

B.Sc., PHYSICS

SYLLABUS

Programme Code: 3USPHY



2024-2027

SENGAMALA THAYAAR EDUCATIONAL TRUST

WOMEN'S COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC) | (An ISO 9001:2015 Certified Institution)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)
Accredited by NAAC- An ISO 9001:2015 Certified Institution
SUNDARAKKOTTAI, MANNARGUDI – 614 016.
TAMILNADU, INDIA.
B.Sc., PHYSICS

CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM

FRAME WORK (CBCS – LOCF)

(For the candidates admitted in the academic year 2024 – 2025)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a „cafeteria“ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME - BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes, which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses within a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Some important terminologies repeatedly used in LOCF:

Core Courses (CC) A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Non Major Elective (NME). A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10th & 12th std.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Undergraduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part –V

Extension activity, Gender studies

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks

Passing Minimum: 40 %

Assignment-3 = 30%

Test-2 = 50%

Seminar = 10%

Attendance = 10%

Question Paper Pattern

Part A:

Part A 1 (10X1=10 marks)

One word question/ Fill in the blanks/True or False/ Multiple Choice Questions

Two Questions from Each unit

Part A 2 (5X2=10 marks)

Match the following

Short Answers

One question from Each unit

Total Marks – 20

Part B: (5X5=25 marks)

Paragraph Answers

Either or type, One Question from each unit

Part C: (10X3=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

Part A: K1 Level

Part B: K2, K3 and K4 Level

Part C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S.No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/ Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in an way
4	K4	Analysis/ Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies as and or decision
6	K6	Synthesis/Creating	The learner creates anew product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K-LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	25			30		75
Continuous Internal Assessment (CIA)	20	25			30		75
QUESTION PATTERN FOREND SEMESTER EXAMINATION/Continuous Internal Assessment							
PART							MARKS
PART – A I. (No choice, One Mark) TWO questions from each unit					(10x1=10)		20
II. (No choice, Two Mark) ONE question from each unit					(5x2=10)		
PART – B (Either/ or type,5-Marks) ONE questions from each unit					(5x5=25)		25
PART – C (3 out of 5) (10Marks) ONE question from each unit					(3x10=30)		30
Total							75

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3.00 Hours.				Max Mark :75			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
PART							
PART – A (One Mark, No choice) (10x1=10)	10						10
(2 - Marks, No choice) (5x2=10)	10						10
PART – B (5 - Marks) (Either/or type) (5x5=25)		5	10	10			25
PART – C (10 Marks) (3 out of 5) (3x10=30)							
Courses having only K5,K6 levels, K5 level- 3 Questions, K6 level- 2 Questions (One K6 level question is compulsory)					20	10	30
Total	20	05	10	10	20	10	75

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$	$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses Passed in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

- For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
- Absence from an examination shall not be taken an attempt.

Table -1: Grading of the Courses - UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including previous semester /s is indicated by **Cumulative Grade Point Average (CGPA)**.

Table - 2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re – appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

Vision.

- To become a centre of excellence in Physics by dissemination and creation of knowledge through teaching and research in Physics at various levels and to help create a scientific Society, which encourages logical thinking.

Mission

- Providing best infrastructure, opportunities and environment to students through which they obtain excellence in knowledge in Physics.
- Exposing the students in developing protocols for the working modules in Physics.

PROGRAMME OUTCOMES FOR B.Sc., DEGREE PROGRAMMES

PO No.	Programme Outcomes (Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)
PO - 1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor Of Science.
PO - 2	Critical thinking, Problem Solving and Reflective thinking: Think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, With self-awareness and reflexivity of both self and society.
PO - 3	Analytical & Scientific Reasoning: Evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and Experiences from an open minded and reasoned perspective.
PO - 4	Research - related Skills: Develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment Or investigation.
PO - 5	Digital literacy and Effective Communication: Use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English hand in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO - 6	Individual and Team Work: Effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the Interests of or a common cause and work efficiently as a member of a team.
PO - 7	Multicultural Competence and Social Interaction: Understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in Group settings.
PO - 8	Awareness of Ethical issues, Human values and Gender Issues: Embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning Women and society.

PO - 9	Awareness of Environment and Sustainability : Understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO -10	Self directed and Lifelong learning: Acquire knowledge and skills, including learning“ how to learn“, that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-Technological changes.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., PHYSICS

PSO1	Placement: To prepare the students who will demonstrate respectful engagement with others“ ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions.
PSO2	Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations.
PSO3	Research and Development: Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.
PSO4	Contribution to Business World: To produce employable, ethical and innovative professionals to sustain in the dynamic business world.
PSO5	Contribution to the Society: To contribute to the development to the society by collaborating with stakeholders for mutual benefit.



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B.Sc., PHYSICS

**CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS – LOCF)**

(For the candidates admitted from the academic year 2024-2025)

ELIGIBILITY: A Pass in 10+2 with Physics and Mathematics as one of the core subjects

Sem	Part	Name of the Course	Course Code	Title of the Paper	Ins. Hours /Week	Ins. Hours /Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
I	I	Language Course–I	U24LC101	Pothu Tamil – I Tamil Ilakkiya Varalaru – I	6	5	1	-	-	3	3	25	75	100
	II	English Language Course – I	U24ELC101	General English – I	6	5	1	-	-	3	3	25	75	100
	III	Core Course – I	U24PH101	Properties of Matter and Acoustics	5	4	1	-	-	5	3	25	75	100
		Core Practical – I	U24PH102P	Physics Practical –I	4	1	-	3	-	4	3	25	75	100
		Allied Course –I	U24AMM101	Calculus	3	2	1	-	-	2	3	25	75	100
		Allied Course –II	U24AMM102	Algebra and Analytical Geometry(3D)	2	2	-	-	-	-	-	-	-	-
IV	Non Major Elective –I • Non-Major Elective I @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10 th & 12 th std. Non-Major Elective I @ - Those who choose NCC in Part V must choose NCC course as Non – Major Elective.			2	1	1	-	-	2	3	25	75	100	
		Foundation Course	U24FCPH11	Introductory Physics	2	1	1	-	-	2	3	25	75	100

				TOTAL		30	21	6	3	-	21	-	-	-	700
II	I	Language Course –II	U24LC202	Pothu Tamil –II Tamil Ilakkiya Varalaru – II	6	5	1	-	-	3	3	25	75	100	
	II	English Language Course –II	U24ELC202	General English –II	6	5	1	-	-	3	3	25	75	100	
	III	Core Course –II	U24PH203	Heat , Thermodynamics and Statistical Physics	5	4	1	-	-	5	3	25	75	100	
		Core Practical –II	U24PH204P	Physics Practical –II	4	1	-	3	-	4	3	25	75	100	
		Allied Course–II	U24AMM102	Algebra and Analytical Geometry(3D)	2	2	-	-	-	2	3	25	75	100	
		Allied Course –III	U24AMM203	Trigonometry and Fourier Series	3	3	-	-	-	2	3	25	75	100	
	IV	Non Major Elective –II • Non-Major Elective II @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10 th & 12 th std. Non-Major Elective II @ - Those who choose NCC in Part V must choose NCC course as Non – Major Elective.			2	1	1	-	-	2	3	25	75	100	
		Skill Enhancement Course –I	U24SEPH21	Energy Physics	2	1	1	-	-	2	3	25	75	100	
			TOTAL		30	21	6	3	-	23	-	-	-	800	

	Part	Name of the Course	Course Code	Title of the Paper	Ins. Hours /Week	Ins. Hours /Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
III	I	Language Course –III	U24LC303	Pothu Tamil – III Thamizhaka Varalarum Panpadum	6	5	1	-	-	3	3	25	75	100
	II	English Language Course – III	U24ELC303	General English –III	6	5	1	-	-	3	3	25	75	100
	III	Core Course –III	U24PH305	Mechanics	4	3	1	-	-	4	3	25	75	100
		Core Practical –III	U24PH306P	Physics Practical –III	4	-	-	4	-	4	3	25	75	100
		Allied Course –IV	U24ACS301	Introduction to Computer and Office Automation	2	2	-	-	-	2	3	25	75	100
	IV	Allied Practical – I	U24ACS302P	Office Automation Lab	2	-	-	2	-	-	-	-	-	-
		Skill Enhancement Course –II	U24SEPH32	Medical Instrumentation	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –III	U24SEPH33	Lasers and Fibre Optics	2	1	1	-	-	2	3	25	75	100
	V	Special Course	24UGSC	Health & Wellness	2	-	-	2	-	1	-	-	-	-
			TOTAL			TOT	17	5	8	-	21	-	-	-
IV	I	Language Course –IV	U24LC404	Pothu Tamil –IV Thamizhum Ariviyalum	6	5	1	-	-	3	3	25	75	100
	II	English Language Course –IV	U24ELC404	General English –IV	6	5	1	-	-	3	3	25	75	100
	III	Core Course – IV	U24PH407	Optics	5	4	1	-	-	5	3	25	75	100
		Core Practical –IV	U24PH408P	Physics Practical –IV	4	-	-	4	-	4	3	25	75	100
		Allied Course –V	U24ACS403	Fundamentals ofC Programming	3	3	-	-	-	2	3	25	75	100
		Allied Practical – I	U24ACS302P	Office Automation Lab	2	-	-	2	-	2	3	25	75	100
	IV	Skill Enhancement Course – IV	U24SEPH44	Communication Physics	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course –V	U24SEPH45	Astrophysics	2	2	-	-	-	2	3	25	75	100
			TOTAL			30	21	3	6	-	23	-	-	-
V	III	Core Course –V	U24PH509	Electricity, Magnetism and Electromagnetism	5	4	1	-	-	4	3	25	75	100
		Core Course –VI	U24PH510	Atomic and Nuclear Physics	5	4	1	-	-	5	3	25	75	100
		Core Course –VII	U24PH511	Analog and Communication Electronics	6	5	1	-	-	5	3	25	75	100
		Core Practical –V	U24PH512P	Physics Practical –V	4	-	-	4	-	4	3	25	75	100
		Elective Course –I	U24PHE51A / U24PHE51B / U24PHE51C	Materials Science / Domestic Electrical Appliances and Measuring Instruments/ Physics of Music	4	3	1	-	-	3	3	25	75	100
		Elective Course –II	U24PHE52A / U24PHE52B / U24PHE52C	Nanoscience and Nano technology / Mathematical Physics / Home Electrical Installation	4	3	1	-	-	3	3	25	75	100

	Part	Name of the Course	Course Code	Title of the Paper	Ins. Hours /Week	Ins. Hours /Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
	IV	Environmental Studies	24UGCES	Environmental Studies	2	2	-	-	-	2	3	25	75	100
		Internship/Industrial visit/Field visit	U24PHI51	Internship/Industrial visit/Field visit	-	-	-	-	-	2	-	-	-	-
			TOTAL	30	21	5	4	-	28	-	-	-	700	
VI	III	Core Course –VIII	U24PH613	Solid State Physics	6	5	1	-	-	4	3	25	75	100
		Core Practical –VI	U24PH614P	Physics Practical –VI	6	1	-	5	-	4	3	25	75	100
		Core Project	U24PHPW	Project with viva – voce/Group Project	5	-	1	4	-	5	3	25	75	100
		Elective Course –III	U24PHE63A / U24PHE63B / U24PHE63C	Numerical Methods and C Programming / Electrical Wiring Fundamentals/ Molecular Biophysics	4	3	1	-	-	3	3	25	75	100
		Elective Course –IV	U24PHE64A / U24PHE64B / U24PHE64C/	Digital Electronics and Microprocessor 8085 / Digital Photography / Advanced Mathematical Physics	4	3	1	-	-	3	3	25	75	100
	IV	Value Education	24UGVED	Value Education	2	2	-	-	-	2	3	25	75	100
		Professional competency Course	U24PCPH61	Aptitude and reasoning Skills for competitive examinations	2	2	-	-	-	2	3	25	75	100
	V	Gender Studies	24UGGS	Gender Studies	1	1	-	-	-	1	3	25	75	100
		Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
			TOTAL	30	17	4	9	-	25	-	-	-	800	
			GRAND TOTAL	180	118	29	33	-	141	-	-	-	4500	
		Extra Credit	Value added course (Atleast One per Year)	-	-	-	-	-	2	-	-	-	-	

L-Lecture

T-Tutorial

P-Practical

S-Seminar

Credit Distribution for B.Sc., Physics

S.No	Part	Subject	No. of Courses	Total Credits
1	I	Language Course	4	12
2	II	English Language Course	4	12
3	III	Core Course – Theory	8	37
4		Core Practical	6	24
5		Core Project	1	05
6		Allied Course – Theory	5	10
7		Allied Course – Practical	1	02
8		Elective Course	4	12
9	IV	Non-Major Elective	2	04
10		Foundation Course	1	02
11		Skill Enhancement Course	5	10
12		Internship/Industrial visit/Field Visit	1	02
13		Environmental Studies	1	02
14		Value Education	1	02
15		Professional Competency Course	1	02
16	V	Special Course	1	01
17		Gender Studies	1	01
18		Extension Activity	1	01
Total			48	141

Note:

	CIA	ESE
1 Theory	25	75
2 Practical	25	75
3	Separate passing minimum is prescribed for Internal and External Marks	

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for End Semester Examinations shall be 40% out of 75marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 25 marks [i.e.10 marks]

The passing minimum for End Semester Examinations shall be 40% out of 75marks [i.e. 30 marks]

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Paper
I	IV	NME - I	U24NMEPH11	Physics For Everyday Life
II	IV	NME - II	U24NMEPH22	Home Electrical Installation

SEMESTER V



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(For the candidates admitted from the academic year 2024 -2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – CC- V: Electricity, Magnetism and Electromagnetism

Ins.Hrs. / Week: 5

Course Credit: 4

Course Code:U24PH509

UNIT-I: CAPACITORS AND THERMO ELECTRICITY (15 Hours)

Capacitor –principle – capacitance of spherical and cylindrical capacitors – capacitance of a parallel plate capacitor (with and without dielectric slab) – effect of dielectric –Carey Foster bridge – temperature coefficient of resistance – Seebeck effect – laws of thermo emf – Peltier effect – Thomson effect – thermoelectric diagrams –uses of thermoelectric diagrams – thermodynamics of thermo couple - determination of Peltier and Thomson coefficients.

UNIT-II: MAGNETIC EFFECTS OF CURRENT (15 Hours)

Biot and Savart's law – magnetic induction due to circular coil – magnetic induction due to solenoid – Helmholtz tangent galvanometer –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 – Ampere's circuital law – differential form – divergence of magnetic field – magnetic induction due to toroid.

UNIT-III: MAGNETISM AND ELECTROMAGNETIC INDUCTION (17 Hours)

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 - earth inductor- determination of angle of dip(Φ)

UNIT-IV: TRANSIENT AND ALTERNATING CURRENTS (14 Hours)

Growth and decay of current in a circuit containing resistance and inductance – growth and decay of charge in a circuit containing resistance and capacitor – growth and decay of charge in an LCR circuit (expressions for charge only) – peak, average and rms values of ac – LCR series and parallel circuits – resonance condition – Q factor – power factor.

UNIT-V: MAXWELLS EQUATIONS AND ELECTROMAGNETIC WAVES (14 Hours)

Maxwell's equations in vacuum, material media– physical significance of Maxwell's equations – displacement current – plane electromagnetic waves in free space – velocity of light – Poynting vector– electromagnetic waves in a linear homogenous media – refractive index.

Total Lecture Hours – 75

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Describe various thermo-electric effects and their properties.
2. Apply Biot and Savart law to study the magnetic effect of electric current.
3. Use Faraday and Lenz laws in explaining self and mutual inductance.
4. Analyze the time variation of current and potential difference in AC circuits.
5. [different physical quantities used to explain magnetic properties of materials.

TEXT BOOKS

1. Murugesan. R., - Electricity and Magnetism, 8thEdn, 2006, S.Chand and Co, New Delhi.
2. Sehgal D.L., Chopra K.L, Sehgal N.K., - Electricity and Magnetism, Sultan Chand and Sons, New Delhi.
3. M. Narayanamurthy and N. Nagarathnam, Electricity and Magnetism, 4th Edition. National Publishing Co., Meerut.
4. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering ,4th Edition, 2009, Tata McGraw-Hill
5. Ralph J. Smith, Richard C. Dorf, Circuits, Devices and Systems: A First Course in Electrical Engineering, 5th Edition, 1992, John Wiley & Sons

REFERENCE BOOKS

- 1) Brijlal and Subramanian, Electricity and Magnetism, 6th Edn., Ratanand Prakash, Agra.
- 2) Brijlal, N.Subramanyan and JivanSeshan, Mechanics and Electrodynamics (2005), Eurasia Publishing House (Pvt.) Ltd., New Delhi.
- 3) David J. Griffiths, Introduction to Electrodynamics, 2ndEdn. 1997, Prentice Hall of India Pvt. Ltd., New Delhi.
- 4) Halliday, R. Resnik and J. Walker - Fundamentals of Physics, 6thEdn., Wiley, NY, 2001.
- 5) William H. Hayt Jr., Jack E. Kemmerly, and Steven M. Durbin *Engineering Circuit Analysis* 8th Edition, 2012, McGraw-Hill Education

E - RESOURCES

1. <https://www.edx.org/course/electricity>
2. <https://www.udemy.com/courses/ electricity>
3. <https://www.edx.org/course/magnetism>
4. <http://www.hajim.rochester.edu/optics/undergraduate/courses.html>
5. <https://www.khanacademy.org/science/electrical-engineering>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	M	M	M	S	S	M
CO2	M	S	S	S	M	S	S	M	M	M	M	S	S	S	M
CO3	S	S	S	M	S	S	S	M	S	M	M	S	S	S	M
CO4	S	S	S	S	S	S	S	M	M	M	M	S	M	S	M
CO5	S	S	M	S	S	S	M	M	S	M	M	M	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 -2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – CC- VI: Atomic and Nuclear Physics

Ins.Hrs. / Week: 5

Course Credit: 5

Course Code: U24PH510

UNIT-I: VECTOR ATOM MODEL

(15 Hours)

Introduction to 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 – magnetic dipole moment due to orbital motion and spin motion of the electron – Bohr magnetron – Stern-Gerlach experiment – selection rules – intensity rule.

UNIT-II: ATOMIC SPECTRA

(15 Hours)

Origin of atomic spectra – excitation and ionization potentials – Davis and Goucher's method – spectral terms and notations – fine structure of sodium D-lines – Zeeman effect –Larmor's theorem – quantum mechanical explanation of normal Zeeman effect – anomalous Zeeman effect (qualitative explanation) –Paschen-Back effect – Stark effect.

UNIT-III: RADIOACTIVITY

(15 Hours)

Discovery of radioactivity – natural radio activity – properties of alpha rays, beta rays and gamma rays – Geiger-Nuttall law – alpha particle spectra –Gammow's theory of alpha decay (qualitative study) – beta ray spectra – neutrino theory of beta decay – nuclear isomerism – internal conversion – non-conservation of parity in weak interactions.

UNIT-IV: NUCLEAR REACTIONS

(15 Hours)

Conservation laws of nuclear reaction – Q-value equation for a nuclear reaction – threshold energy – scattering cross section – artificial radio activity – application of radio isotopes – classification of neutrons – models of nuclear structure – liquid drop model – shell model.

UNIT-V: ELEMENTARY PARTICLES

(15 Hours)

Classification of elementary particles – fundamental interactions – elementary particle quantum numbers – Isospin and strangeness quantum number – Conservation laws and symmetry – quarks – quark model (elementary ideas only) – discovery of cosmic rays – primary and secondary cosmic rays – latitude effect– altitude effect.

Total Lecture Hours – 75

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Apply the vector atom model to understand atomic structure, including quantum numbers, coupling schemes, and magnetic properties, and explain key experiments and phenomena.
2. Analyze atomic spectra, including the origin, excitation, and ionization potentials, and explain various effects such as Zeeman, Paschen-Back, and Stark effects, and describe spectral terms and notations.
3. Analyze the properties and behavior of radioactive materials, including alpha, beta, and gamma decay, and apply relevant theories and laws to understand nuclear phenomena.
4. Apply conservation laws and nuclear reaction kinematics to understand various nuclear reactions, including artificial radioactivity, and describe the applications of radioisotopes and nuclear structure models.
5. Classify elementary particles and fundamental interactions, and apply relevant quantum numbers and conservation laws to understand particle behavior, including the quark model and cosmic rays.

TEXT BOOKS :

1. R. Murugesan, Modern Physics, S. Chand and Co. (All units) (Units I and II-Problems)
2. Brijlaland N. Subrahmanyam, Atomic and Nuclear Physics, S. Chand and Co. (All units)
3. J. B. Rajam, Modern Physics, S. Chand and Co.
4. Sehgal and Chopra, Modern Physics, Sultan Chand, New Delhi
5. Arthur Beiser – Concept of Modern Physics, McGraw Hill Publication, 6th Edition.

REFERENCE BOOKS :

1. Perspective of Modern Physics, Arthur Beiser, McGraw Hill.
2. Modern Physics, S. Ramamoorthy, National Publishing and Co.
3. Laser and Non-Linear Optics by B.B. Laud, Wiley Eastern Ltd., New York, 1985.
4. Tayal, D.C. 2000 – Nuclear Physics, Edition, Himalaya Publishing House, Mumbai.
5. Irving Kaplan (1962) Nuclear Physics, Second Edition, Oxford and IBH Publish and Co, New Delhi.
6. J.B. Rajam – Atomic Physics, S. Chand Publication, 7th Edition.
7. Roy and Nigam, – Nuclear Physics (1967) First edition, Wiley Eastern Limited, New Delhi.

E - RESOURCES

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html>
2. <https://makingphysicsfun.files.wordpress.com/2015/01/photoelectric-effect.pptx>
3. <https://www.khanacademy.org/science/physics/quantum-physics/in-in-nuclei/v/types-of-decay>
4. <https://www.khanacademy.org/science/in-in-class-12th-physics-india/nuclei>
5. <https://nptel.ac.in/courses/115/102/115102024/>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	M	M	M	S	S	L
CO2	S	S	M	S	M	S	S	M	M	M	M	M	S	S	L
CO3	S	S	S	M	S	S	M	S	S	S	M	S	S	S	M
CO4	M	S	S	S	S	M	S	M	M	M	M	S	S	S	M
CO5	S	M	S	S	M	S	S	M	M	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



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DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: V – CC- VII: Analog and Communication Electronics

Ins.Hrs. / Week: 6

Course Credit: 5

Course Code:U24PH511

UNIT-I: SEMICONDUCTORS AND DIODES

(20 Hours)

Introduction to Semiconductors - n-type and p-type Semiconductors - Diode characteristics – Rectifiers - Clipper circuits, Clamping circuits. Half Wave Rectifier, Center Tapped and Bridge Full Wave Rectifiers, calculation of Efficiency and Ripple Factor. Zener diode - Zener diode as Voltage Regulator, Temperature coefficient of Zener diode.

UNIT-II: TRANSISTORS AND TRANSISTOR AMPLIFIERS

(15 Hours)

Transistors: npn and pnp Transistors. Transistor configurations: CB, CE and CC modes – I-V characteristics and Hybrid parameters – DC Load Line – Q point. Self-bias – RC Coupled CE Amplifier – Power Amplifiers – classification of Power Amplifiers: A, B, C – Push-Pull Amplifiers – Tuned Amplifiers.

UNIT-III: TRANSISTOR OSCILLATORS

(20 Hours)

Feedback Amplifier - Principle of Feedback, Positive and Negative Feedback of voltage and current gain, Advantages of Negative Feedback - Barkhausen's Criterion. Transistor oscillators: Hartely, Colpitt, Phase shift Oscillators with mathematical analysis.

UNIT-IV: OPERATIONAL AMPLIFIERS

(20Hours)

Differential Amplifiers – Op-Amp 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 Vibrator.

UNIT-V: MODULATION AND DEMODULATION

(15 Hours)

Theory of Amplitude Modulation - Frequency Modulation – Comparison of AM and FM – Phase Modulation – Sampling Theorem – Pulse Width Modulation – Pulse Modulation Systems: PAM, PPM, and PCM – Demodulation: AM and FM Detection - Duper Heterodyne Receiver (Block Diagram).

Total Lecture Hours – 90

COURSE OUTCOMES

Upon completion of this course, the students would be able to

1. Explain the basic concepts of semiconductor devices.
2. know and classify the basic principles of biasing and transistor amplifiers
3. Acquire the fundamental concepts of oscillators.
4. Understand the working of operational amplifiers
5. Learn and analyze the operations of sequential and combinational digital circuits

TEXT BOOKS

1. V.K.Mehta - Principles of Electronics, S.Chand and Co. Ltd., 2004.
2. V.Vijayendran - Integrated Electronics, S.Vishwanathan Publishers, Chennai.
3. B.L. Theraja - A Text Book of Electrical Technology.
4. John D. Ryder - Electronic fundamentals and Applications.
5. Malvino - Electronic Principles, Tata McGraw Hill.

REFERENCE BOOKS

1. B. Grob - Basic Electronics, 6th edition, McGraw Hill, NY, 1989.
2. Herbert Taub and Donald schilling - Digital Integrated Electronics, McGraw Hill, NY.
3. Ramakant A. – Op amp principles and linear integrated circuits, Gaykward
4. Bagde and S. P. Singh - Elements of Electronics.
5. Millman and Halkias- Integrated Electronics, Tata McGraw Hill.

E - RESOURCES

1. <https://www.queenmaryscollege.edu.in/eresources/undergraduateprogram/py157>
2. www.ocw.mit.edu>...> Circuits and Electronics
3. www.ocw.mit.edu>...> Introductory Analog Electronics Laboratory
4. [https:// www.elprocus.com](https://www.elprocus.com)> semiconductor devices
5. [https:// www.britannica.com](https://www.britannica.com)>technology

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	M	M	M	S	S	L
CO2	S	S	M	S	M	M	S	M	M	M	M	S	S	S	L
CO3	M	M	S	L	S	S	L	S	S	S	M	S	S	S	L
CO4	M	S	S	S	S	S	S	M	L	M	M	S	S	S	M
CO5	S	M	S	S	M	M	S	M	M	S	M	S	S	S	M

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DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: V – CP- V: Physics Practical – V

(Any Eight Experiments)

Ins.Hrs. / Week: 4

Course Credit: 4

Course Code: U24PH512P

1. Diffraction grating Normal incidence.
2. Diffraction grating minimum deviation.
3. Diffraction at a wire.
4. Specific rotation of sugar solution.
5. Bi-prism – Determination of λ .
6. Thickness of a thin film of Bi-prism
7. Brewster's law – polarization
8. Double refraction (μ_e and μ_o)
9. γ – by Cornu's method.
10. Dispersive power of plane diffraction grating.
11. Diffraction at a straight edge.
12. Kundt's tube – Velocity of sound, Adiabatic Young's modulus of the material of the rod.
13. Forbes' method – Thermal conductivity of a metal rod.
14. Spectrometer– Grating - Normal incidence - Wave length of Mercury spectral lines.
15. Spectrometer – Grating - Minimum deviation - Wave length of Mercury spectral lines.
16. Spectrometer – (i-d) curve.
17. Spectrometer – (i-i') curve.
18. Spectrometer – Narrow angled prism.
19. Rydberg's constant
20. e/m Thomson method
21. h by photocell
22. Spectral response of photo conductor (LDR).
23. Potentiometer –Resistance and Specific resistance of the coil.
24. Potentiometer – E.M.F of a thermocouple.
25. Carey Foster's bridge - Temperature coefficient of resistance of the coil.
26. Deflection Magnetometer – Determination of Magnetic moment of a bar magnet and B_H using circular coil carrying current.
27. Vibration magnetometer - Determination of B_H using circular coil carrying current– Tan θ position.
28. B.G – Figure of Merit – Charge Sensitivity

Total Lecture Hours - 60

COURSE OUTCOME

Upon completion of this course, the students would be able to

1. Develop the skill of experimenting collaboratively and ethically.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.
2. M.N.Srinivasan, S.Balasubramanian and R. Ranganathan, A Textbook of Practical Physics, Sultan Chand & Sons (2013).

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

E – RESOURCES

1. <https://youtu.be/GTnPEtksTEc>
2. <https://youtu.be/veQ-LfJhfxM>



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(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – EC-I: Materials Science

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE51A

UNIT-I: CRYSTAL IMPERFECTIONS

(15 Hours)

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 and twist boundaries, twin boundaries, stacking faults – volume defects – effect of imperfections.

UNIT-II: MATERIAL DEFORMATION

(15 Hours)

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.

UNIT-III: PERMANENT DEFORMATION AND STRENGTHENING METHODS OF MATERIALS

(10 Hours)

Introduction – plastic deformation: tensile stress-strain curve – plastic deformation by slip – creep: mechanism of creep – creep resistant materials – strengthening methods: strain hardening, grain refinement – solid solution strengthening – precipitation strengthening.

UNIT-IV: OPTICAL MATERIALS

(10 Hours)

Introduction – optical absorption in metals, semiconductors and insulators – NLO materials and their applications – display devices and display materials: fluorescence and phosphorescence – light emitting diodes – liquid crystal displays.

UNIT-V: MECHANICAL TESTING

(10 Hours)

Destructive testing: tensile test, compression test, hardness test – nondestructive testing (NDT): radiographic methods, ultrasonic methods – thermal methods of NDT: thermography – equipment used for NDT: metallurgical microscope

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Explain different types of crystal imperfections and analyze their effects on material properties.
2. Describe the elastic and viscoelastic behavior of materials using atomic and mechanical models.
3. Understand mechanisms of plastic deformation and apply strengthening techniques to improve material performance.
4. Analyze optical properties of materials and explain the working principles of optical devices.
5. Demonstrate understanding of destructive and nondestructive testing methods for evaluating material properties.

TEXT BOOKS :

1. Material science and Engineering, Raghavan V, Prentice Hall of India, Sixth Edition, 2015
2. Materials science, V. Rajendran, McGraw Hill publications 2011.
3. William D. Callister Jr. & David G. Rethwisch, Materials Science and Engineering: An Introduction, 9th Edition (or latest), Wiley, ISBN: 9781118324578
4. James F. Shackelford, Introduction to Materials Science for Engineers, 8th Edition, Pearson, ISBN: 9780133826654
5. V. Raghavan, Materials Science and Engineering, 6th Edition, Prentice Hall India (PHI), ISBN: 9788120348014

REFERENCE BOOKS

1. William D. Callister, Jr., Material Science and Engineering – An Introduction, 8th Edition, John Wiley and Sons, Inc., 2007
2. W. Bolton, “Engineering materials technology”, 3rd Edition, Butterworth and Heinemann, 2001.
3. Donald R. Askeland, Pradeep P. Phule, “The Science and Engineering of Materials”, 5th Edition, Thomson Learning, First Indian Reprint, 2007.
4. William F. Smith, “Structure and Properties of Engineering Alloys”, Mc-Graw-Hill Inc., U.S.A, 2nd edition, 1993.
5. Donald R. Askeland & Wendelin J. Wright, The Science and Engineering of Materials, Cengage Learning, ISBN: 9781305076761

E-Resources:

1. <https://b-ok.lat/book/3619833/40b36c>
2. <https://ocw.mit.edu/courses/materials-science-and-engineering/>
3. <https://www.coursera.org/learn/materials-science-engineering>
4. onlinecourses.nptel.ac.in/YouTube
5. hep.ph.ic.ac.uk

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	L	L	L	M	M	M	M	S	S	M
CO2	S	S	S	M	M	L	L	L	L	M	M	M	S	S	L
CO3	S	S	S	S	M	L	L	L	M	M	M	S	S	S	M
CO4	S	S	M	M	S	L	L	L	M	M	M	S	S	S	M
CO5	S	S	S	S	M	M	L	M	M	M	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



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DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: V – EC-I: Domestic Electrical Appliances and Measuring Instruments

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE51B

UNIT – I : RESISTORS:

(15 Hours)

Resistance – unit – Law of resistance – effect of temperature on resistance (carbon, metal film, thin film, wire wound) – variable resistors – colour code.- Types of Resistors (Carbon Composition, Metal Oxide, Wire Wound, SMD)- Power Rating of Resistors- Tolerance and Precision Resistors- Surface Mount Technology (SMT) Resistors- Series and Parallel Combination of Resistors- Voltage Divider Rule- Non-linear Resistors (NTC, PTC, LDR, Varistor)- Applications in Current Limiting, Biasing, and Load Resistance

UNIT – II: INDUCTORS:

(10 Hours)

Inductance – General information – types of inductors (ferrite and choking inductors)- Self and Mutual Inductance- Energy Stored in an Inductor- Core Materials: Air Core, Iron Core, Ferrite Core- Inductive Reactance and Its Frequency Dependence- Applications in Filters, Chokes, and Transformers- Series and Parallel Combination of Inductors- Skin Effect in Inductors- Difference Between Ideal and Real Inductors

UNIT – III : CAPACITORS:

(10 Hours)

Capacitors - Principle – types of capacitors (Air, Paper, electrolyte and mica) – fixed and variable capacitors – specifications - applications- Capacitance in Series and Parallel- Charging and Discharging of a Capacitor- Energy Stored in a Capacitor- Dielectric Materials and Their Properties- Electrolytic vs. Non-electrolytic Capacitors- Capacitive Reactance and Frequency Relationship- Use of Capacitors in Oscillators and Filters- Safety and Polarity Considerations in Electrolytic Capacitors

UNIT – IV: LIGHT SOURCES:

(15 Hours)

Definition and units of light – luminous flux - Luminous intensity – illumination – units of luminous intensity – types of light sources – Sodium vapour lamp – Mercury vapour lamp – Fluorescent lamp- Spectral Response of Human Eye- Efficiency of Light Sources (Luminous Efficacy)- LED Technology and Its Advantages- Comparison of Traditional vs. Modern Light Sources- Basics of Color Temperature-Infrared and Ultraviolet Light Sources-Photometry – Measurement of Light

UNIT – V: MEASURING INSTRUMENTS:

(10 Hours)

Galvanometer – Ammeter – Voltmeter – Ohmmeter – Multimeter – CRO- Digital vs. Analog Instruments- Instrument Calibration and Accuracy-Sensitivity and Range Selection-Internal Construction of Ammeter and Voltmeter- Block Diagram and Working of a CRO-Probes and Attenuators Used with CRO-Applications of Multimeters in Circuit Testing

Total Lecture Hours – 60

COURSE OUTCOMES:

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

1. Recall the concepts of resistors, inductors and capacitors
2. Apply their skills on connecting various components like resistors, capacitors etc.
3. Identify the defects in electrical appliances
4. Rectify the defects in the parts of electrical appliances.
5. Able to design prototypes of simple electrical appliances

TEXT BOOKS

1. Basic Electrical Engineering, V.K. Mehta & Rohit Mehta, S. Chand Publishing
2. Electronic Devices and Circuit Theory, Robert L. Boylestad & Louis Nashelsky, Pearson Education, 11th Edition
3. Principles of Electrical Engineering and Electronics, V.K. Mehta & Rohit Mehta, S. Chand Publishing
4. B.L. Theraja, A.K. Theraja, (2008), "A Textbook of Electrical Technology," Volume 1, S. Chand Publishing, New Delhi.
5. H. Cotton, (2006), "Basic Electrical Engineering," 2nd Edition, Pearson Education, India.

REFERENCE BOOKS

1. Home appliances GT Publications, Jaipur.
2. Electrical power – Dr. S. L. Uppal.
3. Basic Electrical Engineering – M. L. Anwani, Dhanapat Rai and Co. New Delhi.
4. M.S. Jamal, (2011), "Basic Electrical Engineering," 3rd Edition, Tata McGraw-Hill Education, New Delhi.
5. H. Cotton, (2006), "Basic Electrical Engineering," 2nd Edition, Pearson Education, India.

E-RESOURCES

1. https://www.electronics-tutorials.ws/resistor/res_1.html
2. <https://www.rohm.com/electronics-basics/resistors/temperature-characteristics>
3. https://www.electronics-tutorials.ws/inductor/ind_2.html
4. <https://www.youtube.com/user/nptelhrd>
5. <https://www.youtube.com/watch?v=DUBgaK2vHvA>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	L	L	L	L	L	M	M	L	M	S	L
CO2	S	S	S	M	M	M	L	L	L	M	M	S	S	S	L
CO3	S	S	S	S	M	M	L	M	L	M	M	S	S	S	M
CO4	S	S	S	S	M	S	L	M	L	M	M	S	S	S	M
CO5	S	S	S	S	S	S	M	M	M	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



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(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – EC-I: Physics of Music

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code:U24PHE51C

UNIT-I: SCIENTIFIC STUDY OF MUSIC

(15 Hours)

Vibrations of atoms of matter– vibrations coupling to air – propagation of sound waves in air, other media, fluids and solids – velocity, frequency, wavelength, time period, intensity: definition and units – classification of sound on frequency and velocity– human and animal sound perception– mechanism of ear and hearing – psychoacoustics

UNIT-II: SIMPLE VIBRATING SYSTEMS

(10 Hours)

Simple harmonic motion – tuning fork– amplitude, phase, energy, energy loss/damping/ dissipation – power – travelling waves and standing waves– laws of vibration in stretched strings– one-dimensional medium – open and closed organ pipes – over tones, harmonics – quality of sound: pitch, timber, loudness – octaves, musical notes

UNIT-III: MUSICAL TONE

(10 Hours)

Pure/simple tones – sine/cosine waves– well-defined frequencies, wavelengths, amplitudes and phases– partial tones – assembly of pure tones– mix of different frequencies and amplitudes– complex tone – superposition of simple tones – complex waveform– periodic complex waveform – formants – resonances– sound envelope

UNIT-IV: PRODUCTION OF MUSICAL SOUNDS

(15 Hours)

Human voice, mechanism of vocal sound production – larynx (sound box) – *stringed Instruments*: plucked and bowed, guitar, mandolin, violin, piano, etc. – *wind instruments*: whistles, flute, saxophone, pipe organ, bagpipes, etc– *percussion instruments*: plates, membranes, drums, cymbals, xylophone etc. – *electronic instruments*: keyboards, electric guitars, rhythm pads, etc. – analog and digital sound synthesizers, –MIDI instrument– computer generated music

UNIT-V: RECORDING OF MUSIC and SOUND

(10 Hours)

Edison phonograph – cylinder and disk records – magnetic wire and tape recorders – digital recording (e.g. to CD, DVD, etc.)– analog transducers, condenser, dynamic microphones, loudspeaker – complex sound fields – near and far fields of acoustic– spectral analysis techniques – continuous and discrete Fourier transforms, digital signal processing – digital filtering – specifications of recording studios

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Understand the scientific principles of sound generation, propagation, perception, and psychoacoustics.
2. Explain simple vibrating systems and analyze the physical principles behind musical instruments like strings and pipes.
3. Understand the composition of musical tones through the superposition of simple tones and the concept of complex waveforms.
4. Describe the mechanisms of musical sound production across human voice, traditional, electronic, and computer-generated instruments.
5. Explain the principles and technologies behind sound recording, transmission, and analysis using modern digital techniques.

TEXT BOOKS:

1. Physics and Music: The Science of Musical Sound by Harvey White (2014)
2. Good Vibrations – The Physics of Music by Barry Parker, (2009)
3. The History of Musical Instruments by Curt Sachs, (2006)
4. Physics and Music: Essential Connections and Illuminating Excursions by Kinko Tsuji and Stefan C. Müller (2021)
5. Thomas D. Rossing, Richard F. Moore, and Paul A. Wheeler, The Science of Sound, 3rd Edition, Pearson Education, ISBN: 9780805385656

REFERENCE BOOKS:

1. Benade, A. H., Fundamentals of Musical Acoustics, Oxford University Press, 2nd Ed., 1990, A
2. Rossing, T. D., Moore, F. R., & Wheeler, P. A., The Science of Sound, Addison-Wesley, 3rd Ed., 2002
3. Fletcher, N. H., & Rossing, T. D., The Physics of Musical Instruments, Springer, 2nd Ed., 1998
4. Howard, D. M., & Angus, J., Acoustics and Psychoacoustics, Routledge, 5th Ed., 2017
5. Arthur H. Benade, Fundamentals of Musical Acoustics, Reprint Edition (1990), Dover Publications, ISBN: 9780486264840

E-RESOURCES :

1. <https://ocw.mit.edu>
2. <https://www.khanacademy.org/science/physics/mechanical-waves-and-sound>
3. <https://exploresound.org>
4. <https://wl.mtsu.edu/faculty/wroberts/teaching/purecomp.php>
5. <https://sites.ualberta.ca/~michaelf/acoustics-notes.htm>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	L	M	L	L	M	S	M	M	S	M
CO2	S	S	S	M	M	L	M	L	L	M	S	M	S	S	M
CO3	S	S	S	M	M	L	M	L	L	M	S	M	S	S	M
CO4	S	S	M	M	S	M	S	M	L	M	S	S	M	S	M
CO5	S	S	S	S	S	M	M	M	L	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – EC-II: Nanoscience and Nanotechnology

Ins.Hrs. / Week: 4 Course Credit: 3 Course Code: U24PHE52A

UNIT-I: NANOSCIENCE AND NANOTECHNOLOGY: (15 Hours)

Nanoscale– nature and nanostructures – nanostructures: 0D, 1D, 2D– surface to volume ratio– size effect – excitons – quantum confinement– metal based nanoparticles (metal and metal oxide) – nanocomposites (non-polymer based) – carbon nanostructures – fullerene –SWCNT and MWCNT

UNIT-II: PROPERTIES OF NANOMATERIALS (10 Hours)

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

UNIT-III: FABRICATION METHODS AND VACUUM TECHNIQUES (10 Hours)

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.

UNIT-IV: CHARACTERIZATION TECHNIQUES (10 Hours)

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.

UNIT-V: APPLICATIONS OF NANOMATERIALS: (15 Hours)

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

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Understand the basic concepts of nanoscience, types of nanostructures, and the significance of size effects and quantum confinement.
2. Explain the mechanical, optical, electrical, magnetic, and electrochemical properties of nanomaterials, including properties of carbon nanotubes.
3. Describe various fabrication methods for nanomaterials and understand vacuum techniques used in nanomaterial synthesis.
4. Understand and apply different characterization techniques like microscopy and spectroscopy for analyzing nanomaterials.
5. Explain the applications of nanomaterials in fields such as medicine, energy, sensors, nanoelectronics, and advanced devices.

TEXT BOOKS

- 1) K.K.Chattopadhyay and A.N.Banerjee, (2012), Introduction to Nanoscience and Nanotechnology, PHI Learning Pvt. Ltd.,
- 2) M.A. Shah, Tokeer Ahmad (2010), Principles of Nanoscience and Nanotechnology, Narosa Publishing House Pvt Ltd.
- 3) Mick Wilson, et al (2005) Nanotechnology, Overseas Press.
- 4) T. Pradeep (2007), *Nano: The Essentials – Understanding Nanoscience and Nanotechnology*, Tata McGraw-Hill Education.
- 5) M.A. Shah and Tokeer Ahmad (2010), *Principles of Nanoscience and Nanotechnology*, Narosa Publishing House.

REFERENCE BOOKS

1. Richard Booker and Earl Boysen, (2005) Nanotechnology, Wiley Publishing Inc. USA
2. J.H.Fendler (2007) Nano particles and nano structured films; Preparation, Characterization and Applications, John Wiley and Sons
3. B.S.Murty, et al (2012) Textbook of Nanoscience and Nanotechnology, Universities Press
4. Guozhong Cao and Ying Wang (2011), Nanostructures and Nanomaterials: Synthesis, Properties and Applications, 2nd Edition, World Scientific Publishing
5. Charles P. Poole Jr. and Frank J. Owens (2003), Introduction to Nanotechnology, Wiley.

E-RESOURCES :

- 1) <https://ocw.mit.edu>
- 2) <https://www.nano.gov/>
- 3) <https://youtu.be/Tb1zVy-T4Uo>
- 4) <https://archive.org/details/principlesofnano0000shah>
- 5) https://www.narosa.com/books_display.asp?catgcode=978-81-8487-072-5

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	L	L	L	M	M	M	M	S	S	M
CO2	S	S	S	M	M	L	L	L	M	M	M	S	S	S	M
CO3	S	S	S	S	M	M	L	L	M	M	M	S	S	S	M
CO4	S	S	S	S	S	M	L	L	M	M	M	S	S	S	M
CO5	S	S	S	S	S	M	M	M	S	S	M	S	S	S	S

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: V – EC-II: Mathematical Physics

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE52B

UNIT-I: MATRICES:

(15 Hours)

Types of matrices – symmetric, Hermitian, unitary and orthogonal matrices – characteristic equation of a matrix – Eigen values and Eigen vectors of a matrix – Cayley-Hamilton theorem – inverse of matrix by Cayley-Hamilton theorem – similarity transformations – diagonalization of 2×2 real symmetric matrices.

UNIT-II: VECTOR CALCULUS:

(10 Hours)

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 theorem, Stoke's theorem, Green's theorem.

UNIT-III: ORTHOGONAL CURVILINEAR COORDINATES:

(10 Hours)

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.

UNIT IV: FOURIER SERIES AND TRANSFORMS

(15 Hours)

Introduction to periodic functions and Dirichlet's conditions – general Fourier series – Fourier expansions of even and odd functions – sine and cosine (half-range) series – change of interval length – Fourier analysis of square, sawtooth, and rectified waveforms. Introduction to Fourier, Fourier sine, and cosine transforms – transforms of single pulse, trigonometric, exponential, and Gaussian functions – inverse Fourier transform – convolution theorem.

UNIT-V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (PDE):

(10 Hours)

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 conditions – Application of boundary and initial conditions – interpretation of physical solutions – problems involving fixed and insulated ends, steady and transient states.

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Understand the properties of different types of matrices, calculate eigenvalues and eigenvectors, and apply the Cayley-Hamilton theorem for matrix diagonalization.
2. Explain the fundamental concepts of vector calculus, including differentiation, gradient, divergence, curl, and the application of key theorems like Gauss's, Stokes', and Green's.
3. Describe orthogonal curvilinear coordinates, including cylindrical and spherical systems, and apply these to compute gradient, divergence, curl, and Laplacian.
4. Understand Fourier series and Fourier transforms, and apply them to analyze periodic functions, waveforms, and various mathematical transformations.
5. Solve partial differential equations (PDEs) related to wave and heat flow, using methods such as separation of variables and applying boundary and initial conditions.

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
2. Mathematical Physics – P. K. Chattopadhyay, New Age International Publishers.
3. Mathematical Physics – B. D. Gupta.
4. Mathematical Physics – H. K. Das, S. Chand and Co, New Delhi.
5. B.S. Grewal (2020), *Higher Engineering Mathematics*, 44th Edition, Khanna Publishers.

REFERENCE BOOKS:

1. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
2. Engineering Mathematics III- B, M. K. Venkataraman,
3. Applied Mathematics for Scientists and Engineers, Bruce R. Kusseand Erik A. Westwig, 2nd Ed, WILEY-VCH Verlag, 2006.
4. Vector space and Matrices – J. C. Jain, Narosa Publishing House Pvt. Ltd.
5. Erwin Kreyszig (2011), *Advanced Engineering Mathematics*, 10th Edition, Wiley India.

E-RESOURCES :

1. <https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/>
2. <https://www.khanacademy.org/math/linear-algebra>
3. <https://tutorial.math.lamar.edu/Classes/LinAlg/LinearAlgebra.aspx>
4. [Linear Algebra - Lamar University](#)

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	L	L	L	L	M	M	M	S	S	L
CO2	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO3	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO4	S	S	S	S	M	L	L	L	L	S	M	S	S	S	M
CO5	S	S	S	S	M	L	L	L	M	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

**DEPARTMENT OF
PHYSICS B.Sc., PHYSICS**

Semester: V – EC-II: Home Electrical Installation

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE52C

UNIT-I: SIMPLE ELECTRICAL CIRCUITS

(15 Hours)

Charge, current, potential difference, resistance – simple electrical circuits – dc ammeter, voltmeter, ohmmeter – ohm's law – difference between dc and ac – advantages of ac over dc – electromagnetic induction – transformers – inductors/chokes – capacitors/condensers – impedance – ac ammeter, voltmeter – symbols and nomenclature

UNIT-II: TRANSMISSION OF ELECTRICITY

(10 Hours)

Production and transmission of electricity – concept of power grid – series and parallel connections – technicalities of junctions and loops in circuits – transmission losses (qualitative) – roles of step-up and step-down transformers – quality of connecting wires – characteristics of single and multicore wires

UNIT-III: ELECTRICAL WIRING

(10 Hours)

Different types of switches – installation of two way switch – role of sockets, plugs, sockets – installation of meters – basic switch board – electrical bell – indicator – fixing of tube lights and fans – heavy equipment like ac, fridge, washing machine, oven, geyser, jet pumps – provisions for inverter – gauge specifications of wires for various needs

UNIT-IV: POWER RATING AND POWER DELIVERED

(15 Hours)

Conversion of electrical energy into different forms – work done by electrical energy – power rating of electrical appliances – energy consumption – electrical energy unit in kwh – calculation of eb bill – joule's heating – useful energy and energy loss – single and three phase connections – measures to save electrical energy – energy audit

UNIT-V: SAFETY MEASURES

(10 Hours)

Insulation for wires – colour specification for mains, return and earth – understanding of fuse and circuit breakers – types of fuse: Kit-kat, hrc, cartridge, mcb, elcb – purpose of earth line – lighting arrestors – short circuiting and over loading – electrical safety – tips to avoid electrical shock – first aid for electrical shock – fire safety for electric current

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

1. Understand the fundamental principles of electrical circuits and electrical measurements.
2. Explain the generation, transmission, and utilization of electrical energy.
3. Perform basic electrical wiring and installation practices safely.
4. Calculate electrical power, energy consumption, and electricity costs.
5. Apply energy conservation techniques and conduct basic energy audits.

TEXT BOOKS:

1. Wiring a House: 5th Edition by Rex Cauldwell, (2014).
2. Black and Decker Advanced Home Wiring, 5th Edition: Backup Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018).
4. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).

REFERENCE BOOKS:

- 1) B. L. Theraja & A. K. Theraja, A Textbook of Electrical Technology, Volume I: Basic Electrical Engineering, S. Chand Publishing, New Delhi.
- 2) V. K. Mehta & Rohit Mehta, Principles of Electrical Engineering and Electronics, S. Chand Publishing, New Delhi.
- 3) D. P. Kothari & I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education, India.
- 4) S. K. Bhattacharya, Basic Electrical Engineering, Pearson Education, India.
- 5) J. B. Gupta, Fundamentals of Electrical Engineering and Electronics, S. K. Kataria & Sons, New Delhi.

E- RESOURCES :

1. [NPTEL Electrical Engineering Courses](#)
2. [MIT OpenCourseWare](#)
3. [All About Circuits](#)
4. [Electrical4U](#)
5. [NIOS Online Course Material](#)

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	L	L	L	L	M	M	M	S	S	L	S
CO2	S	S	M	M	L	L	L	S	M	M	S	S	S	M	S
CO3	S	M	S	M	S	M	S	M	M	S	S	S	S	M	S
CO4	S	S	M	M	L	L	L	S	M	M	S	S	S	M	S
CO5	S	S	S	M	M	M	S	S	S	M	S	S	S	S	S

S-Strong (3) M-Medium (2) L-Low (1)



BHARATHIDASAN UNIVERSITY TIRUCHIRAPPALLI - 620 024

PART-IV ENVIRONMENTAL STUDIES COURSE

FOR ALL UG ARTS, SCIENCE, COMMERCE AND MANAGEMENT CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

Third Year

**PART-IV
ENVIRONMENTAL STUDIES
(Theory)**

Semester-V

Code:25UGCES

Credit: 2

COURSE OBJECTIVES:

1. To appreciate the scope of Environmental Studies, Community ecology and the interdisciplinary nature of environmental issues
2. To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India.
3. The course designed to gain knowledge on values of biodiversity and conservation on global, national, and local scales
4. To study about sources and effects of environmental pollution like air, water, soil, thermal, marine, nuclear and noise
5. To understand the concerns related to Sustainable Development on environment and health
6. To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.

UNIT-1: The Multidisciplinary nature of environmental studies
Definition, scope and importance. (2 lectures)
Need for public awareness

UNIT-2: Natural Resources:
Renewable and non-renewable resources:
Natural resources and associated problems.

1. Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
3. Mineral resources: Use and exploitation, environmental effects of extracting and

using mineral resources, case studies.

4. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
 5. Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
 6. Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.
- Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit: 3

Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-
 - a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4

Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Biological Diversity Act 2002/ BD Rules, 2004

(8 lectures)

Unit: 5

Environmental Pollution

Definition

Causes, effects and control measures of :

1. Air Pollution
2. Water Pollution
3. Soil Pollution
4. Marine Pollution
5. Noise pollution
6. Thermal Pollution
7. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

(8 lectures)

Unit: 6

Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7

Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes

- Environment and human health
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

- Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

COURSE OUTCOMES:

1. Understand the environmental importance including interactions across local to global scales.
2. The learners to update and analyze environmental relationships and interactions of environmental components
3. The student to gain knowledge on importance of natural resources in a systematic way.
4. The course content is introduce the concept of renewable and non-renewable energy resources and its scenario in India and at global level
5. The students will know the relationship between biodiversity and ecosystem functions, direct and indirect values of biodiversity resources and their bioprospecting opportunities.
6. The learners can gain awareness related on environmental pollution, causes and pollution control with case studies.
7. Student to obtain the environmental ethics and gain knowledge about the sustainable development.
8. Learners should realize the environmental legislation and policies of national and international regime and know the regulations applicable to industries and other organizations with significant Environmental aspects

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt Ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p (M) Magazine (R) Reference (TB) Textbook
23. <http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20>

SEMESTER VI



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI – CC-VIII: Solid State Physics

Ins.Hrs. / Week: 6

Course Credit: 4

Course Code: U24PH613

UNIT-I: BONDING IN SOLIDS, CRYSTAL STRUCTURE: (20 Hours)

Types of bonding – ionic bonding – bond energy of NaCl molecule – covalent bonding – metallic bonding – hydrogen bonding – Van-der-Waals bonding – crystal lattice – lattice translational vectors – lattice with basis – unit cell – Bravais' lattices – Miller indices – e – reciprocal lattice vectors – properties – reciprocal lattices to SC, BCC and FCC structures

UNIT-II: ELEMENTARY LATTICE DYNAMICS: (15 Hours)

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 – T³ law (qualitative only) – properties of metals – classical free electron theory of metals (Drude-Lorentz) – Ohm's law – electrical and thermal conductivities – Weidemann-Franz' law – Einstein's theory of specific heat capacity.

UNIT-III: MAGNETIC PROPERTIES OF SOLIDS: (20 Hours)

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.

UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS: (20 Hours)

Polarization and electric susceptibility – local electric field of an atom – dielectric constant and polarisability – internal field – Clausius-Mosotti relation – frequency dependence of dielectric constant – dielectric loss – effect of temperature on dielectric constant – dielectric breakdown and its types – classical theory of electric polarisability – normal and anomalous dispersion – Cauchy and Sellmeier relations – Langevin-Debye equation – complex dielectric constant – optical phenomena.

UNIT-V: FERROELECTRIC MATERIALS

(15 Hours)

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

Total Lecture Hours – 90

COURSE OUTCOMES

Upon completion of this course, the students would be able to

1. Classify the bonding and crystal structure also learn about the crystal structure
2. Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.
3. Give reason for classifying magnetic material on the basis of their behaviour.
4. Comprehend the dielectric behavior of materials.
5. Appreciate the ferroelectric and super conducting properties of materials.

TEXT BOOKS

1. Introduction to Solid State Physics, Kittel, Wiley Eastern Ltd (2003).
2. Solid state Physics, Rita John, 1st edition, TataMcGraw Hill publishers (2014).
3. Solid State Physics, R L Singhal, Kedarnath Ram Nathand Co., Meerut (2003)
4. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
5. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
6. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
7. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer
8. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
9. Solid State Physics, M.A. Wahab, 2011, Narosa Publishing House, ND

REFERENCE BOOKS

1. Puri and Babbar – Solid State Physics – S.Chand and Co. New Delhi.
2. Kittel - Introduction to solid state physics, Wiley and Sons, 7th edition.
3. Raghavan - Materials science and Engineering, PHI
4. Azaroff - Introduction to solids, TMH
5. S. O. Pillai - Solid State Physics, Narosa publication
6. A.J. Dekker - Solid State Physics, McMillan India Ltd.
7. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India

WEB RESOURCES

- <https://nptel.ac.in/courses/115105099/>
- <https://nptel.ac.in/courses/115106061/>
- <https://www.youtube.com/watch?v=OjEVu9lzxOw>
- <https://www.youtube.com/watch?v=LPVCTsyk6j0>
- <https://www.youtube.com/watch?v=9A-kAzXbhJY>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	M	S	S	M	M	S	S	L
CO2	M	S	M	S	M	M	S	M	M	M	M	S	S	S	M
CO3	S	M	S	M	S	M	M	S	S	S	M	S	S	S	M
CO4	S	S	S	S	M	S	S	M	M	M	M	S	S	S	M
CO5	S	M	M	S	S	M	S	M	M	S	M	S	S	S	S

S-Strong (3) M-Medium (2) L-Low (1)



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI – CP- VI : Physics Practical-VI

Minimum of Ten Experiments from the list

Ins.Hrs. / Week: 6

Course Credit: 4

Course Code:U24PH614P

1. Zener diode – voltage regulations
2. Bridge rectifier using diodes
3. Clipping and clamping circuits using diodes.
4. Characteristics of a transistor – (CE mode)
5. Characteristics of a transistor – (CB mode).
6. RC coupled CE transistor amplifier - single stage.
7. Transistor Emitter follower.
8. Colpitt's oscillator -transistor.
9. Hartley oscillator - transistor.
10. Astablemultivibrator - transistor.
11. Bistablemultivibrator - transistor.
12. FET - characteristics.
13. FET - amplifier (common drain)
14. UJT -characteristics
15. AC circuits with L,C,R -Series resonance.
16. AC circuits with L,C,R - Parallel resonance.
17. Operational amplifier - inverting amplifier and summing.
18. Operational amplifier - non-inverting amplifier and summing.
19. Operational amplifier – differential amplifier
20. Operational amplifier - differentiator and integrator.
21. Operational amplifier - D/A converter by binary resistor method.
22. 5V, IC Regulated power supply.
23. Construction of seven segment display.
24. Study of gate ICs – NOT, OR, AND, NOR, NAND, XOR, XNOR
25. Verification of De Morgan's theorem using ICs –NOT, OR, AND
26. NAND as universal building block.
27. NOR as universal building block.
28. Half adder / Half subtractor using basic logic gate ICs
29. Microprocessor 8085 – addition (8 bit only)
30. Microprocessor 8085 – subtraction (8 bit only)
31. Microprocessor 8085 – multiplication (8 bit only)
32. Microprocessor 8085 – division (8 bit only)
33. Microprocessor 8085 – square (8 bit only)
34. Microprocessor 8085 – square root (8 bit only)
35. Microprocessor 8085 – largest/smallest of numbers (8 bit only)
36. Microprocessor 8085 –ascending/descending order

Total Lecture Hours – 90

Upon completion of this course, the students would be able to

1. Develop the skill of experimenting collaboratively and ethically.

TEXT BOOK(S)

1. Dr. S. Somasundaram, Practical Physics, Apsara Publications, Tiruchirappalli, 2012.
2. M.N.Srinivasan, S.Balasubramanian and R. Ranganathan, A Textbook of Practical Physics, Sultan Chand & Sons (2013).

REFERENCE BOOK(S)

1. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005.
2. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

E – RESOURCES

- <https://youtu.be/GTnPEtksTEc>
- <https://youtu.be/veQ-LfJhfxM>
- <https://www.youtube.com/watch?v=-kd5d1Gb-fl>
- <https://www.youtube.com/watch?v=IKvJXv0S2rY>
- <https://www.youtube.com/watch?v=Il0PY8-97Wk>



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAL, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2024 - 2025)

**DEPARTMENT OF PHYSICS
B.Sc., PHYSICS**

Semester: VI – EC-III: Numerical Methods and C Programming

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE63A

UNIT-I: NUMERICAL SOLUTIONS:

(10 Hours)

Determination of Zeros of Polynomials – Roots of Linear and Nonlinear Algebraic and Transcendental equations – Bisection and Newton-Raphson methods – Convergence and Divergence of Solutions.

UNIT-II: NUMERICAL DIFFERENTIATION, INTEGRATION AND CURVE FITTING

(15 Hours)

Newton's Forward and Backward Interpolation – Lagrange's Interpolation – Newton-Raphson method to find square root and cube roots – Principle of Least Squares – Fitting a straight line and exponential curve – Trapezoidal rule – Simpson's 1/3 and 1/8 rule.

UNIT-III: ALGORITHM, FLOW CHART AND PROGRAM

(15 Hours)

Development of Algorithm – Flow chart for solving simple problems – Average of set of numbers – Greatest, Smallest – Conversion of Fahrenheit to Celsius and Celsius to Kelvin, Miles to Kilometer – Sorting set of numbers in Ascending and Descending order – Square matrix, Addition, Subtraction and Multiplication of order (2x2) using Arrays.

UNIT-IV: INTRODUCTION TO C

(10 Hours)

Importance of C – Basic structure of C programming – Constants, Variables and Data types – Character set, Key words and Identifiers – Declaration of Variables and Data types – Operators – Expressions: Arithmetic, Relational, Logical, Assignment – Increment and Decrement – Conditional – Comma Operators.

UNIT-V: CONTROL STRUCTURE

(10 Hours)

Decision making with if, if-else, nested if – switch – go to – break – continue – while, do while, for statements – Arrays, One dimensional and Two dimensional – Declaration of Arrays – Storing Arrays in Memory - Simple Programs.

Total Lecture Hours – 60

COURSE OUTCOMES

Upon completion of this course, the students would be able to

1. Understand and apply numerical methods for finding the zeros of polynomials, solving linear and nonlinear equations, and analyzing the convergence of solutions using methods like bisection and Newton-Raphson.
2. Implement numerical differentiation and integration techniques, and apply interpolation methods and curve fitting approaches to solve real-world problems.
3. Develop algorithms, create flowcharts, and write basic programs to solve mathematical problems such as finding averages, sorting numbers, and performing matrix operations.
4. Understand the fundamentals of C programming, including data types, operators, and expressions, and apply them in writing basic programs.
5. Implement control structures such as decision-making, loops, and arrays in C programming to solve problems involving data manipulation and logic control.

TEXT BOOKS:

1. Numerical methods, Singaravelu, Meenakshi publication, 4th Edn., 1999.
2. Numerical methods P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand, 2016
3. Programming in C, Balagurusamy, TMG, ND, 2012
4. Numerical Analysis, M.K. Venkatraman, NPH, 2013
5. Numerical Analysis, B.D. Gupta, Konark Publishers, New Delhi, 2013

REFERENCE BOOKS:

1. Schaum's outline series, Theory and Problems of programming in C, C. Byron and S. Gottfried, Tata McGraw Hill 2003
2. Numerical methods and C Programming, Veerarajan, 2015.
3. Chapra, S.C., and Canale, R.P. (2018), Numerical Methods for Engineers, 8th Edition, McGraw-Hill Education.
4. Burden, R.L., and Faires, J.D. (2015), Numerical Analysis, 10th Edition, Cengage Learning.
5. King, K.N. (2008), C Programming: A Modern Approach, 2nd Edition, W.W. Norton & Company.

E-RESOURCES:

1. <https://www.khanacademy.org/computing/computer-science/algorithms>
2. <https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2004/>
3. <https://nptel.ac.in/courses/111/105/111105038/>
4. <https://www.youtube.com/watch?v=E1b9J-9FkO0>
5. <https://www.youtube.com/watch?v=0A6jR6hHeQo>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO2	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO3	S	S	S	S	S	M	L	L	L	S	M	S	S	S	M
CO4	S	S	S	M	S	M	L	L	L	S	M	S	S	S	M
CO5	S	S	S	S	S	M	L	L	L	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS



Semester: VI – EC-III: Electrical Wiring Fundamentals

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE63B

UNIT – I : GENERATION OF ELECTRICITY

(10 Hours)

Conventional methods of power generations – Thermal power plant – Atomic power station – Solar energy – wind mill energy- Hydroelectric power plant- Tidal and geothermal energy Block diagram of power generation system- Comparison of renewable and non-renewable energy sources- Basic layout of a power plant (thermal, hydro, nuclear)- Environmental impact of various generation methods

UNIT – II : FUNDAMENTALS OF ELECTRICITY

(10 Hours)

Electron theory – Flow of electrons and current – Resistance - Electromotive Force - voltage – potential difference – voltage drop – alternating current – direct current – Ohm's law – Effects of electric current – Types of electrical circuits – work, power and energy.

conductors, insulators, and semiconductors- Voltage vs. potential difference- Electrical symbols and schematic representation- Resistivity and conductivity- Units and conversions (ampere, volt, ohm, watt, etc.)

UNIT – III: SINGLE PHASE AND POLYPHASE AC CIRCUITS

(15 Hours)

Alternating current – amplitude – time period – frequency – RMS value – polyphase – 2 phase – 3 phase – advantage of polyphase over single phase – star connection – delta Connection- Waveform representation of AC voltage and current- Phasor diagrams and phase angle concepts- Power in AC circuits – real, reactive, and apparent power

UNIT – IV: TRANSFORMER

(15 Hours)

Construction – principle of operation – classification of transformers – types of core – Transformer losses – Efficiency – Alternator – Parts of an alternator – AC three phase motors – AC single phase motors -EMF equation of a transformer- Open-circuit and short-circuit tests- Auto-transformers and their applications- Cooling methods of transformers- Transformer oil and its properties

UNIT – V: HOUSE WIRING

(10 Hours)

Earthing – Necessity of earthing – Types of earthing – safety fuse – circuit breaker – thermal fuses – Toggle switch – keyboard switches – wires and cables – connectors- Types of wiring systems (cleat, conduit, casing-capping)- Basic house wiring diagram (single-line layout)- Load calculation for domestic wiring- Safety precautions during wiring and maintenance

Total Lecture Hours – 60

COURSE OUTCOMES:

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

1. Distinguish various types of electrical components
2. Recall the basic principles of electrical wiring
3. Identify and rectify the defects in simple electrical circuits.
4. Understand the fundamentals of transformer.
5. Do electrical wiring.

TEXT BOOKS

1. Basic Electrical Engineering, D.P. Kothari & I.J. Nagrath, 4th Edition (or latest available), McGraw Hill Education
2. A Textbook of Electrical Technology , Basic Electrical Engineering, B.L. Theraja & A.K. Theraja, 23rd Revised Edition , S. Chand Publishing
3. Electrical Engineering Fundamentals, Vincent Del Toro, 2nd Edition, Pearson Education
4. Hughes, E. (2010), Electrical and Electronic Technology, 9th Edition, Pearson Education.
5. Nagrath, I.J., and Kothari, D.P. (2009), Electrical Machines, 4th Edition, Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. Electrical power – Dr. S. L. Uppal.
2. Basic Electrical Engineering – M. L. Anwani.
3. Sadiku, M.N.O. (2014), Elements of Power System Analysis, 4th Edition, McGraw-Hill Education.
4. L.U. Arora (2015), Fundamentals of Electrical Engineering, 2nd Edition, Pearson Education.
5. B.L. Theraja (2017), A Textbook of Electrical Technology – Vol. 1, S. Chand & Co.

E-RESOURCES

1. <https://nptel.ac.in/courses/121/106/121106014/>
2. <https://energyeducation.ca/>
3. <https://www.youtube.com/watch?v=20Vb6hlQSGg>
4. https://en.wikipedia.org/wiki/Polyphase_system
5. https://www.youtube.com/watch?v=14nZDzdJb_0

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	L	M	L	L	L	L	M	M	M	M	S	L
CO2	S	S	M	M	M	M	L	S	M	M	S	M	S	S	M
CO3	S	S	S	S	M	S	L	S	L	M	S	S	S	S	M
CO4	S	S	S	M	M	L	L	L	M	M	M	S	S	S	M
CO5	S	S	S	S	M	S	M	S	M	M	S	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS



Semester: VI – EC-III: Molecular Biophysics

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE63C

UNIT – I : CELLULAR BASIS OF LIFE

(15 Hours)

Structure and constituents of animal cell -plant cell and bacterial cell – its organelles – Molecular constituents of cell (elementary ideas) – Structures of viruses – types. Stereo Chemistry and Conformation – Asymmetric carbon – Isomerism – Types – Constitution – Configuration and Conformation – Chirality – Fisher convention – L and D system – R-S System – Torsion angle – newman projection conformation of ethane and n-butane – Barrier to rotation.

UNIT – II : STRUCTURE AND CONFORMATION OF PROTEINS (15 Hours)

Amino acids – Structure of Peptide bond – Rigid planar peptide bond – Rigid planar peptide – Cis and Trans configuration – Torsion angles Phi and Psi – Steric hindrance – hardsphere – approximation – contact criteria – Ramachandran (diagram) map – Allowed conformations for a pair of linked peptide units – (map for glycine and alanine residues) – classification of proteins – based on functions – based on structure

UNIT – III : STRUCTURE AND FUNCTION OF CARBOHYDRATE (10 Hours)

Classification – Simple Mono Saccharides – Glyceraldehyde – Fisher projection formulae – L and D and R and S notation – other monosaccharides – Pyranose form – Stereo isomerism of sugars – conformation of pyranoid rings – Disaccharides structure of Cellobiose Maltose – Lactose – Sucrose – Types of linkages in polysaccharides – Ramachandran map for Disaccharides – Polysaccharides – Classification – Structural Storage – Function of cellulose – Amylose – Chitin – Glycogen – Complex carbohydrate

UNIT – IV : STRUCTURE AND FUNCTION OF NUCLEIC ACIDS (10 Hours)

Nucleosides and nucleotides – structure of oligonucleotides – base pairing and base stacking – Structure of DNA – Watson and Cricket model – Variations in DNA structure – Polymorphism – A, B and Z DNA – structure of RNA and tRNA – Genetic code – Protein – Protein biosynthesis – Reverse transcription – Basis ideas of Genetic engineering.

UNIT – V : ENZYMES, VITAMINS, HORMONES AND LIPIDS. (10 Hours)

Enzymes – classification – Mechanism of enzyme action – Factors influencing enzyme action – enzymes of clinical interest – (Amylase, Lipase, Trypsin – Lysozyme) Lipids: Classification of Fatty acids – Properties – complex lipids – Triglycerides Phospholipids – Sphingolipids – Simple lipids – Terpenes.

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Understand the basic structure and components of animal, plant, and bacterial cells, including viruses, and explain simple stereochemistry and conformations.
2. Explain the structure and levels of organization of proteins and interpret Ramachandran plots and torsion angles.
3. Classify carbohydrates and describe the structure, stereochemistry, and function of mono-, di-, and polysaccharides.
4. Describe the structure and function of nucleic acids and explain the processes of protein synthesis and genetic engineering.
5. Understand the classification and functions of enzymes, lipids, vitamins, and hormones and their roles in metabolism and health.

TEXT BOOK:

1. L.Lehninger, D.L.Nelson and M.M.Cox, Principles of Biochemistry, CBS Publishers, New Delhi. (1993).
2. L.Stryer, Biochemistry, W.H.Freeman and Co., Newyord (1997).
3. V.S.R. Rao, P.K.Qasba, P.V.Balaji and R.Chandrasekaran, Conformation of Carbohydrates Harwood Academic Publishers, (1998).
4. G.Schulz and R.H.Schirmer, Principles of Protein structure, Springer – Verlag, (1984).
5. Branden and J.Tooze, Introduction to Protein Structure, Garland Publishing, (1991).

REFERENCE BOOK:

1. J.F.Stoddart, Sterio Chemistry of Carbohydrates, Wiley Interscience (1971).
2. N.Sharon, Complex Carbohydrates – their Chemistry, Biosynthesis and Functions – Addison – Wesley – London (1975).
3. J.K.Kennedy and C.A.White, Bio active carbohydrates in Chemistry Biochemistry and Biology – Ellis Harwood, New York (1983).
4. W.Hoppe, et al., Biophysics – Springer p Verlag (1989).
5. M.M.Woolfson – An Introduction to X- ray Crystallography
6. Thomas E.Creight, Proteins structure and molecular properties, W.H.freeman and Company, New York (1993)

E-RESOURCES:

1. <https://www.youtube.com/watch?v=Vysf5jzKTlg>
2. <https://www.youtube.com/watch?v=GJ5hCVpb4gk>
3. <https://www.youtube.com/watch?v=O0GzFv5h1ZA>
4. <https://www.youtube.com/watch?v=XX4ObOGxeUk>
5. <https://www.youtube.com/watch?v=UAWnscfMX2s>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	L	M	L	L	M	S	M	M	S	M
CO2	S	S	S	S	M	L	L	L	L	M	M	M	S	S	L
CO3	S	S	S	M	M	L	L	L	L	M	M	M	S	S	M
CO4	S	S	S	S	S	L	L	M	M	S	M	S	S	S	S
CO5	S	S	S	M	M	L	M	M	M	S	S	M	S	S	S

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAL, MANNARGUDI-614016.
(For the candidates admitted from the academic year 2024 - 2025)

**DEPARTMENT OF PHYSICS
B.Sc., PHYSICS**

Semester: VI – EC-IV: Digital Electronics and Microprocessor 8085

Ins.Hrs. / Week: 4

Course Credit: 3

Course Code: U24PHE64A

UNIT-I: NUMBER SYSTEMS AND BOOLEAN ALGEBRA (15 Hours)

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 (Karnaughmap: 2, 3, 4 variables).

UNIT-II: COMBINATIONAL LOGIC CIRCUITS (10 Hours)

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.

UNIT-III: SEQUENTIAL CIRCUITS, MEMORY, AND LOGIC FAMILIES (15 Hours)

Flip-flops: S-R Flip-flop, J-K Flip-flop, T and D type flip-flops, 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 – general memory operations, ROM, RAM (static and dynamic), PROM, EPROM, EEPROM, IC – logic families: RTL, DTL, TTL logic, CMOS NAND and NOR Gates, CMOS Inverter, Programmable Logic Devices – Programmable Logic Array (PLA)

UNIT-IV: 8085 MICROPROCESSOR ARCHITECTURE AND PROGRAMMING (10 Hours)

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 –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.

UNIT-V: PERIPHERAL INTERFACING AND I/O DEVICES (10 Hours)

I/O Interfaces: serial communication interface (8251-USART) – programmable peripheral interface (8255-PPI) –programmable interval timers (8253) – keyboard and display (8279), DMA controller (8237).

Total Lecture Hours – 6

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Understand number systems, code conversions, Boolean algebra, and logic gates, and apply minimization techniques like Karnaugh maps for simplifying logic functions.
2. Design and analyze combinational circuits including adders, subtractors, multiplexers, demultiplexers, encoders, decoders, and BCD-to-seven segment decoders.
3. Understand and implement sequential circuits such as flip-flops, registers, and counters, and explore memory types and logic families like TTL and CMOS.
4. Understand the architecture of the 8085 microprocessor, its instruction set, addressing modes, and assembly language programming to perform arithmetic and logical operations.
5. Analyze and implement I/O interfaces using devices like USART, PPI, timers, keyboard/display, and DMA controller for microprocessor communication.

TEXT BOOKS

1. M.Morris Mano, "Digital Design "3rd Edition, PHI, NewDelhi.
2. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)
3. S.Salivahanaand S. Arivazhagan-Digital circuits and design
4. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S.Gaonakar
5. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and GlenSA
- 6.

REFERENCE BOOKS

1. Herbert Taub and Donald Schilling. "Digital Integrated Electronics" . McGraw Hill. 1985.
2. S.K. Bose. "Digital Systems". 2/e. New Age International.1992.
3. D.K. Anvekar and B.S. Sonade. "Electronic Data Converters: Fundamentals and Applications". TMH.1994.
4. Malvino and Leach. "Digital Principles and Applications". TMG HillEdition
5. Microprocessors and Interfacing – Douglas V.Hall
6. Microprocessor and Digital Systems – Douglas V.Hall

WEB RESOURCES

1. <https://youtu.be/-paFaxtTCKI>
2. https://youtu.be/s1DSZEaCX_g
3. https://www.youtube.com/watch?v=V_cVrqm6pgM
4. <https://www.youtube.com/watch?v=H3jwErbztnM>
5. https://www.youtube.com/watch?v=lgQ_wzN9bIo

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	M	S	S	M	S	S	S	L
CO2	M	S	M	S	M	M	S	M	M	M	M	S	S	S	L
CO3	S	M	S	M	S	M	M	S	S	S	M	S	S	S	L
CO4	S	S	S	S	M	S	S	M	M	M	M	S	S	S	M
CO5	S	M	M	S	S	M	S	M	M	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI – 614 016.
(For the candidates admitted from the academic year 2024 - 2025)
DEPARTMENT OF PHYSICS
B.Sc., PHYSICS

Semester: VI – EC-IV: Digital Photography
Ins.Hrs. / Week: 4 Course Credit: 3 Course Code: U24PHE64B

UNIT-I: PHOTOGRAPHY AND BASIC PRINCIPLE OF IMAGE FORMATION:
(15 Hours)

Principle – chemical route and digital route – light, wavelengths, colours – shadows – light intensity and distance – making light form images – pin-hole images – practical limitations to pin-hole images – lens instead of pin-hole – focal length and image size – imaging of closer subjects.

UNIT-II: LENSES – CONTROLLING THE IMAGES:
(10 Hours)

Photographic lens – focal length and angle of view (*problems*) – focusing movement – aperture and f-numbers (*problems*) – depth of field– depth of focus – image stabilization – lenses for digital cameras – lens and camera care

UNIT-III: CAMERA USING FILMS AND ITS TYPES:
(10 Hours)

Camera and its essential components– shutter – aperture – light measurement – film housing – camera types: view camera– view finder camera – Reflex camera– single lens reflex (SLR) camera

UNIT-IV: DIGITAL CAMERAS PRINCIPLE AND TYPES:
(10 Hours)

Principle of digital image capturing – comparison of digital and analog picture information – megapixel – grain, noise and pixel density – optical and digital zooming – image stabilizer – bit depth – white balance – colour modes – file formats (TIFF, RAW and JPEG) – storage cards and types – digital cameras: camera phones – compact camera – hybrid camera – digital SLR.

UNIT-V: THE DIGITAL IMAGE – POSTPRODUCTION:
(15 Hours)

Hardware: computer and its peripherals – software: saving digital file – basic editing: navigating the image – undo/redo/history – crop – rotate – brightness and contrast – colour balance – hue/saturation – dodge/burn – cloning and retouching – removing an element in an image – advanced editing: histogram/levels – curves – selection tools: magic wand – printing digital images: inkjet printer – laser printer – dye sub printer – lambda/light jet printers.

Total Lecture Hours – 60

COURSE OUTCOMES

Upon completion of this course, the students would be able to

1. Understand the basic principles of photography, including image formation, light behavior, and the differences between chemical and digital image processes.
2. Analyze the role of lenses in controlling image formation, including understanding focal length, aperture, depth of field, and how these factors affect photographic quality.
3. Identify the components and functionality of various camera types, including film cameras and their essential parts like shutters, apertures, and viewfinders.
4. Understand the principles of digital cameras, the differences between digital and analog images, and the factors affecting image quality such as megapixels, zooming, and file formats.
5. Learn the post production processes involved in editing digital images, including basic and advanced editing techniques, and understand the different types of printers for outputting digital images.

TEXT BOOKS:

1. Michel J.Langford , Anna Fox and Richard Sawdon Smith, Basic photography, 9th Edition, , 2010-NL, Focal press, London
2. Henry Carroll, Read this if you want to take great photographs of people, Laurence King Publishing
3. Michel J. Langford, Anna Fox, and Richard Sawdon Smith, (2010), Basic Photography, 9th Edition, Focal Press, London.
4. Julie Adair King, (2009), Digital Photography for Dummies, Wiley Publishing, USA.
5. Scott Kelby, (2006), The Digital Photography Book, Volume 1, Peachpit Press, USA.

REFERENCE BOOKS

1. Mark Galer, Digital Photography in Available Light essential skills, 2006, Focal press, London
2. Paul Harcourt Davies, The Photographer's practical handbook, 2005, UK PRESS
3. David Taylor, (2015), Digital Photography Complete Course, DK Publishing, USA.
4. Martin Evening, (2017), Adobe Photoshop for Photographers, 12th Edition, Focal Press, London.
5. Scott Kelby, (2017), The Adobe Photoshop Lightroom Classic CC Book for Digital Photographers, 2nd Edition, New Riders, USA.

E-RESOURCES

1. <https://www.cambridgeincolour.com/tutorials/camera-lenses.htm>
2. <https://photographylife.com/lens-basics>
3. <https://www.youtube.com/watch?v=F8T94sdiNjc>
4. <https://nptel.ac.in/courses>
5. <https://nptel.ac.in/courses>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	L	M	L	L	M	S	M	M	S	M
CO2	S	S	S	M	M	L	M	L	L	M	S	M	S	S	M
CO3	S	S	S	M	M	L	M	L	L	M	S	M	S	S	M
CO4	S	S	M	M	S	M	S	M	L	M	S	S	M	S	M
CO5	S	S	S	S	S	M	M	M	L	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNAR GUDI – 614 016.

(For the candidates admitted from the academic year 2024 - 2025)

DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI – EC-IV: Advanced Mathematical Physics

Ins.Hrs. / Week: 4 Course Credit: 3 Course Code: U24PHE64C

UNIT-I: MATRICES:

(15 Hours)

Introduction – special types of matrices – transpose – conjugate– conjugate transpose– symmetric and anti symmetric – Hermitian and skew Hermitian – orthogonal and unitary – properties – characteristic equation – roots and characteristic vectors – diagonalization– Cayley–Hamilton theorem – simple problems

UNIT-II: VECTOR CALCULUS:

(15 Hours)

∇ operator – divergence – second derivative of vector functions or fields – Laplacian operator – curl of a vector – line integral – line Integral of a vector field around an infinitesimal rectangle – curl of conservative field – surface integral – volume integral (without problem) – Gauss's divergence theorem and proof – Stoke's theorem and proof – simple problems.

UNIT-III: SPECIAL FUNCTIONS:

(10 Hours)

Definition – Beta function – Gamma function – evaluation of Beta function – other forms of Beta function – evaluation of Gamma function – other forms of Gamma function – relation between Beta and Gamma functions – simple problems.

UNIT-IV: FROBENIUS METHOD AND SPECIAL FUNCTIONS:

(10 Hours)

Singular points of second order linear differential equations and importance – singularities of Bessels and Laguerre equations, Frobenius method and applications to differential equations: Legendre and Hermite differential equations – Legendre and Hermite polynomials – Rodrigues formula – generating function – orthogonality

UNIT-V: PARTIAL DIFFERENTIAL EQUATIONS:

(10 Hours)

Solutions to partial differential equations using separation of variables - Laplace's equation in problems of rectangular – cylindrical and spherical symmetry – conducting and dielectric sphere in an external uniform electric field – wave equation and its solution for vibrational modes of a stretched string

Total Lecture Hours – 60

COURSE OUTCOMES:

Upon completion of this course, the students would be able to

1. Explain different types of crystal imperfections and analyze their effects on material properties.
2. Describe the elastic and visco elastic behavior of materials using atomic and mechanical models.
3. Understand mechanisms of plastic deformation and apply strengthening techniques to improve material performance.
4. Analyze optical properties of materials and explain the working principles of optical devices.
5. Demonstrate understanding of destructive and nondestructive testing methods for evaluating material properties.

TEXT BOOKS:

1. Mathematical Physics, B.D. Gupta-Vikas Publishing House, 4 th Edition (2006)
2. Mathematical Physics, SatyaPrakash (Sultan Chand)
3. B.S. Grewal, Higher Engineering Mathematics, 44th or latest, ISBN: 9788174091956
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley, ISBN: 9780470458365
5. Elsevier Academic Press, Mathematical Methods for Physicists, 7th Edition, 7th Edition, ISBN: 9780123846549

REFERENCE BOOKS:

1. Mathematical Methods or Physicists, G.B. Arfken, H.J. Weber, F.E. Harris (2013, 7th Edn., Elsevier)
2. Mathematical Physics—H. K. Dass, Dr. Rama Verma (S. Chand Publishing)
3. Advanced Engineering Mathematics, Erwin Kreyszig (Wiley India)
4. Mathematical Physics and Special Relativity, M. Das, P.K. Jena and B.K. Dash (SrikrishnaPrakashan)
5. Charlie Harper, Introduction to Mathematical Physics, 1st Edition, Prentice Hall, ISBN: 9780134875385

E-Resources:

- 1) <https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/>
- 2) <https://tutorial.math.lamar.edu/Classes/CalcIII/CalcIII.aspx>
- 3) <https://mathworld.wolfram.com/BetaFunction.html>
- 4) <https://mathworld.wolfram.com/GammaFunction.html>
- 5) <https://nptel.ac.in/courses/115/105/115105100/6>

MAPPING WITH PROGRAM AND PROGRAM SPECIFIC OUTCOMES:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	L	L	L	L	M	M	M	S	S	L
CO2	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO3	S	S	S	S	M	L	L	L	L	M	M	S	S	S	L
CO4	S	S	S	S	M	L	L	L	L	S	M	S	S	S	M
CO5	S	S	S	S	M	L	L	L	M	S	M	S	S	S	M

S-Strong (3) M-Medium (2) L-Low (1)

**PART-IV VALUE EDUCATION COURSE**

**FOR ALL UG ARTS, SCIENCE, COMMERCE AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS - LOCF)
(Applicable to the candidates admitted from the academic year 2022-2023 onwards)**

Third Year

**PART-IV
VALUE EDUCATION
(Theory)**

Semester-VI**Code:25UGVED****Credit: 2****OBJECTIVES:**

- 1) To understand the philosophy of life and values through Thirukural
- 2) To analyse the components of values education to attain the sense of citizenship
- 3) To understand different types of values towards National Integration and international understanding
- 4) To learn yoga as value education to promote mental and emotional health
- 5) To understand human rights, women rights and other rights to promote peace and harmony

UNIT I : PHILOSOPHY OF LIFE AND SOCIAL VALUES:

Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT-II – HUMAN VALUES AND CITIZENSHIP

Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education- A P J Kalam's ten points for enlightened citizenship- The role of media in value building

UNIT-III VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT:

Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith -Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same- National Integration and International Understanding.

UNIT IV : YOGA AND HEALTH:

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

UNIT V : HUMAN RIGHTS:

Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights- definitions under Indian and International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty and Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.

UNIT - VI: CURRENT CONTOURS: (for continuous internal assessment only):

BOOKS FOR REFERENCES:

- Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
- j\UfFws; - [p.A.Nghg - Mqfjy nkhoahffj;Ld;ckh E}y> ntsiaB,lfk; jQrhT+H
- Leah Levin, Human Rights, NBT, 1998
- V.R. Krishna Iyer, Dialectics and Dynamics of Human Rights in India, Tagore Law Lectures.
- Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.
- SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedappti, 1999.
- Grose. D. N – “A text book of Value Education’ New Delhi (2005)
- Gawande . EN – “Value Oriented Education” – Vision for better living. New Delhi (2002) Saruptsons
- Brain Trust Aliyar- “Value Education for Health, Happiness and Harmony” Erode (2004) Vethathiri publications

COURSE OUTCOMES: After completion of the course, the student will be able to:

- Apply the values in thirukural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitudinal to follow the constitutional rights



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DEPARTMENT OF PHYSICS

B.Sc., PHYSICS

Semester: VI – PCC: Aptitude and Reasoning Skills For Competitive Examinations

Ins.Hrs. / Week: 2

Course Credit: 2

Course Code:U24PCPH61

UNIT-I: MEASUREMENT

(6 Hours)

Concepts of Measurements; Fundamental units (Length, time and mass) -Definition -Methods of Measurement of Length, Mass and Time - Multiples and sub multiples of units. -Volume of regular and irregular object- SI system - Beam balance & Electronic balance Numerical problems

UNIT-II: FORCES AND MOTION

(6 Hours)

Motion and Rest - Types of Forces -Effects of Forces - Types of Motion - Measuring speed and Units of speed; - Problems related to Speed - Distance and Time - Science today - Robot - Numerical problems

UNIT-III: HEAT, SOURCES OF HEAT

(6 Hours)

Sun, combustion or burning, friction, electrical heat - Heat Definition - Hot and cold objects - Temperature Flow of Heat (Hot to cold) -Thermal Equilibrium Sources of heat -Expansion in solids - Cubical and linear - Uses of Thermal Expansion -Reasoning questions based on expansion - Numerical problems

UNIT-IV: ELECTRICITY

(6 Hours)

Sources of Electricity - Primary and Secondary cells - An electric circuit Symbols of electric components - Open & Closed Circuits, Series & Parallel Circuits -Conductors and Insulators.

UNIT-V :MAGNETISM

(6 Hours)

Discovery of magnets - Magnetic and non magnetic materials - Magnetic poles - Properties of Magnets - Storage and Usage of Magnets - Science today - Flying Trains

Total Lecture Hours – 30 Hours

COURSE OUTCOMES:

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

1. Understand the basic concepts of measurement, fundamental units, methods of measuring length, mass, and time, and solve related numerical problems.
2. Explain the concepts of force and motion, types of motion, and calculate speed, distance, and time using numerical problems.
3. Understand sources of heat, flow of heat, thermal expansion, and apply the concept to real-life situations and problems.
4. Identify different sources of electricity, components of electric circuits, and distinguish between series and parallel circuits.
5. Explain the properties of magnets, identify magnetic materials, and understand their practical uses in daily life and modern technology.

TEXT BOOKS:

1. NCERT Science Textbook (Class 6-8) – Published by NCERT, Covers basics of measurement, motion, heat, electricity, and magnetism in simple language.
2. Science - Tamil Nadu State Board Textbook (Samacheer Kalvi) – Class 6 or 7 Aligned with local curriculum and includes real-life applications and exercises.
3. General Science for Middle School by R.P. Rana – Laxmi Publications
Simplified explanations suitable for foundational understanding with ample illustrations.
4. N. Subrahmanyam & Brij Lal, “*A Textbook of Physics (Part I & II)*”, S. Chand & Company Ltd.
5. M D.C. Tayal, “*Concepts of Physics*”, Himalaya Publishing House.

REFERENCE BOOKS:

1. Conceptual Physics by Paul G. Hewitt – Pearson
2. Physics for Middle School by C.P. Singh – Arya Publishing
3. H.C. Verma, “*Concepts of Physics Vol. I & II*”, Bharati Bhawan Publishers.
4. R. Murugesan, “*Electricity and Magnetism*”, S. Chand Publishing.
5. S.L. Arora, “*Comprehensive Physics*”, Dhanpat Rai Publications.

E-RESOURCES:

1. <https://www.youtube.com/watch?v=6QUFuZpCgGw>
2. <https://www.khanacademy.org/science/physics/electricity-and-magnetism/v/magnetism-2>
3. https://www.youtube.com/watch?v=I_Og5qlqv-Y
4. <https://www.youtube.com/watch?v=02U8nb69qLM>
5. <https://www.youtube.com/watch?v=Lzrjqy4PImE>



BHARATHIDASAN UNIVERSITY

TIRUCHIRAPPALLI - 620 024

PART-V GENDER STUDIES COURSE

**FOR ALL UG ARTS, SCIENCE, COMMERCE AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS - LOCF)**

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

Third Year

**PART-V
GENDER STUDIES**

Semester-VI

Code:25UGGS

(Theory)

Credit: 2

OBJECTIVES:

1. To make students to aware of Gender constructions and gendering Process
2. To explore existing gender biases in the society and to understand the need to work towards the inclusive society
3. To inculcate sensitivity and build gender perspectives.
4. To use the course to bring attitudinal cum behavioral change towards gender neutral ambience and promote the humanistic values

UNIT- I INTRODUCTION TO GENDER STUDIES CONCEPTS

Gender Spectrum.-Sex – Gender distinction – Biological Determinism – Patriarchy – Feminism –Gender Socialization and Stereotyping-Gender Discrimination – Gender Division of labour and roles– Gender Sensitivity and awareness – Gender Equity – Equality – Gender Main streaming and Gender Analysis.

UNIT- II UGC INITIATIVES ON WOMEN’S STUDIES

Definition of Women’s Studies –Gender Studies –UGC Initiatives and guidelines on Women’s Studies - Beijing Conference, UN Initiatives – Convention on Elimination of All forms of

Discrimination Against Women (CEDAW)- Sustainable Development Goals on Gender Equality (SDG 5) and targets

UNIT- III AREAS OF GENDER DISCRIMINATION

Gender Socialization- Sex Ratio– Health and Nutrition– – Literacy and Education - Employment- Governance – participation in decision making- politics- property rights and access to credit- gender based violence- Social institutions –Family, Caste, Class, religion, gender, State. Market – Media – Politics – Judiciary

UNIT -IV WOMEN DEVELOPMENT AND GENDER EMPOWERMENT

Towards Equality Report of Status of Women in India 1974 – International Women’s Decade – International Women’s Year –National Policy for Empowerment of Women 2001

UNIT -V WOMEN’S MOVEMENTS AND SAFEGUARDING MECHANISM :

In India National /State Commission for Women(NCW) – All Women Police Station – Family Court Legislations safeguarding women –Transgender Policy—Constitutional amendments for women’s political participation

UNIT - VI CURRENT CONTOURS: (for continuous internal assessment only):

Tamil Nadu State Policy for Women 2021- National Policy for Women 2015 – Prevention of Sexual Harassment at Work places Act 2013- Protection of Children from Sexual Offences Act, 2012 - Analysis of regressive and progressive High court and supreme court judgments- women proactive policies, programmes, interventions

REFERENCE :

- Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited , 2004
- Bhasin Kamala, Exploring Masculinity: Gender Basics , New Delhi: Women Unlimited ,2004
- Bhasin Kamala , What is Patriarchy? : Gender Basics, New Delhi :Women Unlimited ,1993
- Arya Sadhna Women ,Gender Equality and the State ,New Delhi :Deep &Deep Publication ,2000
- ghyaiy GhpeJ nfhstkh; kJiu :Vfjh>.....
- Mishra .O.P, Law Relating to Women &Child ,Allahabad :Central Law Agency ,2001
- Uma Chakravarti, Gendering Caste Through a Feminist Lens, Sage Publication 2003

- Bhattacharya Malini , Sexual Violence and Law ,Kolkata; West Bengala Commission for Women ,2002
- Sexual Harassment at the Workplace – A Guide , New Delhi ;Sakshi,1999
- m[ujh FLkg tdKiwayUe;J ngzfis ghJfhffk rLLk 2005> kJiu : Vfh 2005
- nghd.fU\zrhkN[.ghy gh] fh&M.[hd tpdnrdL> ngzfSk; crj ejpkdwKk> kJiu :NrhfNfh thrfh; tLLk> 2004
- FLkg tdKiwayUe;J ngzfis ghJfhffk; rLLk 2005- ifNaL jUrr:
- Women's Integrated National Development Trust
- <https://www.schooloflegaleducation.com/women-and-law-in-india-e-book/>

COURSE OUTCOMES:

- Students would have gained a perspective and understood the social reality of gender society understood the differences of gender and sex and may resort to building alternative perspectives and critical thinking.
- Gained knowledge on the various social institutions governing gender and the intersectionality.
- Exposed to the kind of initiatives of the State towards gender equality

