**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
*Reaccredited with 'A++' Grade (4th Cycle) by NAAC*
**VIRUDHUNAGAR**
**Quality Education with Wisdom and Values**

# OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM REGULATIONS AND SYLLABUS
## (with effect from Academic Year 2025 - 2026)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes (Aided), 13 UG Programmes (SF), 13 PG Programmes and 6 Ph.D. Programmes. The curricula for all these Programmes, except Ph.D. Programmes, have been framed as per the guidelines given by the University Grants Commission (UGC) &Tamil Nadu State Council for Higher Education (TANSCHE) under Choice Based Credit System (CBCS) and the guidelines for Outcome Based Education (OBE).

The Departments of Commerce, English, History, Mathematics, Biochemistry and Tamil upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

## A. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose Courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The performance of students is evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

### List of Programmes in which CBCS/Elective Course System is implemented

**UG PROGRAMMES**

| | | |
|---|---|---|
| Arts & Humanities | : | History (E.M. & T.M.), English, Tamil |
| Physical & Life Sciences | : | Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology, Data Science, Computer Applications and Computer Applications - Graphic Design |
| Commerce & Management | : | Commerce, Commerce (Computer Applications), Commerce (Professional Accounting), Business Administration |

**PG PROGRAMMES**

| | | |
|---|---|---|
| Arts & Humanities | : | History, English, Tamil |
| Physical & Life Sciences | : | Mathematics, Physics, Chemistry, Biochemistry, Home Science - Nutrition and Dietetics, Biotechnology, Computer Science and Computer Applications (MCA) * |
| Commerce & Management | : | Commerce, Business Administration (MBA) * |

* AICTE approved Programmes

**OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG**

1. Core Courses
2. Elective Courses
   - Generic Elective Courses
   - Discipline Specific Elective Courses (DSEC)
   - Non Major Elective Courses (NMEC)
3. Skill Enhancement Courses (SEC)
4. Environmental Studies (EVS)
5. Value Education
6. Self Study Courses (Online)
7. Extra Credit Courses (Self Study Courses) (Optional)

**List of Non Major Elective Courses (NME)**
**(2024 – 2025 onwards)**

**UG PROGRAMMES**

| Name of the Course | Course Code | Semester | Department |
|---|---|---|---|
| Introduction to Tourism | 24UHIN11 | I | History (E.M) |
| Indian Constitution | 24UHIN21 | II | |
| சுற்றுலா ஓர் அறிமுகம் | 24UHIN11 | I | History (T.M) |
| இந்திய அரசியலமைப்பு | 24UHIN21 | II | |
| Popular Literature and Culture | 24UENN11 | I | English |
| Philosophy for Literature | 24UENN21 | II | |
| அடிப்படைத் தமிழ் இலக்கணம் – I எழுத்தறிதல்/ பேச்சுக்கலைத்திறன் | 24UBTN11/ 24UTAN11 | I | Tamil |
| அடிப்படைத்தமிழ் – மொழித் திறனறிதல் / பயன்முறைத் தமிழ் | 24UBTN21/ 24UTAN21 | II | |

| | | | |
|---|---|---|---|
| Basic Hindi - I | 24UBHN11 | I | Hindi |
| Basic Hindi - II | 24UBHN21 | II | |
| Everyday Banking/ Practical Banking | 24UCON11N/ 24UCON11 | I | Commerce (Aided) |
| Basic Accounting Principles | 24UCON21 | II | |
| Everyday Banking | 24UCON11N | I | Commerce (Self) |
| Emotional Intelligence | 24UCON21N | II | |
| Everyday Banking/Self- Employment and Startup Business | 24UCON11N/ 24UCCN11 | I | Commerce C.A.(Self) |
| Fundamentals of Marketing | 24UCCN21 | II | |
| Everyday Banking/ Practical Banking | 24UCPN11N/ 24UCPN12N | I | Commerce Professional Accounting |
| Basic Accounting Principles | 24UCPN21N | II | |
| Basics of Event Management | 24UBAN11 | I | Business Administration |
| Managerial Skill Development | 24UBAN21 | II | |
| Quantitative Aptitude -I | 24UMTN11 | I | Mathematics |
| Quantitative Aptitude - II | 24UMTN21 | II | |
| Physics for EveryDay Life | 24UPHN11 | I | Physics |
| Astrophysics | 24UPHN21 | II | |
| Food Chemistry | 24UCHN11 | I | Chemistry |
| Dairy Chemistry | 24UCHN21 | II | |
| Ornamental fish farming and Management | 24UZYN11 | I | Zoology |
| Biocomposting for Entrepreneurship | 24UZYN21 | II | |
| Foundations of Baking and Confectionery | 24UHSN11 | I | Home Science – Nutrition and Dietetics |
| Women's Health and Wellness | 24UHSN21 | II | |
| Nutrition and Health | 24UBCN11 | I | Biochemistry |
| Life Style Diseases | 24UBCN21 | II | |
| Social and Preventive Medicine | 24UMBN11 | I | Microbiology |
| Nutrition and Health Hygiene | 24UMBN21 | II | |
| Herbal Medicine | 24UBON11 | I | Biotechnology |
| Organic Farming and Health Management | 24UBON21 | II | |
| Basics of Fashion | 24UCFN11 | I | Costume Design And Fashion |
| Interior Designing | 24UCFN21 | II | |
| Introduction to HTML | 24UCSN11N | I | Computer Science |
| Office Automation | 24UCSN21N | II | |
| Basics of Internet | 24UITN11N | I | Information Technology |
| Data Analysis using Spreadsheet | 24UITN21N | II | |
| Fundamentals of Information Technology | 24UDSN11 | I | Data Science |

| | | | |
|---|---|---|---|
| Computer Fundamentals | 24UDSN21 | II | |
| Web Designing | 24UCAN11N | I | B.C.A. |
| Fundamentals of Computers | 24UCAN21N | II | |
| Organic Farming | 24UBYN11 | I | Botany |
| Nursery and Landscaping | 24UBYN12 | I | |
| Mushroom Cultivation | 24UBYN21 | II | Botany |
| Medicinal Botany | 24UBYN22 | II | |
| Library and Information Science - I | 24ULSN11 | I | Library Science |
| Library and Information Science - II | 24ULSN21 | II | |
| Cadet Corps for Career Development I | 24UNCN11 | I | National Cadet Corps |
| Cadet Corps for Career Development II | 24UNCN21 | II | |

## B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK

The core philosophy of Outcome Based Education rests in employing a student - centric learning approach to measure the performance of students based on a set of pre-determined outcomes. The significant advantage of OBE is that it enables a revamp of the curriculum based on the learning outcomes, upgradation of academic resources, quality enhancement in research and integration of technology in the teaching –learning process. It also helps in bringing clarity among students as to what is expected of them after completion of the Programme in general and the Course in particular. The OBE directs the teachers to channelize their teaching methodologies and evaluation strategies to attain the PEOs and fulfill the Vision and Mission of the Institution.

**Vision of the Institution**

The founding vision of the Institution is to impart Quality Education to the rural womenfolk and to empower them with knowledge and leadership quality.

**Mission of the Institution**

The mission of the Institution is to impart liberal education committed to quality and excellence. Its quest is to mould learners into globally competent individuals instilling in them life-oriented skills, personal integrity, leadership qualities and service mindedness.

### B.1 Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes

It is imperative for the institution to set the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Course Outcomes (COs), consistent with its Vision and Mission statements. The PEOs and the POs should be driven by the mission of

the institution and should provide distinctive paths to achieve the stated goals. The PEOs for each Programme have to fulfill the Vision and Mission of the Department offering the Programme.

**Vision of the Department of Physics**

To enrich the young minds with scientific temper, ethical responsibilities and professional values and make their contribution to the society.

**Mission of the Department of Physics**

- To impart quality education in Physics by strengthening the students conceptual knowledge
- To enhance their logical thinking, problem solving and communication skills for research and employability
- To develop globally competent, socially responsible and value driven citizens committed to sustainable development

**B.1.1 Programme Educational Objectives (PEOs)**

PEOs are broad statements that describe the career and professional achievements that the programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each programme and should be consistent with the mission of the Institution.

**Programme Educational Objectives (PEOs) of B.Sc. Physics Programme**

**The students will be able to**

- ➢ acquire comprehensive knowledge and sound understanding of concepts in various branches of Physics and exhibit their abilities and skills leading to professional development and lifelong learning
- ➢ be empowered with a successful career in academia, research and industry by developing their scientific temper and communication skills
- ➢ possess cultural, social and spiritual values, sense of responsibility and character integrity for better citizenship.

| **Key Components of the Mission Statement** | PEO1 | PEO2 | PEO3 |
|---|---|---|---|
| conceptual knowledge | √ | √ | - |
| logical thinking, problem solving, communication skills, research and employability | √ | √ | √ |
| sustainable development | - | √ | √ |

### B.1.2 Programme Outcomes (POs)

POs shall be based on Graduates Attributes (GAs) of the programme. The GAs are the attributes expected of a graduate from a programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co- operation/ Team Work, Scientific Reasoning, Reflective Thinking, Information/ Digital Literacy, Multi-cultural Competence, Moral and Ethical Awareness/ Reasoning, Leadership Qualities and Lifelong Learning.

**On successful completion of the Programme, the students will be able to**

1 apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)

2 articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills)*

3 identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving)*

4 critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fullfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning)*

5 use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning)*

6 self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence)*

7 uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness)*

### B.1.3 Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme**.** Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are programme specific. It is mandatory that each PO should be mapped to the respective PSO.

**On completion of B.Sc. Physics Programme, the students will be able to**

**PO1 -** *Disciplinary Knowledge*

**PSO 1.a :** apply the acquired core knowledge in the concepts, principles and theories of fundamental and advanced Physics to pursue higher studies or placement by applying diverse frames of reference.

**PSO 1.b:** be able to demonstrate their technical and observational skills in handling the equipment/instruments with precautions and to interpret the data for formulating engaging ideas.

**PO2 –** *Communication Skills*

**PSO 2** exhibit oral and written communication skills in presenting complex and technical concepts of Physics to wider group of audience such as academic experts, professionals, society and high potential organizations.

**PO3 –** *Scientific Reasoning and Problem Solving*

**PSO 3.a:** determine the various parameters in Physics by appropriate experimental methods and thereby updating their knowledge and skills in research and development.

**PSO 3.b**: enrich their problem-solving skills that make them successful entrepreneurs to meet the challenges and demands of the business world.

**PO4 –** *Critical Thinking and Analytical Reasoning*

**PSO 4.a:** analyze the equations / theories /models in different branches of Physics and realize their significance in Science and technology and industry.

**PSO 4.b**: : apply the principles of various fields of Physics/ Interdisciplinary areas to design innovative devices/components by start-up organizations for the stakeholders.

**PO5 –** *Digital Literacy, Self - Directed and Lifelong Learning*

**PSO 5**: be capable of utilizing modern digital tools, pertaining to their field of interest that enable them for self-directed lifelong learning and sharing with collaborators for mutual benefit.

**PO6 –** *Co-operation/Team Work and Multi-Cultural Competence*

**PSO 6** :build up their leadership qualities, team spirit and good interpersonal relations to make them citizen of the world.

**PO7 –***Moral and Ethical Awareness*

**PSO 7:** adhere the global standards of codes of conduct in Physics community and practice the imbibed moral values in their profession for the upliftment of society.

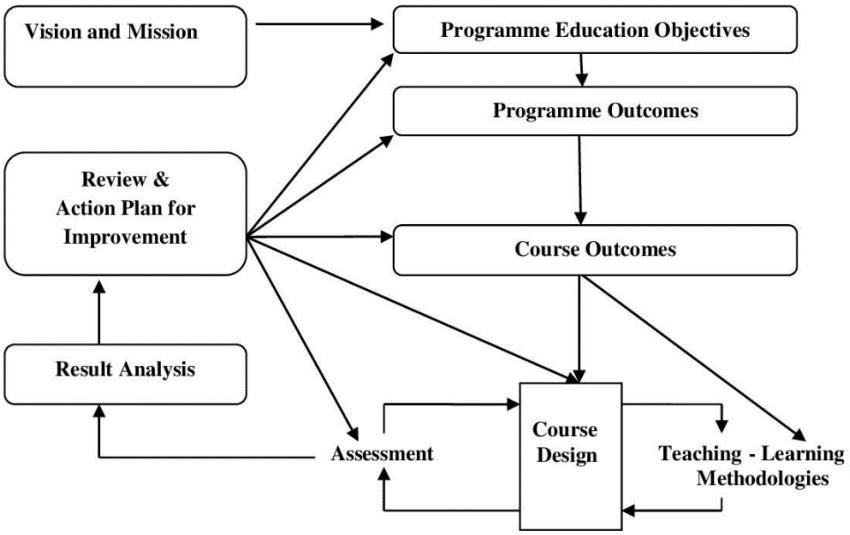
**PO-PEO Mapping Matrix**

Attainment of PEOs can be measured by a PO-PEO matrix. PEOs should evolve through constant feedback from alumnae, students, industry, management, *etc*. It is mandatory that each PEO should be mapped to at least one of the POs.

| PEOs / POs/PSOs | PEO1 | PEO2 | PEO3 |
|---|---|---|---|
| **PO1/PSO1.a** | - | ✓ | ✓ |
| **PO1/PSO1.b** | ✓ | ✓ | ✓ |
| **PO2/PSO2.a** | ✓ | ✓ | - |
| **PO2/PSO2.b** | ✓ | ✓ | - |
| **PO3/PSO3** | - | ✓ | ✓ |
| **PO4/PSO4.a** | - | ✓ | ✓ |
| **PO4/PSO4.b** | ✓ | ✓ | - |
| **PO5/PSO5** | ✓ | ✓ | - |
| **PO6/PSO6** | - | ✓ | ✓ |
| **PO7/PSO7** | - | - | ✓ |

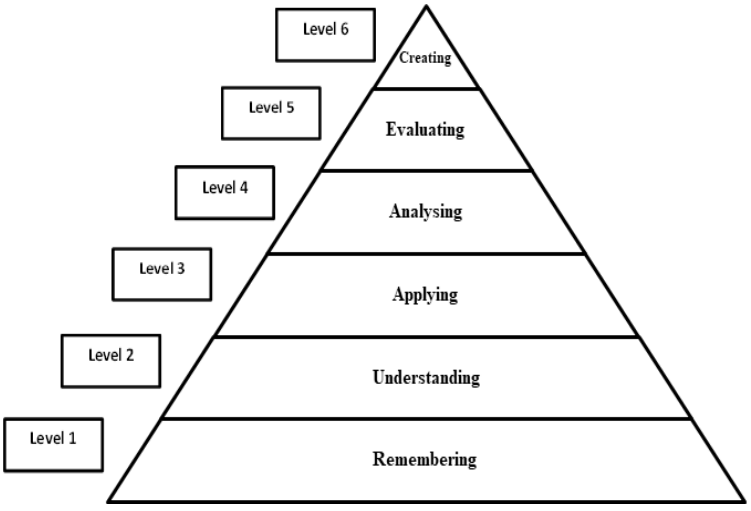
**B.1.4 Course Outcomes (COs)**

Course Outcomes are narrow statements restricted to the course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.




It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

**BLOOM'STAXONOMY**




**CO – PO Mapping of Courses**

After framing the CO statements, the COs framed for each course is mapped with POs based on the relationship that exists between them. The COs which are not related to any of the POs is indicated with (-), signifying Nil. Measurement Mapping is based on Four Points Scale [High (H), Medium (M), Low (L) and Nil (-)]. For calculating weighted percentage of contribution of each Course in the attainment of the respective POs, the weights assigned for H, M and L are 3, 2and 1 respectively.

**CO-PO/PSO Mapping Table (Course Articulation Matrix)**

| PO/PSOs / COs | PO1/ PSO1 | PO2/ PSO2 | PO3/ PSO3 | PO4/ PSO4 | PO5/ PSO5 | PO6/ PSO6 | PO7/ PSO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | | | | | | | |
| **CO2** | | | | | | | |
| **CO3** | | | | | | | |
| **CO4** | | | | | | | |
| **CO5** | | | | | | | |

## ELIGIBILITY FOR ADMISSION

The Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu or any other equivalent examination accepted by the Academic Council with Mathematics as one of the subjects in Higher Secondary Course.

## DURATION OF THE PROGRAMME

The Candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

## MEDIUM OF INSTRUCTION

English

## COURSES OFFERED

| | | |
|---|---|---|
| Part I | : | Tamil/Hindi Course |
| Part II | : | English |
| Part III | : | Core Courses |
| | | Elective Courses<br>• Generic Elective Courses<br>• Discipline Specific Elective Courses |
| | | Self-Study Course - online |
| Part IV | : | Skill Enhancement Courses (SEC) |
| | | Elective Course (NMEC) |
| | | Environmental Studies<br>Value Education |
| | | Internship/Industrial Training |
| | | Self-Study Course (online) |
| Part V | : | National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club/ National Cadet Corps/ Rotaract Club |

## B.2 EVALUATION SCHEME

### B.2.1.PART II

| Components | Internal Assessment Marks | Summative Examination Marks | Total Marks |
|---|---|---|---|
| Theory | 15 | 60 | 100 |
| Practical | 5 | 15 | |
| Assignment | 5 | - | |

Three Periodic Tests - Average of the best two will be considered

### B.2.2.Part I & PART III - Core Courses, Elective Courses (Generic, DSEC)

| Components | Internal Assessment Marks | External Examination Marks | Total Marks |
|---|---|---|---|
| Theory | 25 | 75 | **100** |

**INTERNAL ASSESSMENT**

**Distribution of Marks**

**Theory**

| Mode of Evaluation | | | Marks |
|---|---|---|---|
| Periodic Test | | : | 15 |
| Assignment | K3 Level | : | 5 |
| Quiz | K1 Level | : | 5 |
| **Total** | | **:** | **25** |

Three Periodic Tests - Average of the best two will be considered
Two Assignments - Better of the two will be considered
Three Quiz Tests - Best of the three will be considered

**Practical**

| Mode of Evaluation | | Marks |
|---|---|---|
| Practical Test* | : | 30 |
| Record & Performance | : | 10 |
| **Total** | **:** | **40** |

*Average of the two practical tests will be considered

**Question Pattern for Internal Tests** **Duration: 2 Hours**

| Section | Questions No. | Types of Question | No. of Questions | No. of Questions to be answered | Marks for each Question | Total Marks |
|---|---|---|---|---|---|---|
| A | 1 - 4 | Multiple Choice | 4 | 4 | 1 | 4 |
| B | 5 -6 | Internal Choice - Either … or Type | 3 | 3 | 7 | 21 |
| C | 8 -9 | Internal Choice - Either… or Type | 2 | 2 | 10 | 20 |
| | | | | | **Total** | **45*** |

*The total marks obtained in the Periodic Test will be calculated for 15 marks

**SUMMATIVE EXAMINATION**

**Question Pattern** **Duration: 3 Hours**

| Section | Q. No. | Types of Question | No. of Questions | No. of Questions to be answered | Marks for each Question | Total Marks |
|---|---|---|---|---|---|---|
| A | 1 -10 | Multiple Choice | 10 | 10 | 1 | 10 |
| B | 11 - 15 | Internal Choice – Either …or Type | 5 | 5 | 7 | 35 |
| C | 16 - 18 | Internal Choice – Either… or Type | 3 | 3 | 10 | 30 |
| | | | | | **Total** | **75** |

**PROJECT**

**Assessment by Internal Examiner Only**

**Internal Assessment**

**Distribution of Marks**

| Mode of Evaluation | : | Marks |
|---|---|---|
| Project work and Report | : | 60 |
| Presentation and Viva –Voce | : | 40 |
| Total | : | 100 |

## B.2.3 PART IV - Skill Enhancement Courses, Non Major Elective Courses and Foundation Course

### B.2.3.1 FOUNDATATION COURSE

**INTERNAL ASSESSMENT**
**Distribution of Marks**
**Theory**

| **Mode of Evaluation** | | | **Marks** |
|---|---|---|---|
| Periodic Test | | : | 15 |
| Assignment | K2 Level | : | 5 |
| Quiz | K1 Level | : | 5 |
| **Total** | | **:** | **25** |

Three Periodic Tests - Average of the best two will be considered
Two Assignments - Better of the two will be considered
Three Quiz Tests - Best of the three will be considered

**Question Pattern for Periodic Tests** **Duration: 1 Hour**

| **Section** | **Q.No.** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|---|
| A | 1 - 3 | Internal Choice - Either …or Type | 3 | 3 | 5 | 15 |
| B | 4 | Internal Choice – Either …or Type | 1 | 1 | 10 | 10 |
| | **Total** | | | | | **25*** |

*The total marks obtained in the Periodic Test will be calculated for 15 marks

**SUMMATIVE EXAMINATION**

| **Mode of Evaluation** | | **Marks** |
|---|---|---|
| Summative Examination | : | 50 |
| Online Quiz (Multiple Choice Questions - K2 Level) | : | 25 |
| **Total** | **:** | **75** |

**Question Pattern** **Duration: 2 Hours**

| **Section** | **Q.No.** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|---|
| A | 1 - 5 | Internal Choice - Either … or Type | 5 | 5 | 6 | 30 |
| B | 6 - 7 | Internal Choice – Either… or Type | 2 | 2 | 10 | 20 |
| | **Total** | | | | | **50** |

## B.2.3.2 Skill Enhancement Course - Entrepreneurial skills

**INTERNAL ASSESSMENT ONLY**
**Distribution of Marks**

| **Mode of Evaluation** | | **Marks** |
|---|---|---|
| Periodic Test | : | 15 |
| Assignment | : | 5 |
| Quiz | : | 5 |
| Model Examinations | : | 60 |
| Online Quiz (Multiple Choice Questions - K2 Level) | : | 15 |
| **Total** | **:** | **100** |

**Question Pattern for Periodic Tests** **Duration: 1 Hour**

| **Section** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|
| A Q. No.(1- 3) | Internal Choice – Either Or Type | 3 | 3 | 6 | 18 |
| B Q. No.(4) | Internal Choice – Either Or Type | 1 | 1 | 12 | 12 |
| **Total** | | | | | **30** |

*The total marks obtained in the Periodic Test will be calculated for 15 marks

Two Periodic Tests - Better of the two will be considered

Two Assignments - Better of the two will be considered

Two Quiz Tests - Better of the two will be considered

**Question Pattern for Model Examination** **Duration: 2 Hours**

| **Section** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|
| A Q. No.(1-5) | Internal Choice – Either Or Type | 5 | 5 | 6 | 30 |
| B Q. No.(6- 8) | Internal Choice – Either Or Type | 3 | 3 | 10 | 30 |
| **Total** | | | | | **60** |

## B.2.3.3 Skill Enhancement Courses/ Non Major Elective Courses

**INTERNAL ASSESSMENT**

**Distribution of Marks**

**Theory**

| **Mode of Evaluation** | | | **Marks** |
|---|---|---|---|
| Periodic Test | | : | 15 |
| Assignment | K3 Level | : | 5 |
| Quiz | K2 Level | : | 5 |
| **Total** | | **:** | **25** |

Three Periodic Test - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

**Question Pattern for Periodic Tests** **Duration: 1 Hour**

| **Section** | **Q.No.** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|---|
| A | 1 - 3 | Internal Choice - Either …or Type | 3 | 3 | 5 | 15 |
| B | 4 | Internal Choice – Either …or Type | 1 | 1 | 10 | 10 |
| | **Total** | | | | | **25*** |

*The total marks obtained in the Periodic Test will be calculated for 15 marks

**SUMMATIVE EXAMINATION**

| **Mode of Evaluation** | | **Marks** |
|---|---|---|
| Summative Examination | : | 50 |
| Online Quiz<br>(Multiple Choice Questions - K2 Level) | : | 25 |
| **Total** | **:** | **75** |

**Question Pattern** **Duration: 2 Hours**

| **ction** | **Q.No.** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|---|
| A | 1 - 5 | Internal Choice - Either … or Type | 5 | 5 | 6 | 30 |
| B | 6 - 7 | Internal Choice – Either… or Type | 2 | 2 | 10 | 20 |
| | **Total** | | | | | **50** |

## B.2.4 PART IV- ENVIRONMENTAL STUDIES / VALUE EDUCATION

**INTERNAL ASSESSMENT ONLY**

**Evaluation Pattern**

| **Mode of Evaluation** | | **Marks** |
|---|---|---|
| Periodic Test | : | 15 |
| Assignment - K3 Level | : | 10 |
| Online Quiz<br>(Multiple Choice Questions - K2 Level) | : | 25 |
| Poster Presentation - K3 Level | | 10 |
| Report - K3 Level | | 10 |
| Model Examination | : | 30 |
| **Total** | **:** | **100** |

Three Assignment - Best of the three will be considered

**Question Pattern for Periodic Tests** **Duration: 1 Hour**

| **Section** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|
| A<br>Q. No.(1- 3) | Internal Choice – Either Or Type | 3 | 3 | 6 | 18 |
| B<br>Q. No.(4) | Internal Choice – Either Or Type | 1 | 1 | 12 | 12 |
| **Total** | | | | | **30** |

Two Periodic tests - Better of the two will be considered

*The total marks obtained in the Periodic Test will be calculated for 15 marks

**Question Pattern for Model Examination** **Duration: 2 ½ Hours**

| **Section** | **Q.No.** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|---|
| A | 1 - 5 | Internal Choice - Either … or | 5 | 5 | 6 | 30 |
| B | 6 - 8 | Internal Choice – Either… or Type | 3 | 3 | 10 | 30 |
| | **Total** | | | | | **60** |

*The total marks obtained in the Model Examination will be calculated for 30 marks

### B. 2. 5 PART IV- Internship / Industrial Training

Internship / Industrial Training is mandatory for all the Students

- **Internship:** Students have to involve in a designated activity, working in an organization under the guidance of an identified mentor for a period of 15 days.
- **Industrial Training:** Student has to undertake in-plant training in industries individually or in group for a period of 15 days.
- Internship / Industrial Training must be done during the fourth semester holidays
- **Internal Assessment only.**

| Mode of Evaluation | | Marks |
|---|---|---|
| Onsite Learning/Survey | : | 50 |
| Report | : | 25 |
| Viva-Voce | : | 25 |
| **Total** | | **100** |

### B.2.5 SELF STUDY COURSE

### B.2.5.1 PART III – Discipline Specific Quiz – Online

Assessment by Internal Examiner only

- Question Bank is prepared by the Faculty Members of the Departments for all the Core and Elective Courses offered in all the Semesters.
- No. of Questions to be taken 700.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in VI Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

**Distribution of Marks**

| Mode of Evaluation | | Marks |
|---|---|---|
| Periodic Test | : | 25 |
| Model Examination | : | 75 |
| **Total** | **:** | **100** |

Two Periodic Tests - Better of the two will be considered

### B.2.5.2 PART IV - Practice for Competitive Examinations – Online

Assessment by Internal Examiner only

- Question Bank prepared by the Faculty Members of the respective Departments will be followed.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in V Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

**Subject wise Allotment of Marks**

| Subject | | Marks |
|---|---|---|
| Tamil | : | 10 |
| English | : | 10 |
| History | : | 10 |
| Mathematics | : | 10 |
| Current affairs | : | 10 |
| Commerce, Law & Economics | : | 10 |
| Physical Sciences | : | 10 |
| Life Sciences | : | 15 |
| Computer Science | : | 5 |
| Food and Nutrition | : | 5 |
| Sports and Games | : | 5 |
| **Total** | **:** | **100** |

**Distribution of Marks**

| Mode of Evaluation | | Marks |
|---|---|---|
| Periodic Test | : | 25 |
| Model Examination | : | 75 |
| **Total** | **:** | **100** |

Two Periodic Tests - Better of the two will be considered

**B.2.6. Part V – Extension Activities**

**INTERNAL ASSESSMENT ONLY**

**Distribution of Marks**

| Mode of Evaluation | | Marks |
|---|---|---|
| Attendance | : | 5 |
| Performance | : | 10 |
| Report/Assignment/Project/Camp/Practical | : | 10 |
| **Total** | **:** | **25*** |

*The marks obtained will be calculated for 100 marks

**B.2.7 Transfer of credits earned through MOOC (UGC recognized Courses)**

- Students can opt for minimum of
    - 12 weeks Courses for Core Courses
    - 8 weeks Courses for Elective Courses
    - 4 weeks Courses for Skill Enhancement Course
- The Online Courses opted by the students will be verified and approved by the Head of the Department and forwarded to the Controller of Examinations through the Principal.

- Students are required to register for the equivalent Online Courses through the Institution's SWAYAM-NPTEL Local Chapter after submitting a Permission letter to the Head of the Department.
- The Course should be completed before the beginning of that particular Semester in which the selected Course is offered.
- The student should submit the Course Completion Certificate immediately after receiving it, to the Department.
- The Head of the Department has to send the list of the students and their Course Completion Certificates to the Controller of Examinations through the Principal.
- The students who have submitted the Completion Certificate are exempted from appearing the Periodic Tests and Summative Examinations of the respective course but without any exemption for class attendance.
- Credits allotted for the particular Course in the Curriculum will be transferred after the completion of the Online Course
- Students can earn up to 10 credits within the mandatory credits requirements of the Degree Programme by completing UGC recognised Online Courses.

## B.2.8 EXTRA CREDIT COURSES (OPTIONAL)

### 2.8.1 Extra Credit Course offered by the Department.

Assessment by Internal Examiner Only (To be conducted along with the III Periodic Test)

**Distribution of Marks**

| **Mode of Evaluation** | | **Marks** |
|---|---|---|
| Quiz<br>(Multiple Choice Questions) | : | 25 |
| Model Examination | : | 75 |
| **Total** | **:** | **100** |

**Question Pattern for Model Examination**

| **Section** | **Types of Question** | **No. of Questions** | **No. of Questions to be answered** | **Marks for each Question** | **Total Marks** |
|---|---|---|---|---|---|
| A<br>Q.No.(1-5) | Internal Choice-Either or Type | 5 | 5 | 7 | 35 |
| B<br>Q.No.(6-9) | Internal Choice-Either or Type | 4 | 4 | 10 | 40 |
| | | | | **Total** | **75** |

### 2.8.2 Extra credit Course offered by MOOC (Massive Open Online Course)

- The Courses shall be completed within the first V Semesters of the Programme.
- The allotment of credits is as follows **(Maximum of 10 credits)**

4weeks Course - 1 credit
8 weeks Course - 2 credits
12 weeks Course - 3 credits

## ELIGIBILITY FOR THE DEGREE

- The candidate will not be eligible for the Degree without completing the prescribed Courses of study, lab work, *etc.*, and a minimum Pass marks in all the Courses.
- No Pass minimum for Internal Assessment.
- Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Elective Courses (Generic Elective, DSEC Courses)
- Pass minimum for External Examination is 18 marks out of 50 marks for Skill Enhancement Courses and Non Major Elective Courses (NMEC).
- The aggregate minimum pass percentage is 40 marks for all Courses.
- Pass minimum for External Practical Examination is 21 marks out of 60 marks.

## Attendance

- The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.
- The students who have only 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.
- The students who have attended the classes for 59 days and less - up to 45 days (50%- 65%) can appear for the Summative Examinations only after getting special permission from the Principal.
- The students who have attended the classes for 44 days or less (<50%) cannot appear for the Summative Examinations and have to repeat the whole semester.
- For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
- For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

## B.3 ASSESSMENT MANAGEMENT PLAN

An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

### B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

**Direct Assessment (rubric based)**-Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

**Indirect Assessment** – Done through Course Exit Survey.

**CO Assessment Rubrics**

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory courses. For the practical courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

**CO Attainment**

**Direct CO Attainment**

Course outcomes of all courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

**Target Setting for Assessment Method**

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

**Formula for Attainment for each CO**

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who scored more than the Target}}{\text{Total Number of Student}} \times 100$$

**Attainment Levels of COs**

| **Assessment Methods** | **Attainment Levels** | |
|---|---|---|
| Internal Assessment | Level 1 | 50% of students scoring more than set target marks in Internal Assessment tools |
| | Level 2 | 55% of students scoring more than set target marks in Internal Assessment tools |
| | Level 3 | 60% of students scoring more than set target marks in internal Assessment tools |
| End Semester Summative Examination | Level 1 | 50% of students scoring more than average marks in End Semester Summative Examination |
| | Level 2 | 55% of students scoring more than average marks in End Semester Summative Examination |
| | Level 3 | 60% of students scoring more than average marks in End Semester Summative Examination |

**Indirect CO Attainment**

At the end of each course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the course outcomes.

**Overall CO Attainment= 75% of Direct CO Attainment + 25 % of Indirect CO Attainment**

In each course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the course teacher can set the target as a value greater than the CO attainment of the previous year.

**B.3.2 Assessment Process for Overall PO Attainment**

With the help of CO - PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester Examination and 25 % weightage is given to attainment through Internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/Extra-curricular activities.

**PO Assessment Tools**

| Mode of Assessment | Assessment Tool | Description |
|---|---|---|
| Direct Attainment (Weightage -75%) | CO Assessment | This is computed from the calculated CO Attainment value for each Course |
| Indirect Attainment (Weightage - 25%) | Graduate Exit Survey 10% | At the end of the programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes |
| | Co-curricular/ Extra-curricular activities 15% | For participation in Co-curricular / Extracurricular activities during period of their study. |

**Programme Articulation Matrix (PAM)**

| Course Code | Course Title | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| Average Direct PO Attainment | | | | | | | | | |
| Direct PO Attainment in percentage | | | | | | | | | |

**Indirect Attainment of POs for all Courses**

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| Graduate Exit Survey | | | | | | | | |
| Indirect PO Attainment | | | | | | | | |

**Attainments of POs for all Courses**

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| Direct Attainment (Weightage - 75%) | | | | | | | | |
| Indirect Attainment (Weightage - 25%) | | | | | | | | |
| Overall PO Attainment | | | | | | | | |

**Overall PO Attainment= 75% of Direct PO Attainment +**
**25% of Indirect PO Attainment (Graduate Exit Survey & Participation in Co- curricular and Extracurricular Activities)**

**Expected Level of Attainment for each of the Programme Outcomes**

| POs | Level of Attainment |
|---|---|
| Attainment Value ≥70% | Excellent |
| 60%Attainment Value < 70% | Very Good |
| 50% ≤ Attainment Value < 60% | Good |
| 40% ≤ Attainment Value < 50% | Satisfactory |
| Attainment Value <40% | Not Satisfactory |

**Level of PO attainment**

| Graduation Batch | Overall PO Attainment (in percentage) | Whether Expected Level of PO is Achieved? (Yes/No) |
|---|---|---|
| | | |

**B.3.3 Assessment Process for PEOs**

The curriculum is designed so that all the courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 5 years / 3 years of completion of the programme only through Indirect methods.

**Target for PEO Attainment**

| Assessment Criteria | Target (UG) | Target (PG) |
|---|---|---|
| Record of Employment | 15% of the class strength | 30% of the class strength |
| Progression to Higher Education | 50% of the class strength | 5% of the class strength |
| Record of Entrepreneurship | 2% of the class strength | 5% of the class strength |

**Attainment of PEOs**

| Assessment Criteria & Tool | Weightage |
|---|---|
| Record of Employment | 10 |
| Progression to Higher Education | 20 |
| Record of Entrepreneurship | 10 |
| Feedback from Alumnae | 30 |
| Feedback from Parents | 10 |
| Feedback from Employers | 20 |
| **Total Attainment** | **100** |

$$\text{Percentage of PEO Attainment from Employment} = \frac{\text{Number of Students who have got Employment}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Higher Education} = \frac{\text{Number of Students who pursue Higher Education}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Entrepreneurship} = \frac{\text{Number of Students who have become Entrepreneurs}}{\text{Target}} \times 100$$

**Expected Level of Attainment for each of the Programme Educational Objectives**

| POs | Level of Attainment |
|---|---|
| Attainment Value ≥70% | Excellent |
| 60% ≤ Attainment Value < 70% | Very Good |
| 50% ≤ Attainment Value < 60% | Good |
| 40% ≤ Attainment Value < 50% | Satisfactory |
| Attainment Value <40% | Not Satisfactory |

**Level of PEO Attainment**

| Graduation Batch | Overall PEO Attainment (in percentage) | Whether Expected Level of PEO is Achieved? (Yes/No) |
|---|---|---|
| | | |

## C. PROCESS OF REDEFINING THE PROGRMME EDUCATIONAL OBJECTIVES

The college has always been involving the key stake holders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Physics Programme.

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## BACHELOR OF SCIENCE PHYSICS (2016)

*Outcome Based Education with Choice Based Credit System*
Programme Structure - Allotment of Hours and Credits
For those who join in the Academic Year 2024-2025

| Components | Semester | | | | | | Total Number of Hours (Credits) |
|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | |
| **Part I :** Tamil /Hindi | 6 (3) | 6 (3) | 6 (3) | 6 (3) | - | - | 24 (12) |
| **Part II :** English | 6 (3) | 6(3) | 6 (3) | 6 (3) | - | - | 24 (12) |
| **Part III :** Core Courses, Discipline Specific Elective Courses, Allied Courses and Self Study Course | | | | | | | |
| Core Course | 5 (5) | 5 (5) | 5 (5) | 4 (4) | 6 (6) | 6(6) | 31 (31) |
| Core Course | - | - | - | - | 5 (5) | 6(5) | 11 (10) |
| Core Course | - | - | - | - | 5 (4) | 5(5) | 10(9) |
| Core Course Practical | 3(2) | 3 (2) | 3 (2) | 3 (2) | 3 (2) | 3 (2) | 18(12) |
| Core Course Project | - | - | - | - | 1 (1) | - | 1 (1) |
| Elective Course (DSEC) | - | - | - | - | 5(4) | 5 (4) | 10 (8) |
| Elective Course (DSEC Practical) | - | - | - | - | 3(2) | 3(2) | 6(4) |
| Elective Course I (Allied) | 6 (4) | 3(2) & 3(2) | - | - | - | - | 12(8) |
| Elective Course I Practical I(Allied) | - | - | - | - | - | - | - |
| Elective Course II(Allied) | - | - | 4 (3) | 4 (3) | - | - | 8(6) |
| Elective Course II Practical II(Allied) | - | - | 2 (1) | 2 (1) | - | - | 4 (2) |
| Self Study Course | - | - | - | - | - | 0 (1) | 0 (1) |
| **Part IV :** Skill Enhancement Courses, Elective Courses, Environmental Studies, Value Education , Self-Study Course &Internship/ Industrial Training | | | | | | | |
| SEC | 2 (2) | - | 1 (1) | 2 (2) | - | - | 5(5) |
| SEC | - | 2 (2) | 2 (2) | 2 (2) | - | 2 (2) | 8 (8) |
| Elective Course(NME) | 2 (2) | 2 (2) | - | - | - | - | 4 (4) |
| Value Education | - | - | - | - | 2 (2) | - | 2 (2) |
| Environmental Studies | - | - | 1 (0) | 1 (2) | - | - | 2 (2) |
| Self-Study Course | - | - | - | - | 0 (1) | - | 0 (1) |
| Internship/ Industrial Training | - | - | - | - | 0 (1) | - | 0 (1) |
| **Part V :** Extension Activities | - | - | - | | - | 0 (1) | 0 (1) |
| **Total** | **30 (21)** | **30 (21)** | **30 (20)** | **30(22)** | **30(28)** | **30(28)** | **180 (140)** |
| Extra Credit Course ( Self Study Course) | - | - | - | - | 0(2) | - | 0(2) |

DSEC: Discipline Specific Elective Course; SEC– Skill Enhancement Course
NMEC: Non Major Elective Course

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## B.Sc. PHYSICS – 2016

## PROGRAMME CONTENT

## SEMESTER III

| S. No. | Components | | Title of the Course | Course Code | Hours Per Week | Credits | Exam. Hours | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Int. | Ext. | Total |
| 1. | **Part I** | | Tamil/Hindi | 24UTAG31/ 24UHDG31 | 6 | 3 | 3 | 25 | 75 | 100 |
| 2. | **Part II** | | English | 24UENG31 | 6 | 3 | 3 | 25 | 75 | 100 |
| 3. | **Part III** | Core Course -5 | Mechanics | 24UPHC31 | 5 | 5 | 3 | 25 | 75 | 100 |
| 4. | | Core Course -6 Practical III | Electricity Practical | 24UPHC31P | 3 | 2 | 3 | 40 | 60 | 100 |
| 5. | | Elective Course -II | Basic Electronics | 24UEIA31 | 4 | 3 | 3 | 25 | 75 | 100 |
| 6. | | Elective Course -II Practical I | Applied Electronics and Instrumentation Practical- I | 24UEIA31P | 2 | 1 | 3 | 40 | 60 | 100 |
| 7. | **Part IV** | SEC - 3 | Arduino Programming Practical | 24UPHS31P | 1 | 1 | 2 | 100 | - | 100 |
| 8. | | SEC - 4 | Numerical Methods | 24UPHS32 | 2 | 2 | 2 | 25 | 75 | 100 |
| 9. | | | Environmental Studies | 24UGES41 | 1 | - | - | - | - | - |
| **Total** | | | | | **30** | **20** | | | | **800** |

## SEMESTER IV

| S. No. | Components | | Title of the Course | Course Code | Hours Per Week | Credits | Exam. Hours | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Int. | Ext. | Total |
| 1. | **Part I** | | Tamil/ Hindi | 24UTAG41/ 24UHDG41 | 6 | 3 | 3 | 25 | 75 | 100 |
| 2. | **Part II** | | English | 24UENG41 | 6 | 3 | 3 | 25 | 75 | 100 |
| 3. | **Part III** | Core Course - 7 | Optics and Laser Physics | 24UPHC41 | 4 | 4 | 3 | 25 | 75 | 100 |
| 4. | | Core Course - 8 Practical IV | Optics Practical | 24UPHC41P | 3 | 2 | 3 | 40 | 60 | 100 |
| 5. | | Elective Course –II | Electronic devices and Instrumentation | 24UEIA41 | 4 | 3 | 3 | 25 | 75 | 100 |
| 6. | | Elective Course – II Practical | Applied Electronics and Instrumentation Practical- II | 24UEIA41P | 2 | 1 | 3 | 40 | 60 | 100 |
| 7. | **Part IV** | SEC - 5 | Solar Energy | 24UPHS41 | 2 | 2 | 2 | 25 | 75 | 100 |
| 8. | | SEC - 6 | Programming in C Practical | 24UPHS42P | 2 | 2 | 2 | 40 | 60 | 100 |
| 9. | | | Environmental Studies | 24UGES41 | 1 | 2 | 2 | 100 | - | 100 |
| **Total** | | | | | **30** | **22** | | | | **900** |

## SEMESTER V

| S. No. | Components | | Title of the Course | Course Code | Hours Per Week | Credits | Exam. Hours | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Int. | Ext. | Total |
| 1. | **Part III** | Core Course - 9 | Electricity, Magnetism and Electromagnetism | 24UPHC51 | 6 | 6 | 3 | 25 | 75 | 100 |
| 2. | | Core Course - 10 | Atomic and Nuclear Physics | 24UPHC52 | 5 | 5 | 3 | 25 | 75 | 100 |
| 3. | | Core Course - 11 | Analog and Communication Electronics | 24UPHC53 | 5 | 4 | 3 | 25 | 75 | 100 |
| 4. | | Core Course – 12 Practical V | General Physics Practical - I | 24UPHC51P | 3 | 2 | 3 | 40 | 60 | 100 |
| 5. | | Core Course – 13 | Project | 24UPHC54PR | 1 | 1 | - | 100 | - | 100 |
| 6. | | Elective Course DSEC -1 | Nanoscience and Nano Technology / Mathematical Physics | 24UPHE51 / 24UPHE52 | 5 | 4 | 3 | 25 | 75 | 100 |
| 7. | | Elective Course DSEC -2 Practical I | General Physics Practical – II / Linear Integrated Circuits Practical | 24UPHE53P / 24UPHE54P | 3 | 2 | 3 | 40 | 60 | 100 |
| 8. | **Part IV** | Internship / Industrial Training | Internship | 24UPHI51 | - | 1 | - | 100 | - | 100 |
| 9. | | | Value Education | 24UGVE51 | 2 | 2 | 2 | 100 | - | 100 |
| 10. | | Self-Study Course | Practice for Competitive Examination - Online | 24UGCE51 | - | 1 | - | 100 | - | 100 |
| **Total** | | | | | **30** | **28** | | | | **1000** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11. | Extra Credit Course (Self-Study Course) | Bio Physics | 24UPHO51 | - | 2 | 3 | 100 | - | 100 |

## SEMESTER VI

| S. No. | Components | | Title of the Course | Course Code | Hours Per Week | Credits | Exam. ours | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Int. | Ext. | Total |
| 1. | **Part III** | Core Course – 14 | Quantum Mechanics and Relativity | 24UPHC61 | 6 | 6 | 3 | 25 | 75 | 100 |
| 2. | | Core Course – 15 | Solid State Physics | 24UPHC62 | 6 | 5 | 3 | 25 | 75 | 100 |
| 3. | | Core Course – 16 | Digital Electronics and Microprocessor 8085 | 24UPHC63 | 5 | 5 | 3 | 25 | 75 | 100 |
| 4. | | Core Course – 17 Practical VI | Electronics Practical | 24UPHC61P | 3 | 2 | 3 | 40 | 60 | 100 |
| 5. | | Self-Study Course | Discipline Specific Quiz - Online | 24UPHQ61 | - | 1 | | 100 | - | 100 |
| 6. | | Elective Course DSEC - 3 | Material Science / Energy Physics | 24UPHE61 / 24UPHE62 | 5 | 4 | 3 | 25 | 75 | 100 |
| 7. | | Elective Course DSEC – 4 Practical II | Digital Electronics Practical/ Digital Circuits Simulation Practical | 24UPHE63P / 24UPHE64P | 3 | 2 | 3 | 40 | 60 | 100 |
| 8. | **Part IV** | Professional Competency Skill -7 | Microprocessor Practical | 24UPHS61P | 2 | 2 | 2 | 40 | 60 | 100 |
| 9. | **Part V** | Extension Activity | Extension Activity | | - | 1 | - | 100 | - | 100 |
| | | | | **Total** | **30** | **28** | | | | **900** |

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**B.Sc. PHYSICS**
**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester III** | **MECHANICS** | **Hours/Week: 5** | |
| **Core Course – 5** | | **Credits: 5** | |
| **Course Code 24UPHC31** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain basic laws of motion, conservation of energy and momentum [K1]

CO2: derive the physical parameters and experimental methods involved in gravitation and conservation laws. [K2]

CO3: obtain the physical quantities involved in rigid body dynamics and Lagrangian mechanics. [K2]

CO4: apply basic laws/principles to simple mechanical systems in real life. [K3]

CO5: use learned concepts to solve mechanical problems. [K3]

**UNIT I**

**FORCES AND MOTION:** Mechanics-causes of motion: Force-Newton's law of motion-freely falling bodies – motion in a vertical plane-projectile motion-equilibrium of forces-frictional forces-static friction and coefficient of static friction –dynamic friction and coefficient of dynamic friction.

**GRAVITATION**: Newton's law of gravitation – Kepler's law of planetary motion – determination of G – Boy's experiment – density of earth – mass of the earth and sun — velocity of escape from earth– from solar system – weightlessness – relation between orbital velocity and escape velocity- satellites-orbital velocity of satellite – orbital speed and period of revolution of a satellite very close to earth-artificial satellites - gravitational field and potential - gravitational field and potential due to solid sphere – variation of g with latitude, altitude and depth. (15 hours)

**UNIT II**

**CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM:** Conservation of linear momentum – impulse- principle applied to a system of particles- centre of mass –

motion of velocity of centre of mass- total linear momentum about the centre of mass – equation of motion of centre of mass- collision – calculation of final velocities of colliding particles (one dimension) – systems of variable mass – Rocket – angular momentum – torque- relation between torque and angular momentum- conservation of angular momentum – examples - proton scattering by heavy nucleus. (15 hours)

**UNIT III**

**CONSERVATION LAWS OF ENERGY:** Concepts of work, power and energy- conservative forces- energy- work energy theorem- potential energy- conservative force as negative gradient of potential energy- law of conservation of mechanical energy – potential energy in an electrical field- electric potential- linear restoring force- non conservative forces. (15 hours)

**UNIT IV**

**RIGID BODY DYNAMICS:** Translational and rotational motion –-angular impulse - moment of inertia – general theorems of moment of inertia – moment of inertia of a circular ring, circular disc, cylinder, hollow cylinder, solid sphere,–rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down in inclined plane (15 hours)

**UNIT V**

**LAGRANGIAN MECHANICS:** Generalized coordinates –degrees of freedom – constraints - principle of virtual work and D' Alembert's Principle – Lagrange's equation from D' Alembert's principle – application –simple pendulum – Atwood's machine – compound pendulum. (15hours)

**SELF STUDY**

Weightlessness - proton scattering by heavy nucleus - moment of inertia of hollow cylinder - Atwood's machine

**TEXT BOOKS**

1. Murugesan, R.,(2018). *Properties of matter***,** S.Chand and Company Limited, New Delhi.
2. Mathur, D. S., and Hemne, P. S. (2000). *Mechanics*, Revised Edition, S.Chand and Co.
3. DuraiPandian, P., LaxmiDuraiPandian and Muthamizh Jaya pragasam, (2005). *Mechanics*, 6th revised edition, S.Chand and Co.
4. Upadhyaya, J.C., (2019). *Classical Mechanics*, Himalaya Publishing house, Mumbai.

5. Shukla R. K .Anchal Srivastava(2006), *Mechanics,* New age International Publishers, New Delhi.

**REFERENCEBOOKS**

1. Goldstein Herbert, (1980). *Classical Mechanics*. U.S.A: Addison and Wesely.
2. Halliday, David and Robert, Resnick, (1995). *Physics Vol.I.* New Age, International, Chennai.
3. Halliday, David Robert Resnick and Walker Jearl, (2001). *Fundamentals of Physics*, John Wiley, New Delhi.

**WEB RESOURCES**

1. https://youtu.be/X4_K-XLUIB4
2. https://www.youtube.com/watch?v=p075LPq3Eas
3. https://www.youtube.com/watch?v=mH_pS6fruyg
4. https://www.youtube.com/watch?v=tdkFc88Fw-M

| Course Code 24UPHC31 | PO1 | | PO2 | PO 3 | | PO4 | | PO 5 | PO 6 | PO 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| | PSO 1. a | PSO 1. b | PSO2 | PSO 3. a | PSO 3. b | PSO 4. a | PSO 4. b | PSO 5 | PSO 6 | PSO 7 |
| **CO1** | 3 | - | 3 | - | - | - | - | 3 | - | 2 |
| **CO2** | 3 | - | 3 | - | 3 | 3 | - | - | - | - |
| **CO3** | 3 | 3 | 2 | 2 | 2 | 3 | 3 | - | - | - |
| **CO4** | 3 | 3 | 2 | 3 | - | 2 | - | 2 | - | 2 |
| **CO5** | 3 | - | 2 | - | 2 | - | - | 2 | - | 1 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.A.Azhagu Parvathi
**Course Designer**

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**VIRUDHUNAGAR**
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester III** | **ELECTRICITY PRACTICAL** | **Hours/Week: 3** | |
| **Core Course – 6 Practical - III** | | **Credits: 2** | |
| **Course Code 24UPHC31P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Electricity and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required physical parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Practical's (Any Eight of the below list)**

1. Calibration of low range voltmeter using potentiometer.
2. Calibration of high range voltmeter using potentiometer.
3. Calibration of ammeter using potentiometer.
4. Measurement of resistance using potentiometer.
5. Determination of capacitance using Desauty's bridge.
6. Comparison of EMF of two cells using spot galvanometer.
7. Comparison of capacitance of two capacitors using spot galvanometer.
8. Determination of resistance and specific resistance using Carey Foster's bridge.
9. Determination of e.m.f of thermo couple using potentiometer.
10. Determination of internal resistance of a cell using potentiometer.

| Course Code 24UPHC31P | PO1 | | PO2 | PO 3 | | PO4 | | PO 5 | PO 6 | PO 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| | PSO 1. a | PSO 1. b | PSO 2 | PSO 3. a | PSO 3. b | PSO 4. a | PSO 4.b | PSO 5 | PSO 6 | PSO 7 |
| **CO1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | 1 |
| **CO3** | - | 3 | 3 | 3 | - | 3 | - | 2 | 3 | 3 |
| **CO4** | - | 3 | 3 | 3 | - | 2 | - | 2 | 2 | 3 |
| **CO5** | - | 2 | 2 | 2 | - | 2 | - | 2 | 2 | 3 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.M.Sankareswari
**Course Designer**

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**B.Sc. PHYSICS**
**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester III** | **BASIC ELECTRONICS** | **Hours/Week: 4** | |
| **Elective Course -II** | | **Credits: 3** | |
| **Course Code 24UEIA31** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: list the types of active & passive elements, biasing methods, network theorems and identify the configuration of semiconducting devices & power supplies. [K1]

CO2: explain the function and characteristics of active & passive elements and power supplies. [K2]

CO3: describe various biasing methods, filter circuits and power supplies. [K2]

CO4: use electronic components to construct rectifiers and regulators. [K3]

CO5: apply network theorems to simplify electronic circuits and use the learnt concept to solve simple problems in capacitance and transistors. [K3]

**UNIT I**

**Passive Circuit Elements:**

Resistors, resistor types - wire wound resistors, carbon composition resistors, metal film resistors, variable resistors, potentiometer and rheostats, color-code resistors - Thermistor inductor - inductance of an inductor, mutual inductance, variable inductors, reactance and impedance offered by a wire, Q - of a coil, capacitors - capacitance - types of capacitors, fixed, variable capacitors – capacitors in Series — capacitors in Parallel — energy stored in a capacitor. (12 Hours)

**UNIT II**

**Semiconducting Devices:**

Energy bands in solids – valances and conduction band - types of semiconductors - intrinsic,

extrinsic semiconductors - PN junction diode - construction, working, V-I - characteristics - Zener diode – Tunnel diode - Photo diode - LDR - Rectifiers - half wave rectifier - full wave rectifier - bridge rectifier - clipping circuits - filters - π filters - LC-filter.

(12 Hours)

**UNIT III**

**Transistor and Transistor Biasing:**

Transistor - Transistor action- transistor connections - common base - common emitter - common collector - load line analysis - operating point - methods of transistor biasing - base resistor - emitter bias - biasing with collector feedback - voltage divider bias- Transistor as amplifier. (12 Hours)

**UNIT IV**

**Network Theorems:**

Super position theorem - Thevenin's theorem - Norton's theorem- h-parameters – Filters – Filter definitions - types of filters - low pass filter - high pass filter - band pass filter - band stop filter – Multisection Filter Circuit- Uses of Filters. (12 Hours)

**UNIT V**

**Power Supplies:**

Introduction – unregulated power supply – Regulated Power Supply – IC Regulated Power supply - Zener voltage regulator – three terminal regulated power supplies – study of IC 7800 and 7900 series – LM 317 – IC 723 Voltage regulator. (12 Hours)

**TEXT BOOKS**

1. Theraja, B.L. (2014). *Basic Electronics*, New Delhi: S.Chand & Company Ltd.
2. Mehta, V. K. & Rohit Mehta (2022). *Principles of Electronics*, New Delhi: S.Chand & Company Ltd.

**REFERENCE BOOKS**

1. Albert Malvino, David Bates, Patrick Hoppe, (2021) *Electronic Principles*, Mc Graw Hill Publications Pvt Ltd.
2. Walter Banzhaf, (2010) *Understanding Basic Electronics,* ARRL Publishing Pvt Ltd.

| **Course Code 24UEIA31** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | 1 | - | 1 | - | - | - | - |
| **CO 2** | 3 | - | 3 | - | 2 | 2 | 1 | - | - | 2 |
| **CO 3** | 3 | 2 | 3 | 2 | - | 1 | - | 2 | - | 2 |
| **CO 4** | 3 | - | 2 | - | 3 | 3 | - | - | - | - |
| **CO 5** | 3 | - | 2 | - | 3 | 3 | - | 3 | - | - |

**Strong (3)  Medium (2)  Low (1)**

Dr. A. Azhagu Parvathi
**Head of the Department**

Dr.R. Hemalatha
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester III** | **APPLIED ELECTRONICS AND INSTRUMENTATION PRACTICAL- I** | **Hours/Week: 2** | |
| **Elective Course II Practical – I** | | **Credits: 1** | |
| **Course Code 24UEIA31P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Electronics and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Practicals: (Any Seven)**

1. Characteristics of Zener diode
2. Half wave and full wave rectifiers using diodes
3. Bridge rectifier using diodes
4. Clipping Circuits
5. Verification of Kirchhoff's laws
6. Characteristics of p-n junction diode
7. Low Pass and High Pass Filters using Passive Components

| **Course Code 24UEIA31P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.I.Rathinamala
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | |
|---|---|---|
| **Semester III** | **ARDUINO PROGRAMMING PRACTICAL** | **Hours/Week: 1** |
| **SEC - 3** | | **Credits: 1** |
| **Course Code 24UPHS31P** | | **Internal 100** |

**COURSE OUTCOMES**

CO1: identify syntax, inbuilt functions and statements used in Arduino programs. [K2]

CO2: write simple Arduino programs. [K2]

CO3: construct relevant electronic circuits using Arduino. [K3]

CO4: verify the operation of the constructed circuits by simulation. [K3]

CO5: acquire Arduino programming skills and entrepreneurial skills. [K3]

**List of Practical's:**

1. Blink an LED
2. Soil Moisture Tester using moisture Sensor
3. Night Lamp using LDR sensor
4. LCD Display
5. Control LED brightness using potentiometer
6. Tone melody using piezo buzzer
7. Sweep a servo through its full range of motion using servo motor

| **Course Code 24UPHS31P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | - | - | - | 1 | - | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | - | 2 | - | - | - | 1 |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | - | 1 | 3 | - |
| **CO 4** | - | 3 | 2 | 3 | 3 | 2 | - | 1 | 2 | - |
| **CO 5** | - | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | - |

**Strong (3) Medium (2) Low (1)**

Dr. A. Azhagu Parvathi
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester III** | **NUMERICAL METHODS** | **Hours/Week: 2** | |
| **SEC – 4** | | **Credits: 2** | |
| **Course Code 24UPHS32** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: identify formulas/techniques involved in numerical methods. [K1]

CO2: explain basic principles of numerical methods. [K1]

CO3: deduce the mathematical relations involved in iteration, interpolation, curve fitting, numerical integration. [K2]

CO4: derive the mathematical formulas used in solving simultaneous equations and differential equations. [K2]

CO5: apply the numerical methods to solve problems. [K3]

**UNIT I**

**Algebraic and Transcendental Equations**: Introduction -Bisection method - Newton Raphson method.

**Simultaneous Equations:** Introduction - Simultaneous equations – Back Substitution - Gauss elimination method. (6 hours)

**UNIT II**

**Interpolation**: Introduction - Newton's interpolation formulae - Lagrange's interpolation formula - Divided differences. (6 hours)

**UNIT III**

**Curve fitting:** Introduction - Method of least squares - Fitting a straight line - Fitting an exponential curve. (6 hours)

**UNIT IV**

**Numerical Integration**: Introduction - Newton Cote's Quadrature Formula - Trapezoidal Rule - Simpson's one third rule - Simpson's three eight rule. (6 hours)

**UNIT V**

**Numerical Solutions of Ordinary Differential Equation:** Euler's method - Modified Euler's method - Runge kutta second order method - Runge kutta fourth order method. (6 hours)

**TEXT BOOK**

Arumugam, S. Thangapandi Isaac, A. and Somasundaram, A. (2015). *Numerical Methods*, Scitech Publications (India) Pvt. Ltd.,

**REFERENCE BOOKS**

1. Singaravelu, A., *Numerical Methods* (2016), Meenakshi Agency.
2. Kandasamy, P. Thilagavathy,K., Gunavathi,K.,. *Numerical Methods* (20218), S.Chand & Company LTD.
3. Venkataraman, M.K., *Numerical Methods in Science and Engineering*,. (2013), The National Publishing Company.

| **Course Code 24UPHS32** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | - | - | - | - | - | - | 2 |
| **CO 2** | 3 | 2 | 3 | 2 | 2 | 2 | - | - | - | - |
| **CO 3** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | - | - | - |
| **CO 4** | 3 | 1 | 2 | - | 3 | 3 | 3 | - | 1 | - |
| **CO 5** | 3 | 2 | 2 | - | 3 | 3 | 3 | 3 | 1 | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.M.Sankareswari
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester IV** | **OPTICS AND LASER PHYSICS** | **Hours/Week: 4** | |
| **Core Course - 7** | | **Credits: 4** | |
| **Course Code 24UPHC41** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain the principles and concepts in geometrical, physical optics and lasers. [K1]

CO2: derive the physical parameters related to geometrical, physical optics and laser. [K2]

CO3: discuss experimental methods related to geometrical & physical optics and working of different lasers [K2]

CO4: apply the phenomena in geometrical and physical optics to real life situations. [K3]

CO5: apply the learned concepts to solve problems in optics. [K3]

**UNIT I**

**LENS AND PRISMS:** Fermat's principle of least time – Fermat's principle of law of reflection and refraction – refraction through thick and thin lenses – focal length, power and cardinal points– narrow angled prisms.

aberrations - spherical aberration in a lens– conditions for minimizing spherical aberration of two thin lens separated by a distance – chromatic aberrations in a lens– condition for a chromatism of two thin lenses placed in contact - dispersion - achromatism in prism- dispersion without deviation – direct vision spectroscope –eyepiece – Huygen's eye – piece. (12 Hours)

**UNIT II**

**INTERFERENCE:** division of wave front, Fresnel's biprism – fringes with white light – division of amplitude: interference in thin films due to, (i) reflected light, (ii) transmitted light – colours of thin films applications – air wedge – Newton's rings.

**Interferometers:** Michelson's interferometer – applications, (i) determination of the wavelength of a monochromatic source of light, (ii) determination of the wavelength and separation $D_1$ and $D_2$ lines of sodium light, (iii) determination of a thickness of a mica sheet.

(12 Hours)

**UNIT III**

**DIFFRACTION:** Fresnel's assumptions – zone plate – action of zone plate for an incident spherical wave front – differences between a zone plate and a convex lens –Fresnel type of diffraction – diffraction pattern due to a straight edge – positions of maximum and minimum intensities – Fraunhofer type of diffraction – plane diffraction grating– experiment to determine wavelengths – width of principal maxima

**RESOLVING POWER:** Rayleigh's criterion for resolution – limit of resolution for the eye – resolving power of, Prism and grating. (12 Hours)

**UNIT IV**

**POLARISATION:** optical activity – optically active crystals –polarizer and analyser–double refraction – optic axis, principal plane – Huygens's explanation of double refraction in uniaxial crystals – polaroids and applications – circularly and elliptically polarized light –quarter wave plate – half wave plate – production and detection of circularly and elliptically polarized lights – Fresnel's explanation – specific rotation – Laurent half shade polarimeter– experiment to determine specific rotatory power. (12 Hours)

**UNIT V**

**LASERS:** general principles of lasers – properties of lasers action – spontaneous and stimulated emission – population inversion – optical pumping – He-Ne laser (principle and working) – $CO_2$ laser (principle and working) semiconductor laser – laser applications – principle of holography – recording of the hologram – reconstruction of the image – holography and photography – Applications of holography. (12 Hours)

**SELF STUDY**

direct vision spectroscope – resolving power – prism– polaroids and applications - holography

**TEXT BOOKS**

1. Murugesan, R & Kiruthiga Sivaprasath, (2014) . *Optics and Spectrocopy*, 17th Revised Edition, New Delhi: S.Chand & Company Pvt Ltd
2. Subramaniam, N andBrijlal, (2014). *Optics*, 25th Ed,S. Chand and Co.

## REFERENCE BOOKS


1. Ajoy Ghatak (2005). *Optics*, 3rd Edition, New Delhi: McGraw Hill Company.
2. JenkinsA.Francis and White. (2011), *Fundamentals of Optics*, 4th edition, McGraw Hill Inc., NewDelhi
3. Sasikumar, P.R. (2012). *Photonics,* PHI Pvt Ltd, New Delhi.


## WEB RESOURCES

1. https://science.nasa.gov/ems/
2. https://www.youtube.com/watch?v=tL3rNc1G0qQandlist=RDCMUCzwo7UlGkb-8Pr6svxWo-LAandstart_radio=1andt=2472
3. https://science.nasa.gov/ems/
4. https://imagine.gsfc.nasa.gov/educators/gammaraybursts/imagine/index.html
5. http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/

| **Course Code 24UPHC41** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | - | - | - | - | 3 | - | 3 |
| **CO 2** | 3 | - | 3 | 2 | - | 2 | 2 | - | - | 3 |
| **CO 3** | 3 | 3 | 3 | 1 | 3 | 3 | - | - | - | - |
| **CO 4** | 3 | - | 2 | 2 | 3 | 3 | 1 | 2 | - | - |
| **CO 5** | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | - | 1 |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.G.Shanmuga Priya
**Course Designer**

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**B.Sc. PHYSICS**
**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester IV** | **OPTICS PRACTICAL** | **Hours/Week: 3** | |
| **Core Course - 8 Practical IV** | | **Credits: 2** | |
| **Course Code 24UPHC41P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in light experiments and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required physical parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record Work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Experiments: Any Eight**

1. Determination of refractive index of prism using spectrometer
2. Determination of refractive index of liquid using hollow prism and spectrometer
3. Determination of dispersive power of a prism
4. Determination of radius of curvature of lens by forming Newton's rings
5. Determination of thickness of a wire using air wedge
6. Determination of refractive index of a given liquid by forming liquid lens
7. Determination of width of rectangular aperture and thickness of wire using Laser

8. Laser Diffraction – Determination of Number of lines per cm on Grating and size of lycopodium powder
9. Determination of refractive index of liquid using Laser

| **Course Code 24UPHC41P** | **PO1** | | **PO2** | **PO 3** | | **PO4** | | **PO 5** | **PO 6** | **PO 7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1. a** | **PSO 1. b** | **PSO 2** | **PSO 3. a** | **PSO 3. b** | **PSO 4. a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 2 |
| **CO2** | 3 | 3 | 3 | 2 | 2 | 2 | - | - | - | 1 |
| **CO3** | - | 3 | 3 | 3 | - | 3 | - | 2 | 3 | 3 |
| **CO4** | - | 3 | 3 | 3 | - | 2 | - | 2 | 2 | 3 |
| **CO5** | - | 2 | 2 | 2 | - | 2 | - | 2 | 2 | 3 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
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Dr.R.Hepzi Pramila Devamani
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| | | | |
|---|---|---|---|
| **Semester IV** | **ELECTRONIC DEVICES AND INSTRUMENTATION** | **Hours/Week: 4** | |
| **Elective Course –II** | | **Credits: 3** | |
| **Course Code 24UEIA41** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: identify the principles and concepts of electronic devices and instruments [K1]

CO2: explain the electronic instruments, functions of CRO, semiconducting devices and bio medical devices. [K2]

CO3: describe the construction and working of biopotential recorders and different types of transducers. [K2]

CO4: apply physics principles to construct different types of electrical and electronic instruments and transducers. [K3]

CO5: illustrate applications of CRO, semiconducting devices, biomedical devices and instruments. [K3]

**UNIT I**

**ELECTRICAL AND ELECTRONIC INSTRUMENTS:**

Moving iron attraction type instruments-moving iron repulsion type instrument-radial vane repulsion type instrument - torque equation for moving iron instruments-advantages-disadvantages - basic DC Ammeter - ammeter-requirements - DC Voltmeter - single phase energy meter-calibration of an energy meter-advantages-disadvantages-digital voltmeters-advantages of digital voltmeters-performance parameters of digital voltmeters-basic block diagram of DVM-electronic multimeter - magnetic measurements - fluxmeter - measurement of flux density-theory of flux density measurement. (12 Hours)

**UNIT II**

**CATHODE RAY OSCILLOSCOPE:**

Cathode Ray Tube (CRT) – basic principle of signal display – block diagram of simple oscilloscope – front panel controls of simple CRO - CRO measurements – voltage – current – period and frequency.

**SEMICONDUCTOR DEVICES:** construction, working, operation and applications of SCR and UJT. (12 Hours)

**UNIT III**

**PHYSIOLOGICAL ASSIST DEVICES**

Pacemakers - Energy required to excite heart muscle - methods of simulation - Pacemaker batteries - Mercury cells, lithium cells - Artificial heart valve - Defibrillators - internal defibrillators - external defibrillator (AC and DC defibrillator) Heart lung machine.

(12 Hours)

**UNIT IV**

**BIO POTENTIAL RECORDERS:** Characteristics of the recording system, Electrocardiography - Electroencephalography – Electromyography - Elecroretinography, Electrooculography.

(12 Hours)

**UNIT V**

**TRANSDUCER:**

Classification of transducers – active and passive transducers – characteristics of transducers – passive transducers – resistive transducer – Linear Variable Differential Transducer (LVDT) – capacitive pressure transducer – active transducer – piezoelectric transducer. (12 Hours)

**TEXT BOOKS**

1. Bakshi, U.A., & Bakshi, A.V. (2013). *Measurements & amp; Instrumentation*, Fifth Revised Edition, Technical Publications.
2. Dr.M.Arumugam, (2014), *Biomedical Instrumentation*, Anuradha Publications, Sankar Printers Pvt Ltd.
3. Mehta, V.K. (2006). *Principles of Electronics*, S.Chand & Company Ltd. Unit II

**REFERENCE BOOKS**

1. Leslie Cromwell, Fred Weibell, Erich Pfieffer (2002) *Biomedical Instrumentation and Measurements* Prentice Hall of India, New Delhi.

2. Khandpur, R. S. (2003). Handbook of *Biomedical Instrumentation* 2nd Edn. Tata McGraw Hill, New Delhi.
3. Kuppusamy Thayalan (2017), *Basic Radiological Physics* 2nd Edn. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
4. Theraja, B.L. (2014).*Basic Electronics Solid State*, Revised Edition, S.Chand & Company Ltd.
5. Ubald Raj, A., &Jose Robin, G. (1997).*Basic Electronics*, Edition, Indira Publications.
6. Sedha, R.S. (2008).*A Text book of Applied Electronics*, Revised Edition, S.Chand & Company Ltd.

| **Course Code 24UEIA41** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | - | - | 2 | - | - | - | 2 |
| **CO 2** | 3 | 2 | 3 | 2 | 2 | 2 | - | - | - | - |
| **CO 3** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | - | - | - |
| **CO 4** | 3 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | - | - |
| **CO 5** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | - | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.S.Thenmozhi
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
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*Reaccredited with 'A++' Grade (4th Cycle) by NAAC*
**VIRUDHUNAGAR**
**Quality Education with Wisdom and Values**

**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester IV** | **APPLIED ELECTRONICS AND INSTRUMENTATION PRACTICAL –II** | **Hours/Week: 2** | |
| **Elective Course – II Practical -II** | | **Credit: 1** | |
| **Course Code 24UEIA41P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Electronics and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Practicals: (Any Seven)**

1. Measurement of R, L and C using multimeter
2. IC regulated power supply (5 V)
3. UJT characteristics
4. Thermistor characteristics
5. Logic gates using discrete components
6. Transistor emitter follower
7. Integrator and differentiator using discrete components
8. Verification of Norton's theorem

| **Course Code 24UEIA41P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 2 | 2 | 2 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 3 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 2 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.I.Rathinamala
**Course Designer**

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**B.Sc. PHYSICS**
**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester IV** | **SOLAR ENERGY** | **Hours/Week: 2** | |
| **SEC – 5** | | **Credits: 2** | |
| **Course Code 24UPHS41** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: understand the basics of solar energy, solar thermal system, solar cells and solar PV panels [K1]

CO2: explain the concepts of non-conventional energy, principles and types of solar thermal gadgets and solar cells [K1]

CO3: discuss the construction and working of solar thermal gadgets [K2]

CO4: describe the construction and working of PV cell and module [K2]

CO5: apply the learned concepts to calculate the efficiency of solar thermal devices and reveal the applications of PV module [K3]

**UNIT I**

**Solar Energy Basics:**

Classification of energy resources - importance of non – conventional energy source - salient features - solar energy basics - the sun as a source of energy - extraterrestrial and terrestrial radiations - spectral energy distribution of solar radiation - depletion of solar radiations (no derivation) – measurements - pyrheliometer - sunshine recorder - solar radiation geometry. (6 Hours)

**UNIT II**

**Solar Thermal System:**

Solar collectors - classification - comparison of concentrating and non -concentrating types (flat –plate type) - performance indices - liquid flat-plate collector -flat-plate air heating

collector - evacuated tube collector - modified flat plate collector - Compound Parabolic Concentrator (CPC) – cylindrical parabolic concentrator. (6 Hours)

**UNIT III**

**Solar Thermal Gadgets:**

Solar water heater - solar cooker - box-type solar cooker - paraboloidal dish-type solar cooker - community solar cooker - advanced solar cooker – solar dryer - solar distillation. (6 Hours)

**UNIT IV**

**Solar Cell Fundamental:**

Solar photovoltaic systems - photo conduction - solar cell - I-V characteristics - energy losses and efficiency - cell size - energy payback period (EPP) – solar cell classification - on the basics of thickness of active material - on the basics of junction structure – on the basis of type of active material. (6 Hours)

**UNIT V**

**Solar PV Panel and Applications:**

Solar cell - Solar PV Module - Solar PV Panel - Solar PV array - Solar PV Classification - Solar PV applications - water pumping – lighting - medical refrigeration – Telecommunication and signaling. (6 Hours)

**TEXT BOOK**

Khan, B.H. (2009). *Non-Conventional Energy Resources,* Second Edition: Tata McGraw-Hill Education Private Limited, New Delhi.

**REFERENCE BOOKS**

1. Rai, G.D. (2004). *Solar Energy Utilization*, Delhi: Khanna Publications.
2. Sukhatme, S.P. (2017). *Solar Energy*, Delhi: Tata McGraw Hill.
3. Tiwari, G.N. (2006). *Solar Energy Fundamentals, Design, Modelling and Applications*, New Delhi: Narosa Publishing House

| **Course Code 24UPHS41** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 2 | - | - | 2 | - | - | - | 1 |
| **CO 2** | 3 | - | 3 | 3 | 2 | 2 | - | - | - | - |
| **CO 3** | 3 | 2 | 3 | 3 | 2 | 2 | 2 | - | - | - |
| **CO 4** | 3 | - | 2 | 2 | 3 | 3 | 3 | - | 1 | - |
| **CO 5** | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 1 | - |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.M.Sankareswari
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester IV** | **PROGRAMMING IN C PRACTICAL** | **Hours/Week: 2** | |
| **SEC – 6** | | **Credits: 2** | |
| **Course Code 24UPHS42P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1 : understand the C language to solve the problems in physics using control statements and arrays. [K2]

CO2 : write the C Program using C fundamentals, input & output operations, control statements and arrays. [K2]

CO3 : compile the C program and identify, correct the syntax and logical errors in C program. [K3]

CO4 : execute and run the written program, completion of record work. [K3]

CO5 : check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Practical (Any Eight)**

1. Calculation of the amount of work done in twisting a wire
2. Calculation of time period of oscillations of a compound pendulum.
3. Determination of mass from relativistic equation $m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$
4. Calculation of radius of curvature of lens by Newton's rings
5. Calculation of resonance frequency of LCR circuit
6. Finding the roots of equation by Bisection method
7. Finding the roots of equation by Newton Raphson method

8. Finding the solution of numerical integration by Trapezoidal rule
9. Finding the solution of numerical integration by Runge Kutta II order method
10. Finding the solution of numerical integration by Runge Kutta IV order method

| **Course Code 24UPHS42P** | **PO1** | | **PO2** | **PO 3** | | **PO4** | | **PO 5** | **PO 6** | **PO 7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1. a** | **PSO 1. b** | **PSO 2** | **PSO 3. a** | **PSO 3. b** | **PSO 4. a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO1** | 3 | - | 2 | 3 | - | 2 | - | - | - | 2 |
| **CO2** | - | 3 | 3 | 3 | 2 | 2 | - | - | - | 1 |
| **CO3** | - | 3 | 3 | 3 | - | 3 | - | 2 | 3 | 3 |
| **CO4** | - | 3 | 3 | 3 | - | 2 | - | 2 | 2 | 3 |
| **CO5** | - | 2 | 2 | 2 | - | 2 | - | 2 | 2 | 3 |

**Strong (3) Medium (2) Low (1)**

Dr. A.Azhagu Parvathi
**Head of the Department**

Dr.I.Rathinamala
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM** | **Hours/Week: 6** | |
| **Core Course - 9** | | **Credits: 6** | |
| **Course Code 24UPHC51** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain the concepts, principles in electricity, magnetism and electromagnetism. [K1]

CO2: discuss the theories and experiments related to thermoelectricity, magnetism and electromagnetism. [K2]

CO3: derive the physical parameters related to magnetic effects of current, transient & AC and electromagnetic waves. [K2]

CO4: apply the learnt concepts to study magnetic induction in various coils, LCR circuits, properties of electromagnetic waves through various medium, determination of capacitance in various capacitors. [K3]

CO5: apply the learnt concepts to solve problems in electricity, magnetism and electromagnetism. [K3]

**UNIT I**

**Capacitors and Thermo-electricity:** Capacitor - principle - capacitance of a parallel plate capacitor (with and without dielectric slab) - spherical capacitor (outer sphere earthed) – cylindrical capacitor - effect of dielectric - Carey Foster bridge - temperature coefficient of resistance - Seebeck effect - laws of thermo emf - measurement of thermo emf using potentiometer - Peltier effect - Thomson effect - determination of Peltier and Thomson coefficients - thermoelectric diagrams – uses of thermoelectric diagrams. (18 hours)

**UNIT II**

**Magnetic Effects of Current:** Introduction - Biot and Savart's law - magnetic induction due to circular coil - magnetic induction due to solenoid - Ampere's circuital law - differential

form - divergence of magnetic field - magnetic induction due to toroid - force on a current element by magnetic field - force between two infinitely long conductors - torque on a current loop in a field - moving coil galvanometer - damping correction. (18 hours)

**UNIT III**

**Magnetism and Eletromagnetic Induction:** Magnetic induction B - magnetization M - relation between B, H and M – magnetic susceptibility - magnetic permeability - experiment to draw B-H curve - energy loss due to hysteresis - importance of hysteresis curves - Faraday and Lenz laws - vector form - self-induction - coefficient of self-inductance of solenoid - Anderson's method - mutual induction - coefficient of mutual inductance between two coaxial solenoids - coefficient of coupling – transformer. (18 hours)

**UNIT IV**

**Transient and Alternating Currents:** Growth and decay of current in a circuit containing resistance and inductance - growth and decay of charge in a circuit containing resistance and capacitor - emf induced in a coil rotating in a magnetic field - peak, average and rms values of ac - LCR series and parallel circuits - resonance condition - Q factor - power factor – choke coil. (18 hours)

**UNIT V**

**Maxwells Equations and Electromagnetic Waves:** Introduction - displacement current - Maxwell's equations in vacuum, material media - physical significance of Maxwell's equations - plane electromagnetic waves in free space - velocity of light - Poynting vector - electromagnetic waves through homogenous, isotropic media - refractive index.

(18 hours)

**Self-Study:** Demonstration: Peltier effect - Thomson effect

**TEXT BOOKS**

Murugeshan, R., (2017) *Electricity and Magnetism*, 10th Edition, S.Chand and Co, New Delhi.

**REFERENCE BOOKS**

1. Sehgal, D.L., Chopra, K.L, and Sehgal N.K., (2020) *Electricity and Magnetism*, Sultan Chand and Sons, New Delhi.
2. Brijlal and Subramanian, *Electricity and Magnetism* (1966) 6th Edition, Ratanand Prakash, Agra.
3. Halliday, D., Resnik R., and Walker, J., (2001) *Fundamentals of Physics*, 6th Edition, Wiley, New York.

| **Course Code 24UPHC51** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 3 |
| **CO 2** | 3 | 2 | 3 | 2 | - | - | - | - | 2 | - |
| **CO 3** | 3 | 3 | 3 | - | 2 | 2 | - | 2 | - | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | - | 2 | - | 3 | - | - |
| **CO 5** | 3 | - | 2 | - | 3 | 3 | 2 | - | - | - |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.I.Rathinamala
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **ATOMIC AND NUCLEAR PHYSICS** | **Hours/Week: 5** | |
| **Core Course - 10** | | **Credits: 5** | |
| **Course Code** | | **Internal** | **External** |
| **24UPHC52** | | **25** | **75** |

**COURSE OUTCOMES**

CO1: explain the basics of atom models, spectral lines and notations, nuclear decay, types of nuclear reactions and classification of elementary particles. [K1]

CO2: describe experimental methods to determine related parameters in atomic and nuclear physics. [K2]

CO3: discuss the theory related to atom models & atomic spectra, radioactive decay, elementary particles and energy involved in nuclear reactions. [K2]

CO4: illustrate the operations of nuclear reactors, particle detectors & accelerators, study of elementary particles and applications of radioisotopes. [K3]

CO5: apply the learnt concepts to solve problems in atomic quantisation, atomic spectra, radioactivity and nuclear reactions. [K3]

**UNIT I**

**Vector Atom Model:** Introduction to atom model - Bohr atom model - Determination of radius of nth orbit - drawback of Bohr atom model - Sommerfeld's relativistic atom model - vector atom model - electron spin - spatial quantisation - quantum numbers associated with vector atom model - L-S and J-J coupling - Pauli's exclusion principle - periodic classification of elements - electronic configuration of elements - magnetic dipole moment due to orbital motion and spin motion of the electron - Bohr magnetron - Stern-Gerlach experiment. (15 hours)

**UNIT II**

**Atomic Spectra:** Excitation and ionization potentials - atomic excitation - Davis and Goucher's method – optical spectra - spectral terms and notations - fine structure of sodium D-lines - fine structure of Hα lines - Zeeman effect - Larmor's theorem - quantum

mechanical explanation of normal Zeeman effect - anomalous Zeeman effect - Paschen-Back effect - Stark effect. (15 hours)

**UNIT III**

**Radioactivity:** Natural radio activity - properties of alpha rays, beta rays and gamma rays - range of alpha particles - experimental measurement of range of alpha particles - Geiger-Nuttal experiment - alpha particle spectra - theory of alpha decay - Gamow's theory of alpha decay - beta ray spectra - neutrino theory of beta decay – determination of the wavelength of gamma rays - origin of gamma rays - nuclear isomerism - internal conversion - fundamental laws of radio activity - law of radioactive disintegration - the mean life. (15 hours)

**UNIT IV**

**Nuclear Reactions:** Discovery of artificial transmutation - Q-value equation for a nuclear reaction - threshold energy - types of nuclear reactions - conservation laws of nuclear reaction - artificial radio activity – discovery - preparation of radio elements - application of radio isotopes - the discovery of neutron - classification of neutrons - nuclear fission - energy released in fission - chain reaction - atom bomb - nuclear reactor - nuclear fusion - sources of stellar energy - thermo nuclear reaction. (15 hours)

**UNIT V**

**Nuclear Instrumentation and Elementary Particles:** Wilson cloud chamber - bubble chamber - cyclotron - synchro cyclotron - classification of elementary particles - particles and Anti-particles - antimatter - fundamental interactions - discovery of cosmic rays - latitude effect - azimuth effect - altitude effect - primary and secondary cosmic rays - cosmic ray showers - Van Allen belts - origin of cosmic rays. (15 hours)

**Self-Study:** Determination of the wavelength of gamma rays - origin of gamma rays - nuclear isomerism - internal conversion

**TEXT BOOK**

Murugesan. R, (2017) *Modern Physics*, 18th edition, S. Chand and Co, New Delhi.

**REFERENCE BOOKS**

1. Sehgal, Chopra and Sehgal (2013), *Modern Physics*, 9th Edition, Sultan Chand & Sons, New Delhi
2. Arthur Beiser, Shobhit Mahajan and Rai Choudhury.S (2015), *Concepts of Modern Physics*, 7th Edition, McGraw Hill Education (India) Private Limited.
3. Tayal, D.C (2021), *Nuclear Physics*, 5th Edition, Himalaya Publishing House Private Limited, Mumbai.

| **Course Code 24UPHC52** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1a** | **PSO 1b** | **PSO 2** | **PSO 3a** | **PSO 3b** | **PSO 4a** | **PSO 4b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO1** | 3 | - | 3 | - | 2 | 1 | - | 1 | - | 2 |
| **CO2** | 3 | 1 | 2 | 2 | - | 2 | 2 | - | 1 | 3 |
| **CO3** | 3 | - | 2 | 1 | 3 | 3 | 2 | - | - | - |
| **CO4** | 3 | - | 2 | 1 | 3 | 3 | 1 | 1 | - | - |
| **CO5** | 3 | - | 3 | 2 | 3 | 3 | 3 | 3 | - | 3 |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.M.Sankareswari
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **ANALOG AND COMMUNICATION ELECTRONICS** | **Hours/Week: 5** | |
| **Core Course - 11** | | **Credits: 4** | |
| **Course Code 24UPHC53** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain the characteristics of semiconducting devices, amplifiers, oscillators, and principles of modulation techniques. [K1]

CO2: discuss the operations of FET, transistor circuits, amplifiers & power supplies and condition of oscillators. [K2]

CO3: explain the different types of modulation techniques and working of operational amplifiers in inverting and non-inverting amplifier. [K2]

CO4: illustrate the applications of FET and transistor as amplifiers and oscillators. [K3]

CO5: demonstrate the applications of operational amplifiers and modulation/demodulation circuits. [K3]

**UNIT I**

**Transistor Amplifiers:** transistor configurations: CB, CE CC modes – I-V characteristics – DC load line – Q point self-bias – RC coupled CE amplifier – direct coupled amplifier – transformer coupled amplifier – power amplifiers – classification of power amplifiers: A, B, C – push pull amplifiers – tuned amplifiers. (15 Hours)

**UNIT II**

**Transistor Oscillators:** feedback amplifier - principle of feedback, positive and negative feedback of voltage and current gain, advantages of negative feedback - Barkhausen's criterion - Transistor oscillators: Hartely, Colpitt, Phase shift oscillators with mathematical analysis.

**UNIT III**

**Field Effect Transistor:** FET – junction FET – static characteristics of JFET – DC biasing of a JFET – common source JFET amplifier – advantages of FET – MOSFET – DE MOSFET - static characteristics of DE MOSFET – enhancement-only N-channel MOSFET – FET as switches – FET applications. (15 Hours)

**UNIT IV**

**Operational Amplifiers:** differential amplifiers **–** OPAMP characteristics –IC 741 pin configuration **–** inverting and non-inverting amplifiers – unity follower –summing and difference amplifiers – differentiator and integrator – astable multivibrator (square wave generator) – monostable multivibrator. (15 Hours)

**UNIT V**

**Modulation and Demodulation:** theory of amplitude modulation - frequency modulation – comparison of AM and FM – phase modulation – sampling theorem – pulse width modulation – **d**emodulation**:** AM and FM detection - Super heterodyne receiver (block diagram). (15 Hours)

**Self-Study:** FET as switches, FET applications, Colpitt oscillator.

**TEXT BOOKS**

1. Theraja, B.L., (2022). *Basic Electronics Solid State*, S.Chand & Company Limited, New Delhi
2. Jose Robin, G & Ubald Raj,A. (2014). *Basic Electronics*, Marthandam: Indra Publication.
3. Mehta, V.K. & Rohit Mehta. (2019).*Principles of Electronics.* S. Chand & Company Ltd, New Delhi
4. Sedha, R.S. (2019). *A Text Book of Applied Electronics,* S.Chand & Company Ltd. New Delhi

**REFERENCE BOOKS**

1. Albert Malvino, David Bates, Patrick Hoppe, (2021) *Electronic Principles*, Mc Graw Hill Publications Pvt Ltd.
2. Vijayendran, V., (2009) *Integrated Electronics*, S.Vishwanathan Publishers, Chennai.

| **Course Code 24UPHC53** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1a** | **PSO 1b** | **PSO 2** | **PSO 3a** | **PSO 3b** | **PSO 4a** | **PSO 4b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 2 | - | 2 | 1 | - | 3 | - | 2 |
| **CO 2** | 3 | 3 | 3 | 3 | 1 | 2 | 2 | - | - | 3 |
| **CO 3** | 3 | - | 2 | 2 | 3 | 3 | 1 | - | - | - |
| **CO 4** | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | - | 1 |
| **CO 5** | 3 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 1 |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R.Hepzi Pramila Devamani
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
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**VIRUDHUNAGAR**
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**B.Sc. PHYSICS**

**(2024 -2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **GENERAL PHYSICS PRACTICAL - I** | **Hours/Week: 3** | |
| **Core Course – 12 Practical V** | | **Credits: 2** | |
| **Course Code 24UPHC51P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Electric, Electromagnetism and Optics, and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram / experimental set up with tabular column and write the formula to calculate the required parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood [K3]

**List of Experiments: (Any Eight)**

1. Spectrometer – Grating - Normal Incidence – Wavelength of mercury spectral lines
2. Determination of Refractive Index of a small angled prism by spectrometer
3. Determination of ece of copper using copper voltameter
4. E.M.F. of a thermocouple by spot reflecting galvanometer
5. Determination of Planck's constant
6. Comparison of Mutual Inductances by spot reflecting galvanometer
7. i – d curve by spectrometer
8. Cauchy's constants by spectrometer

9. L.C.R. Series Resonance Circuit
10. Self Inductance of the given coil by Anderson's bridge

| **Course Code 24UPHC51P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.A.Azhagu Parvathi
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | |
|---|---|---|
| **Semester V** | **PROJECT** | **Hours/Week: 1** |
| **Core Course - 13** | | **Credits: 1** |
| **Course Code 24UPHC54PR** | | **Internal 100** |

**COURSE OUTCOMES**

On completion of the project, the students will be able to

CO1: understand the concepts to select projects related to Physics, Electronics and related interdisciplinary fields. [K2]

CO2: apply the theoretical knowledge to construct the circuit /experimental set up /theoretical model to calculate the required physical/electrical parameters. [K3]

CO3: execute the technical skills in handling the equipment, observe the measurements and exhibit written communication skill acquired in related project. [K3]

CO4: relate the accuracy of the results with the theoretical standards and communicate academic and technical knowledge orally. [K3]

CO5: assess the project to meet the challenges at higher education level /societal level. [K4]

Students are expected to select a project in the field of Physics, Electronics and related interdisciplinary fields.

Two students can do one project. Minimum pages for Project report should be 20 pages.

Two typed copies of the report on the completed project must be submitted to the Controller of Examination through the Head of the Department in the month of November during V Semester.

Evaluation will be done internally.

Project work & Report - 60 marks

Presentation & Viva-voce - 40 marks

| **Course Code 24UPHC54PR** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 2 | - | 2 | 2 | 2 | - | 3 | - | 3 |
| **CO 2** | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 |
| **CO 3** | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO 4** | | - | 3 | 2 | 3 | 2 | 3 | 3 | - | - |
| **CO 5** | 3 | - | 3 | 2 | 3 | 2 | 3 | 3 | - | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R. Hemalatha
**Course Designer**

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**B.Sc. PHYSICS**

**(2024 -2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **NANOSCIENCE AND NANO TECHNOLOGY** | **Hours/Week: 5** | |
| **Elective Course DSEC - 1** | | **Credits: 4** | |
| **Course Code 24UPHE51** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: list the geometry of different nanostructures properties, explain principles and concepts in fabrication and characterization techniques. [K1]

CO2: discuss the different types of nanostructures, properties of nanomaterials. [K2]

CO3: describe the various fabrication methods, characterization techniques, construction and working of nano devices. [K2]

CO4: apply the properties of nanomaterials to illustrate the applications of nanostructure and nano devices in real life situations. [K3]

CO5: apply the physics concepts to develop the fabrication methods and to develop the characterization techniques. [K3]

**Unit I**

**Nanoscience And Nanotechnology:** nanoscale– nature and nanostructures – nanostructures: 0D, 1D,2D– surface to volume ratio– size effect – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene –SWCNT and MWCNT. (15 Hours)

**Unit II**

**Properties of Nanomaterials:** introduction –mechanical behavior –elastic properties – hardness and strength – ductility and toughness –superplastic behavior – optical properties – surface plasmon resonance – electrical properties – dielectric materials and properties – magnetic properties – super paramagnetism – electrochemical properties – properties of CNTs. (15 Hours)

**Unit III**

**Fabrication Methods And Vacuum Techniques:** Top-down and bottom-up approaches – electrochemical method – chemical and physical vapour depositions (CVD and PVD) – plasma arc discharge – sputtering – thermal evaporation – pulsed laser deposition – ball milling – lithography: photolithography – e-beam lithography – sol-gel methods – synthesis of CNT. (15 Hours)

**Unit IV**

**Characterization Techniques:** Scanning probe microscopy – scanning tunneling microscopy – atomic force microscopy – scanning electron microscopy – transmission electron microscopy –powder XRD method: determination of structure and grain size analysis – UV-visible and photoluminescence spectroscopy. (15 Hours)

**Unit V**

**Applications of Nanomaterials:** Medicine: drug delivery – photodynamic therapy – molecular motors –energy: fuel cells –rechargeable batteries – supercapacitors– photovoltaics. sensors: nanosensors based on optical and physical properties – electrochemical sensors – nanobiosensors. nanoelectronics: CNTFET – display screens – GMR read/write heads – nanorobots –applications of CNTs (15 Hours)

**Self-Study:** GMR read/write heads, synthesis of CNT.

**TEXT BOOKS**

1. Chattopadhyay K.K. and Banerjee A.N (2012), *Introduction to Nanoscience and Nanotechnology*, PHI Learning Pvt. Ltd.,
2. Shah. Tokeer Ahmad M.A (2010), *Principles of Nanoscience and Nanotechnology*, Narosa Publishing House Pvt Ltd.
3. Mick Wilson, et al (2005) *Nanotechnology*, Overseas Press.
4. Pradeep T. (2008) *NANO: The Essentials*, Tata Mc Graw –Hill Publishing Company Limited, New Delhi.

**REFERENCE BOOKS**

1. Richard Booker and Earl Boysen, (2005) *Nanotechnology*, Wiley Publishing Inc. USA
2. Fendler J.H. (2007) *Nano particles and nano structured films; Preparation, Characterization and Applications*, John Wiley and Sons
3. Murty B.S (2012) *Textbook of Nanoscience and Nanotechnology*, Universities Press.

| **Course Code 24UPHE51** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 3 |
| **CO 2** | 3 | 2 | 3 | 2 | - | - | - | - | 2 | - |
| **CO 3** | 3 | 3 | 3 | - | 2 | 2 | - | 2 | - | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | - | 2 | - | 3 | - | - |
| **CO 5** | 3 | - | 2 | - | 3 | 3 | 2 | - | - | - |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.S.Thenmozhi
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **MATHEMATICAL PHYSICS** | **Hours/Week: 5** | |
| **Elective Course DSEC - 1** | | **Credits: 4** | |
| **Course Code 24UPHE52** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain types of matrices, basic concepts and theorems in vector calculus, orthogonal curvilinear coordinates and Fourier series. [K1]

CO2: derive the theorems in vector calculus and matrices, differential operators in terms of various coordinate systems, and Fourier coefficient for different types of functions. [K2]

CO3: discuss the properties of various types of matrices and significance of gradient, divergence, curl of vectors and obtain the solutions to PDE. [K2]

CO4: solve the problems in vector calculus, characteristic equation in matrices, Fourier series and partial differential equations. [K3]

CO5: demonstrate the applications of Fourier series and partial differential equations in different branches of Physics. [K3]

**UNIT -I**

**MATRICES:** introduction – special types of matrices – transpose – conjugate– conjugate transpose– symmetric and anti symmetric – Hermitian and skew Hermitian – orthogonal and unitary matrices – properties - characteristic equation - eigen values, eigen vectors — Cayley-Hamilton theorem - diagonalization - simple problems. (15 hours)

**UNIT-II**

**VECTOR CALCULUS:** vector differentiation – directional derivatives –definitions and Physical significance of gradient, divergence, curl – Laplace operators– vector identities – line, surface and volume integrals – statement, proof and simple problems for Gauss's divergence , Stoke's theorem, Green's theorem. (15 hours)

**UNIT-III**

**ORTHOGONAL CURVILINEAR COORDINATES:** tangent basis vectors – scale factors – unit vectors in cylindrical and spherical coordinate systems –gradient of a scalar – divergence and curl of a vector – Laplacian in these coordinate systems. (15 hours)

**UNIT-IV**

**FOURIER SERIES:** periodic functions –Dirichlet's conditions – general Fourier series – even and odd functions and their Fourier expansions – Fourier cosine and sine – half range series – change of length of interval. Fourier analysis of square wave,saw-tooth wave, half wave rectifier wave forms. (15 hours)

**UNIT-V**

**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE):** solutions to PDE's by method of separation of variables - PDE for transverse vibrations in elastic strings (one dimensional wave equation) –one dimensional heat flow equation - solutions to these PDE's by method of separation of variables - problems based on boundary conditions and initial condition. (15 hours)

**Self-Study:** Cayley–Hamilton theorem - Laplace operators - Fourier analysis of square wave.

**TEXT BOOKS**

1. Das, H. K., *Mathematical Physics* (2011), S. Chand and Co, New Delhi.
2. Satya Prakash, *Mathematical Physics with Classical Mechanics* (Reprint 2019). New Delhi: Sultan Chand & Sons.
3. Gupta, B. D., *Mathematical Physics* (2009), 4th Edition, S. Chand and Co, New Delhi.

**REFERENCEBOOKS**

1. Spiegel, M.R., *Fourier Analysis* (2004), Tata McGraw-Hill.
2. Jain, J.C., *Vector space and Matrices* (2008) Narosa Publishing House Pvt. Ltd.

**WEB RESOURCES**

1. https://youtu.be/X4_K-XLUIB4
2. https://www.youtube.com/watch?v=p075LPq3Eas
3. https://www.youtube.com/watch?v=mH_pS6fruyg
4. https://www.youtube.com/watch?v=tdkFc88Fw-M

| Course Code 24UPHE52 | PO1 | | PO2 | PO3 | | PO4 | | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|---|---|---|
| | PSO 1.a | PSO 1.b | PSO 2 | PSO 3.a | PSO 3.b | PSO 4.a | PSO 4.b | PSO 5 | PSO 6 | PSO 7 |
| CO1 | 3 | - | 3 | - | 1 | 1 | - | - | - | 2 |
| CO2 | 3 | - | 3 | | 2 | 2 | - | 2 | - | - |
| CO3 | 3 | - | 3 | - | 3 | 2 | - | 2 | - | - |
| CO4 | 3 | - | 2 | - | 3 | 3 | 1 | - | - | - |
| CO5 | 2 | - | 1 | - | 2 | 2 | 1 | 3 | | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.A.Azhagu Parvathi
**Course Designer**

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**B.Sc. PHYSICS**

**(2024 -2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **GENERAL PHYSICS PRACTICAL - II** | **Hours/Week: 3** | |
| **Elective Course DSEC - 2 Practical I** | | **Credits: 2** | |
| **Course Code** | | **Internal** | **External** |
| **24UPHE53P** | | **40** | **60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Electric, Electromagnetism and Optics, and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram / experimental set up with tabular column and write the formula to calculate the required parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood. [K3]

**List of Practical (Any Eight)**

1. Characteristics of Solar Cell
2. Comparison of Magnetic moment of two bar magnets using deflection magnetometer
3. Figure of merit - voltage and current sensitivity of spot reflecting galvanometer
4. Spectrometer – Grating –Minimum Deviation –Wavelength of the mercury spectral lines
5. Determination of L using Maxwell's bridge
6. High resistance by leakage using spot reflecting galvanometer
7. L.C.R Parallel Resonance Circuit

8. i-i' curve by spectrometer
9. Determination of dielectric constant of a given material
10. Hartmann's Interpolation formula by spectrometer

| **Course Code 24UPHE53P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.G.Shanmuga Priya
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **LINEAR INTEGRATED CIRCUITS PRACTICAL** | **Hours/Week: 3** | |
| **Elective Course DSEC - 2 Practical I** | | **Credits: 2** | |
| **Course Code** | | **Internal** | **External** |
| **24UPHE54P** | | **40** | **60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in linear integrated circuits. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required necessary electrical parameters. [K2]

CO3: execute the technical skills in handling the equipment & components and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood [K3]

**List of Experiments: (Any Eight)**

1. Characteristics of a transistor - (CB mode)
2. Bistable Multivibrator - IC 555
3. Operational amplifier - D/A converter by binary resistor method
4. Astable Multivibrator using IC 741
5. Schmitt trigger using IC 555
6. Dual power supply using IC
7. Operational amplifier - inverting amplifier & non-inverting amplifier
8. Logarithmic amplifier using IC 741

9. Integrator and Differentiator using Op Amp
10. Colpitt's oscillator transistor
11. Frequency Modulation.

| **Course Code 24UPHE54P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.S.Thenmozhi
**Course Designer**

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**(2024-2025 onwards)**

| | | |
|---|---|---|
| **Semester V** | **INTERNSHIP** | **Hours/Week: -** |
| **Internship / Industrial Training** | | **Credit: 1** |
| **Course Code 24UPHI51** | | **Internal - 100** |

**COURSE OUTCOMES**

On completion of the Internship / Industrial Training students will be able to

CO1: relate their theoretical insights with hands-on experience. [K2]

CO2: develop technical skills to their respective field of study. [K3]

CO3: demonstrate the attributes such as observational skills, team spirit and inter personal skills built through site visits. [K3]

CO4: exhibit the written communication skills acquired through internship / Industrial Training. [K3]

CO5: analyze the observations and results and communicate their academic and technical knowledge appropriately through oral means. [K4]

**Guidelines/ Regulations**

- Each student must go for Internship training in a reputed Industry / Company / Organization/ Educational Institution.
- Students should produce the completion certificate after the completion of Internship period.
- A report of 10-15 pages must be submitted by each student after the completion of the Internship period.
- Internal Viva-voce examination will be conducted.
- Students with diverse disabilities must complete a 10 day internship programme at their preferred places.

| Course Code 24UPHI51 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 2 | 2 | 2 | 3 | - |
| **CO2** | 3 | 2 | 2 | 2 | 2 | 3 | - |
| **CO3** | 3 | 2 | - | - | - | 3 | - |
| **CO4** | 3 | 3 | 2 | 2 | - | 2 | 3 |
| **CO5** | 3 | 2 | 3 | 3 | 2 | - | - |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.M.Sankareswari
**Course Designer**

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**(2024 -2025 onwards)**

| | | |
|---|---|---|
| Semester V | **BIOPHYSICS** | Hours: 0 |
| | | Credits: 2 |
| Extra Credit Course | | Internal: 100 |
| Course Code<br>**24UPHO51** | | |

**COURSE OUTCOMES**

On completion of the course students will be able to

CO1: understand the effect of mechanical forces on living systems.

CO2: explain the dynamics of fluid and effect of its viscosity appears in biological sytems.

CO3: discuss the processes of transport and diffusion of gases in bio systems.

CO4: interpret the physical features of audition and mechanism of auditory system.

CO5: understand the functioning of retina and photoreceptors of eye.

**UNIT I**

Biomechanics: Biostatics - forces and torques - biophysics of muscle – muscle power – mass specific muscle power – biodynamics – Newton's laws - frictional forces and stoke's law - locomotion on land – walking - jumping.

**UNIT II**

Biophysics and Fluid Flow: Steady laminar flow – coefficient of viscosity - turbulence – hemodynamics – Fluid flow in plants.

**UNIT III**

Biophysics and Gas Transport: The Ideal Gas – Convective Transport of Gases – Diffusion of Gases: Fick's Laws – Physiology of Respiration.

**UNIT IV**

Physics of audition: Transverse and longitudinal waves - pressure waves – wave velocity – intensity of a wave - p hysiological characteristics of sound – human ear – Doppler effect.

**UNIT V**

Physics of vision: Wave nature of light – polarization - geometrical optics – refraction – gradient-index lens – spherical aberration – chromatic aberration - refractive power – refractive power of eye – reduced eye model – retina and photoreceptors – resolving power of eye – diffraction.

**TEXT BOOKS**

Elementary Biophysics, Srivastava, P.K., (2011) Narosa Publishing House Pvt. Ltd.,

**REFERENCE BOOKS**

Biomedical instrumentation, Arumugam, M., (2008) Anuradha Publications, Chennai,

Handbook of Biomedical instrumentation, Khandpur and Raghbir Khandpur R.S., (1987) TMH Publishers

Biomedical instrumentation and measurements, Ananda Natarajan, R., (1995)

PHI Publications, India.

Dr.A.Azhagu Parvathi — **Head of the Department**

Dr. I. Rathinamala — **Course Designer**

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| | | | |
|---|---|---|---|
| **Semester VI** | **QUANTUM MECHANICS AND RELATIVITY** | **Hours/Week: 6** | |
| **Core Course – 14** | | **Credits: 6** | |
| **Course Code** | | **Internal** | **External** |
| **24UPHC61** | | **25** | **75** |

**COURSE OUTCOMES**

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

CO1: explain concepts of wave mechanics and postulates of relativity. [K1]

CO2: derive the expression in quantum statistics and transform equations in relativity and discuss the properties of various operators. [K2]

CO3: obtain the expression for wave equations, eigen functions and eigen value of particles for various potentials. [K2]

CO4: illustrate the applications of matter waves and solve the different potential functions using Schrodinger equation. [K3].

CO5: apply learnt concepts to solve problems in wave mechanics and relativity. [K3]

**UNIT I**

**Photons and Matter waves:** difficulties of classical physics and origin of quantum theory - black body radiation - Planck's law - Einstein's photoelectric equation - Compton effect - pair production - De Broglie waves - phase velocity and group velocity - Davisson and Germer's experiment. (18 hours)

**UNIT II**

**Operators and Schrödinger Equation:** postulates of quantum mechanics - Wave function and its interpretation - Schrödinger's equation - linear operators - Eigenvalue - Hermitian operator - properties of Hermitian operator - observable - operators for position, linear Momentum, angular momentum components - commutator algebra - commutator between these operators - expectation values of position and momentum - Ehrenfest theorem.

(18 hours)

**UNIT III**

**Solving Schrodinger equation - One-dimensional eigen value problems:** particle in a box - potential step - barrier penetration problem - quantum mechanical tunneling - linear harmonic oscillator (operator method) (18 hours)

**UNIT IV**

**Relativity:** Introduction - frames of reference - Newtonian principle of relativity- Galilean Transformation equations - The Ether hypothesis - Michelson-Morley experiment - special theory of relativity - Lorentz transformation equations - length contraction - time dilation - concept of simultaneity - variation of mass with velocity - Einstein's mass-energy relation - relativistic momentum-energy relation. (18 hours)

**UNIT V**

**Relativity:** Minkowaski's four dimensional space - time continuum - General theory of relativity - particle-wave duality - photons and gravity - Gravitational Red shift. predictions of general relativity - rest mass of a photon - space-time diagrams - Geometrical representations of simultaneity, contraction and dilation. (18 hours)

**Self-Study:** Phase velocity and group velocity, commutator algebra, time dilation

**TEXT BOOKS**

1. Murugeshan, R., and Kiruthiga Sivaprasath, (2018) *Modern Physics*, 18th Revised Edition, S.Chand & Company Pvt Ltd, New Delhi.
2. Arthur Biser, (2009) *Concepts of Modern Physics*, 6th Edition, McGraw – Hill International Book Company, New Delhi.

**REFERENCE BOOKS**

1. Gupta, A.B., (2015) *Foundation of Quantum Mechanics*, Books and Allied (P) Ltd, Calcutta.
2. Chattopadthyay, D., and Rakshit, P.C., (2008) *Quantum Mechanics Statistical Mechanics & Solid State Physics*, 8th Revised Edition, S. Chand & Company Ltd New Delhi.
3. Puri, S.P., (2013) *Special theory of Relativity*, 1st Edition Pearson Education, India.

| Course Code 24UPHC61 | PO1 | | PO2 | PO3 | | PO4 | | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|---|---|---|
| | PSO 1.a | PSO 1.b | PSO 2 | PSO 3.a | PSO 3.b | PSO 4.a | PSO 4.b | PSO 5 | PSO 6 | PSO 7 |
| **CO 1** | 3 | - | 2 | 1 | - | 1 | - | - | - | - |
| **CO 2** | 3 | 2 | 2 | 2 | - | - | - | - | 2 | - |
| **CO 3** | 3 | 3 | 2 | - | 2 | 2 | - | - | - | 2 |
| **CO 4** | 3 | 3 | 2 | 3 | - | 2 | - | 2 | - | - |
| **CO 5** | 3 | - | 2 | - | 3 | - | - | - | - | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.G.Shanmuga Priya
**Course Designer**

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**VIRUDHUNAGAR**
**Quality Education with Wisdom and Values**

**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **SOLID STATE PHYSICS** | **Hours/Week: 6** | |
| **Core Course - 15** | | **Credits: 5** | |
| **Course Code** | | **Internal** | **External** |
| **24UPHC62** | | **25** | **75** |

**COURSE OUTCOMES**

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

CO1: explain the fundamental concepts in solid state physics. [K1]

CO2: explain the theories related to bonding in solids, crystal structure, lattice dynamics, magnetic and ferroelectric materials. [K2]

CO3: derive the lattice parameters for crystal systems and explain the parameters related to magnetic and ferroelectric materials. [K2]

CO4: apply the learned concepts to demonstrate experimental techniques to find the relevant physical parameters in solid state physics. [K3]

CO5: apply the learned concepts to solve the problems in solid state physics. [K3]

**UNIT I**

**Crystal structure & Miller Indices**: Lattice points and space lattice – basis and crystal structure – unit cells and lattice parameters – unit cell versus primitive cell – crystal systems – crystal symmetry – twenty-three symmetry elements in a cubic crystal – five-fold rotation axis – metallic crystal structures –diamond cubic structure- Directions, planes and Miller indices – important features of Miller indices of crystal planes – important planes and directions in a cubic crystal – distribution of atoms in the atomic plane of simple cubic crystal – separation between lattice planes in a cubic crystal. (18 hours)

**UNIT II**

**Bonding in Solids:** Bondings in solids **-** Ionic bonding – bond energy of NaCl molecule – calculation of lattice energy of ionic crystals – calculation of Madelung constant of ionic crystals – calculation of repulsive exponent from compressibility data – Born-Haber cycle – properties of ionic solids – examples of ionic solids – covalent bond – saturation in covalent bonds – directional nature of a covalent bond – hybridization – properties of covalent

compounds – metallic bond – properties of metallic crystals – intermolecular bonds – dispersion bonds – dipole bonds – hydrogen bonds. (18 hours)

**UNIT III**

**Elementary Lattice Dynamics:** lattice vibrations and phonons: linear monoatomic and diatomic chains- acoustical and optical phonons –qualitative description of the phonon spectrum in solids –Dulong and Petit's Law – Einstein and Debye theories of specific heat of solids – $T^3$ law (qualitative only). (18 hours)

**UNIT IV**

**Magnetic Properties of Solids:** permeability, susceptibility, relation between them – classification of magnetic materials – properties of dia, para, ferro, ferri and antiferromagnetism –Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Curie-Weiss law – Weiss theory of ferromagnetism(qualitative only) – Heisenberg's quantum theory of ferromagnetism – domains – discussion of B-H curve – hysteresis and energy loss – soft and hard magnets – magnetic alloys. (18 hours)

**UNIT V**

**Ferroelectric Properties of Materials:** Curie-Weiss Law – ferroelectric domains, P-E hysteresis loop – elementary band theory: Kronig-Penny model – band gap(no derivation) – conductor, semiconductor (P and N type) and insulator –conductivity of semiconductor – mobility – Hall effect – measurement of conductivity (four probe method) - Hall coefficient. (18 hours)

**Self-Study:** Diamond cubic structure, Langevin's theory of diamagnetism.

**TEXT BOOKS**

1. Pillai, S.O., (2017) *Solid State Physics*, 10th Edition, S.Chand and Co, New Delhi.
2. Arumugam, M., (2018) *Materials Science,* third edition, Anuradha Publications.

**REFERENCE BOOKS**

1. Kittel, (2019) *Introduction to Solid State Physics,* Willey Eastern Ltd.
2. Wahab, M.A., (2011) *Solid State Physics,* Narosa Publishing House.
3. Rita John, (2014) *Solid State Physics,* 1st edition, TataMcGraw Hill publishers.
4. Srivastava, J.P., (2006) *Elements of Solid State Physics,* 2nd Edition, Prentice-Hall of India.

| **Course Code 24UPHC62** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 3 |
| **CO 2** | 3 | 2 | 3 | 2 | - | - | - | - | 2 | - |
| **CO 3** | 3 | 3 | 3 | - | 2 | 2 | - | 2 | - | 3 |
| **CO 4** | 3 | 3 | 3 | 3 | - | 2 | - | 3 | - | - |
| **CO 5** | 3 | - | 2 | - | 3 | 3 | 2 | - | - | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R. Hemalatha
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **DIGITAL ELECTRONICS AND MICROPROCESSOR 8085** | **Hours/Week: 5** | |
| **Core Course - 16** | | **Credits: 5** | |
| **Course Code 24UPHC63** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain the laws of Boolean algebra, basics of combinational circuits, sequential circuits and architecture of microprocessor 8085 and I/O interfacing. [K1]

CO2: discuss the working of arithmetic, combinational and sequential circuits. [K2]

CO3: describe the mechanism of various memory devices, logic families and explain the functions of instruction set of 8085 microprocessor. [K2]

CO4: apply the learned concepts to simplify the Boolean equations, conversion in various number systems and write the programs using 8085 microprocessor. [K3]

CO5: illustrate the applications of arithmetic, combinational and sequential circuits. [K3]

**UNIT I**

**Number system and Boolean algebra:** Decimal, binary, octal, hexadecimal numbers systems and their conversions – codes: BCD, gray and excess-3 codes –code conversions – complements (1's, 2's, 9's and 10's) –binary addition, binary subtraction using 1's and 2's complement methods – Boolean laws – De-Morgan's theorem –basic logic gates -universal logic gates (NAND and NOR) –standard representation of logic functions (SOP and POS) – minimization techniques (Karnaugh map: 2, 3, 4 variables). (15 Hours)

**UNIT II**

**Arithmetic and Combinational circuits:** Adders, half and full adder – subtractors, half and full subtractor –parallel binary adder – magnitude comparator – multiplexers (4:1) and demultiplexers (1:4), encoder (8-line-to-3- line) and decoder (3-line-to-8-line), BCD to seven segment decoder. (15 Hours)

**UNIT III**

**Sequential Circuits:** Flip-flops: S-R Flip-flop, J-K Flip-flop, T and D type flip-flops, master-slave flip-flop, truth tables, registers:- serial in serial out and parallel in and parallel out – counters asynchronous:-mod-8, mod-10, synchronous - 4-bit and ring counter. (15Hours)

**UNIT IV**

**8085 Microprocessor:** Introduction to microprocessor – INTEL 8085 architecture – register organization –pin configuration of 8085, interrupts and its priority – Program Status Word (PSW) –instruction set of 8085 –addressing modes of 8085. (15 Hours)

**UNIT V**

**8085 Microprocessor Programming:** Assembly language programming using 8085 – programmes for addition (8-Bit and 16-Bit) - subtraction (8-Bit and 16-Bit) - multiplication (8- Bit) - division (8- Bit) – largest and smallest number in an array – BCD to ASCII and ASCII to BCD. (15 Hours)

**Self-Study:** Serial in serial out shift register, MOD-10 counter.

**TEXT BOOKS**

1. Salivahanan, S. & Arivazhagan, S. (2019). Digital Circuits and Design, Fifth Edition. New Delhi: Oxford University Press.
2. Ramesh S.Gaonakar**.,** (2013) *Microprocessor Architecture, Programming and Applications with the 8085,* 6th Edition, Penram International Publishing, Mumbai.

**REFERENCE BOOKS**

1. Morris Mano, M., (2018) *Digital Design*, 6th Edition, PHI, NewDelhi.
2. Donald P Leach, Albert Paul Malvino, Goutam Saha, (2014) *Digital Principles and Applications,* Mc Graw Hill Education Pvt Ltd.
3. Douglas V Hall, Rao, S.S.S.P., (2017) *Microprocessors and Interfacing,* Mc Graw Hill Education Pvt Ltd.

| **Course Code 24UPHC63** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1a** | **PSO 1b** | **PSO 2** | **PSO 3a** | **PSO 3b** | **PSO 4a** | **PSO 4b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 2 | - | 2 | 1 | - | - | - | 2 |
| **CO 2** | 3 | 3 | 3 | 2 | - | 2 | 1 | - | - | - |
| **CO 3** | 3 | - | 2 | 2 | 3 | 2 | 2 | - | - | - |
| **CO 4** | 3 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | - | - |
| **CO 5** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 1 |

**Strong (3)  Medium (2)  Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R.Hepzi Pramila Devamani
**Course Designer**

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**B.Sc. PHYSICS**

**(2024 -2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **ELECTRONICS PRACTICAL** | **Hours/Week: 3** | |
| **Core Course - 17 Practical VI** | | **Credits: 2** | |
| **Course Code 24UPHC61P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in transistor, operational amplifier, oscillators, multivibrator and related experiments. [K2]

CO2: draw the circuit diagram /experimental set up with tabular column/model graph and write the formula to calculate the required necessary electrical parameters. [K2]

CO3: execute the technical skills in handling the equipment & components and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula/graph and complete the record work [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood [K3]

**List of Experiments: (Any Eight)**

1. Characteristics of a transistor – (CE mode)
2. FET – characteristics
3. Zener voltage regulator
4. UJT –relaxation oscillator
5. Hartley oscillator – transistor
6. Voltage doubler and tripler
7. Verification of reciprocity theorem
8. Astable Multivibrator - transistor
9. Amplitude Modulation

10. RC coupled CE transistor amplifier - single stage
11. Adder and subtractor using IC 741

| **Course Code 24UPHC61P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.S.Thenmozhi
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **MATERIAL SCIENCE** | **Hours/Week: 5** | |
| **Elective Course DSEC - 3** | | **Credits: 4** | |
| **Course Code 24UPHE61** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: List out the imperfections in crystals, mechanical deformation, classification of optical materials and different testing methods. [K1]

CO2: explain the structural defects in crystals, mechanical deformation, properties of optical materials and testing methods. [K2]

CO3: derive the physical parameters related to crystal imperfections, mechanical deformation and optical materials. [K2]

CO4: illustrate the applications related to crystal defects, optical materials and mechanical deformation. [K3]

CO5: use the learnt concepts to solve problems in crystal imperfections, mechanical deformation, optical materials and to study the various testing methods. [K3]

**UNIT I**

**Crystal Imperfections:** Introduction – point defects: vacancies (problems), interstitials, impurities, electronic defects – equilibrium concentration of point imperfections (problems)– application of point defects –line defects: edge dislocation (problems), screw dislocation – surface defects: extrinsic defects – intrinsic defects: grain boundaries, tilt &twist boundaries, twin boundaries, stacking faults – volume defects – effect of imperfections. (15 hours)

**UNIT II**

**Material Deformation:** Introduction – elastic behavior of materials – atomic model of elastic behavior –modulus as a parameter in design – rubber like elasticity – inelastic behavior of materials – relaxation process – viscoelastic behavior of materials – spring-Dash pot models of viscoelastic behavior of materials. (15 hours)

**UNIT III**

**Permanent Deformation of Materials:** Introduction - plastic deformation: tensile stress-strain curve - plastic deformation by slip – shear strength of perfect and real crystals – the stress to move a dislocation – effect of temperature on stress –effect of grain size, solute atoms, precipitate particles on dislocation motion - creep: mechanism of creep - creep resistant materials. (15 hours)

**UNIT IV**

**Optical Materials:** Classification of optical materials – optical absorption in metals, semiconductors and insulators – excitons – colour centres - Principle – Photoluminescence: fluorescence and phosphorescence – display devices and display materials: light emitting diodes –liquid crystal displays: principle, classification – comparison – applications – NLO materials and their applications. (15 hours)

**UNIT V**

**Mechanical Testing:** Destructive testing: tensile test compression test, hardness test – nondestructive testing (NDT): radiographic methods, comparison between X-ray and gamma ray radiography - ultrasonic methods – thermal methods of NDT: thermography – equipment used for NDT: metallurgical microscope. (15 hours)

**Self-study:** creep: mechanism of creep - creep resistant materials.

**TEXT BOOKS**

1. Raghavan, V., *Material Science and Engineering* (2023) 6th Edition, PHI Learning Private Limited, Delhi.
2. Rajendran, V., *Materials Science* (2011) McGraw Hill publishing Company Limited, New Delhi.
3. Arumugam, M., *Materials Science* (2013) Anuradha Publications, Kumbakonam.

**REFERENCE BOOKS**

1. William D. Callister, Jr., *Material Science & Engineering – An Introduction* (2007) 8th Edition, John Wiley & Sons, Inc.,
2. Donald, R., Askeland, Pradeep, and Phule, P., *The Science and Engineering of Materials* (2007) 5th Edition, Thomson Learning, First Indian Reprint.

| **Course Code 24UPHE61** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 2 | - | 2 | 2 | - | 3 | - | 2 |
| **CO 2** | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 3 |
| **CO 3** | 3 | - | 2 | 1 | 2 | 3 | 1 | - | - | - |
| **CO 4** | 3 | - | 2 | 2 | 3 | 2 | 1 | 2 | - | - |
| **CO 5** | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | - | 1 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.I.Rathinamala
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester V** | **ENERGY PHYSICS** | **Hours/Week: 5** | |
| **Elective Course DSEC- 3** | | **Credits: 4** | |
| **Course Code 24UPHE62** | | **Internal 25** | **External 75** |

**COURSE OUTCOMES**

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

CO1: explain the principle, classification of various forms of energy resources and energy storage devices.[K1]

CO2: explain the energy resources and their availability, energy conservation process in solar storage system and wind energy system. [K2]

CO3: discuss the energy conservation process in Biomass energy and energy storage devices. [K2]

CO4: compare conventional and nonconventional energy resources, illustrate the applications of solar and wind energy system. [K3]

CO5: illustrate the applications of Biomass and energy storage devices. [K3]

**UNIT I**

**Introduction to Energy Sources:** energy consumption as a measure of prosperity - world energy future - energy sources and their availability - conventional energy sources - non-conventional and renewable energy sources - comparison - merits and demerits - World Energy Status - Energy Scenario in India. (15 hours)

**UNIT II**

**Solar Energy:** solar energy storage systems - solar water heating - solar heating of building - solar cooling of building - solar pond - solar pumping - solar furnace - solar greenhouse - types of greenhouses. (15 hours)

**UNIT III**

**Wind Energy:** introduction - nature of the wind - basic principle of wind energy conversion - wind energy data and energy estimation - basic components of Wind Energy Conversion Systems (WECS) - advantages and disadvantages of WECS - applications - tidal energy.

(15 hours)

**UNIT IV**

**Biomass Energy:** introduction - classification - biomass conversion technologies - photosynthesis - fermentation - biogas generation - classification of biogas plants - anaerobic digestion for biogas - wood gasification - advantages and disadvantages. (15 hours)

**UNIT V**

**Energy Storage:** importance of energy storage - batteries - lead acid battery - nickel-cadmium battery - fuel cells - types of fuel cells - advantages and disadvantages of fuel cells - applications of fuel cells - hydrogen storage. (15 hours)

**Self-Study:** Advantages and disadvantages of WECS, advantages and disadvantages of fuel cells, applications of fuel cells

**TEXT BOOKS**

Rai, G.D., (2014) *Solar Energy Utilization*, 5th Edition Khanna Publications, Delhi.

**REFERENCE BOOKS**

1. Khan, B.H., (2009) *Non-Conventional Energy Resources,* 2nd Edition, Tata McGraw - Hill Education Private Limited, New Delhi.
2. Sukhatme, S.P., (1998) *Solar Energy*, Tata McGraw Hill, Delhi.
3. Tiwari, G.N., (2006) *Solar Energy Fundamentals, Design, Modelling and Applications*, Narosa Publishing House Books, New Delhi.

| **Course Code 24UPHE62** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | - | 3 | 1 | - | 1 | - | - | - | 2 |
| **CO 2** | 3 | 2 | 3 | 2 | - | - | - | - | 2 | - |
| **CO 3** | 3 | - | 3 | - | 2 | 2 | - | 2 | - | 1 |
| **CO 4** | 3 | - | 3 | 3 | - | 2 | - | 3 | - | - |
| **CO 5** | 3 | - | 2 | - | 2 | 2 | 2 | - | - | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.G.Shanmuga Priya
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **DIGITAL ELECTRONICS PRACTICAL** | **Hours/Week: 3** | |
| **Elective Course DSEC - 4 Practical II** | | **Credits: 2** | |
| **Course Code 24UPHE63P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the theoretical concepts in Digital Electronics and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram / experimental set up with tabular column and write the formula to calculate the required parameters. [K2]

CO3: execute the technical skills in handling the equipment and observe the required measurements related to the experiment. [K3]

CO4: calculate the necessary parameters using the formula and complete the record work. [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood [K3]

**List of Practicals (Any Eight)**

1. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR, XNOR
2. Verification of De Morgan's theorem using ICs –NOT, OR, AND
3. NAND as universal building block
4. NOR as universal building block
5. Half adder / Half subtractor using basic logic gate ICs
6. Binary to Gray and Gray to Binary Conversion
7. Decade counter
8. 8-bit Ring Counter

9. Shift Register (serial in serial out and parallel in parallel out)
10. BCD to Seven Segment Decoder.

| **Course Code 24UPHE63P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R.Hepzi Pramila Devamani
**Course Designer**

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**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **DIGITAL CIRCUITS SIMULATION PRACTICAL** | **Hours/Week: 3** | |
| **Elective Course DSEC - 4 Practical II** | | **Credits: 2** | |
| **Course Code 24UPHE64P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the fundamental concepts of digital circuits and formulate the experimental procedure. [K2]

CO2: draw the circuit diagram with necessary logic expressions and truth table. [K2]

CO3: simulate logic, combinational and sequential circuits using digital tools. [K3]

CO4: verify the operation of the constructed circuits by simulation. [K3]

CO5: acquire simulation skills and entrepreneurial skills. [K3]

**List of Practicals (Any Eight)**

1. Basic Gates –AND, OR, NOT Gates
2. Universal Gates – NAND, NOR Gates
3. Universal Gates – Ex-OR, EX-NOR Gates
4. Adder – Half Adder and Full Adder
5. Subtractor – Half Subtractor and Full Subtractor
6. Flip Flop – RS Flip flop and D – Flip flop
7. Decoders – 2 – 4 decoder and 3-8 decoder
8. Multiplexer and Demultiplexer
9. Ring Counter and Decade Counter
10. Shift Register
11. BCD Seven Segment Display

| **Course Code 24UPHE64P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | 1 | - | 1 | - | 3 | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | 2 | 2 | 2 | - | - | - |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | 2 | - | 3 | 2 |
| **CO 4** | - | 3 | 3 | 3 | 2 | 2 | 1 | - | - | 2 |
| **CO 5** | - | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R.Hemalatha
**Course Designer**

**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**
(Belonging to Virudhunagar Hindu Nadars)
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai
*Reaccredited with 'A++' Grade (4th Cycle) by NAAC*
**VIRUDHUNAGAR**
**Quality Education with Wisdom and Values**

**B.Sc. PHYSICS**

**(2024-2025 onwards)**

| | | | |
|---|---|---|---|
| **Semester VI** | **MICROPROCESSOR PRACTICAL** | **Hours/Week: 2** | |
| **SEC – 7 (Professional Competency Skill)** | | **Credits: 2** | |
| **Course Code 24UPHS61P** | | **Internal 40** | **External 60** |

**COURSE OUTCOMES**

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

CO1: understand the various instructions used in 8085 microprocessor. [K2]

CO2: write the programs related to the problems. [K2]

CO3: develop the logical skills in writing the program and observe the required outputs related to the problem. [K3]

CO4: verify the output of the program and complete the record work [K3]

CO5: check/verify the accuracy of the result against standard value and to test whether the principles of the experiment are understood [K3]

**List of Practicals (Any Eight)**

1. Addition and Subtraction of two 8 bit binary numbers
2. Multiplication and Division of two 8 bit binary numbers
3. Square of a number
4. Square root of number
5. Block transfer of data
6. Generate and sum 15 Fibonacci series including carry
7. Largest number and Smallest number in an array of data
8. Ascending and Descending order
9. Palindrome number
10. Searching a number in an array and finding its parity.

| **Course Code 24UPHS61P** | **PO1** | | **PO2** | **PO3** | | **PO4** | | **PO5** | **PO6** | **PO7** |
|---|---|---|---|---|---|---|---|---|---|---|
| | **PSO 1.a** | **PSO 1.b** | **PSO 2** | **PSO 3.a** | **PSO 3.b** | **PSO 4.a** | **PSO 4.b** | **PSO 5** | **PSO 6** | **PSO 7** |
| **CO 1** | 3 | 3 | 3 | - | - | - | 1 | - | - | 2 |
| **CO 2** | - | 3 | 3 | 2 | - | 2 | - | - | - | 1 |
| **CO 3** | - | 3 | 3 | 3 | - | 2 | - | 1 | 3 | - |
| **CO 4** | - | 3 | 2 | 3 | 3 | 2 | - | 1 | 2 | - |
| **CO 5** | - | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | - |

**Strong (3) Medium (2) Low (1)**

Dr.A.Azhagu Parvathi
**Head of the Department**

Dr.R.Hepzi Pramila Devamani
**Course Designer**