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 2023 - 2024)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes(Aided), 15 UG Programmes(SF), 15 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, Zoology, Biochemistry, Home Science - Nutrition and Dietetics, Biotechnology, Computer Science, Computer Science (Data 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)

(2023-2024 onwards)

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	23UHIN11	I	History(EM)
Indian Constitution	23UHIN21	II	History(EM)
சுற்றுலா ஓர் அறிமுகம்	23UHIN11	I	History (TM)
இந்திய அரசியலமைப்பு	23UHIN21	II	History(TM)
Popular Literature and Culture	23UENN11	I	English
English for Professions	23UENN21	II	
பேச்சுக்கலைத்திறன்	23UTAN11	I	Tamil
பயன்முறைத் தமிழ்	23UTAN21	II	
Practical Banking Basic Accounting Principles	23UCON11 23UCON22	I II	Commerce (Aided)

Financial Literacy-I Financial Literacy -II	23UCON12 23UCON21	I II	Commerce (SF)
Self-Employment and Startup Business Fundamentals of Marketing	23UCCN11 23UCCN21	I II	Commerce CA (SF)
Women Protection Laws	23UCPN11	I	Commerce (Professional Accounting)
Basic Labour Laws	23UCPN21	II	
Basics of Event Management	23UBAN11	I	Business Administration
Business Management	23UBAN21	II	
Quantitative Aptitude I	23UMTN11	I	Mathematics
Quantitative Aptitude II	23UMTN21	II	
Physics for Everyday life -I	23UPHN11	I	Physics
Physics for Everyday life -II	23UPHN21	II	
Food Chemistry	23UCHN11	I	Chemistry
Drugs and Natural Products	23UCHN21	II	
Ornamental fish farming and Management	23UZYN11	I	Zoology
Biocomposting for Entrepreneurship	23UZYN21	II	
Foundations of Baking and Confectionery	23UHSN11	I	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	23UHSN21	II	
Nutrition and Health	23UBCN11	I	Biochemistry
Life Style Diseases	23UBCN21	II	
Social and Preventive Medicine	23UMBN11	I	Microbiology
Nutrition & Health Hygiene	23UMBN21	II	
Herbal Medicine	23UBON11	I	Biotechnology
Organic farming and Health Management	23UBON21	II	
Basics of Fashion	23UCFN11	I	Costume Design And Fashion
Interior Designing	23UCFN21	II	
Office Automation	23UCSN11	I	Computer Science
Introduction to Internet and HTML 5	23UCSN21	II	
Office Automation	23UITN11	I	Information Technology
Introduction to HTML	23UITN21	II	
Introduction to HTML	23UCAN11	I	Computer Applications
Fundamentals of Computers	23UCAN21	II	
Introduction to HTML	23UGDN11	I	Computer Applications - Graphic Design
Fundamentals of Computers	23UGDN21	II	
Organic Farming	23UBYN11	I	Botany
Nursery and Landscaping	23UBYN12		
Mushroom Cultivation	23UBYN21	II	
Medicinal Botany	23UBYN22		
Cadet Corps for Career Development I	23UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	23UNCN21	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 ProgrammeSpecific 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.

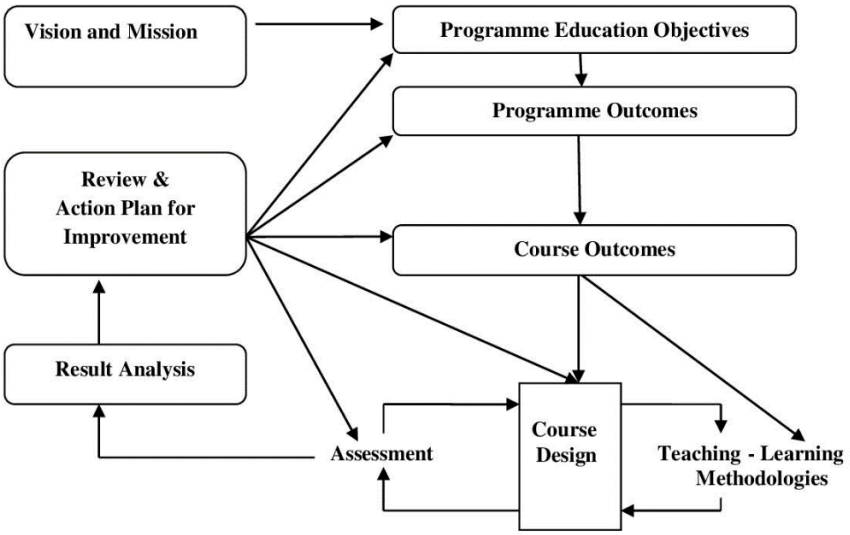
PO-PEO Mapping Matrix

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	-	-	✓

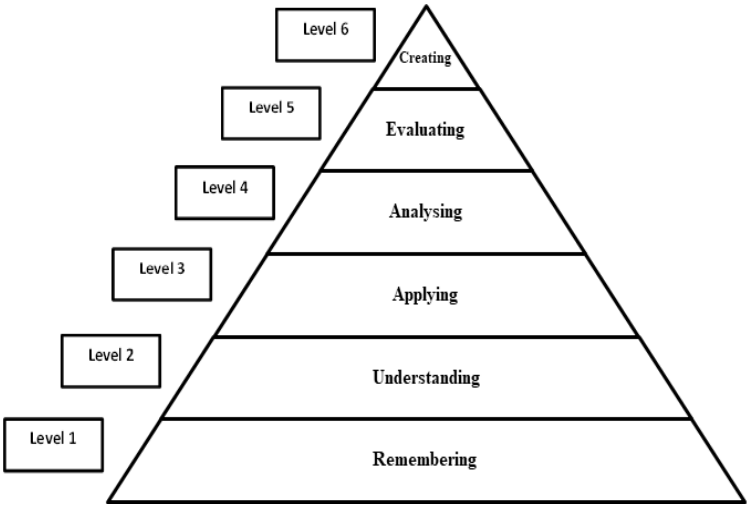
B.1.4 Course Outcomes (COs)

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 • Generic Elective Courses • Discipline Specific Elective Courses
		Self Study Course - online
Part IV	:	Skill Enhancement Courses (SEC)
		Elective Course (NMEC)
		Environmental Studies Value Education
		Field Project/Internship
		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**

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 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.2.4 PART IV- ENVIRONMENTAL STUDIES / VALUE EDUCATION

INTERNAL ASSESSMENT ONLY

Evaluation Pattern

Mode of Evaluation		**Marks**
Periodic Test	:	15
Assignment (Based on the listed activities) - K3 Level	:	10
Online Quiz (Multiple Choice Questions - K2 Level)	:	25
Poster Presentation - K3 Level		10
Report on student's Awareness creation on Environmental Protection /Ethical Values - 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 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***

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 Type	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/ Field Project

Internship / Field Project is compulsory for II year UG Science Students

- **Internship:** A designated activity that carries one credit involving not less than 15 days of working in an organization under the guidance of an identified mentor
- **Field Project:** Students comprising of maximum 5 members in a team need to undertake project that involve conducting surveys inside/outside the college premises and collection of data from designated communities or natural places.
- Assessment by Internal Examiner only

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

B.2.6 SELF STUDY COURSE

B.2.6 .1 PART III - Core & Elective Courses 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
	:	**100**

Two Periodic Tests - Better of the two will be considered

B.2.6 .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.2.7. 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.2.8 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 (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 Q.No.(1-5)	Internal Choice-Either or Type	5	5	7	35
B 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.
  - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
  - Pass minimum for Ability Enhancement Compulsory Courses is 40 marks.
  - Pass minimum for Self Study Courses is 40 marks.

- **ATTENDANCE**
  - For UG, PG Programmes,

(a) The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.

(b) 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.

(c) The students who have attended the classes for 59 days and less – upto 45 days (50%-65%) can appear for the Summative Examinations only after getting special permission from the Principal.

(d) 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.

- These rules are applicable to UG, PG and M.Phil. Programmes and come into effect from 2023- 2024 onwards.
- 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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Quality Education with Wisdom and Values

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 2023-2024

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 & Self Study Course							
Core Course	5 (5)	5 (5)	5 (5)	4 (4)	5 (4)	5(5)	29 (28)
Core Course	-	-	-	-	5 (4)	5(5)	10 (9)
Core Course	-	-	-	-	5 (4)	5(4)	10(8)
Core Course Practical	3(2)	3 (2)	3 (2)	3 (2)	3 (2)	3 (2)	18(12)
Core Course Project	-	-	-	-	1 (3)	-	1 (3)
Elective Course (DSEC)	-	-	-	-	5(4)	5 (4)	10 (8)
Elective Course (DSEC Practical)	-	-	-	-	4(3)	5(4)	9(7)
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/ Field Project							
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/ Field Project	-	-	-	-	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 I
2023-2024 onwards

S. No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/Hindi	23UTAG11/ 23UHDG11	6	3	3	25	75	100
2.	**Part II**		English	23UENG11	6	3	3	25	75	100
3.	**Part III**	Core Course -1	Properties of Matter and Acoustics	23UPHC11	5	5	3	25	75	100
4.		Core Course -2 Practical I	Properties of Matter Practical	23UPHC11P	3	2	3	40	60	100
5.		Elective Course -I	Allied Mathematics -I	23UMTA11	6	4	3	25	75	100
6.	**Part IV**	NME - 1	Physics for Every Day Life - I	23UPHN11	2	2	2	25	75	100
7.		SEC-1 Foundation Course	Introductory Physics	23UPHF11	2	2	2	25	75	100
				Total	**30**	**21**				**700**

B.Sc. PHYSICS
SEMESTER II

S. No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part I**		Tamil/ Hindi	23UTAG21/ 23UHDG21	6	3	3	25	75	100
2.	**Part II**		English	23UENG21	6	3	3	25	75	100
3.	**Part III**	Core Course -3	Heat and Thermodynamics	23UPHC21	5	5	3	25	75	100
4.		Core Course -4 Practical II	Heat, Oscillations, Waves and Sound Practical	23UPHC21P	3	2	3	40	60	100
5.		Elective Course - I	Mathematical Foundations	23UMTA21	3	2	3	25	75	100
6.		Elective Course - I	Statistics and Operations Research	23UMTA22	3	2	3	25	75	100
7.	**Part IV**	NME - 2	Physics for Every Day Life - II	23UPHN21	2	2	2	25	75	100
8.		SEC-2	Programming in C	23UPHS21	2	2	2	25	75	100
				Total	**30**	**21**				**800**

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	23UTAG31/ 23UHDG31	6	3	3	25	75	100
2.	**Part II**		English	23UENG31	6	3	3	25	75	100
3.	**Part III**	Core Course - 5	Mechanics	23UPHC31	5	5	3	25	75	100
4.		Core Course - 6 Practical III	Electricity Practical	23UPHC31P	3	2	3	40	60	100
5.		Elective Course -II	Basic Electronics	23UEIA31	4	3	3	25	75	100
6.		Elective Course -II Practical I	Applied Electronics and Instrumentation Practical- I	23UEIA31P	2	1	3	40	60	100
7.	**Part IV**	SEC - 3	Arduino Programming Practical	23UPHS31P	1	1	2	100	-	100
8.		SEC - 4	Numerical Methods	23UPHS32	2	2	2	25	75	100
9.			Environmental Studies	23UGES41	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	23UTAG41/ 23UHDG41	6	3	3	25	75	100
2.	**Part II**		English	23UENG41	6	3	3	25	75	100
3.	**Part III**	Core Course - 7	Optics and Laser Physics	23UPHC41	4	4	3	25	75	100
4.		Core Course - 8 Practical IV	Optics Practical	23UPHC41P	3	2	3	40	60	100
5.		Elective Course –II	Electronic Devices and Instrumentation	23UEIA41	4	3	3	25	75	100
6.		Elective Course – II Practical	Applied Electronics and Instrumentation Practical- II	23UEIA41P	2	1	3	40	60	100
7.	**Part IV**	SEC - 5	Solar Energy	23UPHS41	2	2	2	25	75	100
8.		SEC - 6	Programming in C Practical	23UPHS42P	2	2	2	25	75	100
9.			Environmental Studies	23UGES41	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	23UPHC51	5	4	3	25	75	100
2		Core Course - 10	Atomic and Nuclear Physics	23UPHC52	5	4	3	25	75	100
3.		Core Course - 11	Analog and Communication Electronics	23UPHC53	5	4	3	25	75	100
4.		Core Course – 12 Practical V	General Physics Practical	23UPHC51P	3	2	3	40	60	100
5.		Core Course – 13	Project	23UPHC54PR	1	3	-	100	-	100
6.		Elective Course DSEC – 1	Nano Science and Nano Technology	23UPHE51	5	4	3	25	75	100
7.		Elective Course DSEC – 2	Mathematical Physics	23UPHE52	4	3	3	25	75	100
8.	**Part IV**		Internship / Industrial Training	23UPHI51G	-	1	-	100	-	100
9.			Value Education	23UGVE11	2	2	2	100	-	100
10.		Self-Study Course	Practice for Competitive Examination-Online	23UGCE51	-	1	-	100	-	100
Total					**30**	**28**				**1000**

11.	Extra Credit Course (Self Study Course)	Bio Physics	23UPHO51	-	2	3	100	-	100

SEMESTER VI

S. No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	**Part III**	Core Course – 14	Quantum Mechanics and Relativity	23UPHC61	5	5	3	25	75	100
2.		Core Course – 15	Solid State Physics	23UPHC62	5	5	3	25	75	100
3.		Core Course – 16	Digital Electronics and Microprocessor 8085	23UPHC63	5	4	3	25	75	100
4.		Core Course – 17 Practical VI	Electronics Practical	23UPHC61P	3	2	3	40	60	100
5.		Self-Study Course	Core Course Online Quiz	23UPHQ61	-	1	-	100	-	100
6.		Elective Course DSEC – 3	Material Science	23UPHE61	5	4	3	25	75	100
7.		Elective Course DSEC – 4	Energy Physics	23UPHE62	5	4	3	25	75	100
8.	**Part IV**	Professional Competency Skill -7	Digital Photography	23UPHS61	2	2	2	25	75	100
9.	**Part V**	Extension Activity	Extension Activity		-	1	-	100	-	100
				Total	**30**	**28**				**900**

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B.Sc. PHYSICS

(2023 -2024 onwards)

Semester I	**PROPERTIES OF MATTER AND ACOUSTICS**	Hours/Week: 5	
Core Course- 1		Credits: 5	
Course Code 23UPHC11		Internal 25	External 75

COURSE OUTCOMES

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

CO1: identify basic concepts related to elasticity, fluid dynamics, wave motion and sound. [K1]

CO2: derive the physical parameters involved in elasticity, fluid dynamics, wave motion and sound. [K2]

CO3: describe the experimental methods involved in measurement of physical parameters related to moduli of materials, surface tension and viscosity, oscillatory motions and ultrasonics. [K2]

CO4: Illustrate the applications of SHM, acoustics and ultrasonics. [K3]

CO5: apply the learned concepts to solve problems in elasticity, fluid dynamics and waves & oscillations. [K3]

UNIT-I

ELASTICITY

Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum . (15 hours)

UNIT-II

BENDING OF BEAMS

Cantilever– expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by

Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope. (15 hours)

UNIT-II

FLUID DYNAMICS

Surface Tension: definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature.

Viscosity: Definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –correction – terminal velocity and Stoke's formula– variation of viscosity with temperature. (15 hours)

UNIT-IV

WAVES AND OSCILLATIONS

Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures - free, damped, forced vibrations –resonance and Sharpness of resonance.

Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus. (15 hours)

UNIT-V

ACOUSTICS OF BUILDINGS AND ULTRASONICS

Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings.

Ultrasonic waves: Production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves. (15 hours)

SELF STUDY

Sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string apparatus.

TEXT BOOKS

1. Murugesan. R, (2019). *Properties of Matter*, S. Chand & Company Ltd., New Delhi.
2. Mathur. D.S., (2012). *Elements of Properties of Matter*, S. Chand & Company Ltd., New Delhi.
3. Brijlal & N. Subrahmanyam, (2003). *Properties of Matter*, S. Chand & Company Ltd., New Delhi.
4. Brijlal and N.Subrahmanyam, (1995). *A Text Book of Sound*, Second revised edition, Vikas Publishing House, Chennai.

REFERENCEBOOKS

1. Smith, C.J., (1960) *General Properties of Matter*, Orient Longman Publishers.
2. Gulati, H.R., (1977) Fundamental of General Properties of Matter, Fifth edition, R. Chand & Co.
3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.

WEBLINKS

1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work
2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html
3. https://www.youtube.com/watch?v=gT8Nth9NWPM
4. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s
5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work
6. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/
7. http://www.sound-physics.com/
8. http://nptel.ac.in/courses/112104026/

Course Code 23UPHC11	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	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	L	1

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

(2023 -2024 onwards)

Semester I	**PROPERTIES OF MATTER PRACTICAL**	Hours/Week: 3	
Core Course – 2 Practical - I		Credits: 2	
Course Code 23UPHC11P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the theoretical concepts in Properties of matter 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: assess the results obtained and compare it with the theoretical value. [K3]

List of Practicals (Any Eight of the below list)

.

1. Determination of rigidity modulus using Torsional pendulum.
2. Determination of Young's modulus by uniform bending – load depression graph.
3. Determination of Young's modulus by non-uniform bending – scale & telescope.
4. Determination of Young's modulus by cantilever – load depression graph.
5. Determination of Young's modulus by cantilever – oscillation method
6. Determination of rigidity modulus by static torsion.
7. Determination of surface tension by drop weight method.

8. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
9. Determination of 'g' using compound pendulum.
10. Error Analysis

Course Code 23UPHC11P	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	3	2	2	-	-	-	1
CO3	3	3	3	3	-	3	-	2	3	3
CO4	3	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

(2023-24 onwards)

Semester I	**ALLIED MATHEMATICS–I**	Hours/Week:6	
Elective Course -I		Credits:4	
Course Code		Internal	External
23UMTA11		25	75

COURSE OUTCOMES

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

CO1: retrieve the fundamental concepts, techniques in Calculus, Algebra and Numerical Methods. [K1]

CO2: explain curvature of a curve, method of solving algebraic, transcendental and simultaneous equations. [K2]

CO3: find the eigen values and eigen vectors of a given matrix and evaluate double and triple integrals. [K2]

CO4: apply the knowledge gained in Calculus and Algebra to other fields. [K3]

CO5: use appropriate method to solve algebraic, transcendental and simultaneous equations. [K3]

UNIT I

The Solution of Numerical Algebraic and Transcendental Equations

The Bisection method - Iteration method – Regula Falsi method – Newton Raphson method – Horner's method (without proof) (Simple problems only)

(18 hours)

UNIT II

Solution of Simultaneous Linear Algebraic Equations

Introduction - Gauss Elimination method – Gauss Jordan method – Gauss Jacobi method - Gauss Seidel method of iteration – (Restricted to three variables only) (Simple problems only)

(18 hours)

UNIT III

Matrices

Eigen Values and Eigen Vectors – Diagonalization of Matrices – Cayley – Hamilton Theorem – Inverse of a Matrix

(18 hours)

UNIT IV

Differential Calculus

n^{th} derivatives – Leibnitz theorem (without proof) – Jacobian – Curvature and radius of curvature (18 hours)

UNIT V

Ordinary Differential Equations

Linear equations with Constant coefficients

Partial Differential Equations

Formation of Partial Differential Equations – Solution of a Partial Differential Equation – Standard Forms

(18 hours)

TEXT BOOKS

1. P.Kandasamy, K.Thilagavathy, K.Gunavathy, Numerical Methods (2016), S.Chand & Company Ltd., New Delhi-55.
2. P.Duraipandian and Dr.S.Udayabaskaran, Allied Mathematics Volume I (2014), S.Chand & Company Ltd., New Delhi-55.
3. P.Duraipandian and Dr.S.Udayabaskaran, Allied Mathematics Volume II (2014), S.Chand & Company Ltd., New Delhi-55.

Unit	Chapter	Section
Text Book 1		
I	3	3.1.1, 3.2, 3.3, 3.4, 3.5
II	4	4.1, 4.2, 4.8, 4.9
Text Book 2		
III	4	4.5, 4.5.1, 4.5.2, 4.5.3
Text Book 3		
IV	1	1.1.1,1.1.2, 1.2, 1.4.3
V	5	5.2.1
	6	6,1,6.2,6.3

Course Code 23UMTA11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	1	2	-
CO2	3	2	3	2	1	2	-
CO3	2	2	3	2	1	2	-
CO4	3	3	3	3	1	2	-
CO5	3	2	3	2	1	3	-

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VIRUDHUNAGAR - 626 001

B.Sc. PHYSICS

(2023 -2024 onwards)

Semester I	**PHYSICS FOR EVERYDAY LIFE - I**	Hours/Week: 2	
NME - 1		Credits: 2	
Course Code 23UPHN11		Internal 25	External 75

COURSE OUTCOMES

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

CO1: identify the Physics principles behind mechanical, optical devices, and home appliances. [K1]

CO 2: recognize the Physics concepts involved in conventional and solar energy resources. [K1]

CO 3: describe the construction and working of mechanical objects, optical instruments, and home appliances. [K2]

CO 4: explain the merits & demerits of conventional energy resources and operation of solar energy gadgets. [K2]

CO 5: apply the learned concepts in Physics to elucidate the operation of everyday life objects. [K3]

UNIT I

MECHANICAL OBJECTS

Spring scales – bouncing balls – roller coasters – bicycles – rockets and space travel. (6 Hours)

UNIT II

OPTICAL INSTRUMENTS AND LASER

Vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser. (6 Hours)

UNIT III

PHYSICS OF HOME APPLIANCES

Bulb – fan – hair drier – television –washing machine – geyser - water purifier – vacuum cleaners. (6 Hours)

UNIT IV

CONVENTIONAL ENERGY SOURCES

Conventional sources of energy – fossil fuels - merits, demerits and applications of coal - merits, demerits and applications of oil - merits, demerits and applications of natural gas - nuclear energy: its merits and demerits. (6 Hours)

UNIT V

SOLAR ENERGY

Solar constant – general applications of solar energy – solar water heaters – solar photovoltaic cells – general applications of solar cells. (6 Hours)

TEXT BOOKS

1. Umme Ammara, (2019). *The Physics in our Daily Lives*, Gugucool Publishing, Hyderabad.
2. Walter Lawin, (2011). *For the love of physics*, Free Press, New York.
3. Jose Robin, G. and Ubald Raj, A., (2014). *Energy Physics*, Indira Publication, Marthandam.

REFERENCE BOOKS

1. Gupta, A.B., (2011). Revised edition. *College Physics* (Volume 1), Calcutta: Books and Allied Pvt. Ltd.
2. Jose Robin, G., and Ubald Raj, A., (2016). *Maintenance of Electrical Equipment*, Marthandam: Indira Publication.
3. Khan, B.H. (2009). *Non – Conventional Energy Resources*, Third Reprint. New Delhi: Tata McGraw-Hill Education Private Limited.

Course Code 23UPHN11	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	1	1	1	2	1	1
CO 2	3	2	2	1	1	-	-
CO 3	3	2	2	2	1	-	-
CO 4	3	2	3	2	2	-	-
CO 5	3	2	2	2	2	2	-

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

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B.Sc. PHYSICS

(2023 -2024 onwards)

Semester I	**INTRODUCTORY PHYSICS**	Hours/Week: 2	
SEC-1 Foundation Course		Credits: 2	
Course Code 23UPHF11		Internal 25	External 75

COURSE OUTCOMES

CO1: identify scalar and vector quantities in Physics, units and dimensions of Physical quantities, different types of forces and different forms of energy. [K1]

CO2: list out types of motion, Oscillations, properties of matter. [K1]

CO3: understand algebraic operations of vector quantities, type of force between microscopic & macroscopic bodies in nature and conservation of momentum, energy in different process. [K2]

CO4: explain various energy resources, mechanics of linear and circular motion. [K2]

CO5: describe how mechanics of microscopic and macroscopic bodies can be realized for real life applications. [K2]

UNIT I

Vectors, scalars – examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions – standard physics constants**.** (6 Hours)

UNIT II

Different types of forces – gravitational, electrostatic, magnetic, electromagnetic, nuclear – mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces. (6 Hours)

UNIT III

Different forms of energy– conservation laws of momentum, energy – types of collisions – angular momentum– alternate energy sources–real life examples. (6 Hours)

UNIT IV

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations. (6Hours)

UNIT V

Surface tension – shape of liquid drop – angle of contact – viscosity –lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use-conductors, insulators – thermal and electric. (6 Hours)

TEXT BOOKS

1. Mathur, D.S., (2010). *Elements of Properties of Matter,* S. Chand & Company Ltd., New Delhi.
2. Brijlal & Subrahmanyam, N., (2003). *Properties of Matter,* S. Chand & Company Ltd., New Delhi.

REFERENCE BOOKS

1. Gulati, H.R., (1977). *Fundamental of General Properties of Matter,* Fifth edition. S. Chand & Company Ltd., New Delhi.
2. Verma, H.C., (2017). *Concepts of Physics,* Bharati Bhawan Publishers, New Delhi.

Course Code 23UPHF11	PO1		PO2	PO 3		PO4		PO 5	PO 6	PO 7
	PSO 1. a	PSO 1. b	PSO 2	PSO 3. a	PSO3. b	PSO 4. a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	-	3	-	-	-	-	-	-	2
CO2	3	-	3	-	-	-	-	-	-	2
CO3	3	-	3	2	-	2		-	-	-
CO4	3	-	3	2	-	2	-	-	-	-
CO5	3	-	2	3	-	3	-	2	-	-

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

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Dr. G.Shanmuga Priya — Course Designer

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B.Sc. PHYSICS

(2023 -2024 onwards)

Semester II	**HEAT AND THERMODYNAMICS**	Hours/Week: 5	
Core Course - 3		Credits: 5	
Course Code 23UPHC21		Internal 25	External 75

COURSE OUTCOMES

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

CO1: explain laws, concepts and physical parameters related to thermodynamics, heat transfer process [K1]

CO2: describe experimental methods related to calorimetry, heat transfer process and liquefaction of gases. [K2]

CO3: derive the expressions for physical parameters related to calorimetry, Thermodynamics, radiation process [K2]

CO4: illustrate the applications of low temperature physics, laws of thermodynamics to heat engine and heat transfer process. [K3]

CO5: apply the learned concepts to solve simple the problems in calorimetry performance of thermodynamics system and Heat transfer process. [K3]

UNIT I

Thermometry and Calorimetry

Platinum resistance thermometer - thermistor-specific heat capacity - heat capacity - calorimetry-principle of calorimetry or method of mixtures-Barton's correction-experiment to determine the specific heat capacity of a liquid -the two specific heat capacities of a gas-Difference between the two specific heat capacities- Joly's differential steam calorimeter for finding C_V -Regnault's method to find C_P -Callendar and Barnes' continuous flow method - thermoelectric thermometer-Newton's law of cooling-specific heat capacity of a liquid.

(15 Hours)

UNIT II

Kinetic Theory of gases

Isothermal and adiabatic process-work done during isothermal and adiabatic process- gas equation – Clement and Desormes' method to find γ.

Introduction- derivation of ideal gas equation-degrees of freedom- equipartition of energy-atomicity of gases-Maxwell's law of distribution of molecular velocities(qualitative)-expressions for mean velocity, mean square velocity and the most probable velocity-experimental verification-–mean free path of a molecule-expression for the mean free path-transport phenomena-expression for the viscosity of a gas-thermal conductivity of gases-expression for the coefficient of diffusion on the basis of kinetic theory of gases. (15Hours)

UNIT III

Thermodynamics and Thermodynamic Relations

Zeroth law of thermodynamics-first law of thermodynamics-heat engine-expression for the efficiency of a Carnot's engine- -construction working and efficiency of petrol engine and diesel engine- reversible process-second law of thermodynamics- -entropy-change of entropy in a reversible process (Carnot's cycle)-change in entropy in an irreversible process-temperature-entropy diagram-third law of thermodynamics

Thermodynamic potentials-derivation of Maxell's four thermodynamic relations from the thermodynamic potentials U, H, F and G- - applications of Maxwell's Thermodynamic relations-Clasius -Clapeyron's equation-(first latent heat equation) (15 Hours)

UNIT IV

Conduction and Radiation

Introduction- coefficient of thermal conductivity- steady state – Lee's disc method of determining the thermal conductivity of a bad conductor- - experimental determination of thermal conductivity- Searle's method.

Thermal radiation- - Ferry's black body- Wien's .black body – energy distribution in black body radiation- Planck's hypothesis – Planck's law of radiation-derivation of Planck's law – Stefan's law –Derivation of Stefan Boltzmann law of radiation- determination of Stefan's constant –Solar constant – Angstrom's pyrheliometer. (15 Hours)

UNIT V

Liquefaction of gases

Different methods of liquefaction of gases – methods of freezing mixture– cooling by evaporation under reduced pressure – cooling by adiabatic expansion – Joule-Thomson expansion – liquefaction of gases – principle of regenerative cooling – liquefaction of air-

Linde's Process — Liquid Oxygen for medical purpose– importance of cryocoolers-production of low temperatures – adiabatic demagnetization. (15 Hours)

SELF STUDY

1. Clasius - Clapeyron's equation
2. Liquid Oxygen for medical purpose– importance of cryocoolers

TEXT BOOKS

1. Brijlal & N. Subramaniam, 2022, Heat, Thermodynamics & Statistical Physics, S. Chand & Company Ltd., New Delhi.
2. Murugeshan, R. and Kiruthiga Sivaprasath, (2018). *Thermal Physics*, S. Chand & Company Ltd., New Delhi

REFERENCE BOOKS

1. Rajam, J.B., and Arora, C.L., (1976). *Heat and Thermodynamics*, 8th edition, S.Chand & Co. Ltd.
2. Mathur, D.S., *Heat and Thermodynamics*, Sultan Chand & Sons.
3. Resnick, Halliday & Walker, (2010). *Fundamentals of Physics*, 6th Edition.
4. Sears, Zemansky, Hugh, D. Young, Roger and Freedman, A., (2021). *University Physics with Modern Physics*, 15th Edition, Pearson.

WEBSITE LINKS

1. https://youtu.be/M_5KYncYNyc
2. https://www.youtube.com/watch?v=4M72kQulGKk&vl=en

Course Code 23UPHC21	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	3	-	-	-	-	3	-	2
CO2	3	-	3	3	-	1	-	-	-	-
CO3	3	3	3	2	-	3	2	-	-	1
CO4	3	3	2	3	M	2	-	2	-	2
CO5	3	-	2	-	M	3	-	3	2	-

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

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B.Sc. PHYSICS

(2023 - 2024 onwards)

Semester II	**HEAT, OSCILLATIONS, WAVES & SOUND - PRACTICAL**	Hours/Week: 3	
Core Course – 4 Practical - II		Credits: 2	
Course Code 23UPHC21P		Internal 40	External 60

COURSE OUTCOMES

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

CO1: understand the theoretical concepts in Heat Oscillations, Waves & Sound 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: assess the results obtained and compare it with the theoretical value. [K3]

List of Experiments: Any Eight

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of bad conductor by Lee's disc method.
3. Determination of specific heat capacity of solid.
4. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphical method),
5. Velocity of sound through a wire using Sonometer.
6. Determination of frequency of an electrically maintained tuning fork
7. To verify the laws of transverse vibration using sonometer.
8. To verify the laws of transverse vibration using Melde's apparatus.
9. Frequency of AC by using sonometer.
10. Determination of Stefan's Constant

Course Code 23UPHC21P	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	3	2	2	-	-	-	1
CO3	3	3	3	3	-	3	-	2	3	3
CO4	3	3	3	3	-	2	-	2	2	3
CO5	-	2	2	2	-	2	-	2	2	3

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

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VIRUDHUNAGAR - 626 001
B.Sc. PHYSICS AND CHEMISTRY
(2023-24 onwards)

Semester II	**MATHEMATICAL FOUNDATIONS**	Hours/Week:3	
Elective Course -I		Credits:2	
Course Code		Internal	External
23UMTA21		25	75

COURSE OUTCOMES

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

CO1: retrieve the basic concepts in differentiation, integration, algebraic equations and trigonometric functions. [K1]

CO2: explain the concepts in Algebra, Vector Calculus and Trigonometry. [K2]

CO3: find approximate solutions, establish the relation between roots and coefficients of an equation. [K2]

CO4: apply the concepts in Algebra and trigonometry in various fields. [K3]

CO5: apply the knowledge gained in Vector Calculus to solve problems in real life situations. [K3]

UNIT I

Vector Differentiation

Differentiation of Vectors – Gradient – Velocity and Acceleration –Divergence and Curl (Simple Theorems only) - Problems. (9 hours)

UNIT II

Vector Integration

Line integrals – Surface integrals – Theorems of Green, Gauss and Stoke's (Statements only) – Problems. (9 hours)

UNIT III

Algebra

Formation of Equations – Relation between roots and coefficients. (9 hours)

UNIT IV

Algebra Continued

Transformation of Equations – Approximate solutions of numerical equations. (9 hours)

UNIT V

Trigonometry

Expansion of sinθ, cosθ, tanθ in powers of θ–Hyperbolic Functions. (9 hours)

TEXTBOOKS

1. Arumugam.S. and Thangapandi Isaac.A. (2004). *Ancillary Mathematics Paper II (Revised)*, New Gamma Publishing House.
2. Arumugam.S. and Thangapandi Isaac.A.(2014).*Allied Mathematics Paper I*, New Gamma Publishing House.

Unit	Chapter	Section
Text Book1		
I	1	1.2–1.5
II	2	2.1,2.2,2.3
Text Book2		
III	Part1-Chapter1	1.1,1.2
IV	Part1-Chapter1	1.4,1.5
V	Part3- Chapter1 Chapter2	 1.3 2.1

Course Code 23UMTA21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	-	-
CO2	3	1	3	2	2	1	-
CO3	3	2	3	2	2	1	-
CO4	2	2	1	2	2	-	-
CO5	3	1	1	2	2	1	-

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B.Sc. PHYSICS AND CHEMISTRY

(2023-24 onwards)

Semester II	**STATISTICS AND OPERATIONS RESEARCH**	Hours/Week:3	
Elective Course - I		Credits:2	
Course Code		Internal	External
23UMTA22		25	75

COURSEOUTCOMES

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

CO1: retrieve the basic concepts in Statistics and Operations Research. [K1]

CO2: explain the techniques used to solve the problems in Statistics and Operations Research [K 2]

CO3: find solutions to solve the problems in the society. [K2]

CO4: calculate some statistical constants to get statistical inference and use O.R techniques to solve real life problems. [K3]

CO5: apply Correlation and Regression to draw conclusion for a given data. [K3]

UNIT I

Statistics

Correlation

Correlation-Problems-Rank correlation (9 hours)

UNIT II

Regression

Regression –Properties of Regression coefficients–Problems. (9 hours)

UNIT III

Operations Research

Formulation of Linear Programming Problem – Mathematical formulation of a Linear Programming Problem- Graphical method. (9 hours)

UNIT IV

Operations Research Continued:

Mathematical formulation of Transportation Problems – Initial Basic Feasible Solutions (Method 1, Method 2, Method 3, Method 4). (9 hours)

UNIT V

Operations Research Continued:

Introduction- Mathematical formulation of an Assignment Problem – Solution to Assignment Problem – Hungarian Algorithm (balanced minimization problems only).

(9 hours)

TEXTBOOKS

1. Arumugam.S and Thangapandi Isaac. A. (2011). *Statistics*, New Gamma Publishing House.
2. Arumugam.S and Thangapandi Isaac. A.(2015). *Topics in Operations Research Linear Programming*, New Gamma Publishing house.

Unit	Chapter	Section
Text Book 1		
I	6	6.0, 6.1, 6.2
II	6	6.3
Text Book 2		
III	3	3.1, 3.2, 3.4
IV	4	4.1
V	5	5.0, 5.1, 5.2

Course Code 23UMTA22	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	3	-
CO2	3	2	3	3	3	2	-
CO3	3	3	3	3	3	3	-
CO4	3	2	3	3	3	3	-
CO5	3	2	3	3	3	3	-

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B.Sc. PHYSICS

(2023 -2024 onwards)

Semester I	**PHYSICS FOR EVERYDAY LIFE - II**	Hours/Week: 2	
NME-2		Credits: 2	
Course Code **23UPHN21**		Internal 25	External 75

COURSE OUTCOMES

CO1: explain the Physics principles of general appliances used in our daily life. [K1]

CO 2: recognize the Physics concepts involved in kitchen & medical gadgets and also identify the Indian scientists who have made significant contributions to Physics. [K1]

CO 3: describe the construction and working of general appliances, kitchen and medical gadgets. [K2]

CO 4: discuss the operation of office gadgets and the development in Science and Technology through the contribution of Indian Scientists. [K2]

CO 5: apply the learned concepts in Physics to elucidate the operation of everyday life objects. [K3]

UNIT I

General Appliances:

DC - AC – Starter - Choke coil - Fuse – Electric motor – Electric generator - Transformer. (6 Hours)

UNIT II

Kitchen Gadgets:

Pressure cooker - Microwave oven - Toaster - Mixer grinder - Grinder - Refrigerator. (6 Hours)

UNIT III

Medical Gadgets:

Clinical thermometer – Pulse oxymeter – Heart beat monitor – Blood glucose monitor – Blood pressure monitor - Pedometers and Weighing scale. (6 Hours)

UNIT IV

Office:

Fax machine – Laser printer - Photocopier - Inverter - Air conditioner. (6 Hours)

UNIT V

Indian Physicist and their Contributions:

C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Dr. APJ Abdul Kalam, and their contribution to science and technology

(6 Hours)

TEXT BOOKS

Material - Prepared by the Department of Physics

REFERENCE BOOKS

1. Jose Robin, G. & Ubald Raj, A. (2016). *Maintenance of Electrical Equipment*, Marthandam: Indira Publication.

Course Code 23UPHN21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	1	1	1	2	1	1
CO 2	3	2	2	1	1	-	-
CO 3	3	2	2	2	1	-	-
CO 4	3	2	3	2	2	-	-
CO 5	3	2	2	2	2	2	-

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

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B.Sc. PHYSICS

(2023 - 2024 onwards)

Semester II	**PROGRAMMING IN C**	Hours/Week: 2	
SEC – 2		Credits: 2	
Course Code **23UPHS21**		Internal 25	External 75

COURSE OUTCOMES

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

CO 1: write the basics of 'C' fundamentals with its syntax. [K1]

CO 2: outline the syntax of arrays, structures and functions in C. [K1]

CO 3: explain the functions of operators input, output operations and control statements in C. [K2]

CO 4: describe the functions of arrays, structures and functions in C. [K2]

CO 5: write programs by applying the syntax in C language. [K3]

UNIT I

Constants, Variables and Data Types: Character set, C tokens, keywords and identifiers – constants - variables - data types –declaration of variables – C operators – formatted input: inputting integer numbers – formatted output: output of integer numbers. (6 Hours)

UNIT II

Decision making with if statement - simple if statement –the if-else statement- nesting of if - else statement – else-if ladder – switch statement - goto statement - the while statement –the do–while statement- the for statement. (6 Hours)

UNIT III

Data structures - one dimensional arrays – declaration of one dimensional arrays initialization of one dimensional arrays - two dimensional arrays - initialization of two dimensional arrays – understanding pointers – accessing the address of a variable. (6 Hours)

UNIT IV

Defining a structure – declaring structure variables – accessing structure members – structure initialization - arrays of structures – arrays within structures – Unions – size of structures – bit fields. (6 Hours)

UNIT V

Definition of functions –return values and their types – function calls – function declaration - category of functions – nesting of functions– recursion. (6 Hours)

TEXT BOOK

1. Balagurusamy, E., (Sixth edition) *Programming in ANSI C*, Tata Mc Graw Hill Education Private Limited.

REFERENCE BOOKS

1. Ramasamy, S, and Radhaganesan, P, (2005), *Programming in C*, Scitech Publications India Private Limited, Chennai & Hyderabad.
2. Schaum's outline series & Gottfried. (2006). *Programming with C*, Tata Mc GrawHill publishing company Ltd., New Delhi.

Course Code 20UPHS21	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	-	1	-	2
CO 2	3	-	3	-	1	1	-	2	-	2
CO 3	3	-	2	1	1	1	-	2	-	2
CO 4	3	3	2	3	3	3	2	3	1	-
CO 5	3	2	2	3	3	3	3	3	-	-

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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Quality Education with Wisdom and Values

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester III	**MECHANICS**	**Hours/Week: 5**	
Core Course – 5		**Credits: 5**	
Course Code 23UPHC31		**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

LAWS OF MOTION: Newton's Laws – forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field –basic forces of nature.

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 – earth satellites – parking orbit – gravitational field and potential - gravitational field and potential due to solid sphere – variation of g with latitude, altitude and depth. (15hours)

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. (15hours)

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.

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 23UPHC31	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	-	-	-	-	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)

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B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester III	**Electricity Practical**	**Hours/Week: 3**	
Core Course – 6 Practical - III		**Credits: 2**	
Course Code 23UPHC31P		**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: assess the results obtained and compare it with the theoretical value. [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 23UPHC31P	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)

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B.Sc. PHYSICS
(for those who join in 2023-2024)

Semester III	**BASIC ELECTRONICS**	**Hours/Week: 4**	
Elective Course -II		**Credits: 3**	
Course Code 23UEIA31		**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 – Varactor diode - 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 (2013). *Principles of Electronics*, New Delhi: S.Chand & Company Ltd.

3. Jose Robin, G. (2004). *Basic Electronics and Applied Electronics*, Indira Publication: Marthandam.

BOOK 1:

UNIT I: Chapter 5 – Sections: 5.1- 5.12, 5.14, 5.15, 5.19 - 5.21, 5.23, 5.25, 5.32-5.35, 5.37, 5.39 - 5.41, 5.45, 5.47, 5.49

UNIT II: Chapter 12 - Sections: 12.17, 12.19, 12.23 -12.25.

Chapter 14 - Sections: 14.1
Chapter 15 - Sections: 15.1, 15.2, 15.7, 15.8
Chapter 17 - Sections: 17.5-17.9, 17.13, 17.14

UNIT IV: Chapter 4 – Sections: 4.2, 4.5-4.8

Chapter 21 – Sections: 21.14.

Chapter 11 – Sections: 11.13-11.21

Chapter 15– Sections: 15.12

BOOK 2:

UNIT III: Chapter 8 – Sections: 8.4, 8.5, 8.7-8.10, 8.12, 8.13, 8.16-8.18

Chapter 9 – Sections: 9.2, 9.7-9.12

BOOK 3:

UNIT V: Chapter 1

Course Code 23UEIA31	**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)

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B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester III	**Applied Electronics and Instrumentation Practical- I**	**Hours/Week: 2**	
Elective Course II Practical – I		**Credits: 1**	
Course Code 23UEIA31P		**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: assess the results obtained and compare it with the theoretical value. [K3]

List of Practicals :

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. Verification of Norton's theorem
7. Low Pass and High Pass Filters using Passive Components

Course Code 23UEIA31P	**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)

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Semester III	**Arduino Programming Practical**	**Hours/Week: 1**
SEC Practical		**Credits: 1**
Course Code 23UPHS31P		**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 23UPHS31P	**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)

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Semester III	**Numerical Methods**	**Hours/Week: 2**	
SEC – 4		**Credits: 2**	
Course Code 23UPHS32		**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.

[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]

Test Book:

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

Unit I: Chapter 3: 3.0, 3.2, (Relevant Topic), 3.4

Chapter 4: 4.0 to 4.3

Unit II: Chapter 7: 7.0, 7.1, 7.3, 7.4

Unit III: Chapter 2: 2.0, 2.4 (I, III)

Unit IV: Chapter 8: 8.0, 8.5 (Relevant Topics)

Unit V: Chapter 10: 10.3, 10.4 (Relevant Topics)

Reference Book:

1. Kandasamy, P. Thilagavathy,K., Gunavathi,K., (1997). *Numerical Methods,* S.Chand & Company LTD.
2. Venkataraman, M.K., Numerical Methods in Science and Engineering,. The National Publishing Company.

Course Code 23UPHS32	**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)

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Semester IV	**OPTICS AND LASER PHYSICS**	**Hours/Week: 4**	
Core Course - 7		**Credits: 4**	
Course Code 23UPHC41		**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]

UNITI

LENS AND PRISMS: Fermat's principle of least time – thick and thin lenses – focal length, power and cardinal points of a thick lens – narrow angled prisms- eyepiece - 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.

(12Hours)

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. (12Hours)

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 – holography

(12Hours)

SELF STUDY

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

TEXT BOOKS

1. Murugesan , R& Kiruthiga Sivaprasath, (2014) . *Optics and Spectrocopy* , 17 th Revised Edition, New Delhi: S.Chand& Company Pvt Ltd

2. Subramaniam. N andBrijlal, (2014). *Optics*, 25thEd,S.Chandand 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 23UPHC41	**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)

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Semester IV	**OPTICS PRACTICAL**	**Hours/Week: 3**	
Core Course - 8 **Practical IV**		**Credits: 2**	
Course Code **23UPHC41P**		**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: assess the results obtained and compare it with the theoretical value. [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 refractive index using Laser.
8. Determination of wavelengths, particle size using Laser/Monochromatic source.
9. Determination of thickness of wire using Laser.
10. Laser Diffraction – Determination of Number of lines per cm on Grating and size of lycopodium powder.
11. Determination of refractive index of liquid using Laser.
12. Determination of width of rectangular aperture and thickness of wire using Laser.

Course Code 23UPHC41P	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)

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Quality Education with Wisdom and Values

B.Sc. PHYSICS
(for those who join in 2023-2024)

Semester IV	**Electronic Devices and Instrumentation**	**Hours/Week: 4**	
Elective Course –II		**Credits: 3**	
Course Code 23UEIA41		**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

SEMICONDUCTOR DEVICES:

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 – 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.

(12Hours)

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.

UNIT I - Chapter 2 – Sections: 2.8.1-2.8.6, 2.9, 2.9.1, 2.9.2, 2.12 - 2.18, - 2.18.5, 2.23-2.26, 2.36-2.36.6, 2.38-2.40

UNIT II–Chapter 5- Sections: 5.9 – 5.13, 5.22 – 5.22.3

UNIT V–Chapter 6 -Sections: 6.1- 6.3, 6.5 – 6.7, 6.12, 6.13.3, 6.14, 6.16

2. Dr.M.Arumugam, (2014), *Biomedical Instrumentation*, Anuradha Publications, Sankar Printers Pvt Ltd.

UNIT III – Chapter V - Sections: 5.1-5.2(5.2.1, 5.2.2), 5.3, 5.4, 5.5(5.5.1), 5.7

UNIT IV– Chapter IV - Sections: 4.3(4.3.1-4.3.2), 4.4(4.4.1-4.4.4), 4.5, 4.6

3. Mehta, V.K. (2006).*Principles of Electronics*, S.Chand & Company Ltd.

Unit II - Chapter 23-23.1 – 23.5, 23.11

Chapter 24 – 24.9 – 24.13

Reference Book:

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 23UEIA41	**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)

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B.Sc. PHYSICS

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Semester IV	**Applied Electronics and Instrumentation Practical –II**	**Hours/Week: 2**	
Elective Course – II Practical -II		**Credit: 1**	
Course Code 23UEIA41P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

CO1: understandthe 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: assess the results obtained and compare it with the theoretical value. [K3]

List of Practical's

1. Measurement of R, L and C using multimeter
2. IC regulated power supply (5 V)
3. Zener diode – voltage regulator
4. Measurements of AC/DC voltages & frequency using CRO
5. Logic gates using discrete components
6. Transistor emitter follower
7. Integrator and differentiator using discrete components

Course Code 23UEIA41P	**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)

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Semester IV	**SOLAR ENERGY**	**Hours/Week: 2**	
SEC – 5		**Credits: 2**	
Course Code 23UPHS41		**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 – Non-Conventional Energy Resources*, Second Edition.: Tata McGraw-Hill Education Private Limited, New Delhi.

UNIT –I Chapter 1 - Sections: 1.3, 1.5, 1.9, 4, 4.1, 4.4, 4.5, 4.6, 4.7, 4.7.1, 4.7.2, 4.7.3, 4.10.

UNIT –II Chapter 5 - Sections: 5.1, - 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.6, 5.1.7, 5.1.8, 5.1.9, 5.1.10

UNIT –III Chapter 5 - Sections: 5.2, 5.6, 5.6.1, 5.6.2, 5.6.3, 5.6.4, 5.9, 5.10

UNIT –IV Chapter 6 - Sections: 6, 6.1 – 6.1.1, 6.1.4, 6.2 – 6.2.1, 6.2.4, 6.2.5, 6.2.6, 6.2.7, 6.3 - 6.3.1, 6.3.2, 6.3.3

UNIT –V Chapter 6 - Sections: 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.8 – 6.8.1, 6.8.2, 6.8.3, 6.8.4, 6.9.2, 6.9.3, 6.9.4, 6.9.6

REFERENCE BOOKS

1. Rai, G.D. (2004). *Solar Energy Utilization*, Delhi: Khanna Publications.
2. Sukhatme, S.P. (1998). *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 23UPHS41	**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)

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B.Sc. PHYSICS

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Semester IV	**PROGRAMMING IN C PRACTICAL**	**Hours/Week: 2**	
SEC - 6		**Credits: 2**	
Course Code 23UPHS42P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

CO1 : undertand 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 : assess the results obtained using C program and compare it with the theoretical value. [K3]

List of Practical (Any Eight of the below list)

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 23UPHS42P	**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	3	2	2	-	-	-	1
CO3	3	3	3	3	-	3	-	2	3	3
CO4	3	3	3	3	-	2	-	2	2	3
CO5	-	2	2	2	-	2	-	2	2	3

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

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