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

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

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

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

A. CHOICE BASED CREDIT SYSTEM (CBCS)

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

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

UG PROGRAMMES

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

PG PROGRAMMES

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

* AICTE approved Programmes

OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG

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

List of Non Major Elective Courses (NME)

(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 அரசியலமமப்பு	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.

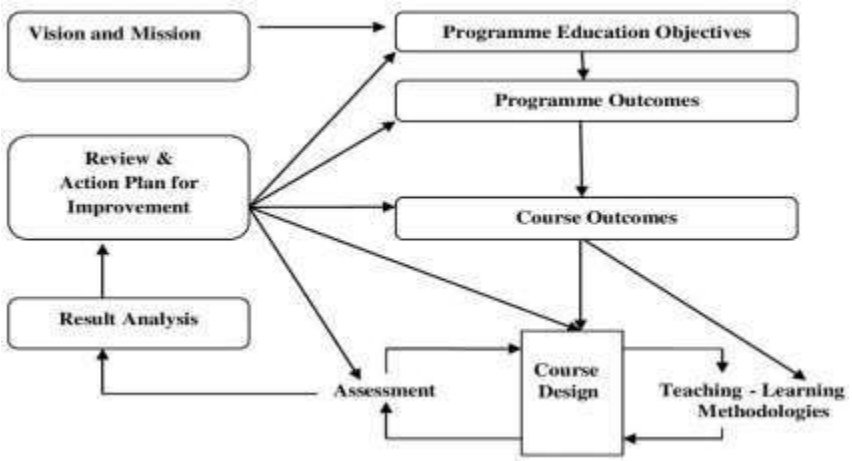
PO-PEO Mapping Matrix

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	-	-	✓

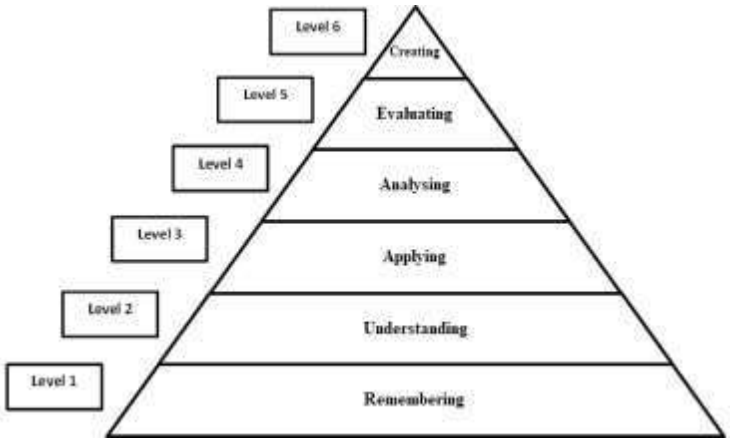
B.1.4 Course Outcomes (COs)

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**	
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					

B.2.3.2 Skill Enhancement Course - Entrepreneurial skills

INTERNAL ASSESSMENT ONLY
Distribution of Marks

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

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

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

*The total marks obtained in the Periodic Test will be calculated for 15 marks
Two Periodic Tests - Better of the two will be considered
Two Assignments - Better of the two will be considered
Two Quiz Tests - Better of the two will be considered

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

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

B.2.3.3 Skill Enhancement Courses/ Non Major Elective Courses

INTERNAL ASSESSMENT
Distribution of Marks
Theory

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

Three Periodic 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 - K3 Level	:	10
Online Quiz (Multiple Choice Questions - K2 Level)	:	25
Poster Presentation - K3 Level		10
Report - K3 Level		10
Model Examination	:	30
Total	**:**	**100**

Three Assignment - Best of the three will be considered

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

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A 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 / Industrial Training

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

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

B.2.6 SELF STUDY COURSE

B.2.6.1 PART III - Discipline Specific Quiz – Online

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

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
	:	**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 for all the Courses.
  - ➢ 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.

- **ATTENDANCE**

(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.

- ➢ For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
- ➢ For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

B.3 ASSESSMENT MANAGEMENT PLAN

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

B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the

Continuous Internal Assessments and in End Semester Examination of a course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

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

Indirect Assessment – Done through Course Exit Survey.

CO Assessment Rubrics

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

CO Attainment

Direct CO Attainment

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

Target Setting for Assessment Method

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

Formula for Attainment for each CO

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

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

Attainment Levels of COs

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

Indirect CO Attainment

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

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

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

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

B.3.2 Assessment Process for Overall PO Attainment

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

PO Assessment Tools

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

Programme Articulation Matrix (PAM)

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

Indirect Attainment of POs for all Courses

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

Attainments of POs for all Courses

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

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

Expected Level of Attainment for each of the Programme Outcomes

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

Level of PO attainment

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

B.3.3 Assessment Process for PEOs

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

Target for PEO Attainment

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

Attainment of PEOs

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

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

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

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

Expected Level of Attainment for each of the Programme Educational Objectives

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

Level of PEO Attainment

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

C. PROCESS OF REDEFINING THE PROGRMME EDUCATIONAL OBJECTIVES

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

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

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)	6 (5)	6(6)	31 (30)
Core Course	-	-	-	-	5 (5)	6(5)	11 (10)
Core Course	-	-	-	-	5 (5)	5(5)	10(9)
Core Course Practical	3(2)	3 (2)	3 (2)	3 (2)	3 (2)	3 (2)	18(12)
Core Course Project	-	-	-	-	1 (1)	-	1 (1)
Elective Course (DSEC)	-	-	-	-	5(4)	5 (4)	10 (8)
Elective Course (DSEC Practical)	-	-	-	-	3(2)	3(2)	6(4)
Elective Course I (Allied)	6 (4)	3(2) & 3(2)	-	-	-	-	12(8)
Elective Course I Practical I(Allied)	-	-	-	-	-	-	-
Elective Course II(Allied)	-	-	4 (3)	4 (3)	-	-	8(6)
Elective Course II Practical II(Allied)	-	-	2 (1)	2 (1)	-	-	4 (2)
Self Study Course	-	-	-	-	-	0 (1)	0 (1)
Part IV : Skill Enhancement Courses, Elective Courses, Environmental Studies, Value Education , Self Study Course &Internship/ Industrial Training							
SEC	2 (2)	-	1 (1)	2 (2)	-	-	5(5)
SEC	-	2 (2)	2 (2)	2 (2)	-	2 (2)	8 (8)
Elective Course(NME)	2 (2)	2 (2)	-	-	-	-	4 (4)
Value Education	-	-	-	-	2 (2)	-	2 (2)
Environmental Studies	-	-	1 (0)	1 (2)	-	-	2 (2)
Self Study Course	-	-	-	-	0 (1)	-	0 (1)
Internship/ Industrial Training	-	-	-	-	0 (1)	-	0 (1)
Part V : Extension Activities	-	-	-		-	0 (1)	0 (1)
Total	**30 (21)**	**30 (21)**	**30 (20)**	**30(22)**	**30(28)**	**30(28)**	**180 (140)**
Extra Credit Course (Self Study Course)	-	-	-	-	0(2)	-	0(2)

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

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	6	5	3	25	75	100
2		Core Course - 10	Atomic and Nuclear Physics	23UPHC52	5	5	3	25	75	100
3.		Core Course - 11	Analog and Communication Electronics	23UPHC53	5	5	3	25	75	100
4.		Core Course – 12 Practical V	General Physics Practical - I	23UPHC51P	3	2	3	40	60	100
5.		Core Course – 13	Project	23UPHC54PR	1	1	-	100	-	100
6.		Elective Course DSEC – 1	Nanoscience and Nano Technology / Mathematical Physics	23UPHE51 / 23UPHE52	5	4	3	25	75	100
7.		Elective Course DSEC – 2 Practical I	General Physics Practical – II / Linear Integrated Circuits Practical	23UPHE53P / 23UPHE54P	3	2	3	40	60	100
8.	**Part IV**	Internship / Industrial Training	Internship	23UPHI51	-	1	-	100	-	100
9.			Value Education	23UGVE51	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	Statistical, Quantum Mechanics and Relativity	23UPHC61	6	6	3	25	75	100
2.		Core Course – 15	Solid State Physics	23UPHC62	6	5	3	25	75	100
3.		Core Course – 16	Digital Electronics and Microprocessor 8085	23UPHC63	5	5	3	25	75	100
4.		Core Course – 17 Practical VI	Electronics Practical	23UPHC61P	3	2	3	40	60	100
5.		Self-Study Course	Discipline Specific Quiz - Online	23UPHQ61	-	1	-	100	-	100
6.		Elective Course DSEC – 3	Material Science / Energy Physics	23UPHE61 / 23UPHE62	5	4	3	25	75	100
7.		Elective Course DSEC – 4 Practical II	Digital Electronics Practical / Digital Circuits Simulation Practical	23UPHE63P / 23UPHE64P	3	2	3	40	60	100
8.	**Part IV**	Professional Competency Skill -7	Microprocessor Practical	23UPHS61P	2	2	2	40	60	100
9.	**Part V**	Extension Activity	Extension Activities		-	1	-	100	-	100
				Total	**30**	**28**				**900**

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**ELECTRICITY, MAGNETISM AND ELECTROMAGNETISM**	**Hours/Week: 6**	
Core Course - 9		**Credits: 5**	
Course Code 23UPHC51		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

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

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

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

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

UNIT I

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

UNIT II

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

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

UNIT III

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

UNIT IV

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

UNIT V

Maxwells Equations and Electromagnetic Waves: Introduction - displacement current - Maxwell's equations in vacuum, material media - physical significance of Maxwell's equations - plane electromagnetic waves in free space - velocity of light - Poynting vector - electromagnetic waves through homogenous, isotropic media - refractive index. (18 hours)

Self-Study: Demonstration: Peltier effect - Thomson effect

TEXT BOOK

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

REFERENCE BOOKS

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

Course Code 23UPHC51	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	-	3	1	-	1	-	-	-	3
CO 2	3	2	3	2	-	-	-	-	2	-
CO 3	3	3	3	-	2	2	-	2	-	3
CO 4	3	3	3	3	-	2	-	3	-	-
CO 5	3	-	2	-	3	3	2	-	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.I.Rathinamala
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**ATOMIC AND NUCLEAR PHYSICS**	**Hours/Week: 5**	
Core Course - 10		**Credits: 5**	
Course Code 23UPHC52		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

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

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

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

Unit I

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

Unit II

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

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

Unit III

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

Unit IV

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

Unit V

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

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

TEXT BOOK

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

REFERENCE BOOKS

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

Course Code 23UPHC52	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1a	**PSO 1b**	**PSO 2**	**PSO 3a**	**PSO 3b**	**PSO 4a**	**PSO 4b**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	-	3	-	2	1	-	1	-	2
CO2	3	1	2	2	-	2	2	-	1	3
CO3	3	-	2	1	3	3	2	-	-	-
CO4	3	-	2	1	3	3	1	1	-	-
CO5	3	-	3	2	3	3	3	3	-	3

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.M.Sankareswari
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**ANALOG AND COMMUNICATION ELECTRONICS**	**Hours/Week: 5**	
Core Course - 11		**Credits: 5**	
Course Code 23UPHC53		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

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

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

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

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

UNIT I

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

UNIT II

Transistor Oscillators: feedback amplifier - principle of feedback, positive and negative feedback of voltage and current gain, advantages of negative feedback - Barkhausen's criterion - Transistor oscillators: Hartely, Colpitt, Phase shift oscillators with mathematical analysis. (15 Hours)

UNIT III

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

UNIT IV

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

UNIT V

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

Self-Study: FET as switches - FET applications - Colpitt oscillator

TEXT BOOKS

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

REFERENCE BOOKS

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

Course Code 23UPHC53	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1a	**PSO 1b**	**PSO 2**	**PSO 3a**	**PSO 3b**	**PSO 4a**	**PSO 4b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	-	2	-	2	1	-	3	-	2
CO 2	3	3	3	3	1	2	2	-	-	3
CO 3	3	-	2	2	3	3	1	-	-	-
CO 4	3	2	2	3	3	3	3	3	-	1
CO 5	3	1	2	2	2	3	2	3	2	1

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R.Hepzi Pramila Devamani
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester V	**GENERAL PHYSICS PRACTICAL - I**	**Hours/Week: 3**	
Core Course - 12 Practical V		**Credits: 2**	
Course Code 23UPHC51P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Experiments: (Any Eight)

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

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

Course Code 23UPHC51P	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.A.Azhagu Parvathi
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester V	**PROJECT**	**Hours/Week: 1**
Core Course - 13		**Credits: 1**
Course Code 23UPHC54PR		**Internal 100**

COURSE OUTCOMES

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

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

CO2: construct the circuit /experimental set up /theoretical model to calculate the required physical/electrical parameters. [K2]

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

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

CO5: apply the outcome of the project to meet the challenges at higher education level / societal level. [K3]

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

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

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

Evaluation will be done internally.

Project work & Report - 60 marks

Presentation & Viva-voce - 40 marks

Course Code 23UPHC54PR	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	2	-	2	2	2	-	3	-	3
CO 2	3	3	2	3	3	2	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3
CO 4		-	3	2	3	2	3	3	-	-
CO 5	3	-	3	2	3	2	3	3	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R. Hemalatha
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester V	**NANOSCIENCE AND NANO TECHNOLOGY**	**Hours/Week: 5**	
Elective Course DSEC - 1		**Credits: 4**	
Course Code 23UPHE51		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

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

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

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

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

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

Course Code 23UPHE51	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO 1	3	-	3	1	-	1	-	-	-	3
CO 2	3	2	3	2	-	-	-	-	2	-
CO 3	3	3	3	-	2	2	-	2	-	3
CO 4	3	3	3	3	-	2	-	3	-	-
CO 5	3	-	2	-	3	3	2	-	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.S.Thenmozhi
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**MATHEMATICAL PHYSICS**	**Hours/Week: 5**	
Elective Course – 1 DSEC - 1		**Credits: 4**	
Course Code 23UPHE52		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

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

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

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

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

UNIT -I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

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

TEXT BOOKS

1. Das, H. K., *Mathematical Physics*, S. Chand and Co, New Delhi.
2. Satya Prakash *Mathematical Physics with Classical Mechanics*, (Reprint 2014). New Delhi: Sultan Chand & Sons.
3. Gupta, B. D., *Mathematical Physics.*

REFERENCEBOOKS

1. Spiegel, M.R., *Fourier Analysis* (2004), Tata McGraw-Hill.
2. Venkataraman, M. K., *Engineering Mathematics III- B*
3. Bruce R. Kusseand Erik A. Westwig, *Applied Mathematics for Scientists and Engineers* (2006) 2nd Ed, WILEY-VCH Verlag.
4. Jain, J.C., *Vector space and Matrices,* Narosa Publishing House Pvt. Ltd.
5. Erwin Kreyszig, *Advanced Engineering Mathematics*, (2008), Wiley India.

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 23UPHE52	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	-	3	-	1	1	-	-	-	2
CO2	3	-	3		2	2	-	2	-	-
CO3	3	-	3	-	3	2	-	2	-	-
CO4	3	-	2	-	3	3	1	-	-	-
CO5	2	-	1	-	2	2	1	3		-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.A.Azhagu Parvathi
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester V	**GENERAL PHYSICS PRACTICAL – II**	**Hours/Week: 3**	
Elective Course DSEC - 2 Practical I		**Credits: 2**	
Course Code 23UPHE53P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Practical (Any Eight)

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

Course Code 23UPHE53P	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.G.Shanmuga Priya
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester V	**LINEAR INTEGRATED CIRCUITS PRACTICAL**	**Hours/Week: 3**	
Elective Course DSEC - 2 Practical – I		**Credits: 2**	
Course Code 23UPHE54P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Experiments: (Any Eight)

1. Characteristics of a transistor - (CB mode)
2. Bistable Multivibrator - IC 555
3. Operational amplifier - D/A converter by binary resistor method
4. Astable Multivibrator using IC 741
5. Schmitt trigger using IC 555
6. Dual power supply using IC
7. Operational amplifier - inverting amplifier & non-inverting amplifier
8. Logarithmic amplifier using IC 741
9. Integrator and Differentiator using Op Amp
10. Colpitt's oscillator transistor
11. Frequency modulation

Course Code 23UPHE54P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.S.Thenmozhi
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**INTERNSHIP**	**Hours/Week: -**
Internship / Industrial Training		**Credit: 1**
Course Code **23UPHI51**		**Internal - 100**

COURSE OUTCOMES

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

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

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

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

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

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

Guidelines/ Regulations:

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

Course Code 23UPHI51	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	3	-
CO2	3	2	2	2	2	3	-
CO3	3	2	-	-	-	3	-
CO4	3	3	2	2	-	2	3
CO5	3	2	3	3	2	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.M.Sankareswari
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**BIOPHYSICS**	**Hours/Week: -**
Extra Credit Course		**Credit: 2**
Course Code **23UPHO51**		**Internal - 100**

Course outcomes:

On completion of the course students will be able to

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

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

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

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

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

Unit I

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

Unit II

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

Unit III

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

Unit IV

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

Unit V

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

Text Books:

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

References

1. Biomedical instrumentation, Arumugam, M., (2008) Anuradha publications, Chennai,
2. Handbook of Biomedical instrumentation, Khandpur and Raghbir Khandpur R.S., (1987) TMH Publishers
3. Biomedical instrumentation and measurements, Ananda Natarajan, R., (1995) PHI Publications, India.

Dr.A.Azhagu Parvathi
Head of the Department

Dr. I. Rathinamala
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**STATISTICAL, QUANTUM MECHANICS AND RELATIVITY**	**Hours/Week: 6**	
Core Course - 14		**Credits: 6**	
Course Code 23UPHC61		**Internal 25**	**External 75**

COURSE OUTCOMES

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

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

CO2: derive the expression for distribution function of statistical mechanics, quantum statistics and transform equations in relativity and discuss the properties of various operators. [K2]

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

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

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

Unit I

Statistical Mechanics: Definition of phase-space - micro and macro states - ensembles - different types of ensembles - classical and quantum statistics - Maxwell-Boltzmann statistics - expression for distribution function - Bose-Einstein statistics - expression for distribution function - Fermi-Dirac statistics - expression for distribution function - comparison of three statistics. (18 hours)

Unit II

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

Unit III

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

(18 hours)

Unit IV

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

Unit V

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

Self-Study: Comparison of three statistics, commutator algebra, time dilation

TEXT BOOKS

1. Brijlal, Subramanyam, N., & Hemne, P.S., (2019) *Heat, Thermodynamics and Statistical Physics*, S.Chand & Company Pvt. Ltd, New Delhi
2. Murugeshan., R and Kiruthiga Sivaprasath., (2018) *Modern Physics*, 18th Revised Edition, S.Chand & Company Pvt Ltd, New Delhi International Book Company, New Delhi.

REFERENCE BOOKS

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

Course Code 23UPHC61	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	-	2	1	-	1	-	-	-	-
CO 2	3	2	2	2	-	-	-	-	2	-
CO 3	3	3	2	-	2	2	-	-	-	2
CO 4	3	3	2	3	-	2	-	2	-	-
CO 5	3	-	2	-	3	-	-	-	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.G.Shanmuga Priya
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester VI	**SOLID STATE PHYSICS**	**Hours/Week: 6**	
Core Course - 15		**Credits: 5**	
Course Code		**Internal**	**External**
23UPHC62		**25**	**75**

COURSE OUTCOMES

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

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

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

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

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

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

UNIT I

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

UNIT II

Bonding in Solids: Bondings in solids **-** Ionic bonding – bond energy of NaCl molecule – calculation of lattice energy of ionic crystals – calculation of Madelung constant of ionic crystals – calculation of repulsive exponent from compressibility data – Born-Haber cycle – properties of ionic solids – examples of ionic solids – covalent bond – saturation in covalent bonds – directional nature of a covalent bond – hybridization – properties of covalent compounds – metallic bond – properties of metallic crystals – intermolecular bonds – dispersion bonds – dipole bonds – hydrogen bonds. (18 hours)

UNIT III

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

UNIT IV

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

UNIT V

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

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

TEXT BOOKS

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

REFERENCE BOOKS

1. Kittel, (2019) *Introduction to Solid State Physics,* Willey Eastern Ltd.

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

Course Code 23UPHC62	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	-	3	1	-	1	-	-	-	3
CO 2	3	2	3	2	-	-	-	-	2	-
CO 3	3	3	3	-	2	2	-	2	-	3
CO 4	3	3	3	3	-	2	-	3	-	-
CO 5	3	-	2	-	3	3	2	-	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R. Hemalatha
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**DIGITAL ELECTRONICS AND MICROPROCESSOR 8085**	**Hours/Week: 5**	
Core Course - 16		**Credits: 5**	
Course Code		**Internal**	**External**
23UPHC63		**25**	**75**

COURSE OUTCOMES

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

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

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

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

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

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

Course Code 23UPHC63	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1a	**PSO 1b**	**PSO 2**	**PSO 3a**	**PSO 3b**	**PSO 4a**	**PSO 4b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	-	2	-	2	1	-	-	-	2
CO 2	3	3	3	2	-	2	1	-	-	-
CO 3	3	-	2	2	3	2	2	-	-	-
CO 4	3	1	2	2	3	3	2	2	-	-
CO 5	3	3	2	3	3	3	2	3	2	1

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R.Hepzi Pramila Devamani
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023 -2024)

Semester VI	**ELECTRONICS PRACTICAL**	**Hours/Week: 3**	
Core Course - 17 Practical VI		**Credits: 2**	
Course Code 23UPHC61P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Experiments: (Any Eight)

1. Characteristics of a transistor – (CE mode)
2. FET – characteristics
3. Zener voltage regulator
4. UJT –relaxation oscillator
5. Hartley oscillator – transistor
6. Voltage doubler and tripler
7. Verification of reciprocity theorem
8. Astable Multivibrator - transistor
9. Amplitude Modulation
10. RC coupled CE transistor amplifier - single stage
11. Adder and subtractor using IC 741

Course Code 23UPHC61P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.S.Thenmozhi
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**MATERIAL SCIENCE**	**Hours/Week: 5**	
Elective Course **DSEC - 3**		**Credits: 4**	
Course Code **23UPHE61**		**Internal** **25**	**External** **75**

COURSE OUTCOMES

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

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

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

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

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

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

Unit I

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

Unit II

Material Deformation: Introduction – elastic behavior of materials – atomic model of elastic behavior –modulus as a parameter in design – rubber like elasticity – inelastic behavior of

materials – relaxation process – viscoelastic behavior of materials – spring-Dash pot models of viscoelastic behavior of materials. (15 hours)

UNIT III

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

Self-Study: creep: mechanism of creep - creep resistant materials.

UNIT IV

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

UNIT V

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

Self-Study: strengthening methods

TEXT BOOKS

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

REFERENCE BOOKS

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

Course Code 23UPHE61	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO 1	3	-	2	-	2	2	-	3	-	2
CO 2	3	3	3	2	-	2	2	-	-	3
CO 3	3	-	2	1	2	3	1	-	-	-
CO 4	3	-	2	2	3	2	1	2	-	-
CO 5	3	2	2	3	3	3	3	3	-	1

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.I.Rathinamala
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester V	**ENERGY PHYSICS**	**Hours/Week: 5**	
Elective Course **DSEC- 3**		**Credits: 4**	
Course Code **23UPHE62**		**Internal** **25**	**External** **75**

COURSE OUTCOMES

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

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

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

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

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

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

Unit I

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

Unit II

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

Unit III

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

(15 hours)

Unit IV

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

Unit V

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

Course Code 23UPHE62	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO 1	3	-	3	1	-	1	-	-	-	2
CO 2	3	2	3	2	-	-	-	-	2	-
CO 3	3	3	3	-	2	2	-	2	-	1
CO 4	3	3	3	3	-	2	-	3	-	-
CO 5	3	-	2	-	2	2	2	-	-	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.G.Shanmuga Priya
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**DIGITAL ELECTRONICS PRACTICAL**	**Hours/Week: 3**	
Elective Course DSEC – 4 Practical II		**Credits: 2**	
Course Code 23UPHE63P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Practicals (Any Eight)

1. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR, XNOR
2. Verification of De Morgan's theorem using ICs –NOT, OR, AND
3. NAND as universal building block
4. NOR as universal building block
5. Half adder / Half subtractor using basic logic gate ICs
6. Binary to Gray and Gray to Binary Conversion
7. Decade counter
8. Ring Counter (8-bit)
9. Shift Register (serial in serial out, parallel in parallel out)
10. BCD to Seven Segment Decoder.

Course Code 23UPHE63P	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R.Hepzi Pramila Devamani
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**DIGITAL CIRCUITS SIMULATION PRACTICAL**	**Hours/Week: 3**	
Elective Course DSEC – 4 Practical II		**Credits: 2**	
Course Code 23UPHE64P		**Internal 40**	**External 60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Practicals (Any Eight)

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

Course Code 23UPHE64P	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	1	-	1	-	3	-	2
CO 2	-	3	3	2	2	2	2	-	-	-
CO 3	-	3	3	3	-	2	2	-	3	2
CO 4	-	3	3	3	2	2	1	-	-	2
CO 5	-	3	2	3	2	2	2	2	2	2

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R.Hemalatha
Course Designer

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

B.Sc. PHYSICS

(for those who join in 2023-2024)

Semester VI	**MICROPROCESSOR PRACTICAL**	**Hours/Week: 2**	
SEC- 7		**Credits: 2**	
Course Code		**Internal**	**External**
23UPHS61P		**40**	**60**

COURSE OUTCOMES

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

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

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

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

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

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

List of Practicals (Any Eight)

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

Course Code 23UPHS61P	**PO1**		**PO2**	**PO3**		**PO4**		**PO5**	**PO6**	**PO7**
	PSO 1.a	**PSO 1.b**	**PSO 2**	**PSO 3.a**	**PSO 3.b**	**PSO 4.a**	**PSO 4.b**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	3	3	-	-	-	1	-	-	2
CO 2	-	3	3	2	-	2	-	-	-	1
CO 3	-	3	3	3	-	2	-	1	3	-
CO 4	-	3	2	3	3	2	-	1	2	-
CO 5	-	3	2	3	3	3	2	2	2	-

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

Dr.A.Azhagu Parvathi
Head of the Department

Dr.R.Hepzi Pramila Devamani
Course Designer