; tsu;r;rpia fw;W gadile;jdH.</td>
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<td>CO-2</td>
<td>,yf;fpa tiffis mwptpay; Nehf;fpy; fz;L gadile;jdH.</td>
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<td>CO-3</td>
<td>gz;ila jkpohpd; tho;Tld; $ba tPuj;iij fw;W gadile;jdH.</td>
<td>06</td>
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<td>CO-4</td>
<td>cyf muq;fpy; jpUf;Fws; ngw;Ws;s ,lj;iij xg;gPI;L E}y;fs; top fw;W czHe;jdH.</td>
<td>06</td>
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<td>CO-5</td>
<td>E}yhrphpaHfSf;fpilapyhd xw;Wik Ntw;Wikia xg;gPI;bd; %yk; mwpe;J nhfz;ldH.</td>
<td>05</td>
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ghlE}y;fs;
1. ,uhk. nghpa fUg;gd; (jkpo;z;y;) xg;gpyf;fpa mwPKfk;.
2. ifyhrgjp - xg;gpay; ,yf;fpak;.
jhs;: 15
nghpahhpay;

Programme : MA., Course Code : 17P4TA15
Semester : IV No.of hrs : 6
Core Paper – XV No.of Credits : 4

Nehf;fk; : nghpahh; tho;Tk; gzpAk; gw;wp czh;j;jy;
Nehf;fk; : jkpofr; r%fr;rpH;jpUj;j ,af;f tuyhW gw;wp czh;j;jy;
Nehf;fk; : Rakhpahij ,af;f tuyhW gw;wp czh;j;jy;
Nehf;fk; : Mz;> ngz; cah;T> jho;T> fw;G> tpjit kWkzk; gw;wp czh;j;jy;
Nehf;fk; : tUzhrpuk mikk;Gk; jPz;lhiAk; gw;wp czh;j;jy;

myF: 1 nghpahh; tho;Tk; gzpAk;:
gpwg;G> fy;tp> jpUkzk;> gFj;jwpT kdg;ghq;F> fs;Sf;fil kwpay;> itf;fk; Nghh;> nghJ tho;T> fhq;fpul;> EioT> fhq;fpul;> khehl;bypUe;J ntspNawy;> FbauR ,jo; njhf;fk;> Rakhpahij ,af;fk;> ghh;g;gduy;yhjh; khehL> tUzhrpuk xopg;G> ,e;jp vjqh;g;G Nghuhl;IlKk; rpiwAk;> jkpo;;;ehL jkpo;;Uf;Nf> jpuhtplf; foqf; Nghjh;wk;> ePjpf;fI;rpj; jiyth;> kf;fs; ,af;fkhij;> jpuhtpl Kd;Ndw;wf; foqf; - jkpo;;; kf;fs; egy; Nghuhl;Iq;fs;.

myF: 2 jkpoifr; r%fr;rPh;jpUjj; ,af;f tuyhW
Me;jpuehL> grth;> ftpQh; Ntkdh> gpupkzpa vjqh;g;G> ,uhruhhk; Nkhfd;uha;> gpuk;k rkh[k;> Rthkp jahde;jh;> Mhpa rkh[k;> R+uj;Jf;fhukh;> jhNhjgh ghz;Luht;> khzh; jh;krig> NrhpqhG+Ny> rj;aNrhj rkhrk;> je;ij nghphahpd; jd;kjpg;G ,yf;fpk; Kd;Nhbb Nfush ehuah FU <oth;> jPath; r% tpLjiy; jPz;lhik xopg;G.

myF: 3 Rakhpahij ,af;f tuyhW
Rakhpahij ,af;fj; Nghjh;wk;> Rakhpahijr; rq;fk;> Nehf;fk;> jd;kjpg;G> rkj;Jtk;> rNhjhj;jt; ghh;g;gduy;yhjh; 10 tj khfhz khehL> tFg;G thhp cphik> rhjp> Ngjk; cah;T> jho;T> tUzhrpuk KWg;G> ngz;zpd; jpuKzk taJ> tpjit KWKzk;> ,isQh; rq;fk;> Rakhpahij tbtq;fs;.

myF: 4 ngz; tpLjiy
Mz;> ngz; cah;T> jho;T> fw;G> tpjit KWKzk;> Foe;iy kzk;> nrhj;Jhpik> ngz; fpsh;r;rpapd; Njij> ngz;zbikF;F; fhuzk;> nrhj;Jhpik ,y;iy> Mz; ngz; rkj;Jtk;> xjjc cphik ,d;ik> jdpr;nrhj;Jilik> murpay; gjtp Ntiyfsp; le;J tpOf;fhL Ntz;ly;.

myF: 5 itjPf vjqh;g;G
tUzhrpuk mikk;Gk; jPz;lhikAk;> itf;fk; fpsh;r;rp; <oth;fSf;fhd miog;G> fKjp; <NuhL Nfhap; YioTg; Nghuhl;lk;> Nfhap; YioTk; jPz;lhikAk; tFg;G;thhp cphik vOj;J
<.Nt.uh fUj;J> fUj;Jg; ghpkhw;w fUtp> goph;tof;fg; gz;G NtWghLfSk;> fUjjhf;f NtWghLfSk;> tlnkhop vjqh;g;G> mbikg;gLj;Jk; nkhop; jkpo;;;nkhop tpLjyf;fhd tophL;b> Ntw;W nkhop vjqh;g;G> ,e;jp vjqh;g;Gg; Nghuhl;lk;> jkpo;;;nkhopf; fhg;G> fiyr; nrhy;yhf;fk;> vOj;Jr; rPh;jpUjj;Jk;.
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<td>07</td>
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<td>CO-2</td>
<td>r%f tpLjyf;Fk;&gt; jPz;lhik xopg;Gf;Fk; mth; ghLGl;lij khzth;fs; njhpe;J nhfz;ldh;</td>
<td>06</td>
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<td>CO-3</td>
<td>ghh:g;ghdpau; ;y;yj;jpUkzk;&gt; Rakupahij ,af;fk;&gt; ngz;zp;dk; kWkzk;&gt; vd gy Nghuhl;lq;fis elj;jp jPz;lhikia xopf;f ghLGl;lh; vd;gij Ghpe;J nhfz;ldh;</td>
<td>06</td>
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<td>CO-4</td>
<td>ngz;fspd; eyDJj;fhftTk;&gt; ngz;fSk; r%fj;jpy; rk chpik ngw;W thoTk; mauhJ cijo;jh; vd;gij khzth;fs; mwpe;J nhfz;ldh;</td>
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<td>tlnkhop vjpu;g;G; &gt; e;jp vjpu;g;G; &gt; e;jp vjpu;g;Gg; Nghuhl;il;lk;&gt; jkpo;nkhop;fgy;G; fiyr;nrhy;yhf;fk;&gt; vOj;Jr; rPu;jpUj;jk; Mfpatw;Wf;F nghpJk; ghLGl;lh; vd;gij mwpyj;</td>
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ghl E}y;fs;

1. nghpahhpay; njhFjp (1>2>) 2004> Nt. MidKj;J> ijay; ehafp epidT E}y; ntsPaPl;lfk;> GJr;Nrhp.  
2. Ra khpahij ,af;fk;> 1990> kq;fs KUNfrd;> ghhpepiyak;> nrd;id.

ghh;it E}y;fs;:

1. nghpahh; <.nt.uh rpe;jidj; njhFjp 1>3> Nt. MidKj;J> rpe;jidahsh; fofk;> jpUr;ruhg;gs;sp.  
2. nghpahh; fsQ;rpak;> njhFjp 1-6> fp. tPukzp(njh.M)
3. nghpahh; Rakhpahij gpur;ru epWtdk;> nrd;id.

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<td>CO-1</td>
<td>fl;lf;fiyapd; rpwg;Gfis gw;wp njhpe;Jnhfz;ldh;:</td>
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<td>CO-2</td>
<td>rpw;gf;fiyfspd; mikg;igAk; mj ntspg;gLj;Jk; gz;ghl;ilAk; njhpe;Jnhfz;ldh;:</td>
<td>04</td>
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<tr>
<td>CO-3</td>
<td>fhye;NhWk; khWtUk; muRf;F Vw;wthW jd;id khw;wp; fnhz;l</td>
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Elective Paper – IV- A

Clftpay;

Programme : MA.,  Course Code : 17P4TAE04
Semester : IV  No.of hrs : 6
Elective Paper – IV - A  No.of Credits : 4
Upon completion of this course, students will be able to

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<tr>
<td>CO-4</td>
<td>jpiug;gl nkhop&gt; fij gw;wp czh;j;j nfhz;ldh;</td>
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<td>CO-5</td>
<td>nra;jpg;glq;fSk; khw;W Clfq;fs; gw;wp njhpe;Jnfhz;ldh;</td>
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ghh;it E}y;fs;:

1. kf;fs; njhlh;gpay; - fpU\;zrhkp
2. rptf;Fkhh; - rpdpkh mw;Gjnkhop
3. nry;tk; - thndhypf; fiy
4. e. ey;yjk;gp - njhifyhl;rp jkpo;
5. ,uh. Nfhjz;lghzp - ,jopay;
6. <\];tud; - ,jopay;
7. kh.gh. FUrhp - ,jopay; fiy
8. KUNfr ghz;bad; - jfty; njhlh;gpay;
Elective Paper – IV- B
tho;tpay; gz;ghl;Lf; fy;tp

Programme : MA., Course Code : 17P4TAE08
Semester : IV No.of hrs : 6
Elective Paper – IV - B No.of Credits : 4

Nehf;fk; : MSik> JzpT> elj;i> ek;gp;f if gw;wp czh;ij;y;
Nehf;fk; : kdjp cupikfs;> r%f cupikfs;> jdpkdpj cupikfs; gw;wp czh;ij;y;
Nehf;fk; : kdjpDk; Rw;Wr;#oYk; - ,aw;if mikg;G gw;wp czh;ij;y;
Nehf;fk; : Rw;Wr;#oiyg; ghJfhf;Fk; topKiwfs; gw;wp czh;ij;y;
Nehf;fk; : ngz;zpa tpst;fk;> ngz;zpaj; Njhw;wKk; tsu;r;rpAk; gw;wp czh;ij;y;

myF : 1 MSikj;jpwd; Nkk;ghL
MSik Mw;wy; ntspg;ghLfs; - JzpT – elj;i> ek;gp;f if – jpahdk; - Neu;Kfr;rpe;jid – jd;id
czu;jy; - fhj;j;jpd; mLukia cuzu;e;J nrayhw;wy; - vz;zq;fs; - Nkk;ghLfs; - kdjpjg; gz;Gfs; -
kdpjNeak; - ntw;wpF xd;lj gbfs; - ,y;f;paq;fsp;y;> tuyhw;wp;y;> Md;kPfj;jpy; kdpjg;
gz;GfSk;> kdjp NeaKk; ntspg;gLk; tpjk;.

myF – 2 kdjp cupikfs;
kdjp cupikfs; - r%f cupikfs; - jdpkdpj cupikfs; - mbg;gil cupikfs; - gz;ghL kw;Wk; fy;tp
cupikfs; - ePj;jg;Nghizfspd; jd;ikfs; - kdjp cupik Mizaq;fs; - Mizaq;jpd; ftd <u;g;Gfsd;fs; -
cupikAk; flikAk; - kdjp cupik Mizaq;jpd; Fwpg;gplj;jf; eltbf;iff; - kdpj cupikiaf; fhf;Fk;
mwpf;iff;.

myF – 3 Rw;Wr;#oy; tpopg;Gzu;T
kdjpDk; Rw;Wr;#oYk; - ,aw;if mikg;G – kiyfs; - fhLfs; - MWfs; - fly;fs; - fpuhkq;fs; -
efuq;fs; - ,aw;if mopTk; jPq;Fk; - Rw;Wr;#oy; fy;tp – Njpa Rw;Wr;#oy; nfhs;if – Ik;G+jq;fs
khrlar; nra;thjy; - d;W ek;Kd; cs;s rpf;fy;fs;.

myF :4 Rw;Wr;#oy; ghJfhg;G
Rw;Wr;#oiyg; ghJfhf;Fk; topKiwfs; - tdtsg;ghJfhg;G – ePu; epiyfisg; ghJfhj;jy; - epytsk;
fhj;jy; - er;rp;yh Ntshz;ik – tspkz;lyg; ghJfhg;G – ,aw;fia Nerpj;jy; - tdtpyq;Ffs; - gwftfisg;
ghJfhj;jy;.

myF – 5 ngz;zpak;
Upon completion of this course, students will be able to

<table>
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<th>CO No.</th>
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<th>PSOs addressed</th>
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<td>CO-4</td>
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ghIE}y;

1. kdpj tho;f;ifAk;> Rw;Wr;#oYk;> lhf;lu; Nfh.jq;fNtY> jpUtuR Gj;jf epiyak;> jp.efu;> nrd;id

ghu;it E}y;fs;:

1. vz;zq;fs; - lhf;lu; vk.;v];.cja%u;j;jp> fq;if Gjjf epiyak;> jp.efu;> nrd;id – 17
2. ntw;wp jUk; MSik Mw;wy; - rp.v];. Njt;ehj;> eu;kjh gjpjjg;gfk;> nrd;id
3. tho;f;ifg; gz;Gfs; - lhf;lu; vd.;=jud;> fq;ifg; Gjjf epiyak;> jp.efu;> nrd;id 17
4. mbg;gil kdpj cupikfs; - rp.v];. Njt;ehj;> eu;kjh gjpjjg;gfk;> nrd;id
5. jkpopyf;fpaj;ppy; kdpjNeak;> r.fpU;\%u;j;jp> cyfj;jkpohua;r;rp epWtdk;> nrd;id
6. kdstf;fiy – Ntjhj;jpu<klup\p> Ntjhj;jpu<gpjjg;gfk;> <NuhL
7. jkpopyf;fpajKk; ngz;zpaKk;> muf;fky;ypfh> epA+ nrQ;Rup Gf;`T;}> nrd;id
8. jkpo;f; ftpijfs;py; ngz;Zupik; lhf;lu; r.tp[ayl;Rkp> ghu;f;fu; gjjpg;gfk; nrd;id
10.ntw;wpf;Fd;gJ gbfs;> te;jh (nkh.ng)> fz;zjhrd; gjpjjg;gfk;> nrd;id
Dissertation - I

Course Code : 17P4TAPR01

Semester : IV

No.of Credits : 2

Course Details:

Course Code: 17P4TAPR01  
Semester: IV  
Credits: 2

Grading System:

- TFg;G : KJfiyj; jkpo;  
mfkjpg;ngz;  
40

- Mz;L : ,uz;lhkhz;L  
Gwkjpg;ngz;  
60

- gUtK; : ehd;fhk; gUtK;  
nkhj;j kjpg;ngz;  
100

Course Description:

apl;fl; fl;Luif;fhd tiuaiu

jpl;lf; fl;Luif;fhd tiuaiu

tha;nkhopj; Njh;T – 40 kjpg;ngz;

Gwkjpg;gPL – 60 kjpg;ngz;
SELVAMM ARTS & SCIENCE COLLEGE, NAMAKKAL
(AUTONOMOUS)
Nationally Reaccredited at the Highest Grade “A” by NAAC
Affiliated to Periyar University, (Salem)-11

M.Sc. CHEMISTRY
(Semester pattern)
REGULATIONS AND SYLLABUS
(Under Choice Based Credit System)

For
Students Admitted During
2017-2018 Onwards
Vision

To impart a high quality of education & training in the field of chemistry to enable successful career for the post graduate students in the field of research, education & industrial applications.

Mission

Independent thought, collegiality, exchange of ideas and high ethical standards, development of innovative instructional techniques and increased job opportunities.

Program Outcomes (PG)

<table>
<thead>
<tr>
<th>PO. No</th>
<th>Upon completion of M.Sc Degree programme, the graduates will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 1</td>
<td><strong>Application</strong>: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.</td>
</tr>
<tr>
<td>PO 2</td>
<td><strong>Analysis</strong>: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.</td>
</tr>
<tr>
<td>PO 3</td>
<td><strong>Solution Finding</strong>: Facilitate to enter multidisciplinary path to solve day-to-day problems</td>
</tr>
<tr>
<td>PO 4</td>
<td><strong>Progression in Career</strong>: Prepare students for prominent career in industry, banks offices and for further academic study</td>
</tr>
<tr>
<td>PO 5</td>
<td><strong>Research Capability</strong>: Able to do the experiments with proper procedure, appropriately record and Analyze the results.</td>
</tr>
<tr>
<td>PO 6</td>
<td><strong>Expressing their talents</strong>: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.</td>
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<tr>
<td>PO 7</td>
<td><strong>Individual sustainability</strong>: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.</td>
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<tr>
<td>PO 8</td>
<td><strong>Competency</strong>: Attain competency in job market / entrepreneurship.</td>
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<tr>
<td>Semester</td>
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Total Credits for I & II Semesters = 52
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<th>Exam Hrs</th>
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<td>CC-IX Chemistry of Inorganic Solids</td>
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Total Credits for III & IV Semesters = 48
Total credits for all semesters = 100

Note: Extension activities 60 Hrs outside the Class Hours
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<tr>
<th>PSO.NO</th>
<th>Upon Completion of M.Sc Degree programme, the graduates will be able to</th>
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<tbody>
<tr>
<td>PSO-1</td>
<td>Gains complete knowledge about all fundamental aspects of all the elements of chemistry</td>
</tr>
<tr>
<td>PSO-2</td>
<td>Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental method of chemical analysis, molecular rearrangements and separation techniques.</td>
</tr>
<tr>
<td>PSO-3</td>
<td>Appreciates the importance of various elements present in the periodic table, stereochemistry, coordination chemistry and structure of molecules, properties of compounds, structural determination of complexes using theories and instruments.</td>
</tr>
<tr>
<td>PSO-4</td>
<td>Gathers attention about the physical aspects of atomic structure, dual behavior, reaction pathways with respect to time, various energy transformations, molecular assembly in nano level, and significance of electrochemistry, chemical kinetics, and molecular segregation using their symmetry.</td>
</tr>
<tr>
<td>PSO-5</td>
<td>Learns about the potential uses of analytical industrial chemistry, medicinal chemistry, green chemistry, spectroscopy, quantum chemistry, polymer chemistry and photochemistry.</td>
</tr>
<tr>
<td>PSO-6</td>
<td>Carry out experiments in the area of organic analysis, estimation, separation, derivative process</td>
</tr>
<tr>
<td>PSO-7</td>
<td>Easily assess the periodic properties of all elements and coordination chemistry.</td>
</tr>
<tr>
<td>PSO-8</td>
<td>Will become familiar with different branches of chemistry like photochemistry, analytical, organic, inorganic, physical environmental, polymer, biochemistry, spectroscopy and nanochemistry.</td>
</tr>
<tr>
<td>PSO-9</td>
<td>Carry out experiments in the area of Inorganic semi micro analysis, preparation, and conductometry and potentiometry analysis.</td>
</tr>
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</table>
Selvann Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY

CORE PAPER - I

ORGANIC CHEMISTRY - I

Semester : I

Paper code : 17P1CH01

Credits 5

Hours/weeks 5

Course Objectives

- To make the students to know about the nomenclature of organic compounds.
- To learn the concepts of aromaticity and stereochemistry and their application in the determination of reaction mechanism.

UNIT – I IUPAC Nomenclature

IUPAC nomenclature of organic molecules including regio- and stereoisomer's.

Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.


Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.

UNIT - II Nucleophilic Substitution Reactions

The $S_{N1}$, $S_{N2}$, mixed $S_{N1}$ and $S_{N2}$, $S_{Ni}$ and SET mechanisms. The neighboring group mechanism, neighboring group participation by $\sigma$ and $\pi$ bonds, anchimeric assistance. Nucleophilic substitution at an allylic, aliphatic trigonal and vinylic carbon; Reactivity effects of substrates structure, attacking nucleophile, leaving group and reaction medium, ambident nucleophile, regioselectivity. Reactions involving substitution at carbon doubly bonded to oxygen and nitrogen: Williamson reaction, Von Braun reaction, Claisen and Dieckmann condensation. Hydrolysis of esters

Aromatic nucleophilic Substitution - $S_{N1}$, $S_{NAr}$, $S_{Ni}$, Benzyne mechanism Aromatic nucleophilic substitution of activated halides - Ziegler alkylation, Chichibabin reaction.
UNIT - III Electrophilic Substitution Reactions

Aromatic electrophilic substitution: The arenium ion mechanism, typical reactions like nitration, sulphonation, halogenations, Friedel-Crafts alkylation, acylation and diazonium coupling, electrophilic substitution on monosubstituted benzene, orientation and reactivity - ortho, meta and para directing groups, ortho-para ratio, ipso attack, Gatterman, Gatterman-Koch, Vilsmeir, Reimer-Tiemann reaction.

Aliphatic electrophilic substitution - S_{E2} and S_{E1} mechanisms, electrophilic substitution accompanied by double bond shifts. Effect of substrates, leaving group and the solvent polarity on the reactivity

UNIT - IV Stereochemistry


UNIT-V Aromaticity and problems in Reaction Mechanism

Definition of aromaticity – Hückel's and Craig's Rules – ring currents – Nonbenzenoid aromatic compounds – Aromatic character in 3,5 and 7 membered ring compound – Anti- aromaticity – systems with 2, 4, 6, 8, 10, 14 and 18 electrons -Azulene - Annulenes – Sydnones and fullerenes – Alternant and non alternant hydrocarbons. Homoaromaticity

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>To acquire more knowledge in the study of aromaticity.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>To learn the basics of Nucleophilic and Electrophilic Substitution Reactions.</td>
<td>2</td>
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</tbody>
</table>
The students will be able to acquire the skills for correct stereo chemical assignment and interpretation in rather simple organic molecules.

Text Books:

2. *Structures and Mechanism* by E.S. Gould
10. *Structure and mechanism in organic chemistry* by C.K. Ingold, cornell University press
11. *Aromatic Nucleophilic Substitution* by J. Miller

Reference Books:

Semester-I
Paper code: 17P1CH02

Course Objectives

a. To Study the chemistry of Reaction mechanism and electronic spectra
b. To learn the Spectroscopic techniques

UNIT – I Stability aspects of complexes


UNIT – II Reaction mechanisms in Complexes

Electron transfer reactions – Outer and inner sphere processes; atom transfer reaction, formation and rearrangement of precursor complexes, the bridging ligand, successor complexes; Cross reactions and Marcus – Hush theory Reaction mechanism of coordination compounds – Substitution reactions, Labile and inert complexes. Substitution in square planar complexes – General mechanism; reactivity of Platinum complexes; influences of entering and leaving groups; the Trans effect – theory.

UNIT – III Electronic Spectra of Complexes

Spectroscopic Term symbols for d^{1-10} ions – derivation of term symbols and ground state term symbol, Hund’s rule; Selection rules – break down of selection rules, spin-orbit coupling, band intensities, weak and strong field limits- correlation diagram; Energy level diagrams; Orgel and Tanabe – Sugano diagrams; effect of distortion and spin orbit coupling on spectra; Evaluation of Dq and B values for octahedral complexes of Nickel, Cobalt-Charge transfer spectra for KMnO4. Spectral properties of Lanthanides and Actinides.

UNIT – IV IR Spectra of metal complexes

Combined uses of IR spectra in the structural elucidation of simple molecules like N₂O, CIF₃, NO₃, ClO₃, NSF₃. Effect of coordination on ligand
vibrations, use of group vibrations in the structural elucidation of metal complexes of Urea, Thiourea, Cyanide, Thiocyanate, Nitrate and Sulphate. Effect of isotopic substitution on the vibration spectra of molecules, vibration spectra of metal carbonyls with reference to the nature of bonding, geometry and number of C-O stretching vibrations, Group theoretical treatment for $C_2V$ molecules, limitations of IR.

**UNIT – V Inorganic spectroscopic Techniques**

Characterization of inorganic compounds by NMR, EPR, Mossbauer, MS, electron spectroscopy and microscopic techniques.

NMR Spectra of $^{31}P(H_3PO_4, H_3PO_3, H_3PO_2, F_2HPO_2, H_4P_2O_4)$, $^{19}F(ClF_3, BrF_5, TiF_5(Cis-Trans) TiF_2, ^1H(H_2O, H_2O_2), ^{11}B(B_3H_8)^{-}$, Mossbauer Spectra of $(FeCN_6)^{4+}, (FeCN_6)^{3-}, (FeH_2O_6)^{2+}, (FeH_2O_6)^{3+}$.

EPR Spectra of (Methyl radical, Naphthalene, Anthracene, Phenyl radical)

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To learn about the stability of complexes</td>
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</tr>
<tr>
<td>CO-2</td>
<td>To know the detail study of reaction mechanism in complexes.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>To familiarize the electronic spectra of complexes.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the IR Spectra of metal complexes.</td>
<td>5</td>
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</tbody>
</table>

**Text books:**

DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY


Reference Books:


Semester: I

Paper code: 17P1CH03

Credits 5

Hours / week: 5

Course Objectives

- To Study the fundamentals of classical Thermodynamics & Quantum Chemistry
- To understand the theories of Kinetics of reaction

UNIT – I Quantum Chemistry – I

Operators- algebra of operators, commutation relations, commutators, linear, angular momentum, Laplacian, Hermitian, Hamiltonian and Ladder operators, eigen values and eigen functions, Hermitian property of operators, orthogonality and normalization.

Quantum mechanical postulates – Schrodinger equation and its solution to the problem of a particle in one and three dimensional boxes – the harmonic oscillator.

De – Broglie equation – Heisenberg uncertainty principle – Compton effect

UNIT – II Quantum Chemistry –II


UNIT – III Chemical Kinetics – I

Theories of Reaction rates – Arrhenius theory – effect of temperature on reaction rate


UNIT – IV Chemical Kinetics – II

Reactions in solutions – comparison between gas phase and solution reactions – the influence of solvent, ionic strength, dielectric constant and pressure on reaction in solution – Kinetic isotope effects – Linear free energy relationship – Hammett and Taft equations.

UNIT – V Surface Chemistry and Catalysis


Course Outcomes

<table>
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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tr>
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<td>Schrodinger equation for a particle in a box and quantum chemical description.</td>
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<tr>
<td>CO-2</td>
<td>Electronic and Hamiltonian operators for molecules.</td>
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<td>CO-3</td>
<td>To understand the term symbol, Eigen function, Eigen value.</td>
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<tr>
<td>CO-4</td>
<td>To learn the surface reaction of kinetics and acid-base catalysis.</td>
<td>4</td>
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</tbody>
</table>

Text Books:
DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY

5. D.A. Mcquarrie, Quantum chemistry, University science books, Mill Valley, California (1983)

Reference Books:

8. I.N. Levine, Quantum chemistry, Allyn and Bacon, Boston, 1983.

Course Objectives

- To Study the basic concepts of polymer chemistry
- To learn the properties of commercial polymers

UNIT – I Basic Concepts:


UNIT – II Co-ordination Polymerization:


UNIT – III Molecular Weight and Properties:

Polydispersion – average molecular weight concept, number, weight and viscosity average molecular weights. Measurement of molecular weights. Gel permeation chromatography, viscosity, light scattering, osmotic and ultracentrifugation methods. Polymer structure and physical properties – crystalline melting point Tm. The glass transition temperature. Determination of Tg. Relationship between Tm and Tg.

UNIT – IV Polymer Processing:

Plastics, elastomers and fibres. Compounding processing techniques: calendaring, die casting, rotational casting, film casting, injection moulding and blow moulding extrusion, moulding, thermoforming, foaming, reinforcing and fiber spinning.
Polyethylene, polyvinyl chloride, polyamides, polyesters, phenolic resins, epoxy resins and silicone polymers. Functional polymers, Fire retarding polymers and electrically conducting polymers. Biomedical polymers – contact lens, dental polymers, artificial heart, kidney, skin and blood cells.

Course Outcomes

<table>
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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Basic concepts of polymerization.</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Theories and types of Co-polymerization.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the polymer reactions</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Properties of polymers and their applications.</td>
<td>5</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
Semester: II  
Credits 5  
Paper code: 17P2CH04  
Hours and week 5  

Course Objectives  
- To learn the concepts of Elimination and Pericyclic reactions  
- To Understand the Conformational analysis  
- To learn the nature and synthesis of natural products  

UNIT - I Elimination reactions  
1.1 E₁, E₂, E₁CB mechanisms, Orientation of the double bond - Hofmann and Saytzeff rule, competition between elimination and substitution, dehydration and dehydrohalogenation reactions, stereochemistry of E₂ eliminations in cyclohexane ring systems, mechanism of pyrolytic eliminations, chugaev reaction and Cope elimination.  

UNIT - II Addition Reactions  
Addition to Carbon - Carbon and Carbon - Hetero atom Multiple bonds: Addition of halogen and nitrosyl chloride to olefins, hydration of olefins and acetylenes, hydroboration, hydroxylation, epoxidation, Michael addition, 1,3-dipolar addition.  
Mechanisms of Mannich, Stobbe, Darzen Glycidic ester condensation, Benzoin condensation, Peterson olefination (Silyl Wittig reaction), Strecker synthesis, Wittig, Wittig - Horner, Perkin, Thorpe, Ritter and Prins reactions.  

UNIT - III Conformational Analysis  
3.1 Conformational analysis of simple cyclic (chair and boat cyclohexanes) and acyclic (n-butane) systems, conformation of simple 1,2 disubstituted derivatives - ethylene chlorohydrin and ethylene glycol, Conformational analysis and stereochemical features of disubstituted cyclohexanes (1,2; 1,3; 1,4 dialkylcyclo hexanes), conformation and stereochemistry of cis and trans decalins, effects of conformation on reactivity in acyclic and cyclohexanes, Oxidation and acylation of cyclohexanols,
reduction of cyclohexanones, esterification and hydrolysis of cyclohexane carboxylic acid derivatives.

UNIT - IV Organic Photochemistry and Pericyclic reactions


UNIT - V Alkaloids and Terpenoids

Occurrence, Extraction of alkaloids, Classification of alkaloids, structure elucidation, synthesis and stereochemistry of the following alkaloids: Quinine, Papaverine, Morphine and Reserpine. Biosynthesis of alkaloids.

Terpenoids: Structure, Stereochemistry and synthesis of zingiberene, cadinene and abeitic acid

Course Outcomes

<table>
<thead>
<tr>
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<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the elimination reaction of E1, E2, E1cB</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the concept of Huckel theory of aromaticity.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>To learn about the organic photochemistry.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the selection rules, Hofmann rules.</td>
<td>2</td>
</tr>
<tr>
<td>CO-5</td>
<td>To familiarize the organic reagent and their uses.</td>
<td>1</td>
</tr>
</tbody>
</table>
Text Books:

Reference Books:
Course Objectives

- To understand the fundamentals of Classical Thermodynamics & Quantum Chemistry
- To learn the group-theory

UNIT – I Classical Thermodynamics

Maxwell's relations and thermodynamic equations of state – applications in the evaluation of $C_p$-$C_v$ for solids and for vanderwaals gases Partial molar properties – Gibbs – Duhem equation – Partial molar free energy (Chemical Potential) – Determination of chemical potential [Direct Method and Method of Intercepts] and partial molar volume – variation of chemical potential with Temperature and Pressure

UNIT – II Classical Thermodynamics – II

Thermodynamics of ideal and non ideal gases and solution Fugacity – definition – Methods of determination of fugacity – Variation of fugacity with temperature and pressure. Determination of activities and activity coefficient from Vapour pressure Concept of ionic strength.

Unit – III Group Theory – I

Symmetry elements and symmetry operations – Point groups – identification and representation of groups – comparison of Molecular symmetry with Crystallographic symmetry – Reducible and irreducible representation – Direct product representation – Great orthogonality theorem and its consequences – Character Table and their uses.

UNIT – IV Group Theory – II

Symmetry selection rules for vibrational, Electronic and Raman Spectra –
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M.Sc., CHEMISTRY

determination of representation of vibrational modes in non-linear molecules such as H\textsubscript{2}O, CH\textsubscript{4}, XeF\textsubscript{4}, SF\textsubscript{6} and NH\textsubscript{3} – symmetry of Hybrid orbitals in non-linear molecule (BF\textsubscript{3}, CH\textsubscript{4}, XeF\textsubscript{4}, PCl\textsubscript{5} and SF\textsubscript{6}) – Electronic spectra of formaldehyde.

UNIT – V Chemical Kinetics – III


Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To understand the Maxwell’s relation, Gibbs Duhem equation.</td>
<td>4</td>
</tr>
<tr>
<td>CO-2</td>
<td>To learn about the fugacity.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the point group, character table and their uses.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the application of group theory in spectra.</td>
<td>5</td>
</tr>
</tbody>
</table>

Text Books:

7. V.Ramakrishnan and M.S.Gopinathan, *Group theory in chemistry*,


**Reference Books:**
ELECTIVE PAPER – II
ACID- BASE & ORGANOMETALLIC CHEMISTRY

Semester: II
Paper code: 17P2CHE02
Course Objectives

- To Understand the concepts of acid base & metal ligands bond
- To Understand the fundamentals of Organometallic

Chemistry UNIT- I Acid-Bases and Non aqueous solvents
Non-aqueous solvents-differentiating and leveling solvents-salvation number – medium effect- Ph Measurement in non-aqueous media-liq NH₃,SO₂, H₂SO₄,HCN, HF as solvents.

UNIT-II Theories of Metal-Ligand bond
MO theory-sigma-and pi-bonding in complexes –Naphelauxetic effect-the angular overlap model. Molecular orbital theory of Polyatomic molecules – linear molecules (XH₂ type)
- Walsh diagram-BH₃, NH₃, Methane – Geometry & their Character table.

UNIT-III Organometallic compounds
Organometallic compounds: synthesis, bonding and structure, and reactivity(S,Se,Cu,Li).
Organometallics in homogeneous catalysis.

UNIT IV Reaction mechanism of complexes
Trans influence replacement of coordinated water; mechanism of acid hydrolysis and base hydrolysis – Conjugate base mechanism; direct and indirect evidences in favour of the mechanism; application of substitution reaction in the synthesis of Platinum and Cobalt complexes.

UNIT-V Bio Inorganic Chemistry
4.1 Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, metal complexes in medicine.

5.2 Cages and metal clusters.

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To learn about the concept of Acid-bases and non-aqueous solvent.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the theories of Molecular orbital theory.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>To learn the organometallic compounds.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>To understand the reaction mechanism of complexes.</td>
<td>2</td>
</tr>
</tbody>
</table>

**Text Books:**

Reference Books:

Course Objectives

• To Understand the Retero-synthetic analysis of complex organic molecules and molecular rearrangements.
• To learn the Oxidizing and Reducing agents and their applications.

UNIT - I Disconnection Approach

An introduction to synthons and synthetic equivalents, disconnection approach: The importance of the order of events in organic synthesis, one group C-X and two group C-X disconnections, chemoselectivity, reversal of polarity, cyclization reactions, amine synthesis.

One group C-C disconnections - Alcohols and carbonyl compounds, regioselectivity, alkene synthesis, Olefination of carbonyl compounds - McMurry’s method.

Two group C-C disconnections - Diels Alder reaction, Michael addition.

UNIT - II Reagents in Organic Synthesis

Synthesis of simple organic molecules using standard reactions like acylation and alkylation of enamines and active methylene compounds. Sulphurylides. Protection and deprotection of functional groups (R-OH, R-CHO, RCOR, R- NH₂ and R-COOH)

Reagents and their uses: DCC, trimethylsilyl iodide, trimethylsilyl chloride, 1,3- dithiane (umpolung), diisobutylaluminium hydride (DIBAL), 9-BBN, Osmium tetroxide, DDQ, Selenium dioxide, Phase transfer Catalysts.

UNIT - III Molecular Rearrangements

3.1 A detailed study of the mechanism of the following rearrangements: Nucleophilic, Electrophilic and Free radical rearrangements - memory effects, migratory aptitudes, Wagner-Meerwin, Demyanov, Dienone-Phenol, Favorski, Baeyer-Villiger, Wolff, Stevens, Von-Richter, Clasien, Beckmann and Fries rearrangements (a few examples in each rearrangement are to be studied).
UNIT - IV Oxidation and Reduction Reactions

Study of the following oxidation reactions with mechanism: Oxidation of alcohols by CrO₃, DMSO alone, DMSO in combination with DCC; acetic anhydride and oxalyl chloride, oxidation of arylmethane, oxidation of methylene alpha to carbonyl, allylic oxidation of olefins, oxidative cleavage of glycols, oxidative cleavage of double bonds by ozonolysis.

Study of the following reduction reactions with mechanism; Reduction of carbonyl compounds by hydrides, selectivity in reduction of 4-ter-butyl cyclohexanone using selectrides, Clemmensen and Wolff Kishner reductions, Birch reduction, MPV reduction.

UNIT - V Proteins and nucleic acids

Classification of proteins; Primary, secondary and tertiary structures of proteins and their functions

Nucleic acids - nucleosides and nucleotides, their chemistry including synthesis; RNA and DNA; Functions of nucleic acids

Course Outcomes

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<tbody>
<tr>
<td>CO-1</td>
<td>To understand the disconnection approach in one group and two group disconnection.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>To synthesis the simple organic molecules using standard reactions.</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study in detail of the molecular rearrangement and their mechanism.</td>
<td>1</td>
</tr>
<tr>
<td>CO-5</td>
<td>To study the oxidation and reduction reactions and their mechanism.</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Books:

Selvamm Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY


**Reference Books:**

- S.W. Pelletier, Van Nostrand, **Chemistry of Alkaloids**, Reinhold, 1970.
Semester-III                      Credits  5  
Paper code: 17P3CH07                      Hours/week  5  

Course Objectives  
• To study the fundamentals of Statistical Thermodynamics & Quantum Chemistry  
• To learn the Spectroscopy  

UNIT – I Statistical Thermodynamics  

UNIT – II Irreversible Thermodynamics  

UNIT - III Quantum Chemistry – III  
3.1 Valence Bond theory of Hydrogen molecule – Comparison of MO and VB theories – Concept of Hybridization – sp, sp$^2$ and sp$^3$ hybridization – Hückel Molecular orbital (HMO) theory for conjugated π- system – applications to simple systems – (Ethylene, butadiene and benzene) – Self consistent field approximation – Hartree’s and Hartree – Fock Self Consistant field theory – Slater type orbital’s – Slater rules.  

UNIT – IV Theory of IR and Raman Spectroscopy

Raman Spectra -# Polarization of light and Raman Effect– elastic and inelastic scattering#– pure rotational and rotational-vibrational Raman spectra

UNIT – V Spectroscopy – II


Course Outcomes

<table>
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<tr>
<th>CO No.</th>
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<th>PSOs addressed</th>
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</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the comparison and application of MB, BE and FD.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>To study the sp, sp\textsuperscript{2} and sp\textsuperscript{3} hybridization – Huckel Molecular orbital (HMO) theory for conjugated π-system.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>To acquire more knowledge in theory of IR and Raman spectra.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>To learn about the NMR spectra and ESR spectra.</td>
<td>3</td>
</tr>
</tbody>
</table>
Text Books:


\textbf{Reference Books}


ELECTIVE PAPER – III

Electrolytes, Electrolytic & Photo Chemistry

Semester: III
Paper code: 17P3CHE03
Credits 4
Hours/week 4

Course Objectives

• To understand electrochemistry
• To learn

photochemistry UNIT – I

Electrochemistry – I


UNIT – II Electrochemistry – II


UNIT – III Electrochemistry – III

Electrochemical inorganic and organic reactions of technological interest (at least one example in each) – Corrosion and Passivation of metals – construction of Pourbaix and Evans diagrams – Prevention of Corrosion.
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Electrochemical energy systems – Primary and Secondary batteries – (dry cells, lead acid - storage batteries, silver zinc cell, nickel cadmium battery, mercury cell) – Fuel cells – Electrode position – Principles and applications.
UNIT – IV Photochemistry – I


UNIT – V Photochemistry – II


Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study theory of Debye Huckel and its limiting law.</td>
<td>4</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the structure of Helmholtz Perrin, Gouychapman and Stern models of electrical double layers.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the concept of primary and secondary batteries.</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the theory and factors affects of Fluorescence and phosphorescence</td>
<td>5</td>
</tr>
</tbody>
</table>
Text Books:-


Reference Books:-

Selvamm Arts & Science College (Autonomous)  Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY

ORGANIC AND INORGANIC SPECTROSCOPY

Semester : IV  Credits  5
Paper code : 17P4CHE04  Hours/week  5

Course Objectives

• To understand the principle and applications of UV-Vis, IR, NMR, Mass and ESR Spectroscopy
• To know the importance of photochemical reactions

UNIT - I Organic Spectra: UV - VIS, and IR Spectra


UNIT - II ORD-CD and Mass Spectra

ORD - CD: Definition, deduction of absolute configuration, octant rule for ketones, Cotton effect, α-haloketone rule.

Mass spectra - theory, applications, McLafferty rearrangement, fragmentation pattern, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

UNIT - III Spectroscopy & Structure Determination

Structure determination of organic compounds by Interpreting IR Spectra Isopropyl benzene, Benzylamine, Methyl benzoate, Methyl phenyl ether, Nitrobenzene. UV-Vis, Absorption Maxima for Nonconjugated and Conjugated Dienes.

Interpreting $^1$H NMR Spectra - 1,1 Dichloro Ethane, 3-pentanone, Ethyl propionate, 1-chloro-3- iodo propane ,Vinyl Acetate,1-propanol. Interpreting $^{13}$C NMR Spectra – t- Butanol, 2, 2, 4 trimethyl -1, 3-pentanediol, Diethyl phthalate.

Mass Spectrometry of Small Molecules: Magnetic-Sector Instruments, Interpreting Mass Spectra hexane, Benzyl chloride,
Bromoethane, Octane. Mass Spectrometry of Some Common Functional Groups: Alcohols, Amines, Carbonyl compounds
UNIT - IV EPR Spectroscopy and Mossbauer Spectroscopy:

Theory: derivative curves; g values; factors affecting the magnitude of g value; zero field splitting; Kramer's degeneracy; EPR spectra of Vo (II), Mn(II), Co(II), Ni(II) and Cu(II) complexes; covalency of metal - ligand bonding by EPR; John-teller distortions in Cu(II) complexes.

Mossbauer Spectroscopy - Doppler effect, isomer effect; electron - neutron hyperfine interactions; Quadrupole interactions and magnetic interactions; simple applications to Iron and Tin compounds.

UNIT - V Photoelectron Spectroscopy

5.1 Photoelectron Spectroscopy - Principle, PES of diatomic molecules and polyatomic molecules (HCl, HBr, HI, CO, NH₃ and H₂O); Core electron PES; X-ray photoelectron spectroscopy (ESCA) applications.

Course Outcomes

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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To understand the Calculation of λ_max for organic molecules by Woodward - Fischer rules for dienes, enones.</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the theory and application of Mass spectra.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>To study the theory and applications of ¹H NMR Spectra and ¹³C NMR Spectra.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>To get the theoretical knowledge of the various spectroscopic methods on the basis of the examples from the science and industry.</td>
<td>5</td>
</tr>
</tbody>
</table>
Text Books:

Reference Books:


Course Objectives

- To learn theories and structures of solids
- To study the Bio inorganic chemistry

UNIT – I Theories and structures of solids:
1.1 Crystal defects-point, line and plane defects- colour centers nonstoichiometric compounds-Electronic structure of solids- free electron and band theory of solids. Types of solids – electrical conductivity and superconductivity - high temperature superconductors- Structure of alloys, intermetallic compounds interstitial compounds, clathrates - metal cluster compounds-Crystal growth methods from chemical reaction, liquid solution, diffusion, fused salt electrolysis and by chemical vapour transport.

UNIT – II Introduction to Nanomaterials
2.1 Introduction to Nano particles – definitions – classifications of Nanomaterials- Mechanical, thermal, magnetic and biological properties of Nanomaterials.

UNIT – III Synthesis Methodologies of Nanomaterials

UNIT – IV Characterizations of Nanomaterials
UNIT-V Green chemistry

Introduction – Basic principles of green chemistry - tools of green chemistry- atom economy- reaction of atom economy – green solvents, green reactions, microwave induced green synthesis
Introduction-water based reactions(only)- Nanotechnology synthesis of carbon nanotubes(CNTS)- types – properties and uses.

Course Outcomes

<table>
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<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the theories and structures of solids</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>To study the classifications of Nanomaterials and biological properties of Nanomaterials.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>To study the basic principle of green chemistry.</td>
<td>5</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:-

Semester: IV  Credits  5
Paper code: 17P4CH09  Hours/week  6

Course Objectives

• To understand the chemistry of inorganic chains, rings, cages and clusters
• To learn the Electronic Spectra of Complexes

UNIT – I Inorganic chains, rings, cages and clusters:

Boron hydrides – polyhedral boranes, hydroborate ions – a general study of preparation, properties and structure, styx numbers, Wade’s rules. Concept of multi-centered bond structure of \( \text{B}_2\text{H}_6, \text{B}_4\text{H}_{10}, [\text{B}_{12}\text{H}_{12}]^{2-}, \text{B}_6\text{H}_{10}, \text{B}_8\text{H}_{12}, \text{B}_{10}\text{H}_{14} \), closo, nido, arachno boranes and carboranes - preparation, properties and uses.

Polymeric sulphur nitride- phosphorus oxide -borazines phosphonitrilic compounds- trimers and tetrarsers –homocyclic inorganic ring systems.

Metal clusters – Chemistry of low molecularity metal clusters only – structure of \([\text{Re}_2\text{Cl}_8]^{2-}\) tiple metal – metal bonds.

UNIT – II Elements of Solid State:

Elements of crystallography - space lattices-unit cells-crystal system- X-ray diffraction Bragg’s method- Rotating crystal method and powder methods- indexing of crystal planes - Structure of typical lattices such as sodium chloride, Cesium chloride. Zinc blende, wurtzite, rutile, fluorite, antifluorite, pervoskite, \( \text{ReO}_3 \) structure -spinels and anti spinels-covalent crystals diamond and graphite –Crystal Structure & properties.


UNIT-III: Reactions and mechanism of organometalic compounds

Oxidative-addition reaction- Free radical, ionic, mechanism, addition of \( \text{H}_2, \text{HX}, \text{O}_2 \)
UNIT – IV Organometallic Chemistry

4.1 Carbon donors – Alkyl and Aryls - preparation and properties. Carbonyls – 18 electron rule, isolable concept – application to structure of carbonyls (simple and polynuclear); Nitrosyls – bridging and terminal nitrosyls, bent and linear nitrosyls; Chain Carbon donors - Olefins, acetylene and allyl complexes – Synthesis, structure and bonding; Cyclic carbon donors -Metallocene – synthesis, structure and bonding (Ferrocene only) Substitution – electrophilic and nucleophilic attack on ligands. Carboxylation and decarbonylation; fluxional isomerism.

UNIT – V Catalysis

5.1 Hydrogenation of olefins (Wilkinson’s catalyst); hydroformylation of olefins using Cobalt or Rhodium catalysts (oxo process); Oxidation of olefins to aldehydes and ketones (Wacker process); polymerization (Zeigler– Natta catalyst); Cyclo oligomerization of acetylene using Nickel catalyst (Reppe’s catalyst); polymer bound catalysts.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To get more knowledge about nucelophilic and electrophilic on coordination chemistry.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the 18 electron rule, Metallocence.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>To study the Wilkinson’s catalyst, oxo process, wacker process, zeigler—natta catalysts and Reppe’s catalyst.</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:


Reference Books:
Semester: II  
Credits  4
Paper code: 17P2CHP01  
Hours/week  3
Total: 60 marks  
Duration: 6 hours

Course Objectives:
- To learn technique of organic qualitative analysis.
- To learn some double stage organic preparations.
  Separate the following types of mixture and analyse only one of the components present as desired by the Teacher/Examiner.

1. Mixture Analysis:
   1. Soluble and insoluble
   2. Acidic and Neutral
   3. less acidic and neutral
   4. Basic and neutral

2. Two Stage Preparations:
   1. Acetylsalicylic acid from methylsalicylate
   2. 1,3,5 – Tribromobenzene from Aniline
   3. p-Nitroaniline from acetanilide
   4. p-Bromoaniline from acetanilide
   5. Benzilic acid from benzoin

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the technique of organic qualitative analysis.</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Study some double stage organic preparations.</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Learn the Separate the following types of mixture and analyze only one of the components present as desired by the Teacher/Examiner.</td>
<td>6</td>
</tr>
</tbody>
</table>

REFERENCES:
Semester: II
Paper code: 17P2CHP02

Course Objectives:
- To learn quantitative separation of metal ions in binary mixtures.
- To learn simple single stage preparations of some inorganic complex.

Volumetry, Gravimetry / Complexometric and complex preparations:

Estimation of the following elements by volumetric and gravimetric / complexometric methods:
1. Cu (V) Ni (G/C)  
2. Cu (V) Zn (G/C)  
3. Cu (V) Mg (G/C)  
4. Zn (V) Cu (G/C)  

Preparations
1. Tetramminecopper(II)sulphate  
2. Potassiumtrioxalatochromate(III)  
3. Hexathiourealead(II)nitrate  
4. Potassiumtrioxalatoaluminate(III)  
5. Tristhioureacopper(I)chloride  
6. Tristhioureacopper(II)sulphate

Course Outcomes

<table>
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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>learn the inorganic metal properties</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Study the quantitative separation of metal ions in binary mixtures.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the simple single stage preparations of some inorganic complex.</td>
<td>3</td>
</tr>
</tbody>
</table>

REFERENCES:
Semester: II

Paper code: 17P2CHP03

Credits 5

Hours /week 4

Course Objectives:

- To understand Phase diagram and kinetics
- To learn the instrumental techniques

Non-Electrical

1. Simple eutectic system of diphenylamine and naphthaline.
2. Kinetic of acid hydrolysis of ester.
3. Determination of equilibrium constant for the reaction between \( \text{KI} + \text{I}_2 \rightarrow \text{KI}_3 \)
4. Comparison of strengths of two acids from kinetic study
5. Estimation of KI by partition method
6. Determine the rate constant of the reaction between Potassium Iodide and Potassium persulphate at room temperature.
8. Effect of impurity on CST of phenol – water system and determination of concentration of sodium chloride / Succinic acid.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Determine the Simple eutectic system</td>
<td>4</td>
</tr>
<tr>
<td>CO-2</td>
<td>Determine the rate constant</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Study the draw the phase diagram</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>learn the physical instrumental techniques</td>
<td>7</td>
</tr>
</tbody>
</table>

REFERENCES:
CORE PRACTICAL – IV
ORGANIC CHEMISTRY – PRACTICAL – II

Semester-III
Paper code: 17P3CHP04
Course Objectives:

- To understand the organic qualitative separation and identification
- To know the concept of Thin Layer Chromatography

1. Estimation of the following:
   Phenol, Aniline, Ethyl methyl ketone, Glucose,
2. Identification of chromophore / functional groups using UV / IR spectra.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the organic Estimations</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Identification of chromophore / functional groups using UV / IR spectra</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>get the theoretical knowledge of the various spectroscopic methods on the</td>
<td>5</td>
</tr>
</tbody>
</table>

References:
Semester: III

Paper code: 17P3CHP05

Course Objectives:

- To learn the technique of inorganic qualitative analysis.
- To understand the concept of common ion effect and solubility product.
- To learn colorimetric analysis.

Semi-micro Qualitative Analysis:

Analysis of two common and two rare earth cations in a given inorganic mixture

Colorimetric Estimations:

Cu, Fe, Mn, Ni, Cr, Co

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>learn the technique of inorganic qualitative analysis.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>Identify various ions present in mixture of salt</td>
<td>6</td>
</tr>
<tr>
<td>CO-3</td>
<td>Estimate the ions present in the sample by different techniques</td>
<td>6</td>
</tr>
</tbody>
</table>

References:

Selvamm Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., CHEMISTRY

CORE PRACTICAL – VI

PHYSICAL CHEMISTRY ELECTRICAL-PRACTICAL

Semester: IV
Paper code: 17P4CHP06
Credits 4
Hours/week 4

Course Objectives:

- To understand the principles of conductometry and potentiometry.
- To learn the instrumental techniques.

Conductometry:
1. Determination pKa – Ostwald’s dilution law.
3. Estimation of mixture of halides
4. Determination of equivalent conductivity of a strong electrolyte at different concentration and examine the validity of the Onsager's theory as limiting law at high dilutions

Potentiometry titrations:
5. Determination of titration of FeSO₄ by using KMnO₄
6. Determination of titration of KCl by using AgNO₃
7. Determination of titration of KI by using AgNO₃
8. Determination of titration of KI by using KMnO₄

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Set-up of different electrochemical cells</td>
<td>4</td>
</tr>
<tr>
<td>CO-2</td>
<td>Analyze the dissociation constant and solubility product by conductometry and potentiometry respectively</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Assess and adopt the conductometric methods to verify the theories</td>
<td>9</td>
</tr>
</tbody>
</table>

References:

SELVAMM ARTS & SCIENCE COLLEGE, NAMAKKAL
(AUTONOMOUS)
Nationally Reaccredited at the Highest Grade “A” by NAAC
Affiliated to Periyar University, (Salem)-11

M.Sc. ORGANIC CHEMISTRY
(Semester pattern)
REGULATIONS AND SYLLABUS
(Under Choice Based Credit System)
FOR
Students Admitted During
2018-2019 Onwards
Selvamm Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., ORGANIC CHEMISTRY

**Vision**

To impart a high quality of education & training in the field of chemistry to enable successful career for the post graduate students in the field of research, education & industrial applications.

**Mission**

Independent thought, collegiality, exchange of ideas and high ethical standards, development of innovative instructional techniques and increased job opportunities.

**Programme Outcomes (PG)**

<table>
<thead>
<tr>
<th>PO.No</th>
<th>Upon completion of M.Sc Degree programme, the graduates will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 1</td>
<td><strong>Application</strong>: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.</td>
</tr>
<tr>
<td>PO 2</td>
<td><strong>Analysis</strong>: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.</td>
</tr>
<tr>
<td>PO 3</td>
<td><strong>Solution Finding</strong>: Facilitate to enter multidisciplinary path to solve day-to-day problems</td>
</tr>
<tr>
<td>PO 4</td>
<td><strong>Progression in Career</strong>: Prepare students for prominent career in industry, banks offices and for further academic study</td>
</tr>
<tr>
<td>PO 5</td>
<td><strong>Research Capability</strong>: Able to do the experiments with proper procedure, appropriately record and Analyze the results.</td>
</tr>
<tr>
<td>PO 6</td>
<td><strong>Expressing their talents</strong>: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.</td>
</tr>
<tr>
<td>PO 7</td>
<td><strong>Individual sustainability</strong>: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.</td>
</tr>
<tr>
<td>PO 8</td>
<td><strong>Competency</strong>: Attain competency in job market / entrepreneurship.</td>
</tr>
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</table>
## STRUCTURE OF M.Sc. (ORGANIC CHEMISTRY) PROGRAMME UNDER CBCS PATTERN FOR AUTONOMOUS

(From 2018-2019)

### CURRICULUM AND SCHEME OF EXAMINATIONS

<table>
<thead>
<tr>
<th>Semester</th>
<th>Paper Code</th>
<th>Course Name</th>
<th>No. of Hrs</th>
<th>No. of Credits</th>
<th>Marks</th>
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<tbody>
<tr>
<td>I</td>
<td>17P1OCH01</td>
<td>CC-I- Organic Chemistry-I</td>
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Total Credits for I & II Semesters = 52
# Course Details

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<th>Marks</th>
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<td>III</td>
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<td>17P4EX01</td>
<td>Extension Activities</td>
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<td>17P4STE01</td>
<td>Skill (LSRW) Through English</td>
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<td><strong>TOTAL</strong></td>
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</table>

**Total Credits for III & IV Semesters** = 48

**TOTAL CREDITS FOR ALL SEMESTERS** = 100

**Note:** Extension Activities 60 Hrs outside the Class Hours
Programme Specific Outcomes (M.Sc Organic Chemistry)

<table>
<thead>
<tr>
<th>PSO</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSO-1</td>
<td>Global level research opportunities to pursue Ph.D programme targeted approach of CSIR –NET examination</td>
</tr>
<tr>
<td>PSO-2</td>
<td>Enormous job opportunities at all level of chemical, pharmaceutical, food products, life oriented material industries.</td>
</tr>
<tr>
<td>PSO-3</td>
<td>Specific placements in R &amp; D and synthetic division of polymer industries &amp; Allied Division.</td>
</tr>
<tr>
<td>PSO-4</td>
<td>Discipline specific competitive exams conducted by service commission.</td>
</tr>
<tr>
<td>PSO-5</td>
<td>Will gain fundamental and conceptual knowledge in chemistry.</td>
</tr>
<tr>
<td>PSO-6</td>
<td>Will Obtain knowledge in Spectral, Analytical, Qualitative &amp; Quantitative techniques, which will be useful in industry.</td>
</tr>
<tr>
<td>PSO-7</td>
<td>Handling of Equipment, Soft skills, communication and presentation skills.</td>
</tr>
<tr>
<td>PSO-8</td>
<td>Will get knowledge in designing a synthetic route for developing organic compounds, drugs, natural products &amp; also will be well versed in green concepts of organic synthesis.</td>
</tr>
<tr>
<td>PSO-9</td>
<td>Will be able to contribute to the generation of new scientific insights or to the innovations of new applications of chemical research.</td>
</tr>
<tr>
<td>PSO-10</td>
<td>Understands the background of organic reaction mechanisms, complex chemical structures, and instrumental method of chemical analysis, molecular rearrangements and separation techniques.</td>
</tr>
</tbody>
</table>
Selvamm Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., ORGANIC CHEMISTRY

CORE PAPER - I
ORGANIC CHEMISTRY - I

<table>
<thead>
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<th>Semester</th>
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<table>
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<tr>
<th>Paper code</th>
<th>Hours/weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>17P1OCH01</td>
<td>5</td>
</tr>
</tbody>
</table>

**Course Objectives**

- To learn about optical activity of asymmetric molecules.
- Basic idea about aliphatic nucleophilic substitution reactions, aromaticity, aromatic nucleophilic and electrophilic substitution reactions.
- To learn about the alkaloids, Flavones and isoflavones.

**UNIT- I Stereochemistry**


Conformational analysis and stereochemical features of disubstituted cyclohexanes (1,2 ; 1,3 ; 1,4 dialkyl cyclo hexanes), conformation and stereochemistry of cis and trans decalins.

**UNIT II Reaction intermediates, Structure and Reactivity**

Reaction intermediates: Formation, stability and structure of carbonions, carbanions, carbenes, nitrenes and free radicals. Free radical reactions: Sandmeyer reaction, Gomberg-Bachmann reaction, Pschorr reaction and Ullmann reaction, Hunsdiecker reaction.

Effect of structure on reactivity – resonance and fields effects, steric effects, quantitative treatment the Hammett equation and linear free energy relationship, substituent and reaction constant, Taft equation. Thermodynamic and kinetic requirements for reactions, thermodynamically and kinetically controlled reactions, Hammonds postulate, transition states and intermediates, Kinetic & non kinetic methods of determining mechanisms, identification of products and determination of the presence of an intermediate, isotopic labeling, kinetic isotope effects.
UNIT III Aliphatic Nucleophilic Substitution Reactions

The SN1, SN2 & SNi mechanisms. The neighbouring group mechanism, neighbouring group participation by π and σ bonds, anchimeric assistance. Nucleophilic substitution at an allylic, aliphatic trigonal and vinylic carbon.

Reactivity effects of substrates structure, attacking nucleophile, leaving group and reaction medium, ambident nucleophile, regioselectivity. Williamson reaction, Vonbraun reaction, hydrolysis of esters, Claisen and Dieckmann condensation.

UNIT - IV  Aromatic electrophilic and nucleophilic substitution reactions

The arenium ion mechanism, typical reactions like nitration sulphonation, halogenation, Friedel – Crafts alkylation, acylation and diazonium coupling, electrophilic substitution on monosubstituted benzene, orientation and reactivity – ortho, meta and para directing groups, ortho-para ratio, ipso attack, Gatterman, Gatterman- Koch, Vilsmeir, Houben Hoesch reaction.

Aromatic nucleophilic substitution reactions, the SNAr mechanism, the aryl cation mechanism, the benzyne intermediate mechanism, Ziegler alkylation, Chichibabin reaction.

UNIT – V Alkaloids, Flavones and Isoflavones

Synthesis and Structural elucidation of Quinine, Papaverine, Morphine and Reserpine. Synthesis and structural elucidation of flavones, Isoflavones and anthocyanins

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To learn the concept stereochemistry and its importance.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>To familiarize the various types of aromatic substitution reaction and their mechanism.</td>
<td>10</td>
</tr>
</tbody>
</table>
Co-3 To understand the various types of aliphatic nucleophilic substitution. 5

TEXT BOOKS


REFERENCE BOOKS

Course Objectives

• To Understand the chemistry of Reaction mechanism and electronic spectra
• To learn the Spectroscopic techniques

UNIT – I Stability aspects of complexes


UNIT – II Reaction mechanisms in Complexes

Electron transfer reactions – Outer and inner sphere processes; atom transfer reaction, formation and rearrangement of precursor complexes, the bridging ligand, successor complexes; Cross reactions and Marcus – Hush theory Reaction mechanism of coordination compounds – Substitution reactions, Labile and inert complexes. Substitution in square planar complexes – General mechanism; reactivity of Platinum complexes; influences of entering and leaving groups; the Trans effect – theory.

UNIT – III Electronic Spectra of Complexes

Spectroscopic Term symbols for d<sup>1-10</sup> ions – derivation of term symbols and ground state term symbol, Hund’s rule; Selection rules – break down of selection rules, spin-orbit coupling, band intensities, weak and strong field limits- correlation diagram; Energy level diagrams; Orgel and Tanabe – Sugano diagrams; effect of distortion and spin orbit coupling on spectra; Evaluation of Dq and B values for octahedral complexes of Nickel, Cobalt-Charge transfer spectra for KMnO<sub>4</sub>. Spectral properties of Lanthanides and Actinides.

UNIT – IV IR Spectra of metal complexes

Combined uses of IR spectra in the structural elucidation of simple molecules like N<sub>2</sub>O, CIF<sub>3</sub>, NO<sub>3</sub>, ClO<sub>3</sub>, NSF<sub>3</sub>. Effect of coordination on ligand vibrations, use of group vibrations in the structural elucidation of metal complexes of Urea, Thiourea, Cyanide, Thiocyanate, Nitrate and Sulphate. Effect of isotopic substitution on the
vibration spectra of molecules, vibration spectra of metal carbonyls with reference to the nature of bonding, geometry and number of C-O stretching vibrations, Group theoretical treatment for C$_2$V molecules, limitations of IR.

UNIT – V Inorganic spectroscopic Techniques

Characterisation of inorganic compounds by NMR, EPR, Mössbauer, MS, electron spectroscopy and microscopic techniques.

NMR Spectra of $^{31}$P(H$_3$PO$_4$, H$_3$PO$_3$,H$_3$PO$_2$, F$_2$HPO$_2$ H$_4$P$_2$O$_4$),$^{19}$F(ClF$_3$,BrF$_5$, TiF$_4$(Cis-Trans) TiF$_2$, $^1$H(H$_2$O,H$_2$O$_2$), $^{11}$B (B$_3$H$_8$)$^-$, Mossbauer Spectra of (FeCN$_6$)$^{4-}$, (FeCN$_6$)$^{3-}$,(FeH$_3$O$_6$)$^{2+}$,(FeH$_2$O$_6$)$^{3+}$.EPR Spectra of (Methyl radical, Napthalene, Anthracene, Phenyl radical)

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>To learn about the stability of complexes</td>
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<tr>
<td>CO-2</td>
<td>To know the detail study of reaction mechanism in complexes.</td>
<td>10</td>
</tr>
<tr>
<td>CO-3</td>
<td>To familiarize the electronic spectra of complexes.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the IR Spectra of metal complexes.</td>
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Text books:

Reference Books:

Semester: I  
Credits 5  
Paper code: 17P1OCH03  
Hours / week : 5  

Course Objectives  
- To Study the fundamentals of classical Thermodynamics & Quantum Chemistry.  
- To understand the theories of Kinetics of reaction .  
- To study the surface chemistry and catalysis.  

UNIT – I Quantum Chemistry – I  
Operators- algebra of operators, commutation relations, commutators, linear, angular momentum, Laplacian, Hermitian, Hamiltonian and Ladder operators, eigen values and eigen functions, Hermitian property of operators, orthogonality and normalization.  
Quantum mechanical postulates – Schrödinger equation and its solution to the problem of a particle in one and three dimensional boxes – the harmonic oscillator.  
De – Broglie equation – Heisenberg uncertainty principle – Compton effect  

UNIT – II Quantum Chemistry – II  

UNIT – III Chemical Kinetics – I  

UNIT – IV Chemical Kinetics – II
Reactions in solutions – comparison between gas phase and solution reactions – the influence of solvent, ionic strength, dielectric constant and pressure on reaction in solution – Kinetic isotope effects – Linear free energy relationship – Hammett and Taft equations.

**UNIT – V Surface Chemistry and Catalysis**


**Course Outcomes**

<table>
<thead>
<tr>
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<th>Upon completion of this course, students will be able to</th>
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<td>CO-1</td>
<td>To understand basics of quantum chemistry</td>
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<td>CO-2</td>
<td>To understand the term symbol, eigen function, eigen value.</td>
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<tr>
<td>CO-3</td>
<td>To learn the surface reaction of kinetics and acid-base catalysis.</td>
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</table>

**Text Books:**

5. D.A. Mcquarrie, Quantum chemistry, University science books, Mill Valley, California (1983)
DEPARTMENT OF CHEMISTRY
M.Sc., ORGANIC CHEMISTRY


Reference Books:

8. J.N. Levine, Quantum chemistry, Allyn and Bacon, Boston, 1983.
ELECTIVE PAPER – I
POLYMER CHEMISTRY

Semester: I Credits 4
Paper code: 17P1OCH01 Hours / week : 4

Objectives

- To Study the basic concepts of polymer chemistry
- To learn the properties of commercial polymers and biomedical polymers.

UNIT – I Basic Concepts:


UNIT – II Co-ordination Polymerization:


UNIT – III Molecular Weight and Properties:

Polydispersion – average molecular weight concept, number, weight and viscosity average molecular weights. Measurement of molecular weights. Gel permeation chromatography, viscosity, light scattering, osmotic and ultracentrifugation methods. Polymer structure and physical properties – crystalline melting point Tm. The glass transition temperature. Determination of Tg. Relationship between Tm and Tg.

UNIT – IV Polymer Processing:

Plastics, elastomers and fibres. Compounding processing techniques: calendering, die casting, rotational casting, film casting, injection moulding and blow moulding extrusion, moulding, thermoforming, foaming, reinforcing and fibre spinning.
UNIT – V Properties of Commercial Polymers:

Polyethylene, polyvinyl chloride, polyamides, polyesters, phenolic resins, epoxy resins and silicone polymers. Functional polymers, Fire retarding polymers and electrically conducting polymers. Biomedical polymers – contact lens, dental polymers, artificial heart, kidney, skin.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Basic concepts of polymerization.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Theories and types of Co-polymerization.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Properties of polymers and their applications.</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Books:


Reference Books:

Course Objectives

- To learn the concepts of Elimination and Pericyclic reactions
- To learn the aromatic character
- To study the photochemical reactions, percyclical reaction.
- To understand the reagent in organic synthesis.

UNIT I Elimination Reactions

1.1 E1, E2, E1cB mechanisms, Orientation of the double bond- Hofmann and Saytzeff rule, competition between elimination and substitution, dehydration and dehydrohalogenation reactions, stereochemistry of E2 eliminations in cyclohexane ring systems, mechanism of pyrolytic eliminations, Chugaev reaction and Cope Elimination.

UNIT II Aromaticity

Aromatic character: Five-, six-, seven-, and eight-membered rings - other systems with aromatic sextets - Huckel's theory of aromaticity, concept of homoaromaticity and antiaromaticity.

Electron occupancy in MO's and aromaticity - NMR concept of aromaticity and antiaromaticity, systems with 2, 4, 8 and 10 electrons, systems of more than 10 Electrons (annulenes), Mobius aromaticity. Bonding properties of systems with (4n+2)π-electrons and 4nπ-electrons, alternant and non-alternant hydrocarbons (azulene type) - aromaticity in heteroaromatic Molecules, sydnones and fullerenes.

UNIT III Organic Photochemistry

Photochemical reactions: Fate of excited molecules, Jablonski diagram, Norrish Type I and Norrish Type II reactions, photo reduction of ketone, photo addition reactions, Paterno Buchi reaction, di –pi methane rearrangement, photochemistry of arenes, Photooxidation (Formation of peroxy compounds), Photoisomerization (Cis – trans isomerization),
UNIT IV Pericyclic Reactions

UNIT V Reagents in Organic Synthesis
5.1 Reagents and their uses: DCC, DDQ, DBU, DIBAL, 9BBN, NBS, 1,3–dithiane (umpolung), n-Butyl Lithium, trimethyl silyl iodide, trimethyl silyl chloride, Lithium dimethyl cuprate, Baker's yeast and Gilman's reagent.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the elimination reaction of E1, E2, E1cB</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the concept of Huckel theory of aromaticity.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the cope rearrangement, clasien rearrangement and Frontier molecular orbital theory.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text books

**Reference books**

1. S. H. Pine, J.B. Hendrickson, D.J. Cram and G.S. Hammond,
   

2. S.M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry,
   
Core Paper - V

Physical Chemistry – II

Semester: II

Credits 5

Paper code: 17P2OCH05

Hours /week 5

Course Objectives

- To understand the fundamentals of Classical Thermodynamics & Quantum Chemistry
- To learn the symmetry elements and symmetry operations.
- To study the selection rule for vibrational, electronic and Raman spectra.

Unit – I Classical Thermodynamics – I

Maxwell’s relations and thermodynamic equations of state – applications in the evaluation of \( C_p - C_v \) for solids and for vanderwaals gases Partial molar properties – Gibbs – Duhem equation – Partial molar free energy (Chemical Potential) – Determination of chemical potential [Direct Method and Method of Intercepts] and partial molar volume – variation of chemical potential with Temperature and Pressure

Unit – II Classical Thermodynamics – II

Thermodynamics of ideal and non ideal gases and solution Fugacity – definition – Methods of determination of fugacity – Variation of fugacity with temperature and pressure. Determination of activities and activity coefficient from Vapour pressure Concept of ionic strength.

Unit – III Group Theory – I

Symmetry elements and symmetry operations – Point groups – identification and representation of groups – comparison of Molecular symmetry with Crystallographic symmetry – Reducible and irreducible representation – Direct product representation – Great orthogonality theorem and its consequences – Character Table and their uses.

Unit – IV Group Theory – II

Symmetry selection rules for vibrational, Electronic and Raman Spectra – determination of representation of vibrational modes in non-linear molecules such as \( \text{H}_2\text{O}, \text{CH}_4, \text{XeF}_4, \text{SF}_6 \) and \( \text{NH}_3 \) – symmetry of Hybrid orbitals in non-linear molecule \( \text{BF}_3, \text{CH}_4, \text{XeF}_4, \text{PCl}_5 \) and \( \text{SF}_6 \) – Electronic spectra of formaldehyde.

Unit – V Chemical Kinetics – III

**Course Outcomes**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To understand the Maxwells relation, Gibbs Duhem equation.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the point group, character table and their uses.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the application of group theory in spectra.</td>
<td>10</td>
</tr>
</tbody>
</table>

**Text Books:**


**Reference Books:**


ELECTIVE PAPER – II
ACID-BASE & ORGANOMETALLIC CHEMISTRY

Semester: II
Credits: 4
Paper code: 17P2OCHE02
Hours/week: 4

Course Objectives

- To Understand the concepts of acid base & metal ligands bond.
- To Understand the fundamentals of Organometallic Chemistry.
- To study the bioinorganic chemistry of photosystems, porphyrins, metalloenzymes, oxygen transport.

UNIT- I Acid-Bases and Non aqueous solvents


Non-aqueous solvents-differentiating and leveling solvents-salvation number – medium effect- Ph Measurement in non-aqueous media-liq NH₃, SO₂, H₂SO₄, HCN, HF assolvents.

UNIT-II Theories of Metal-Ligand bond


UNIT-III Organometallic compounds

3.1 Organometallic compounds: synthesis, bonding and structure, and reactivity(S,Se.Cu,Li). Organometallics in homogeneous catalysis.

UNIT IV Reaction mechanism of complexes

4.1 Trans influence replacement of coordinated water; mechanism of acid hydrolysis and base hydrolysis – Conjugate base mechanism; direct and indirect evidences in favour of the mechanism; application of substitution reaction in the synthesis of Platinum and Cobalt complexes.

UNIT-V Bio Inorganic Chemistry
Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron-transfer reactions; nitrogen fixation, metal complexes in medicine.

Cages and metal clusters.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To learn about the concept of Acid-bases and non-aqueous solvent.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the theories of Molecular orbital theory.</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>To learn the organometallic compounds.</td>
<td>1</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
CORE PRACTICAL - I
ORGANIC CHEMISTRY PRACTICAL – I

Semester: II
Paper code: 17P2OCHP01
Total: 60 marks

Credits 4
Hours /week 3
Duration: 6 hours

Objectives:

- To learn technique of organic qualitative analysis.
- To learn some double stage organic preparations.

Separate the following types of mixture and analyze only one of the components Present as desired by the Teacher / Examiner.

1. Mixture Analysis:
   1. Soluble and insoluble
   2. Acidic and Neutral
   3. less acidic and neutral
   4. Basic and neutral

2. Two Stage Preparations:
   1. Acetylsalicylicacid from methylsalicylate
   2. 1,3,5 – Tribromobenzene from Aniline
   3. p-Nitroaniline from acetanilide
   4. p-Bromoaniline from acetanilide
   5. Benzilic acid from benzoin

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the technique of organic qualitative analysis.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Study some double stage organic preparations.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>learn the Separate the following types of mixture and analyse only one of the components present as desired by the Teacher / Examiner</td>
<td>2</td>
</tr>
</tbody>
</table>

References:
CORE PRACTICAL – II
INORGANIC CHEMISTRY PRACTICAL – I

Semester: II  Credit  4
Paper code: 17P2OCHP02  Hours /week 3

Objectives:
✓ To learn quantitative separation of metal ions in binary mixtures.
✓ To learn simple single stage preparations of some inorganic complex.

Volumetry, Gravimetry / Complexometric and complex preparations:

Estimation of the following elements by volumetric and
gravimetric / complexometric methods:

1. Cu (V) Ni (G/C)
2. Cu (V) Zn (G/C)
3. Cu (V) Mg (G/C)
4. Zn (V) Cu (G/C)

Note: V - Volumetric
G - Gravimetric
C - Complexometric

Preparations
1. Tetramminecopper(II)sulphate
2. Potassiumtrioxalatochromate(III)
3. Hexathiourealead(II)nitrate
4. Potassiumtrioxalatoaluminate(III)
5. Tristhioureacopper(I)chloride
6. Tristhioureacopper(II)sulphate

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Study the quantitative separation of metal ions in binary mixtures.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand the simple single stage preparations of some inorganic complex.</td>
<td>10</td>
</tr>
<tr>
<td>CO-3</td>
<td>learn the inorganic metal properties</td>
<td>5</td>
</tr>
</tbody>
</table>
References:

SELVAMM ARTS & SCIENCE COLLEGE (AUTONOMOUS) NAMAKKAL

DEPARTMENT OF CHEMISTRY
M.Sc., ORGANIC CHEMISTRY

CORE PRACTICAL – III PHYSICAL
CHEMISTRY PRACTICAL -I

Semester: II
Paper code: 17P2OCHP03

Credits 5
Hours /week 4

Objectives:
- To understand Phase diagram and kinetics
- To learn the instrumental techniques

Non- Electrical

1. Simple eutectic system of diphenylamine and naphthalene.
2. Kinetic of acid hydrolysis of ester.
3. Determination of equilibrium constant for the reaction between KI+I₂=KI₃
4. Comparison of strengths of two acids from kinetic study
5. Estimation of KI by partition method
6. Determine the rate constant of the reaction between Potassium Iodide and Potassium Persulphate at room temperature.
8. Effect of impurity on CST of phenol – water system and determination of Concentration of sodium chloride / succinic acid.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Determine the Simple eutectic system</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Determine the rate constant</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Study the draw the phase diagram</td>
<td>9</td>
</tr>
</tbody>
</table>

References:
Course Objectives

- To understand the naming reaction and its mechanism.
- To study the rearrangement reaction and its mechanism.
- To understand the concepts of oxidation and reduction reaction.
- To study the structure and stereochemical aspects of steroids.
- To study the analytical techniques of ORD, CD and Mass spectrometry.

UNIT I - Addition to Carbon Carbon and Carbon–Hetero atom multiple bonds.

Addition of halogen and nitrosyl chloride to olefins, hydration of olefins and acetylenes, hydroboration, hydroxylation-cishydroxylation (OsO4 & KMnO4), transhydroxylation (Prevost reaction and Woodward modification), epoxidation, Michael addition, 1,3 dipolar addition, carbenes and their additions, Diels-Alder reaction.

Mechanism and applications of Mannich, Stobbe, Darzen Glycidic ester condensation. Benzoin condensation, Peterson olefination (Silyl Wittig reaction), Strecker synthesis, Wittig, Wittig - Horner, Perkin, Thorpe, Ritter, Prins reactions.

UNIT II Molecular Rearrangements (15 Hours)

A detailed study of the mechanism of the following rearrangements. Wagner – Meerwin, Demyanov, Dienone- Phenol, Favoriski, Baeyer – Villiger, Wolff, Stevens, Von– Richter, Beckmann, Hydroperoxide, Smiles, Jacobsen, Hofmann - Martius rearrangements (a few examples in each rearrangement are to be studied).

UNIT III Oxidation and Reduction Reactions (15 Hours)
Study of the following oxidation reactions with mechanism: Oxidation of alcohols by CrO3, DMSO alone, DMSO in combination with DCC; acetic anhydride and oxalyl chloride, oxidation of arylmethane, oxidation of methylene alpha to carbonyl, allylic oxidation of olefins, oxidative cleavage of glycols, oxidative cleavage of double bonds by ozonolysis.

Study of the following reduction reactions with mechanism; Reduction of carbonyl compounds by complex metal hydrides (LAH, NaBH4, NaBH3CN), clemmensen and Wolff Kishner reductions, Birch reduction, MPV reduction.

UNIT IV Steroids


UNIT V ORD, CD and Mass Spectrometry

ORD-CD: Definition, deduction of absolute configuration, octant rule for ketones, Cotton effect-axial haloketone rule.

Mass spectra –Basic principle, molecular ion peak, base peak, meta stable ion peak, isotopic peaks, Nitrogen rule, ring rule, McLafferty rearrangement, rules for fragmentation pattern, Examples of mass spectral fragmentation of organic compounds (alkanes, aromatic hydro carbons, alkyl halides, aldehydes, ketones, alcohols, acids and esters).

Course Outcomes

<table>
<thead>
<tr>
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<th>Upon completion of this course , students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Describe the important concepts of the organic chemistry for the synthesis of new molecule, introduction of different functional group..</td>
<td>10</td>
</tr>
</tbody>
</table>
Text books


Reference books

CORE VII

ORGANIC CHEMISTRY – IV

Semester: III Credits 5
Paper code: 17P3OCH07 Hours /week 5

Course Objectives

➢ To study the classification of carbohydrates.
➢ To study the synthesis and structure of vitamins.
➢ To study the naming reactions.
➢ To study the twelve principles of green chemistry.

UNIT I Carbohydrates

Introduction, definition and classification; Monosaccharides – configuration of aldotrioses, aldotetroses, aldopentoses, aldohexoses, Ketohexoses; Deoxy – sugars; Ring structure of monosaccharides; mutarotation; a brief introduction on the structure of disaccharides (sucrose and maltose as representative examples) and polysaccharides (starch, cellulose and cyclodextrins as representative examples).

UNIT II Vitamin

Structure and synthesis of the following: Retinol, thiamine, riboflavin, pyridoxine, pantothenic acid, ascorbic acid, tocopherols, vitamin K and cyanocobalamine.

UNIT III Name Reactions

A study of the following reactions: Dieckmann cyclization, Shapiro reaction, Stork enamine, Barton and ene reactions; Sharpless asymmetric epoxidation, Robinson annulation; Grignard reactions, Duff reactions, Simmons Smith reaction, Chichibabin reaction, Hoffmann – Loffler – Freytag reaction.

UNIT IV Green Chemistry I
Introduction – Need for green chemistry – twelve principles of green chemistry - Designing a green synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts. Use of the following in green synthesis with suitable examples:

a) Green reagents: dimethylcarbonate, polymer supported reagents.
b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phase transfer catalysts, crown ethers, biocatalysts.
c) Green solvents: water, ionic liquids, supercritical carbon dioxide.
d) Solid state reactions: solid phase synthesis, solid supported synthesis.

UNIT Green Chemistry II

Microwave assisted synthesis: Microwave equipment, activation-benefits, limitations, microwave effects. Reactions in water, reactions in organic solvents, solvent free reactions. Michael addition in aqueous medium and solid state.

Ultrasound assisted reactions- Reformatsky reaction and Strecker synthesis. Comparison of traditional processes versus green processes in the syntheses of ibuprofen, adipic acid, 4-amino diphenylamine, p-bromotoluene and benzimidazole.

Course Outcomes

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the classification of carbohydrates.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>To get more knowledge in the synthesis and structure of vitamins.</td>
<td>10</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the naming reactions.</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>To understand the twelve principles of green chemistry.</td>
<td>6</td>
</tr>
</tbody>
</table>

Text books

2. Atta-Ur-Rahman and M.I. Choudhary, New Trends in Natural Product
M.Sc., ORGANIC CHEMISTRY


Reference books:


ELECTIVE PAPER - III

INSTRUMENTAL METHODS OF ANALYSIS

Semester: III  Credits  5
Paper code: 17P3OCH07  Hours /week  5

Course Objectives

➢ To study the theory, instrumentation and application of absorption, emission and reflection spectra.
➢ To study the analytical techniques in thermal and magnetic methods.
➢ To study the polarography, amperometry and chromatography.

UNIT I  Absorption, Emission and Reflection Spectroscopy

Absorption spectrometry – Beer Lambert's law; Principles of UV visible spectroscopy – photometric titrations; Principles and applications of Fluorimetry, turbidimetry and nephelometry.

Flame Photometry – Theory, instrumentation and a few important applications; Atomic absorption spectroscopy (AAS) – Theory, instrumentation and applications; Atomic fluorescence.

UNIT II  Thermal and Magnetic Methods of Analysis

DTA/DSC – Principle and instrumentation, Different techniques. Application to organic and inorganic compounds.

TGA – Principle, instrumentation of TGA curves, Application to organic and inorganic compounds.

Magneto chemical Analysis – Magnetic susceptibility and its measurements, Guoy's, Quink's curie's, and Ranking's balances. Application to simple compounds and ranking's transition metal complexes, Lanthanides and Actinides.

UNIT III  Characterisation of Nanoscale Materials

Nearfield Optical Microscopy (SNOM). Scanning ion conductance microscope, scanning thermal microscope, scanning probe microscopes and surface plasmon spectroscopy.

UNIT IV Polarography and Amperometry

Polarography – Theory, apparatus, DME, diffusion kinetic and catalytic currents, current voltage curves for reversible and irreversible system, qualitative and quantitative application to inorganic systems.

Amperometric titrations – Theory, apparatus, types of titration curves, successive titrations and two indicator electrodes – applications.

UNIT V Chromatography

Principle, method and applications of column and thin layer chromatographies; Gas liquid chromatography – principle, retention time values, instrumentation, carrier gas, column, detectors – thermal conductivity, flame ionization and electron capture; few applications of GLC; HPLC – theory, instrumentation and applications.

Course Outcomes

<table>
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<th>Upon completion of this course, students will be able to</th>
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</tr>
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<tbody>
<tr>
<td>CO-1</td>
<td>To study the theory, instrumentation and application of absorption, emission and reflection spectra.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>To get more knowledge in the analytical techniques in thermal and magnetic methods.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the principle and application of the polarography, amperometry and chromatography.</td>
<td>6</td>
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</tbody>
</table>

Text books


Reference books:

CORE PRACTICAL - IV
ORGANIC CHEMISTRY PRACTICAL II

Semester: III  
Credits: 5

Paper code: 17P3OCHP04  
Hours/week: 6

ORGANIC ESTIMATIONS

1. Phenol
2. Aniline
3. Methyl Ketone
4. Glucose

II. Organic preparation involving two stages

1. m- Nitro aniline from Nitro Benzene.
2. Benzanilide from Benzophenone.
3. Anthraquinone from phthalic anhydride.
4. Beta Naphthol from naphthalene.

Course Outcomes

<table>
<thead>
<tr>
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<th>PSOs addressed</th>
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</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the organic Estimations</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Identification of chromophore / functional groups using UV / IR spectra</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>get the theoretical knowledge of the various spectroscopic methods.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Basics of the examples from the science and industry.</td>
<td>3</td>
</tr>
</tbody>
</table>
Reference books:

CORE PRACTICAL - V
ORGANIC CHEMISTRY PRACTICAL III

Semester: III
Credits 5
Paper code: 17P3OCHP05
Hours /week 6

I. Estimation of the following:
   1. Hydroxyl group
   2. Amino group
   3. Aldehyde group
   4. Glycine

II. Multi stage preparation involving oxidations and reductions
   1. Preparation of Cyclohexanone (Oxidation)
   2. Preparation of adipic acid (Oxidation)
   3. Preparation of trimethyl acetic acid (Oxidation)
   4. Preparation of benzene (Wolff- Kishner reduction)
   5. Preparation of benzhydrol (Reduction)
   6. Preparation and stereochemistry of azobenzene (Reduction).

Course Outcomes

<table>
<thead>
<tr>
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<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To study the organic estimation</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Independently perform two or more step organic synthesis</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>To learn the multi stage preparation involving oxidations and reductions</td>
<td>1</td>
</tr>
</tbody>
</table>

Reference books:
CORE VIII
ORGANIC CHEMISTRY- V

Semester: IV  Credits  5
Paper code: 17P3OCH08  Hours /week  5

Course Objectives

➢ To study the synthesis and reactions of heterocyclic atom.
➢ To study the concept of retro-synthetic reactions.
➢ To study the terpenoids and carotenoids of natural products.
➢ To understand the types of proteins, DNA, RNA.

UNIT I  Five membered heterocyclics with two hetero atoms

Synthesis, reactivity, aromatic character and importance of the following heterocycles: Pyrazole, imidazole, oxazole, thiazole, isoxazole, isothiazole Heterocyclics with two or more hetero atoms Six Membered heterocycles with two or more heteroatoms: Synthesis and reactions of diazines (pyridazine, pyrimidine & pyrazine) Synthesis and importance of purines and pteridines: Synthesis of Caffeine, theobromine and theophylline.

UNIT II  Retro synthesis

Retro synthetic analysis – definition; synthon approach – synthetic equivalent, reagent, functional group interconversions; Linear and convergent method in organic synthesis; Disconnection approach – one group disconnection; retro synthesis of alcohols; retro Diels – Alder reaction; retro synthesis of olefins, aliphatic and aromatic ketones; protective groups in organic synthesis.

UNIT III  Terpenoids and Carotenoids

UNIT IV Polarography and Amperometry


UNIT-V Chromatography

Nucleotides, nucleosides and heterocyclic bases-Chemical synthesis of nucleosides and nucleotides. Primary, secondary and tertiary structure of DNA. Types of RNA-mRNA, tRNA and rRNA. Replication, transcription and translation-Genetic code.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To attain more knowledge in synthesis and reactions of heterocyclic atom.</td>
<td>10</td>
</tr>
<tr>
<td>CO-2</td>
<td>To understand the concept of retro-synthetic reactions.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>To study the terpenoids and carotenoids of natural products.</td>
<td>8</td>
</tr>
</tbody>
</table>

Text books


**Reference books:**


Selvamm Arts & Science College (Autonomous) Namakkal

DEPARTMENT OF CHEMISTRY
M.Sc., ORGANIC CHEMISTRY

CORE PAPER - IX

ORGANIC SPECTROSCOPY-IX

Semester: IV  Credits 5
Paper code: 17P3OCH09  Hours /week 5

Course Objectives

- To learn about the principle of UV- Visible spectra.
- To acquire knowledge in IR and Raman spectra.
- To study the principle of $^1$H NMR and $^{13}$C NMR.
- To understood the theory and application of ESR spectra.

UNIT I  UV – VIS  (15 Hours)

UV – VIS: Laws of light absorption – chromophores and auxochromes – types of electronic transitions – bathochromic, hypsochromic, hypochromic and hyperchromic effects; Applications of UV – VIS spectroscopy – use of model compounds and additivity – dienes, polyenes and α, β – unsaturated carbonyl compounds – Woodward – Fieser rules – Calculation of $\lambda_{\text{max}}$ for organic molecules; absorption spectra of polynes, polyenes and aromatic compounds; stereochemical factors in electronic spectroscopy; charge transfer complexes.

UNIT II  IR and Raman  (15 Hours)

IR : Molecular vibrations – stretching and bending vibrations, Hooks law – Overtone and combination bands; Factors influencing vibrational frequencies – effect of substituents, conjugation, distortion, geometry, hydrogen bonding – Fermi resonance; Characteristic group frequencies of organic molecules; interpretation of IR spectra of organic molecules.

Raman : Theory, application of Raman spectra to organic, inorganic and biological species, quantitative applications, Resonance Raman spectroscopy.

UNIT III  $^1$H NMR  (15 Hours)

Origin – relaxation and saturation; Chemical shift, factors influencing chemical shift; magnetic equivalence – homotopic, enantiotopic and diastereotopic protons; spin – spin coupling – Criteria for first order and non – first order spectra – representation of non-equivalent hydrogens by alphabets; geminal, vicinal and long range couplings – Karplus equation – NMR of simple AX and AMX type organic molecules, identification of H in various chemical environments to assign structure to the organic molecules using chemical shift values and coupling.
Simplification of spectra – high fields, deuterium exchange, shift reagents – satellite spectra – multiple resonance – spin decoupling, spin tickling and INDO

UNIT IV $^{13}$C NMR (15 Hours)

$^{13}$C NMR : Distinction between 1H and 13C NMR – theory and experiment – factors affecting intensity of signals – Nuclear Overhauser effect – chemical shift and its dependence on polar and steric effects (gamma gauche effect); additivity relationships

- C-C and C-H couplings – off resonance, gated and single frequency decouplings – relationship between coupling constant and 's' character; effect of shift reagents on 13C chemical shifts; applications of 13C NMR to find the different carbon functional groups.

UNIT ESR and conjoined problems (15 Hours)

ESR Spectroscopy; Basic principles, zero field splitting and Kramer's degeneracy, factors affecting the 'g' value. Isotropic and anisotropic hyperfine coupling constants. Applications of ESR spectroscopy.

Conjoined problems: Structural elucidation of organic compounds using a combination of all the above spectral methods – a problem solving approach.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To understand the principle and application of UV-VISIBLE spectra.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>To study the principle and application of IR and Raman spectra.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>To understand the simple AX and AMX type organic molecules in NMR spectra.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>To study the $^{13}$C NMR and ESR spectra.</td>
<td>4</td>
</tr>
</tbody>
</table>
Text books


Reference books:

APPLICATIONS OF ORGANIC SPECTROSCOPY

Semester : IV  
Credits : 5
Paper code : 17P4OCHE04  
Hours /week : 6

Objectives

• To understand the principle and applications of IR, UV-Vis, NMR and Mass Spectroscopy
• To know the importance of organic molecule structural identifications

UNIT - I Organic Spectra: IR Spectra

Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines.

Detailed study of vibrational frequencies of carbonyl compounds (ketones, Aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds).

UNIT – II Organic Spectra: Microwave Spectroscopy

Definition of spectrum. Electromagnetic radiation, quantization of different forms of energies in molecules (translational, rotational and electronic).

Born -Oppenheimer approximation

Microwave spectroscopy-theory of microwave spectroscopy, selection rule. Calculation of moment of inertia and bond length of diatomic molecules.

UNIT – III Organic Spectra: NMR

Interpreting $^1$H NMR Spectra - 1,1 Dichloro Ethane, 3- pentanone, Ethyl propionate , 1-chloro- 3- iodo propane , Vinyl Acetate, 1- propanol.

Interpreting $^{13}$C NMR Spectroscopy: General considerations - Chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon) - Coupling constants.

UNIT-IV Organic Spectra: Mass

Mass Spectrometry of Some Common Functional Groups: Alcohols, Amines, Carbonyl compounds
UNIT - V Photoelectron Spectroscopy

5.1 Photoelectron Spectroscopy - Principle, PES of diatomic molecules and polyatomic molecules (HCl, HBr, HI, CO, NH₃ and H₂O); Core electron PES; X-ray photoelectron spectroscopy (ESCA) applications.

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>To understand the principle and applications of NMR and Mass Spectroscopy</td>
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<tr>
<td>CO-2</td>
<td>To know the importance of organic molecule structural identifications IR, UV-Vis.</td>
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<tr>
<td>CO-3</td>
<td>To understand the principle and applications of</td>
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<td>CO-4</td>
<td>To understand the principle and applications of NMR and Mass Spectroscopy</td>
<td>3</td>
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</table>

Text Books:

Reference Books:

ORGANIC CHEMISTRY PRACTICAL - IV

Semester: IV
Paper code: 17P3OCHP06
Credits 5
Hours/week 6

Course Outcomes

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>extract, identify and characterize the compounds isolated from natural products.</td>
<td>8</td>
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<tr>
<td>CO-2</td>
<td>Students will be able to interpret the structure of any given unknown Organic compound by the analysis of given Spectral data.</td>
<td>1</td>
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<tr>
<td>CO-3</td>
<td>Students can check the purity of the given organic compound, can able to study the progress of the reaction and can determine the components present in the given organic mixture by applying TLC principles.</td>
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<tr>
<td>CO-4</td>
<td>Students can able to separate the two organic compounds from the mixture by applying Column chromatography.</td>
<td>9</td>
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</table>
Reference books:


M.Sc., Biotechnology

Curriculum and Syllabus
(Based on Choice Based Credit System with Semester Pattern)
Effective from the Academic year
2018-2019

Department of Biotechnology
Vision:

Vision of this programme is to make Knowledge implement competent, ethically engaged, professionals that can transform with a potential to innovate, invent for the benefit of society and base in premium processes and applications.

Mission:

Regular updating of Course curricula as per the demand of Biotechnology industry and academia. Entrepreneurship skill development. All the courses in the programme are carefully designed to equip the students for competitive exams like CSIR NET, SET etc and also to write research proposals for grants.

Programme Outcomes (PG)

PO 1: Application: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

PO 2: Analysis: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

PO 3: Solution Finding: Facilitate to enter multidisciplinary path to solve day-to-day problems.

PO 4: Progression in Career: Prepare students for prominent career in industry, banks offices and for further academic study.

PO 5: Research Capability: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

PO 6: Expressing their talents: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.

PO 7: Individual sustainability: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: Competency: Attain competency in job market / entrepreneurship.
Selvamm Arts and Science College, Namakkal (Autonomous)  
Department of Biotechnology  
M.Sc Biotechnology

Selvamm Arts and Science College, Namakkal (Autonomous)  
Department of Biotechnology Choice Based Credit System Course Structure of  
M.Sc.

<table>
<thead>
<tr>
<th>Sem</th>
<th>Code</th>
<th>Category</th>
<th>Course</th>
<th>Hrs</th>
<th>Credits</th>
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<tr>
<td>I</td>
<td>17P1BT01</td>
<td>Core I</td>
<td>Biochemistry and Enzymology</td>
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<td>CI 75</td>
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<tr>
<td></td>
<td>17P1BT02</td>
<td>Core II</td>
<td>Cell and Molecular Biology</td>
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<td>17P1BT03</td>
<td>Core III</td>
<td>Marine and Pharmaceutical Biotechnology</td>
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<td>17P1BTP01</td>
<td>Core IV</td>
<td>Lab in Biochemistry and Enzymology</td>
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<td>17P1BTE01</td>
<td>Elective I</td>
<td>Taxonomy and Biodiversity</td>
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| II   | 17P2BT04| Core VI     | Microbiology and Immunology     | 5   | 5       | CI 75 |
|      | 17P2BT05| Core VII    | Genetic Engineering             | 5   | 5       | EA 100|
|      | 17P2BTP03| Core VIII   | Lab in Microbiology and Immunology | 5  | 3       | EA 100|
|      | 17P2BTP04| Core IX     | Lab in Genetic Engineering      | 5   | 3       | EA 100|
|      | 17P2BTE02| Elective II | Bioinstrumentation and          | 4   | 4       | CI 75 |
|      |          |             | Research Methodology            |     |         |       |
|      | 17P2TED01| EDC         | Mushroom Cultivation and its Marketing | 4  | 4       | CI 75 |
|      | 17P2HR01|             | Human Rights                    | 2   | 2       | EA 100|
|      |          | Total        |                                 | 30  | 26      |       |
|      | 17P3BT06| Core X      | Plant and Animal                | 6   | 5       | CI 75 |

Total number of Credits : 100
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<td>17P3BT07</td>
<td>Core XI</td>
<td>Industrial and Fermentation Technology</td>
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<td>17P3BTP06</td>
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<td>Tissue Engineering and Stem Cell Biology</td>
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<td>17P4BT09</td>
<td>Core XV</td>
<td>Environmental and Nano-Biotechnology</td>
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<td>17P4BT10</td>
<td>Core XVI</td>
<td>Drug Discovery and Development</td>
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<td>17P4BTE04</td>
<td>Elective</td>
<td>Bioinformatics, IPR, Bioethics &amp; Biosafety</td>
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<td>17P4BTPR01</td>
<td>Core XVII</td>
<td>Project /Dissertation and Viva-voce</td>
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**OVER ALL TOTAL** 120 100 **2400**

* Extension Activity Required for 60 Hours
Programme Specific Outcomes:

<table>
<thead>
<tr>
<th>PO. No</th>
<th>Upon completion of B. Sc Degree programme, the graduates will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSO 1</td>
<td>Introduce endocrine glands, enzyme secreted by Hormones and its functions and the role in molecular level, characterization of enzymes and its types. To have successful career as professional or a researcher through lifelong learning in the field of biotechnology.</td>
</tr>
<tr>
<td>PSO 2</td>
<td>Apply the fundamental organization of life and how is deteriorating their normal role at molecular level and know about cell signaling and cell-cell communication.</td>
</tr>
<tr>
<td>PSO 3</td>
<td>Study about pharmacokinetics and dynamics learn something the commercial products from marine bioactive compounds. Demonstrate the application of biotechnological processes of industrial biochemical processes that are of social and industrial importance.</td>
</tr>
<tr>
<td>PSO 4</td>
<td>Introduce the biodiversity of the Plant, Animal and microbes and understand the Principles of Plant and Animal Taxonomy.</td>
</tr>
<tr>
<td>PSO 5</td>
<td>Exhibit skills of handling microbial processes, biochemical analysis by making use of state of the art instruments. Cure the genetically disorder with help of gene therapy and r DNA technology.</td>
</tr>
<tr>
<td>PSO 6</td>
<td>Perform immunodiffusion and immuno electrophoresis. Apply research based knowledge and biotechnological methods to investigate complex biological problems.</td>
</tr>
<tr>
<td>PSO 7</td>
<td>Assess personal, product and environmental safety, health, intellectual property rights, Ethical and social Responsibilities related to modern biotechnological research and development.</td>
</tr>
<tr>
<td>PSO 8</td>
<td>Bioinformatics tools play on crucial role in initial drug development, Evaluate the mechanism of Drug action. Apply the tissue metabolism in human being.</td>
</tr>
<tr>
<td>PSO 9</td>
<td>Isolate, purify and characterize biological samples using sophisticated analytical</td>
</tr>
</tbody>
</table>
experimental techniques and understand the Intellectual property rights.

| PSO 10 | Exhibit strong, independent learning, analytical and problem solving skills with special emphasis on design, communication, and an ability to work in teams. |
Core: I Biochemistry and Enzymology

Semester-I

Course Code: 17P1BT01

Credit: 5

Hrs/week: 5

Course objective: To understand the basics of biomolecules with chemical bondings, bioenergetics and enzyme kinetics, structure of protein and nucleic acids and metabolism of biomolecules

UNIT I


UNIT II


UNIT III

Hormones: Definition, Classification of hormones. Biological functions and disorders of pancreatic hormone (Insulin), thyroid hormone (Thyroxin), Hypothalamus and pituitary hormone (GH,TSH,GTH,ADH) and Adrenal gland (Adrenaline, Nor adrenaline).
UNIT-IV

Enzyme Kinetics- Steady state theory, MM Equation, LB Plot, Eadie-Hofstee Plot, Hanes Plot, Enzyme catalysis and Mechanism of Enzyme catalysis, Serine proteases (Carboxypeptidases, Chymotrypsin) and Lysozyme. Mechanism of Bi Substrate reaction. Metalloenzymes and Metal Activated Enzymes. Co enzymes – Structure and functions.

UNIT-V


Course Outcome:

<table>
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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tr>
<td>Co-1</td>
<td>To know about basic biochemistry concepts</td>
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</tr>
<tr>
<td>Co-2</td>
<td>To study about characterization of enzymes and its types</td>
<td>1</td>
</tr>
<tr>
<td>Co-3</td>
<td>To get knowledge about proteins and amino acids</td>
<td>7</td>
</tr>
<tr>
<td>Co-4</td>
<td>To learn about Hormones and its functions</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:

Core: II Cell and Molecular Biology

Semester-I

Course Code: 17P1BT02

Course objective: To understand of the basics of cell and molecular biology such as cell organelles, cell cycle, cell signals, central dogma of cell and its molecular mechanism.

UNIT I: Architecture of cell
The dynamic cell - the molecules of life Biomembranes and subcellular organization of eukaryotic cells - microscopy and cell architecture - purification of cells and their parts, organelles of prokaryotic and eukaryotic cell.

UNIT II: Biomembrane and cell organelles
Membrane structure and function: structure of models membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, electrical properties of membranes. Structural organization and function of intercellular organelles: nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, cell wall, paroxysms, plastids, vacuoles, chloroplast, structure & function of cytoskeleton and its role in motility.

UNIT III: Molecular Structure of Nucleus and chromosome
Nucleus (structure including ultra structure and functions) - chromosome structure and types - Programmed Cell Death (PCD), DNA - Denaturation and renaturation, Circular and spherical DNA - Gene amplification - PCR, DNA finger printing - DNA replication - polymerases, primers and mechanism - molecular methods of DNA replication.

UNIT IV: Central Dogma of Prokaryotes and eukaryotes
UNIT V: Cell communication and Cancer biology

Course Outcome:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>To know about basic cell biology and molecular biology.</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>To know about biomembrane and cell organelles.</td>
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</tr>
<tr>
<td>Co-3</td>
<td>To clear explain about nucleic acid functions and structures.</td>
<td>4</td>
</tr>
<tr>
<td>Co-4</td>
<td>To study about central dogma of Prokaryotes and eukaryotes.</td>
<td>8</td>
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</tbody>
</table>

Text Books:

4. David Frifelder Cell and molecular biology.
Reference Books:

Core: III Marine and Pharmaceutical Biotechnology

Semester-I

Course Code: 17P1BT03

Credit: 5

Hrs/week: 5

Course objective: To provide knowledge about marine micro and macro organisms and its medically important products.

UNIT I Introduction to marine biotechnology

UNIT II Marine products
Bioactive compounds from marine resources. Marine natural products and their commercial production. Marine microalgal biotechnology.

UNIT III Introduction to Pharmaceutical biotechnology
Introduction to Pharmaceutical biotechnology, Introduction to pharmacokinetic concepts, biological /research advances and approved biological for pharmaceutical uses and introduction to pharmacogenomics.

UNIT IV Therapeutics enzymes and antibiotics
Enzymes in therapeutics, clinical analysis and Pharma industry. Screening of antibiotics procedures, inoculums and medium for commercial production of penicillin and cephalosporin, fermentation process, isolation and purification.

UNIT V Pharmacokinetics and Pharmacodynamics
Course Outcome

<table>
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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>To understanding of the fundamentals of Marine resources</td>
<td>3</td>
</tr>
<tr>
<td>Co-2</td>
<td>To learn about the commercial products from marine bioactive compounds</td>
<td>5</td>
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<tr>
<td>Co-3</td>
<td>To study about pharmacokinetics and pharmacodynamics</td>
<td>10</td>
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<tr>
<td>Co-4</td>
<td>To understand the enzymes in therapeutics and antibiotics</td>
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Text Books:

References Books:
Core: IV Lab in Biochemistry and Enzymology

Semester-I  Credit: 3
Course Code: 17P1BTP01  Hrs/week: 5

Course objective: To educate and train the students for lab techniques of Biochemistry and Enzymology

List of Experiments:
1. Estimation of glucose (DNS method)
2. Estimation of DNA (Diphenylamine)
3. Estimation of RNA (Orcinol)
4. Estimation of Protein (Lowry’s and Bradford Methods)
5. Separation of aminoacids by Paper and Thin layer chromatography
6. Qualitative analysis of carbohydrate
7. Qualitative analysis of aminoacids.
8. SDS-PAGE
9. Effect of ph on the activity of acid phosphatase
10. Effect of temperature on the rate of acid phosphatase
11. Determination of SGOT
12. Determination of SGPT
13. Effect of ph on α amylase activity

Text Books:

Reference Books:
Selvamm Arts & Science College (Autonomous) Namakkal

Department of Biotechnology

M.Sc Biotechnology


Core: V Lab in Cell and Molecular Biology

Semester-I

Course Code: 17P1BTP02

Hrs/week: 5

Credit: 3

Course objective: To educate and train the students for lab techniques of Cell and Molecular Biology

List of Experiments:

1. Principles of Microscopy and optics
2. Cell counting - RBC and WBC
3. Mitosis in onion root tip and Meiosis in Flower bud and Grasshopper
4. Demonstration: Confocal Microscopy,
5. Demonstration: Transmission and scanning electron microscopy
6. Isolation of genomic DNA from Prokaryotic & Eukaryotic
7. Isolation of Plasmid DNA from E.coli
8. Polytene chromosome
10. Induced Mutagenesis (UV & NTG).
11. Isolation of antibiotic resistant Bacteria by gradient plate technique.
12. Detection of mutants by replica plate techniques.

Text Books:


Reference Books:
Elective: I Taxonomy and Biodiversity

Semester-I  
Credit: 4

Course Code: 17P1BTE01  
Hrs/week: 5

Course objective: To provide fundamental theoretical knowledge to the students about Taxonomy and biodiversity.

UNIT I: Introduction of Taxonomy
Classification - Artificial, natural and phylogenetic system of classification, Whittaker's five kingdom system, Major characteristics features used in taxonomy - classical and molecular, taxonomic hierarchy, taxon, nomenclature and species concept. Numerical taxonomy.

UNIT II: Classification of prokaryotes
Classification of prokaryotes – Bacteria, Archaea and Actinomycetes. Characteristic features of the domain and phylum. General classification of viruses-morphological structure

UNIT III: Classification of Eukaryotes
Classification of eukaryotic microorganisms Fungi, Algae and Protozoa with their characteristic features.

UNIT IV: Principles of Plant and Animal Taxonomy
Principles of Plant taxonomy - Bentham and Hooker classification upto the level of order. Animal taxonomy – origin of vertebrates and invertebrates upto class level with one example.

UNIT V: Introduction of Biodiversity
Biodiversity –definition, global and Indian perspective, hot spots, IUCN, climate change.
Course Outcome

<table>
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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tr>
<td>Co-1</td>
<td>To study about Taxonomy and its classification</td>
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</tr>
<tr>
<td>Co-2</td>
<td>To learn about classification of prokaryotes and Eukaryotes</td>
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</tr>
<tr>
<td>Co-3</td>
<td>To understand the Principles of Plant and Animal Taxonomy</td>
<td>7</td>
</tr>
<tr>
<td>Co-4</td>
<td>To Study about Biodiversity and Climate Change</td>
<td>4</td>
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Text Books:


Reference Books:

Core: VI Microbiology and Immunology

Semester-II
Course Code: 17P2BT04
Credit: 5
Hrs/week: 5

Course objective: To provide detailed knowledge about taxonomy and diversity of microbes, growth, disease/infectious microbe and aspects of immunotechniques and vaccine technology

UNIT I General Microbiology
Microbial taxonomy and diversity: Bacteria, Archea and their broad classification; Eukaryotic microbes; fungi, yeasts, molds and protozoa; viruses and their classification, molecular approaches to microbial taxonomy. Prokaryotic and eukaryotic cells. Structure and function; prokaryotic cell wall, cell membrane, mechanism of solute transport across membranes, flagella and pili, capsules.

UNIT II Microbial growth and antimicrobials
Microbial growth: Definition of growth; Growth curve; Mathematical expression of exponential growth phase; Measurement of growth yields; Synchronous growth; Continuous culture; Effect of environmental factors on growth. Effect of physical and chemical agents; Evaluation of effectiveness of antimicrobial agents.

UNIT III Microbial diseases and general immunology
Microbial diseases and host pathogen interaction: Reservoirs of infection; Nosocomial infection; Emerging infectious diseases; Mechanism of microbial pathogenicity; Nonspecific defense of host; antigen and antibodies; Humoral and cell mediated immunity; vaccines; Immune
deficiency; Human diseases caused by viruses, bacteria, and pathogenic fungi general characteristic of antimicrobial drugs and Mode of action.

UNIT IV Antigens and antibodies
Antigen and antibodies interactions: Antibody affinity-avidity-specificity-cross reactivity; Antigen processing and presentation through MHC 1 and 2 and BCR. Hybridoma and monoclonal antibody production.

UNIT V Hypersensitivity
Generation of T cell clones; HLA typing. Types of hypersensitivity-assessment of delayed hypersensitivity reactions. Antigen isolation, purification and characterization of various antigens and haptens from pathogens and other biological molecules by biophysical, chemical and affinity separation methods. Biology and assay of cytokines.

Course Outcome

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>To know about microbial taxonomy and diversity</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>To clearly explain Prokaryotic and eukaryotic cells</td>
<td>2</td>
</tr>
<tr>
<td>Co-3</td>
<td>To learn about the microbial growth pattern</td>
<td>6</td>
</tr>
<tr>
<td>Co-4</td>
<td>To clearly explain about antimicrobial chemicals and its actions</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
Selvamm Arts & Science College (Autonomous) Namakkal

Department of Biotechnology

M.Sc Biotechnology

Core: VII Genetic Engineering

Semester-II

Course Code: 17P2BT05

Credit: 5

Hrs/week: 5

Course Objective: To understand the principles of Genetic engineering and its applications

UNIT I Basic tools of genetic engineering

DNA cutting and modifying enzymes-restriction endonucleases, alkaline phosphatase, polynucleotide kinase, DNA ligase, S1 nuclease, exonucleases; Ligation of DNA fragments-in vitro ligation strategies (Joining DNA with ligases, topoisomerases and site specific recombinases); Chemical synthesis of DNA adaptors, linkers and homo-polymer tailing for in vitro ligation.

UNIT II Cloning vectors


UNIT III Molecular Tools

Restriction mapping, Southern, western & northern blotting, DNA and Protein sequencing methods, mechanism & types of PCR, RFLP, RAPD, DNA finger printing, DNA micro array, DNA and RNA shifting, site directed mutagenesis, phage display and cell surface display and gene silencing by RNAi.
UNIT IV Gene expression in recombinants
Principles of maximizing gene expression; Expression vectors design for
downstream processing and protein purification- Histag, GST-tag and MBP-tag.

UNIT V Applications
Recombinant products, new materials and devices-biosensors; Agricultural
applications; Industrial applications; Medicinal applications-vaccines and
nucleic acid therapeutics; Environmental applications; r-DNA regulation
guidelines.

Course Outcome

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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</thead>
<tbody>
<tr>
<td>Co-1</td>
<td>To understanding of the basics of gene cloning, genetic engineering tools and enzymes.</td>
<td>5</td>
</tr>
<tr>
<td>Co-2</td>
<td>To learn about the principles of cloning vectors</td>
<td>6</td>
</tr>
<tr>
<td>Co-3</td>
<td>To learn the molecular tools and its applications</td>
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<tr>
<td>Co-4</td>
<td>To understanding the principles of gene expression and recombination</td>
<td>2</td>
</tr>
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</table>

Text Books:

Reference Books:
Core: VIII Lab in  Microbiology and Immunology

Semester-II

Course Code: 17P2BTP03

Credit: 3  Hrs/week: 5

Course objective: To educate and train the students for lab techniques of Microbiology and Immunology.

List of Experiments:

Microbiology

1. Sterilization techniques
2. Preparation of culture media (a) broth type of media (b) Agar.
3. Culturing of Microorganisms: Pure culture techniques: Streak plate; pour plate, isolation and preservation of bacterial and fungal culture.
4. Identification of microorganisms. (a) Staining techniques (b) Biochemical testing.
5. Quantization of microorganisms
6. Environmental sample analysis-Quantitative estimation of pathogenic and non-pathogenic microbes from sewage and soil samples.
7. Food microbiology (a) milk (b) Fermented Food (c) Salmonella in poultry.
8. Clinical microbiology: Normal mouth flora, blood and urine culture, antibiotic disc test assay

Immunology
1. Immunization Techniques – Collection of Serum
2. Purification of antibodies/immunodiffusion.
3. Agglutination and precipitation.
4. Enzyme linked immunoabsorbant Assay (ELISA).
5. Immunoelectrophoresis.

**Text Books:**

**Reference Books:**
4. William Wu, Michael J. welshpeter B. KaufmanHelen H. Zhang, Methods in
Core: IX Lab in Genetic Engineering

Semester-II Credit: 3
Course Code: 17P2BTP04 Hrs/week: 5

Course objective: To educate and train the students for lab techniques of genetic engineering and gene cloning, lab techniques of fermentation technology processes for the product development.

List of Experiments:
1. Bacterial culture and antibiotic selection media
2. Isolation of Plasmid DNA, Genomic DNA-AGE
3. Purification and Quantization of nucleic acids by gel elution method.
4. Preparation of Competent cells, construction of plasmid vectors
5. Transformation and Selection of transformed colonies
6. Polymerase Chain Reaction - Amplification of DNA
7. Manual DNA sequencing (Demo)
8. Restriction digestion
9. Protein molecular weight determination

Text Books:

Reference Books:
Elective: II Bioinstrumentation and Research Methodology

Semester-II

Course Code: 17P2BTE02

Credit: 4

Hrs/week: 4

Course objective: To provide fundamental theoretical knowledge to the students about principle and methods of bioinstrumentation and research methodology.

UNIT I Microscope and Spectroscopy

UNIT II Microscope and Spectroscopy
Histochemical and immunotechniques: detection of molecules using ELISA, RIA, immunoprecipitation, flow cytometry and immunofluorescence
microscopy, in situ localization by techniques such as FISH and GISH. Medical imaging techniques (X-ray, CAT-Scan, ECG, EEG). X-ray crystallography, Methods for detecting radioactivity- GM and Scintillation counters, Autoradiography.

UNIT III Introduction of Research
Research: Meaning, objectives and types of research. Research methods in biological sciences. Research process, selection of problems - stages in the execution of research; preparation of manuscript - report writing - format of journals - proof reading. Sources of information; journals, reviews, books, and monographs-bibliography. Standard of research journals - impact factor - citation index

UNIT IV Introduction and Measures of Dispersion

UNIT V Sampling, Hypothesis and ANOVA
Introduction- properties of the t- distribution, uses of t- distribution. Two sample test and paired t-test.Hypothesis- testing-steps in hypothesis testing, decisions and conclusions. Probability, Test for normality and equality of variance. Types of error- sample size calculations.ANOVA one way and two ways ANOVA.Single and multiple linear regression and correlations.

Course Outcome

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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tbody>
<tr>
<td>Co-1</td>
<td>To learn about concept of Microscope and spectroscopy techniques</td>
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<tr>
<td>Co-2</td>
<td>To understand the objectives and types of research.</td>
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<tr>
<td>Co-3</td>
<td>To study about sampling, hypothesis and ANOVA</td>
<td>7</td>
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</table>

Text Books:

Reference Books:
Mushroom Cultivation and Its Marketing

Semester-II  
Credit: 4

Course Code: 17P2BTED01  
Hrs/week: 4

Course Objective: To learn the cultivation of various mushrooms and create the student for self-employment.

UNIT I: Mushroom Biology

UNIT II: Cultivation Methods
General preparation for Mushroom Cultivation. - Basic elements for Mushroom growth and farm settings - Basic elements for Mushroom growth and farm settings - Cultivation methods (Agaricusmorcella, Volvariella and Pleurotus)

Unit III: Value of Mushroom
Production of Mushrooms from waste substrates. Rice bran, Ground nut, Sugar cane trash. Mushrooms in food and medicine. Nutritional and medicinal value of mushrooms.

UNIT IV: Compounds from mushroom
Production of Mushrooms enzymes and metabolites and Preparation of other value added products from Mushroom. Diseases and Pest control.

UNIT V: Mushroom Marketing
Post-harvest technology, marketing strategies of mushroom with special reference to export and local marketing.

**Course Outcome**

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<tr>
<th>Co No.</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>Co-1</td>
<td>To learn about History, Ecology and life cycle of Mushroom.</td>
<td>1</td>
</tr>
<tr>
<td>Co-2</td>
<td>To learn the cultivation techniques of mushroom.</td>
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<tr>
<td>Co-3</td>
<td>To understand the Values and Marketing of mushroom</td>
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</table>

**Text Books:**


**Reference Books:**

Core: X Plant and Animal Biotechnology

Semester-III Credit: 5
Course Code: 17P3BT06 Hrs/week: 6

Course objective: To provide fundamental theoretical knowledge about plant and animal biotechnology and its current products.

UNIT I Introduction to Plant Biotechnology
UNIT II Introduction to plant tissue culture

UNIT III Application of Plant tissue culture

UNIT IV Introduction of Animal Biotechnology
Biotechnology for Animal Improvement: Conventional methods of animal improvement, predominantly selective breeding and cross-breeding - Artificial insemination - Pregnancy diagnosis - Embryo biotechniques: Augmentation of reproductive efficiency and faster multiplication of superior germ plasm - Super ovulation - In vitro maturation of oocytes - In vitro fertilization.

UNIT V Gene therapy and animal cell culture preservation
Equipments and materials for animal cell culture technology. Aseptic Techniques for cell culture. Preparation and Sterilization of cell culture media and reagents. Basic techniques of mammalian cell culture in vitro; disaggregation of tissue and primary culture; maintenance of cell culture; Cell line preservation and characterization: Cell/embryo cryopreservation - Cell line banking - Cytotoxicity and viability assays – Karyotyping.

Course Outcome

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<tr>
<td>Co-1</td>
<td>To study about introduction to plant biotechnology</td>
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Selvamm Arts & Science College (Autonomous) Namakkal

Department of Biotechnology

M.Sc Biotechnology

<table>
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<tr>
<th>Co-2</th>
<th>To understand the plant tissue culture techniques</th>
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</thead>
<tbody>
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<td>Co-3</td>
<td>To study about animal Biotechnology</td>
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</table>

**Text Books:**


**Reference Books:**

Core: XI Industrial and Fermentation Technology

Semester-III Credit: 5
Code: 17P3BT07 Hrs/week: 5

Course objective: To provide knowledge about fermentation technological process for industrial important.

UNIT I Introduction to fermentation technology
Introduction to fermentation technology; interaction between chemical engineering, microbiology and biochemistry. History of fermentation. Outline of upstream processing. Media formulation, Sterilization and process optimization.
UNIT II Bioreactors and its design
Bioreactors: Functions, design, aeration and agitation, sterilization instrumentation and control. Differentiation types of reactors, continuous and Fed-batch cultures, Garden’s fermentation classification, design and operation of fermenters, basic concepts for selection of a reactor.

UNIT III Industrially important microbes

UNIT IV Downstream process
Downstream processing. Recovery of particulate matter, product isolation, distillation, centrifugation, whole broth processing, filtration, aqueous two – phase separation, solvent extraction, chromatography and electrophoresis.

UNIT V Microbial products and computer assisted data monitoring and analysis

Course Outcome

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<th>CO No.</th>
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<tr>
<td>Co-1</td>
<td>To study about fermentation technology and bioreactor design.</td>
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<tr>
<td>Co-2</td>
<td>To learn about industrially important microbes and its applications</td>
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<tr>
<td>Co-3</td>
<td>To understand the Downstream process</td>
<td>6</td>
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</tbody>
</table>
Selvamm Arts & Science College (Autonomous) Namakkal
Department of Biotechnology
M.Sc Biotechnology

**Text Books:**

**Reference Books:**

**Core: XII Lab in Plant and Animal Biotechnology**

**Semester-III**

**Code: 17P3BTP05**

**Credit: 3**

**Hrs/week: 5**

**Course objective:** To educate and train the students for lab techniques of plant and animal tissue culture and its manipulation.
List of Experiments:

**Plant Biotechnology**
1. Preparation of media
2. Surface sterilization.
3. Callus propagation of plants.
4. Micro-propagation
5. Protoplast isolation and culture.
6. Organ culture
7. Synthetic Seed
8. Anther culture, production of haploids.
9. Cytological examination of callus tissue

**Animal Biotechnology**
1. Preparation of tissue culture medium and membrane filtration
2. Preparation of single cell suspension from spleen
3. Trypsinization of monolayer cell and Passage
4. Egg Innoculation
5. Cryopreservation techniques for cell culture
6. Cell counting and viability
7. Role of serum in cell culture

Core: XIII Lab in Industrial and Fermentation Technology

Semester-III Credit: 3
Course Code: 17P3BTP06 Hrs/week: 5

Course objective: To educate and train the students for lab techniques of Industrial and fermentation technology processes for the product development.
List of Experiments:

1. Production of wine using common yeast.
2. Isolation and screening of microorganism producing proteases
3. Isolation and screening of microorganism producing amylases
4. Isolation and screening of antibiotic producers by crowded plate technique.
5. Immobilization of yeast cells.
7. Production of alcohol by fermentation and Estimation.
8. Growth curves of bacteria, Measurement of growth in liquid cultures
11. Isolation of antibiotic producing microbes from soil.
12. Production of industrial enzyme by submerged fermentation.
13. Production of industrial enzyme by solid-state fermentation

Core: XIV Medical and Herbal Biotechnology

Semester-III  Credit: 5
Course Code: 17P3BT08  Hrs/week: 5

Course objective: To provide detailed knowledge about medicinal and herbal biotechnology and its products
UNIT I Introduction to medical biotechnology

UNIT II Diagnosis and medical coding
Diagnosis and Kit Development- Use of enzymes in clinical diagnosis, Use of biosensors for rapid clinical analysis.- Diagnostic kit development for microanalysis. Introductions to medical coding and transcription. Importance of ICD9 and ICD10.

UNIT III Introduction to Stem Cell Biology

UNIT IV Introduction to Herbal medicine

UNIT V Herbal biotechnology

Course Outcome
Upon completion of this course, students will be able to

<table>
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<th>CO No.</th>
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<td>Co-1</td>
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<tr>
<td>Co-2</td>
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<tr>
<td>Co-3</td>
<td>8</td>
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</table>

Text Books


Reference Books

Elective: III Tissue Engineering and Stem Cell Biology

Semester-III                      Credit: 4
Course Code 17P3BTE03              Hrs/week: 4
**Course objective:** To provide fundamental theoretical knowledge to the students about Tissue Engineering in animal cell and Stem Cell Biology.

**UNIT I: Basic biology of tissue engineering**
Basic biology of tissue engineering; the basis of growth and differentiation – morphogenesis and tissue engineering. Role of basic fibroblast growth factors and angiogenesis. Biomaterials in tissue engineering. Cell-Based Therapies.

**UNIT II: Biomaterials and bioreactors**

**UNIT III: Introduction to stem cell**
Stem cell – Definition, characterization, Pluripotent stem cells, Self renewal and differentiation, hierarchy, Stem cell niche, Niche specification -0 Drosophila germ line stem cells. Types of stem cells: Adult stem cell from amniotic fluid, cord blood and tooth primordial. Neural stem cells and its applications.

**UNIT IV: Cell signals and its pathways**
Characteristics of stem cell – cell cycle, Ras/ Raf pathways, P13K cell signaling, p53 check points, Role of LIF pathways in cell cycle control. Stem cell communications – gap junctions, cell fusions, HOX genes, upstream transcriptional factors, Tran differentiation, cell fusion.

**UNIT V: Applications of stem cells**
Therapeutics applications of embryonic stem cells, Bone marrow stem cells, Adipose derived stem cells and Hematopoietic stem cells in heart regeneration and neural defects. Ethics in human stem cell research; Controversy surrounding human embryonic stem cell research, societal implications: women, low-income, Different religious views, Current Ethical Guidelines in India, Ethical views of other countries and how this affects advancement of science Policy.
Course Outcome

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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tbody>
<tr>
<td>Co-1</td>
<td>To understand the basic biology of tissue engineering</td>
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<tr>
<td>Co-2</td>
<td>To learn about bio medicals and bioreactors</td>
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<tr>
<td>Co-3</td>
<td>To study about stem cell, cell signals and its pathways</td>
<td>2</td>
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</table>

Text Books:

Reference Books:

Internship

Semester-III Credit: 2
Course Code: 17P3BTI01  Week: 2

Course Objective: To train the students with hands on techniques of biotechnological field for the minimum period time.

Course outcome:

- Students have to go for training in any biotechnological industry or laboratories for learns the hands on training in the relevant field. After getting the training, the students should submit the training certificate along with detailed report to the department.

Core: XV Environmental and Nano-Biotechnology

Semester-IV  Credit: 5
Course Code: 17P4BT09  Hrs/week: 6

Course objective: To provide fundamental theoretical knowledge about Environmental and Nano Biotechnology and its application.

UNIT I: Introduction of environmental biotechnology

UNIT II: Bioremediation
Biochemical & Genetic basis of Bioremediation - Bioremediation of soil, water, contaminated with oil spills, heavy metals & detergents. Phytoremediation, Degradation of pesticides & petroleum products.

UNIT III: Biotechnological methods

UNIT IV: Introduction to nanotechnology

UNIT V: Applications of Nanobioechnology

Course Outcome
Selvamm Arts & Science College (Autonomous) Namakkal

Department of Biotechnology

M.Sc Biotechnology

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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tbody>
<tr>
<td>Co-1</td>
<td>To learn about environmental biotechnology</td>
<td>7</td>
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<tr>
<td>Co-2</td>
<td>To understand the bioremediation and biotechnological methods</td>
<td>4</td>
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<tr>
<td>Co-3</td>
<td>To study about nanotechnology and applications of nanotechnology</td>
<td>7</td>
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</tbody>
</table>

Text Books:


Reference Books:


Core: XVI Drug Discovery and Development
Course Code: 17P4BT10

Course objective: To provide fundamental theoretical knowledge to the students about drugs and their actions on living systems and chemotherapeutic values.

UNIT I Introduction of Drugs
Drugs - definition, source and nature, types of classification and nomenclature, dose response curve and LD50. Role of drugs, Drug – protein interactions, routes of drug administration.

UNIT I Drug targets

UNIT III Drug design

UNIT IV Drug discovery
Biological testing and bioassays - testing drugs in vitro and in vivo. Drug discovery. Lead compounds - natural sources and synthetic sources.

UNIT V Drug development
Drug development. Target - oriented drug design, computer aided drug design, Quantitative structure, activity relationship - binding interaction, Functional groups and Pharmacophore. High throughput screening and Molecular dockin
Selvamm Arts & Science College (Autonomous) Namakkal
Department of Biotechnology
M.Sc Biotechnology

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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>Co-1</td>
<td>To learn about drugs, drug targets and drug design</td>
<td>5</td>
</tr>
<tr>
<td>Co-2</td>
<td>To study about drug discovery and development</td>
<td>8</td>
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</table>

Text Books:
4. Essentials of Medical Pharmacology, KD Tripathi-Jaypee Brothers Medical Publishers (P) LTD
Selvamm Arts & Science College (Autonomous) Namakkal

Department of Biotechnology

M.Sc Biotechnology

Elective: IV Bioinformatics, IPR, Bioethics & Biosafety

Semester-IV

Course Code: 17P4BTE04

Credit: 4

Hrs/week: 4

Course objective: To provide fundamental theoretical knowledge to the students about Bioinformatics IPR, Bioethics and biosafety.

UNIT I - Bioinformatics

Introduction of Bioinformatics - History and scope of bioinformatics, Database - Biological Databases: Nucleic Acid sequence Databases: Genbank, NCBI, EMBL, DDBJ; Protein Sequence Databases: Swiss Prot, PIR; Structural Databases: PDB, CATH, SCOP and specialized databases.

UNIT II - Biological Databases


UNIT III - IPR

UNIT- IV-Bioethics

Bioethics- Ethical, Legal & Social Issues of Biotechnology. National & International issues on Genetic modification & recombinant DNA technologies, Release of GMO's in environment, Human embryonic cloning & stem cell research, transgenic plants and animals.

UNIT -V-Biosafety

Biosafety-Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level, General guidelines for rDNA research. Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).

Course Outcome

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<tr>
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<th>Upon completion of this course, students will be able to</th>
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<td>Co-1</td>
<td>To learn basic knowledge about bioinformatics and biological databases.</td>
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<tr>
<td>Co-2</td>
<td>To understand the Intellectual property rights.</td>
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<tr>
<td>Co-3</td>
<td>To study about bioethics and biosafety of biotechnology.</td>
<td>8</td>
</tr>
</tbody>
</table>

Reference Books


6. Recombinant DNA safety guidelines, Department of Biotechnology, Ministry of Sciences & Technology, Government of India.

7. Recombinant DNA safety guidelines & regulation, Department of Biotechnology,

Ministry of Sciences & Technology, Government of India.

8. Revised guidelines for research in transgenic plants Department of

Biotechnology,

Ministry of Sciences & Technology, Government of India.


and case. Excel books.


D.West, Academic Press.


Pvt.Ltd.


Project /Dissertation and Viva-voce

Semester- IV  

Course Code: 17P4BTPR01

Course objective: Student should do research on their own interest or research guide interest on any biotechnology topic for 6 months in the university or any industries or laboratories. After the research, he/she should submit the detailed reports about the research in a dissertation and should present in an external examiner.
Selvamm Arts and Science College (Autonomous)
(Nationally Reaccredited (2nd Cycle) at ‘A’ Grade by NAAC)
UGC recognized 2(f) and 2(B) Institution
Affiliated to Periyar University, Salem.
Namakkal – 637 003.

Department of Computer Science
Master of Science (Computer Science)
Regulations and Syllabus – CBCS Pattern (Autonomous)
(2017-18 and thereafter)
Vision
To prepare the students to take up a career in the highly competitive IT industry, Education field as well as carry out research and development.

Mission
To produce best quality computer science and IT professionals and researchers by providing state-of-the-art training, hands on experience.

Programme Outcomes (PG)

PO 1: Application: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

PO 2: Analysis: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

PO 3: Solution Finding: Facilitate to enter multidisciplinary path to solve day-to-day problems.

PO 4: Progression in Career: Prepare students for prominent career in industry, banks offices and for further academic study.

PO 5: Research Capability: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

PO 6: Expressing their talents: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.

PO 7: Individual sustainability: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: Competency: Attain competency in job market / entrepreneurship.
Selvamm Arts and Science College (Autonomous), Namakkal
Department of Computer Science
M.Sc – Computer Science

**Structure of M.Sc (Computer Science)**

**Programme Under CBCS Pattern for Autonomous**
*(From 2017-18 and Thereafter)*

**Curriculum and Scheme of Examinations**

<table>
<thead>
<tr>
<th>Sem</th>
<th>Course Code</th>
<th>Course</th>
<th>Credits</th>
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<td>17P1CS01</td>
<td>Design and Analysis of Algorithms</td>
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<td>I</td>
<td>17P1CS02</td>
<td>Theory of Automata</td>
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<td>17P1CS03</td>
<td>Programming in C#</td>
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Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science

M.Sc – Computer Science

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We offer the following EDC to other PG programmes.

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<tr>
<td>17P2CSED02</td>
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ELECTIVE – I (I – SEMESTER)

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ELECTIVE – II (II – SEMESTER)
### ELECTIVE – III (III – SEMESTER)

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<td>17P3CSE08</td>
<td>Blockchain Technologies</td>
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<td>17P3CSE09</td>
<td>Augmented Reality</td>
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### ELECTIVE – IV (IV – SEMESTER)

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<tr>
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<td>Distributed Operating System</td>
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<tr>
<td>17P4CSE12</td>
<td>Bioinformatics</td>
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Annexure – I

Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc – Computer Science

SELVAMM ARTS AND SCIENCE COLLEGE (AUTONOMOUS), NAMAKKAL

College Name : 
Course : 
Student Name : 
Register Number : 
Title of the Project : 
Place : 
Date :

Name of the Internal Guide : 
Qualification : 
Teaching Experience : 
Place : 
Date : Signature of Internal Guide

Principal
COLLEGE BONAFIDE
CERTIFICATE
ACKNOWLEDGEMENT
CONTENTS
ABSTRACT

1. INTRODUCTION

OVERVIEW
PROJECT DESCRIPTION

2. SYSTEM STUDY

EXISTING SYSTEM
PROPOSED SYSTEM

3. SYSTEM SPECIFICATION

HARDWARE REQUIREMENTS
SOFTWARE REQUIREMENTS
SOFTWARE DESCRIPTION

4. SYSTEM DESIGN

INPUT DESIGN
OUTPUT DESIGN
CODE DESIGN
DATABASE DESIGN

5. TESTING AND IMPLEMENTATION

6. CONCLUSION AND FUTURE ENHANCEMENT

7. BIBLIOGRAPHY

8. APPENDICES

DATA FLOW DIAGRAM
TABLE STRUCTURE
SCREEN SHOTS
8.4. SAMPLE CODING
A. Format of the title page

TITLE OF THE PROJECT

A project report submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Science to

SELVAMM ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

NAMAKKAL

By

STUDENT NAME
REG. No.

Under the guidance of Staff Name and Qualification

Selvamm Arts And Science College (Autonomous)

(Affiliated to Periyar University)
(Nationally Re-Accredited (2nd Cycle) at “A” Grade by NAAC) Salem Road, Pappinaickenpatti Post, Nallipalayam (Via), Namakkal - 637 003.
B. Format of the Certificate

SELVAMM ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
PLACE with PIN CODE

MONTH – YEAR
PROJECT WORK

TITLE OF THE PROJECT
Bonafide Work Done by

STUDENT NAME
REG. No.

A Project submitted in partial fulfillment of the requirements
for the degree of Master of Science in Computer Science
SELVAMM ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

INTERNAL GUIDE
HEAD OF THE DEPARTMENT

Submitted for the Viva-Voce Examination held on ________

Internal Examiner
External Examiner
| PSO-1 | Able to apply knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models from defined problems and requirements |
| PSO-2 | An ability to use current techniques, skills, and tools necessary for computing practice. |
| PSO-3 | Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics of varying complexity |
| PSO-4 | Students will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions. |
| PSO-5 | Student will get ability to identify, critically analyze, formulate and develop computer application |
| PSO-6 | To attain deep knowledge and understanding the principles of programming for applying in broad range of languages and open source platforms. |
| PSO-7 | Able to analyze customer requirements, create high level design, implement and document robust and reliable software systems |
| PSO-8 | Develop inter-disciplinary and multi-disciplinary domain skills |
| PSO-9 | Promote continuous learning and innovation in research |
| PSO-10 | To Enhance skills and adapt new computing technologies for attaining professional excellence and carrying research. |
COREI: Design and Analysis of Algorithms

Semester: I
Code: 17P1CS01

Hours: 5
Credits: 4

Objectives:

- To learn the Analysis of Algorithms.
- To understand the concepts of Algorithms
- Analyze the concept of algorithms and asymptotic performance of algorithms.
- Analyze of sorting and searching algorithms.
- Apply important algorithmic design strategies.
- Knowledge of algorithm design methods

Unit -I

Unit-II

Unit-III

Unit-IV
Unit-V

<table>
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<th>PSO addressed</th>
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<td>CO-1</td>
<td>Understanding the basic concepts of algorithms and analyze the performance of algorithms.</td>
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<tr>
<td>CO-2</td>
<td>Understanding the concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Learning the mathematical foundation in analysis of algorithms, Knowledge of various algorithm design techniques for developing algorithms.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understanding various searching, sorting and graph traversal algorithms.</td>
<td>2</td>
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<tr>
<td>CO-5</td>
<td>Understand different algorithmic design strategies</td>
<td>10</td>
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</table>

**Text Book:**

**Reference Books:**
COREII: Theory of Automata

Semester: I
Code: 17P1CS02
Credits: 4

Objectives:

- Be able to construct finite state machines and the equivalent regular expressions.
- Be able to prove the equivalence of languages described by finite state machines and regular expressions.
- Be able to construct pushdown automata and the equivalent context free grammars.
- Be able to prove the equivalence of languages described by pushdown automata and context free grammars.
- Be able to construct Turing machines and Post machines.
- Be able to prove the equivalence of languages described by Turing machines and Post machines.

Note: No Theorems Required. Emphasis on Concepts and Applications.

Applications. Unit - I


Unit - II

Unit - III

Unit - IV
Introduction to Turing Machines: Problems that computers cannot solve- The Turing Machine Programming Techniques for Turing Machines – Extensions to the Basic Turing Machine – Restricted Turing Machines – Turing Machines and Computers.

Unit - V

<table>
<thead>
<tr>
<th>Co.No</th>
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<tr>
<td>CO-1</td>
<td>Understand the concepts of alphabets and formal languages</td>
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<tr>
<td>CO-2</td>
<td>Determine if a certain word belongs to a language</td>
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<tr>
<td>CO-3</td>
<td>Simplify automata and context-free grammars</td>
<td>5</td>
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<tr>
<td>CO-4</td>
<td>Define, understand and theoretically exercise finite state machines.</td>
<td>4</td>
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<tr>
<td>CO-5</td>
<td>Define and theoretically exercise regular expressions</td>
<td>6</td>
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<tr>
<td>CO-6</td>
<td>Understand the relationship between push down automata and context free languages</td>
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<tr>
<td>CO-7</td>
<td>Define, understand and exercise Turing machine.</td>
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</table>
Text Book:


Reference Books:

COREIII: Programming in C#

Semester: I
Code: 17P1CS03
Hours: 4
Credits: 4

Objectives:

- To learn the C#.NET Framework.
- Able to programming in C# programming language
- To get the knowledge of object-oriented paradigm in the C# programming language
- To understand .NET environments.

Unit - I
Introducing C# - Understanding .NET: The C# Environment - Overview of C#

Unit - II
Literals, Variables and Data Types - Operators and Expressions - Decision Making and Branching

Unit - III
Decision Making and Looping - Methods in C# - Handling Arrays - Manipulating Strings

Unit - IV
Structures and Enumerations - Classes and Objects - Inheritance and Polymorphism

Unit - V
Upon completion of this course, students will be able to

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<td>CO-3</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>7</td>
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</table>

To know the programming language C#
Use the programming language C# for various programming technologies
Develop software in C#
Evaluate user requirements for software functionality required to decide whether the programming language C# can meet use requirements

**Text Book:**


**Reference Books:**

CORE IV: OOAD and UML

Semester: I
Code: 17P1CS04
Hours: 5
Credits: 4

Objectives:

- The importance of modeling in the software development life cycle
- The UML notation and symbols
- The object-oriented approach to analyzing and designing systems and software solutions
- How to Employ the UML notation to create effective and efficient system designs

Unit – I


Unit – II

Classes and Objects: The nature of the Class- Relationships among Classes- The Interplay of Classes and Objects – On building quality classes and objects. Classification: The importance of proper classification – Identifying proper Classes and Objects – Key Abstraction Mechanism.

Unit – III


Unit – IV

Unit – V

<table>
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<td>CO-1</td>
<td>Master the fundamental principles of OO programming</td>
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<td>CO-2</td>
<td>Familiar with the application of the Unified Modeling Language (UML) towards analysis and design</td>
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<td>CO-3</td>
<td>Master key principles in OO analysis, design, and development.</td>
<td>2</td>
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<td>CO-4</td>
<td>Master common patterns in OO design and implement them</td>
<td>5</td>
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<tr>
<td>CO-5</td>
<td>Master key principles in OO analysis, design, and development.</td>
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Text Books:

Reference Books:
Lab - I : Programming in C#

Semester: I
Code: 17P1CSP01

Hours: 3
Credits: 2

1. Branching and Looping
2. Arrays, Strings and methods
3. Structures and Enumerations
4. Classes and Objects
5. Inheritance
6. Polymorphism
7. Interfaces
8. Multiple Interfaces
9. Operator Overloading
10. Exceptions Handling
Lab II: UML

Semester: I  
Code: 17P1CSP02  
Hours: 3  
Credits: 2

Develop software for an application using typical CASE Tool by following Software Engineering methodology as given below

1. Problem Statement
2. System design and Implementation

Suggested list of applications

1. Online Quiz System
2. Student Mark Analysis
3. ATM Banking
4. Library Management System
5. Course Registration
6. Stock Maintenance
7. Payroll Processing System

Software:

StarUML – freely available UML/MDA platform running on Win32 platform.

List of Diagrams

1. Use Case Diagram
2. Class Diagram
3. Sequence Diagram
4. Collaboration Diagram
5. Deployment Diagram
6. State Diagram
7. Activity Diagram
8. Object Diagram
COREV: Advanced Java Programming

Semester: II  
Hours: 5

Code: 17P2CS05  
Credits: 4

Objectives:
- To introduce students to the Java programming language.
- To create Java programs that leverage the object-oriented features of the Java language, such as encapsulation, inheritance and polymorphism; use data types, arrays and other data collections
- To implement I/O functionality to read from and write to text files.

Unit – I
Exception Handling – Multithreaded Programming – I/O, Applets and other Topics.

Unit – II

Unit – III

Unit – IV

Unit – V
Java Database Connectivity – Servlets – Remote Method Invocation.
Upon completion of this course, students will be able to

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**Text Books:**

**Reference Books:**
CORE VI: Soft Computing

Semester: II
Code: 17P2CS06

Objectives:

- To understand the learning methods.
- To understand the Neural Network Architecture
- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Unit – I


Unit - II


Unit - III

Unit – IV


Unit – V


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<td>Understand importance of soft computing.</td>
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<td>Understand different soft computing techniques like Genetic Algorithms</td>
<td>3</td>
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<td>CO-3</td>
<td>Implement algorithms based on soft computing</td>
<td>6</td>
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<tr>
<td>CO-4</td>
<td>Understands Fuzzy Logic, Neural Networks and their combination</td>
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<tr>
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<td>Apply soft computing techniques to solve engineering or real life problems.</td>
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Text Book:

Reference Books:


3. Simon Haykin, “Neural Networks – A Comprehensive Foundation”, PHI.
CORE VII: Internet and Web Programming

Semester: II  
Hours: 4  
Code: 17P2CS07  
Credits: 4

Objectives:

- To understand of XHTML+CSS programming.
- Create and compile advanced dynamic web projects
- To understand database applications.
- Show understanding of the logic behind advanced web applications.
- Demonstrate an understanding of Content Management Systems

Unit- I

Unit-II
Selvamn Arts and Science College (Autonomous), Namakkal
Department of Computer Science
M.Sc – Computer Science


Unit-III

Unit-IV

Unit-V
Database Management with JDBC and ADO: Exploring SQL Basics-Defining API for Database Connection-Connecting to Databases Using JDBC and ADO. Introduction to XML: History of XML-Introducing XSL-Describing RSS-Explaining Web Services-Understanding SOA.

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<td>Demonstrate understanding of [X]HTML+CSS programming</td>
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<td>CO-2</td>
<td>Create and compile advanced dynamic web projects</td>
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<tr>
<td>CO-3</td>
<td>Demonstrate understanding of database applications</td>
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<td>Show understanding of the logic behind advanced web applications</td>
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<tr>
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<td>Demonstrate an understanding of Content Management Systems</td>
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Text Book:


Reference Book:

Lab III: Advanced Java Programming

Semester: II  
Code: 17P2CSP03

Hours: 3  
Credits: 2

1. Implementation of Multi threading concepts
2. Implementation of Exception handling concepts
3. Implementation of I/O Streams
4. Program using AWT
5. Implementation of Swing
6. Implementation of Event handling
7. Network Programming using TCP / UDP
8. Program using Java Beans
9. Program using JDBC
10. RMI
Lab IV: IWP Lab

Semester: II
Code: 17P2CSP04

Hours: 3
Credits: 2

1. A Program to illustrate body tag, pre tags, text Font tag, Heading Tag, Text Formatting, Lists

2. A Program to illustrate Image tag, Anchor Tag, Html Frames, Forms and Embed Multimedia files

3. Web page creation with all types of Cascading style sheets

4. Client side scripts for validating web form controls using DHTML (Operators, Flow control statements, Arrays, Functions)

5. Web page creation using java script and Validate user Forms

6. Programs In Java To Create Three-Tier Applications Using JSP and Databases

7. Demonstrate code to use Cookies in Servlet.

8. Write a code to demonstrate Session Tracker Servlet.

9. Creating a login application using Session Tracking.

10. Create a java program to insert values in Tables.

11. Create a program in ASP to retrieve data from a database

12. Create an XML document with XSLT style sheet elements
CORE VIII: Big Data Technologies

Semester: III  
Hours: 4  
Code: 17P3CS08  
Credits: 4

Objectives:

- To understand basics of Big data
- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs

Unit-I


Unit-II

Parallel Processing with Map Reduce: Map Reduce Overview – Sample Map Reduce Applications - Map Reduce Programming – Map Reduce jobs execution Hadoop Streaming – HIVE Language – PIG Language.  
NoSQL Databases: RDBMS vs NoSQL – Types of NOSQL Databases – Architecture of NoSQL – CAP Theorem – HBase – Cassandra.
Unit-III


Unit-IV


Unit-V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Identify Big Data and its Business Implications.</td>
<td>3, 7</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand the components of Hadoop</td>
<td>4, 10</td>
</tr>
<tr>
<td>CO-3</td>
<td>Access and Process Data on Distributed File System</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand Data Mining Principles</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Identify appropriate data mining algorithms to solve real world problems</td>
<td>9, 10</td>
</tr>
<tr>
<td>CO-6</td>
<td>Apply Machine Learning Techniques using R.</td>
<td>4, 7</td>
</tr>
</tbody>
</table>

Text Books


Reference Book

CORE IX: Mobile Computing

Semester: III  
Code: 17P3CS09

Hours: 5  
Credits: 4

Objectives:

- To introduce mobile communication concepts
- To provide detailed knowledge on Mobile Application and Development

Unit – I


Unit – II


Unit – III


Unit – IV

Unit – V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understanding mobile communication concepts.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Get detailed knowledge on Mobile Application and Development</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Design and develop user Interfaces for the Android platform.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Apply Java programming concepts to Android application development.</td>
<td>6</td>
</tr>
<tr>
<td>CO-5</td>
<td>Familiar with technology and business trends impacting mobile applications.</td>
<td>8</td>
</tr>
</tbody>
</table>

Text Book:


Reference Book:

CORE X: Mobile Application Development

Semester: III  
Code: 17P3CS10

Hours: 5  
Credits: 4

Objectives

- Install and configure Android application development tools.
- Design and develop user Interfaces for the Android platform.
- Able to create mobile applications
- Understands SQLite databases.

Unit-I


Unit-II

Application – Creating a Launcher icon for the Application - Previewing the Application in the Visual Designer

**Unit-III**


**Unit-IV**


**Unit-V**

Upon completion of this course, students will be able to:

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Description</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Describe mobile application models/architectures and patterns.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Apply mobile application models/architectures and patterns to the development of a mobile software application.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Apply a mobile development framework to the development of a mobile application.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Describe the components and structure of a mobile development framework</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to create Feature rich applications in Android</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Book:

Reference Book:
2.
CORE XI: Cloud Computing

Semester: III Hours: 4
Code: 17P3CS11 Credits: 4

Objectives:

- To introduce the concepts of Cloud Computing as a new computing paradigm.
- The students will have an opportunity to explore the Cloud Computing various terminology, principles and applications.
- To understand different views of the Cloud Computing such as theoretical, technical and commercial aspects.
- A variety of real case studies and existing in market cloud-based tools will be identified and studied in order to provide students with a close overview to Cloud Computing applications.

Unit-I


Unit-II


**Unit-III**

**Cloud Services:** Introduction to Service- Storage as a Service- Database as a Service- Information as a Service- Process as a Service- Application as a Service- Management/Governance as a Service- Platform as a Service- Security as a Service- Testing as a Service – Integration as a Service. **Software Plus Services:** Introduction- Mobile Device Integration- Providers- Microsoft Online- Intuit Quick Base- Cast Iron Cloud- Bunjee Connect- Introduction to MapReduce- Google File System- Hadoop Framework- Hadoop Distributed File System.

**Unit-IV**


**Unit-V**

Co.No | Upon completion of this course, students will be able to | PSO addressed
---|---|---
CO-1 | Introduce the broad perspective of cloud architecture and model. | 2
CO-2 | Apply different cloud programming model as per need. | 3
CO-3 | Explore some important cloud computing driven commercial systems | 6
CO-4 | Understand cloud management and storage | 1,8
CO-5 | Understand various cloud collaboration techniques | 9

**Text Book:**


**Reference Book:**

Develop R Script for the following:

1. Perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND).
2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames.
3. Perform Matrix Manipulation
4. To perform statistical operations (Mean, Median, Mode and Standard deviation).
5. To perform data pre-processing operations.
6. To perform histogram using dataset.
7. To perform decision tree
8. To perform Regression
10. To perform KNN classification using dataset.
Lab VI: Mobile Application Development

Semester: III               Hours: 4
Code: 17P3CSP06             Credits: 2

1. Intent and Activity
2. Using Controls
3. Alert Dialogs
4. List View
5. Options Menu
6. Seek Bars
7. Shared Preferences
8. Status Bar Notifications
9. Tab Widgets Talking Clock.
10. Animation
CORE XII: Machine Learning

Semester: IV  
Hours: 5
Code: 17P4CS12  
Credits: 4

Objectives:

- To understand machine learning and feature engineering
- To understand neural network
- To know supervised learning methods
- To understand Support Vector Machines
- To introduce unsupervised learning methods

Unit- I


Unit- II

Unit- III


Unit- IV


Unit- V

Upon completion of this course, students will be able to understand machine learning techniques and computing environment, data pre processing, to evaluate model estimators, design machine learning and associated algorithms, and implement solutions using the machine learning techniques. The PSO addressed is 1, 2, 3, 5, 6, and 9.

**Text Book:**

**Reference Book:**
CORE XIII: Open Source Technologies

Semester: III  
Hours: 5

Code: 17P4CS13  
Credits: 5

Objectives:

- To provide a basic idea of Open source technology
- To understand the role and future of open source software in the industry
- Able to do programming in Python

Unit I


Unit II

Unit III

**Functions:** Introduction – Built-in Functions – Composition of Functions – User Defined Functions – Parameters and Arguments - Function Calls – The return Statement – Python Recursive Functions – The Anonymous Functions – Writing Python Scripts. **Strings and List:** Strings – List.

Unit IV

**Tuples and Dictionaries:** Tuples – Dictionaries. **Files and Exceptions:** Text Files – Directories – Exceptions – Exceptions with Arguments – User-defined Exceptions.

Unit V

**Classes and Objects:** Overview of Object Oriented Programming – Class definition – Creating Objects – Objects as Arguments – Objects as Return values – Built-in Class Attributes – Inheritance – Method Overriding – Data Encapsulation – Data Hiding.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Able to recognize the benefits and features of Open Source Technology.</td>
<td>1,2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Interpret, Contrast and compare open source products among themselves</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand object oriented concepts</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to write program in python</td>
<td>8</td>
</tr>
<tr>
<td>CO-5</td>
<td>Learnt how to use class inheritance in Python for reusability</td>
<td>9</td>
</tr>
</tbody>
</table>
Text Books

Reference Books
Lab VII: Python

Semester: IV  
Code: 17P4CSP07  
Hours: 3  
Credits: 2

1. To Write a Python Program to print Prime Number using provided range.
2. To Write a Python Program to check if the input year is Leap Year or Not.
3. To Write a Python function to convert a Decimal number to Binary, Octal and Hexadecimal Equivalents.
4. To Write a Python Program to demonstrate the Built-in Functions.
5. To Write a Python Program to implement String Functions and Operations.
6. To Write a Python Program to implement List Functions and Operations.
7. To Write a Python Program to implement Tuples Functions and Operations.
8. To Write a Python Program to implement Dictionaries Functions and Operations.
9. To write a function to print the resolution of an image file in python.
10. To Write a Python Program to implement File and File I/O Operations.
11. To Write a Python Program to demonstrate Exception Handling.
12. To Write a Python Program to demonstrate Inheritance and Method Overloading.
Elective I: Computer Architecture

Semester: I  
Code: 17P1CSE01  
Hours: 5  
Credits: 4

Objectives:

- To conceptualize the basics of organizational and architectural issues of a digital computer.
- To understand the instruction codes.
- To understand CPU and RISC.
- To know about peripheral devices and data transfer mode
- Able to know about memory organization and multiprocessors

Unit-I


Unit-II


Unit-III

Central Processing Unit: Introduction-General Register Organization- Stack Organization- Instruction Formats-Addressing Modes-Data Transfer
Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc –Computer Science
and Manipulation- Program Control-Reduced Instruction Set Computer (RISC).

Unit-IV


Unit-V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand basic structure of computer.</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Perform computer arithmetic operation.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Ability to understand control unit operations.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Explore to design memory organization that uses banks for different word size operations.</td>
<td>7</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand the concept of I/O organization.</td>
<td>3</td>
</tr>
<tr>
<td>CO-6</td>
<td>Understand types of memory and interprocessor communication.</td>
<td>2</td>
</tr>
</tbody>
</table>
Text Book:

Reference Book:
ELECTIVE I: System Software

Semester: I
Code: 17P1CSE02

Objectives:

- To explain the basic concepts of language processing
- To understand the basics of assemblers
- To educate macros
- To explain basics of compilers and interpreters
- To narrate linkers and software tools for program development

Unit - I

Unit - II
Assemblers: Elements of Assembly language programming - Overview of the Assembly process - Design of a Two-pass Assembler - A single pass Assembler for the IBM PC.

Unit - III
Macros and Macro processors – Macro definition, call, and expansion – Nested macro calls – Advanced macro facilities - Design of a macro preprocessor - Compilers: Aspects of compilation.

Unit - IV
Compilers and Interpreters – Memory allocation - Compilation of Expressions and Control structures - Code optimization – Interpreters.
Unit - V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understanding the basic concepts of language processing.</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand the basics of assemblers, Know macros.</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understanding basics of compilers and interpreters, Know linkers and software tools for program development.</td>
<td>4</td>
</tr>
</tbody>
</table>

Text Book:


Reference Books:

ELECTIVE I: Principles of Programming Languages

Semester: I                      Hours: 5
Code: 17P1CSE03                  Credits: 4

Objectives:
- To understand the role of programming languages
- To learn the properties of languages
- Increase the ability to learn new programming languages
- Increase the capacity to express programming concepts and choose among alternative ways to express things
- Make good use of debuggers and related tools

Unit – I

Unit – II
Modeling Language Properties: Formal Properties of Languages- Language Semantics- Elementary data Types: Properties of Types and Object- Scalar Data Types - Composite Data Types

Unit – III
Encapsulation: Structure data types - Abstract data types - Encapsulation by sub programs Type Definitions Inheritance: - Polymorphisms

Unit – IV
Unit- V
Formal Semantics: Sample small language - operational Semantics - Denotation Semantics - Axiomatic Semantics - Program correctness - Parallel Programming: Parallel Processing and programming languages - threads - Semaphore - monitors-message passing - parallelism Non Imperative Languages

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Master analyzing semantic issues associated with function implementations.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>Master implementation techniques for interpreted functional languages.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Master using object-oriented languages.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Be familiar with design issues of object-oriented and functional languages.</td>
<td>6</td>
</tr>
<tr>
<td>CO-5</td>
<td>Be familiar with design issues of object-oriented and functional languages.</td>
<td>1</td>
</tr>
<tr>
<td>CO-6</td>
<td>Be familiar with using functional languages</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
## Elective II: Advanced Database Management System

**Semester:** II  
**Code:** 17P2CSE04  
**Hours:** 4  
**Credits:** 4

### Objectives:
- To describe a sound introduction to the discipline of database management systems.
- To enhance knowledge to advanced SQL.
- To demonstrate the principles OODBMS.
- To introduce mobile data.

### Unit – I

Advanced Data Modeling - Advanced SQL - Database design.

### Unit – II

Advanced Database concepts: Transaction management and concurrency control - Database performance tuning and query optimization, distributed database management systems.

### Unit – III


### Unit – IV

Web databases: Internet technologies and databases - Uses of internet databases - Web to database Middleware - Server side Extensions – The web
Unit – V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understands the Fundamental concepts in testing.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understands the types of testing, Know how to test throughout the software life-cycle.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understands static test techniques, test design, test management and Know the tools supports testing</td>
<td>4</td>
</tr>
</tbody>
</table>

Text Books:


Reference Books:

ELECTIVE II: Software Testing

Semester: II
Code: 17P2CSE05

Hours: 4
Credits: 4

Objectives:

- To introduce the basic concepts of software testing
- To understand the Fundamental concepts in testing
- To introduce the types of testing
- To understand software life-cycle
- To know testing techniques, test design, test management and
- Know the tools supports testing

Unit - I


Unit – II


Unit - III

Unit - IV

Unit - V

<table>
<thead>
<tr>
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<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understands the Fundamental concepts in testing.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understands the types of testing, Know how to test throughout the software life-cycle.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understands static test techniques, test design, test management and Know the tools supports testing</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Book:

Reference Book:
ELECTIVE II: Graph Theory

Semester: II  
Hours: 4
Code: 17P2CSE06  
Credits: 4

Objectives:
- To understand different types of graphs.
- To know fundamental circuits and cut sets
- Able to understand different types of matrices
- Understand spanning tree
- To understand various types of algorithms

Unit - I

Unit - II

Unit- III
Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc –Computer Science

Unit -IV


Unit-V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Solve problems using basic graph theory, Identify induced subgraphs, cliques, matchings, covers in graphs .</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Solve problems involving vertex and edge connectivity, planarity and crossing numbers.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Solve problems involving vertex and edge coloring, Model real world problems using graph theory</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Book:

Reference Book:
Elective III : Cyber Security

Semester: III
Code: 17P3CSE07
Hours: 4
Credits: 4

Objectives:

- To understand the Encryption Methods.
- To understand the Network Security Controls.
- To identify methods for data recovery.
- To apply the methods for preservation of digital evidence.

Unit-I:


Unit-II:

Making “Good” Encryption Algorithms-The Data Encryption standard-The AES encryption algorithm-Public key Encryption – Possible Attacks on RSA-The uses of Encryption.

Unit-III:

Program Security: Secure programs-Non Malicious program errors-Virus and other malicious code-Targeted Malicious code-Control against program threats.

Unit-IV:

Database and Data mining security: Introduction to Databases-security requirements- reliability and integrity – sensitive data-Inference-multilevel databases- proposals for multilevel security-data mining.
Unit-V:


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understanding the Encryption Methods.</td>
<td>10</td>
</tr>
<tr>
<td>CO-2</td>
<td>Know the Network Security Controls.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Identify the methods for data recovery.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>Apply the methods for preservation of digital evidence.</td>
<td>8</td>
</tr>
</tbody>
</table>

Text Book:

ELECTIVE III : Blockchain Technologies

Semester: III  Hours: 4
Code: 17P3CSE08  Credits: 4

Objectives

- To provide conceptual understanding of the function of Blockchains
- To understand the structure of a blockchain
- To provide technological underpinnings of blockchain operations as distributed data structures and decision making systems, their functionality and different architecture types.
- It provides a critical evaluation of existing smart contract capabilities and platforms, and examines their future directions, opportunities, risks and challenges.

Unit I:

Unit II:

**Decentralization:** Decentralization using blockchain - Methods of decentralization – Routes to decentralization - Blockchain and full ecosystem decentralization- Smart contract - Decentralized organizations- Decentralized autonomous organizations -Decentralized autonomous corporations - Decentralized autonomous societies- Decentralized applications- Platforms for Decentralization. **Cryptography and Technical Foundations:** Introduction –Mathematics - Cryptography - Confidentiality - Integrity – Authentication - Cryptographic primitives – Asymmetric Cryptography.

Unit III:


Unit IV:

**Bitcoin:** Bitcoin definition - Transactions - The transaction life cycle - The transaction structure - Types of transaction. **Blockchain:** The structure of a block -The structure of a block header -The genesis block - The bitcoin network -Wallets. **Bitcoin payments:** Bitcoin investment and buying and selling bitcoins - Bitcoin installation- Bitcoin programming and the command-line interface - Bitcoin improvement proposals (BIPs).

Unit V:

Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc –Computer Science

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the structure of a blockchain</td>
<td>4</td>
</tr>
<tr>
<td>CO-2</td>
<td>Analyze the incentive structure in a blockchain based system and critically assess its functions.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Analyze to what extent smart and self-executing contracts can benefit automation, governance, transparency</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Attain awareness of the new challenges that exist in monetizing businesses around blockchains and smart contracts.</td>
<td>4</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand Bit Coin and payment</td>
<td>6</td>
</tr>
<tr>
<td>CO-6</td>
<td>Able to analyze alternate bit coins</td>
<td>3</td>
</tr>
</tbody>
</table>

**Text book:**
1. Imran Bashir, “Mastering Blockchain Distributed ledgers, decentralization and smart contracts”, Packt Publishing 2017

**Reference Book:**
Elective III: Augmented Reality

Semester: III
Code: 17P3CSE09

Hours: 4
Credits: 4

Objectives:

- To make students know the basic concept and framework of augmented reality.
- To teach students the principles and multidisciplinary features of augmented reality.
- To teach camera calibration to students.
- To teach students the technology for managing large scale environment in real time.

Unit-I


Unit-II

Tracking: Tracking, Calibration, and Registration - Coordinate Systems - Characteristics of Tracking Technology - Stationary Tracking Systems - Mobile Sensors - Optical Tracking - Sensor Fusion

Unit-III

Unit-IV

Calibration and Registration: Camera Calibration- Display Calibration- Registration. Visual Coherence: Registration -Occlusion- Photometric Registration- Common Illumination-Diminished Reality-Camera Simulation

Unit-V

Situated Visualization: Challenges- Visualization Registration- Annotations and Labeling. Interaction: Output Modalities- Input Modalities- Tangible Interfaces- Multi-view Interfaces

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Analyse the components of AR systems</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Assess and compare technologies in the context of AR systems design.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Develop novel interaction schemes by integrating appropriate technologies</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Be familiar with the literature in AR</td>
<td>4</td>
</tr>
<tr>
<td>CO-5</td>
<td>Building of the virtual environment and modalities of interaction and modeling.</td>
<td>6</td>
</tr>
</tbody>
</table>

Text Book:

References:
Elective IV: Digital Image Processing

Semester: IV  
Hours: 5  
Code: 17P4CSE10  
Credits: 4

Objectives:
- To study the image fundamentals and mathematical transforms necessary for image processing
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

Unit – I


Unit – II


Unit – III

Segmentation: Thresholding – Edge Based Segmentation: Edge Image Thresholding, Border tracing - Region Based Segmentation – Matching –
Unit – IV


Unit – V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Review the fundamental concepts of a digital image processing system.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Analyze images in the frequency domain using various transforms</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Evaluate the techniques for image enhancement and image restoration</td>
<td>8</td>
</tr>
<tr>
<td>CO-4</td>
<td>Categorize various compression techniques.</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Interpret Image compression standards and representation techniques.</td>
<td>9</td>
</tr>
</tbody>
</table>
**Text Books:**


**Reference Books:**

Elective IV: Distributed Operating System

Semester: IV
Code: 17P4CSE11

Objectives:

- To provide an in-depth knowledge about the operating system.
- To understand message passing and synchronization
- Able to know RPC
- To understand communication process, file system and memory management synchronization.

Unit-I:

Unit-II:

Unit-III:
Unit-IV:


Unit-V:


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understands what is distributed operating system</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Know message passing and synchronization</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understands RPC</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Able to understand communication process, file system and memory management synchronization</td>
<td>7</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understands distributed file systems</td>
<td>1</td>
</tr>
</tbody>
</table>

Text Book:

Elective - IV : Bioinformatics

Semester: IV  
Hours: 5

Code: 17P4CSE12  
Credits: 4

Outcomes

- To give students an introduction to the basic practical techniques of bioinformatics.
- Emphasis will be given to the application of bioinformatics and biological databases to problem solving in real research problems.
- The students will become familiar with the use of a wide variety of internet applications, biological database
- Will be able to apply these methods to research problems.

Unit-I

Bioinformatics - Definition - Biological & Specialized Databases - Nucleic acid sequence databases: GenBank, EMBL, DDBJ - Protein sequence databases: SWISS-PROT, TrEMBL, PIR_PSD - Genome Databases at NCBI, EBI, TIGR, SANGER - Virtual Library.

Unit-II

Bioinformatics servers - NCBI - EBI - GENOMENET - Bibliographic resources and literature databases - PUBMED, MEDLINE, AGRICOLA - Database Searching techniques - ENTREZ - Data Mining - techniques & tools - Data Warehousing - Top Down & Bottom up approaches.

Unit-III

Sequence patterns & representation - consensus, regular expression, contigs, motifs and blocks - Sequence Analysis - FASTA - BLAST - Scoring matrices - PAM and BLOSUM
Unit-IV

Phylogenetic analysis - taxonomy and phylogeny - molecular evolution
- Data used in Taxonomy and Phylogeny - Phylogenetic trees - Definition and
description - types of trees - tree construction - tree analysis - homologous -
orthologous - paralogous - Phylip and phylogenetic analysis.

Unit-V

Application of Bioinformatics - Drug designing - Drug discovery cycle - Role of
Bioinformatics in drug design - Target identification - lead discovery -
Structure-based drug design - Modeling of target- small molecule
interactions.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>The students will be able to describe the contents and</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>properties of the most important bioinformatics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>databases</td>
<td></td>
</tr>
<tr>
<td>CO-2</td>
<td>Performs text- and sequence-based searches</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Able to explain the major steps in pair wise and multiple</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>sequence alignment</td>
<td></td>
</tr>
<tr>
<td>CO-4</td>
<td>Understands data used in Bioinformatics</td>
<td>9</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understands the applications of Bioinformatics</td>
<td>9</td>
</tr>
</tbody>
</table>

Text books:

Reference books:


Extra Disciplinary Courses: Fundamentals of Computers and Communication

Semester: II
Code: 17P2CSED01

Hours: 5
Credits: 4

Outcomes

- To understand the basics of computer
- Able to know operating system and its types
- Explore Word, Excel and PowerPoint
- The students will become familiar with the use of a wide variety of internet applications
- Able to know the database management concepts and web databases.

Unit I:

Unit II:
Unit III:

Unit IV:

Unit V:

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Clearly known the components of a computer and computer software</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understood Input devices and output devices.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Ability to analyze operating systems and utility programs</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to use Word Document for project purpose</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Able to create PowerPoint presentations with animation effects</td>
<td>4</td>
</tr>
<tr>
<td>CO-6</td>
<td>Understand the concepts of networks, able to know the database management concepts and web databases</td>
<td>9</td>
</tr>
</tbody>
</table>
Text Book:

Reference Books:
Extra Disciplinary Courses: Principles of Information Technology

Semester: II
Code: 17P2CSED02

Objectives
- Able to know Business and Information Technology in the Modern Organization
- Understands the significance of Hardware, input and output technology, System Software,
- Able to understand networks, telecommunication applications and Internet Evolution
- Able to know the Information Systems

Development Unit – I

Business Environment: Business and Information Technology – business in the information age – about information technology – what is an information system – Information Technology in the Modern Organization.

Unit – II


Unit – III

Managing Organizational Data and Information: Basics of data arrangement
Selvam Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc – Computer Science


Unit – IV

Functional , Enterprises and Inter organizational systems: Information system to support business functions – transaction processing information systems – accounting and finance system – marketing and sales system – production and operations management system – Integrated information system and enterprises resource planning – inter organizational – Global information system – Electronic Commerce.

Unit – V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Ability to know Business and Information Technology in the Modern Organization and Significance of Hardware, input and output technology</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understands how to Manage Organizational Data and Information.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Able to understand networks, telecommunication applications and Internet evolution of the internet and operation of the internet, Intranets and Extranets.</td>
<td>1</td>
</tr>
</tbody>
</table>
Selvamm Arts and Science College (Autonomous), Namakkal

Department of Computer Science
M.Sc –Computer Science

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-4</td>
<td>Describes Inter-organizational systems.</td>
<td>9</td>
</tr>
<tr>
<td>CO-5</td>
<td>Able to know the information systems development</td>
<td>3</td>
</tr>
</tbody>
</table>

**Text Book:**


**Reference Book:**

1. V. Rajaraman,” Introduction to Information Technology”, Prentice Hall of India.
Extra Disciplinary Courses: E-Commerce

Semester: II  
Code: 17P2CSED03  
Hours: 5  
Credits: 4

Objectives

- Understand the components and roles of the Electronic Commerce environment.
- Able to know how businesses sell products and services on the Web,
- Understands the qualities of an effective Web business presence.
- Understands E-Commerce payment systems,
- Able to identify and reach customers on the Web
- Understands Web marketing approaches and elements of branding.

Unit - I

Unit - II

Unit - III
Unit - IV


Unit - V

Internet and World Wide Web: Origin of the Internet – New uses for the Internet – Commercial use of the Internet - Growth of the Internet – Advertising on the Internet.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Explain the components and roles of the Electronic Commerce environment.</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Explain how businesses sell products and services on the Web</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Able to describe the qualities of an effective Web business presence.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understood about the E-Commerce payment systems</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Analyze web marketing approaches and elements of branding</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Books:

Reference Book:
M. Sc., Electronics and Communication

Syllabus and Regulations
Under Choice Based Credit System (CBCS)
(Effect from 2017-2018)
Vision

To be recognized by the society at large as a full-fledged department, offering quality higher education in the Electronics and Communication Engineering field with research focus catering to the needs of the public and staying in tune with the advancing technological revolution and challenging cultural changes.

Mission

Establish a unique learning environment to enable the students to face the challenges of the Electronics and Communication Engineering field.

Promote the establishment of centers of excellence in niche technology areas to nurture the spirit of innovation and creativity among faculty and students.

Programme Outcomes (POs)

**PO 1: Application**: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

**PO 2: Analysis**: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

**PO 3: Solution Finding**: Facilitate to enter multidisciplinary path to solve day-to-day problems.

**PO 4: Progression in Career**: Prepare students for prominent career in industry, banks offices and for further academic study.

**PO 5: Research Capability**: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

**PO 6: Expressing their talents**: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.
PO 7: **Individual sustainability:** Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: **Competency:** Attain competency in job market / entrepreneurship.
<table>
<thead>
<tr>
<th>Sem</th>
<th>Sub Code</th>
<th>Course Title</th>
<th>Hrs/Wk</th>
<th>Credits</th>
<th>Max. Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>17P1EL01</td>
<td><strong>Core 1</strong>: Electronic Devices and Circuits</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P1EL02</td>
<td><strong>Core 2</strong>: 8051 Microcontroller Using ‘C’</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P1EL03</td>
<td><strong>Core 3</strong>: Bio Medical Instrumentation</td>
<td>5</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P1EL04</td>
<td><strong>Core 4</strong>: Telecommunication and Fiber Optics</td>
<td>5</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P1ELP01</td>
<td><strong>Practical 1</strong>: Applied Electronics Lab</td>
<td>5</td>
<td>3</td>
<td>100</td>
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<tr>
<td></td>
<td>17P1ELP02</td>
<td><strong>Practical 2</strong>: 8051 Microcontroller Lab</td>
<td>5</td>
<td>3</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td><strong>Total for Sem I</strong></td>
<td>30</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>17P2EL05</td>
<td><strong>Core 5</strong>: Android development tools &amp; Application</td>
<td>5</td>
<td>5</td>
<td>100</td>
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<tr>
<td></td>
<td>17P2EL06</td>
<td><strong>Core 6</strong>: Industrial Electronics</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P2EL07</td>
<td><strong>Core 7</strong>: Microwave and Radar Communication</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P2ELED01</td>
<td>EDC</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P2HR01</td>
<td>Human Rights</td>
<td>2</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P2ELP03</td>
<td><strong>Practical 3</strong>: Android development tools &amp; Application Lab</td>
<td>5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P2ELP04</td>
<td><strong>Practical 4</strong>: Power Electronics Lab</td>
<td>5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extension Services*</td>
<td></td>
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<td><strong>Total for Sem II</strong></td>
<td>30</td>
<td>26</td>
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<tr>
<td>III</td>
<td>17P3EL08</td>
<td><strong>Core 8</strong>: Embedded System Using PIC</td>
<td>6</td>
<td>5</td>
<td>100</td>
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<tr>
<td></td>
<td>17P3EL09</td>
<td><strong>Core 9</strong>: Automotive Electronics</td>
<td>6</td>
<td>5</td>
<td>100</td>
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<tr>
<td></td>
<td>17P3EL10</td>
<td><strong>Core 10</strong>: JAVA Programming</td>
<td>5</td>
<td>4</td>
<td>100</td>
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<tr>
<td></td>
<td>17P3ELE01</td>
<td><strong>Elective - I</strong>: Wireless Communication System</td>
<td>5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P3ELE02</td>
<td><strong>Elective – II</strong>: Instrumentation and Control System</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17P3ELP05</td>
<td><strong>Practical 5</strong>: Embedded Systems</td>
<td>5</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P3ELP06</td>
<td><strong>Practical 6</strong>: JAVA Programming Lab</td>
<td>3</td>
<td>2</td>
<td>100</td>
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<tr>
<td></td>
<td></td>
<td>Extension Activities</td>
<td>2</td>
<td></td>
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<td></td>
<td></td>
<td><strong>Total for Sem III</strong></td>
<td>30</td>
<td>24</td>
<td></td>
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<tr>
<td>IV</td>
<td>17P4EL11</td>
<td><strong>Core 11</strong>: VLSI Design and VHDL Programming</td>
<td>5</td>
<td>5</td>
<td>100</td>
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<tr>
<td></td>
<td>17P4EL12</td>
<td><strong>Core 12</strong>: Digital Signal Processing</td>
<td>5</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P4ELE03</td>
<td><strong>Elective - III</strong>: Industrial Automation using PLC</td>
<td>5</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>17P4ELE04</td>
<td><strong>Elective - IV</strong>: Signal and Systems</td>
<td>5</td>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>
Suggestions

1. Masters in Science on Electronics and Communication covers the basic topics of the field; however regular updating of the syllabus is necessary according to the recent developments in this field.

2. To enhance the quality of the teachers those who are teaching this course shall be given short-term training programmers in the emerging fields.

*Extension activity is Compulsory to get degree. it is conducted from sem-II to sem-III each sem 30 hrs (Minimum 60 hrs)

*No Internal Mark for Project Work & Viva Voce

EDC: Extra Disciplinary Course

<table>
<thead>
<tr>
<th>S.No</th>
<th>Sub Code</th>
<th>Course Name</th>
<th>Hrs/Wk</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17P2ELED01</td>
<td>Communication Systems</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>17P2ELED02</td>
<td>Cellular Phone Servicing</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>PSO</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-1</td>
<td>Understand the basic knowledge of semiconductor devices and characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-2</td>
<td>Evaluate the design and operations of circuits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-3</td>
<td>Analyze the techniques used to find the output of the desired electronic circuit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-4</td>
<td>Applying the Assembly language program to describe the process and architecture of the Peripheral devices.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-5</td>
<td>Understand the various operation of the linear system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-6</td>
<td>Design the various systems which will able to transfer the data’s.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-7</td>
<td>Get accurate solution for the communicating devices and Equipments.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-8</td>
<td>Get the knowledge of industrial components and characteristics of the various block of system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-9</td>
<td>Designing the program for derive various applications, structure of trends of Electronics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSO-10</td>
<td>Acquire the desire destination of the medical relevant instruments.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Semester I
Core I – Electronic Devices and Circuits

Paper Code: 17P1EL01  Hrs:5/Cr:5

Objective:
❖ To learn the basic concepts of semiconductor devices.
❖ To learn the designing concepts of Analog circuits

Unit – I: Diode Circuit Analysis

Unit – II:Bipolar Junction Transistor and Field Effect Transistor

Unit – III: Thyristors
Introduction to Thyristors – construction, operation characteristics and Applications of Silicon Control Rectifier – Light Activated Silicon Control Rectifier, TRIAC, DIAC AND Unipolar Junctional Transistor – Thyristors rating – Rectifier circuits using Silicon Control Rectifier .
Unit - IV: Amplifiers


Unit – V: Oscillators


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the current voltage characteristics of semiconductor devices</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation,</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Design and analyze of electronic circuits</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Evaluate frequency response to understand behavior of Electronics circuits.</td>
<td>1</td>
</tr>
</tbody>
</table>
Text books:

Reference Books:
Semester I

Core-II: 8051 Micro controller using C

Paper Code: 17P1EL02  Hrs:5/Cr: 5

Objective:

- This subject presence the architecture, programming in ALP & C and real world application of the 8051 microcontroller.

Unit – I  Introduction to Embedded System


Unit- II  8051 & Advanced Processor Architectures Real World Interfacing


Unit- III  8051 Programming In C & Hard Ware Connection

Data Types and Time Delay in 8051 C - I/O Programming in 8051 C – Logic Operators in 8051 C - Data Conversion Programs in 8051c – Accessing Code ROM Space in 8051C - Data Serialization Using 8051 C - Pin Description of the 8051 - Design and Test of 8051 Trainer Explaining the INTEL Hex File.

Unit -IV  Timer, Interrupts & Peripherals

Unit -V  Real World Applications


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Draw and describe architecture of 8051 and ARM7 microcontroller</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Interface various peripheral devices to the microcontrollers</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Write assembly language program for microcontrollers.</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Design microcontroller based system for various applications</td>
<td>6</td>
</tr>
</tbody>
</table>

Text books:


Reference book:

Semester I
Core-III: Biomedical Instrumentation
Code: 17P1EL03                      Hrs:5/Cr:4

Objective:
- To get exposure in various measuring techniques in the field of bioelectronics.

Unit -I  Bioelectric Potential and Cardiovascular System

Unit -II  Biomedical Electrodes and Recorders

Unit -III  Patient Monitoring System

Unit -IV  Operation Theatre Equipment
Unit -V Advanced Biomedical Instrumentation


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Students will able to analysis the basic medical instruments</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Students have an ability to operate the medical instruments.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Students have an knowledge on recording medical systems</td>
<td>10</td>
</tr>
<tr>
<td>CO-4</td>
<td>Students will get clear idea about internal organs which related to electrical medical equipment.</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Students will able to produce handle microscope, thermometer, x-ray machine.</td>
<td>8</td>
</tr>
</tbody>
</table>

Text Books:

Semester I
Core-III: Telecommunication and Fiber Optics

Paper Code: 17P1EL04 Hrs:5/Cr: 4

Objective:

❖ To learn about telecommunication system, digital switching system, transmission networks, and fiber optic communication.

Unit – I: Telecommunication & Transmission Systems


Unit - II: Digital Switching System


Unit – III: Call Processing


Unit – IV: Telephone & Transmission Network Organization

Selvamm Arts and Science College (Autonomous), Namakkal
Department of Electronics & Communication
M.Sc Electronics & Communication

Technology – SONET/SDH: SONET Network Layers – Frame Format –
SONET Multiplexing– SONET Topologies – SDH.

Unit – V: Optical Fiber Communication

A basic fiber optic system – Frequencies – Fiber Optic Cables –
Refraction – Numerical Aperture – Graded Index Cables – Single Mode –
Multi Mode – Cable Constructions – Cable Losses – Connectors – Light
Sources – Light Detector.

### Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Students has known the history of wireless communication and small techniques.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>They have learnt multiplexing and demultiplexing, encoding and decoding of different signals.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Students have ability to processing call with its configuration</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to analysis telephone and transmission network organization</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>They get wide knowledge on fiber optics communication.</td>
<td>1</td>
</tr>
</tbody>
</table>

### Text Books:

2. “Telecommunication Switching and Networks” by P. Gnanasivam, PHI, 2004

### Reference Book:

Semester II
Core IV: Android Development Tools & Application

Paper Code: 17P2EL05

Objective:
- To learn testing and development of Android Software and real time application

Unit – I Introduction to Android:
- Background – Platform for Mobile Development – Native Android Applications – Android SDK Features – Open Handset Alliance – Android in Mobile

Introducing the Development Framework:

Unit – II Developing for Android:

Unit – III Mobile and Embedded Devices:
Unit – IV Audio, Video and Camera:

Playing Audio and Video – Manipulating Raw Audio – Creating a Sound Pool – Using Audio Effects – Camera for taking Pictures – Recording Video – Adding Media to the Media Store.

Unit – V Real time Applications:


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understanding of the specific requirements, possibilities and challenges when developing for a mobile context.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Apply mobile application models/architectures and patterns to the development of a mobile software application.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Describe the components and structure of a mobile development framework (Google’s Android Studio).</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Use Intent, Broadcast receivers and Internet services in Android App.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text Book:

Reference Books:

5. Google Play store.
Objective:

- To Learn the Overview and Working Principles of Thyristors AC Voltage Controller & Controllers, and DC Choppers.

Unit - I  Thyristors and Controlled Rectifiers


Unit – II  AC Voltage Controller


Unit – III  Thyristor Communication Techniques and Power Transistor


Unit – IV  DC Choppers and Static Switches

Unit – V DC Drives


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Students have ability to handled rectifiers.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>They have knowledge about phase controller and on-off control of basic industrial components</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>They leant communication techniques and power transistor.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>They have an ability to handled high power dc components.</td>
<td>8</td>
</tr>
<tr>
<td>CO-5</td>
<td>They have an clear idea about operating modes of dc drives.</td>
<td>3</td>
</tr>
</tbody>
</table>

Text Books:

1. Muhammad H. Rashi
Reference Books:


Semester II

Core V: Microwave and Radar Communication

Paper Code: 17P2EL07        Hrs:4 /Cr: 4

Objective:

- To understand analysis of waveguides and gain complete knowledge about microwave components.
- To analysis and study characteristics of microwave tube generator and amplifiers

Unit- I: Introduction to Microwaves


Unit -II: Microwave Amplifiers and Oscillators


Unit -III: Microwave Antennas

Quantitative theory of short dipole antenna- characteristics of grounded quarter wave and ungrounded half wave antenna-radiation resistance and radiation pattern –folded dipole and its application-broad side and end fire array -loop antenna-direction finding by Adcock and beeline tossi system-helical rhombic -Yagi antenna-horn antenna and parabolic reflectors.
Unit -IV : Principles of Radar


Unit -V: FM Radar and MTI

Doppler effect -CW radar-FM CW radar - Multiple frequency CW radar moving target indicator (MTI) - Non coherent MTI - Pulsed Doppler Radar FM altimeter-Tracking -Sequential lobbing – Conical Scan – Monopulse tracking radar.

Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand various parameters of waveguide and use of component as per applications</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Discussed the microwave amplifiers and oscillators basic operation, characteristics, parameters, limitations, various microwave components</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the concepts of antennas</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Able to understand the essential principles of operation of radar systems.</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Able to discriminate different Radars, find applications and use of its supporting systems</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Book:
1. Microwave and Radar Engineering – N.Kulkarni, Umesh Publication
Objective:

- This subject presents the architecture & programming of PIC16F877 microcontroller and micro C/OS-II RTOS functions.

Unit- I: Introduction to Embedded Systems


Unit -II: PIC 16F87X Microcontrollers


Unit- III: Peripheral Features of 16F87X Microcontrollers


Unit- IV: Basic Design Using a Real-Time Operating System

Unit-V: ARM Processor

Introduction – Pin Diagram – Architecture – Memory Organization -
Difference Between Microprocessor / Microcontroller / PIC / ARM –
Types Of ARM Processor - Simple Programs.

Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Ability to create embedded programming</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>The learnt internal architecture of the PIC microcontroller</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Ability to understand the peripheral features of PIC microcontroller.</td>
<td>9</td>
</tr>
</tbody>
</table>

Text books:


Reference books:

Semester III
Core IX: Automotive Electronics

Paper Code: 17P3EL09  Hrs:6/Cr: 5

Objective

- To know fundamentals of Automotive Electronics, fuel injection and ignition systems.
- To provide knowledge about application of electronics in Automobile engineering.
- To impart knowledge about automotive engines.

Unit – I : Fundamentals of Automotive


Unit – II : Ignition Systems


Unit – III : Fuel Injection


Unit – IV : Chassis Electrical System

Chassis Electrical Systems: Anti-lock Brakes – Introduction – Requirements of ABS – General System Description – ABS components – Anti-lock Brake System Control -
Traction Control – Functions – System Operation – Safety Systems:
Central Locking - Electric Windows – Airbags and Belt Tensioners.

Unit – V : Technologies

Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Students have an knowledge of fundamentals of automotive electronics</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Abilitynto handled the machinery ignition system</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>They have known the fuel ingestion of industrial machinery</td>
<td>10</td>
</tr>
</tbody>
</table>

Text Books
3. www.flexray.com
4. www.can-cia.org
5. www.interfacebus.com
Semester IV

Core XII: VLSI Design and VHDL Programming

Paper Code: 17P4EL11 \hspace{1cm} \text{Hrs: 5/Cr: 5}

Objective:

- To learn the basics of VLSI technology and VHDL programming

Unit -I: CMOS Circuits & Processing Technology


Unit -II: Introduction and Basic Concept of VHDL


Unit -III: Modeling Techniques of VHDL


Unit -IV: Data Flow Style of Modeling


**Unit- V: Advanced Features in VHDL**


**Course outcomes (COs)**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Ability to create CMOS circuit and processing technology</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>They have known basic concept of VHDL.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>They have understand data flows style of modeling.</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to analysis the latest version of VHDL programming</td>
<td>4</td>
</tr>
</tbody>
</table>

**Text Books**


**Book for Reference**

Semester IV
Core XII: Digital Signal Processing

Paper Code: 17P3EL12                  Hrs: 5/ Cr: 5

Objective:

- To make the students learn, Theory of DSP, design of DSP applications and introduction to DSP Processors.

Unit – I: Architecture of Fixed Point PDSP


Unit – II: Assembly Language Instruction and Programming


Unit – III: Architecture of Floating Point PDSP


Unit – IV: Application Programs in C3X

TMS320C3X Starter Kit (DSK) - Addressing Modes - Generation and Finding the Sun of Series - Convolution of Two Sequences - Processing Real time Signals with C3X Kit.
Unit – V: MATLAB with Programming


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Use concepts of trigonometry, complex algebra, Fourier transform, z-transform to analyze the operations on signals and acquire knowledge about Systems</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Design, implementation, analysis and comparison of digital filters for processing of discrete time signals. Compile and solve the digital signal processing problems using MAT lab.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Interpret, represent and process discrete/digital signals and systems</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Thorough understanding of frequency domain analysis of discrete time signals.</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Ability to design &amp; analyze DSP systems like FIR and IIR Filter etc.</td>
<td>6</td>
</tr>
</tbody>
</table>

Text Book:

Reference Books:


Semester III

Elective I: Wireless Communication System

Paper Code: 17P3ELE01

Hrs: 5/Cr: 3

Objective:

- To learn the concepts of microwave and the principles of satellite communication systems.

Unit- I: Fundamental Concept


Unit- II: Transmission and Wave Guide


Unit - III: Antennas


Unit - IV: Transmission and Receiver Circuitry


Unit- V: Satellite Based Wireless System

Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Describe the phases of planning and design of mobile wireless networks</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc</td>
<td>6</td>
</tr>
<tr>
<td>CO-3</td>
<td>Students will details of sensor network architecture, traffic related protocols, transmission technology etc.</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand middleware protocol and network management issues of sensor networks</td>
<td>7</td>
</tr>
</tbody>
</table>

Text Book:
1. Wireless Communication Technology-Blulee (Indian Edition)

Reference Book:
Semester III
Elective II: Instrumentation and Control Systems

Paper Code: 17P3ELE02  Hrs: 5/Cr: 4

Objective:
 To understand instrumentation, digital meters and measurements.

Unit-I

Unit-II

Unit-III

Unit-IV
Introduction to Block diagrams-Block diagram reduction-Signal flow graph-Signal flow graph algebra-construction of signal flow graph from block diagram- Mason’s gain formula-Time Re sponse Analysis of First and second order systems-Steady state Error.
Unit-V

Stability Analysis of Control System: Bode plot- Routh Hurwitz criterion- Root Locus-Nyquist Criterion- Principles of P-PI-PD-PID Controllers- Cascade and feedback compensation, lag, lead, lag-lead Compensation.

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Familiar with the principle and working of various sensors and transducers.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Able to design signal conditioning circuit for various transducers.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Able to identify or choose a transducer for a specific measurement application</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to analysis stability of control system</td>
<td>5</td>
</tr>
</tbody>
</table>

Reference Book:
Semester IV
Elective III
Industrial Automation Using PLC

Paper Code: 17P4ELE03 Hrs: 5/Cr: 4

Objective:
- To learn the concepts of PLC
- To Deal with Ladder Logic programming and Simulation

Unit-I: Introduction to PLC, Ladder Diagram Fundamentals


Unit-II: Programmable Logic Controller & Fundamental Programming


Unit - III: Advanced Programming Techniques and Overview of Mnemonic Programming Code


Unit- IV: Wiring Techniques, Analog I/O & Sensors

Analogue (D/A) Output – Sensor Output Classification – Connecting Discrete Sensors to PLC Inputs – Proximity Sensors – Optical Proximity Sensors.

Unit V: Motor Controls


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Ability to gain knowledge on Programmable Logic Controllers</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Will understand different types of Devices to which PLC input and output modules are connected.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Able to create ladder diagrams from process control descriptions</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to apply PLC timers and counters for the control of industrial processes</td>
<td>4</td>
</tr>
<tr>
<td>CO-5</td>
<td>Able to use different types PLC functions, Data Handling Function.</td>
<td>2</td>
</tr>
</tbody>
</table>

Text book:


Reference book:

Objective:

- Able to describe signals mathematically and understand how to perform mathematical operation on signals.
- Able to solve a linear constant coefficient difference equation using Laplace transform techniques.

Unit – I: Introduction to Signal And System


Unit – II: Laplace Transform


Unit – III: Fourier series

Unit – IV: Fourier Transform


Unit – V: Z-Transforms


Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them,</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand use of transforms in analysis of signals and system in continuous and discrete time domain.</td>
<td>6</td>
</tr>
<tr>
<td>CO-3</td>
<td>Observe the effect of various properties and operations of signals and systems</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behavior of electronic circuits and communication system.</td>
<td>2</td>
</tr>
</tbody>
</table>

Text Book:

Objective:

- To impart the concepts of Digital Modulation Techniques and the principles of Fiber optics communication.

Unit – I: Basic Concepts and Laws


Unit –II: Introduction to Communication Systems


Unit –III: Antennas and Radio Receivers

Elementary Consideration – Radiation Mechanisms Elementary Doublet - Antenna Parameters and their Definitions - Effects of Antenna Height – Folded Dipole and its Applications – Parabolic Reflectors - Helical Antenna - Superhetrodyne Receiver - Radio Frequency Section Characteristics – Communication Receivers (Block Diagram Only) - FM Receiver (Block Diagram)

Unit- IV: Television

Introduction to Television Theory – Details of Indian Standard- Black and White Transmission – Plumbicon – Scanning - TV Tuner Block Diagram - Transmission and Reception of Color TV.

Unit –V: Radar and Satellite Communication

### Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Analysis the DC circuits, Combination of transformation</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Ability to understand FM transmitter and receiver functions</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Ability to understand types of Antenna receiver functions</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the fundamental concepts of television transmitter and receiver systems.</td>
<td>9</td>
</tr>
</tbody>
</table>

### Text books:


### Reference Books:

Selvamm Arts and Science College (Autonomous), Namakkal
Department of Electronics & Communication
M.Sc Electronics & Communication

Semester II
EDC Paper –II: Cellular Phone Servicing

Paper Code: 17P2ELED02  Hrs: 4/Cr: 4

Objective:

- This course to learn the fundamental concepts of mobile
technologies, mobile OS and service tools.

Unit - I: Basics

  Working of a Telephone - Local Exchange - Initiating a call -
  Calling a Number - Making a Connection - Answering a Call -
  Conversation - Ending a Call - Hook Switch - Transmitter - Receiver -
  Ringer - Cellular Mobile Telephone System - Mobile Phone Service Area -
  Mobile Fraud Call.

Unit - II: Access Technologies

  GSM - CDMA - GPRS - EDGE - WCDMA - UMTS - HSDPA -
  Satellite Phones - GPS - Mobile Browsers - WAP.

Unit - III: Mobile Operation System

  Types of Wireless Options – Batteries - Memory Cards – Messaging
  - Ring Tones - Keypad Types - Display Types - Handset Form Factor –
  SMS Abbreviations - Mobile OS.

Unit - IV: Mobile Hardware & Software System

  Hardware/Software Repairing - Various Locks - Installation of:
  UFS Driver, UFS Suite & Flashing Files - IMEI Number Detection -
  Mobile  GSM Utility Codes (Any Five of Nokia Hand Set)

Unit - V - Other Mobile Service Tools

  Ultrasonic Cleaner - Computer Connectors - SIM Card Reader -
  Memory Card Reader - Mobile Virus - Virus Prevention - Removing Virus
  - Health Hazards with Mobiles - SAR.
Course outcomes (COs)

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To have knowledge of the mobile system specifications.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>To analyze the mobile date capacity. To study about the storage capacity in GB Level.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>To identify and evaluate currently available mobile phone apps related to the prevention for health care</td>
<td>7</td>
</tr>
</tbody>
</table>

Reference books:

1. Modern Mobile phone Introduction & Servicing - Manahar Lotia - BPB - (Unit - I)
2. Modern Mobile Phone Repair using Computer Software & Service Devices - Manahar Lotia - BPB - 120/- (Units I, IV & V)
3. Modern Mobile Phone Unlocking & Utility Codes For GSM & CDMA Phones - Manahar Lotia - BPB - Rs.99/- (Unit - IV).
4. Mobile Telephony - Digit Magazine - Supplement - Jan 2006 - Jasubhai Digital Media Publications. (Unit II & III)
5. Blue Tooth Technology – CSR Prabhu & A Prathap Reddi – PHI - Rs.250/-
Selvamm Arts & Science College ( Autonomous), Namakkal.

Department of Mathematics

M.Sc., Mathematics

Nationally Re-Accredited at the highest Grade “A” by NAAC
UGC recognized 2(f) and 12(B) Institution
Affiliated to Periyar University, (Salem)
Namakkal – 637 003

MASTER OF SCIENCE
MATHEMATICS

CHOICE BASED CREDIT SYSTEM (CBCS)

SYLLABUS (2017-18)
VISION

Problem solving, understanding, reasoning and sense-making are at the heart of mathematics teaching and learning and are central to mathematical proficiency.

MISSION

To nurture pupils to become effective and creative problem solver in applying mathematical knowledge and skills in a dynamic world of modern technology.

Program Outcomes (PG)

PO 1: Application: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

PO 2: Analysis: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

PO 3: Solution Finding: Facilitate to enter multidisciplinary path to solve day-to-day problems.

PO 4: Progression in Career: Prepare students for prominent career in industry, banks offices and for further academic study.

PO 5: Research Capability: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

PO 6: Expressing their talents: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.

PO 7: Individual sustainability: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: Competency: Attain competency in job market / entrepreneurship.
M.Sc., MATHEMATICS-COURSE PATTERN

Choice Based Credit System
(For the students admitted from the year 2017 onwards)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Subject</th>
<th>Paper Code</th>
<th>Title of the Paper</th>
<th>Ins. Hrs/Week</th>
<th>Credit</th>
<th>Max. Marks</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I YEAR I</td>
<td>Core I</td>
<td>17P1MA01</td>
<td>Linear Algebra</td>
<td>6</td>
<td>6</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Core II</td>
<td>17P1MA02</td>
<td>Real Analysis-I</td>
<td>6</td>
<td>5</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Core III</td>
<td>17P1MA03</td>
<td>Ordinary Differential Equations</td>
<td>6</td>
<td>5</td>
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<td>17P1MAE01/17P1MAE02/17P1MAE03</td>
<td>(to choose 1 out of 3) 1. Graph Theory 2. Tensor Analysis and Relativity Theory 3. Combinatorics</td>
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<td>Measure Theory and Integration</td>
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Selvam Arts & Science College (Autonomous), Namakkal.
Department of Mathematics
M.Sc., Mathematics
## Selvamm Arts & Science College (Autonomous), Namakkal.

### Department of Mathematics

M.Sc., Mathematics

<table>
<thead>
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<th>Year/ Semester</th>
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| Total for Semester III | 30 | 25 | 600 |

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**TOTAL**

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## Program Specific Outcomes (PSOs)

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<th>PSO</th>
<th>Description</th>
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<tr>
<td>PSO1</td>
<td>The ability to understand, analyze on statistical problems in the area of transportation, probability, inventory control and network construction, information theory.</td>
</tr>
<tr>
<td>PSO2</td>
<td>Operation research are used in the area of game theory, queuing theory, optimization population dynamics, signal processing.</td>
</tr>
<tr>
<td>PSO3</td>
<td>To improve your own learning and performance.</td>
</tr>
<tr>
<td>PSO4</td>
<td>To develop abstract mathematical thinking.</td>
</tr>
<tr>
<td>PSO-5</td>
<td>Real Numbers and Algebraic Expressions. Classify and Define Properties of Real Numbers. Solve Multi-Step Linear Equations. Problem Solving.</td>
</tr>
<tr>
<td>PSO-6</td>
<td>Simplify and perform arithmetic operations on rational algebraic expressions, including those with radicals and perform the basic arithmetic operations of addition, subtraction, multiplication and division on polynomials.</td>
</tr>
<tr>
<td>PSO-7</td>
<td>Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.</td>
</tr>
<tr>
<td>PSO-8</td>
<td>Formulate and solve problems as networks and graphs. Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems. Use CPM and PERT techniques, to plan, schedule, and control project activities.</td>
</tr>
<tr>
<td>PSO-9</td>
<td>Complex numbers, analytic functions, Cauchy integral theorem, Cauchy integral formula, power series and conformal mapping.</td>
</tr>
<tr>
<td>PSO-10</td>
<td>Fluid, solid or continuum mechanics. You have good knowledge of a broad range of methods and techniques based on mechanics and can use them for analysis and problem solving.</td>
</tr>
<tr>
<td>PSO-11</td>
<td>Correlation and Regression analysis, Multiple Regression and Statistical Forecasting.</td>
</tr>
<tr>
<td>PSO-12</td>
<td>Analyze vector functions to find derivatives, tangent lines, integrals, arc length, and curvature, Differentiate vector fields, Determine gradient vector fields and find potential functions, Evaluate line integrals directly and by the fundamental theorem.</td>
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</tbody>
</table>
CORE COURSE I – LINEAR ALGEBRA

Semester: I

Hours / Week : 6

Paper Code: 17P1MA01
Credit : 6

Objectives:
- To study Linear Transformations and its properties
- To study the Algebra of polynomials and Annihilating Polynomials

UNIT I
System of Linear Equations – Matrices and Elementary Row operations – Row-Reduced Echelon Matrices – Matrix Multiplications – Invertible Matrices – Vector spaces – Subspaces – Bases and dimension – Coordinates. (Chapter I Sections 1.1 - 1.6 & Chapter 2 Sections 2.1 – 2.4)

UNIT II

UNIT III
Algebras – The algebra of polynomials – Polynomial ideals – The prime factorization of polynomial – Commutative rings – Determinant functions. (Chapter 4 Sections 4.1 – 4.2, 4.4 – 4.5 & Chapter 5 Sections 5.1 -5.2)

UNIT IV
Characteristic values – Annihilating polynomials – Invariant subspaces – Direct-sum Decompositions. (Chapter 6 Sections 6.1 – 6.4, 6.6)

UNIT V
Invariant Direct sums – The primary Decomposition theorem – Inner products – Inner product spaces – Unitary operators – Normal operators. (Chapter 6 Sections 6.7 - 6.8 & Chapter 8 Sections 8.1 - 8.2, 8.4 – 8.5)
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
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</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Computational and Algebraic Skills.</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Critically analyze and construct mathematical arguments that relate to the study of introductory linear algebra.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>Use technology, where appropriate, to enhance and facilitate mathematical understanding, as well as an aid in solving problems and presenting solutions.</td>
<td>4</td>
</tr>
<tr>
<td>CO-4</td>
<td>Communicate and understand mathematical statements, ideas and results, both verbally and in writing, with the correct use of mathematical definitions, terminology and symbolism.</td>
<td>6</td>
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</table>

**TEXT BOOK:**


**REFERENCE(S)**


Selvamm Arts & Science College (Autonomous), Namakkal.

Department of Mathematics
M.Sc., Mathematics

CORE COURSE II – REAL ANALYSIS -1

Semester: I  
Hours / Week : 6
Paper Code: 17P1MA02  
Credit : 5

Objectives:
To give the students a thorough knowledge of the various aspects of Real line and Metric Spaces. Give knowledge for any advanced learning in Pure Mathematics. Inherit the knowledge of Analysing and approaching life problems. To train the students to apply pure into applied problems. To train the students in problem-solving as a preparatory to NET/SET.

UNIT I
The Real and Complex Number Systems: Introduction - Ordered Sets - Fields - The Real Field - The Extended Real Number System - The Complex Field - Euclidean Spaces. (Chapter 1)

UNIT II
Basic Topology: Finite, Countable and Uncountable Sets - Metric Spaces - Compact Sets - Perfect Sets - Connected Sets. (Chapter 2)

UNIT III
Numerical Sequences and Series: Convergent Sequences - Subsequences - Cauchy Sequences - Upper and Lower Limits - Some Special Sequences - Series - Series of non-negative terms – the number e. (Chapter 3 [3.1-3.32])

UNIT VI:
Convergence of Series: The Root and Ratio Tests - Power Series - Summation by parts - Absolute convergence - Addition and Multiplication of Series - Rearrangements. (Chapter 3 [3.33-3.54])

UNIT-V:
Continuity: Limits of Functions - Continuous functions - Continuity and Compactness - Continuity and Connectedness - Discontinuities - Monotonic functions - Infinite Limits and Limits at Infinity. (Chapter 4)
Course Outcomes:

<table>
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<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
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</thead>
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<tr>
<td>CO-1</td>
<td>Describe fundamental properties of the real numbers that lead to the formal development of real analysis.</td>
<td>5</td>
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<tr>
<td>CO-2</td>
<td>Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration</td>
<td>7</td>
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<tr>
<td>CO-3</td>
<td>Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems</td>
<td>4</td>
</tr>
<tr>
<td>CO-4</td>
<td>Describe fundamental properties of the real numbers that lead to the formal development of real analysis.</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Comprehend regions arguments developing the theory underpinning real analysis.</td>
<td>4</td>
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</table>

**TEXT BOOK:**

**REFERENCE(S)**
Semester: I  Hours / Week : 6
Paper Code:17P1MA03  Credit: 5

Objectives:
Differential Equations occur frequently in many branches of science and in both pure and applied mathematics. The purpose of this course is to make students study the model changing patterns in both physical and mathematical problems.

UNIT I

UNIT II
Regular Singular Points – Gauss’s hypergeometric equation – The Point at infinity - Legendre Polynomials – Bessel functions – Properties of Legendre Polynomials and Bessel functions. (Chapter 5 : Sections 28 to 31 and Chapter 6: Sections 32 to 35)

UNIT III
Linear Systems of First Order Equations – Homogeneous Equations with Constant Coefficients – The Existence and Uniqueness of Solutions of Initial Value Problem for First Order Ordinary Differential Equations – The Method of Solutions of Successive Approximations and Picard’s Theorem. (Chapter 7: Sections 37, 38 and Chapter 11: Sections 55, 56)

UNIT IV
Oscillation Theory and Boundary value problems – Qualitative Properties of Solutions – Sturm Comparison Theorems – Eigenvalues, Eigenfunctions and the Vibrating String. (Chapter 4: Sections 22 to 24)
UNIT V
Nonlinear equations: Autonomous Systems; the phase plane and its phenomena – Types of critical points; Stability – critical points and stability for linear systems – Stability by Liapunov’s direct method – Simple critical points of nonlinear systems. (Chapter 8: Sections 42 to 44)

Course Outcomes:

<table>
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<th>Upon completion of this course, students will be able to</th>
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<tr>
<td>CO-1</td>
<td>Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.</td>
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<td>CO-2</td>
<td>Find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.</td>
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<tr>
<td>CO-3</td>
<td>Introduced to the complete solution of a nonhomogeneous differential equation with constant coefficients by the method of undetermined coefficients.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>To have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.</td>
<td>3</td>
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</tbody>
</table>

TEXT BOOK:
G.F. Simmons, Differential Equations with Applications and Historical Notes, TMH, New Delhi, 1984.

REFERENCE(S)
CORE COURSE IV – INTEGRAL EQUATIONS & CALCULUS OF VARIATIONS

Semester: I  Hours / Week : 6
Paper Code: 17P1MA04  Credit : 5

Objectives:
Calculus of variations and integral equations play an important role in both pure and applied mathematics. The objective is to provide an introduction to the central ideas of variational problems and integral equations and to guide students through derivations of appropriate integral equations governing the behavior of several standard physical problems.

UNIT I
LINEAR INTEGRAL EQUATIONS – Definition, Regularity conditions – Special kind of kernels – Eigen values and eigen functions – Convolution Integral – The inner and scalar product of two functions – notation – Integral equations – Examples – Fred Holm alternative – examples – An approximate method. (Chapter 1:1.1 to 1.6 and 2:2.1 to 2.4 of [1])

UNIT II
METHOD OF SUCCESSIVE APPROXIMATION: Iterative scheme – Examples – Voltra Integral equation – Examples – Some results about the resolvent kernel. (Chapter 3:3.1 to 3.5 of [1]).

UNIT III
APPLICATIONS TO ORDINARY DIFFERENTIAL EQUATIONS – Initial value problems – Boundary value problems – Singular integral equations – Abel integral equation.
(Chapter 5:5.1 to 5.3 and Chapter 8 :8.1, 8.2 of [1])
UNIT IV
CALCULUS OF VARIATION AND APPLICATION – Maxima and Minima – The simplest case-Illustrative Examples. (Chapter 2 :Sec:2.1 to 2.3 of [2])

UNIT V
NATURAL BOUNDARY CONDITIONS AND TRANSITION CONDITIONS – The Variational notation – The more general case with illustrative equations – Constraints and Lagrange’s multipliers – Variables end points – Sturm – (Liouville Problems). (Chapter 2: 2.4 to 2.9 of [2]).

Course Outcomes:

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<td>Fully understand the properties of geometrical problems.</td>
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<td>CO-2</td>
<td>Be familiar with variational problems.</td>
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<tr>
<td>CO-3</td>
<td>Be familiar isoperimetric problems.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Be thorough with different types of integral equations.</td>
<td>7</td>
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TEXT BOOK(S)

REFERENCE(S)
ELECTIVE – I
(To choose any 1 out of the given 3)

PAPER I - GRAPH THEORY

Semester: I Hours / Week : 6
Paper Code: 17P1MAE01 Credits : 4

Objectives
The purpose of this course is to make student to understand Graph Theory and its various models and applications which are widely used in different areas such as study of molecules, construction of bonds in chemistry, study of atoms, biology, operation research, sociology, engineering, economics and war science to find optimal way to perform.

UNIT I
(Chapter 1 (Section 1.1 – 1.7) Chapter 2 (Section 2.1 – 2.3))

UNIT II
CONNECTIVITY, EULER TOURS AND HAMILTON CYCLES:
Connectivity – Blocks – Euler tours – Hamilton Cycles.
(Chapter 3 (Section 3.1 – 3.2) Chapter 4 (Section 4.1 – 4.2))

UNIT III
MATCHINGS, EDGE COLOURINGS: Matchings – Matchings and Coverings in Bipartite Graphs – Edge Chromatic Number – Vizing’s Theorem. (Chapter 5 (Section 5.1 – 5.2) Chapter 6 (Section 6.1 – 6.2))
UNIT IV
INDEPENDENT SETS AND CLIQUES, VERTEX COLOURINGS: 
Independent sets – Ramsey’s Theorem – Chromatic Number – Brooks’ 
Theorem – Chromatic Polynomials. (Chapter 7 (Section 7.1 – 7.2) Chapter 
8 (Section 8.1 – 8.2, 8.4))

UNIT V
PLANAR GRAPHS: Plane and planar Graphs – Dual graphs – Euler’s 
Formula – The Five-Colour Theorem and the Four-Colour Conjecture. 
(Chapter 9 (Section 9.1 – 9.3, 9.6))

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
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<tr>
<td>CO-1</td>
<td>Understand the ideas of permutations.</td>
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<tr>
<td>CO-2</td>
<td>Combinations and apply combinatorial ideas to practical problems.</td>
<td>3</td>
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</table>

TEXT BOOK:
J.A. Bondy and U.S.R. Murthy, Graph Theory and Applications, 

REFERENCE(S):
1. J. Clark and D.A. Holton, A First look at Graph Theory, Allied 
3. A. Gibbons, Algorithmic Graph Theory, Cambridge University Press, 
2. TENSOR ANALYSIS AND RELATIVITY THEORY

Semester: I Hours / Week : 6
Paper Code: 17P1MAE02 Credit: 4

Objectives
The course aims to introduce vector algebra and vector calculus and special relativity and relativistic kinematics, dynamics and accelerated systems.

UNIT I


UNIT II

TENSOR CALCULUS: Riemannian Space – Christoffel Symbols and their properties. (Chapter III: 3.1 and 3.2)

UNIT III

TENSOR CALCULUS (CONTD): Covariant Differentiation of Tensors – Riemann – Christoffel Curvature Tensor – Intrinsic Differentiation. (Chapter III: 3.3 – 3.5)

UNIT IV

UNIT V

four vector – Force – Conservation of Energy – Mass and energy –
Example – inelastic collision – Principle of equivalence – Lagrangian and
Hamiltonian formulations. Accelerated Systems : Rocket with constant
acceleration – Example – Rocket with constant thrust. (Chapter 7:
Sections 7.3 and 7.4)

TEXT BOOK(S)
1. U.C. De, Absos Ali Shaikh and Joydeep Sengupta, Tensor Calculus,
   Narosa Publishing House, New Delhi, 2004. (Units I, II and III)
2. D. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi,
   1985. (Units IV and V)

REFERENCE(S)
   University Press, 1930.
3. COMBINATORICS

Semester: I
Paper Code: 17P1MAE03

Objectives:
To introduce combinatorial techniques for solving enumeration problems.

UNIT I
Permutations and combinations – Distributions of distinct objects – Distributions of non distinct objects – Stirlings formula.

UNIT II
Generating functions. – Generating function for combinations enumerators for permutations – Distributions of distinct objects into non-distinct cells – Partitions of integers – The Ferrers graphs elementary relations.

UNIT III
Recurrence relation – Linear recurrence relations with constant coefficients solutions by the technique of generating functions – A special class of nonlinear difference equations recurrence relations with two indices.

UNIT IV
The principle of inclusion and exclusion – General formula – Permutations with restriction on relative positions derangements – The rook polynomials permutations with forbidden positions.

UNIT V
TEXT BOOK:

REFERENCE(S)
CORE COURSE V – ALGEBRA

Semester: II Hours / Week : 6
Paper Code: 17P2MA05 Credit : 5

Objectives:

This course aims to provide an extended study to the subject of algebra, which is one of the basic pillars of modern mathematics. The focus of the course will be the study of certain structures called Direct-Product, Finite-Abelian Groups, Extension Fields and some related structures. Abstract algebra gives to student a good mathematical maturity and enables to build mathematical thinking and skill.

UNIT I

GROUP THEORY: Cayley’s theorem- Permutation Groups- Another counting principle – Sylow’s theorem- (Chapter II: Sec 2.9 to 2.12)

UNIT II

RING THEORY: Polynomial rings – Polynomials over the rational field – Polynomials over commutative rings. (Chapter III: Sec 3.9 to 3.11)

UNIT III

Vector Spaces and Modules- Dual space - Inner Product Spaces – Modules .(Chapter IV: 4.3 to 4.5)

UNIT IV

FIELDS: Extension fields – Roots of Polynomials – More about roots. (Chapter V: Sec 5.1 to 5.5)

UNIT V

FINITE FIELDS: The elements of Galois Theory – Finite fields. (Chapter V: 5.6 and Chapter VII: Sec 7.1)
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>To find the number of Sylow subgroups</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>To find the number of non isomorphic abelian groups.</td>
<td>6</td>
</tr>
<tr>
<td>CO-3</td>
<td>To find the splitting field, Galois group of the given polynomial.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>To check whether the given polynomial is solvable by radical</td>
<td>6</td>
</tr>
</tbody>
</table>

**TEXT BOOK:**

**REFERENCE(S)**
Selvamm Arts & Science College (Autonomous), Namakkal.

Department of Mathematics

M.Sc., Mathematics

CORE COURSE VI – REAL ANALYSIS - II

Semester: II  Hours / Week : 6
Paper Code: 17P2MA06  Credit : 5

Objectives:
To give the students a thorough knowledge of the various aspects of Real line and Metric Spaces. Give knowledge for any advanced learning in Pure Mathematics. Inherit the knowledge of Analysing and approaching life problems. To train the students to apply pure into applied problems. To train the students in problem-solving as a preparatory to NET/SET.

UNIT I
DIFFERENTIATION: The Derivative of a real function – Mean value Theorems - The continuity of derivatives – L'Hospital Rule – Derivatives of Higher Order - Taylor’s Theorem – Differentiation of Vector valued Functions (Chapters 5)

UNIT II

UNIT-III:
SEQUENCE AND SERIES OF FUNCTIONS: Discussion of Main Problem-Uniform Convergence - Uniform Convergence and Continuity - Uniform Convergence and Integration - Uniform Convergence and Differentiation. (Chapter 7 [7.1 - 7.18])

UNIT-IV:
SOME SPECIAL FUNCTIONS: Power series -The Exponential and Logarithmic Functions - The Trigonometric Functions - The Algebraic Completeness of the Complex Field - Fourier series - The Gamma function. (Chapter 8 [8.1 - 8.22])

UNIT-V:
FUNCTIONS OF SEVERAL VARIABLES: LinearTransformations - Differentiation - The Contraction Principle - The Inverse Function Theorem - The Implicit Function Theorem. (Chapter 9 [9.1 - 9.29])
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Effectively locate and use the information needed to prove theorems and establish mathematical results.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>Demonstrate the ability to integrate knowledge and ideas of differentiation, and integration in a coherent and meaningful manner and use appropriate techniques for solving related problems</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Demonstrate an intuitive and computational understanding of set theory, continuity, differentiation, and integration through calculations and solving application problems</td>
<td>9</td>
</tr>
<tr>
<td>CO-4</td>
<td>Demonstrate the ability to manipulate and use power series.</td>
<td>9</td>
</tr>
<tr>
<td>CO-5</td>
<td>define singularities of a function, know the different types of singularities, and be able to determine the points of singularities of a function</td>
<td>7</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
Objectives:

This course aims to provide an extended study to the subject of complex analysis, which is one of the basic pillars of modern mathematics. The focus of the course will be the study of analytic functions, properties of power series, mappings, evaluation of complex integration by Cauchy’s residue theorem. Complex Analysis gives to student a good mathematical maturity and enables to build mathematical thinking and skill.

UNIT I

COMPLEX FUNCTIONS:
Introduction to the concept of analytic functions, Limits and Continuity, Analytic functions, Polynomials Rational functions – Elementary theory of Power series. (Chapter 1: 1.1 – 1.6, 2.1 – 2.4)

UNIT II

FUNDAMENTAL THEOREMS IN COMPLEX INTEGRATION:
Line Integrals – Rectifiable Arcs – Line Integrals as Functions of Arcs – Cauchy’s Theorem for a Rectangle – Cauchy’s Theorem in a Disk; Cauchy’s Integral Formula: The Index of a Point with Respect to a Closed Curve – The Integral Formula – Higher Derivatives.
(Chapter 4: 1.1 – 1.5, 2.1 – 2.3)

UNIT III

LOCAL PROPERTIES OF ANALYTIC FUNCTIONS:
UNIT IV
THE GENERAL FORM OF CAUCHY’S THEOREM:
(Chapter 4: 4.1 – 4.6, 5.1 – 5.3)

UNIT V
HARMONIC FUNCTIONS:
Definition and Basic Properties – The Mean-value Property – Poisson’s Formula – Schwarz’s Theorem – The Reflection Principle; Power series expansions – Weierstrass’s Theorem – The Taylor Series – The Laurent Series. (Chapter 4: 6.1 – 6.5 and Chapter 5: 1.1 – 1.3)

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Easily describe domains and compute limits in the complex plane.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Verify Cauchy’s Integral Formula</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Calculate Zeros and Poles, – Essential Singularity</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Calculate Taylor or Laurent series for functions.</td>
<td>4</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
ELECTIVE – II
(To choose any 1 out of the given 3)

PAPER II

1. FUZZY MATHEMATICS

Semester: II  
Hours / Week : 5
Paper Code: 17P2MAE04  
Credit : 4

Objectives
To introduce the concept of uncertainty and fuzziness in logic and to Study fuzzy arithmetic, fuzzy relations and construction of fuzzy sets.

UNIT I
Fuzzy sets – Basic types – Basic concepts – α-cuts – Additional properties of α-cuts.[Chapter 1,2: Section 1.3 to 1.4 and 2.1 to 2.2]

UNIT II
Operations on Fuzzy sets – Types of operations – Fuzzy complements – t-Norms – Fuzzy Unions – Combinations of operations.[ Chapter 3: Section 3.1 to 3.5]

UNIT III
Fuzzy Arithmetic – Fuzzy numbers – Arithmetic operations on intervals – Arithmetic operations on Fuzzy numbers.[ Chapter 4: Section 4.1 to 4.4]

UNIT IV
Fuzzy relations – Binary fuzzy relations – Fuzzy equivalence relations – Fuzzy compatibility relations – Fuzzy ordering relations – fuzzy morphisms. [Chapter 5: Section 5.3, 5.5 to 5.8]
UNIT V

**Fuzzy Relation Equations** – Solution method – Fuzzy Relation Equations based on Sup-i Compositions – Fuzzy Relation Equations based on inf-ωi Compositions.[Chapter 6: Section 6.3 to 6.5]

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>construct the appropriate fuzzy numbers corresponding to uncertain and imprecise collected data.</td>
<td>3</td>
</tr>
<tr>
<td>CO-2</td>
<td>handle the problems having uncertain and imprecise data.</td>
<td>4</td>
</tr>
<tr>
<td>CO-3</td>
<td>find the optimal solution of mathematical programming problems having uncertain and imprecise data.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Deal with the fuzzy logic problems in real world problems</td>
<td>3</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
2. NUMBER THEORY AND CRYPTOGRAPHY

Semester: II  
Hours / Week : 5

Paper Code: 17P2MAE05  
Credit : 4

Objectives
This course aims to give elementary ideas from number theory which will have applications in cryptology.

UNIT I
ELEMENTARY NUMBER THEORY: Time Estimates for doing arithmetic – Divisibility and Euclidean algorithm – Congruences – Applications to factoring. (Chapter-I)

UNIT II
CRYPTOGRAPHY: Some simple crypto systems – Enciphering matrices. (Chapter-III)

UNIT III
FINITE FIELDS AND QUADRATIC RESIDUES: Finite fields – Quadratic residues and Reciprocity. (Chapter-II)

UNIT IV
PUBLIC KEY CRYPTOGRAPHY: The idea of public key cryptography – RSA – Discrete log – Knapsack. (Chapter-IV : Sections 4.1 to 4.4)

UNIT V

TEXT BOOK:
REFERENCE(S)


3. DIFFERENCE EQUATIONS

Semester: II  
Hours / Week  : 5

Paper Code: 17P2MAE06  
Credit  : 4

Objectives
To introduce the process of discretization, discrete version of Differential Equations, Discrete oscillation and the asymptotic behavior of solutions of certain class of difference equations for linear cases only. Solution of difference equations using z-transforms is stressed.

UNIT I
LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER:  
Difference Calculus – General Theory of Linear Difference Equations – Linear Homogeneous Equations with Constant coefficients – Linear non-homogeneous equations – Method of Undetermined coefficients, the method of variation of constants – Limiting behavior of solutions. (Chapter 2: Sections 2.1 to 2.5)

UNIT II
SYSTEM OF DIFFERENCE EQUATIONS:  
Autonomous System – The Basic Theory – The Jordan form – Linear periodic system. (Chapter 3: Section 3.1 to 3.4)

UNIT III
THE Z-TRANSFORM METHOD:  
Definition, Example and properties of Z-transform – The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method – Volterra Difference Equation of convolution types – Volterra systems(simple problems only). (Chapter 5: Sections 5.1 to 5.3, 5.5)
UNIT IV
ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION: Tools and Approximations – Poincare’s Theorem – Second order difference equations – Asymptotic diagonal systems – Higher order Difference Equations. (Chapter 8 : Sections 8.1 to 8.5)

UNIT V
OSCILLATION THEORY: Three-term difference Equation – Non-linear Difference Equations – Self-Adjoint second order equations. (Chapter 7 : Sections 7.1 to 7.3)

TEXT BOOK:
Saber N. Elaydi, An Introduction to Difference Equations, Springer Verlag, New York, 1996.

REFERENCE(S)
Objectives

Partial differential equations allow deterministic mathematical formulations of phenomena in physics and engineering as well as biological processes among many other scenarios. The objective of this course is to present the main results in the context of partial differential equations that allow learning about these models and to study numerical methods for the approximation of their solution.

UNIT I


UNIT II


UNIT III

Parabolic Differential Equations: Parabolic differential equations – Occurrence of the diffusion equation – Boundary condition – Separation of variable method – Diffusion equation in cylindrical – Spherical co-ordinates (Chapter 4: Sections 4.1 to 4.5)
UNIT IV

Hyperbolic Differential Equations: Hyperbolic differential equations – Occurrence of wave equation – One dimensional wave equation – Reduction to canonical form – D’Alembert solution – Separation of variable method – Periodic solutions – Cylindrical – Spherical co-ordinates – Duhamel principle for wave equations. (Chapter 5 : Sections 5.1 to 5.6 and 5.9)

UNIT V


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>classify partial differential equations and transform into canonical form</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>solve linear partial differential equations of both first and second order</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Apply partial derivative equation techniques to predict the behaviour of certain phenomena.</td>
<td>4</td>
</tr>
<tr>
<td>CO-4</td>
<td>apply specific methodologies, techniques and resources to conduct research and produce innovative results in the area of specialisation.</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>identify real phenomena as models of partial derivative equations</td>
<td>7</td>
</tr>
</tbody>
</table>

TEXT BOOK:
REFERENCE:

Objectives:

To develop familiarity with the physical concepts and facility with the mathematical methods of classical dynamics. To develop skills in formulating and solving physics problems. To give a detailed knowledge about the mechanical system of particles, application of Lagrange’s equations and Hamilton equation as well as the theory of Hamilton Jacobi theory, canonical transformations.

UNIT I
MECHANICAL SYSTEMS: Introduction – Generalized coordinates – Constraints – Virtual work – Energy and Momentum. (Chapter 1: Sections 1.1 to 1.5)

UNIT II
LAGRANGE’S EQUATIONS: Derivation of Lagrange’s equations – Examples – Integrals of motion. (Chapter 2: Sections 2.1 to 2.3)

UNIT III
HAMILTON’S EQUATIONS: Hamilton’s Principle – Hamilton’s Equation – Other variational principle. (Chapter 4: Sections 4.1 to 4.3)

UNIT IV
HAMILTON–JACOBI THEORY: Hamilton Principle function – Hamilton–Jacobi Equation – Separability. (Chapter 5: Sections 5.1 to 5.3)

UNIT V
CANONICAL TRANSFORMATION: Differential forms and generating functions – Special Transformations - Lagrange and Poisson brackets. (Chapter 6: Sections 6.1 to 6.3)
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand force vectors and represent them in one, two and three dimensions</td>
<td>10</td>
</tr>
<tr>
<td>CO-2</td>
<td>Determine the resultants of forces and moments in two and three dimensions</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Describe the concept of dry friction and analyze the equilibrium of rigid bodies subjected to this force.</td>
<td>3</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
CORE COURSE X – NUMERICAL ANALYSIS

Semester: III Hours / Week : 5
Paper Code: 17P3MA10 Credit: 4

Objectives:
Numerical Analysis is a methodology developed to find solutions to those mathematical problems which do not have exact analytical solutions. Numerical Methods finds applications in all field of engineering, physical sciences and life sciences. The objective is to use these techniques to find solutions numerically both reliably and to a specified accuracy.

UNIT I
NUMERICAL SOLUTIONS TO ORDINARY DIFFERENTIAL EQUATIONS:

UNIT II

UNIT III

UNIT IV
NUMERICAL SOLUTIONS TO PARTIAL DIFFERENTIAL EQUATIONS:
Introduction difference quotients – Geometrical representation of partial differential equations – Classification of partial differential equations – Elliptic equation – Solution to Laplace’s equation by Liebmann’s iteration process. (Chapter 12: Sections 12.1 to 12.6)
UNIT V

NUMERICAL SOLUTIONS TO PARTIAL DIFFERENTIAL EQUATIONS


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Numerically solve a scalar nonlinear equation. Understand basics of finite precision arithmetic, conditioning of problems and stability of numerical algorithms.</td>
<td>6</td>
</tr>
<tr>
<td>CO-2</td>
<td>Use condition number and norms to assess accuracy of solutions to linear equations and least squares problems</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Numerically approximate functions with polynomials</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand and apply appropriate techniques for numerical differentiation and integration.</td>
<td>7</td>
</tr>
</tbody>
</table>

TEXT BOOK:


REFERENCE(S)

Objective:
The purpose of the course is to learn the concept of topological spaces, continuous functions, connectedness, compactness, countability and separation axioms. This course aims to acquaint the students with various topics of topology.

UNIT I
TOPOLOGICAL SPACES: Topological spaces – Basis for a topology – The order topology – The product topology on X x Y – The subspace topology – Closed sets and limit points. (Chapter 2: Sections 12 to 17)

UNIT II
CONTINUOUS FUNCTIONS: Continuous functions – The product topology – The metric topology. (Chapter 2: Sections 18 to 21)

UNIT III
CONNECTEDNESS: Connected spaces – Connected subspaces of the Real line – Components and local connectedness. (Chapter 3: Sections 23 to 25)

UNIT IV
COMPACTNESS: Compact spaces – Compact subspaces of the Real line – Limit Point Compactness – Local Compactness (Chapter 3: Sections 26 to 29)

UNIT V
COUNTABILITY AND SEPARATION AXIOMS: The Countability Axioms – The separation Axioms – Normal spaces – The Urysohn Lemma – The Urysohnmetrization Theorem. (Chapter 4: Sections 30 to 34)
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Construct the product topology on product spaces</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Use the open ball on metric spaces, construct the metric topology and define open-closed sets of the space.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>We also explored and studied Connected subspaces of the Real line</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Compactness is the generalization to topological spaces of the property of closed and bounded subsets of the real line</td>
<td>10</td>
</tr>
<tr>
<td>CO-5</td>
<td>Every normal space with countable base is metrizable. Actually, every regular Hausdorff space with countable base is metrizable.</td>
<td>5</td>
</tr>
</tbody>
</table>

**TEXT BOOK:**

**REFERENCE(S)**
Objective:

It was designed for Post Graduate students to understand the measures and integration. The integral has the advantage that one can give specific formulas for integrand. It gives thorough treatment of integration and different ion on R together with fundamentals of abstract measure and integration.

UNIT I

LEBESGUE MEASURE: Outer measure – Definition & properties – Lebesgue measure measurable sets – Properties - Non-measurable set - Measurable functions. (Chapter 3 Sec. 1-6)

UNIT II

LEBESGUE INTEGRAL: Lebesgue Integral of simple function – Bounded measurable function of a nonnegative function – Fatou’s lemma – Monotone convergence theorem – General Lebesgue integral – Lebesgue convergence theorem – Convergence in measure. (Chapter 4 Sec.1-5)

UNIT III

DIFFERENTIATION AND INTEGRATION: Differentiation of monotone functions – Vitali’s lemma – Integral of derivative – Functions of bounded variation – Differentiation of an integral – Absolute continuity – Convex functions – Jensen’s inequality.(Chapter 5 Sec. 1-5)

UNIT IV

UNIT V
MEASURE AND OUTER MEASURE: Outer measure and Measurability – Extension theorem – Product measures – Fubini’s theorem – Tonnelli’s theorem. Chapter 12 Sec. 1, 2 and 4)

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Use the Lebesgue outer measure to draw conclusions</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand about the function, non negative function and convergence theorems.</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand about the Differentiation and Integration.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Use the Measure spaces, Measurable functions and Integration.</td>
<td>7</td>
</tr>
<tr>
<td>CO-5</td>
<td>The term “Outer Measure” is used to extension theorem, Fubini’s and Tonnelli’s theorem.</td>
<td>9</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
ELECTIVE III
(To choose any one out of the given 3)
PAPER-III- OPTIMIZATION TECHNIQUES

Semester: III
Hours / Week : 5
Paper Code: 17P3MAE07
Credit : 4

Objectives
This course introduces advanced topics in Linear and non-linear Programming.

Unit-I
Integer programming-Application of integer programming- Formulation of Integer programming problems- (Either or constraints- Assignment problems- travelling salesman problem- Capital budgeting problem- Fixed charge problem- warehouse location problem- Concept only)- Methods of Integer programming- Cutting plane Algorithm-Gomory fractional algorithm-Mixed Algorithm- Simple problems (Sec. 6.10 to 6.10.6)

Unit-II

Unit-III
Decision Theory- Decision Making Environment – Decision making under certainty - Decision making under uncertainty- Decision making under Risk- Game theory – Game models- Definition- Rules of Game theory- Saddle point- Dominance Property- mixed strategy two-person zero sum game (Sec- 9.1to 9.5and 9.10 to 9.18)

Unit-IV
Inventory model necessity for maintaining Inventory – Inventory cost – Inventory costs- inventory control problems-classification of
inventory- inventory models with deterministic demand : Demand Rate uniform, Replenishment rate infinite- Demand Rate Non-uniform, Replenishment rate infinite- Demand Rate uniform, Replenishment rate or production finite- Demand Rate uniform, Replenishment rate infinite Shortages allowed- Statements only (simple problems)- inventory models with probabilistic demand- Statements only (simple problems) (Sec. 12.1 to 12.5.4 &12.6)

Unit-V

Introduction- Formulation-local and global optimum- concave and convex function- types on non-linear programming problem- constrained extremal problems- simple problem (Sec. 16.1 to 16.7)

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Know methods of solving Integer Programming problems and Multistage programming.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Know methods of using Operations Research techniques in decision making.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Be able to understand non-linear programming algorithms.</td>
<td>2</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
2. NON LINEAR DIFFERENTIAL EQUATIONS
Semester: III  Hours / Week : 5
Paper Code: 17P3MAE08  Credit : 4

UNIT I
FIRST ORDER SYSTEMS IN TWO VARIABLES AND LINEARIZATION:
The general phase plane – Some population models – Linear approximation at equilibrium points – Linear systems in matrix form.

UNIT II

UNIT III

UNIT IV

UNIT V

TEXT BOOK:
REFERENCE(S)

3. CONTROL THEORY

**Semester: III**

**Paper Code:** 17P3MAE09

**Objective:**
To study observability, controllability, stability and optimal control of linear systems.

**UNIT I**

**UNIT II**
Controllability: Linear systems – Controllability Grammian – Adjoint systems – Constant coefficients systems – steering function – Nonlinear systems.

**UNIT III**

**UNIT IV**

**UNIT V**
Optimal control: Linear time varying systems with quadratic performance criteria – Matrix Riccati equation – Linear time invariant systems – Nonlinear Systems

**Text Book:**

**Books for Reference:**
CORE COURSE XIII - FUNCTIONAL ANALYSIS

Semester: IV  Hours/week: 6
Paper Code: 17P4MA13  Credit: 5

Objectives
1. To study the three structure theorems of Functional Analysis viz., Hahn-Banach theorem, open mapping theorem and uniform boundedness principle.
2. To introduce Hilbert spaces and operator theory leading to the spectral theory of operators on a Hilbert space.

UNIT I
BANACH SPACES: The definition and some examples – Continuous linear transformations – The Hahn-Banach theorem. (Chapters 9: Sec: 46 to 48)

UNIT II
BANACH SPACES: The natural imbedding of N in N** – The open mapping theorem – The conjugate of an operator. – Hilbert spaces definition and some simple properties.
(Chapters 9: Sec: 49 to 51)

UNIT III
HILBERT SPACES: Hilbert spaces definition and some simple properties
– Orthogonal complements – Orthonormal sets – The conjugate space H*
– The adjoint of an operator. (Chapter 10: Sec: 52 to 56)

UNIT IV
OPERATIONS ON HILBERT SPACES: Self-adjoint operators – Normal and unitary operators – Projections. (Chapter 10: Sec: 57 to 59)

UNIT V
(Chapter 12: Sec: 64 to 69)
Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Demonstrate an understanding of three structure theorems of functional analysis viz., Hahn-Banach theorem, open mapping theorem and uniform boundedness principle.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Use the open mapping theorem of the Banach space.</td>
<td>9</td>
</tr>
<tr>
<td>CO-3</td>
<td>Construct the operations on Hilbert space.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>We also explored and studied Banach algebras.</td>
<td>5</td>
</tr>
</tbody>
</table>

TEXT BOOK:

REFERENCE(S)
CORE COURSE XIV– DIFFERENTIAL GEOMETRY

Semester: IV  
Paper Code: 17P4MA14  

Objectives

- This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non-intrinsic properties of surface and the differential geometry of surfaces are explored.
- To enlighten the students with many applications of this subject.

UNIT I

(Chapter I: Sections 1 to 9)

UNIT II

INTRINSIC PROPERTIES OF A SURFACE: Definition of a surface – Curves on a surface – Surface of revolution – Helicoids – Metric – Direction coefficients – Families of curves – Isometric correspondence – Intrinsic properties. (Chapter II: Sections 1 to 9)

UNIT III

(Chapter II: Sections 10 to 18)

UNIT IV

(Chapter III: Sections 1 to 8)
UNIT V

DIFFERENTIAL GEOMETRY OF SURFACES: Fundamental Equations of Surface Theory – Fundamental Existence Theorem for surfaces – Compact surfaces whose points are umbilics – Hilbert’s lemma – Compact surface of constant curvature – Complete surfaces. (Chapter III : Sections 9 and 10 & Chapter IV : Only Section 1 to 5)

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>The Serret-Frenet frame for space curves and the notion of torsion of a space.</td>
<td>9</td>
</tr>
<tr>
<td>CO-2</td>
<td>Gauss Bonnet theorem and its implications for a geodesic triangle on a surface.</td>
<td>7</td>
</tr>
<tr>
<td>CO-3</td>
<td>Lines of Curvature and Rodrigue’s formula.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>The course introduces the fundamentals of differential geometry primarily by focussing on the theory of curves and surfaces in three space.</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>The theory of curves studies global properties of curves such as the four vertex theorem.</td>
<td>4</td>
</tr>
</tbody>
</table>

TEXT BOOK:

T.J. Willmore, An Introduction to Differential Geometry, Oxford University Press, (17th Impression), New Delhi, 2002. (Indian Print)

REFERENCE(S)
Department of Mathematics
M.Sc., Mathematics

ELECTIVE – IV
(To choose any 1 out of the given 3)
PAPER IV-.FLUID DYNAMICS

Semester: IV Hours / Week : 6
Paper Code: 17P3MAE10 Credit: 4

Objectives

This course aims to discuss kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.

To give the students a feel of the applications of Complex Analysis in the analysis of the flow of fluids.

UNIT I

KINEMATICS OF FLUIDS IN MOTION: Real fluids and Ideal fluids – Velocity of a fluid at a point, Stream lines, path lines, steady and unsteady flows- Velocity potential – The vorticity vector – Local and particle rates of changes – Equations of continuity – Worked examples – Acceleration of a fluid – Conditions at a rigid boundary.
(Chapter 2. Sections 2.1 to 2.10)

UNIT II

EQUATIONS OF MOTION OF A FLUID: Pressure at a point in a fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two in viscid immiscible fluids – Euler’s equation of motion – Discussion of the case of steady motion under conservative body forces. (Chapter 3. Sections 3.1 to 3.7)

UNIT III

SOME THREE DIMENSIONAL FLOWS: Introduction – Sources, sinks and doublets – Images in a rigid infinite plane – Axis symmetric flows – Stokes stream function. (Chapter 4 Sections 4.1, 4.2, 4.3, 4.5)
UNIT IV
SOME TWO DIMENSIONAL FLOWS: Meaning of two dimensional flow – Use of Cylindrical polar coordinate – The stream function – The complex potential for two dimensional, irrotational incompressible flow – Complex velocity potentials for standard two dimensional flows – Some worked examples – Two dimensional Image systems – The Milne Thompson circle Theorem. (Chapter 5. Sections 5.1 to 5.8)

UNIT V

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>Emonstrate kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.</td>
<td>10</td>
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<tr>
<td>CO-2</td>
<td>Give the students a feel of the applications of Complex Analysis in the analysis of the flow of fluids.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Construct some two and three dimensional flows.</td>
<td>10</td>
</tr>
<tr>
<td>CO-4</td>
<td>Describe viscous flows.</td>
<td>10</td>
</tr>
</tbody>
</table>

TEXT BOOK:
REFERENCE(S)


2. PROBABILITY THEORY

Semester: IV  
Hours / Week : 6
Paper Code: 17P4MAE11  
Credit : 4

Objectives:

The overall purpose of the course is that the student should be well acquainted with basic concepts in probability theory, models and solution methods applied to real problems.

UNIT I

RANDOM EVENTS AND RANDOM VARIABLES: Random events –
Probability axioms – Combinatorial formulae – Conditional probability –
Bayes Theorem – Independent events – Random Variables – Distribution
Function – Joint Distribution – Marginal Distribution – Conditional
Distribution – Independent random variables – Functions of random
variables. (Chapter 1: Sections 1.1 to 1.7 Chapter 2 : Sections 2.1 to 2.9)

UNIT II

PARAMETERS OF THE DISTRIBUTION: Expectation – Moments – The
Chebyshev Inequality – Absolute moments – Order parameters –
Moments of random vectors – Regression of the first and second types.
(Chapter 3 : Sections 3.1 to 3.8)

UNIT III

CHARACTERISTIC FUNCTIONS: Properties of characteristic functions –
Characteristic functions and moments – Semi-invariants – Characteristic
function of the sum of the independent random variables – Determination
of distribution function by the Characteristic function – Characteristic
function of multidimensional random vectors – Probability generating
functions. (Chapter 4 : Sections 4.1 to 4.7)
UNIT IV


(Chapter 5: Section 5.1 to 5.10 (Omit Section 5.11)

UNIT V


(Chapter 6: Sections 6.1 to 6.4, 6.6 to 6.9, 6.11 and 6.12. (Omit Sections 6.5, 6.10,6.13 to 6.15))

TEXT BOOK:


REFERENCE(S)

3. STOCHASTIC PROCESSES

Semester: IV  Hours / Week : 6
Paper Code: 17P4MAE12  Credit : 4

Objectives
1. To understand the stochastic models for many real life probabilistic situations.
2. To learn the well known models like Birth-death and queuing to reorient their knowledge of stochastic analysis.

UNIT I
STOCHASTIC PROCESSES: Some notions – Specification of Stochastic processes – Stationary processes – Markov Chains – Definitions and examples – Higher Transition probabilities – Generalization of Independent Bernoulli trails – Sequence of chain – Dependent trains. (Ch. II : Sec 2.1 to 2.3, Ch III : Sec 3.1 to 3.3)

UNIT II
MARKOV CHAINS: Classification of states and chains – Determination of Higher transition probabilities – Stability of a Markov system – Reducible chains – Markov chains with continuous state space. (Ch III Sec 3.4 to 3.6, 3.8, 3.9 and 3.11)

UNIT III
MARKOV PROCESSES WITH DISCRETE STATE SPACE: Poisson processes and their extensions – Poisson process and related distribution – Generalization of Poisson process- Birth and Death process – Markov processes with discrete state space (continuous time Markov Chains). (Ch IV : Sec 4.1 to 4.5)

UNIT IV
RENEWAL PROCESSES AND THEORY: Renewal process – Renewal processes in continuous time – Renewal equation – stopping time – Wald’s equation – Renewal theorems. (Ch VI : Sec 6.1 to 6.5)
UNIT V

STOCHASTIC PROCESSES IN QUEUING – Queuing system – General concepts – The queuing model M/M/1 – Steady state Behaviour – Transient behaviour of M/M/1 Model – Non-Markovian models – The model GI/M/1.

(Ch X : Sec 10.1 to 10.3, 10.7 and 10.8 (omit sec 10.2.3 & 10.2.3.1))

TEXT BOOK:

REFERENCE(S)
EDC - I – OPERATIONS RESEARCH

Semester: II  Hours / Week  : 5
Paper Code: 17P2MAEDC01  Credit  : 4

Objectives:

- To know the origin and development of Operations Research.
- To introduce the field of operations research which has many applications in management techniques.
- To develop the skills of formulation of LPP and different techniques to solve it.
- To know the application of Transportation and Assignment problems.

UNIT I


UNIT II


UNIT III

UNIT IV


UNIT V

Introduction – Definition of network, event, activity, optimistic time, pessimistic time, the most likely time, critical path, total float and free float – Difference between slack and float – Phases of critical path in a PERT network – Difference between CPM and PERT – Problems.

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Use the linear programming problems.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand about the procedure of solving an LPP.</td>
<td>8</td>
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<tr>
<td>CO-3</td>
<td>Understand about the balanced and unbalanced transportation problems.</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Know methods of solving assignment problems.</td>
<td>2</td>
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</table>

TEXT BOOKS:


REFERENCES:

Objectives:

- To develop skills in solving problems using numerical techniques
- This course covers the techniques of the numerical differentiation and Numerical Integration. It also deals with solution of difference equation, Algebraic and Transcendental equation and Numerical solution of ordinary differential equations of first order.

UNIT I


UNIT II

Finite Differences – Forward Differences – Backward Differences – Newton’s formulae for Interpolation – Central Difference Interpolation formulae – Gauss’s central difference formulae – Bessel’s formulae – Everett’s formulae.

UNIT III


UNIT IV

UNIT V


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Know the method of successive approximation.</td>
<td>2</td>
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<tr>
<td>CO-2</td>
<td>Understand about finite differences.</td>
<td>11</td>
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<tr>
<td>CO-3</td>
<td>Use the numerical differentiation.</td>
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<tr>
<td>CO-4</td>
<td>Determine solution of linear systems.</td>
<td>1</td>
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</table>

TEXT BOOKS:

REFERENCE:
Department of microbiology

SYLLABUS

CHOICE BASED CREDIT SYSTEM

SEMESTER PATTERN

M.Sc. Applied Microbiology

(2017-2018 onwards)
M. Sc. APPLIED MICROBIOLOGY
CHOICE BASED CREDIT SYSTEM
REGULATIONS
(w.e.f. 2017-2018)

1. CONDITIONS FOR ADMISSION

ELIGIBILITY CONDITIONS FOR ADMISSION

Candidate who has passed the B.Sc. degree in any Life Sciences (Microbiology / Applied microbiology/ Industrial Microbiology/ Botany/ Plant Sciences and Plant Biotechnology/ Zoology/ Animal Science/ Applied Animal Science and Animal Biotechnology/ Biochemistry/ Bioinformatics/ Biology/ Life Sciences/ Home Science/ Food Science & Nutrition/ BSMS/BAMS/BUMS/Chemistry with Botany / Zoology as Allied Subjects of this University or an Examination of any other University accepted by the Syndicate as equivalent thereto shall be eligible for admission to M.Sc. Degree Course in Microbiology.

Candidate shall be admitted to the examination only if he/she has taken the qualifying degree in Science/ Medical subjects as mentioned after having completed the prescribed courses consisting of twelve years of study and has passed the qualifying examination.

ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed course of study in a college affiliated to the University for a period of not less than two academic years, passed the examination of all the four semesters prescribed earning 100 credits and fulfilled such conditions as have been prescribed therefore.

Duration Of The Course
The programme for the degree of **Master of Science in Organic Chemistry** shall consist of **two Academic years** divided into four semesters. Each semester consist of 90 working days.

**Passing minimum:**

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

The candidate shall be declared to have passed the examination if the candidate secures not less than 50% marks in the Board examination in each paper / practical. However submission of a record notebook is a must. For the project work and viva-voce a candidate should secure 50% of the marks for pass.

**Examinations:**

**Theory Evaluation of Internal Assessment**

<table>
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<th>Component</th>
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<td>Snap test</td>
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<tr>
<td>Seminar</td>
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</tr>
<tr>
<td>CIA-I</td>
<td>5 Marks</td>
</tr>
<tr>
<td>CIA-II</td>
<td>5 Marks</td>
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<tr>
<td>Model Exam</td>
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<td><strong>Total</strong></td>
<td><strong>25 Marks</strong></td>
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</table>

The Passing minimum shall be 50% out of 25 marks (12.5 marks)
**Practical:**

**Evaluation of Internal Assessment**

<table>
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<tr>
<th>Test</th>
<th>Marks</th>
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</thead>
<tbody>
<tr>
<td>Test 1</td>
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</tr>
<tr>
<td>Test 2</td>
<td>15</td>
</tr>
<tr>
<td>Record</td>
<td>10</td>
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</table>

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Total 40 Marks  
---------------

The passing minimum shall be 50% out of 40 marks (20 Marks)

**Evaluation Of External Examinations**

Time: 6 Hours

Max Marks: 60

Distribution of Marks

<table>
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<tr>
<th>Viva-Voce</th>
<th>10 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record</td>
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<td>Estimation / Mixture / Expt.</td>
<td>35/20/45 Marks</td>
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<tr>
<td>Preparation / Calorimetric</td>
<td>10/15 Marks</td>
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</table>

Dissertation

Evaluation (External) : 100 Marks

Viva-voce (joint) : 20 Marks

**Regulations of Project Work**

- Students should do their five months [Dec to Apr] Project work in Company / Industries.
- The Candidate should submit the filled in format as given in Annexure-I to the department for approval during the 1st Week of January in their Project semester.
• Each internal guide shall have maximum of eight Students.
• Periodically the project should be reviewed minimum three times by the advisory committee.
• The Students should prepare three copies of the dissertation and submit the same to the college on 30th April for the evaluation by examiners. After evaluation one copy is to be retained in the College Library and one copy is to be submitted to the University (Registrar) and the student can hold one copy.
• A Sample format of the dissertation is enclosed in Annexure-II.
• Format of the Title page and certificate are enclosed in Annexure- III.
• The Students should use OHP / Power Point Presentation during their Project Viva voce Examinations.

Vision

To impart a high quality of education & training in the field of microbiology to enable successful career for the post graduate students in the field of research, education & industrial applications.

Mission

Independent thought, collegiality, exchange of ideas and high ethical standards, development of innovative instructional techniques and increased job opportunities.

Program Outcomes

<table>
<thead>
<tr>
<th>PO.No</th>
<th>Upon completion of M.Sc Degree programme , the graduates will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 1</td>
<td>Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.</td>
</tr>
<tr>
<td>PO 2</td>
<td>Perform analysis to assess, interpret, and create innovative ideas through practical experiment.</td>
</tr>
<tr>
<td>PO 3</td>
<td>Facilitate to enter multidisciplinary path to solve day-to-day scientific problems.</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PO 4</td>
<td>Prepare students for prominent career in industry, banks offices and for further academic study.</td>
</tr>
<tr>
<td>PO 5</td>
<td>Able to do the experiments with proper procedure, appropriately record and Analyze the results.</td>
</tr>
<tr>
<td>PO 6</td>
<td>Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.</td>
</tr>
<tr>
<td>PO 7</td>
<td>Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.</td>
</tr>
<tr>
<td>PO 8</td>
<td>Attain competency in job market / entrepreneurship.</td>
</tr>
</tbody>
</table>
Structure of M.Sc. (Applied Microbiology) Programme Under CBCS Pattern For Autonomous
(From 2018-2019)

Curriculum and Scheme of Examinations

<table>
<thead>
<tr>
<th>Sem.</th>
<th>Course code</th>
<th>Course</th>
<th>Hrs/wk</th>
<th>Credits</th>
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<td>General Microbiology</td>
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<td>4</td>
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<td>4</td>
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**Total**  
30 28 800

**III**

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<td><strong>24</strong></td>
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**Note:** Extension activities 60 hrs outside the class hrs (From Semester II & III)

<table>
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<td>Extension activities</td>
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<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>17P4STE01</td>
<td>Skills (LSRW) Through English (STE)</td>
<td>2</td>
<td>1</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>24</strong></td>
<td><strong>600</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grand Total** 120 100 2600
## Programme specific outcomes

<table>
<thead>
<tr>
<th>PSO-1</th>
<th>Students will be able to acquire, articulate, retain and apply specialized language and knowledge relevant to life science</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSO-2</td>
<td>Acquire knowledge and understanding of organism biology and genetics, evolution, molecular biology and basic biological chemistry. Instill the intellectual skills to analyze and solve biology-related problems, formulate and test hypothesis using experimental design.</td>
</tr>
<tr>
<td>PSO-3</td>
<td>Global level research opportunities to pursue Ph.D programme targeted approach of CSIR – NET examination</td>
</tr>
<tr>
<td>PSO-4</td>
<td>Explore the scientific literature effectively and use computational tools. Communicate ideas and principles effective through oral presentations, computer based tools and written reports.</td>
</tr>
<tr>
<td>PSO-5</td>
<td>Specific placements in R &amp; D and synthetic division of polymer industries &amp; Allied Division.</td>
</tr>
<tr>
<td>PSO-6</td>
<td>Graduates will acquire practical skills- plan &amp; execute experimental techniques independently as well as to analyse &amp; interpret data.</td>
</tr>
<tr>
<td>PSO-7</td>
<td>Graduates will effectively know the concept of metabolism, such as anabolic and catabolic activities in organisms</td>
</tr>
<tr>
<td>PSO-8</td>
<td>A general course emphasizing distribution, morphology and physiology of microorganisms in addition to skills in aseptic procedures, isolation and identification.</td>
</tr>
<tr>
<td>PSO-9</td>
<td>Analyze and apply latest laboratory technologies to solve problems in the areas of infection sites &amp; critical thinking.</td>
</tr>
<tr>
<td>PSO-10</td>
<td>Will get knowledge in designing a synthetic route for developing organic compounds, drugs, natural products &amp; also will be well versed in green concepts of organic synthesis.</td>
</tr>
</tbody>
</table>
CORE I- GENERAL MICROBIOLOGY

Objectives:

General microbiology deals with

- The early developments of microbiology,
- Basic concepts of what microorganism is & its characteristics,
- Importance of the various cellular organization,
- Taxonomic groups and their economic importance.
- Various types of microscopes
- Staining techniques for identification of microbes,
- The effect of various antimicrobial agents on microbial inhibition.

UNIT I Origin and Evolution of Microbiology – Contributions of Early Microbiologists – Classification of Microorganisms – Haeckel’s three kingdom concepts – Whittaker’s five kingdom concepts – Classification and Salient features of bacteria according to the Bergey’s manual of determinative bacteriology – Cyanobacteria.

UNIT II Microscopy – Simple – Compound, Dark field, Phase contrast, Fluorescent and Electron microscopes – SEM, TEM, freeze fraction, confocal microscopy and their applications – Stains and staining reactions – Simple, Differential and Special staining techniques.


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
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</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures</td>
<td>01</td>
</tr>
<tr>
<td>CO2:</td>
<td>Understand the structural similarities and differences among various physiological groups of bacteria/archaea</td>
<td>02</td>
</tr>
<tr>
<td>CO3:</td>
<td>Learn Culture media and their applications and also understand various physical and chemical means of sterilization</td>
<td>09</td>
</tr>
</tbody>
</table>

TEXTBOOKS


REFERENCES


**Web Site Addresses:**

1. http://www.sheffcol.ac.uk/links/Science/Biology/Microbiology
5. http://www.bris.ac.uk/vetpath/cpl/tut.html
CORE II- IMMUNOLOGY AND IMMUNOTECHNOLOGY

Objectives:

- To study in detail the components of the immune system.
- To learn the immunological basis of infectious diseases, cancer and transplantation.
- To distinguish and characterize various immune cells, to understand the mechanism of antibody diversity,
- To understand the role of cytokines in immunity, to understand the significance of the major histocompatibility.

Unit-I **Introduction:** History of Immunology, types of immunity- Innate and acquired, passive and Active. Primary Lymphoid organ - bone marrow and thymus, Secondary lymphoid organ- spleen and lymph nodes.Humoral and cell mediated immunity. Induction of immune response-Cytokines, lymphokines and chemokines.

**Unit-II Antigens, Antibodies and Complement system:** Antigens- properties and types. Haptens, adjuvants and Mitogen (superantigens).Immunoglobulins-structure, properties, types and subtypes. Complement pathways.

**Unit-III Major Histocompatibility Complex:** Structure, function of MHC and HLA system. Transplantation- organ transplantations in humans, tissue typing methods, Graft disease (GVHD). Autoimmune disease.Hypersensitivity reaction.

Unit-V Immunological techniques and their principles: antigen antibody interaction-Affinity, Avidity of antibody and epitope mapping. Invitro of immunological methods- agglutination, precipitation, complement fixation, neutralization, immunofluorescence, ELISA, Radial immunoassays. Cytotoxicity assay- labeled antibody technique and immunohistochemistry.

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<tr>
<th>Co.No</th>
<th>Upon completion of this course , students will be able to</th>
<th>PSO addressed</th>
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<tbody>
<tr>
<td>CO1:</td>
<td>Understand the mechanism of clonal selection, antibody diversity and various serological diagnostic techniques based on antigen – antibody interaction.</td>
<td>09</td>
</tr>
<tr>
<td>CO2:</td>
<td>Understand the cellular process involved in inflammation, immunity and hypersensitivity reactions.</td>
<td>02</td>
</tr>
<tr>
<td>CO3:</td>
<td>Describe the basic mechanism of innate and acquired immunity; humoral and Cell mediated immunity.</td>
<td>01</td>
</tr>
</tbody>
</table>

TEXTBOOKS


REFERENCES

1. Chapel H and Halbey M.1986. Essentials of Clinical Immunology

Web Site Addresses:

CORE III– MICROBIAL GENETICS AND MOLECULAR BIOLOGY

Objectives:

- To make a detailed study on the blueprint of life and the information centers called genes.
- To expose the mechanism and function of gene transfer methods.

UNIT I DNA the genetic material – Evidences for DNA as the genetic material – Importance of bacteria and viruses in genetics. The duplex DNA- Double helix and multiple conformations, Denaturation and Renaturation. RNA – Structure and as genetic material. Gene transfer mechanisms- Transformation, Conjugation and Transduction.


<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>Understanding of genetics, metabolism and development and relate these results to current theories and models in genetics.</td>
<td>01</td>
</tr>
<tr>
<td>CO2:</td>
<td>current understanding of the roles of molecular genetics underpinning aspects of bacterial life metabolic processes and gene regulation, eukaryote genetics and gene regulation, eukaryote developmental processes and basic principles of population and quantitative genetics.</td>
<td>02</td>
</tr>
<tr>
<td>CO3:</td>
<td>Understand concept of genes and Understand Process of DNA replication transcription, translation</td>
<td>01</td>
</tr>
</tbody>
</table>

**TEXTBOOKS**


**REFERENCES**


**Web Site Addresses:**

1. [www.en.wikipedia.org/wiki/Microbial_genetics](http://www.en.wikipedia.org/wiki/Microbial_genetics)

2. [www.microbiologyprocedure.com/genetics/microbial-genetics/microbial-genetics.htm](http://www.microbiologyprocedure.com/genetics/microbial-genetics/microbial-genetics.htm)

3. [www.bestwebbuys.com/Microbiology-N_10038066-books.html](http://www.bestwebbuys.com/Microbiology-N_10038066-books.html)


CORE - IV: BIOFERTILIZER TECHNOLOGY

Objectives
- To make the students to understand
- The microorganisms as potential biofertilizer organisms
- The technology of inoculum production.
- To make the students entrepreneurs.


UNIT-III Nitrogenous Biofertilizers I: Bacteria - Isolation and purification of Azospirillum and Azotobacter, mass multiplication of Azospirillum and Azotobacter, formulation of inoculum of Azospirillum and Azotobacter, application of inoculants of Azospirillum and Azotobacter. Isolation and purification of Rhizobium, mass multiplication and inoculum production of Rhizobium, Methods of application of Rhizobium inoculants.

UNIT-IV Isolation and purification of Cyanobacteria. Mass multiplication of cyanobacterial bioinoculants - Trough or Tank method, Pit method, Field method;
methods of application of cyanobacterial inoculum. Azolla - mass cultivation and application in rice fields.


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<tr>
<th>Co.No</th>
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<tbody>
<tr>
<td><strong>CO1:</strong></td>
<td>develop a knowledge on different microbial flora of soil, nitrogen fixing capacity and their use as biofertilizer</td>
<td>10</td>
</tr>
<tr>
<td><strong>CO2:</strong></td>
<td>Understand various biogeochemical cycles – Carbon, Nitrogen, Phosphorus cycles etc.</td>
<td>07</td>
</tr>
<tr>
<td><strong>CO3:</strong></td>
<td>Understand various plant microbes interactions especially mycorrhizae and their applications especially the biofertilizers and their production techniques</td>
<td>05</td>
</tr>
</tbody>
</table>

**REFERENCES**


CORE V – MEDICAL BACTERIOLOGY AND VIROLOGY

Objectives:

- To provide a comprehensive theoretical knowledge of animal, plant and bacterial viruses.
- To understand the basic techniques of viral culture.
- The mechanism of Pathogenesis, laboratory diagnosis and treatment of bacterial and viral infections.


UNIT II  Morphology, classification, culture characters, pathogenicity, laboratory diagnosis, control and treatment of following organisms. *Staphylococci*, *Streptococci, Pneumococcus, Neisseriae, Corynebacteriumdiphtheriae, Mycobacteria, Clostridium tetani and Bacillus anthracis.*

UNIT III  Morphology, classification, culture characters, pathogenicity, laboratory diagnosis, control and treatment of following organisms. *Escherichia, Klebsiella, Proteus,Salmonella, Shigella, Vibrio cholerae, Pseudomonas aeruginosa, Haemophilusinfluenzae and Yersninapestis. Mycoplasma pneumonia*

UNIT IV  General Properties of viruses – Structure, replication, reaction to physical and chemical agents. Serodiagnosis of viral infections – Cultivation and detection of viruses – Structure and properties of prions and viroids – Anti-viral agents (Drugs, Interferons& Vaccines).

UNIT V  Classification and nomenclature of animal & human viruses – Epidemiology, Life cycle, Pathogenicity, Diagnosis, Prevention and Treatment of
RNA viruses – Picorna, Orthomyxo, Paramyxo and Arbo viruses – Rhabdo, HIV and Oncogenic viruses.

<table>
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<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
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<tbody>
<tr>
<td>CO1:</td>
<td>Know the morphological, biochemical, cultural properties of medically important bacteria and virus.</td>
<td>07</td>
</tr>
<tr>
<td>CO2:</td>
<td>Learn the methods of collection, transport and processing of clinical specimens.</td>
<td>09</td>
</tr>
<tr>
<td>CO3:</td>
<td>Comprehend the diagnosis of bacterial and viral infections and prevention methods.</td>
<td>09</td>
</tr>
</tbody>
</table>

**TEXTBOOKS**


**REFERENCES**


Web Site Addresses:

2.  http://www.virology.net/garryfavwebaids.html#genaids
4.  http://users.ox.ac.uk/~genemed/virology.htm
CORE VI – MEDICAL MYCOLOGY AND PARASITOLOGY

Objectives:

- To provide a comprehensive theoretical knowledge of animal, plant and bacterial viruses.
- To understand the basic techniques of viral culture.


UNIT II Morphology, classification, culture characters, pathogenicity, laboratory diagnosis, control and treatment of following organisms. **Superficial mycosis** – Pityriasis versicolor, Tineanigra **Cutaneous mycosis** – Dermatophytosis; **Subcutaneous mycosis** – Sporotrichosis, Mycetoma. Chromoblastomycosis.

UNIT III Morphology, classification, culture characters, pathogenicity, laboratory diagnosis, control and treatment of following organisms **Systemic mycosis** – Histoplasmosis. **Opportunistic mycosis** – Candidosis, Cryptococcosis – Aspergillosis.


UNIT V Infection of helminthes – Taeniasolium, T.saginata, Echinococcus granulosus, Fasciola hepatica, Paragonimus westermani and Schistosomes.
Ascaris lumbricoides, Ancylostoma duodenmale, Trichuris, Enterobious and Wuchereria bancrofti.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
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</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>Students the conceptual basis for understanding pathogenic fungi and parasite along with the mechanisms by which they cause disease in the human body.</td>
<td>01</td>
</tr>
<tr>
<td>CO2:</td>
<td>develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of fungal and parasitic diseases.</td>
<td>09</td>
</tr>
<tr>
<td>CO3:</td>
<td>Demonstrate practical skills in fundamental microbiological techniques for fungi and parasitic infection.</td>
<td>09</td>
</tr>
</tbody>
</table>

**TEXT BOOKS**


**REFERENCES**


**Web Site Addresses:**

1. [http://dmoz.org/Science/Biology/Microbiology/](http://dmoz.org/Science/Biology/Microbiology/)
3. [http://cal.vet.upenn.edu/parasite/links.html](http://cal.vet.upenn.edu/parasite/links.html)
ELECTIVE I- PHARMACEUTICAL CHEMISTRY

Objectives:

- To know about fundamentals of chemistry
- To expose the students to the concepts of production of therapeutics
- To learn techniques used in pharmaceutics & also drug actions


UNIT III Pharmacokinetics and Pharmacodynamics - Routes of drug administration- volume of distribution- biotransformation- phase I and phase II reactions- bioavailability- excretion of drugs and their metabolites as defined by Henderson hasselbalch equation.

UNIT IV Mechanism of action of drugs - Drug physical and chemical actions – drug interactions- therapeutic applications of beneficial interactions. Adverse drug

**UNIT V Techniques in pharmaceutics** – Screening, extraction procedures, purification and evaluation of biomedical potential and the side effects of the drugs. Evaluation of drugs in biological fluids - bioassays, microbiological assays, radio immunoassays.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>CO1:</td>
<td>Demonstrate the importance of chemistry in the development and applications of therapeutic drugs.</td>
<td>05</td>
</tr>
<tr>
<td>CO2:</td>
<td>Gain an appreciation of the importance of ionization of drugs with respect to the solubility and efficacy of drugs.</td>
<td>10</td>
</tr>
<tr>
<td>CO3:</td>
<td>Develop an understanding of the physic-chemical properties of drugs.</td>
<td>09</td>
</tr>
</tbody>
</table>

**Text Books**


Reference Books

3. Biosynthesis of Marine Natural Products: Microorganisms and Macroalgae. B. S. Moore, Natural Products Report, 1999, 16, 653-674

Websites

http://www.chemlin.net/chemistry/pharmaceuticalChemistry.htm
http://www.internetchemie.info/chemistry/pharmaceutical-chemistry.htm
http://web.chem.ucla.edu/~harding/orglinks.html
http://ibchem.com/IB/ibfiles/options/opt_B/opb.htm
CORE VII- GENETIC ENGINEERING AND ADVANCES IN BIOTECHNOLOGY

Objectives:

- To impart thorough knowledge of the basic tools in genetic engineering
- To expose the students to the concepts of genetic recombination, sequencing and gene amplification.
- To explain the applications of biotechnological tools
- To study the applications of engineering in plants, animals and environmental aspects.

UNIT I


UNIT II


UNIT III

UNIT IV


UNIT V

Techniques in Biotechnology—Blotting techniques—Southern, Northern and Western blotting. PCR amplification and its application. RFLP and RAPD analysis and its applications. DNA sequencing methods—dideoxy, chemical and Next Generation Sequencing (NGS). Chromosomal walking, chromosome jumping, site directed mutagenesis, Protein engineering.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
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</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>explain that genetic engineering involves the extraction of genes from one organism and placing them into another organism</td>
<td>05</td>
</tr>
<tr>
<td>CO2:</td>
<td>describe how sections of DNA containing a desired gene can be extracted from a donor organism using restriction enzymes</td>
<td>10</td>
</tr>
<tr>
<td>CO3:</td>
<td>How isolated DNA fragments can be placed in plasmids, with reference to the role of ligase.</td>
<td>09</td>
</tr>
</tbody>
</table>
TEXT BOOKS


REFERENCE BOOKS


CORE VIII - SOIL, AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY

Objectives:

Soil & Agricultural Microbiology tells about

- The distribution of the various major groups of organisms found in the soil environment,
- Positive and negative interactions among these group of organisms,
- Agricultural importance of microorganisms and their role,
- Microbes benefiting and affecting agricultural practices.

UNIT I

Discoveries in soil Microbiology; distribution of microorganisms in soil, Autochthonous, Allochthonous and Zymogenous microbes, quantitative estimation of microorganisms in soil, role of microorganisms in soil fertility; influence of soil and environmental factors on micro flora, moisture, pH, temperature, organic matter, agronomic practices.

UNIT II

Interaction between soil microbes–Neutralism, Commensalism, Symbiosis, Synergism, Amensalism, Parasitism, Predation and Competition. Interrelationships between soil microbes and plants, Rhizosphere concept, R:S ratio, rhizoplane; spermosphere; phyllosphere, Mycorrhizae-types, Rumen flora, Insects microbial interactions.

UNIT III

UNIT IV


UNIT V


<table>
<thead>
<tr>
<th>Co.No</th>
<th>PSO addressed</th>
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<tbody>
<tr>
<td>CO1:</td>
<td>01</td>
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<tr>
<td>CO2:</td>
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</tbody>
</table>

Upon completion of this course, students will be able to

CO1: Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection and characterization

CO2: Understand various plant microbes interactions especially
rhizosphere, phyllosphere and mycorrhizae and their applications especially the biofertilizers and their production techniques.

| CO3: | Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment | 02 |

**TEXT BOOK:**


**REFERENCE BOOKS:**


Course Objectives

- This course is to know current bio-resources and their exploitations on the production of microbial products.
- The content of the precise course include nature of the bio-resources, industrially important microorganisms, up and down stream process, functions of the fermentors, primary and secondary metabolites and production of recombinant products.
- It also covers production of steroids, sterols and non-steroid compounds through microbial transformations.

Unit I

Introduction to fermentation technology: Interaction between chemical engineering, Microbiology and Biochemistry. History of fermentation. Introduction to fermentation processes, Microbial culture selection for fermentation processes. Media formulation and process optimization.

Unit –II

Gaden’s Fermentation classification, Design and operation of Fermentor, Basic concepts for selection of a reactor, packed bed reactor, Fluidized bed reactor, Trickle bed reactor, Bubble column reactor, Scale up of Bioreactor.

Unit -III

Down Stream processing.Recovery of particulate matter, product isolation, distillation, centrifugation, whole broth processing, filtration, aqueous two-phase separation, solvent extraction, chromatography and electrophoresis.
UNIT IV

Microbial production of organic acids (Citric acid, Acetic acid, Lactic acid and Itaconic acid), Amino acids (L - Glutamic acid and L - Lysine), Antibiotics (Penicillin, Semi synthetic penicillins, Streptomycin, Tetracyclines and Griseofulvin), enzymes (Amylases, Proteases and Pectinases), vitamins (B12, B2 and C), alcoholic beverages. Microbial transformations – steroids, sterols, antibiotics and pesticides

UNIT V

Production of vaccines, toxoid, antisera and their standardization. Antiseptics, disinfectants and their standardization. Types of water (DM/Purified water/water for injection) used in pharmaceutical industry. Environmental monitoring. Growth promotion test.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSO addressed</th>
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</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>Should have understood the basics of fermentation technology and learnt the concept of screening, optimization and maintenance of cultures.</td>
<td>09</td>
</tr>
<tr>
<td>CO2:</td>
<td>Knowledge about - combining living matter, in the form of organisms or enzymes, with nutrients under specific optimal conditions to make a desired product</td>
<td>07</td>
</tr>
<tr>
<td>CO3:</td>
<td>Antibiotics, synthetic antimicrobial agents and Regulations aspects in pharmaceutical industry</td>
<td>10</td>
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</tbody>
</table>

Text Book:


References:


Course Objectives

- To know Basic principles of embryology and general anatomical concepts.
- Develop a broad understanding of the structural organization of the human body at the macroscopic level.
- Develop a foundation for physical examination and functional assessment of the human organism.

UNIT I

An Introduction to Human body - Overview of level of organization and characteristics- Digestive system - Components of digestive system (GI tract and accessory organs) and their functions.

UNIT II

Muscular system - Muscle tissue - types (Skeletal, smooth and cardiac) – functions and properties. Neuro muscular junction.

UNIT III

Respiratory system - Anatomy - External and internal respiration. Cardiovascular system - Anatomy of heart, Cardiac cycle and ECG.

UNIT IV

UNIT V


<table>
<thead>
<tr>
<th>Co.No</th>
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<tbody>
<tr>
<td>CO1:</td>
<td>Use anatomical terminology to identify and describe locations of major organs of each system covered</td>
<td>01</td>
</tr>
<tr>
<td>CO2:</td>
<td>To explain structure and functions of Respiratory, Digestive, Circulatory, Excretory, Reproductive and Endocrine systems.</td>
<td>01</td>
</tr>
<tr>
<td>CO3:</td>
<td>To explain properties of digestive and excretory system. List of organs of all other systems.</td>
<td>01</td>
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TEXT BOOKS:


REFERENCES:


SEMESTER - IV

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<tr>
<td>Marks</td>
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CORE X- RESEARCH METHODOLOGY, BIOSTATISTICS AND BIOINFORMATICS

Course Objectives

- understand some basic concepts of research and its methodologies
- Identify appropriate research topics
- Select and define appropriate research problem and parameters
- Prepare a project proposal (to undertake a project)
- To learn about the bioinformatics databases, databanks, data format and data retrieval from the online sources.
- To make students understand the essential features of the interdisciplinary field of science for better understanding biological data.
- To provide the student with a strong foundation for performing further research in bioinformatics.

UNIT I

UNIT II


UNIT III

ANOVA (one way and two way), Chi square test – Student’s T test – testing of hypothesis-null hypothesis- level of significance-standard error. F Test

Web Resources for Microbiology – Use of Digital Library.

UNIT IV

Bioinformatics - Introduction and skills for a bioinformatician. Biological databases-Database searching, Sequence analysis, Pair alignment, Visualizing proteins tructures, Predicting structure and function of protein using sequences, Tools for genomics and proteomics.

UNIT V

Bioinstrumentation - Principles and applications of pH meter, Centrifuge. Electrophorosis, Chromatography - Thin layer, Column, Gas and high pressure liquid chromatography, spectrophotometry, NMR, Atomic absorption spectrophotometer, Microbial Identification System, Autoanalyser - ELISA Reader.

<table>
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<tr>
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<tbody>
<tr>
<td>CO1:</td>
<td>A basic understanding of the underlying principles of quantitative and qualitative research methods.</td>
<td>04</td>
</tr>
<tr>
<td>CO2:</td>
<td>Different computational methods used in basic biostatistics</td>
<td>04</td>
</tr>
<tr>
<td>CO3:</td>
<td>Various modes of presenting and disseminating research</td>
<td>03</td>
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</tbody>
</table>
TEXT BOOKS:


REFERENCES:


Objectives:

In food and dairy microbiology

- Study about food preservation, spoilage and detection of pathogens using advanced techniques.
- To study about importance of microbes in dairy microbiology

In poultry microbiology

To know about the poultry pathogens and its detection methods

Unit-I: Food as substrate for microorganisms: Microorganisms important in food microbiology- Molds, yeasts and Bacteria- General characteristics- classification and importance. Principles of food preservation- physical, chemical preservatives and food additives. Factors influencing Microbial growth in food- Extrinsic and Intrinsic factors.

Unit-II: Contamination and spoilage: Cereals, sugar products, vegetables, fruits, meat and meat products, milk and milk products- Fish and sea food- spoilage of canned foods. Detection of spoilage and characterization.

Unit-III: Food-borne infection and intoxications: Bacterial and non bacterial- with examples of infective and toxic types- Brucella, Bacillus, Clostridium, Salmonella, Escherichia, Shigella, Staphylococcus, Vibrio, Yersinia, Campylobacter, Nematodes, Protozoa, algae, fungi and viruses. Molecular and immunological methods for detection of food pathogens.
Unit-IV: Milk - Its composition,-Microbial analysis of raw milk- control of microorganisms in milk- Role of constituents and method of manufacture of cheese (bacterial and mold ripened) butter and ice cream- fermented milk beverages-probiotics-potential benefits-characteristics need for probiotics culture.


<table>
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<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
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<tr>
<td>CO1:</td>
<td>Get sufficient knowledge in relationship between food and microbes, techniques used in food processing.</td>
</tr>
<tr>
<td>CO2:</td>
<td>Know advanced theoretical education and practical training in the area of food microbiology.</td>
</tr>
<tr>
<td>CO3:</td>
<td>Know about microbiological quality control analysis in food science technology.</td>
</tr>
</tbody>
</table>

PSO addressed

01

09

09

TEXTBOOKS


REFERENCES


   New York.


6. Frank.E. Cunningham-The Microbiology of poultry meat products.
   Andrew Davies and Ron Board-The Microbiology of Meat and Poultry.


ELECTIVE III - NANOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS

Objectives:

- To impart the knowledge of Nano Science and its application in biology
- To improve the knowledge about recombinant products with help of advanced techniques
- To know the molecular diagnostic methods

UNIT I


UNIT II


UNIT III
Synthesis of nanoparticles and microorganisms and Use of Nanoparticles in Animals - Nanoparticles for Imaging and Therapy in Humans - Military applications of Nanotechnology - Nanomaterials for food Applications - Toxicity of Nanoparticles - Future Perspectives.

UNIT- IV

IPR - Definition - Types of IP: Patents, Trademarks, Copyright & Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, IP as a factor in R&D; IPs of relevance to Microbiology few Case Studies.WTO - Definition - Functions - Forms of IPR Protection.

UNIT-V

Biosafety – Introduction, Historical background, Introduction to biological safety cabinets, Primary Containment for Biohazards, Biosafety levels, Biosafety levels of Specific Microorganisms. Bioethics-Definition - Animal Ethics – Norms in India – Licensing of animal house – ethical clearance norms for conducting studies on human subjects.

<table>
<thead>
<tr>
<th>Co.No</th>
<th>Upon completion of this course, students will be able to</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>The applications of nanotechnology will influence science of tomorrow and will change many sides of our life.</td>
</tr>
<tr>
<td>CO2:</td>
<td>Introduce students to intellectual property rights and their application.</td>
</tr>
<tr>
<td>CO3:</td>
<td>Develop students’ ability to prepare a professional written memorandum, as well as understanding and drafting the main types of legal contracts used in this area.</td>
</tr>
</tbody>
</table>

PSO addressed

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>03</td>
</tr>
<tr>
<td>CO2:</td>
<td>02</td>
</tr>
<tr>
<td>CO3:</td>
<td>06</td>
</tr>
</tbody>
</table>
TEXTBOOKS


REFERENCES

1. Immobilization of cells and enzymes
2. Microbial production of wine
3. Minimal inhibitory concentration (MIC) determination of antibiotics – Broth Dilution
4. Minimal inhibitory concentration (MIC) determination of antibiotics – Filter paper disc assay

**REFERENCE BOOKS:**

1. Handling and maintenance of bright field microscopy.
2. Micrometry – Measurement of microorganisms
5. Media preparation-Liquid, solid, Agar deep, slant and plate
6. Pure culture techniques: Streak plate, pour plate, spread plate.
7. Enumeration of bacteria from soil & Water sample.
8. Growth curve
   a. Visual method-Haemocytometer method
9. Effect of various factors on growth of bacteria
   i). Temperature
   ii). pH
10. Antibiotic sensitivity test – Kirby – Bauer methods.

**TEXT BOOKS**


**REFERENCES**

PRACTICAL-II
(IMMUNOLOGY, IMMUNO TECHNOLOGY & MICROBIAL GENETICS & MOLECULAR BIOLOGY)

Practical Exam. Hours: 6 hours/day

1. ABO Blood grouping – Rh typing and cross matching.
2. Agglutination tests.
   a. WIDAL – slide and tube test
   b. RA test
   c. ASO test
   d. CRP test
   e. HCG test
3. Precipitation reaction
   i). Ouchterlony’s Double Immunodiffusion test (ODD)
   ii). Counter immunoelectrophoresis (CIE)
   iii). Rocket immunoelectrophoresis
4. Rapid plasma reagin test
5. Isolation of mutants by replica plating and gradient plate technique.
6. Bacterial conjugation
7. Development of competent cells in E.coli.
8. Bacterial transformation
9. Isolation of phage from sewage.
10. Isolation of chromosomal DNA from Bacteria.

TEXT BOOKS


REFERENCES

2. Immunochemistry (Vol. IV) Publication, Chicago
4. Essential Immunology (1997) Ivan Roitt (Blackwell Science Publishers, UK,
SEMESTER – II

PRACTICAL-III

(MEDICAL BACTERIOLOGY AND VIROLOGY)

Practical Exam. Hours: 6 hours/day

1. Collection and transport of clinical specimens from sputum, pus, urine, faeces, blood and CSF.
2. Culture techniques for sputum, pus, urine, faeces, blood and CSF.
3. Identification of pathogenic bacteria from clinical specimens.
   - Staphylococcusspp
   - Salmonellasspp
   - Streptococcusspp
   - Shigellaspp
   - Bacilluspp
   - Vibriospp
   - Escherichiaspp
   - Pseudomonasspp
   - Klebsiellaspp
   - Proteusspp
4. Viral cultivation methods - Egg inoculation techniques (All routes)
5. Haemagglutination (HA) test
6. Haemagglutination inhibition (HI) tests.
7. Diagnosis of HIV virus ELISA Method
8. Diagnosis of HBV virus ELISA Method

TEXT BOOKS


**REFERENCES**


**Web Site Addresses:**

http:// www.bact.wise.edu/bact330

http:// www.bact.wise.edu/microtextbook/

http:// www.textbook of microbiology.net/

http:// www.microbeworld.org/

http:// www.protocol-online.com

http:// www.microbiologyonline.org.uk/
http://www.microbes.info/
http://dmoz.org/science/biology/microbiology
http://www.biosci.ohio-state.edu/%7Eparsite/home.html
http://cal.vet.upenn.edu/parasitic/links.htm
PRACTICAL-IV
(MEDICAL MYCOLOGY AND PARASITOLOGY)

Practical Exam. Hours: 6 hours/day

1. Direct microscopy – KOH and Lactophenol cotton blue preparations for skin scrapings for fungi
2. Cultivation of fungi.
3. Culture media and their uses in fungal cultivation.
4. Isolation and identification of fungal pathogens from clinical specimens.
5. Dermatophytes Histoplasma spp.
6. Aspergillus spp Candida spp.
7. Fusarium spp Cryptococcus spp.
8. Examination of cysts/ Ova in faeces – Direct Method
9. Simple floatation
10. Concentration methods
11. Formal ether Method
12. Zinc sulphate Methods

TEXT BOOKS


**REFERENCES**


**Web Site Addresses:**

http://www.bact.wise.edu/bact330

http://www.bact.wise.edu/microtextbook/

http://www.textbook of microbiology.net/

http://www.microbeworld.org/

http://www.protocol-online.com

http://www.microbiologyonline.org.uk/

http://www.microbes.info/
http://dmoz.org/science/biology/microbiology

http://www.biosci.ohio-state.edu/%7Eparasite/home.html

http://cal.vet.upenn.edu/parasitic/links.htm
PRACTICAL – V- GENETIC ENGINEERING AND INDUSTRIAL MICROBIOLOGY

1. Restriction digestion of Chromosomal DNA
2. Isolation of plasmid DNA.
3. PCR amplification of Chromosomal DNA (Demo).
4. SDS - PAGE.
5. Protein estimation by Lowry et al method
6. Separation of biomolecules by paper and thin layer chromatography.
7. Immobilization of cells and enzymes
8. Microbial production of wine
9. Minimal inhibitory concentration (MIC) determination of antibiotics – Broth Dilution
10. Minimal inhibitory concentration (MIC) determination of antibiotics – Filter paper disc assay

REFERENCE BOOKS:


PRACTICAL-VI
SOIL, AGRICULTURAL AND ENVIRONMENTAL
MICROBIOLOGY

Practical Exam.Hours: 6 hours/day

1. Enumeration of microbial population from soil
2. Isolation of free living nitrogen fixing bacteria from soil – Azotobacter
3. Isolation of symbiotic Nitrogen fixing bacteria from root nodule – Rhizobium
4. Enumeration of microorganisms from phyllosphere
5. Study of cyanobacteria.
6. Examination of plant diseases
   a. Bacterial Disease- Blight of rice, Citrus canker, Brown rot of potato
   b. Fungal Disease- Blast of rice, Red rot of sugarcane, Tikka leaf spot of ground nut, Alternaria leaf spot.
7. Bacterial examination of water (qualitative)
8. Standard plate count (quantitative test)
9. Membrane filter technique
10. Enumeration of microorganism from air
    i) Settle plate technique, ii) Air sampling technique
11. Isolation of cellulolytic organisms.

TEXT BOOKS

REFERENCES

**PRACTICAL-VII**

**FOOD, DAIRY AND POULTRY MICROBIOLOGY**

**Practical Exam. Hours: 6 hours/day**

1. Microbiological analysis of food products.
2. Direct microscopic count of organism in milk (Breeds count).
5. Litmus milk test.
6. Microbiological examination of spoiled foods.
7. Effect of food preservatives on survival of food spoilage organism
8. Examination of microbial load in soft drinks.
9. Examination of microbial load in ice – creams.
10. Molecular and immunological methods for food pathogen diagnosis
11. Haemagglutination (HA) test and Haemagglutination Inhibition (HI) for ND and IB.
12. Salmonellosis-Isolation and Identification of *Salmonella pullorum* from cloaca swabs.

**TEXTBOOKS**


REFERENCES


Web site addresses

1. www.wikipedia.org/wiki/Food_microbiology
2. www.microbes.info/resources/Food_Microbiology
3. www.bionewsonline.com/1/what_is_food_microbiology.htm
4. www.en.wikipedia.org/wiki/Environmental_microbiology
5. www.microbes.info/resources/Environmental microbiology
Selvamm Arts and Science College (Autonomous)

Nationally Reaccredited at ‘A’ Grade by NAAC
UGC Recognized 2(f) and 12(B) Institution
Affiliated to Periyar University, Salem.
Namakkal-637 003

MASTER OF SCIENCE PROGRAMME

Department of Physics
M.Sc., Physics Syllabus

Choice Based Credit System (CBCS)

REGULATIONS AND SYLLABUS

Effective from 2017-2018
Vision

Integrated Development of Urban and Rural Students and empowering them for Social Transformation through Physics Education.

Mission

Provide adequate facilities to master the theories and experiments in Physics through innovative teaching and evaluation Strategies.

To enrich with scientific skills and temper to be a self – reliant and responsible Citizen of our country.

Programme Outcomes:

PO 1: Application: Apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.

PO 2: Analysis: Perform analysis to assess, interpret, and create innovative ideas through practical experiment.

PO 3: Solution Finding: Facilitate to enter multidisciplinary path to solve day-to-day problems.

PO 4: Progression in Career: Prepare students for prominent career in industry, banks offices and for further academic study.

PO 5: Research Capability: Able to do the experiments with proper procedure, appropriately record and Analyze the results.

PO 6: Expressing their talents: Improve communication ability and knowledge transfer through ICT aided learning integrated with library resources.

PO 7: Individual sustainability: Carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.

PO 8: Competency: Attain competency in job market / entrepreneurship.
## 4. Structure and Scheme of Examination for M.Sc. Physics 2017 - 2018

<table>
<thead>
<tr>
<th>Sem</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Hrs / Week</th>
<th>Exam hours</th>
<th>Credits</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>17P1PH01</td>
<td>Advanced Mathematical Physics</td>
<td>5</td>
<td>3</td>
<td>5</td>
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<tr>
<td>I</td>
<td>17P1PH02</td>
<td>Classical Mechanics</td>
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<td>3</td>
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<tr>
<td>I</td>
<td>17P1PH03</td>
<td>Advanced Electronics</td>
<td>5</td>
<td>3</td>
<td>5</td>
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<tr>
<td>I</td>
<td>17P1PHEx</td>
<td>Elective Course – I</td>
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<td>17P1PHP01</td>
<td>Practical – I : Advanced Electronics Experiments</td>
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<tr>
<td>II</td>
<td>17P2PH04</td>
<td>Electromagnetic Theory</td>
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<td>II</td>
<td>17P2PH05</td>
<td>Quantum Mechanics – I</td>
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<td>II</td>
<td>17P2PHEx</td>
<td>Elective Course – II</td>
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<td>II</td>
<td>17P2PHP02</td>
<td>Practical – II : Advanced Physics Experiments</td>
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<td>17P2HR01</td>
<td>Human Rights</td>
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<tr>
<td>III</td>
<td>17P3PH06</td>
<td>Thermodynamics and Statistical Mechanics</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>25</td>
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<tr>
<td>III</td>
<td>17P3PH07</td>
<td>Quantum Mechanics – II</td>
<td>5</td>
<td>3</td>
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<tr>
<td>III</td>
<td>17P3PH08</td>
<td>Microprocessor and Microcontroller</td>
<td>5</td>
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<td>III</td>
<td>17P3PH09</td>
<td>Condensed Matter Physics</td>
<td>5</td>
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<td>17P3PHP03</td>
<td>Practical – III : Microprocessor and Microcontroller</td>
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<td>4</td>
<td>4</td>
<td>40</td>
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<td><strong>28</strong></td>
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<tr>
<td>IV</td>
<td>17P4PH10</td>
<td>Nuclear and Particle Physics</td>
<td>5</td>
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<td>17P4PH11</td>
<td>Molecular Spectroscopy</td>
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<td>IV</td>
<td>17P4PHEx</td>
<td>Elective Course – IV</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<tr>
<td>IV</td>
<td>17P4PHPR1</td>
<td>Project Work</td>
<td>13</td>
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<td>8</td>
<td>--</td>
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<tr>
<td>I-IV</td>
<td>17P4STE01</td>
<td>Skills(LSRW) Through English [STE]</td>
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<td>--</td>
<td>1</td>
<td>25</td>
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<tr>
<td>I-IV</td>
<td></td>
<td><strong>Total Hours and Credits</strong></td>
<td><strong>30</strong></td>
<td><strong>23</strong></td>
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</tr>
<tr>
<td>II-III</td>
<td>17P4EX01</td>
<td>Extension Activity: Empowering Rural People [ERP]</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
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</tbody>
</table>

|              | **Total** | **100** | **2300** |

**M.Sc. Physics**

*Effective from 2017–2018*
Selvamm Arts & Science College (Autonomous) Namakkal – 637 003

Department of Physics

M.Sc. Physics

CIA - Continuous Internal Assessment  ESE - End Semester Examination
x - Corresponding Elective Course
xxxx - Corresponding Extra Disciplinary Course by other department

EDC (Extra Disciplinary Course) - Students are expected opt EDC offered by other Departments.

Elective Courses:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Elective Courses</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Non Conventional Energy Sources</td>
<td>17PxPHE01</td>
</tr>
<tr>
<td>2.</td>
<td>Crystal Growth and Thin Films</td>
<td>17PxPHE02</td>
</tr>
<tr>
<td>3.</td>
<td>Nano Science</td>
<td>17PxPHE03</td>
</tr>
<tr>
<td>4.</td>
<td>Semiconductor Physics</td>
<td>17PxPHE04</td>
</tr>
<tr>
<td>5.</td>
<td>Modern Optics</td>
<td>17PxPHE05</td>
</tr>
<tr>
<td>6.</td>
<td>Communication System</td>
<td>17PxPHE06</td>
</tr>
</tbody>
</table>

x - Corresponding Semester

Extra Disciplinary Courses:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Extra Disciplinary Courses</th>
<th>Course Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Medical Physics</td>
<td>17P2PHED1</td>
</tr>
<tr>
<td>2.</td>
<td>Renewable Energy Sources</td>
<td>17P2PHED2</td>
</tr>
<tr>
<td>3.</td>
<td>Biophysics</td>
<td>17P2PHED3</td>
</tr>
</tbody>
</table>
Programme Specific outcomes:

**PSO1:** Gain the subject knowledge in depth and applications of Concepts.

**PSO2:** Solve the Mathematical and Physical Problems in the level of Competitive exams.

**PSO3:** Create design and conduct experiments/ demonstration/ Models to analyze and interpret the data.

**PSO4:** Design and develop the electronic circuits and Programs.

**PSO5:** Acquire the Knowledge on the Laws, Theorem and equations.

**PSO6:** Develop the Proficiency on energies to meet out the social needs.

**PSO7:** Gain the technical knowledge on instrumentations, synthesis and characterization of materials.

**PSO8:** Plot a basic Research foundation and develop the presentation Skill with Proper Communication.

**PSO9:** Employability skills, Leadership quality and Entrepreneurial Skills.

**PSO10:** Higher education towards ethics and social relevant.
CORE I - ADVANCED MATHEMATICAL PHYSICS

Semester: I
Course code: 17P1PH01

Credits: 5
Hours/Week: 5

Objectives

1. To understand various mathematical techniques and concepts.
2. To understand Mathematical applications to physical situations in various branches of Physics like mechanics, electrostatics, electrodynamics, fluid dynamics, etc are taught.

Unit- I: Vector Space and Tensors

Linear Vector Space - Linear independence of vector – Schmidt’s Orthogonalisation Method - Schwartz inequality – Application of vector to hydrodynamics – Equation of continuity.

Tensors - N-dimensional space - Superscripts – Subscripts - Kronecker delta symbol – Algebric operation of tensors - Symmetric and Antisymmetric tensors - Application of tensors - Dynamics of particle.

Unit- II: Partial Differential Equations

Introduction- Solution of Laplace’s Equation in Cartesian Coordinates – Solution of Laplace’s Equation in 2D cylindrical coordinates – Solution of Laplace’s equation in general cylindrical coordinates – Solution of Laplace’s equation in spherical Polar coordinates – Fourier equation of heat flow – Solution of heat flow equation (Solution of equation only) – D Alembert’s Solution.

Unit- III: Complex Integrations

Line integral in the complex function - Cauchy’s integral theorem (Cauchy’s proof) - Cauchy’s integral formula - Derivatives of an analytic function – Taylor’s series, Laurent’s series (Statement and proof only) - Residues and their evaluation - Cauchy’s residue theorem.

Unit- IV: Special Functions

Solution of Bessel – Legendre – Lagurre - Hermite differential equation - Dirac delta function - Three dimensional Dirac delta function - Green’s function for one dimensional case - Symmetry property of Green’s function.
Unit - V: Group Theory

- Concept of group - Abelian group - Irreducible and reducible representation - Symmetry element and symmetry operation - Unitary transformation - Schur’s lemma, Great Orthogonality theorem (Statement and proof only)

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>How to apply the basic methods of mathematical physics in addressing the statics and dynamics of physical systems on examples from classical and quantum physics.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>The theory of partial differential equations are perhaps most closely associated with mathematical physics.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Use complex function techniques, Employ analytical techniques to solve boundary value problems.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>Apply symmetry considerations and group theory to solve problem within spectroscopic techniques, solid state physics and particle physics.</td>
<td>2</td>
</tr>
<tr>
<td>CO-5</td>
<td>The student shall be able to contribute to innovation and application of basic research.</td>
<td>8</td>
</tr>
</tbody>
</table>

Books for Study:

Books for Reference:

M.Sc. Physics Effective from 2017–2018
Semester: I                          Credits: 5
Course code: 17P1PH02              Hours/Week: 5

Objectives
1. To understand the fundamental principles of Classical Mechanics and their applications
2. To learn various mathematical techniques of classical mechanics and their applications to physical systems and introduce relativistic dynamics.

Unit I: Fundamental Principles and Lagrangian Formulation

Unit II: Motion under Central Force

Unit III: Rigid Body Dynamics and Oscillatory Motion

Unit IV: Hamilton’s Formulation
Hamilton’s canonical equations of motion – Hamilton’s equations from variation principle – Applications of Hamilton’s equations of motion to linear harmonic oscillator, pendulum, compound pendulum and charged particles in an electromagnetic field - Principle of least action – Canonical transformations
– Poission bracket – Hamilton--Jacobi method – Action and angle variables – Kepler’s problem in action angle variables.

**Unit V: Relativistic Mechanics**

Reviews of basic ideas of special relativity – Energy momentum four -vector – Minkowski’s four-dimensional space – Lorentz transformation as rotation in Minkowski’s space – Composition of Lorentz transformation about two orthogonal directions – Thomas precession – Elements of general theory of relativity.

**Course Outcomes:**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the advanced classical techniques like Lagrangian and Hamiltonian equations and their applications.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Analyses the satellite motions.</td>
<td>8</td>
</tr>
<tr>
<td>CO-3</td>
<td>Differentiable rigid body &amp; oscillatory motions.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the classical concepts in relativistic mechanics</td>
<td>1</td>
</tr>
<tr>
<td>CO-5</td>
<td>Apply principles of qualitative and quantitative analysis to interpret physical data.</td>
<td>5</td>
</tr>
</tbody>
</table>

**Books for Study**

1. Satya Prakash, Mathematical Physics with Classical Mechanics (S.Chand & Sons)
Books for Reference

Semester: I  Credits: 5
Course code: 17P1PH03  Hours/Week: 5

Objectives
1. To understand various techniques and concepts in Electronics
2. To apply these techniques in practical circuits.
3. To develop the skill in Transducer.

Unit-I:  Semiconductor Devices and Special Devices


Unit-II:  Operational Amplifier


Unit-III:  Waveform Generators and Active Filters

Sine wave oscillation with phase shift and wein’s networks – Comparator -Schmitt trigger - Astable and Monostable operations - Triangular wave generator. Active filters - Butterworth filters - Band pass filters - Band notch filter.

Unit-IV:  Data Converters


Unit-V:  Transducer

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the current voltage characteristics of semiconductor devices.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Learn basic function of operational amplifier, Ideal and practical Characteristics and their mathematical application.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand basic construction of active filters, comparators and their application in electronics.</td>
<td>4</td>
</tr>
<tr>
<td>CO-4</td>
<td>Choose appropriate A/D and D/A converters for signal processing applications</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand principle of working of various transducers used to measure Temperature, comparative study of various transducers.</td>
<td>3</td>
</tr>
</tbody>
</table>

Books for study:


Books for Reference:

CORE PRACTICAL – I: ADVANCED ELECTRONICS EXPERIMENTS

Semester: I  Credits: 4
Course code:  17P1PHP01  Hours/Week: 10

1. FET characteristics and Design of FET amplifier
2. UJT characteristics and Design of Saw tooth wave oscillator
3. Design of square wave generator using IC 741
4. Design of square wave generator using IC 555 Timer
5. Design of Monostable multivibrator using the IC 741
6. Design of Monostable multivibrator using the IC 555 timer.
7. Design of schmitt’s Trigger using the IC 741
8. Design of schmitt’s Trigger using the IC 555 timer
9. Analog computer circuit design – solving the simultaneous equations
10. Binary addition and subtraction – IC 7483
11. Multiplexer and Demultiplexer
12. Decoders and Encoders
13. Counters and shift registers – IC 7476 / 7473
14. BCD Counter – Decoding and Display
15. Design of binary weighted and R/2R Ladder DAC using the IC 741
17. SCR Charaterstics
18. Construction of Half-Adder and Full-Adder circuit using NAND & NOR gate
   and study their performance.
   NOR gate and study their performance.
20. Solve the given Boolean equation by Sum of Product (SOP) and Product of
   Sum (POS) using Logic gates.
CORE IV - ELECTROMAGNETIC THEORY

Semester: II
Course code: 17P2PH04
Credits: 5
Hours/Week: 5

Objectives
1. To understand the basics of electrostatics, magnetostatics and electromagnetics.
2. To acquire knowledge of wave propagation in different median and flow of power.
3. To know the modes of propagation of guided waves and propagation through wave guides.

Unit-I: Electrostatics

Gauss Law – Poisson & Laplace equations - Solution of Laplace equation in spherical polar coordinate - Conducting sphere - Multipole expansion - Electrostatic energy – Dielectrics - Polarization and Displacement vectors - Boundary conditions - Dielectric sphere in a uniform field - Molecular polarisability and electric susceptibility - Electrostatic energy in dielectric medium - Clausius-Mossotti equation.

Unit-II: Magnetostatics


Unit-III: Electromagnetics

Faraday’s law of induction - Maxwell’s equation - Maxwell’s displacement current - Vector and Scalar potential – Maxwell equations in terms of electromagnetic Potential - Gauge transformation - Lorentz gauge - Coulomb gauge - Conservation laws for a system of charges - Poynting theorem- Poynting vector.
Unit-IV: Wave Propagation

Plane electromagnetic waves in free space – Isotropic and anisotropic non-conducting media – Conducting media – Boundary conditions at the surface of discontinuity – Reflection and Refraction of electromagnetic waves at a plane interface between dielectrics – Polarization – Polarization by reflection and total internal reflection.

Unit-V: Wave Guides and Simple Radiating Systems


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Have an understanding of Maxwell’s equations and be able to manipulate and apply them to EM problems.</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Formulate and analyze problems involving loss media with planar Boundaries using uniform plane waves.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Solve such problems in simple geometries using separation of variables</td>
<td>2</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the expressions for the energy both for the electrostatic and Magneto static fields.</td>
<td>6</td>
</tr>
<tr>
<td>CO-5</td>
<td>Illustrate techniques for antenna parameter measurements and understand the various applications of antennas</td>
<td>4</td>
</tr>
</tbody>
</table>
Books for Study:

Books for Reference:
Objectives

1. To understand the basic concepts in Quantum Mechanics.
2. To know about the concepts of identical particles and angular momentum.
3. To study the variation and approximation methods.

Unit – I: Foundation of Quantum Mechanics


Unit – II: Energy Eigen Value Problems

Free particle – Particle in a box - Potential step and rectangular potential barrier - Applications of Barrier penetration (alpha decay) – A particle in one dimensional, infinite deep potential well - Solutions for Particle in 3D - Infinitely deep potential well –Square well potential (concept) – One dimensional linear harmonic oscillator- Three dimensional harmonic oscillator.

Unit – III: Identical particles and spin

Physical meaning of identity - Symmetry and antisymmetric wave functions and their construction - Distinguishability of identical particles - Pauli’s exclusion principle - Slater’s determinant - Spin angular momentum - Spin matrices for electron - Commutation relations - Symmetric and Antisymmetric wave functions hydrogen molecule.

Unit – IV: Angular momentum and their properties

Angular momentum operator in position representation - Total angular momentum operators - Commutation relation of total angular momentum - Commutation relations for angular momentum components - Eigen value
spectrum - Combination of angular momentum states: Clebsch Gordan coefficients – Calculation of CG for \( j_1 = \frac{1}{2}, j_2 = \frac{1}{2} \) and P-state of electron.

**Unit – V: Approximation methods Time independent perturbation theory**


**Course Outcomes:**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the physical interpretation of wave functions.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Derive the eigenkets of the angular momentum operators and prove Properties of completeness and Orthogonality.</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Theory of identical particles and quantum statistics, and able to perform Calculations on systems of identical particles.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Mastered the concepts of angular momentum and spin.</td>
<td>8</td>
</tr>
<tr>
<td>CO-5</td>
<td>Account for the phenomena involved in the Zeeman Effect and WKB methods.</td>
<td>1</td>
</tr>
</tbody>
</table>

**Books for Study:**

Books for Reference:

CORE PRACTICAL – II: ADVANCED PHYSICS EXPERIMENTS

Semester: II
Course code: 17P2PHP02
Credits: 4
Hours/Week: 8

1. Observed and find Young’s modulus by Elliptical fringes.
2. Observed and find Young’s modulus by hyperbolic fringes.
3. Susceptibility of the given liquid by Guoy’s method.
4. Susceptibility of the given liquid by Quincke’s method.
5. Determine Stefan’s constant using Hot body method.
7. Find t between Etalon plates by using F.P Etalon.
8. Michelson’s Interferometer.
9. Arc Spectra Fe-Hg (or) Cu-Hg (or) Brass-Hg
10. Molecular spectra ALO band or CN band
12. Ultrasonic interferometer – Compressibility of the given liquid.
13. Temperature coefficient of thermistor & Semiconductor – Band gap energy
14. Hall effect – semiconductor to find $V_H$, Mobility etc.,
15. Characteristics of GM Tube, Inverse square law by GM Counter.
16. e - Milliken’s oil drop method
17. Ultrasonic diffraction.
19. Gamma ray spectrometer
20. Laser experiments
   i) Diffraction at straight edge
   ii) Diffraction at a circular aperture
CORE VI - THERMODYNAMICS AND STATISTICAL MECHANICS

Semester: III  Credits: 5
Course code: 17P3PH06  Hours/Week: 5

Objectives
1. To study the laws of thermodynamics and Phase transitions
2. To understand the concept of kinetic theory
3. To learn the basics of classical and quantum statistical mechanics and to understand some of their applications.
4. To understand the need for quantum Statistical Mechanics and its various applications.

Unit - I: Thermodynamics

Unit - II: Kinetic Theory

Unit - III: Classical Statistical Mechanics

Unit - IV: Quantum Statistical Mechanics
Unit - V: Applications of Quantum Statistical Mechanics


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the four postulates, including definitions of state variables and the entropy</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Learn how to derive Maxwell relations among derivatives of thermodynamic variables</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand statistical mechanics of systems in other generalized canonical Formulation.</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>The statistical mechanical description of Fermi- and Bose- statistics for Electron, photon- gases.</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Know of applications of statistical mechanics and thermodynamics in other Disciplines</td>
<td>1</td>
</tr>
</tbody>
</table>

Books for Study

Books for Reference

2. Gupta, Kumar, Statistical Mechanics Pragathi prahashan.
Semester: III  
Course code: 17P3PH07  
Credits: 5  
Hours/Week: 5

Objectives
1. To understand Advance level - Quantum Mechanics.
2. To acquire knowledge on approximation methods employed in solving quantum mechanical problems.
3. To throw light on relativistic mechanics and quantum theory of radiation.
4. To have a glimpse of perturbation theory and its applications.

Unit - I: Time Dependent Perturbation Theory

Unit - II: Scattering Theory

Unit - III: Relativistic Theory of Quantum Mechanics

Unit - IV: Quantum Field Theory
Unit-V: Approximation Methods


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Develop a knowledge and understanding of time dependent perturbation theory</td>
<td>2</td>
</tr>
<tr>
<td>CO-2</td>
<td>Acquire the knowledge of scattering theory and partial wave Analysis.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Analyze the Klein-Gordon equation for free-particle solutions</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>formulate the Lagrangian and Hamiltonian form of classical field Equations as well as analyze the system of bosons and fermions</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Acquire knowledge on approximation methods employed in solving quantum mechanical problems.</td>
<td>2</td>
</tr>
</tbody>
</table>

Books for Study:

Books for Reference:

4. Gupta, Kumar, Sharma, Quantum Mechanics, Galgotia Publications,
5. S. Devanarayanan, Quantum Mechanics, Aarthi Publications.
6. Chatwall Anand, Quantum Mechanics, Aarthi Publications.
7. Thankappan, Quantum Mechanics, Aarthi Publications.
8. Branson, Quantum Mechanics, Aarthi Publications.
CORE VIII - MICROPROCESSOR AND MICROCONTROLLER

Semester: III  Credits: 5
Course code: 17P3PH08  Hours/Week: 5

Objectives
1. To understand the Microprocessor and Microcontroller architecture.
2. To know the machine code, op-code and mnemonics for the basic microprocessor 8085.
3. To know the interfacing and applications of the Peripheral devices.

Unit- I: Architecture and Programming of 8085


Assembly language programming: Arithmetic operations: Choosing biggest & smallest numbers from a list –Ascending and Descending orders – Square root of 8-bit number.

Unit- II: Data transfer schemes and interfacing

Memory interfacing and I/O interfacing – Address space – Address space partitioning – Data transfer schemes – Programmed data transfer – Direct memory access – Serial data transfer – Types of interfacing devices – Programmable peripheral interface 8255 - Interfacing of ADC and DAC – Waveform generation – LED interface – 7 segment Display interface.

Unit - III: Applications of microprocessors


Unit - IV: Architecture of Microcontroller 8051

Introduction – Comparison between microcontroller and microprocessors – architecture of 8051 – key features of 8051 – Memory organization – Data
memory and program memory – Internal RAM organization – Special function registers – control registers – I/O ports – Counters and Timers – Interrupt structure.

**Unit- V: Programming the Microcontroller 8051**

Instructions set of 8051 – Arithmetic, Logical, Data move, Jump and call instructions - Addressing modes – Immediate, Register, Direct and Indirect addressing modes – Assembly language programming – Simple programs to illustrate arithmetic and logical operations (sum of numbers, biggest and smallest in an array) – Software time delay.

**Course Outcomes:**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the basic architecture of 8-bit microprocessors and able to write programming skills in assembly language programs.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand I/O interfacing and techniques</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand advance microprocessor in applications.</td>
<td>8</td>
</tr>
<tr>
<td>CO-4</td>
<td>Ability to differentiate microprocessor and microcontroller.</td>
<td>4</td>
</tr>
<tr>
<td>CO-5</td>
<td>Learn instruction set and Able to write assembly language program for Microcontroller</td>
<td>10</td>
</tr>
</tbody>
</table>

**Books for study:**

Books for Reference:

Semester: III
Course code: 17P3PH09
Credits: 5
Hours/Week: 5

Objectives
1. To study Crystallography, Lattice Vibration and Phonons
2. To impart the knowledge of free electron theory and band theory
3. To explain superconductivity in detail.
4. To understand defects in crystal.

Unit-I: Crystallography, Lattice Vibration and Phonons

Unit - II: Thermal property, Free electron theory and Transport properties.

Unit- III: Band Theory of solids & Semiconductor

Unit- IV: Superconductivity
Meissner effect – Type I & Type II Superconductors – Josephson tunneling – Josephson effect – Thermodynamics of the superconducting...

**Unit – V: Defects in crystal**


**Course Outcomes:**

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Differentiate between different Lattice types and explain the concepts of Reciprocal lattice and crystal diffraction.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Predict electrical and thermal properties of solids and explain their origin.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the Band theory and classifying semiconductor.</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>Explain superconductivity, its properties, important parameters related to possible applications.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Books for Study:**

Books for Reference:
5. Gupta, Kumar, Sharma- Solid State Physics, Galgotia Publications.
6. S.L. Gupta, V. Kumar - Solid State Physics, Galgotia Publications.
Selvamm Arts & Science College (Autonomous) Namakkal – 637 003

Department of Physics
M.Sc. Physics

CORE PRACTICAL III - MICROPROCESSOR AND MICROCONTROLLER

EXPERIMENTS

Semester: III
Course code: 17P3PHP03

Credits: 4
Hours/Week: 6

1. Addition, Subtraction, Multiplication and Division – 16 bit numbers.
2. Sum of a series of 8 – bit numbers solving expressions.
3. Finding the largest / smallest number in a data array.
4. Arranging a series of numbers in Descending / Ascending order.
5. Square, Square root and factorial of a number.
6. Code conversions and temperature conversion.
7. Clock programs.
8. Interfacing of an 8 – bit DAC and wave form generation
    [Square, Rectangular, Saw tooth, Triangular and Sine waves].
10. Interfacing of ADC 0809.
11. Interfacing of seven segment display – Display of Alphanumeric character
12. Stepper motor interfacing.
14. Hex – Key board interface.
16. Microcontroller array operations using 8051
17. Microcontroller arithmetic operation using 8051.
18. Temperature controller using 8051.
Objectives

1. To understand the basic structure and properties of the nucleus.
2. To know the various theories and mechanisms of radioactive decay.
3. To acquire knowledge about nuclear fission and fusion processes.
4. To understand the basic idea of elementary particles.

Unit – I:


Unit – II:

**Radioactive decays:** Neutrino hypothesis – Fermi’s theory of beta decay - Selection rules – Non conservation of parity in beta decay – Gamma decay – Internal conversion – Nuclear isomerism.

**Nuclear detectors:** Basic principle of particle detectors – Proportional counters – Geiger Muller counters – Solid state detectors – Scintillation counter.

Unit – III:

**Nuclear Fission:** Types of fission – Mass and Energy distribution of nuclear fragments – Nuclear chain reactions – Four factor formula – Bohr wheeler’s theory of nuclear fission.

**Nuclear fusion:** – Thermonuclear reactions – Controlled thermonuclear reactions – Pinch effect – Fusion Reactor.

Unit – IV:

**Nuclear Reactions:** Types of nuclear reaction – Conservation laws – Nuclear scattering kinematics - Energetic of reactions – Q equation – Level width in nuclear reaction – Nuclear reaction cross section – Partial wave
analysis – Breit-wigner one level formula – Direct reactions – Nuclear shock waves.

Unit – V:

**Elementary Particles:** Classifications of elementary particles – Four type of interactions and– Isospin quantum numbers – Strangeness and Hypercharge – Invariance principles and symmetries – Invariance under charge – Parity (CP), Time (T) and CPT -CPT violation in neutral K meson decay – Quark model SU(3) symmetry – Gellmann – Nishijama formula.

Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the nuclear forces and scattering theories.</td>
<td>5</td>
</tr>
<tr>
<td>CO-2</td>
<td>Calculate alpha, beta and gamma decay. Know about particle detectors and accelerators</td>
<td>2</td>
</tr>
<tr>
<td>CO-3</td>
<td>Know the concepts of fission, fusion and chain reactions.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Learn nuclear reactions, nuclear scattering kinematics and Q-value of Nuclear reactions.</td>
<td>2</td>
</tr>
<tr>
<td>CO-5</td>
<td>Classify elementary particles according to their quantum numbers and draw simple reaction diagrams.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Books for Study:**


**Books for Reference:**

M.Sc. Physics

5. Devanathan- Nuclear Physics, Narosa Publications.
Semester: IV  
Credits: 5  
Course Code: 17P4PH11  
Hours/Week: 5

Objectives

1. To understand the fundamental aspects of major areas of spectroscopy, likes as Infra-red, Raman, NMR, etc.
2. To know the spectroscopic techniques to use in finding the molecular structure, bond angles, bond length, etc.

Unit – I: Vibrational Spectroscopy

Symmetry of polyatomic molecules and molecular vibrations – Selection rules for Raman and IR vibrational normal modes – Calculation of normal modes for Raman and IR activity to C$_{2v}$ and C$_{3v}$ point groups – Representation for molecular vibrations – Internal and symmetry coordinates.

Unit – II: IR-Spectroscopy


Unit – III: Raman Spectroscopy


Unit – IV: NMR and ESR Spectroscopy

Basic principles of interaction of spin and applied magnetic field – Concept of NMR spectroscopy – NMR spectrometer – Advantage of FT-NMR – Chemical shift – simple application to structural determination.

Origin of electron spin resonance – ESR spectrometer – Hyper fine structure study – Triplet states study of ESR – applications of ESR.
Unit – V: NQR and Mossbauer spectroscopy

Principles of NQR – Energy levels of quadrupole transitions for half integral spins – NQR spectrometer – Applications of NQR.


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the vibrational normal modes.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Known the basic physical chemistry law those govern molecular spectroscopy.</td>
<td>5</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the basic information on molecular methods.</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Select molecular spectroscopy methods suitable for solving given scientific problem.</td>
<td>8</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand the phenomenon of the interaction of light with matter in terms of the relationship with the molecular structure.</td>
<td>10</td>
</tr>
</tbody>
</table>

Books for Study:

Books for Reference:
ELECTIVE COURSE - NON CONVENTIONAL ENERGY SOURCES

Semester: I / II / III / IV  Credits: 4
Course Code: 17PXPH01  Hours/Week: 5

Objectives
1. To create awareness among students about the growing energy needs.
2. To study the conventional and non conventional sources of energy and the methods of proper utilization.
3. To understand the various types of Non conventional energy sources.
4. To help students visualize the concept of “waste” as an alternative to meet the growing demands for energy.

Unit – I: Energy sources and solar radiation

Energy sources and their availability – Renewable energy sources - Prospects and Advantages.


Unit – II: Solar cells


Unit – III: Applications of solar energy


Unit – IV: Wind Energy

Basic principles of wind energy conversion wind data and energy estimation – Basic components of wind energy conversion systems (WECS) - Types of wind machines – Generating systems – Schemes for electric generation – Generator control – Load control – Applications of wind energy.

Unit – V: Energy from Biomass and Biogas

M.Sc. Physics  Effective from 2017–2018  39

Biogas generation: Introduction – Basic process and energetic – Advantages of anaerobic digestion – Factors affecting bio digestion or generation of gas.


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Know the renewable energy sources and solar radiations.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Gain the knowledge about principle and operation of solar cells</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Learn the different technologies of converting the solar energy and Learn the different applications</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the principles of wind energy.</td>
<td>6</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand the concept of biomass energy and their classification.</td>
<td>6</td>
</tr>
</tbody>
</table>

Books for study:
2. M.P.Agarwal, Solar Energy, S.Chand & Co.,

Books for Reference:
ELECTIVE COURSE - CRYSTAL GROWTH AND THIN FILMS

Semester: I / II / III / IV
Course Code: 17PxPHE02
Credits: 4
Hours/Week: 5

Objectives

1. To provide the basic knowledge of the crystal growth and thin film techniques.
2. To understand the theories of crystal growth.
3. To study the characterization of growing crystal and thin film.

Unit – I: Nature and Crystal Growth Theory

- Crystalline state
- Chemical bonding
- Nature of bonding: Covalent, Ionic, Metallic, Hydrogen and Vanderwaals bonds
- Phase equilibrium
- Single component system
- Component system
- Binary compounds with congruent melting
- Solid solutions
- Solid-Liquid equilibrium
- Liquid-Vapour equilibrium.

Unit – II: Growth Techniques

- Solution growth technique: Low temperature solution growth
- Solubility
- Constant temperature bath
- Crystallizer
- SEED preparation and mounting
- Slow cooling and slow evaporation methods.

- Gel growth technique: Principle
- Various types
- Structure of gel
- Importance of gel
- Experimental procedure
- Advantage of gel method.

- Melt growth technique: Bridgemann technique
- Czochralski technique
- Experimental arrangement
- Growth process.

- Vapour Deposition: Fundamentals of Physical Vapour Deposition
- Chemical Vapour Deposition (CVD)
- Chemical vapour transport.

Unit – III: Preparation of Thins-films

- Kinetic aspects of gases in a vacuum chamber
- Classifications of vacuum ranges
- Production of vacuum
- Pressure measurement in vacuum systems
- Thin film (epitaxy)
- Definition
- Types of epitaxy.

Different Growth Techniques: Liquid Phase Epitaxy – Vapour Phase Epitaxy
- Molecular Beam Epitaxy
- Metal Organic Vapour Phase Epitaxy
- Sputtering (RF & DC)
- Pulsed Laser Deposition.

Unit – IV: Thin film Deposition Techniques:


Unit – V: Characterization and Applications


Course Outcomes:

<table>
<thead>
<tr>
<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Understand the importance of the crystalline order in solids.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Learn about the crystal growth mechanisms and techniques.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Know the concept of preparation and growth techniques of thin films.</td>
<td>1</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the Various thin films deposition techniques.</td>
<td>7</td>
</tr>
<tr>
<td>CO-5</td>
<td>Learnt the characterization and techniques for crystal and thin films.</td>
<td>7</td>
</tr>
</tbody>
</table>
Book for study:
2. A. Goswami, Thin Film Fundamentals, New Age International (P) Ltd. Publishers, New Delhi, 1996.

Book for Reference:
2. P. Ramasamy, ISTE Summer school Lecture Notes, Crystal Growth Centre, Anna University, Chennai, 1991.
ELECTIVE COURSE - NANOSCIENCE

Semester: I / II /III /IV  Credits: 4
Course Code: 17PxPHE03  Hours/Week: 4

Objectives
1. To understand the principles and techniques of Nano science.
2. To apply the Nano science techniques.

Unit – I: Nanoworld

Historical perspective on nanomaterial – Classification of Nanomaterials – Nanorods – Nanoparticles - Quantum well, Wire and dots – Nano Particle Fabrication Methods – Method of Top down, Bottom Up approach and Sol Gel Technique.

Unit-II: Metals, Semiconductors and Ceramics Nanocrystals


Unit-III: Nanoparticles and Magnetism

Magnetism in particles or reduced size and dimensions – Variations of magnetic moment with size – Magnetism in clusters of nano magnetic solids – Magnetic behaviour of small particles – Diluted Magnetic Semiconductors and their applications - Intermetalic compounds – Importance of nanoscale magnetism.

Unit – IV: Chemical and Catalytic Aspects of Nanocrystals

Nanomaterials in catalysis – Nanostructure Adsorbents – Nanoparticles as new chemical reagents – Nanocrystals superlattices.

Unit – V: Application of Nanotechnology


Course Outcomes:

<table>
<thead>
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<th>Upon completion of this course, students will be able to</th>
<th>PSOs addressed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Acquire the knowledge of general principles of physics, chemistry, and biology role on the nanometer scale.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Understand the knowledge of at least one specialization area within the field of nanoscience and nanotechnology.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Proficiency in translating this knowledge into useful technological applications</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Predict finite size effects induced changes on material properties.</td>
<td>7</td>
</tr>
<tr>
<td>CO-5</td>
<td>Learnt the application of nanotechnology</td>
<td>8</td>
</tr>
</tbody>
</table>

Books for Study:

Books for Reference:


ELECTIVE COURSE - SEMICONDUCTOR PHYSICS

Semester: I / II / III / IV  Credits: 4
Course Code: 17PxPHE04  Hours/Week: 5

Objectives

1. To understand the semiconductor devices.
2. To know the concepts of electron devices.

Unit - I:

Equilibrium distribution of electrons and holes in intrinsic semiconductors – \( n_o \) and \( p_o \) equations - Intrinsic Fermi level position - Dopant energy levels – Equilibrium distribution of electrons and holes in extrinsic semiconductors - Degenerated/Non - degenerated semiconductors.

Unit - II:


Unit - III:

Metal-Semiconductor contact: The Schottky barrier formation - Its characteristics and junction properties - Non-ideal effects on the barrier height - Current voltage relationship - Ideal non-rectifying barriers - Specific contact resistance - Basics Hetero-junction and 2DEG formation.

Unit - IV:

MOS structure and its energy band diagram - Depletion layer thickness - Work function differences - Flat band voltage - Charge distribution – Capacitance - Voltage characteristics and frequency effects – Fixed oxide and interface charge effects – MOSFET structure and principle of operation – MOSFET current-voltage characteristics relationship- Substrate bias effects.

Unit - V:

Unipolar resonant tunneling transistor - Visible and Infrared LEDs (Device structure and Working principle) – Semiconductor lasers (device structure, laser operation, optical confinement) – Basics of quantum well lasers – Photoconductor and Photodiode (device structure and working principle) – PN junction solar cells.

Course Outcomes:

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<tbody>
<tr>
<td>CO-1</td>
<td>Have knowledge about the physics of semiconductor materials.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Describe crystalline structures of semiconductors.</td>
<td>3</td>
</tr>
<tr>
<td>CO-3</td>
<td>Understand the band structures of semiconductors</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Describe the physical characteristics such as electronic structure and optical and transport properties.</td>
<td>7</td>
</tr>
</tbody>
</table>

Books for Study:
1. Donald A. Neamen Semiconductor Physics and Devices the McGraw-Hill companies.

Books for Reference:
ELECTIVE COURSE - MODERN OPTICS

Semester: I / II / III / IV
Course Code: 17PxPHE05
Credits: 4
Hours/Week: 4

Objectives
1. To provide a broad overview of the various optical instruments and laser.
2. To know about the nonlinear optical phenomena.
3. To understand the magneto and electro optics.
4. To provide a broad overview of Laser Spectroscopy.

Unit-I: Interference and Coherence

Multiple beam interferometry: Multiple reflections from a plane parallel film - Fabrey-Perot Etalon - Fabry-Perot interferometer - Resolving power of a scanning Fabry-Perot interferometer and Fabry-Perot Etalon - Interference Filters.

Coherence: The line width - Spatial Coherence - Michelson Stellar interferometer - Optical beats.

Unit-II: Lasers


Unit-III: Non-Linear Optics


Unit-IV: Magneto and Electro Optics


Unit-V: Laser Spectroscopy


Course Outcomes:

<table>
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<th>CO No.</th>
<th>Upon completion of this course, students will be able to</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CO-1</td>
<td>Known the working principle of optical instruments.</td>
<td>7</td>
</tr>
<tr>
<td>CO-2</td>
<td>Acquire Absorption and spontaneous and stimulated emission in two level systems.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Learn about the principles of nonlinear optics and origin of optical Non linearity.</td>
<td>5</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the principles of electro-optics &amp; magneto optics for various Optical Effects.</td>
<td>5</td>
</tr>
<tr>
<td>CO-5</td>
<td>Gain knowledge about the fundamentals of Laser spectroscopy.</td>
<td>1</td>
</tr>
</tbody>
</table>

Books for Study:


Books for Reference:

ELECTIVE COURSE - COMMUNICATION SYSTEM

Semester: I / II / III / IV  
Credits: 4
Course code: 17PxPHE06  
Hours/Week: 5

Objectives
1. To study the different types of communication systems.
2. To give an exposure to various types of computer communications.
3. To understand the concepts and techniques involved in communication by optical fiber, Radar and Navigation and satellite.

Unit – I: Modulation Systems & Digital data Carrier systems


Amplitude shift keying - Frequency shift keying – Phase shift Keying - Pulse Code Modulation - Multiplex transmission - Frequency and Time Division Multiplexing.

Unit – II: Computer Communication System

Types of networks - Design features of computer communication networks – ISDN – LAN - Time Division Multiple Access (TDMA) - Frequency division multiple Access (FDMA) – ALOHA - Slotted ALOHA - Carrier sense multiple Access (CSMA) - CDMA – WCDMA.

Unit – III: Fiber Optic Communication system

Fiber optics - Different types of fiber - Step index and graded index fibers - Fiber loses - Optical sources and detectors (qualitative only) - Power launching and coupling - Sources to power launching – Fiber joints - Splicing techniques - General optical communication systems.

Unit – IV: Radar and Navigation

Unit –V: Satellite and Mobile Communication


Course Outcomes:

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<th>Upon completion of this course, students will be able to</th>
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<tbody>
<tr>
<td>CO-1</td>
<td>Describe the basic aspects of signals and systems analysis.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Show clear understanding of the basic concepts of data communications including the key aspects of networking.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Distinguish between the various modes of operation of Optical fibers.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand Target detection and tracking using radar systems.</td>
<td>3</td>
</tr>
<tr>
<td>CO-5</td>
<td>Know Compare competitive satellite services and satellite access techniques.</td>
<td>8</td>
</tr>
</tbody>
</table>
Books for study


Books for Reference

Semester: II  
Course code: 17P2PHED1  
Credits: 4  
Hours/Week: 5

Objectives

1. To understand the basic knowledge of various medical equipments and their working principles.
2. To provide a basic idea about X-Rays and the hazards of radiation on human health.

Unit – I: Electrodes


Unit – II: Transducer

Transducers- Classification of transducers – Piezoelectric Transducer- Thermistors – Photoelectric type resistive transducer - Strain gauge Transducers – metallic wire transducer - LVDT

Unit – III: Blood pressure measurements


Unit – IV: X- Ray Instrumentation


Unit – V: Radioactivity and Endoscope

## Course Outcomes:

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<th>CO No.</th>
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</tr>
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<tbody>
<tr>
<td>CO-1</td>
<td>Observed types of electrodes and its uses.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Know various form of energy conversion by using transducers.</td>
<td>6</td>
</tr>
<tr>
<td>CO-3</td>
<td>Analyze technique involved in blood pressure measurements as well as instrumentation applications’</td>
<td>7</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the knowledge of X–ray tube and computer tomography.</td>
<td>10</td>
</tr>
<tr>
<td>CO-5</td>
<td>Students are able to know various medicinal field applications.</td>
<td>1</td>
</tr>
</tbody>
</table>

### Books for Study:

### Books for Reference:
1. Leslie Cromwell, Fred J.Weibell and Erich A.Pfeiffer, Biomedical instrumentation and measurements.
EDC - RENEWABLE ENERGY SOURCES

Semester: II Credits: 4
Course Code: 17P2PHED2 Hours/Week: 5

Objectives
1. To create awareness among students about the growing energy needs.
2. To study the conventional and non conventional sources of energy and the methods of proper utilization.
3. To understand the various types of Non conventional energy sources.
4. To help students visualize the concept of “waste” as an alternative to meet the growing demands for energy.

Unit – I: Energy sources and solar radiation

Energy sources and their availability – Renewable energy sources - Prospects and Advantages.


Unit – II: Solar cells


Unit – III: Applications of solar energy


Unit – IV: Wind Energy

Basic principles of wind energy conversion wind data and energy estimation – Basic components of wind energy conversion systems (WECS) - Types of wind machines – Generating systems – Schemes for electric generation – Generator control – Load control – Applications of wind energy.
Unit – V: Energy from Biomass and Biogas

**Biomass:** Biomass conversion Technologies – Wet and Dry process – Photosynthesis.

**Biogas generation:** Introduction – Basic process and energetic – Advantages of anaerobic digestion – Factors affecting bio digestion or generation of gas.

**Classification of Biogas plants:** Continuous and batch type – Dome and Drum types - Advantage and Disadvantage - Bio gas plants – KVIC - Biogas from wastes - Fuel properties of biogas - Utilization of biogas.

**Course Outcomes:**

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<tbody>
<tr>
<td>CO-1</td>
<td>Know the renewable energy sources and solar radiations.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Gain the knowledge about principle and operation of solar cells.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Learn the different technologies of converting the solar energy and learn the different applications.</td>
<td>3</td>
</tr>
<tr>
<td>CO-4</td>
<td>Understand the principles of wind energy.</td>
<td>6</td>
</tr>
<tr>
<td>CO-5</td>
<td>Understand the concept of biomass energy and their classification.</td>
<td>6</td>
</tr>
</tbody>
</table>

**Books for study:**

2. M.P.Agarwal, Solar Energy, S.Chand & Co.,

**Books for Reference:**

Semester: II  
Course code: 17P2PHED3 
Credits: 4  
Hours/Week: 5

Objectives:
1. To acquire the basic knowledge of bonding and thermodynamics.
2. To acquire the knowledge of Photobiology, Membrane Conductivity and Radiation Biology.
3. To acquire the knowledge of Instrumentation of Biological Studies.

Unit-I Chemical bonds and Thermodynamics


Unit-II Photobiology


Unit-III Membrance conductivity and Radiation biology


Unit-IV Instrumentation

Unit-V Medical Biophysics

Electrocardiography (ECG) – Electromyography (EMG) –
Electroencephelograph (EEG) – Phonocardiography (PCG) – Computer

Course Outcomes:

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</tr>
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<tbody>
<tr>
<td>CO-1</td>
<td>Understand the different types bonding and thermodynamics.</td>
<td>1</td>
</tr>
<tr>
<td>CO-2</td>
<td>Known the knowledge of Photobiology, Membrane Conductivity and radiation Biology.</td>
<td>1</td>
</tr>
<tr>
<td>CO-3</td>
<td>Analyze Biological significance involved in Radiation.</td>
<td>6</td>
</tr>
<tr>
<td>CO-4</td>
<td>Gain the knowledge of bio physics instrumentation</td>
<td>7</td>
</tr>
</tbody>
</table>

Book for Study:


Book for Reference: