

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS)

Reaccredited with “B++” Grade by NAAC

(Affiliated to Periyar University)

SALEM – 16



PG AND RESEARCH DEPARTMENT OF PHYSICS

CHOICE BASED CREDIT SYSTEM (CBCS)

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

B.Sc. PHYSICS

2026-2029 BATCH

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INTRODUCTION

Physics is one of the basic and fundamental sciences. The curriculum for the graduate programme in Physics is revised as per the UGC guidelines on Learning Outcome based Course Framework. The learner-centric courses let the student progressively develop a deeper understanding of various aspects of physics.

The new curriculum offer courses in the core areas of mechanics, acoustics, optics and spectroscopy, electricity and magnetism, atomic and nuclear physics, solid state, electronics and other fields. The courses will train students with sound theoretical and experimental knowledge that suits the need of academics and industry. In addition to the theoretical course work, the students also learn physics laboratory methods for different branches of physics, specialized measurement techniques, analysis of observational data, including error estimation and etc. The students will have deeper understanding of laws of nature through the subjects like classical mechanics, quantum mechanics, statistical physics etc. The problem solving ability of students will be enhanced. The students can apply principles in physics to real life problems. The courses like integrated electronics and microprocessors will enhance the logical skills as well as employability skills. The numerical methods and mathematical physics provide analytical thinking and provides a better platform for higher level physics for research.

The restructured courses with well-defined objectives and learning outcomes, provide guidance to prospective students in choosing the elective courses to broaden their skills not only in the field of physics but also in interdisciplinary areas. The elective modules of the framework offer students choice to gain knowledge and expertise in specialized domains of physics like astrophysics, medical physics, etc.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	B.Sc. PHYSICS
Programme Code:	UPHY
Duration:	3 years [UG]
Programme Outcomes:	PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. PO5: Analytical reasoning: Ability to 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. PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation PO7: Cooperation/Team work: Ability to work effectively and respectfully 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 a common cause and work efficiently as a member of a team PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. PO 13: Moral and ethical awareness/reasoning: Ability to 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. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/re-skilling.
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Programme Specific Outcomes: (These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or University for their Programme)	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. PSO 2: 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. PSO 5: Contribution to the Society: To contribute to the development of the society by collaborating with stakeholders for mutual benefit
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Highlights of the Revamped Curriculum

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome/ Benefits
I	Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analyzing the world through the literary lens Gives rise to a new perspective.	➤ Instill confidence among students ➤ Create interest for the subject
I,II,III,IV	Skill Enhancement papers (Discipline centric /Generic/Entrepreneurial)	➤ Industry ready graduates ➤ Skilled human resource ➤ Students are equipped with essential skills to ➤ Make them employable
		➤ Training on language and communication skills enable the students gain knowledge and Exposure in the competitive world.
		➤ Discipline centric skill will improve the Technical knowhow of solving real life problems.
III	Elective papers	➤ Strengthening the domain knowledge ➤ Introducing the stakeholders to the State-of Art techniques from the streams of multidisciplinary, cross disciplinary and interdisciplinary nature ➤ Emerging topics in higher education/ industry/ communication network/ health sector etc. are introduced with hands-on-training.

IV	Elective Papers	➤ Exposure to industry moulds students into solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V	Elective papers	➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting Intangible outcome
VI	Elective papers	➤ Enriches the study beyond the course. ➤ Developing are search framework and Presenting their Independent and Intellectual ideas effectively.
Extra Credits: For Advanced Learners/Honors degree		➤ To cater to the needs of peer learners/research Aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Credit Distribution for UG Programme

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part 1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	Part..1. Language – Tamil	3	6	5.1 Core Course –CC IX	4	5	6.1 Core Course – CC XIV	3	5
Part.2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	5.2 Core Course – CC X	4	5	6.2 Core Course – CC XV	3	5
1.3 Core Course – CC I	5	5	2..3 Core Course – CC III	5	5	3.3 Core Course – CC V	5	6	4.3 Core Course – CC VII Core Industry Module	5	5	5. 3.Core Course CC – XI	4	5	6.3 Core Course – CC XVI	3	5
1.4 Core Course – CC II	3	4	2.4 Core Course – CC IV	3	4	3.4 Core Course – CC VI	3	3	4.4 Core Course – CC VIII	3	3	5. 4.Core Course –/ CC –XII	3	3	6.4 Core Course – CC XVII	3	3
1.5 Elective I Generic/ Discipline Specific	5	5	2.5 Elective II Generic/ Discipline Specific	5	5	3.5 Elective III Generic/ Discipline Specific	5	5	4.5 Elective IV Generic/ Discipline Specific	5	5	5.5 Core Course –/ Project with viva-voce CC –XIII	4	5	6.5 Elective VII Generic/ Discipline Specific	3	5
1.6 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	2	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.6 Skill Enhancement Course SEC-6	2	2	5.6 Elective V Generic/ Discipline Specific	3	5	6.6 Elective VIII Generic/ Discipline Specific	3	5
1.7 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course –SEC-3	2	2	3.7 Skill Enhancement Course SEC-5	2	2	4.7 Skill Enhancement Course SEC-7	2	2	5.7 Value Education	2	2	6.7 Extension Activity	1	-
						3.8 E.V.S. 3.9 Health & wellness	- 1	1 -	4.8 E.V.S	2	1	5.8 Summer Internship /Industrial Training	2		6.8 Professional Competency Skill	2	2
	23	30		23	30		23	30		25	30		26	30		21	30
Total – 141 Credits																	

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	4	6	4	3	25
Total	23	23	23	25	26	21	141

Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the undergraduate programme and the other component. Part IV has to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.

Total Credits:141

EXTRA CREDITS FOR EXTRA SKILLS

Total Extra Credits-28 (20% of the total credits)

B.Sc. PHYSICS
CURRICULUM DESIGN AND SCHEME OF EXAMINATION
(APPLICABLE TO STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2026-27)

SEMESTER-I

Part	Course Code	Course Title	Course Type	Hrs. /Week L/T/P	Credits	CIA	ESE	TOTAL
I	26ULTC1/ 26ULHC1/ 26ULSC1	Tamil/Hindi/ Sanskrit –I	Language	6	3	30	70	100
II	26ULEC1	English–I	English	6	3	30	70	100
III	26UPHCC1	Properties of Matter and Sound with AI	Core Course	5	5	30	70	100
	26UPHCCQ1	Properties of Matter Practi- cal	Core Course	4	3	40	60	100
	26UPHCGEC1	Chemistry–I	Generic Elective	3	3	30	70	100
	26UPHCGECQ1	Chemistry Practical– I		2	2	40	60	100
IV	26UPHSEC1	NME: Phys- ics for Eve- ryday Life	Skill Enhance- ment Course	2	2	30	70	100
	26UPHSEFC	Introductory Physics	Foundation Course	2	2	30	70	100
Total				30	23			
*Extra Skills (Out of College Hours)						*Credits	*Marks	
Articulation and Idea Fixation						-	-	
Physical Fitness Practice						-	-	
Society Connect Activity						-	-	

***Extra credits are given for extra skills and courses qualified in MOOC / NPTEL**

PEDAGOGICAL APPROACHES TEACH- ING LEARNING STRATEGIES

- a. Chalk and talk
- b. Group -Learning and Teaching
- c. Individual Learning /Self-Study
- d. Game Based Learning
- e. Technology Based Learning
- f. Peer Teaching
- g. Learning Through Problem Solving
- h. Project Based Learning

METHODS OF EVALUATION AND ASSESSMENT

Methods of Evaluation-Theory		
Internal Eval- uation	Continuous Internal Assessment Test	30 Marks
	Assessment Components	
	Model Examination and Attendance	
External Evaluation	End Semester Examination	70 Marks
	Total	100 Marks
Methods of Evaluation-Practical		
Internal Eval- uation	Laboratory work assessment (best 2 out of 3)	40 Marks
	Viva voce/ Lab quiz, Class Performance	
External Evaluation	End Semester Examination	60 Marks
	Record	
	Total	100 Marks
REVISED BLOOMS LEVEL		
BL1	Exhibits memory of previously learned material by recalling fundamental facts, terms, basic concept and answers about the selection.	
BL2	Demonstrate understanding of parts and Idea free organizing, comparing, translating, interpreting, giving descriptors and stating main ideas.	
BL3	Solve problems in new situation by applying acquired knowledge, facts, techniques and rules in different or new way.	
BL4	Examine and break information into parts by identifying motives or causes. Make inference and find evidence to support generalizations.	
BL5	Present and depend opinion by making judgement about information, validity of ideas or quality of work based on a set of criteria.	
BL6	Compile information together into different way by combining elements in a new pattern or proposing alternative solutions.	

Evaluation Pattern

An academic year is divided into two semesters. The first semester is from June/July to November/December and the second semester is from November/December to April/May. A semester consists of 90 working days.

Evaluation consists of both Continuous Internal Assessment (CIA) and End Semester Examinations (ESE). The entire Undergraduate and Postgraduate Programmes offered by our college have various assessments for continuous internal evaluation. Relevant types of internal assessment are developed suiting the needs and requirements of each specific course. The various assessment components are quiz, snap test, viva-voce, seminar, listening comprehension, reading comprehension, problem solving, map reading, group discussion, panel discussion, assignment, field visit, poster presentation, open book test, writing composition, case study, online test, Book Review, Projects etc.

The CIA marks are read out and signed by the students in the respective classes on the day specified in the calendar. CIA is mandatory for all the students.

Internal Assessment Modes (Theory Course)

Any six of the assessment components	15 marks
Cycle Test(2)	5 marks
Model Examination	5 marks
Attendance	5 marks
Total	30 marks

Internal Assessment Modes (Practical Course)

Laboratory work assessment (best 2 out of 3)	20 marks
Viva voce/ Lab quiz	10 marks
Class Performance	10 marks
Total	40 marks

Society Connect Project (UG & PG)

Project Assessment	10 marks
Presentation and feedback from the society	10 marks
Participation in discussion	10 marks
Total	30 marks

Internal Assessment Modes (Project)

Project Assessment	15 marks
Participation in discussion	10 marks
Presentation	5 marks
Total	30 marks

PASSING MINIMUM

The candidate shall be declared to have passed the examination if the candidates secure not less than 28 marks out of 70 marks in the semester examination in each theory course and in total (CIA mark + Theory ESE) not less than 40 marks.

The candidates shall be declared to have passed the examination if she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 24 marks out of 60 marks in the Practical Exam conducted by the University. There is no passing minimum for the record notebook. However, submission of the record notebook is necessary. Candidate who does not obtain the required minimum marks for a pass in a Course/Practical shall be declared Re-Appear (RA) and the candidate has to appear and pass the same at a subsequent appearance.

Theory Course (Revised Bloom's Taxonomy)
Question Paper Model for UG

Intended Learning Skills	Maximum 70 marks Passing Minimum :40% Duration: Three hours
Memory Recall/ Example/ Counter Example/Knowledge about the Concept/ Understanding	Part- A ($20 \times 1 = 20$ marks) Answer ALL questions Each question carries 1 marks
	Four questions from each UNIT
	Questions 1 to Questions 20
Description/Application (problem)	Part- B ($5 \times 4 = 20$ marks) Answer ALL questions Each question carries 4 marks
	Either-or-Type Both parts of each question from the same Unit
	Questions 21(a) or 21 (b) to Questions 25(a) to 25(b)
Analysis/ Create/Evaluation	Part- C ($3 \times 10 = 30$ marks) Answer ANY THREE questions Each question carries 10 marks
	IVE questions covering all the five units
	Question 26 to Question 30

Each question should carry course outcomes and cognitive level For instance:

1. [CO1 : BL₂] Question xxxx
2. [CO3 : BL₁] Question xxxx

SEMESTER – I								
Course Code	Course Title	Category	L	T	P	Credits	Inst. Hours	Marks
26UPHCC1	PROPERTIES OF MATTER AND SOUND WITH AI	Core	4	1	-	5	5	70
COURSE OBJECTIVES		Study of the properties of matter leads to information, which is of practical value to both the physicist and the engineers. It, gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.						

UNITS	COURSE DETAILS
UNIT-I	ELASTICITY: Hooke's law – stress-strain diagram – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion– torsional pendulum (with and without masses)
UNIT-II	BENDING OF BEAMS: Cantilever – expression for Bending moment – expression for depression at the loaded end of the cantilever– oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope
UNIT-III	FLUID DYNAMICS: <i>Surface tension:</i> definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature <i>Viscosity:</i> definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature.
UNIT-IV	WAVES AND OSCILLATIONS: Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures- free, damped, forced vibrations –resonance and Sharpness of resonance. Laws of transverse vibration in strings –sonometer – determination of AC frequency using sonometer –determination of frequency using Melde's string Apparatus.

UNIT-V	ACOUSTICS OF BUILDINGS AND ULTRASONICS: Intensity of sound – decibel – loudness of sound – reverberation – Sabine’s reverberation formula – acoustic intensity – factors affecting the acoustics of buildings. <i>Ultrasonic waves:</i> production of ultrasonic waves – Piezoelectric crystal method – magnetostriction effect – application of ultrasonic waves -Artificial Intelligence in Speech Identification and Recognition
TEXT BOOKS	1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co. 2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S. Chand & Co 3. D.R.Khanna & R.S.Bedi, 1969, Textbook of Sound, AtmaRam& sons 4. Brij Lal and N. Subrahmanyam, 1995, A Text Book of Sound, Second revised edition, Vikas Publishing House. 5. R. Murugesan, 2012, Properties of Matter, S. Chand & Co.
REFERENCE BOOKS	1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers 2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, R. Chand & Co. 3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India.
WEBLINKS	1. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html 3. https://www.youtube.com/watch?v=gT8Nth9NWPM 4. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s 5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work 6. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 7. http://www.sound-physics.com/ 8. http://nptel.ac.in/courses/112104026/

COURSE OUTCOMES:

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

CO Number	CO Statement	Knowledge Level
CO1	Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum.	K1
CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.	K2
CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface; soap films provide an analogue solution to many engineering problems.	K3

CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of AC mains.	K4
CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, assimilate different methods of production of ultrasonic waves and identify Speech using Artificial Intelligence.	K5

Map course out comes (**CO**) for each course with program out comes (**PO**) in the 3-point scale of STRONG(**S**), MEDIUM (**M**) and LOW(**L**).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	M	S	S	M	S	S	S	S	M

MAPPING WITH PROGRAM SPECIFIC OUT COMES:

Map Course Outcomes (**CO**) for each course with Program Specific Outcomes (**PSO**) in the 3-point scale of STRONG (**S**), MEDIUM (**M**) and LOW(**L**).

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S
CO2	S	M	S	S	M
CO3	S	M	S	M	S
CO4	S	S	S	S	S
CO5	M	M	S	M	S

SEMESTER: I								
Course Code	Course Title	Category	L	T	P	Credits	Inst. Hours	Marks
26UPHCCQ1	PROPERTIES OF MATTER -PRACTICAL	Core	1	-	3	3	4	60

COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results
PROPERTIES OF MATTER -PRACTICAL (Any 8 of the below list)	
1. Determination of rigidity modulus without mass using Torsional pendulum. 2. Determination of rigidity modulus with masses using Torsional pendulum. 3. Determination of moment of inertia of an irregular body. 4. Verification of parallel axes theorem on moment of inertia. 5. Verification of perpendicular axes theorem on moment of inertia. 6. Determination of moment of inertia and g using Bifilar pendulum. 7. Determination of Young's modulus by stretching of wire with known masses. 8. Verification of Hook's law by stretching of wire method. 9. Determination of Young's modulus by uniform bending – load depression graph. 10. Determination of Young's modulus by non-uniform bending – scale & telescope. 11. Determination of Young's modulus by cantilever – load depression graph. 12. Determination of Young's modulus by cantilever – oscillation method 13. Determination of Young's modulus by Koenig's method – (or unknown load) 14. Determination of rigidity modulus by static torsion. 15. Determination of Y, n and K by Searle's double bar method. 16. Determination of surface tension & interfacial surface tension by drop weight method. 17. Determination of co-efficient of viscosity by Stokes' method – terminal velocity. 18. Determination of critical pressure for streamline flow. 19. Determination of Poisson's ratio of rubber tube. 20. Determination of viscosity by Poiseuille's flow method. 21. Determination radius of capillary tube by mercury pellet method. 22. Determination of g using compound pendulum.	
BOOKS FOR STUDY	1. Practical Physics and Electronics - C.C. Ouseph, U.J. Rao, V. Vijeyendran, SV Printers and Publishers Pvt. Ltd., (2007). 2. A text book of Practical Physics - M.N. Srinivasan and others, Sultan Chand and Sons (2014).
REFERENCE BOOKS	B.Sc Practical Physics - C. L Arora, S. Chand (1995).

Outcomes: On completion of the course, students should be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts behind various physics experiments.	K ₁
CO2	Relate various properties of matter with their behaviour and connect them with different physical parameters involved	K ₂
CO3	Determine the elastic properties of materials through experimental procedures.	K ₃
CO4	Measure different physical parameters with maximum Accuracy	K ₃
CO5	Apply theoretical knowledge to analyze experimental data	K ₄

MAPPING WITH PROGRAM OUT COMES:

Map course out comes (**CO**) for each course with program out comes (**PO**) in the 3-point scale of STRONG(S), MEDIUM (M) and LOW(L).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	M	S	S	M	S	S	S	S	M

MAPPING WITH PROGRAM SPECIFIC OUT COMES:

Map Course Outcomes (**CO**) for each course with Program Specific Outcomes (**PSO**) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW(L).

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S
CO2	S	M	S	S	M
CO3	S	M	S	M	S
CO4	S	S	S	S	S
CO5	M	M	uS	M	S

Title of the Course	CHEMISTRY- I (FOR PHYSICS)						
Paper No.	Generic Elective - I						
Category	Generic Course	Year Semester	I I	Credits	3	Course Code	26UPHCGEC1
Instructional hours per week	Lecture	Tutorial	Lab Practice		Total		
	3	-	-		3		
Prerequisites	Higher secondary chemistry						
Objectives of the course	This course aims to provide knowledge on the - basics of atomic orbitals, chemical bonds, hybridization - concepts of thermodynamics and its applications - concepts of nuclear chemistry - importance of chemical industries - qualitative and analytical methods						
Course Outline	UNIT I Chemical Bonding and Nuclear Chemistry Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions - group displacement law. Nuclear binding energy - mass defect – calculations; Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes – carbon dating, rock dating and medicinal applications.						
	UNIT II Industrial Chemistry Fuels: Fuel gases: natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required). Silicones: Synthesis, properties and uses of silicones. Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.						
	UNIT III Fundamental Concepts in Organic Chemistry Hybridization: Orbital overlap, hybridization and geometry of CH ₄ , C ₂ H ₄ , C ₂ H ₂ and C ₆ H ₆ . Electronic effects: Inductive effect and consequences on k _a and k _b of organic acids and bases, electromeric, mesomeric, hyperconjugation and steric-examples. Reaction mechanisms: Types of reactions–aromaticity (Huckel’s rule) – aromatic electrophilic substitution; nitration, halogenation, Friedel- Craft’s alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.						

	UNIT IV Thermodynamics and Phase Equilibria Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation). Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy. Phase Equilibria: Phase rule - definition of terms in it. Applications of phase rule to water system. Two component system - Reduced phase rule and its application to a simple eutectic system (Pb-Ag).
	UNIT V Analytical Chemistry Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques – extraction, distillation and crystallization. Chromatography: principle and applications of column, paper and thin layer chromatography.

Extended Professional Component (is a part of internal component only, not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours).
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Veeraiyan, V, <i>Text book of Ancillary Chemistry</i>; High mount publishing house, Chennai, 1st Ed., 2009. 2. Vaithyanathan, S, <i>Text book of Ancillary Chemistry</i>; Priya Publications, Karur, 2006. 3. Arun Bahl, S, Bahl, B.S, <i>Advanced Organic Chemistry</i>; S. Chand and Company, New Delhi, 23rd Ed., 2012. 4. Soni, P. L, Chawla, H, M, <i>Text Book of Organic Chemistry</i>; Sultan Chand & sons, New Delhi, 29th Ed., 2007.

Reference Books	5. Soni, P. L, Mohan Katyal, <i>Text book of Inorganic chemistry</i> ; Sultan Chand and Company, New Delhi, 20 th Ed., 2007. 6. Puri, B.R, Sharma, L.R, & Pathania, M.S, <i>Textbook Physical Chemistry</i> ; Vishal Publishing Co., New Delhi, 47 th Ed., 2018. 7. Sharma, B.K, <i>Industrial Chemistry</i> , GOEL publishing house, Meerut, 19 th Ed., 2014.
Course Outcomes On completion of the course the students should be able to	
CO1: gain in-depth knowledge about the theories of chemical bonding, nuclear reactions and its applications. CO2: evaluate the efficiencies and uses of various fuels and fertilizers CO3: explain the type of hybridization, electronic effect and mechanism involved in the organic reactions. CO4: apply various thermodynamic principles, systems and phase rule. CO5: explain various methods to identify an appropriate method for the separation of chemical components	

Title of the Course	CHEMISTRY PRACTICAL- I (Physics)						
Paper Name	Generic Elective-I – Chemistry Practical -I						
Category	Generic Course	Year	I	Credit	2	Course Code	26UPHCGECQ1
		Semester	I				
Instructional hours per week	Lecture	Tutorial		Lab Practice		Total	
	-	-		2		2	
Prerequisites	Higher Secondary Chemistry						
Objectives of the course	This course aims to provide knowledge on the - basics of preparation of solutions. - principles and practical experience of volumetric analysis.						
Course Outline	Volumetric analysis 1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid using standard oxalic acid. 3. Estimation of ferrous sulphate using standard Mohr's salt. 4. Estimation of oxalic acid using standard ferrous sulphate. 5. Estimation of potassium permanganate using standard sodium hydroxide. 6. Estimation of magnesium using EDTA. 7. Estimation of ferrous ion using diphenyl amine as indicator.						
Reference Book	Venkateswaran, V, Veerasamy, R, Kulandaivelu, A.R, <i>Basic Principles of Practical Chemistry</i> ; Sultan Chand & sons, 2 nd Ed., 1997.						
Course Outcomes On successful completion of the course the students should be able to CO1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO2: design, carry out, record and interpret the results of volumetric titration. CO3: apply their skill in the analysis of water /hardness. CO4: analyze the chemical constituents in allied chemical products.							

SEMESTER : I								
Course Code	Course Title	Category	L	T	P	Credits	Inst. Hours	Marks
26UPHSEC1	NME: PHYSICS FOR EVERYDAY LIFE	Skill Enhancement Course	2	-	-	2	2	70

PHYSICS FOR EVERYDAY LIFE	
Learning Objective: To know where all physics principles have been put to use in daily life and appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics	
UNITS	COURSE DETAILS
UNIT-I	MECHANICS Motion, Force and Newton's laws-momentum-Circular motion – Gravitation-Planetary motion –Rotational Motion –Earth Satellites – Communication Satellites
UNIT-II	OPTICAL INSTRUMENTS AND LASER: Vision corrective lenses – polaroid glasses – UV protective glass – polaroid camera – colour photography – holography and laser.
UNIT-III	PHYSICS OF HOME APPLIANCES: bulb – fan – hair drier – television – air conditioners – microwave ovens – vacuum cleaners
UNIT-IV	SOLAR ENERGY: Solar constant – General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.
UNIT-V	INDIAN PHYSICIST AND THEIR CONTRIBUTIONS: C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyam Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.
TEXT BOOKS	1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019. 2. For the love of physics, Walter Lawin, Free Press, New York, 2011.

SEMESTER – I								
Course Code	Course Title	Category	L	T	P	Credits	Inst. Hours	Marks
26UPHSEFC	INTRODUCTORY PHYSICS	Foundation Course	2	-	-	2	2	70
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.							
UNITS	COURSE DETAILS							
UNIT-I	vectors, scalars –examples for scalars and vectors from physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants							
UNIT-II	different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces							
UNIT-III	different forms of energy– conservation laws of momentum, energy – types of collisions –angular momentum– alternate energy sources–real life examples							
UNIT-IV	types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads – stream line and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations							
UNIT-V	surface tension – shape of liquid drop – angle of contact – viscosity – lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use- conductors, insulators – thermal and electric							
TEXT BOOKS	1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co 2. Brij Lal & N. Subrahmanyam, 2003, Properties of Matter, S. Chand & Co.							
REFERENCE BOOKS	1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S. Chand & Co.							
WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/per-mot2.html https://science.nasa.gov/ems/ 2. https://eesc.columbia.edu/courses/eec/climate/lectures/radiation_hays/							

COURSE OUTCOMES:

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

COURSE OUTCOMES	CO1	Apply concept of vectors to understand concepts of Physics and solve problems
	CO2	Appreciate different forces present in Nature while learning about phenomena related to these different forces.
	CO3	Quantify energy in different process and relate momentum, velocity and energy
	CO4	Differentiate different types of motions they would encounter in various courses and understand their basis
	CO5	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

MAPPING WITH PROGRAM OUTCOMES:

Map course outcomes (CO) for each course with program outcomes (PO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

MAPPING WITH PROGRAM SPECIFIC OUT COMES:

Map Course Outcomes (CO) for each course with Program Specific Outcomes (PSO) in the 3-point scale of STRONG (S), MEDIUM (M) and LOW (L).

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S
CO2	S	M	S	S	M
CO3	S	M	S	M	S
CO4	S	S	S	S	S
CO5	M	M	S	M	S