

# **M.G.R.COLLEGE, HOSUR**

## **Department wise PG-Outcomes**

<b>S.No.</b>	<b>PG Departments</b>
1	M.A. ENGLISH
2	M.COM
3	M.Sc., PHYSICS
4	M.Sc., CHEMISTRY
5	M.Sc., MATHEMATICS
6	M.Sc., COMPUTER SCIENCE
7	M.Sc., BIOCHEMISTRY
8	M.Sc., BIOTECHNOLOGY
9	M.Sc., MICROBIOLOGY

# 1. DEPARTMENT OF ENGLISH

## M.A ENGLISH

### OBJECTIVES AND OUTCOMES

#### Programme Educational Objectives:

**PEO1:** To acquaint students with major trends in English literature through a detailed study of specific literary texts.

**PEO2:** To improve the linguistic competence along with the literary competence of students.

**PEO3:** To facilitate students to read and appreciate the literary texts.

**PEO4:** To enable the students to face the competitive exams with ease.

**PEO5:** Move beyond the textbook and bring their language skills to professional use.

#### Programme Specific Outcomes:

**PSO1:** To create awareness regarding the structure of modern English and literary theory.

**PSO2:** To introduce the various aspects of literary criticism for proper understanding and appreciations of literature.

**PSO3:** To acquaint the students with different theoretical and practical aspects and components of language and literature teaching.

**PSO4:** To provide students with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.

**PSO5:** To understand people, culture, societies and events of the entire globe.

#### Programme Outcome:

**PO1:** The study of literature cultivates wisdom and a worldview.

**PO2:** Produce focused, organized and well-developed writings and demonstrate competence in English.

**PO3:** It helps to consider multiple perspectives and understand the complexity of human nature.

**PO4:** Recognize and comprehend different varieties of English.

## M.A ENGLISH (2021)

### SEMESTER -I

#### CORE PAPER I – CHAUCER TO THE PRE-ROMANTICS

**OUTCOME:**

- Studying the history of English literature helps the learners to get familiarity with the writers and their works of ancient England till modern England
- Students can learn about the traditions which inform English literature
- The study forms the basis for understanding the British literature and also it is a vital subject for those who opt to study English Literature at PG level.
- It helps to learn to think historically and to consider oneself as responsible, democratic citizen

#### CORE PAPER II - SHAKESPEARE

**OUTCOME:**

- By studying Shakespeare, one can gain knowledge about his powerful portrayal of words and famous quotes, which are still in vogue
- Shakespeare's themes are timeless and continue to be relevant even after his death
- Shakespeare's plays are not of an age, but for all time

#### CORE PAPER III – WORLD SHORT STORY

**OUTCOME:**

- Explain the significance of the period, the literal movements and the writers background in short story analysis
- Analyses and evaluate different short stories
- Analyses and relates the story to the real life.

#### CORE PAPER IV – NON-BRITISH LITERATURE

**OUTCOME:**

- It has c2 level in English
- It has an extensive knowledge of English language literature theory or of cultural, political and social conditions in the USA or Britain historically and contemporarily.
- It has a thorough working knowledge of cultural, social and methodologies in the fields of English literary studies, American and British area studies or cultural studies.

#### ELECTIVE PAPER I – ENGLISH FOR SPECIFIC PURPOSE

**OUTCOME:**

- Students will identify topics and formulate question, identify appropriate methods and sources for research, and engage ethically with sources.

- Oral communication - Students will participate in critical conversation and prepare, organise, and deliver their work to the public

## SEMESTER -II CORE V –

### ROMANTIC AND VICTORIAN AGE

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Students would interpret the plays critically</li></ul>  |
| <ul style="list-style-type: none"><li>• Students would be able to analyse the characters, style and dramatic devices employed by the Playwright.</li></ul> |

### CORE VI – AMERICAN LITERATURE

<b>OUTCOME:</b>
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|---|
| <ul style="list-style-type: none"><li>• The study of American literature provides the learners the most available knowledge about its people, belief, perceptions and philosophy.</li></ul> |
| <ul style="list-style-type: none"><li>• Readers could explore their culture, religion and history.</li></ul>  |
| <ul style="list-style-type: none"><li>• In general, it enhances the vocabulary and understanding of the language of that country.</li></ul>   |

### CORE VII – LANGUAGE AND LINGUISTICS

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Learners get to know various analysis of language using phonetic</li></ul> |
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### ELECTIVE – II WOMEN’S WRITING

<b>Outcome of the Course:</b>
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| <ul style="list-style-type: none"><li>• Study supports the feminist goals of defining, establishing and defending equal civil, economic and social rights for women.</li></ul> |
| <ul style="list-style-type: none"><li>• It teaches how the concepts of gender, influence social and interpersonal behaviour.</li></ul>   |
| <ul style="list-style-type: none"><li>• Learners acquire the impact of gender identity on human relations historically and cross-culturally</li></ul>                          |

### EDC – ENGLISH FOR COMPETITIVE EXAMINATION

<b>OUTCOME:</b>
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|---|
| <ul style="list-style-type: none"><li>• It enhances opportunities for employment as English teachers.</li></ul> |
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### COMMON PAPER – HUMAN RIGHTS

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Human rights as a branch of public international law, and relevant mechanism at global as well as regional levels.</li></ul> |
| <ul style="list-style-type: none"><li>• Promote human rights through legal as well as non-legal.</li></ul>   |

## INTERNSHIP PROGRAMME

<b>OUTCOME:</b>
• Apply theory to real life.
• Get a feel for the work environment.
• Boost their confidence in bringing out their potential and increase their motivation□
• Build networks.
• Enrich CV
• Getting a job directly
• Getting a reference or letter of recommendation

## SEMESTER – IIICORE -

### VIII – BUSINESS METHODOLOGY

<b>OUTCOME:</b>
• Discuss the various tips involved in conducting research.
• Develop the ability to apply the methods while working on a research project work.
• Develop a appropriate framework for research studies.

### CORE – IX – 20<sup>th</sup> CENTURY LITERATURE

<b>OUTCOME:</b>
• Have a sophisticated understanding of the relationship between literary texts and social structures.
• Know the cultural, political, and stylistic protocols of modernism and its various literary movements.
• Can read texts closely, and know how to read both formal and thematic aspects of texts as part of large cultural and historical movements.

### CORE – X – LITERARY THEORY AND CRITICISM

<b>OUTCOME:</b>
• Develops the learners' creative writing based on forms, structures and purposes.
• Learners become more critical and analytical.
• Learners could describe a sense of the writer's overall purpose and intent.
• The study makes the learners to assess and analyse the structure and language of the text.

### CORE – XI – FOURTH WORLD LITERATURE

<b>OUTCOME:</b>
• Studying literature enhance our understanding of how we communicate, shape our identities and understand the world, both in the present and the past.

### **ELECTIVE – III – COMPARATIVE LITERATURE AND TRANSLATION**

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Students would understand and respect other cultures portrayed in the literary texts.</li></ul>          |
| <ul style="list-style-type: none"><li>• Students would become acquainted with few of the world classics available through translation.</li></ul> |

### **SEMESTER – IV CORE**

#### **- XII - ENGLISH LANGUAGE TEACHING**

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• It enhances learners' linguistic skills, besides vocabulary and grammar.</li></ul>                          |
| <ul style="list-style-type: none"><li>• It inspires the learners to go in search of world literature, which is available only in English.</li></ul> |

#### **CORE – XIII - INDIAN WRITING IN ENGLISH**

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Study of Indian writers' writing in English gives knowledge of Indian sensibility, Indian subjects and Indian themes</li></ul> |
| <ul style="list-style-type: none"><li>• The study reflects Indian ethos and milieu</li></ul>   |

#### **CORE IV – JOURNALISM AND MEDIA COMMUNICATION**

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• Student will be able to write a variety of mass media products, including news stories, press releases, and advertising copy, following accepted journalistic standards, including association press.</li></ul> |
| <ul style="list-style-type: none"><li>• Student will understand and be able to apply relevant case law involving journalism, the first amendment and other mass media issues.</li></ul>   |

#### **CORE – PROJECT**

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| <ul style="list-style-type: none"><li>• Learners get to know various analysis of language and various components of literature and language.</li></ul> |
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#### **ELECTIVE – IV – ENGLISH LITERATURE FOR COMPETITIVE EXAMINATIONS**

<b>OUTCOME:</b>
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| <ul style="list-style-type: none"><li>• It enhances opportunities for employment as English teachers</li></ul> |
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## 2. DEPARTMENT OF COMMERCE

### Programme Outcomes (PO):

1	<b>PO1:</b>	Critical Thinking and Professional Development: Emphasizing the critical thinking and analytical skills on the basis of subject expertise to equip the students into professionals.
2	<b>PO2:</b>	Problem Solving: Exploring the subject expertise to understand the complex problems and executing the resolving strategy through effective networking among the knowledge pool.
3	<b>PO3:</b>	Effective Communication: Ability to perform the knowledge dissemination through the effective oral/ verbal communication, report writing and presentations.
4	<b>PO4:</b>	Multi-Disciplinary Exploration: Value added exposure to the students to work on the multi-disciplinary platform.
5	<b>PO5:</b>	Research and Development (R&D) Capability: Ability to pursue research and development (R&D) careers in academic and industrial sectors on the core/ inter disciplinary areas.
6	<b>PO6:</b>	Skill Development, Employable and Entrepreneurial Abilities: Strengthening the skill components of the students and enabling their lifelong learning ability and Inculcating the entrepreneurial capacity on their relevant subject areas.

### Programme Specific Outcomes (PSOs):

1	PSO1:	The students should possess the knowledge, skills and attitudes during the end of the M.com degree course
2	PSO2:	By virtue of the training and curriculum, they can become an Managers, Accountants , Cost Accountants, Bank Managers, Auditors, Company Secretaries, Teachers, Professors, Stock Agents, Government jobs etc.,

### SEMESTER - I

#### CORE I - MARKETING MANAGEMENT

#### Course Outcome:

- On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Understanding the Marketing concepts and its evolution.	<b>K1</b>
<b>CO2</b>	Analyse the market based on segmentation, targeting and positioning	<b>K2</b>
<b>CO3</b>	Know the consumer behavior and their decision making process.	<b>K3</b>
<b>CO4</b>	Make decisions on product, price, promotion mix and distribution	<b>K4</b>
<b>CO5</b>	Understand the rural markets and the contemporary issues in markets.	<b>K5</b>

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#### MAPPING WITH PROGRAMME OUTCOMES:



CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	M	M	S	M
<b>CO3</b>	S	M	M	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	M

S- Strong, M- Medium, L – Low

## **CORE II - ACCOUNTING FOR MANAGERIAL DECISION**

### **Program Outcomes:**

- To develop an understanding of the conceptual framework of the Management Accounting.
- To provide the knowledge in the Management Accounting Techniques in business decision making.

### **Course Outcome:**

- On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Know about Tools and Techniques of Management Accounting.	<b>K1</b>
<b>CO2</b>	Learning about the Advantages & Limitations of Ratio Analysis	<b>K2</b>
<b>CO3</b>	Understanding the concept of Funds and Flow of Funds.	<b>K3</b>

## MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	M	S	S	S
CO3	S	M	S	M	M

S- Strong, M- Medium, L – Low

### CORE III - FINANCIAL MANAGEMENT

To develop knowledge about Business Finance and the background of Accounting and Management  
To make students aware about the challenges and opportunities of Financial Management

#### Course Outcome:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To learn the Role and functions of Financial Management	K1
CO2	Learn about the Cost of Capital and its importance.	K2
CO3	Understanding the concept of Leverages and Theories of Capital Structure.	K3
CO4	Dividend Theories, Dividend policy.	K4

## MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	M	M	S

S- Strong, M- Medium, L – Low

### CORE IV - MODERN BANKING

#### Program Outcomes:

- To develop knowledge about Business Finance and the background of Accounting and Management
- To make students aware about the challenges and opportunities of Financial Management

#### Course Outcome:

CO Number	CO Statement	Knowledge Level
CO1	To learn the context of banking: the financial system.	K1
CO2	To Understand the principles of banking.	K2
CO3	Elucidate the broad functions of banks.	K3
CO4	Analyse and explain the basic raison d'etre for banks.	K4
CO5	Describe the components of the balance sheets of banks. Elucidate the liability and asset portfolio management "problem" of banks.	K5

## MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	M	S	S	S	M
CO3	S	M	S	S	M
CO4	M	S	M	M	S

S- Strong, M- Medium, L – Low

## ELECTIVE PAPER I - ORGANISATIONAL BEHAVIOUR

### Program Outcomes:

- To develop knowledge about Business Finance and the background of Accounting and Management
- To make students aware about the challenges and opportunities of Financial Management

**Course Outcome:** To analyze and compare different models used to explain individual behavior related to motivation and rewards

CO Number	CO Statement	Knowledge Level
CO1	To studying the concept of organizational behavior	K1
CO2	To study the theories of personality	K2
CO3	To learn the concept of motivation	K3
CO4	To Understand the Concepts of group, types of group and group behavior	K4
CO5	To gain the Knowledge about interpersonal behavior, principles and developing interpersonal behavior	K5

## MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M

S- Strong, M- Medium, L – Low

## **CORE V - ADVANCED COST ACCOUNTING**

**Course Outcome:** To understand basic concept, preprocess used to determine product cost

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	Identify various Classifications of cost and Elements of cost	<b>K1</b>
<b>CO2</b>	know the methods of accounting followed for inventory maintenance and issues of stocks from the stores.	<b>K2</b>
<b>CO3</b>	know the cost ascertainment technique for labour cost including various incentive plans	<b>K3</b>
<b>CO4</b>	Learn the appropriate and apportionment of overheads for a department and calculation of machine hour rate	<b>K4</b>
<b>CO5</b>	Understand the preparation of Job, Batch , Contract costing and process cost accounting and report.	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	M	S

S- Strong, M- Medium, L – Low

**CORE VI - INVESTMENT ANALYSIS AND PORTFOLIO  
MANAGEMENT**

**Course Outcome:** The objectives of this course is to introduce the intuition and concepts of investment analysis

CO Number	CO Statement	Knowledge Level
CO1	To study the concept of investment, speculation, gambling, investment process.	K1
CO2	To understand the various of investment alternatives and strategies.	K2
CO3	Limelighting the fundamental analysis of economic, industry and company analysis	K3
CO4	To gain the knowledge about Technical analysis, types of chart and various theories	K4
CO5	To know the concept of Portfolio anaysis and management	K5

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	S	S	S	M
CO3	S	M	S	M	S
CO4	M	M	S	S	S
CO5	S	S	M	M	S

S- Strong, M- Medium, L – Low





**Elective-II PAPER I - FINANCIAL MARKETS AND INSTITUTIONS**

**Course Outcome:** Financial system to acquire an understanding of various concepts related to leasing

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Describe the dimensions of performance and risk relevant to financial firms and Calculate contemporary measures of financial measures of performance and risk.	<b>K1</b>
<b>CO2</b>	Describe contemporary managerial risk management oversight processes and Explain how the financial services component industries (insurance, banking, securities, real estate and financial planning) interact.	<b>K2</b>
<b>CO3</b>	Design hedging strategies to manage market risks (e.g., currency, commodity, economic and political).	<b>K3</b>
<b>CO4</b>	Evaluate the economic environment and the impact of governmental economic policies on consumers and financial institutions.	<b>K4</b>
<b>CO5</b>	Describe the impact that financial innovation, advances in technology, and changes in regulations has had on the structure of the financial firms	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low

## Elective-II PAPER II - EXPORT- IMPORT MANAGEMENT

### Course Outcome:

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	To introduce students to the world of financial services	<b>K1</b>
<b>CO2</b>	To enrich students understanding of the fundamental concepts and working of financial service institution	<b>K2</b>
<b>CO3</b>	To equip students with the knowledge and skills necessary to become employable in the financial service industry	<b>K3</b>
<b>CO4</b>	To differentiate between fund based and fee based and financial activities of the Indian financial system	<b>K4</b>

### MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	S	S	M	M
<b>CO3</b>	S	M	M	M	M
<b>CO4</b>	M	M	S	M	S
<b>CO5</b>	M	S	S	M	S

S- Strong, M- Medium, L – Low

## INTERNSHIP TRAINING PROGRAMME

### Course Outcome:

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Students able to construct the company profile by compiling the brief history, management structure, products or service offered.	<b>K1</b>
<b>CO2</b>	Students is able to determine the challenges and future potentials for his/her internship organization in particular and the sector in general.	<b>K2</b>
<b>CO3</b>	For his/her organization of internship, the students is able to assess its strength, weakness, opportunities and threats (SWOT)	<b>K3</b>

### MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M

S- Strong, M- Medium, L – Low

## CORE IX - RESEARCH METHODOLOGY

Course Outcome:

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Know the concept of business research and its types	<b>K1</b>
<b>CO2</b>	Understand the process of identification, selection and formulation of research problem	<b>K2</b>
<b>CO3</b>	Know the need and sources of collection of primary and secondary data.	<b>K3</b>
<b>CO4</b>	Understand the different methods of data collection and techniques.	<b>K4</b>
<b>CO5</b>	Understand the methods and techniques of sampling and steps in sampling.	<b>K5</b>

### MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

## CORE X - ADVANCED CORPORATE ACCOUNTING

Course Outcome:

**MAPPING WITH PROGRAMMES OUTCOMES:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Learn the accounting knowledge about Equity shares, Preference Shares and Debentures.	<b>K1</b>
<b>CO2</b>	Understand the accounting concept of Final Accounting	<b>K2</b>
<b>CO3</b>	Acquire the accounting concept of amalgamation, absorption, Internal and External Reconstruction	<b>K3</b>
<b>CO4</b>	To motivate the students to understand the concept of Liquidator's Final Statement and Holding Company	<b>K4</b>
<b>CO5</b>	To remember the accounting for Banking and Insurance companies	<b>K5</b>

S- Strong, M- Medium, L – Low

**M.COM**  
**SEMESTER - III**  
**CORE XI - HUMAN RESOURCE MANAGEMENT**

**Course Outcome:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	To study the objectives and functions of Human resource management	<b>K1</b>
<b>CO2</b>	To understand the concept of Human resource planning and HRP process and job analysis	<b>K2</b>
<b>CO3</b>	Limelighting the selection process, recruitment and training development	<b>K3</b>
<b>CO4</b>	To gain the knowledge about discipline, Act of discipline and Grievances	<b>K4</b>
<b>CO5</b>	To know the concept of organisational conflict and Leadership theories	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S



## CORE XII - INCOME TAX AND TAX PLANNING

Course Outcome:

MAPPING WITH PROGRAMME OUTCOMES:

CO Number	CO Statement	Knowledge Level
CO1	Introduce the basic concept of income tax and exempted incomes.	K1
CO2	Familiarities the provisions of salary income and house property income	K2
CO3	Discuss about income from business and profession also know the concept of capital gains	K3
CO4	Understand the concept of income from other sources, set off and carry forward losses	K4
CO5	To know deductions form GTI, Clubbing of income & Assessment of Individual	K5

S- Strong, M- Medium, L – Low

## ELECTIVE III - PAPER I RESOURCE

### MANAGEMENT TECHNIQUES

Course Outcome:

CO Number	CO Statement	Knowledge Level
CO1	To study the objectives and functions of Human resource management	K1
CO2	To understand the concept of Human resource planning and HRP process and job analysis	K2
CO3	Lime lighting the selection process, recruitment and training development	K3
CO4	To know the concept of organizational conflict and Leadership theories	K4

MAPPING WITH PROGRAMME OUTCOMES:

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S

S- Strong, M- Medium, L – Low

Course Outcome:

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Understand the overview of retail marketing & retail Consumers	K1
CO2	Have knowledge on retail pricing & retail Locations.	K2
CO3	Know about various Retail Formats	K3
CO4	Learn Supply Chain management & E-Retailing	K4
CO5	Explain Retail Environment and Merchandise management	K5

MAPPING WITH PROGRAMME OUTCOMES:

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	M	S	M	M

S- Strong, M- Medium, L – Low



### **CORE XIII – GOOD AND SERVICE TAX**

Course Outcome:

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	Understand the concept of indirect taxes	<b>K1</b>
<b>CO2</b>	Understand the Nature, scope and other concepts of CENVAT and MODVAT alsoabout VAT	<b>K2</b>
<b>CO3</b>	UNDERSTAND CUSTOMA act	<b>K3</b>
<b>CO4</b>	Understand the concept Central sales Tax Act	<b>K4</b>
<b>CO5</b>	Know about GST and apportionment of GST between central and states	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low

**SEMESTER - IV**  
**CORE XIV - SERVICES MARKETING**

**Course Outcome:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Know in detail about the Service Sector and apply the 7 P's of Service Marketing.	<b>K1</b>
<b>CO2</b>	Understand the Consumer Behaviour in Service Sector	<b>K2</b>
<b>CO3</b>	Getting indepth knowledge about Service marketing concepts	<b>K3</b>
<b>CO4</b>	Getting acquainted with the utilities in Service marketing Sector	<b>K4</b>
<b>CO5</b>	Set standard and measure service quality and productivity	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

M- Medium, L – Low

S-  
Strong,

**M.COM SEMESTER - IV PROJECT WORK****Course Outcome:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	To know about Identifying the title of the project	<b>K1</b>
<b>CO2</b>	Gain Knowledge above how collection of data	<b>K2</b>
<b>CO3</b>	Ability to interpret the collection of data	<b>K3</b>
<b>CO4</b>	To develop give suggestions to company	<b>K4</b>
<b>CO5</b>	How prepare Questionnaire	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low



**ELECTIVE IV - PAPER I - INSURANCE AND RISK  
MANAGEMENT**

**Course Outcome:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	To studying the concept of objectives, principles and characteristics of insurance	<b>K1</b>
<b>CO2</b>	To understand the Indian insurance institute	<b>K2</b>
<b>CO3</b>	To know the overview of the risk management	<b>K3</b>
<b>CO4</b>	To Lean the concept of Tourism marketing	<b>K4</b>
<b>CO5</b>	Gain the knowledge about risk management and control	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	M	M	S

S- Strong, M- Medium, L – Low

**ELECTIVE IV - PAPER II - STRATEGIC MANAGEMENT**

**Course Outcome:**

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	To expose students to various perspectives and concepts in the field of strategic management	<b>K1</b>
<b>CO2</b>	The course would enable the students to understand the principles if strategy formulation, implementation and control in organization.	<b>K2</b>
<b>CO3</b>	To help students develop skills for applying this concepts to the solution of business problems.	<b>K3</b>
<b>CO4</b>	To help students master the analytical tools of strategic management.	<b>K4</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S

S- Strong, M- Medium, L – Low

**EDC - PAPER – I  
BUSINESS COMMUNICATION**

**Course Outcome:**

CO Number	CO Statement	Knowledge Level
CO1	Understand the essentials of effective business letters.	<b>K1</b>
CO2	Draft an application for employment.	<b>K2</b>
CO3	Gain Practical knowledge to face an Interview.	<b>K3</b>
CO4	Developing writing skills towards secretarial correspondence	<b>K4</b>
CO5	Exploring a practical knowledge for bank & Insurance Correspondence.	<b>K5</b>

**MAPPING WITH PROGRAMME OUTCOMES:**

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	M	S

S- Strong, M- Medium, L – Low

## M.COM EDC - PAPER – II

### PRINCIPLES OF MARKETING

#### Program Outcomes:

- To highlight the various marketing functions and to impart necessary skills which help the students to choose a career in the field of marketing.
- To provide basic knowledge about the latest trends in marketing.

#### Course Outcomes:

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understanding and knowledge of Introduction of Marketing.	K1
CO2	To have knowledge on Marketing Function	K2
CO3	Understanding the Standardisation, Grading, MIS	K3
CO4	To have knowledge on Product Planning and Development and Product life cycle.	K4
CO5	To have knowledge on Global Marketing- E-Marketing- Tele Marketing- Green Marketing- Online Marketing- Neuro Marketing	K5

#### MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	M	S

S- Strong, M- Medium, L – Low

## EDC - PAPER – III PRINCIPLES OF ACCOUNTANCY

### Program Outcome:

- To enable the students to acquire basic knowledge of accounting principles, concepts and conventions.
  - To make the students to acquire the skill to prepare the trial balance and final accounts.

### Course Outcome:

- On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Provide a basic knowledge about Basic Concepts Fundamentals of Book Keeping accounting concepts	K1
CO2	Understand use the Final accounts of a sole trading concern.	K2
CO3	Understanding the Final accounts of Non- trading concerns	K3
CO4	To have knowledge on preparation Bank Reconciliation statement and Royalties.	K4
CO5	To have knowledge on preparing Depreciation Accounts	K5

### MAPPING WITH PROGRAMME OUTCOMES:

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	M	S

S- Strong, M- Medium, L – Low

### 3. DEPARTMENT OF PHYSICS

#### Programme Outcomes (POs)

1. Graduates will be able to apply assimilated knowledge to evolve tangible solution to emerging problems.
2. Graduates will be able to analyze and interpret data to create and design new knowledge.
3. Graduates will be able to engage in innovative and socially relevant research and effectively communicate the findings.
4. Graduates will become ethically committed professional and entrepreneurs upholding human values.
5. Graduates imbued with ethical values and social concern will be able to understand and appreciate cultural diversity, social harmony and ensure sustainable environment.

#### Programme Specific Objectives (PSOs)

1. Gained the ability to identify and analyse complex Physics problems using the principles of Physics with suitable mathematical tools.
2. Acquired skills which will put the learners at an advantage in careers as drivers to associate with different subjects.
3. Moulded to adopt, absorb and develop innovative ideas
4. Developed skills to communicate effectively with peers, professionals and society at large and demonstrate professional ethics
5. Exhibited effective individual talent, and engaged themselves in lifelong learning and dissemination

COURSE DESCRIPTORS		
<b>Course Code</b>	21PPH01	
<b>Course Title</b>	Classical Mechanics, Thermodynamics and Statistical Mechanics	
<b>Credits</b>	4	
<b>Hours/Week</b>	5	
<b>Category</b>	Major Core-1	
<b>Semester</b>	1	
<b>Regulation</b>	2021-2022	
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>
I	21PPH01	Classical Mechanics, Thermodynamics and Statistical Mechanics
<b>CO No.</b>	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
<b>CO 1</b>	acquire knowledge about conservation laws, constraints, relativistic mechanics, Lagrangian and Hamiltonian dynamics.	
<b>CO 2</b>	understand Kepler problem, rigid body dynamics, relativistic mechanics Lagrangian and Hamilton's formulation.	
<b>CO 3</b>	analyse the Euler's equations and apply them for rigid body dynamics.	
<b>CO 4</b>	evaluate the concepts of inertial, non-inertial frames of references and rotating coordinate system in relativistic mechanics	
<b>CO 5</b>	apply and formulate the Lagrangian and Hamiltonian to solve problems in mechanics and relativistic mechanics.	

Semestet	Course	Title of the Course
I	21PPH01	Classical Mechanics, Thermodynamics and Statistical Mechanics

Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	H	M	M	H
CO-2	H	H	H	M
CO-3	H	L	H	H
CO-4	M	M	H	H
CO-5	M	H	M	L
Mean Overall Score				

COURSE DESCRIPTORS				
Course Code	21PPH02			
Course Title	MATHEMATICAL PHYSICS			
Credits	4			
Hours/Week	5			
Category	Major Cour-2			
Semester	1			
Regulation	2021-2022			
Semester	Course Code	Title of the Course		
I	21PPH02	CORE II - MATHEMATICAL PHYSICS		
CO No.	CO-Statements			
	On the successful completion (K-Levels) of the course, student will be able to			
CO 1	acquire the knowledge about different mathematical methods like vector and matrix algebra, partial derivatives, complex functions, special functions, Fourier series and integral transforms for solving different physics problems			
CO 2	solve partial differential equations, identify complex-differentiable functions, construct Fourier series and integral transforms and special functions.			
CO 3	compute Eigen values and Eigen vectors, line integrals using Cauchy's integral theorem for different physics problems, apply method of separation of variable in different coordinate systems			
CO 4	apply matrix spaces, partial differential equations, integral transforms, special functions to obtain the solution for complex physics problems			
CO 5	analyse the solutions obtained by various mathematical methods.			
Semestet	Course	Title of the Course		
I	21PPH02	MATHEMATICAL PHYSICS		
Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	M	H	M	M
CO-2	M	L	H	L
CO-3	H	M	M	H
CO-4	L	H	M	H
CO-5	H	H	M	H

Mean Overall Score

**COURSE DESCRIPTORS**

<b>Course Code</b>	21PPH03	
<b>Course Title</b>	ELECTRONICS 21PPH03	
<b>Credits</b>	5	
<b>Hours/Week</b>	4	
<b>Category</b>	Major Cour - 3	
<b>Semester</b>	1	
<b>Regulation</b>	2021-2022	
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>
<b>I</b>	<b>21PPH03</b>	<b>ELECTRONICS</b>
<b>CO No.</b>	<b>CO-Statements</b>	
<b>CO 1</b>	<b>On the successful completion (K-Levels) of the course, student will be able to describe and discuss characteristics diode, P-N junction, schottky diode and varactor diode Electronics.</b>	
<b>CO 2</b>	outline semiconductor devices, examine the Analog and digital circuits and identify the states and working characteristics of circuits.	
<b>CO 3</b>	list and use the methods to examine Analog and digital circuit problems.	
<b>CO 4</b>	assess the limitations of Analog and Digital circuits and recommend the solutions.	
<b>CO 5</b>	design and construct Analog and Digital circuits for demand K1&K2	

<b>Semestet</b>	<b>Course</b>	<b>Title of the Course</b>		
<b>I</b>	<b>21PPH03</b>	<b>ELECTRONICS</b>		
<b>Course Outcomes (COs)</b>	<b>Programme Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>
<b>CO-1</b>	M	H	M	M
<b>CO-2</b>	M	L	H	L
<b>CO-3</b>	H	M	M	H
<b>CO-4</b>	L	H	M	H
<b>CO-5</b>	H	H	M	H

Mean Overall Score

**COURSE DESCRIPTORS**

<b>Course Code</b>	21PPHE01
<b>Course Title</b>	MICROPROCESSORS AND MICROCONTROLLERS
<b>Credits</b>	4
<b>Hours/Week</b>	5
<b>Category</b>	Elective-1
<b>Semester</b>	1

<b>Regulation</b>	2021-2022	
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>
<b>I</b>	<b>21PPHE01</b>	<b>MICROPROCESSORS MICROCONTROLLERS</b>
<b>CO No.</b>	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
<b>CO 1</b>	describe and discuss the architecture of Microcontroller, Arduino and IoT.	
<b>CO 2</b>	list and outline the features of Arduino IDE, syntax and algorithm and use this to solve the problems	
<b>CO 3</b>	use professional ethics on using sensors to rate modern society	
<b>CO 4</b>	investigate and explain the automatic electronic devices and plan self-sustainability, employability and over all personality	
<b>CO 5</b>	identify the applications of Arduino, recommend the methods, design and construct various physics Instruments.	

<b>Semestet</b>	<b>Course</b>	<b>Title of the Course</b>		
<b>I</b>	<b>21PPHE01</b>	<b>MICROPROCESSORS AND MICROCONTROLLERS</b>		
<b>Course Outcomes (COs)</b>	<b>Programme Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>
<b>CO-1</b>	H	M	H	L
<b>CO-2</b>	H	M	H	H
<b>CO-3</b>	M	H	M	H
<b>CO-4</b>	M	H	H	L
<b>CO-5</b>	H	M	M	H
Mean Overall Score				

<b>COURSE DESCRIPTORS</b>		
<b>Course Code</b>	21PPH04	
<b>Course Title</b>	THEORY OF SEMICONDUCTOR DEVICES	
<b>Credits</b>	4	
<b>Hours/Week</b>	5	
<b>Category</b>	Major Core- IV	
<b>Semester</b>	2	
<b>Regulation</b>	2021-2022	
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>
<b>I</b>	<b>21PPH04</b>	<b>THEORY OF SEMICONDUCTOR DEVICES</b>
<b>CO No.</b>	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
<b>CO 1</b>	describe and outline structure of Semiconducting materials	
<b>CO 2</b>	explain and illustrate the semiconductor junction	
<b>CO 3</b>	examine the semiconducting devices and circuits, explain the working characteristics and use these principles in the complex circuits.	



CO 4	assess the electronic device problems and recommend the solutions.
CO 5	synthesis new materials for semiconductor devices

Semestet	Course	Title of the Course			
I	21PPH04	THEORY OF SEMICONDUCTOR DEVICES			
Course Outcomes (COs)	Programme Outcomes				
	PO 1	PO 2	PO 3	PO 4	
CO-1	H	H	M	H	
CO-2	M	M	M	H	
CO-3	H	H	H	H	
CO-4	M	H	M	M	
CO-5	H	M	H	H	
Mean Overall Score					

COURSE DESCRIPTORS		
Course Code	21PPH05	
Course Title	Quantum Mechanics - I	
Credits	4	
Hours/Week	5	
Category	Major Cour-V	
Semester	2	
Regulation	2021-2022	
Semester	Course Code	Title of the Course
I	21PPH05	Quantum Mechanics - I
CO No.	CO-Statements	
	On the successful completion (K-Levels) of the course, student will be able to	
CO 1	describe the principles and methods of wave mechanics and matrix mechanics based on Dirac notation.	
CO 2	explain quantum mechanical methods to study angular momentum and various perturbed systems.	
CO 3	apply the quantum theory to 1D potentials, 3D potentials, rotation & addition of angular momenta, stationary states and timedependent systems.	
CO 4	analyse various properties using the quantum theory and compare it with the results of classical physics.	
CO 5	evaluate and summarize the methods and properties of various quantum mechanical systems	

Semestet	Course	Title of the Course	
I	21PPH05	Quantum Mechanics - I	
Course Outcomes (COs)	Programme Outcomes		

	PO 1	PO 2	PO 3	PO 4
CO-1	H	M	L	M
CO-2	M	H	M	H
CO-3	H	H	M	H
CO-4	H	M	L	H
CO-5	M	L	H	M
Mean Overall Score				

COURSE DESCRIPTORS		
Course Code	21PPH06	
Course Title	COMPUTATIONAL PHYSICS & C++ PROGRAMMING	
Credits	4	
Hours/Week	5	
Category	Major Cour-VI	
Semester	2	
Regulation	2021-2022	
Semester	Course Code	Title of the Course
I	21PPH06	COMPUTATIONAL PHYSICS & C++ PROGRAMMING
CO No.	CO-Statements	
CO 1	On the successful completion (K-Levels) of the course, student will be able to gain knowledge on the mathematical methods in Tensors, Group Theory and programming Language and comprehend the same for the problems in physics at ease	
CO 2	apply the knowledge gained in computational and numerical methods to solve problems in physics.	
CO 3	analyse computationally the given problems in physics by various theoretical models.	
CO 4	evaluate the complex problems in physics based on specific theories, procedures and tools.	
CO 5	synthesis the computational methods adapted to produce precise and accurate results on select problems	

Semestet	Course	Title of the Course		
I	21PPH06	COMPUTATIONAL PHYSICS & C++ PROGRAMMING		
Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	M	H	M	H
CO-2	H	L	M	M
CO-3	H	L	H	H
CO-4	H	H	M	L
CO-5	M	M	H	M
Mean Overall Score				

COURSE DESCRIPTORS		
Course Code	21PPHE02	
Course Title	Nano Physics	
Credits	4	
Hours/Week	5	
Category	Elective-2	
Semester	2	
Regulation	2021-2022	
Semester	Course Code	Title of the Course
I	21PPHE02	Nano Physics
CO No.	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
CO 1	acquire the knowledge on fundamentals of nanoscience.	
CO 2	understand and realize the applications of various nanostructures towards optical and electronic devices.	
CO 3	apply quantum physics concepts on nanostructures and study the corresponding physical and chemical properties	
CO 4	analyse the various processing techniques to fabricate nanodevices.	
CO 5	evaluate the properties of nanostructures with size and morphology and develop an appropriate conclusion in favour of change in properties.	

Semestet	Course	Title of the Course		
I	21PPHE02	Nano Physics		
Course Outcomes (COs)	<b>Programme Outcomes</b>			
	PO 1	PO 2	PO 3	PO 4
CO-1	H	M	H	M
CO-2	H	H	H	L
CO-3	H	M	H	H
CO-4	M	L	H	M
CO-5	H	M	L	H
Mean Overall Score				

COURSE DESCRIPTORS		
Course Code	21PPH07	
Course Title	ELECTROMAGNETIC THEORY & PLASMA PHYSICS	
Credits	4	
Hours/Week	5	
Category	Major Cour-7	
Semester	3	
Regulation	2021-2022	
Semester	Course Code	Title of the Course

<b>I</b>	<b>21PPH07</b>	<b>ELECTROMAGNETIC THEORY &amp; PLASMA PHYSICS</b>		
<b>CO No.</b>	<b>CO-Statements</b>			
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>			
<b>CO 1</b>	impart and describe the knowledge on the concepts in electrostatics, magnetostatics, field equations and electromagnetic waves.			
<b>CO 2</b>	explain the boundary conditions in electrostatics and magnetostatics, Poynting theorem, propagation of electromagnetic waves.			
<b>CO 3</b>	apply and analyze the knowledge to solve image problems, magnetic field and potential problems, boundary conditions and radiationreaction.			
<b>CO 4</b>	relate and check the knowledge from symmetry problems, Gauss law and Biot-Savart's law.			
<b>CO 5</b>	compare and summarize TE, TM, TEM waves, normal and oblique incidences for conductors.			
<b>Semestet</b>	<b>Course</b>	<b>Title of the Course</b>		
<b>I</b>	<b>21PPH07</b>	<b>ELECTROMAGNETIC THEORY &amp; PLASMA PHYSICS</b>		
<b>Course Outcomes (COs)</b>	<b>Programme Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>
<b>CO-1</b>	H	H	M	H
<b>CO-2</b>	H	L	H	M
<b>CO-3</b>	M	H	M	H
<b>CO-4</b>	M	H	H	M
<b>CO-5</b>	H	M	M	L
Mean Overall Score				
<b>COURSE DESCRIPTORS</b>				
<b>Course Code</b>	21PPH08			
<b>Course Title</b>	QUANTUM MECHANICS - II			
<b>Credits</b>	4			
<b>Hours/Week</b>	5			
<b>Category</b>	Major Cour-8			
<b>Semester</b>	3			
<b>Regulation</b>	2021-2022			
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>		
<b>I</b>	<b>21PPH08</b>	<b>QUANTUM MECHANICS - II</b>		
<b>CO No.</b>	<b>CO-Statements</b>			
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>			
<b>CO 1</b>	describe the principles and methods of wave mechanics and matrixmechanics based on Dirac notation			
<b>CO 2</b>	explain quantum mechanical methods to study angular momentum and various perturbed systems.			

<b>CO 3</b>	apply the quantum theory to 1D potentials, 3D potentials, Electric dipole transition - Selection rules and polarizability forbidden transitions. Quantum theory of radiation:
<b>CO 4</b>	analyse various properties using the quantum theory and Approximations in atomic structure - Central field approximation - Thomas Fermi Statistical model - Hartree-Fock Equation - method of self-consistent field
<b>CO 5</b>	evaluate and Klein-Gordon Equation for a free particle and its solution - Charge and current densities in four vector - KG equation in electromagnetic fieldsummarize the methods and properties of various quantum mechanical systems.

Semestet	Course	Title of the Course			
<b>I</b>	<b>21PPH08</b>	<b>QUANTUM MECHANICS - II</b>			
Course Outcomes (COs)	Programme Outcomes				
	PO 1	PO 2	PO 3	PO 4	
<b>CO-1</b>	M	H	M	M	
<b>CO-2</b>	H	L	H	H	
<b>CO-3</b>	H	H	M	H	
<b>CO-4</b>	M	H	H	M	
<b>CO-5</b>	H	M	L	H	
Mean Overall Score					

COURSE DESCRIPTORS		
<b>Course Code</b>	21PPH09	
<b>Course Title</b>	MOLECULAR PHYSICS & SPECTROSCOPY	
<b>Credits</b>	4	
<b>Hours/Week</b>	5	
<b>Category</b>	Major Cour-9	
<b>Semester</b>	3	
<b>Regulation</b>	2021-2022	
Semester	Course Code	Title of the Course
<b>I</b>	<b>21PPH09</b>	<b>MOLECULAR PHYSICS &amp; SPECTROSCOPY</b>
CO No.	CO-Statements	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
<b>CO 1</b>	acquire knowledge and understand the aspects of various spectroscopic methods like rotational spectroscopy and its techniques.	
<b>CO 2</b>	explain the theory and principles of vibrational spectroscopy and its techniques.	
<b>CO 3</b>	perceive the theory and principles of electronic and X-ray spectroscopy and apply them to describe fluorescence and phosphorescence	
<b>CO 4</b>	comprehend the basics of Raman spectroscopy and evaluate and examine the molecular and atomic structure of different advanced materials.	
<b>CO 5</b>	understand the physics behind NMR and ESR spectroscopy, Mossbauer spectroscopic techniques and apply it examine new materials and to make novel drugs in the field of medicine.	

Semestet	Course	Title of the Course		
I	21PPH09	MOLECULAR PHYSICS & SPECTROSCOPY		
Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	M	H	M	H
CO-2	H	L	H	H
CO-3	M	H	M	M
CO-4	H	L	H	H
CO-5	H	M	L	M
Mean Overall Score				

COURSE DESCRIPTORS		
Course Code	21PPHE08	
Course Title	CRYSTAL GROWTH & THIN FILM PHYSICS	
Credits	4	
Hours/Week	5	
Category	Elective-3	
Semester	3	
Regulation	2021-2022	
Semester	Course Code	Title of the Course
I	21PPHE08	CRYSTAL GROWTH & THIN FILM PHYSICS
CO No.	CO-Statements	
	On the successful completion (K-Levels) of the course, student will be able to	
CO 1	acquire the knowledge about the fundamentals of nucleation and various crystallization theories.	
CO 2	understand various crystallization theories, various crystal growth methods and thin film deposition techniques.	
CO 3	apply the essential processing parameters for different crystal growth and thin film deposition techniques.	
CO 4	analyze the different growth techniques and choose an appropriate technique to grow crystals and thin films.	
CO 5	evaluate the merits and demerits of different growth techniques and design a new growth approach to overcome the existing demerits.	

Semestet	Course	Title of the Course		
I	21PPHE08	CRYSTAL GROWTH & THIN FILM PHYSICS		
Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	M	H	M	M
CO-2	M	H	L	H

CO-3	H	M	H	H
CO-4	L	H	M	M
CO-5	H	M	H	L
Mean Overall Score				

COURSE DESCRIPTORS		
Course Code	21PPH10	
Course Title	Nuclear & Elementary Particle Physics	
Credits	4	
Hours/Week	5	
Category	Major Cour-10	
Semester	4	
Regulation	2021-2022	
Semester	Course Code	Title of the Course
I	21PPH10	Nuclear & Elementary Particle Physics
CO No.	CO-Statements	
	On the successful completion (K-Levels) of the course, student will be able to	
CO 1	recall and explain a clear picture of nuclear composition, Radio activity, cosmic rays and understand various nuclear models.	
CO 2	understand the working of nuclear detectors and counters, realize the importance of Cosmic rays and its effects on earth	
CO 3	apply and Evaluate the applications of Nuclear Physics to Medical field and various other fields related to Physics.	
CO 4	analyse the different types of nuclear particles and particle accelerators.	
CO 5	formulate the four-factor formula and compound nuclear theory based on nuclear fission and fusion concepts	

Semestet	Course	Title of the Course		
I	21PPH10	Nuclear & Elementary Particle Physics		
Course Outcomes (COs)	Programme Outcomes			
	PO 1	PO 2	PO 3	PO 4
CO-1	H	M	H	M
CO-2	M	H	H	L
CO-3	H	M	H	H
CO-4	M	H	H	M
CO-5	H	L	H	M
Mean Overall Score				

COURSE DESCRIPTORS	
Course Code	21PPH11
Course Title	CONDENSED MATTER PHYSICS

<b>Credits</b>	4	
<b>Hours/Week</b>	5	
<b>Category</b>	Major Cour-11	
<b>Semester</b>	4	
<b>Regulation</b>	2021-2022	
<b>Semester</b>	<b>Course Code</b>	<b>Title of the Course</b>
<b>I</b>	<b>21PPH11</b>	<b>CONDENSED MATTER PHYSICS</b>
<b>CO No.</b>	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
<b>CO 1</b>	Acquire knowledge and understand the behaviour of electrons in solids based on classical and quantum theories. activity, cosmic rays and understand various nuclear models.	
<b>CO 2</b>	Apply the knowledge and analyse the available semiconducting and superconducting materials	
<b>CO 3</b>	Able to differentiate between ferroelectric, anti-ferroelectric, piezoelectric, pyroelectric materials, Plasmons, polaritons and polarons	
<b>CO 4</b>	Develop and synthesize new materials for a requirement.	
<b>CO 5</b>	Create an eco-friendly environment with lifelong development and usage of condensed matters.	

<b>Semestet</b>	<b>Course</b>	<b>Title of the Course</b>		
<b>I</b>	<b>21PPH11</b>	<b>CONDENSED MATTER PHYSICS</b>		
<b>Course Outcomes (COs)</b>	<b>Programme Outcomes</b>			
	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>
<b>CO-1</b>	H	H	L	H
<b>CO-2</b>	H	M	H	M
<b>CO-3</b>	M	H	M	H
<b>CO-4</b>	M	L	H	M
<b>CO-5</b>	H	M	M	L
Mean Overall Score				

COURSE DESCRIPTORS	
<b>Course Code</b>	21PPHE05
<b>Course Title</b>	Physics of Non-conventional Energy Resources
<b>Credits</b>	4
<b>Hours/Week</b>	5
<b>Category</b>	Elective-4
<b>Semester</b>	4
<b>Regulation</b>	2021-2022



Semester	Course Code	Title of the Course
I	21PPHE05	Physics of Non-conventional Energy Resources
CO No.	<b>CO-Statements</b>	
	<b>On the successful completion (K-Levels) of the course, student will be able to</b>	
CO 1	acquir the principles of solar energy and predict its utilization.	
CO 2	understand the classifications of the solar energy collectors and methodologies of storing solar energy	
CO 3	know the applications of solar energy, wind energy and biomass and other forms of energy sources.	
CO 4	analysis the different forms of energy resources based on its economic aspects	
CO 5	assess the generated renewable energies and design the different energy resources.	

Semestet	Course	Title of the Course			
I	21PPHE05	Physics of Non-conventional Energy Resources			
Course Outcomes (COs)	<b>Programme Outcomes</b>				
	PO 1	PO 2	PO 3	PO 4	
CO-1	M	M	H	L	
CO-2	H	L	H	H	
CO-3	H	M	H	M	
CO-4	M	H	M	M	
CO-5	H	L	M	H	
Mean Overall Score					

# 4. DEPARTMENT OF CHEMISTRY

Programme Outcomes(POs)	
PO1	To impart knowledge in advanced concepts and applications in various fields of chemistry
PO2	To provide wide choice of elective subjects with updated and new areas in various branches of Chemistry to meet the needs of all students

## SEMESTER I

### CORE I - ORGANIC CHEMISTRY PAPER CODE

:21PCH01

#### Course Outcomes:

CO Number	CO Statement
CO1	Stereochemistry, ORD and CD
CO2	Reaction intermediates and aliphatic electrophilic substitution
CO3	Effect of structure on reactivity
CO4	Aliphatic nucleophilic substitution
CO5	Alkaloids and Anthocyanins

#### Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**CORE II – INORGANIC CHEMISTRY -I**  
**PAPER CODE: 21PCH02**

**Course Outcomes:**

CO Number	CO Statement
CO1	Structure and Bonding, Hard and soft acids
CO2	Bioinorganic chemistry, Biological significances of metals
CO3	Boron compounds and Clusters
CO4	Nuclear chemistry, subatomic particles, detection and determination
CO5	Nuclear reaction and radioisotopes

**Mapping with Programme Outcomes:**

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**CORE III - PHYSICAL CHEMISTRY – IPAPER**  
**CODE:21PCH03**

**Course Outcomes:**

CO Number	CO Statement
CO1	Classical thermodynamics and its application
CO2	Statistical thermodynamics and its uses
CO3	Chemical kinetics to study the reaction mechanisms
CO4	Quantum chemistry of various molecules
CO5	Group theory to ensure the geometry of molecules

**Mapping with Programme Outcomes:**

COs	PO1	PO2
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<b>CO1</b>	<b>S</b>	<b>M</b>
<b>CO2</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>M</b>	<b>S</b>

<b>CO4</b>	S	S
<b>CO5</b>	M	S

Strong-S; Medium-M; Low-L

### Elective Paper I – POLYMERCHEMISTRY

**PAPER CODE:21PCHE01**

#### Course Outcomes:

CO Number	CO Statement
<b>CO1</b>	Monomers, repeat units, degree of polymerization.
<b>CO2</b>	Molecular Weight and Physical Properties
<b>CO3</b>	Polymer Processing and Polymerization Techniques
<b>CO4</b>	Synthesis and applications of Commercial Polymers,
<b>CO5</b>	Conducting polymers and Electrochemical doping

#### Mapping with Programme Outcomes:

COs	PO1	PO2
<b>CO1</b>	S	M
<b>CO2</b>	S	S
<b>CO3</b>	M	S
<b>CO4</b>	S	S
<b>CO5</b>	M	S

Strong-S; Medium-M; Low-L

### SEMESTER II

### CORE IV - ORGANIC CHEMISTRY – II

**PAPER CODE:21PCH04**

#### Course Outcomes:

CO Number	CO Statement
<b>CO1</b>	Aromaticity- Aromaticity in benzenoid, non-benzenoid
<b>CO2</b>	Elimination and Free radicals

CO3	Aromatic electrophilic and nucleophilic substitution
CO4	Organic Photo chemistry and its applications

CO5	Pericyclic reactions, Classification, basic concept of orbital symmetry
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Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

## CORE PAPER V - PHYSICAL CHEMISTRY – II PAPER CODE:21PCH05

### Course Outcomes:

CO Number	CO Statement
CO1	Statistical Thermodynamics and its applications
CO2	Various partition function and its explanation
CO3	Chemical kinetics of complex reactions
CO4	Orientation of quantum chemistry to molecules
CO5	Group theory and its selection rule

Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**ELECTIVE II SPECTROSCOPY PAPER  
CODE: 21PCHE02**

### Course Outcomes:

<b>CO Number</b>	<b>CO Statement</b>
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<b>CO1</b>	UV-VIS and IR- Spectroscopy
<b>CO2</b>	Basics of NMR spectroscopy
<b>CO3</b>	Instrumentation and application of NMR spectroscopy
<b>CO4</b>	Introduction of EPR and Mossbauer spectroscopy
<b>CO5</b>	Mass spectrometry and spectroscopic applications

Mapping with Programme Outcomes:

<b>COs</b>	<b>PO1</b>	<b>PO2</b>
<b>CO1</b>	S	M
<b>CO2</b>	S	S
<b>CO3</b>	M	S
<b>CO4</b>	S	S
<b>CO5</b>	M	S

Strong-S; Medium-M; Low-L

## **CORE PRACTICAL I – ORGANIC CHEMISTRY PRACTICAL – I**

### **PAPER CODE:21PCHP01**

#### Course Outcomes:

1. Identification of components in a two component mixture and preparation of their derivatives. Determination of boiling point/melting point for components and melting point for their derivatives .
2. Preparation of Organic compounds.

## **CORE PRACTICAL II-INORGANIC CHEMISTRY PRACTICAL I**

### **PAPER CODE:21PCHP02**

#### Course Outcomes:

1. Semimicro qualitative analysis of mixtures containing the following cations to be tested W, Tl, Pb, Se, Te, Mo, Cu, Bi, Cd, Tl, Ce, Th, Zr, V, Cr, Fe, Ti, Zn, Ni, Co, Mn.
2. Visual and Photometric determination of Iron, Nickel, Manganese and Copper

## **CORE PRACTICAL –III PHYSICAL CHEMISTRY PRACTICAL –I**

### **PAPER CODE: 21PCHP03**

**Course Outcomes:**

1. Conducting kinetics experiments.
2. Various phase diagram analysis
3. Adsorption of oxalic acid on charcoal & determination of surface area

SEMESTER III

**CORE VI - ORGANIC CHEMISTRY – III**  
**PAPER CODE:21PCH06**

**Course Outcomes:**

CO Number	CO Statement
CO1	Addition to carbon-carbon and carbon-hetero multiple bonds
CO2	Study of Molecular rearrangements
CO3	Oxidation and reduction reactions
CO4	Steroids and Steroid Hormones
CO5	Reagent in organic chemistry

**Mapping with Programme Outcomes:**

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**CORE PAPER-VII INORGANIC CHEMISTRY – II**

**PAPER CODE:21PCH07**

**Course Outcomes:**

CO Number	CO Statement
CO1	Electrical properties of solids
CO2	Solid state and its types
CO3	Theories of coordination compounds

<b>CO4</b>	Stability and StereochemicalAspects
<b>CO5</b>	Reaction Mechanism of transition metal complexes

Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**CORE VIII - PHYSICAL CHEMISTRY III PAPER**  
**CODE: 21PCH08**

Course Outcomes:

CO Number	CO Statement
CO1	Basics concept of electrochemistry
CO2	Electrochemistry and its applications
CO3	Process of photochemistry
CO4	Quantum applications to various systems
CO5	Rotational and vibrational spectroscopy

Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

**ELECTIVE III EXPERIMENTAL METHODS IN CHEMISTRY**  
**PAPER CODE: 21PCHE03**

**Course Outcomes:**

CO Number	CO Statement
CO1	Basic concepts in surface imaging
CO2	Destructive and Non – Destructive techniques in chemical analysis
CO3	Various electroanalytical techniques
CO4	Normal and Reversed-phase liquid chromatography
CO5	Gel chromatography & Ion – Exchange chromatography

Mapping with Programme Outcomes:

COs	PO1	PO2
CO1	S	M
CO2	S	S
CO3	M	S
CO4	S	S
CO5	M	S

Strong-S; Medium-M; Low-L

#### SEMESTER IV

#### CORE PAPER-IX INORGANIC CHEMISTRY PAPER CODE :21PCH09

#### Course Outcomes:

CO Number	CO Statement
CO1	<b>Bonding in Organometallic Complexes and metalcarbonyls</b>
CO2	<b>Organometallic and Organometallic Sandwich complexes</b>
CO3	<b>Catalysis and hydrogenation</b>
CO4	<b>Supramolecular Chemistry and PhotoChemistry</b>
CO5	<b>Electronic Spectra of Complexes</b>

Mapping with Programme Outcomes:

<b>COs</b>	<b>PO1</b>	<b>PO2</b>
<b>CO1</b>	S	M
<b>CO2</b>	S	S
<b>CO3</b>	M	S



<b>CO4</b>	S	S
<b>CO5</b>	M	S

Strong-S; Medium-M; Low-L

## ELECTIVE IV MEDICINAL CHEMISTRY PAPER CODE: 21PCHE04

### Course Outcomes:

CO Number	CO Statement
CO1	<b>Basic Concepts of Drugs</b>
CO2	<b>Drugs Acting on CNS</b>
CO3	<b>Drugs Affecting the Cardiovascular System</b>
CO4	<b>Drugs Affecting the Harmonal System and Immune System</b>
CO5	<b>Chemotherapeutic Agents and its uses</b>

### Mapping with Programme Outcomes:

COs	PO1	PO2
<b>CO1</b>	S	M
<b>CO2</b>	S	S
<b>CO3</b>	M	S
<b>CO4</b>	S	S
<b>CO5</b>	M	S

Strong-S; Medium-M; Low-L

## CORE PRACTICAL IV- ORGANIC CHEMISTRY PRACTICAL – II PAPER CODE: 21PCHP04

### Course Outcomes:

1. Organic Estimations
2. Organic preparations involving two steps

## CORE PRACTICAL - V INORGANIC CHEMISTRY PRACTICAL – II PAPER CODE:21PCHP05

**Course Outcomes:**

1. Quantitative analysis of complex material.
2. Preparation of inorganic compounds.

**CORE PRACTICAL –VI PHYSICAL CHEMISTRY PRACTICAL – IIPAPER CODE:  
21PCHP06**

**Course Outcomes:**

1. **Viscosity** Variation of viscosity of liquids with temperature
2. Study the surface tension-concentration relationship of solutions (Gibb's equation )

**PROJECT: DISSERTATION WORKPAPER  
CODE: 21PCHPR1**

**Course Outcomes:**

1. Emphasis the synthesis of new materials.
2. Increasing the knowledge on various techniques

## 5. DEPARTMENT OF MATHEMATICS

### M.Sc. MATHEMATICS SEMESTER – I CORE I - LINEAR ALGEBRA

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to describe a diagonalizable operator  $T$  in a language of invariant direct sum decompositions (projections which commute with  $T$ ).
- to find the minimal polynomials, Jordan forms and the rational forms of real matrices.

### M.Sc. MATHEMATICS SEMESTER – I CORE II - REAL ANALYSIS – I

**LEARNING OUTCOMES:**

On successful completion of this course, students will be able

- to give the definition of concepts related to metric spaces, such as continuity, compactness, completeness and connectedness that will help for further studies within topology and functional analysis.
- to demonstrate an understanding of limits and how they are used in sequences, series, continuity and differentiation.
- to construct rigorous mathematical proofs of basic results in real analysis.

### M.Sc. MATHEMATICS SEMESTER – I CORE III - ORDINARY DIFFERENTIAL EQUATIONS

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to solve the differential equations by using various methods.

**M.Sc. MATHEMATICS SEMESTER – I**  
**CORE IV – MECHANICS**

**LEARNING OUTCOMES:**

- At the end of the course, the students will understand the formation of differential equations which will help to study the dynamics of mechanical systems.

**M.Sc. MATHEMATICS**  
**SEMESTER - II**  
**CORE V – ABSTRACT ALGEBRA**

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to find the number of Sylow subgroups.
- to find the number of non-isomorphic abelian groups.
- to find the splitting field, Galois group of the given polynomial.
- to check whether the given polynomial is solvable by radicals or not.

**M.Sc. MATHEMATICS**  
**SEMESTER - II**  
**CORE VI – REAL ANALYSIS – II**

**LEARNING OUTCOMES:**

On successful completion of this course, students will be able to

- find the integrals of a bounded function on a closed bounded interval
- understand sequences and series of functions and its convergence
- find the derivative of functions of several variables.

**M.Sc. MATHEMATICS**  
**SEMESTER -II**  
**CORE VII - PARTIAL DIFFERENTIAL EQUATIONS**

**LEARNING OUTCOMES:** At the end of the course, students will

- be familiar with the modeling assumptions and derivations that lead to PDE's.
- recognize the major classification of PDEs and the qualitative difference between the classes of equations.
- be competent in solving linear PDEs using classical methods.

**M.Sc. MATHEMATICS SEMESTER -III**  
**CORE VIII – COMPLEX ANALYSIS**

**LEARNING OUTCOMES:** At the end of the course, students will

- be familiar with the modeling assumptions and derivations that lead to Complex Analysis
- recognize the major classification of analytic functions, harmonic functions, conformal mappings and the qualitative difference between the complex integration & Real integration.

**M.Sc. MATHEMATICS SEMESTER - III**  
**CORE IX – TOPOLOGY**

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to understand various concepts of Topology.

**M.Sc. MATHEMATICS**  
**SEMESTER -III**  
**CORE X - MEASURE THEORY AND INTEGRATION**

**LEARNING OUTCOMES:**

- At the end of the course, the students will be able get the knowledge of Measure and Outer measure, generalization of integrals with help of measures.

**M.Sc. MATHEMATICS**

**SEMESTER – III**

**CORE XI - GRAPH THEORY**

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to identify the graphs of connectivity and tree.
- to find the Independent set and cycle graph.
- to understand graph coloring.
- to check planarity.

**M.Sc. MATHEMATICS**

**SEMESTER - IV**

**CORE XII - FUNCTIONAL ANALYSIS**

**LEARNING OUTCOMES:**

On successful completion of this course, students will be able to

- Understand the relationship between metric space, normed space, inner product space
- understand properties of continuous linear functionals on Banach space
- understand various types of operators on Hilbert space.
- know Regular elements, singular elements, spectrum of Banach algebra & its ideals

**M.Sc. MATHEMATICS**  
**SEMESTER - IV**  
**CORE XIII – PROBABILITY THEORY**

**LEARNING OUTCOMES:** At the end of the course, students will be able

- to get the knowledge of Random variables and Random events.
- to understand characteristic of function and Properties of characteristic function.

**M.Sc. MATHEMATICS**  
**SEMESTER - IV**  
**CORE XIV - CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS**

**LEARNING OUTCOMES:**

After the successful completion of the course, students will be able

- to know different types variational problems and finding their extremals.
- to find solution of Fredholm &Volterra integral equations through different methods.

**M.Sc. MATHEMATICS**  
**SEMESTER - I**  
**ELECTIVE I - PAPER I - DISCRETE MATHEMATICS**

**LEARNING OUTCOMES:** Students completing this course will be able to

- express a logic sentence in terms of predicates, quantifiers and logical connectives.
- apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction and mathematical induction.
- solve m a t h e m a t i c s problems that involve computing permutations and combinations of a set, fundamental enumeration principles.
- evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.



**M.Sc. MATHEMATICS**  
**SEMESTER - I**  
**ELECTIVE I - PAPER II - COMBINATORIAL MATHEMATICS**

**LEARNING OUTCOMES:** After completing the course, students will be able to

- Use formulas for counting basic combinatorial outcomes to construct solutions to complete combinatorial enumeration problems:
  - permutation, with and without repetitions;
  - combinations, with and without repetitions;
- Apply counting strategies to solve discrete probability problems.
- Use specialized techniques to solve combinatorial enumeration problems:
  - generating functions;
  - recurrence relations;
  - Inclusion-exclusion principle.

**M.Sc. MATHEMATICS**  
**SEMESTER – II**  
**ELECTIVE II- PAPER I - NUMERICAL ANALYSIS**

**LEARNING OUTCOMES:** At the end of the course, students will

- learn the principles for designing numerical schemes for differential equations.
- be able to analyze the consistency, stability and convergence of a numerical scheme.
- be able to know, for each type of differential equations, what kind of numerical methods are best suited for and the reasons behind these choices?
- be able to make a connection between the mathematical equations or properties and the corresponding physical meanings.
- be able to use a programming language or mathematical software to implement and test the numerical schemes.

**M.Sc. MATHEMATICS**  
**SEMESTER - II**  
**ELECTIVE II - PAPER II - DIFFERENCE EQUATIONS**

**LEARNING OUTCOMES:**

After the successful completion of the course, students will be able

- to know the fundamentals of difference calculus, like, the difference operator, the computation of sums, the concept of generating function and the important Euler summation formula.
- to solve linear difference equations using different methods, namely, annihilator method, z-transform method, etc.
- to find the stability results for the linear system using eigen value criteria.
- to find asymptotic analysis of sums, and asymptotic behavior of solutions to linear difference equations by the theorems of Poincare and Perron.

**M.Sc. MATHEMATICS**  
**SEMESTER - III**  
**ELECTIVE III - PAPER I - DIFFERENTIAL GEOMETRY**

**LEARNING OUTCOMES:** After successful completion of the course, students will be able to

- calculate the curvature and torsion of a curve.
- find the osculating surface and osculating curve at any point of a given curve.
- calculate the first and the second fundamental forms of surface.
- calculate the Gaussian curvature, the mean curvature, the curvature lines, the asymptotic lines, the geodesics of a surface.

**M.Sc. MATHEMATICS**  
**SEMESTER – III**  
**ELECTIVE III - PAPER II – FLUID DYNAMICS**

**LEARNING OUTCOMES:** On successful completion of the course, the student will be able to,

- Recognize and find the values of fluid properties and relationship between them and understand the principles of continuity, momentum, and energy as applied to fluid motions.
- Identify these principles written in form of mathematical equations.
- Apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics.

**M.Sc. MATHEMATICS**  
**SEMESTER – III**

**ELECTIVE III - PAPER III - PROGRAMMING WITH C++**

**LEARNING OUTCOMES:** At the end of the course, students will be able

- To acquire the knowledge of getting solution to mathematical problems with the help of C++.

**M.Sc. MATHMATICS**  
**SEMESTER - IV**

**ELECTIVE IV - PAPER I - NUMBER THEORY**

**LEARNING OUTCOMES:** At the end of the course, student will be able to

- apply the Law of Quadratic Reciprocity and other methods to classify numbers as primitive roots, quadratic residues and quadratic non-residues.
- formulate and prove conjectures about numeric patterns and
- produce rigorous arguments centered on the material of number theory, most notably in the use of Mathematical induction and the Well-Ordered principle in the proof of theorems.

**M.Sc. MATHMATICS**  
**SEMESTER - IV**

**ELECTIVE IV- PAPER II - OPTIMIZATION TECHNIQUES**

**LEARNING OUTCOMES:** At the end of the course, students will be able to

- Formulate a real-world problem as linear programming and queuing models.
- Assess the existence and uniqueness of solutions and derive necessary and sufficient optimality conditions for a given optimization problem.
- Understand the mathematical tools that are needed to solve optimization problems.
- Identify and develop decision making and inventory models from the verbal description of the real system.

**M.Sc. MATHEMATICS**  
**SEMESTER II**  
**EXTRA DISCIPLINARY COURSE (EDC)**  
**EDC - PAPER I - NUMERICAL & STATISTICAL METHODS**  
(Theorems and proof are not expected)

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**LEARNING OUTCOMES:**

- After successful completion of the course, the students will be able to apply these concepts to solve algebraic and transcendental equations, system of linear equations, evaluate derivatives and integrals using numerical techniques. Further, students will be able to analyze the given data with the help of the above statistical tools.

**M.Sc. MATHEMATICS SEMESTER – II**

**EXTRA DISCIPLINARY COURSE (EDC) EDC - PAPER II - STATISTICS**  
(Theorems and proof are not expected)

**LEARNING OUTCOMES:** After successful completion of the course, students will be able to

- calculate Mean, Median and Mode in series of individual observations.
- find Discrete series, Continuous series.
- calculate the first and the second fundamental forms of surface.
- calculate the Range, Quartile deviation, Mean deviation about an average, Standard deviation and co-efficient of variation for individual, discrete and continuous type data.

**M.Sc. MATHEMATICS SEMESTER – II**

**ADD ON COURSE (AOC) - PAPER I – ADVANCED LATEX**

**Learning Outcomes:**

This course will enable the students to:

- Create and typeset a LaTeX document
- Typeset a mathematical document
- Draw pictures in LaTeX
- Create beamer presentations
- Prepare the projects or dissertations in LaTeX

## **M.Sc. MATHEMATICS SEMESTER – II**

### **ADD ON COURSE (AOC) - PAPER II PYTHON PROGRAMMING**

#### **Learning outcomes:**

This course enable the students to

- Get solution to their various mathematical problems quickly through Python programming.
- Implement the skill to find out the solution to dynamical systems given as differential equations.
- Do computational Mathematics easily.

## **M.Sc. MATHEMATICS SEMESTER – II**

### **ADD ON COURSE (AOC) - PAPER III ARTIFICIAL INTELLIGENCE**

**Course Outcomes:** This course enable the students to

- understand the role of Mathematics and Statistics in Machine Learning
- understand the associated frameworks in large scale computation

## **6. DEPARTMENT OF COMPUTER SCIENCE**

### **M. Sc-Computer Science**

**Programme Educational Outcomes (PEOs), Programme Specific Outcomes (PSOs) and Course Outcomes (Pos) under CBCS Pattern effect from 2019-2020 Onwards**

**Periyar University, Salem**

#### **Programme Educational Outcomes (PEOs) for M.Sc Computer Science are as follows**

PEO1: Apply algorithmic, mathematical and scientific reasoning to a variety of computational problems

M. Sc-Computer Science Syllabus under CBCS Pattern effect from 2019-2020 Onwards  
Periyar University, Salem

PEO2: Implement software systems that meet specified design and performance requirements.

PEO3: Work effectively in teams to design and implement solutions to computational problems

PEO4: Communicate effectively, both orally and in writing. Design, correctly implement and document solutions to significant computational problems

#### **Programme Specific Outcomes (PSOs) for M.Sc Computer Science are as follows**

PSO1: An ability to apply profound knowledge to analyze and design software and systems containing hardware and software components of varying complexity.

PSO2: An ability to apply mathematical model, algorithmic principles, and computer science theory in the design of real-time applications

Programme Outcomes (POs) for M.Sc Computer Science are as follows

PO1: Computational Knowledge: Gain knowledge in the theoretical foundations of Computer Science, Computing Fundamentals and Basic Mathematics.

PO2: Problem Analysis: to analyze and identify the customer requirements in multidisciplinary domains, create high level design and implement robust software applications using latest technological skills.

PO3: Design and Development: design and develop solutions for complex problems in various domains. Serve as the Programmers or the Software

Engineers with the sound knowledge of practical and theoretical concepts for developing software.

PO4: Research Activity: To understand the fundamentals of research and inculcate the ability to undertake original research at the cutting edge of computer science & its related areas. Produce researchers who can investigate problems in different application domains and creatively develop, and evaluate computational solutions.

PO5: Software tool usage: To adapt and apply modern computing skills and tools to resolve problems with software development tools, software systems, and modern computing platforms.

PO6: Professional ethics: To understand professional ethics and cyber regulations and develop youth with social commitments.

PO7: Personality development: To understand Management Principles and apply the principles to develop software as a team member and manage projects efficiently for multidisciplinary environments.

PO8: Communication and Presentation Efficacy: Communicate effectively with computing society in both verbal and written form. Improve communication and presentation skills, especially in providing technical support.

PO9: Social Responsibility: To address Social and Environmental issues for local and global needs and give relevant solutions for them. Gained the analytical ability to analyze the literature and social issues to appreciate the strength and to suggest the improvements for better results.

PO10: Entrepreneurship: Discover the opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.



PO11: Algorithmic principles and theory: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

PO12: Team work: Solve the problems (programming networking database and Web design) in the Information Technology environment. Function effectively on teams to accomplish a common goal and demonstrate professional behavior.

**SEMESTER I**  
**Core Course-I-DESIGN AND ANALYSIS OF ALGORITHMS**

**Credits: 4**

**COURSE OUTCOMES**

CO1 : Gives stepwise procedure to solve problems and gives in-depth idea on primary data structure

CO2 : Gives idea on sorting and searching through divide and conquer techniques

CO3 : Concentrates on solving real time problems through greedy methods

CO4 : Concentrates on solving real time problems through dynamic programming

CO5 : Gives in-depth knowledge on solving real time problems using back tracking

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## Core Course-II - DISTRIBUTED OPERATING SYSTEM

Credits: 4

### OUTCOMES

CO1 : Clear understanding on several resource management techniques like distributed shared memory and other resources

CO2 : Knowledge on mutual exclusion and Deadlock detection of Distributed operating system

CO3 : Able to design and implement algorithms of distributed shared memory and commit protocols

CO4 : Able to design and implement fault tolerant distributed systems.

CO5 : Able to understand the recent operating systems

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

S- Strong , M- Medium , L – Low

## Core Course – III - ADVANCED JAVA PROGRAMMING

Credits: 4

### COURSE OUTCOMES

CO1 : Can get knowledge to create and design Patterns.

CO2 : Understand the AWT package and to develop an applet.

CO3 : Can know how to use JDBC concept.

CO4 : Understand the Database connectivity using Servlet and JSP.

CO5 : Get clear knowledge about Lambda,Encode,Decode,Jshell.

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	S	S	S	S
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

S- Strong , M- Medium , L – Low

## Core Course-IV-INTERNET OF THINGS

Credits:4

### OUTCOMES

At the end of this course, students should be able to

- Gain the basic knowledge about IoT and they will be able to use IoT related products in reallife.
- It helps to rely less on physical resources and started to do their work smarter.

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	S	S	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	M	M	S
CO5	S	S	L	S	S

S- Strong , M- Medium , L – Low

## **Core Course-V - Lab – I - ADVANCED JAVA PROGRAMMING LAB**

**Credits: 2**

1. Implementation of Multi-threading and Exception handling concepts
2. Write a program to read, write and copy a file using bytestreams.
3. Write a program to read, write and copy a file using characterstreams.
4. Develop a programs using AWT to display the personal detail of an employee.
5. Develop a banking system using Swing.
6. Write a program to handle Mouse and Keyevents.
7. Implement TCP/IP protocol for message communication.
8. Implement UDP protocol for message communication.
9. Using JDBC develop a student information system.
10. Implement client/server communication using servlets.
11. Develop a web page using JSP.
12. Implementation of RMI.

## **Core Course-VI- 17PCSP02- Lab - II ALGORITHMS USING C++ LAB**

**Credits: 2**

1. Apply the Divide and Conquer technique to arrange a set of numbers using Merge Sort method.
2. Perform Strassen's matrix multiplication using Divide and Conquer method.
3. Solve the Knapsack problem using Dynamic Programming.
4. Construct a Minimum Spanning Tree using Greedy method.
5. Perform Warshall's Algorithm using Dynamic Programming.
6. Solve Dijkstra's Algorithm using Greedy Technique.
7. Solve Subset Sum problem using Backtracking
8. Implement the 8-Queens Problem using Backtracking.
9. Implement Knapsack Problem using Backtracking.
10. Find the solution of Traveling Salesperson Problem using Branch and Bound technique.

**SEMESTER II**  
**Core Course - VII –ADVANCED WEB TECHNOLOGY**

**Credits: 4**

**OUTCOMES**

On the successful completion of this course, Students will be able to:

- Design a web page with Web form fundamentals and web controlclasses
- Recognize the importance of validation control, cookies and session
- Apply the knowledge of ASP.NET object, ADO.NET data access andSQLtodevelopaclientservermodel.
- Recognize the difference between Data list and Data grid controls in accessingdata.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	S	S	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	M	S	L	S	S

**S- Strong , M- Medium , L – Low**



## Core Course - VIII–COMPILER DESIGN

Credits: 4

### OUTCOME

- On the successful completion of this course, Students will be able to:  
Use the knowledge of patterns, tokens & regular expressions for solving a problem

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	S	S	S
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	M

S- Strong , M- Medium , L – Low

## Core Course - IX–DATA MINING

Credits: 4

### OUTCOME

- After completing this course, students will be familiar with basic data mining concepts for solving real world problems.

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	M	S	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

S- Strong , M- Medium , L – Low

## Core Course - X- Lab – III WEB TECHNOLOGY LAB

Credits: 2

1. Create minimum two simple applications using controls. Eg: Calculator, DrawingPictures using GDI, Animation and Trainer Kit.
2. Create a program to perform validation using validation controls.
3. Develop a website using ADO.Net to implement online Banking with login page, accountdetails, deposit, withdraw, fund transfer and report of transaction with following options –last 10 days, last 1 month, last 6 month, last 1 year.  
Note: create menu for navigation and also maintain session that expires after inactive of 5min.
4. Write a simple ASP.NET program to display the following Web Controls:
  - A button with text “click me”. The button control must be in the center of the form.
  - A label with a text hello
  - A checkbox.The form name must be Web Controls.
5. Write an application that simulates sending a SOAP message as a request and receiving another as a response.
6. Develop a web page to insert, update, delete student details using web service for accessing database.
7. Write a simple ASP.NET program using COM component .
8. Write a simple ASP.NET program to check whether a given string is palindrome or not using custom controls.
9. Create a WebPage and add EnableCaching attribute by the concept of Caching in ASP.Net.
10. Write a simple ASP.Net program to perform Form Authentication.

**Core Course – XI-Lab – IV DATA MINING LAB**

**Credits: 2**

**III SEMESTER**

**Core Course- XII - OPEN SOURCE COMPUTING**

**Credits: 4**

**OUTCOME**

- After completing this course, students will be familiar with the basics of Python programming for writing programs for the real world problems.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	S	S	M
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	M	M	S
CO5	S	S	L	S	M

- 
- S- Strong , M- Medium , L – Low

## Core Course- XIII – DIGITAL IMAGE PROCESSING

### OUTCOMES

At the end of this course, students should be able to

- Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.
- Interpret Image compression standards, and Interpret image segmentation and representation techniques.
- Gain idea to process various images used in various fields such as weather forecasting, Diagnosis of various diseases using images such as tumor, cancer etc.

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## Core Course- XIV –BIG DATA ANALYTICS

### OUTCOMES

On successful completion of the course the student should

- Able to apply Hadoop ecosystem components.
- Able to participate in data science and big data analytics projects

### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	M	S	M
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## **Core Course – XV - Lab – IV DIGITAL IMAGE PROCESSING LAB**

1. Choose two grayscale images or RGB images that you will first have to grayscale (with `rgb2gray()` function) . Display original images and the same images after their QUANTIZATION with different number of bits (1 to 8) using MATLAB.
2. Perform Histogram Equalization on a Color image using MATLAB.
3. Using Spatial Domain technique, write a program in MATLAB to perform Smoothing operation in an image.
4. Write a MATLAB code to transform 1-D FIR Filter to 2-D FIR Filter using Frequency Transformation Method. (FIR-Finite Impulse Response).
5. Find the Boundaries of Objects within an image by Sobel operator method in MATLAB.
6. Write a MATLAB program to detect the edges within the image and compare the results of both Canny and Prewitt Methods.
7. Write a program to Compress an image using Huffman coding method in MATLAB.
8. Implement Discrete Cosine Transformation method to compress an image using MATLAB.
9. Write a MATLAB code for Image Segmentation to convert to a binary image to improve the legibility of text Using thresholding technique.
10. Compute the Watershed Transform of the Segmentation function in an image at foreground and background marker pixels using Marker-Controlled Watershed Segmentation in MATLAB.

## **Core Course – XVI - Lab – IV MINI PROJECT USING OPEN SOURCE**

The student must submit a report to the Guide allotted to them and appear for viva-voce examination. The project report may contain the following:

1. Introduction
2. Data Collection / system study
3. System development
4. Implementation
  - Source code
  - Sample input
  - Sample output
5. Conclusion



## Core Course- XVII – MACHINE LEARNING

### OUTCOMES

On completion of the course students will be expected to:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
- Be able to design and implement various machine learning algorithms in a range of real-world applications.

#### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	S	S	S
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## ELECTIVE I

### OUTCOMES                      **ADVANCED COMPUTER ARCHITECTURE**

At the end of the course, the student should be able to:

- Understand the fundamentals of computer Architecture, security architecture, threats and vulnerabilities
- Apply the various Authentication schemes to simulate different applications.
- Understand various architectures and System security standards

#### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	S	S	S	S
CO2	S	M	M	M	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE I**  
**OPTIMIZATION TECHNIQUES**

**OUTCOMES**

Upon completion of the course, students will have:

- Describe clearly a problem, identify its parts and analyze the individual functions. Feasibility study for solving an optimization problem
- Evaluate and measure the performance of an algorithm, Discover, study and solve optimization problems.
- Understand optimization techniques using algorithms, and Investigate, study, develop, organize and promote innovative solutions for various applications.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	M	M	S
CO2	M	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE I  
EMBEDDED SYSTEMS**

**OUTCOMES**

Students are able to

- Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
- Become aware of interrupts, hyper threading and software optimization.
- Design real time embedded systems using the concepts of RTOS.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	M	S	M	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE II**  
**ADVANCED DATABASE MANAGEMENT SYSTEMS**

**OUTCOME**

On completion of the course, students will able to

- Know about the Various Data models and Works on Database Architecture
- Knowledge patterns, Object Oriented Databases are well equipped.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	S	M	M	S
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE II SOFT  
COMPUTING**

**OUTCOMES**

Upon completion of the course, the student are expected to

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.
- Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.
- Reveal different applications of these models to solve engineering and other problems.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	S
CO2	S	M	M	S	S
CO3	S	M	L	L	M
CO4	M	M	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE II  
ADVANCED COMPUTER NETWORKS**

**Outcomes**

After the completion of this course students will be able to

- To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
- To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
- To be familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.
- To be familiar with network tools and network programming

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE III  
CLOUD COMPUTING**

**OUTCOME**

- Completing this course should provide you with a good understanding of cloud computing and a systematic knowledge of the fundamental technologies, architecture, and security.

**Mapping with Course Outcome and Programme Outcomes**

<b>Course Outcome</b>	<b>Programme Outcome</b>				
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>P05</b>
CO1	S	S	M	S	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	M

**S- Strong , M- Medium , L – Low**



**ELECTIVE III ARTIFICIAL  
INTELLIGENCE**

**OUTCOME**

- Completing this course should provide you with a good understanding of Artificial Intelligence and a systematic knowledge of the fundamental technologies, architecture, and security.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	L	S	S	M	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

### ELECTIVE III

#### OUTCOMES                      OBJECT ORIENTED SYSTEM DEVELOPMENT

On the successful completion of this course, Students will be able to

- Show how the object-oriented approach differs from the traditional approach to systems analysis and design.
- Analyze, design, document the requirements through use case driven approach
- Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.
- Recognize the difference between various object relationships: inheritance, association and aggregation.
- Show the role and function of test cases, testing strategies and test plans in developing object-oriented software.

#### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE IV  
WAP AND XML**

**OUTCOMES**

Students who successfully complete this course will be able to

- Apply XML concepts to develop Webapplication.
- DevelopSOAApplicationusingXMLandWebServices.
- Extract information from the websites using XML programming

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	S	M	M	S	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## ELECTIVE IV MOBILE COMPUTING

### OUTCOMES

- Able to explain the basics of mobile system
- Able to develop mobile application
- Understand the Mobile Adhoc networks and its routing
- Understand the different types of security features

#### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	S	S	M	S
CO2	M	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE IV GRID  
COMPUTING**

**OUTCOMES:**

At the end of the course, the student should be able to:

- Explain the basic concepts and architectures of Grid computing
- Program the data management services of Grid computing
- Apply the security models in the grid and the cloud environment
- Use the Grid and Cloud concepts in applications

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	S	S	S	S
CO2	S	M	M	S	S
CO3	S	S	L	M	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## ELECTIVE V WEB SERVICES

### OUTCOMES

On completion of this course you should be able to:

- Understand the design principles and application of SOAP and REST based webservices.
- Design collaborating webservices according to a specification.
- Implement an application that uses multiple web services in a realistic business scenario.
- Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them.

#### Mapping with Course Outcome and Programme Outcomes

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	M	M	S	S
CO3	S	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

**ELECTIVE V  
WIRELESS NETWORKS**

**OUTCOMES**

Upon Completion of the course, the Students will be able to

- Conversant With the Latest 3G/4G and WiMAX Networks And ItsArchitecture.
- Design and Implement Wireless Network Environment for Any Application Using Latest Wireless Protocolsand Standards.
- Implement Different Type Of Applications For Smart Phones And Mobile Devices With Latest NetworkStrategies.

**Mapping with Course Outcome and Programme Outcomes**

Course Outcome	Programme Outcome				
	PO1	PO2	PO3	PO4	P05
CO1	M	S	M	S	S
CO2	S	M	M	S	S
CO3	M	S	L	L	M
CO4	M	S	S	M	S
CO5	S	S	L	S	S

**S- Strong , M- Medium , L – Low**

## **ELECTIVE V CRYPTOGRAPHY AND NETWORK SECURITY OUTCOMES**

At the end of the course, the student should be able to:

- Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographicalgorithms
- Apply the different cryptographic operations of public key cryptography
- Apply the various Authentication schemes to simulate different applications.
- Understand various Security practices and System security standards

### **Mapping with Course Outcome and Programme Outcomes**

<b>Course Outcome</b>	<b>Programme Outcome</b>				
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>P05</b>
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	M	S	L	L	M
CO4	M	S	M	M	S
CO5	S	M	L	S	S

**S- Strong , M- Medium , L – Low**



# 7. DEPARTMENT OF BIOCHEMISTRY

## M.Sc., BIOCHEMISTRY

### PROGRAM OBJECTIVES AND OUTCOMES

#### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

**PEO 1:** To prepare students for the future careers in the concerned/various relevant fields in which a core understanding of the chemistry of life is important.

**PEO 2:** To enable the graduates to exhibit leadership, make life long learners with professional and social ethics and make them communicate effectively.

**PEO 3:** To add highly skilled scientific workforce in the area of biomedical research sectors, academic, industry as well as for research laboratories across the country and the globe by following best practices for improving the professionalization and employability of students.

**PEO 4:** The practical and technical skills with laboratory-based work and the final year research project prepare the students for a research or technical position by defining specific and transferable skills.

**PEO 5:** To sensitize and train the students towards research with typical employers include pharmaceutical, biotechnology, food, water and agricultural companies and specialist services, such as toxicological studies.

**PEO 6:** To train the students in generic and competency skills so as to be able to work in potential places including scientific and medical publishers and the Intellectual Property Office

#### PROGRAMME SPECIFIC OBJECTIVES (PSOs)

<b>PSO1:</b>	To acquire necessary knowledge and skills in core themes, principles and components of basic Biochemistry
<b>PSO2:</b>	To demonstrate the knowledge of biochemical processes from the cellular and molecular aspects
<b>PSO3:</b>	To Integrate and apply the techniques studied and to compare and contrast the depth of scientific knowledge in the broad range of fields
<b>PSO4:</b>	To be able to understand, analyze and apply the studied basic and concepts in wide variety of applications including diagnostics, biochemical pathway regulation and drug development and use this knowledge and apply the same for multitude of laboratory applications.
<b>PSO5:</b>	To provide students with the knowledge and skill base that would enable them to go for self-employment and entrepreneurship

### PROGRAMME OBJECTIVES (POs)

PO1: To demonstrate comprehensive knowledge on various areas of Biochemistry.

PO2: To acquire skills in areas related to the current and emerging developments.

PO3: To communicate the concepts, constructs and techniques of the subject learnt in a clear, concise and lucid manner.

PO4: To plan and execute the experiments to the relevant theories of Biochemistry.

PO5: To apply critical thinking, scientific reasoning and mathematical skills in studied areas of Biochemistry.

PO6: To train the students to acquire various relevant generic and competency skills in various aspects of biochemistry so as to be able to work independently in a group or individually.

PO7: To make a student life long learner with moral and ethical values,

### PROGRAMME OUTCOME (PO'S)

Biochemistry will provide students with the necessary knowledge and skills to undertake a career in research, either in industry or in an academic setting.

The training provided will give students the breadth and depth of scientific knowledge in Biochemistry.

On completion of the programme, students will be qualified to apply for a PhD or to gain employment in the pharmaceutical or biotechnology industries, which are among the strongest growth sectors.

The programme will be based on a combination of taught modules, independent learning and an extended research project to be carried out either in the University departments or industry or in association with industry at the University.

The programme incorporates a substantial element of hands-on research experience, with enhanced experimental skills being gained alongside experienced research workers.

It is intended that, on successful completion of the M.Sc degree programme, students will :

- **be capable of demonstrating comprehensive knowledge** and have a fundamental/systematic or coherent understanding of major concepts, theoretical principles and experimental findings in biochemistry.
- **acquire skills in areas related to the current and emerging developments** in the field of Biochemistry.

<ul style="list-style-type: none"> <li>• <b>be identifying and applying appropriate biochemical principles</b> and methodologies to solve a wide range of problems associated with Biochemistry.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>communicate the results of studies undertaken</b> in Biochemistry accurately in a range of different contexts using the main concepts, constructs and techniques of the subject learnt in a clear and concise manner in writing and oral skills.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Plan and execute the experiments</b>, investigate, analyze and interpret data collected using appropriate experimental methods, and report the</li> </ul>
<p>findings of the experiment and relate the interpretations and conclusions to relevant theories of Biochemistry.</p>
<ul style="list-style-type: none"> <li>• They will have the <b>ability to employ critical thinking, scientific reasoning and efficient problem</b> solving skills in the basic areas of biochemistry.</li> </ul>
<ul style="list-style-type: none"> <li>• Be able to <b>demonstrate relevant generic skills and competencies</b> such as (i) problem solving skills, (ii) investigative skills, (iii) communication skills (iv) analytical skills, (v) ICT skills, (vi) skills such as the ability to work both independently and in a group.</li> </ul>
<ul style="list-style-type: none"> <li>• <b>demonstrate professional behaviour</b> such as (i) unbiased and truthful in all aspects of work (ii) follow moral and ethical practices (iii) Life long learners aimed at personal development and for improving knowledge/skill development (iv) focusing on issues related to social cause.</li> </ul>

**SEMESTER I****COURSE NAME: BIOMOLECULES****COURSE CODE: 21PBC01****COURSE OBJECTIVES****To study the structure and functions of macromolecules**

	<b>COURSE OUTCOME</b>
<b>COURSE NO</b>	
<b>CO1</b>	To explain about the structure, properties and functions of polysaccharides
<b>CO2</b>	Illustrate on structure, properties and functions of lipids, interactions of lipids in biological membrane.
<b>CO3</b>	Determine the classification, properties and significance of proteins
<b>CO4</b>	Explain about the DNA properties and functions, biological importance of histone proteins
<b>CO5</b>	To determine the significance of vitamins and its antioxidant activity, minerals of biological significance

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER I****COURSE NAME: ADVANCED ENZYMOLOGY****COURSE CODE: 21PBC02****COURSE OBJECTIVES**

To provide a basic understanding of biological catalysis,

To learn Mechanism of action of enzymes, structure and function relationship,

To Understanding the enzyme kinetics and role of coenzymes/co-factors and an overview of Industrial application of enzymes.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and Compare methods for production, purification, characterization of enzymes
<b>CO2</b>	To derive the equations of Enzyme kinetics. Discuss the factors affecting enzymatic reactions. Mechanism of enzyme catalysis and structure and functions of coenzymes
<b>CO3</b>	Describe the concepts of co-operative behavior, enzyme inhibition and allosteric regulation.
<b>CO4</b>	Compare methods for production, purification, characterization and immobilization of enzymes. Describe the multi enzyme complex with example. To know about the biosensors and its functions.
<b>CO5</b>	Describe the major applications of enzymes in industry, understand the principles of enzyme immobilisation techniques and enzyme extraction procedures. Develop new ideas for the development of enzyme-based drugs. Discover the current and future trends of applying enzyme technology for the commercialization purpose of biotechnological products.

### MAPPING WITH PROGRAMME OUTCOMES

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	M	S	S	M	M	M	S
CO2	S	M	S	S	S	M	M	S
CO3	S	M	S	M	S	M	M	S
CO4	S	M	S	S	M	M	M	S
CO5	S	M	S	S	M	M	M	S

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER I

**COURSE NAME: CELL AND MOLECULAR BIOLOGY**

**COURSE CODE: 21PBC03**

#### **COURSE OBJECTIVES**

**To understand the structure and functions of the cells**

**To gain the knowledge about the concepts of central dogma of molecular biology and the details of Replication, Transcription and Translation process**

COURSE NO	COURSE OUTCOME
<b>CO1</b>	Know about tissue types, organization and classes of cell junctions and describe the role of cell adhesion molecules and ECM components.
<b>CO2</b>	Understand what happens during the cell cycle and cell death and explain about membrane transports and checkpoints in the cell cycle.
<b>CO3</b>	To understand the basic structures, properties and organisation of eukaryotic and prokaryotic chromosomes
<b>CO4</b>	To emphasize the molecular mechanism of DNA replication and recombination involved in eukaryotes and prokaryotes.
<b>CO5</b>	Deeply understand the transcription process in prokaryotes and eukaryotes.
<b>CO6</b>	To knows about the translation and post translational modification in prokaryotes and eukaryotes

<b>CO7</b>	Learn the changes and consequences in chromosome structure and its related disorders, thereby know how the DNA repair mechanism by anticancer therapeutics involved against DNA mutation and uncontrolled cell growth.
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**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO6</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO7</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

<b>SEMESTER I</b>
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<b>COURSE NAME: BIOCHEMICAL TECHNIQUE</b>
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<b>COURSE CODE: 21PBCE01</b>
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<b>COURSE OBJECTIVES</b>
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To focus on the biochemical techniques includes spectrophotometry, centrifugation, electrophoresis, radioactivity etc.,
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To Learning these techniques will be very useful for operating instruments and become the basic knowledge in their future.
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<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
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<b>CO1</b>	Have a strong and sound knowledge of the fundamental principles of Instrumentation.
<b>CO2</b>	Have the practical skills and techniques in biochemical analysis.
<b>CO3</b>	Have the practical knowledge of all the instrumental applications.

### MAPPING WITH PROGRAMME OUTCOMES

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
<b>CO1</b>	S	M	S	M	M	S	M	S
<b>CO2</b>	S	S	S	S	S	S	M	S
<b>CO3</b>	S	S	S	S	S	S	M	S

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER I

**COURSE NAME:LAB COURSE I**

**COURSE CODE: 21PBCP01**

### COURSE OBJECTIVE

To bring the skills of performing basic biochemical techniques which are important in clinical investigations.

To learning all the basic biochemical estimations and aids in hands on training.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
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<b>CO1</b>	Learn how to standardize the biochemical tests.
<b>CO2</b>	Can do chromatographic techniques.
<b>CO3</b>	Separate sugars and amino acids by Paper chromatography
<b>CO4</b>	Can do titrations.
<b>CO5</b>	Isolate glycogen from tissues

### MAPPING WITH PROGRAMME OUTCOMES

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER I

**COURSE NAME: LAB COURSE II**

**COURSE CODE: 21PBCP02**

### COURSE OBJECTIVE

This course aims to bring the skills of performing isolation, identification and purification of enzymes.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
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<b>CO1</b>	To determine the enzyme activity.
<b>CO2</b>	Immobilize the enzymes by different methods
<b>CO3</b>	To learn the kinetic studies of the enzymes.

### MAPPING WITH PROGRAMME OUTCOMES

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
<b>CO1</b>	S	S	S	M	S	S	M	M
<b>CO2</b>	S	S	S	M	S	S	M	M
<b>CO3</b>	S	S	S	M	S	S	M	M

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER II

**COURSE NAME: INTERMEDIARY METABOLISM**

**COURSE CODE: 21PBC04**

### COURSE OBJECTIVES

To understand the major metabolic pathways involved in synthesis and degradation of biomolecules and energy generation

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand the concepts of metabolism, characteristics of metabolic pathways and strategies used to study these pathways.

<b>CO2</b>	To relate various metabolic interrelationship and its control
<b>CO3</b>	Gain a detailed knowledge of various catabolic and anabolic pathways
<b>CO4</b>	Understand the regulation of various pathways

### MAPPING WITH PROGRAMME OUTCOMES

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER II

**COURSE NAME: GENETIC ENGINEERING AND CANCER BIOLOGY**

**COURSE CODE:21PBC05**

### COURSE OBJECTIVES

To study the gene manipulation, cloning and gene expression techniques.

To understand on biology and genetic basis of cancer

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
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<b>CO1</b>	Explain the basic techniques in gene manipulation and various enzymes used in gene transfer.
<b>CO2</b>	Analyze on basic characteristic features and significance of cloning vectors, gene transfer methods and various cloning techniques.
<b>CO3</b>	Depict on the significance and applications of recombinant DNA technology.
<b>CO4</b>	Pertain on Overview of cell cycle, cell growth, tumors, cancers and isolation techniques
<b>CO5</b>	Describe on carcinoigenesis

#### MAPPING WITH PROGRAMME OUTCOMES

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

#### SEMESTER II

**COURSE NAME: PLANT BIOCHEMISTRY AND BIOTECHNOLOGY**

**COURSE CODE: 21PBC06**

**COURSE OBJECTIVES**

This paper aims to provide a basic understanding of structure and functions of cell, photosynthesis, nitrogen fixation, and phytohormones.

This paper also provides the knowledge about secondary metabolites and gene transfer methods.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand the basic knowledge of mechanism of water transport and Photosynthesis
<b>CO2</b>	Describe the nitrogen fixation mechanisms in plants and interrelationship between photosynthesis and nitrogen metabolism
<b>CO3</b>	Get the Knowledge about the Biosynthesis, transport, distribution, mechanism of action and physiological effects of plant hormones
<b>CO4</b>	Understand the role of secondary metabolites in drug development
<b>CO5</b>	Know about the isolation, fusion and culture of protoplast and also understand genetic manipulation of plants. Understand the gene transfer methods for plants and also know marker free gene methodologies and gene targeting.
<b>CO6</b>	Know the transgenic plants and its applications & risks. Also understand the genetic modification in food industry and its applications, controversies over risks.
<b>CO7</b>	Know the plant molecular biology techniques and its applications.

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO6</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO7</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER II****COURSE NAME: LAB COURSE III****COURSE CODE: 21PBCP03****COURSE OBJECTIVE**

To study the basic concepts of techniques in isolation, identification and estimation of plant constituents.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Do the experiment of plant tissues culture.
<b>CO2</b>	Qualitatively analyse the phytochemicals in medicinal plants.
<b>CO3</b>	Estimate the major secondary metabolites.

**MAPPING WITH PROGRAMME OUTCOMES**

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S

S-STRONG, M-MEDIUM, L-LOW

## SEMESTER II

**COURSE NAME: LAB COURSE IV**

**COURSE CODE: 21PBCP04**

### COURSE OBJECTIVE

To study the basic concepts of techniques in isolation, identification and estimation of nucleic acids

COURSE NO	COURSE OUTCOME
CO1	Isolate DNA & RNA from different sources.
CO2	Estimate DNA and RNA
CO3	Learn the techniques of molecular biology

### MAPPING WITH PROGRAMME OUTCOMES

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S	S	S	M	S	S	M	S
CO2	S	S	S	M	S	S	M	S
CO3	S	S	S	M	S	S	M	S

S-STRONG, M-MEDIUM, L-LOW



**SEMESTER III****COURSE NAME: ADVANCED CLINICAL BIOCHEMISTRY****COURSE CODE: 21PBC06****COURSE OBJECTIVES**

The aim of the study of this paper is clinical approach of blood and urine samples and their complications.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand the collection and analysis of blood and urine samples
<b>CO2</b>	Understand the role of carbohydrates and lipid metabolism in various diagnostic and therapeutic approaches.
<b>CO3</b>	Have a clear knowledge about inborn error and hereditary defects in amino acids metabolism.
<b>CO4</b>	Know about the gastric function test for diagnosis and therapeutic complications.
<b>CO5</b>	To learn the differentiate blood tests that are used to evaluate renal function test and liver functions.
<b>CO6</b>	Know in detail about the disorders of mineral metabolism and Erythrocyte metabolisms

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
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<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO6</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO7</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

### SEMESTER III

**COURSE NAME: CONCEPTS OF IMMUNOLOGY**

**COURSE CODE: 21PBC07**

#### COURSE OBJECTIVES

To study the immune responses of human body against antigen, immunological techniques and vaccine synthesis.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand the humoral and cell mediated immunity.
<b>CO2</b>	Know the primary and secondary lymphoid organ.
<b>CO3</b>	Describe the theories of antibody formation and factors influencing antibody production.
<b>CO4</b>	To learn the types of transplantation and understand how its malfunction linked with autoimmune disease and hyper sensitivity.

<b>CO5</b>	Understand the active and passive immunization and learn how to make recombinant vector vaccines.
<b>CO6</b>	Clear knowledge about the agglutination and precipitation techniques involved in research level.

#### MAPPING WITH PROGRAMME OUTCOMES

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO6</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

#### SEMESTER III

**COURSE NAME: PHARMACEUTICAL BIOCHEMISTRY AND TOXICOLOGY**

**COURSE CODE: 21PBCP08**

**COURSE OBJECTIVES:**

This course deals with the study of fundamental concepts of pharmacology about the physicochemical properties of the drug, their origin, classification and nomenclature of drugs, how do they act etc.,

It also enables the students to gain the complete knowledge about drug designing and also know about the principles of toxicology.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand clearly about the basic concepts of pharmacology
<b>CO2</b>	Have a thorough knowledge about the mechanism of drug action, Drug interaction, Receptors.
<b>CO3</b>	Know the aspects of New discovery of drugs and drug designing.
<b>CO4</b>	Recognize the principles of toxicology, Antidotes and the management of poisoning.

#### MAPPING WITH PROGRAMME OUTCOMES

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

#### SEMESTER III

**COURSE NAME: BIOSTATISTICS AND RESEARCH METHODOLOGY**

**COURSE CODE: 21PBC09**

**COURSE OBJECTIVES:**

To study this paper we can understand methods which is used to implement in Research.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	On completion of this course, students are able to understand about biostatistics, bioethics, IPR and legal protection, patent filling and infringement and biosafety.
<b>CO2</b>	Understand the sample, population and statistical inference.
<b>CO3</b>	Gain knowledge about concept, philosophical consideration and epistemology of science, ethical terms, principles and theories of bioethics

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER III**

**COURSE NAME: MICROBIAL BIOCHEMISTRY**

**COURSE CODE: 21PBCE03**

## COURSE OBJECTIVES

To get knowledge about microorganisms and their characters.

To Gain knowledge about the applications of microorganisms.

COURSE NO	COURSE OUTCOME
CO1	Understand the classification and controlling of microbes and study isolation of microbes and maintenance.
CO2	Describe important characteristic of microorganisms, thereby identify different type of microorganisms.
CO3	Study about various types of microorganisms involved in infection of food products.
CO4	Recognise the sources and transmission of infections and how the factors involving in infection.
CO5	Know about the different types of microscopes and its functioned products.

## MAPPING WITH PROGRAMME OUTCOMES

Cos/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	M	S	S	M	L	L	S
CO2	M	M	S	S	M	L	L	S
CO3	M	M	S	S	M	L	L	S
CO4	M	M	S	S	M	L	L	S
CO5	M	M	S	S	M	L	L	S
CO6	M	M	S	S	M	L	L	S

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER III****COURSE NAME: LAB COURSE V****COURSE CODE: 21PBCP05****COURSE OBJECTIVES**

To study the basic concepts of techniques in isolation, identification and estimation of clinical samples.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Learn the techniques of haematology.
<b>CO2</b>	Estimate the blood constituents.
<b>CO3</b>	Determine the activity of enzymes.
<b>CO4</b>	Estimate the constituents of urine sample.

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER III****COURSE NAME: LAB COURSE VI****COURSE CODE: 21PBCP06****COURSE OBJECTIVES:**

To study the basic concepts of techniques in isolation, identification and estimation of Nucleic acids.

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Learn the techniques of immunology.
<b>CO2</b>	Learn the principles of immunological reactions.
<b>CO3</b>	Carry out diagnostic tests using immunology kits.

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>

S-STRONG, M-MEDIUM, L-LOW

**SEMESTER IV****COURSE NAME: HUMAN PHYSIOLOGY AND ENDORINOLOGY****COURSE CODE: 21PBCP10****COURSE OBJECTIVES:**



**To study the mechanism of human body systems and mode of action of Hormones**

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	To understand the fundamental mechanisms of body fluids and blood cells.
<b>CO2</b>	Illustrate the circulatory system includes heart structure, cardiac cycles and cardiac factors and respiratory system includes anatomy, physiology, gas exchange and explain the role of lungs in acid base balance.
<b>CO3</b>	Learn about the anatomy of digestive system and secretions, composition and functions of gastric and biliary system thereby learn how to digest the biomolecules in intestine.
<b>CO4</b>	Understand the classification, biosynthesis and mechanism of anterior and posterior pituitary hormones in biological regulation and know about its deficiency diseases.
<b>CO5</b>	Know in detail about synthesis, secretion, regulation, transport, metabolic fate and biological actions of thyroid hormone and learn about thyroid function test.
<b>CO6</b>	To learn clear picture about adrenal hormone's synthesis, regulation, transport, metabolism and biological effects.
<b>CO7</b>	Recognize a role of gonadal hormones and know about biological effects of oestrogen and progesterone. Know what kind of biochemical changes occur during pregnancy.
<b>CO8</b>	Understand the signal transduction pathway through cytoplasmic and nuclear level and its role in cellular function.

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>

<b>CO3</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO6</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO7</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO8</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

#### **SEMESTER IV**

**COURSE NAME: BIOINFORMATICS AND NANOTECHNOLOGY**

**COURSE CODE: 21PBCE04**

#### **COURSE OBJECTIVES:**

**To study different levels of Bioinformatics tools and applications.**

**To gain knowledge about nanoparticles and their applications in science.**

<b>COURSE NO</b>	<b>COURSE OUTCOME</b>
<b>CO1</b>	Understand the basic concepts of bio-informatics databases and tools on internet. Learn how to apply computational facility in different fields of life sciences, physical and chemical sciences.
<b>CO2</b>	Have a clear detail about different protein structure and its predicting method.
<b>CO3</b>	To learn how can utilise the BLAST and FASTA analysis for biological sequence.
<b>CO4</b>	Recognise how can visual the structures and classification of proteins by visualization tools and learn to utilise this tools for alignment and analysis.
<b>CO5</b>	Understand the drug designing through computer based modification programs using synthetic or natural source.

**MAPPING WITH PROGRAMME OUTCOMES**

<b>Cos/Pos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>

S-STRONG, M-MEDIUM, L-LOW

## 8. DEPARTMENT OF BIOTECHNOLOGY

<b>PROGRAMME OUTCOME (PO) - BIOTECHNOLOGY</b>	
<b>PO1</b>	Students develop global competencies in the area of basic and applied biological sciences.
<b>PO2</b>	Knowledge on biotechnology will guarantee promising career opportunities in academic, research and industrial sets.
<b>PO3</b>	To enrich students' knowledge and train them in various branches of Biotechnology such as genetics, molecular biology, biochemistry, immunology, plant/animal/microbial biotechnology, environmental biotechnology, clinical biotechnology and tissue culture techniques.
<b>PO4</b>	Enhancing the subject knowledge of students by using traditional and modern ICT based teaching methods and learning by doing.
<b>PO5</b>	To groom the students to meet futuristic challenges and national interests.

<b>PROGRAM SPECIFIC OUTCOME (PSO) - BIOTECHNOLOGY</b>	
<b>On Completion of the Programme, the students will be able</b>	
<b>PSO1</b>	To bestow the students with all the research skills required to work independently.
<b>PSO2</b>	To develop scientific temperament and social responsibilities in the students.
<b>PSO3</b>	To inculcate nature care by imparting knowledge of advance modern techniques.
<b>PSO4</b>	As Biotechnology is an interdisciplinary course, empower the students to acquire technological knowhow by connecting disciplinary and interdisciplinary aspects of biotechnology.
<b>PSO5</b>	Acquire knowledge in students of biotechnology enabling their applications in industry and research.

<b>COURSE OUTCOME (CO) FOR POSTGRADUATION IN BIOTECHNOLOGY</b>		
<b>SEMESTER I</b>		
<b>Course Title</b>	<b>CORE I – CELL BIOLOGY – 21PBT01</b>	<b>Knowledge level</b>
<b>On Completion of the Course, the students will be able</b>		
<b>CO1</b>	To demonstrate the prokaryotic and eukaryotic cell.	<b>K1</b>

<b>CO2</b>	To discuss the cell membrane and function in detail.	<b>K2</b>
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<b>CO3</b>	To compile the structural and functional organization of cell organelles.	<b>K3</b>
<b>CO4</b>	To gain knowledge for cell to cell signaling.	<b>K4</b>
<b>CO5</b>	To examine the cellular basis of differentiation.	<b>K5</b>

<b>On Completion of the Course, the students will be able</b>		
<b>PO1</b>	To explain structures of prokaryotic and eukaryotic cells especially macromolecules, membranes and organelles	<b>K1</b>
<b>PO2</b>	To assess the cellular components underlying mitotic and meiotic cell division.	<b>K2</b>
<b>PO3</b>	To discuss cellular components that generate and utilize energy in cells.	<b>K3</b>
<b>PO4</b>	To gain knowledge on communication of the cells with other cells.	<b>K4</b>
<b>PO5</b>	To gain knowledge on organelles and the cellular mechanisms	<b>K5</b>

<b>MAPPING WITH PO - CELL BIOLOGY – 21PBT01</b>					
<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S
<b>S- Strong, M- Medium, L – Low</b>					

<b>Course Title</b>	<b>CORE II – BIOLOGICAL CHEMISTRY - 21PBT02</b>	<b>Knowledge level</b>
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To have a strong foundation in chemical biology.	<b>K6</b>
<b>CO2</b>	To assess the metabolic pathways of biomolecules and its relevance to clinical condition.	<b>K7</b>
<b>CO3</b>	To correlate biochemical process with biotechnology application.	<b>K8</b>

<b>CO4</b>	To discuss the significance of various metabolic process occurring in biological system.	<b>K9</b>
<b>CO5</b>	To evaluate of both hormones in enzymology and its medical importance in human life.	<b>K10</b>

**On Completion of the Course, the students will be able**

<b>PO1</b>	To understand biological phenomena in molecular level.	<b>K6</b>
<b>PO2</b>	To govern complex biological metabolic pathways.	<b>K7</b>
<b>PO3</b>	To understand relationship of various molecules and its interactions with biological systems.	<b>K8</b>
<b>PO4</b>	To quantify and qualify biomolecules and its involvement in metabolism.	<b>K9</b>
<b>PO5</b>	To understand function of each hormones and enzymes of human body.	<b>K10</b>

**MAPPING WITH PO - BIOLOGICAL CHEMISTRY - 21PBT02**

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S

**S- Strong, M- Medium, L – Low**

<b>Course Title</b>	<b>CORE III – MICROBIOLOGY - 21PBT03</b>	<b>Knowledge level</b>
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To evaluate the landmarks of microbiology, sterilization, principle and working of microscopes.	<b>K11</b>
<b>CO2</b>	To get in depth knowledge of microbial diversity and growth curve of microbes.	<b>K12</b>

<b>CO3</b>	To know microbial diseases and host pathogens interaction by microbes.	<b>K13</b>
<b>CO4</b>	To examine on epidemic and pandemic diseases.	<b>K14</b>
<b>CO5</b>	To provide an outline on agricultural and environmental microbiology.	<b>K15</b>

<b>On Completion of the Course, the students will be able</b>		
<b>PO1</b>	To understand historical era of microscopes and microbiology.	<b>K11</b>
<b>PO2</b>	To understand diversity of microbes in the environment.	<b>K12</b>
<b>PO3</b>	To understand relationship of host and the pathogens that involve in human welfare and pathogenesis.	<b>K13</b>
<b>PO4</b>	To understand the involvement in pathogens in host metabolism and diseases caused by them.	<b>K14</b>
<b>PO5</b>	To understand uses of microbes in various fields.	<b>K15</b>

<b>MAPPING WITH PO - MICROBIOLOGY - 21PBT03</b>					
<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S

**S- Strong, M- Medium, L – Low**

<b>SEMESTER II</b>		
<b>Course Title</b>	<b>CORE VI – GENETICS AND MOLECULAR BIOLOGY - 21PBT04</b>	<b>Knowledge level</b>
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To understand basic concepts of mendelian and non-mendelian inheritance with suitable model organism.	<b>K16</b>



<b>CO2</b>	To apply the principles and mechanisms of microbial and population genetics.	<b>K17</b>
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<b>CO3</b>	To analyse the structure and functions of informational molecules like DNA, RNA and proteins.	<b>K18</b>
<b>CO4</b>	To evaluate the mechanism of genome mapping with molecular markers and oncogenes.	<b>K19</b>

**On Completion of the Course, the students will be able**

<b>PO1</b>	To gain knowledge on growth, development and behaviour of organisms	<b>K16</b>
<b>PO2</b>	To recall the molecular events evolved over the time by process of mutation, selection and genetic change.	<b>K17</b>
<b>PO3</b>	To construct and utilize vector-based systems and describe complex biological system	<b>K18</b>
<b>PO4</b>	To analyse biological phenomena using mapping and other techniques	<b>K19</b>

**MAPPING WITH PO - GENETICS AND MOLECULAR BIOLOGY - 21PBT04**

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	M	S	S	M
<b>CO3</b>	S	M	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S

**S- Strong, M- Medium, L – Low**

<b>Course Title</b>	<b>CORE VII – IMMUNOLOGY AND IMMUNOTECHNOLOGY - 21PBT05</b>	<b>Knowledge level</b>
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To present an overview on types of immunity & immunological responses.	<b>K20</b>

<b>CO2</b>	To demonstrate the principle of antigen and antibody interactions and its diagnostic applications.	<b>K21</b>
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<b>CO3</b>	To display the role of MHC in antigen processing, presentation, process of T cell and B cell activation during the course of cell mediated and humoral immune responses respectively.	<b>K22</b>
<b>CO4</b>	To elucidate on the properties and functions of cytokines and complement components in immune response, hypersensitivity reactions and different types of vaccines.	<b>K23</b>
<b>CO5</b>	To interpret the mechanism of immune response against the infectious diseases, immunodeficiency, autoimmune diseases, transplantations and cancers.	<b>K24</b>

**On Completion of the Course, the students will be able**

<b>PO1</b>	To illustrate different cells, organs involved in immune system, their properties and role of antigens and antibodies in immune system.	<b>K20</b>
<b>PO2</b>	To gain knowledge on immunity, antigen, antibody and cells of immune system.	<b>K21</b>
<b>PO3</b>	To understand cells of immune system and their regulation function	<b>K22</b>
<b>PO4</b>	To analyse biological phenomena of human body and its diverse effect of immunity and vaccine responses.	<b>K23</b>
<b>PO5</b>	To evaluate Immunotechnology in transplantation process.	<b>K24</b>

**MAPPING WITH PO - IMMUNOLOGY AND IMMUNOTECHNOLOGY - 21PBT05**

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S

**S- Strong, M- Medium, L – Low**

<b>Course Title</b>	<b>CORE VIII – GENETIC ENGINEERING - 21PBT06</b>	<b>Knowledge level</b>
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**On the successful completion of the course, students  
will be able**

<b>CO1</b>	To obtain theoretical knowledge enzymes and their application in genetic engineering.	<b>K25</b>
<b>CO2</b>	To understand basic concept of gene cloning, role of enzymes, vectors responsible for gene manipulation and transformation in genetic engineering	<b>K26</b>
<b>CO3</b>	To have an insight on gene transfer methods, identifying suitable hosts for cloning and sequencing.	<b>K27</b>
<b>CO4</b>	To learn genomic library construction, hybridization and labeling techniques.	<b>K28</b>
<b>CO5</b>	To describe the transgenic methods, chromosome jumping, PCR methods and gene therapy.	<b>K29</b>

<b>On Completion of the Course, the students will be able</b>		
<b>PO1</b>	To gain knowledge on gene manipulation and gene transfer technologies.	<b>K25</b>
<b>PO2</b>	To enhance and understand concept of vectors and vector-based systems.	<b>K26</b>
<b>PO3</b>	To understand the role of expression system and method of selection.	<b>K27</b>
<b>PO4</b>	To explore hybridization techniques.	<b>K28</b>
<b>PO5</b>	To understand gene transfer concept and its implementation	<b>K29</b>

<b>MAPPING WITH PO - GENETIC ENGINEERING - 21PBT06</b>					
<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	S
<b>CO3</b>	S	S	S	S	S
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S
<b>S- Strong, M- Medium, L – Low</b>					

<b>SEMESTER III</b>
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Course Title	CORE XI – PLANT BIOTECHNOLOGY - 21PBT07	Knowledge level
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To acquire the knowledge on techniques plant tissue culture, organization, measures adopted for aseptic manipulation and nutritional requirements of cultured tissues.	<b>K20</b>
<b>CO2</b>	To learn the techniques of culturing tissues, single cells, protoplasts, anther culture, germplasm conservation and cryobiology.	<b>K21</b>
<b>CO3</b>	To learn the large-scale clonal propagation of plants through various micropropagation techniques, Production of secondary metabolites under in vitro conditions.	<b>K22</b>
<b>CO4</b>	For good understanding of r-DNA technology, methods of gene transfer, molecular markers and marker assisted selection.	<b>K23</b>
<b>CO5</b>	To develop transgenics resistant to biotic, abiotic stresses, quality characteristics and their role in crop improvement.	<b>K24</b>
<b>On Completion of the Course, the students will be able</b>		
<b>PO1</b>	To understand various invitro culture techniques of plants.	<b>K20</b>
<b>PO2</b>	To learn gene transferring mechanisms in plants.	<b>K21</b>
<b>PO3</b>	To knowledge on plant tissue culture and its requirements.	<b>K22</b>
<b>PO4</b>	To learn genetic engineering and gene modification.	<b>K23</b>
<b>PO5</b>	To highlight the applications of plant biotechnology in agriculture.	<b>K24</b>

<b>MAPPING WITH PO - PLANT BIOTECHNOLOGY - 21PBT07</b>					
CO - Number	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	S
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S
<b>S- Strong, M- Medium, L – Low</b>					

<b>Course Title</b>	<b>CORE XII – ANIMAL BIOTECHNOLOGY - 21PBT08</b>	<b>Knowledge level</b>
<b>On the successful completion of the course, students will be able</b>		
<b>CO1</b>	To know and be familiar with the organization of animal cells, scope, limitations of animal cell culture, types and characteristics of cell culture.	<b>K25</b>
<b>CO2</b>	To gain knowledge on infrastructure requirements for animal cell culture like laboratory layout, design, equipment, substrates and media requirements for animal cell culture, properties of animal cell culture medium and maintenance of aseptic condition.	<b>K26</b>
<b>CO3</b>	To become aware of the basic techniques involved in animal cell culture for establishment of cell line, cloning, selection, cell line characterization, quantification and scale up techniques.	<b>K27</b>
<b>CO4</b>	To understand about the applications of animal cell culture in drug testing like viability and cytotoxicity assay, cryopreservation of cell lines and establishment of cell banks, bio-safety regulations and Bioethics in animal cell culture and specialized techniques preferred in animal cell culture.	<b>K28</b>
<b>CO5</b>	To interpret about culture of specific cell types like hematopoietic cells and tumor cells, tissue engineering and stem cell technology and its applications, role of animal cell culture in IVF, test tube babies and gene therapy using embryonic stem cells.	<b>K29</b>

<b>On Completion of the Course, the students will be able</b>		
<b>PO1</b>	To understand animal gene expression system.	<b>K25</b>
<b>PO2</b>	To understand genetic characteristics in animal cell culture.	<b>K26</b>
<b>PO3</b>	To acquire knowledge on transgene technology.	<b>K27</b>
<b>PO4</b>	To emphasize fertilization and development in animal cell biology.	<b>K28</b>
<b>PO5</b>	To evaluate gene transfer, stem cell and transgenics in animal biotechnology.	<b>K29</b>

**MAPPING WITH PO - ANIMAL BIOTECHNOLOGY - 21PBT08**



CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	M	S	S
CO5	S	M	S	S	S

**S- Strong, M- Medium, L – Low**

Course Title	CORE XIII – BIOPROCESS TECHNOLOGY - 21PBT09	Knowledge level
<b>On the successful completion of the course, students will be able</b>		
CO1	To design bioreactors and necessary control for maximizing production.	<b>K30</b>
CO2	To select and optimize media for maximum production of microbial metabolites.	<b>K31</b>
CO3	To design protocols for strain improvement and separation of molecules after separation process.	<b>K32</b>
CO4	To design the protocols for strain improvement and separation of molecules after separation process.	<b>K33</b>
CO5	To understand the various techniques for isolation, recovery and purification of a protein and evaluate the outcome.	<b>K34</b>

<b>On Completion of the Course, the students will be able</b>		
PO1	To understand applications of microbes in production.	<b>K30</b>
PO2	To evaluate the other products such as enzymes, secondary metabolites produced by the microbes which are useful in the industries.	<b>K31</b>
PO3	To evaluate microbial products and its economic value in market.	<b>K32</b>
PO4	To gain knowledge on fermentation, metabolites, vitamins produced by microbes and separation from other products.	<b>K33</b>
PO5	To enhance other technologies in the separation process.	<b>K34</b>

**MAPPING WITH PO - BIOPROCESS TECHNOLOGY - 21PBT09**

CO - Number	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	M	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	M	S	S
CO5	S	M	S	S	S
<b>S- Strong, M- Medium, L – Low</b>					

Course Title	CORE XIV – RESERCH METHODOLOGY AND BIOINSTRUMENTATION - 21PBT10	Knowledge level
<b>On the successful completion of the course, students will be able</b>		
CO1	To learn introduction, types and methods of research.	<b>K35</b>
CO2	To acquire the skills of scientific reading, writing and presentations of research.	<b>K36</b>
CO3	To apply the working principles and methodology of various types of measurement techniques like spectroscopy, centrifuge, chromatography and fluorimetry.	<b>K37</b>
CO4	To analyze the mechanism of separation and imaging techniques.	<b>K38</b>
CO5	To learn the statistical analysis of biological data.	<b>K39</b>

<b>On Completion of the Course, the students will be able</b>		
PO1	To analyze the basics of instrumentation by analysis.	<b>K35</b>
PO2	To exemplify the structure of atoms and molecules by using the principles of spectroscopy.	<b>K36</b>
PO3	To evaluate biomolecules by separating, purifying and quantifying process.	<b>K37</b>
PO4	To prepare the requisite and applications of imaging techniques.	<b>K38</b>
PO5	To categorize the working principle and applications of fluorescence and radiation-based techniques.	<b>K39</b>

**MAPPING WITH PO - RESERCH METHODOLOGY AND BIOINSTRUMENTATION**

<b>CO - Number</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	S	S	S	S	M
<b>CO4</b>	S	S	M	S	S
<b>CO5</b>	S	M	S	S	S
<b>S- Strong, M- Medium, L – Low</b>					

# 9. DEPARTMENT OF MICROBIOLOGY

## Programme: M.Sc., - Microbiology

<b>Course</b>	<b>CORE I : GENERAL MICROBIOLOGY</b>
<b>Code</b>	<b>21PMI01</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Gain a strong foundation on general microbiological practices
<b>Co-2</b>	Learn the basics of various characteristics features of divisions used in the classification of bacteria, fungi, protozoa and algae.
<b>Co-3</b>	Know the basics of Microbial taxonomy and Metabolism of microbes
<b>Course</b>	<b>CORE II : IMMUNOLOGY AND IMMUNOTECHNOLOGY</b>
<b>Code</b>	<b>21PMI02</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Gain a strong foundation on general immunological practices
<b>Co-2</b>	Understanding the Immunological assays and test
<b>Co-3</b>	Understanding the various drugs and vaccines in emerging diseases
<b>Course Title</b>	<b>CORE III : CELL AND MOLECULAR BIOLOGY</b>
<b>Code</b>	<b>21PMIEL01</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Gain a strong foundation on general Cell Structures and Molecular practices
<b>Co-2</b>	Understanding the Molecular Structure of Genes
<b>Co-3</b>	Basic process and encoding Genetic level important mechanisms
<b>Course Title</b>	<b>COMPULSORY - INHERITENCE BIOLOGY</b>
<b>Code</b>	<b>21PMI03</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Mendelian Principle
<b>Co-2</b>	Gene Mapping
<b>Co-3</b>	Mutation.
<b>Course Title</b>	<b>PRACTICAL - I - GENERAL MICROBIOLOGY AND IMMUNOLOGY</b>
<b>Code</b>	<b>21PMBP01</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Perform the various staining techniques of bacteria and study the growth rate of bacteria
<b>Co-2</b>	Understand the various methods to isolate and identify the Microorganisms
<b>Course Title</b>	<b>PRACTICAL - II - CELL AND MOLECULAR BIOLOGY</b>
<b>Code</b>	<b>21PMBP02</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Perform the various staining techniques of bacteria and study the Isolation of DNA and RNA process of Bacteria
<b>Co-2</b>	Understand the various methods to isolate and identify the Microorganisms and Bacterial Genetical analytical process

**Semester - II**

<b>Course Title</b>	<b>CORE IV - MEDICAL BACTERIOLOGY AND MYCOLOGY</b>
<b>Code</b>	<b>21PMI04</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	To understand the basic information on bacterial and fungal disease
<b>Co-2</b>	Important knowledge on host and parasitic infections
<b>Co-3</b>	Create a knowledge on the infection caused by the organism
<b>Co-4</b>	To understand the pathogenesis of bacterial and fungal diseases
<b>Course Title</b>	<b>CORE V - INDUSTRIAL AND PHARMACEUTICAL MICROBIOLOGY</b>
<b>Code</b>	<b>21PMI05</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Gain wide information regarding various types of bacterial and fungal Biochemical process and Fermentations
<b>Co-2</b>	Microbial production of various industrial important products by bacteria and fungai
<b>Co-3</b>	Understanding Pharmaceutical microbiological process by checking sterility of the samples.
<b>Course Title</b>	<b>CORE VI - GENETIC ENGINEERING AND ADVANCES IN BIOTECHNOLOGY</b>
<b>Code</b>	<b>21PMI06</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	To learn the basics of recombinant DNA technology
<b>Co-2</b>	To acquire an idea about cloning mechanisms
<b>Course Title</b>	<b>EDC - I - ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY</b>
<b>Code</b>	<b>21PBTE01</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	To get an insight into the working principles of optical methods, radioisotopes, spectroscopy and separation methods
<b>Co-2</b>	This will enable the students to carry out the research work innovatively
<b>Course Title</b>	<b>COMMEN PAPER - VALUE EDUCATION: HUMAN RIGHTS</b>
<b>Code</b>	<b>21PHR01</b>
<b>At the end of the successful completion of this course, the learner will be able to</b>	
<b>Co-1</b>	Understand the core principles of human rights philosophy
<b>Co-2</b>	Know the importance and functions of human rights commission
<b>Co-3</b>	Know the rights from the Governance, economic and social development through various Acts

<b>Course Title</b>	<b>PRACTICAL - III - MEDICAL BACTERIOLOGY AND MYCOLOGY</b>
<b>Code</b>	<b>21PMBP03</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Perform the various staining techniques of bacteria and study the Isolation from various samples
<b>Co-2</b>	Understand the various methods to isolate and identify the Microorganisms from Bacterial Infection samples
<b>Course Title</b>	<b>PRACTICAL- IV - GENETIC ENGINEERING AND INDUSTRIAL MICROBIOLOGY</b>
<b>Code</b>	<b>21PMBP04</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	To understand the basic information on bacterial and fungal industrial products
<b>Co-2</b>	Important knowledge on microbial products
<b>Co-3</b>	Create a knowledge on industrially important process
<b>Co-4</b>	To understand the isolation of nucleic acids from bacteria

**Semester - III**

<b>Course Title</b>	<b>CORE VII - MEDICAL VIROLOGY AND PARASITOLOGY</b>
<b>Code</b>	<b>21PMIP07</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	The epidemiological diagnostic techniques
<b>Co-2</b>	Preventive measures and techniques
<b>Course Title</b>	<b>CORE VIII - FOOD, DAIRY AND ENVIRONMENTAL MICROBIOLOGY</b>
<b>Code</b>	<b>21PMI08</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	The course is designed to develop the student with enough knowledge about disease caused by
<b>Co-2</b>	The Micro organisms present in air and sewage
<b>Course Title</b>	<b>CORE IX - SOIL, AGRICULTURAL MICROBIOLOGY AND BIODEGRADATION</b>
<b>Code</b>	<b>21PMI09</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Isolation and identification of diseases producing bacteria from soil samples
<b>Co-2</b>	Micro organism present as Bio fertilizers
<b>Co-3</b>	Soil pathogens
<b>Co-4</b>	Degradation process in soil
<b>Course Title</b>	<b>PRACTICAL V - MEDICAL VIROLOGY AND PARASITOLOGY</b>
<b>Code</b>	<b>21PMB05</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Staining techniques to observe parasites.
<b>Co-2</b>	Isolation and identification of viruses and parasites in the clinical sample

<b>Course Title</b>	<b>PRACTICAL VI- FOOD, DIARY, ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY</b>
<b>Code</b>	<b>21PMIP06</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Isolation and identification of diseases producing bacteria from soil samples.
<b>Co-2</b>	Micro organism present as Bio fertilizers.
<b>Co-3</b>	Soil pathogens
<b>Co-4</b>	Degradation process in soil
<b>Course Title</b>	<b>ELECTIVE COURSES - METHODS IN BIOLOGY - COMPULSORY</b>
<b>Code</b>	<b>21PMIEL02</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Recombinant DNA methods
<b>Co-2</b>	Immuno Techniques
<b>Co-3</b>	Biophysical Method

**Semester - IV**

<b>Course Title</b>	<b>CORE X - RESEARCH METHODOLOGY, BIostatISTICS AND BIOINFORMATICS</b>
<b>Code</b>	<b>21UMB08</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Data collection and computations in biology.
<b>Co-2</b>	Presentation of research
<b>Co-3</b>	Bio informatics related with research
<b>Course Title</b>	<b>ELECTIVE COURSES - BIOINSTRUMENTATION AND BIOLOGICAL TECHNIQUES</b>
<b>Code</b>	<b>21PMIEL04</b>
<b>On Completion of the Course, the students will be able</b>	
<b>Co-1</b>	Bio instruments mechanism Energy
<b>Co-2</b>	Principles and methodology of biological technique
<b>Co-3</b>	Molecular techniques process