Manonmaniam
Sundaranar University

B. Sc PHYSICS SYLLABUS

(for affiliated colleges)

ACADEMIC YEAR 2026-2027

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI

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MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

OPERATIONAL GUIDELINES FOR FRAMING CURRICULUM

VISION AND MISSION OF THE UNIVERSITY

Vision

"To provide quality education to reach the un-reached"

Mission

- To conduct research, teaching and outreach programmes to improve conditions of human living
- To offer a wide variety of off-campus educational and training programs, including the use of information technology, to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development
- To provide quality / inclusive education, especially for the rural and un-reached segments of economically downtrodden students including women, socially oppressed and differently abled

PREAMBLE

Physics is one of the basic and fundamental sciences. The curriculum for the undergraduate 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

PROGRAMME EDUCATIONAL OUTCOMES (PEO)

In alignment with the Vision and Mission of the University, the following have been defined as the PEO for the graduates.

PEO1: Developing strong positive attitude to learn independently the concepts in the field of study

PEO2: Ensuring confidence among the learners to apply the knowledge and skills gained to solve real life issues

PEO3: Habituating ethical values among the learners to succeed in personal and professional life

PROGRAMME OUTCOMES (PO)

Programme Outcomes for the Under Graduate and Post Graduate Degree Programmes of the University are articulated as under.

After the successful completion of Undergraduate Programme from the University, the learner should be able to

PO1: Comprehend the knowledge acquired and communicate the same to others.

PO2: Analyse and compare the factual data / situation to comprehend and to critically evaluate to find solution to the problem ahead.

PO3: Apply theories and philosophies learned in solving the problem in scientific manner.

PO4: Think reflectively on the earlier activities and attempt for self directed lifelong learning process.

PO5: Understand multicultural existence and identify the means to prolong moral/ethical values in personal and professional life.

PO6: Explore through multiple sources and get exposed to the digital technology

PO7: Act as a responsible member in teams and practice leadership qualities

Program Specific Outcomes (PSOs)

On successful completion of Bachelor of B programme, the student should be able to:

PSO1: Disciplinary Knowledge:

Prepare the students for a successful career and work with values for social concern.

Understand the concepts and applications in the field of Physics viz. Mechanics, Thermodynamics,

Optics, Electricity and electromagnetism, Quantum Mechanics, Electronics etc.

Perform experiments with accuracy and precision using standard laboratory equipment.

PSO2: Critical Thinking:

Analyze experimental data and interpret results in terms of physical laws and concepts.

Develop logical reasoning and critical thinking skills to solve theoretical and practical problems in Physics.

PSO3: Problem Solving:

Apply mathematical methods and analytical techniques to solve quantitative physics problems.

Use mathematical tools to analyze physical concepts.

PSO4: Analytical & Scientific Reasoning:

Develop and apply analytical and scientific reasoning to understand interpret and solve problems related to physical phenomena using fundamental principles of physics.

PSO5: Research related skills:

Design and execute a Project to solve real-world problems in accordance to the need of the industry and society.

PSO6: Self-directed & Lifelong Learning:

Build a strong conceptual and analytical foundation for higher-level courses in physics and related disciplines, including quantum mechanics, electronics, and materials science.

PSO7: Employability and Entrepreneurship

Develop skills for employability, entrepreneurship, and career readiness in industry, research organizations, education, information technology, and technology-driven sectors through problem-solving, innovation, teamwork, and effective communication.

Each Course has to address a minimum of 4 PSOs

Level of contribution of the Course towards attaining PSOs

0 – No Contribution 1 – Low Level 2 – Medium Level 3 – High Level

COURSE OUTCOMES (CO)

Four Course Outcomes (COs) for each course that can be achieved by the learners on completion of that particular course are as follows:

Considering outcomes related to

i. K1 and K2 level of evaluation in all the Units as CO1

ii. K3 level of evaluation in all the Units as CO2

iii. K4 level of evaluation in all the Units as CO3

iv. K5 and K6 level of evaluation in all the Units as CO4.

All the COs proposed in each of the courses should be mapped with POs based on the relevance.

Level of Correlation between COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

G. Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids:

	Pos							**PSOs**						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
CO1														
CO2														
CO3														
CO4														

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	12	12	22	18	90
Part IV	4	4	6	6	3	2	25
Part V	-	-	-	-	-	1	1
Total	23	23	24	24	25	21	140

MEASUREMENT OF ATTAINMENT OF COURSE OUTCOME

The Course Outcomes (COs) are measured through the performance of learners by direct and indirect assessment methods for that particular course.

i. Internal Assessment (25 Marks)

Tests – 20 Marks

Seminar / Assignments/Attention (Participation) in Class – 5 Marks

ii. Semester End Examinations (75 Marks)

Written exams, Practical, Project report, and Comprehensive Viva Voce

Note: In both Internal and Semester End Examinations

Lower Order Thinking (K1, K2, & K3) – 60 % in each part

Higher Order Thinking (K4, K5, & K6) – 40 % in each part

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 components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.

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EVALUATION SCHEME

- B.Sc Physics curriculum is divided and studied in six semesters.
- The internal assessments and external examination are the two parts of evaluation scheme.
- The external theory and practical examinations will be conducted by the university at the end of each semester.
- There is a separate passing minimum of 40% for the external and overall components.

DISTRIBUTION OF MARKS BETWEEN INTERNAL AND EXTERNAL ASSESSMENT FOR CORE, SKILL ENHANCEMENT,

ELECTIVE, AND ALLIED COURSES.

* Theory Marks 25: 75

* Practical Marks 50: 50

Pass minimum of 40% for external and overall components.

1. Internal Assessment.

Internal Marks for Theory shall be allotted in the following manner

The average of the best two tests from three compulsory tests. Each test is of one hour duration	20 marks
Assignment	05 marks
Total	25 Marks

2. Marks for Practical / Major Project shall be allotted in the following manner

Internal Marks: 50; External Marks: 50

External evaluation of Project;

Project report evaluation and Viva-Voce will be conducted by both the External examiner and the Guide at the end of the semester.

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4. Internship

Report for Internship / Industrial Visit / Field Visit / Research Institute Visit.

Should be evaluated along with the project at the end of V^{th} semester.

Students should submit a report for internship / industrial visit / field visit / Research institute visit/ knowledge up dation activity at the end of the fifth semester with attendance certificate from the concern organisation.

The duration of internship should be 30 hours.

Internal: 50 marks; External: 50 marks

5. Extension Activity:

The student should participate in any one of the programme like NSS, NCC, YRC, RRC, games and sports/ youth welfare activity, outreach programmes etc. the examination / report / evaluation will be conducted at the end of sixth semester.

6. Naan Mudhalvan programme is compulsory for all the students. Those who failed in naan mudhalvan can write exam for the substitute subject*.

7. The question pattern for all theory courses shall be as follows.

Duration of Exam: 3 Hours

Section	Type of questions	Mark Distribution
Part A	Ten Multiple choice question (Two question from each unit compulsory)	10 x1=10 Marks
Part B	Five Internal Choice questions (One question from each unit: either or choice)	5x5=25 marks
Part C	Five Internal Choice questions (One question from each unit: either or choice)	5x8=40 marks
	Total	**75 Marks**

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B.Sc., (CBCS) DEGREE EXAMINATION, NOVEMBER 2026

First Semester | PHYSICS – CORE

PROPERTIES OF MATTER AND ACOUSTICS

(For those who joined in July 2026 onwards)

Time: 3 Hours | **Maximum Marks: 75**

Q. No.	Questions	Cognitive Level
	PART – A (10 × 1 = 10 Marks) ***Answer All Questions***	
1	Hooke's law is valid within the a) Elastic limit b) Breaking point c) Yield point d) Plastic region	**K1**
2	The ratio of lateral strain to longitudinal strain is called a) Young's modulus b) Bulk modulus c) Poisson's ratio d) Rigidity modulus	**K1**
3	The SI unit of surface tension is a) $N\ m^{-1}$ b) N m c) Pa d) J	**K1**
4	Flow of liquid through a capillary tube is explained by a) Bernoulli's theorem b) Stoke's law c) Poiseuille's law d) Hooke's law	**K2**
5	The motion in which acceleration is directly proportional to displacement is a) Random motion b) Circular motion c) SHM d) Projectile motion	**K1**
6	Lissajous figures are produced by the composition of a) Two SHMs b) Two circular motions c) Two translatory motions d) Rotational motions	**K2**
7	Resonance occurs when the frequency of the driving force is equal to the a) Damped frequency b) Natural frequency c) Average frequency d) Harmonic frequency	**K2**
8	The unit used to measure sound intensity level is a) Hertz b) Pascal c) Decibel d) Newton	**K1**
9	Ultrasonic waves have frequencies greater than a) 20 Hz b) 200 Hz c) 2000 Hz d) 20,000 Hz	**K2**
10	The piezoelectric effect is used for the production of a) Infrared rays b) Microwaves c) Ultrasonic waves d) X-rays	**K3**
	PART – B (5 × 5 = 25 Marks) ***Answer All Questions (Either/Or Type)***	
11	(a) State Hooke's law and explain the stress-strain diagram. OR (b) Derive the relation between elastic constants and Poisson's ratio.	**K2**
12	(a) Derive an expression for the depression at the loaded end of a cantilever. OR	**K3**

	(b) Explain the determination of Young's modulus by non-uniform bending.	
13	(a) Explain excess pressure inside spherical drops and soap bubbles. OR (b) Derive Poiseuille's equation for the flow of liquid through a capillary tube.	**K3**
14	(a) Explain the composition of two SHMs at right angles and the formation of Lissajous figures. OR (b) Describe free, damped and forced vibrations.	**K3**
15	(a) Discuss the factors affecting the acoustics of buildings. OR (b) Explain the production and detection of ultrasonic waves by the piezoelectric crystal method.	**K2**
PART – C (5 × 8 = 40 Marks) ***Answer All Questions (Either/Or Type)***		
16	(a) Compare Young's modulus, Bulk modulus and Rigidity modulus and establish the relationship among elastic constants. OR (b) A wire of given dimensions is stretched by a load. Calculate the work done and analyse the effect of dimensions on elasticity.	**K4**
17	(a) Evaluate the advantages and limitations of the cantilever and uniform bending methods in determining Young's modulus. OR (b) Analyse the factors affecting bending moment and discuss their practical significance in engineering structures.	**K5**
18	(a) A liquid flows through a capillary tube under given conditions. Apply Poiseuille's equation to determine the rate of flow and discuss the influence of viscosity. OR (b) Evaluate the applications of surface tension and viscosity in biological and industrial processes.	**K5**
19	(a) Explain the phenomenon of resonance and the concept of sharpness of resonance with suitable examples. OR (b) Explain the methods of determining frequency using a sonometer and Melde's string apparatus.	**K3**
20	(a) Assess the importance of building acoustics in the design of auditoriums and theatres. Suggest suitable remedies for common acoustic defects. OR (b) Evaluate the role of ultrasonic waves in medical diagnosis, industry and underwater communication.	**K6**

PROGRAMME STRUCTURE

First Year Semester-I			
Part	**List of Courses**	**Credit**	**Hours per week (L/T/ P)**
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	CoreTheory1–Properties of Matter and Acoustics	5	5
	Core Practical1–Physics Practical I	3	3
	AlliedTheory1–Allied Mathematics I	5	6
Part-IV	**Skill Enhancement Course SEC-1** PHYSICS FOR EVERYDAY LIFE	2	2
	Foundation Course– Introductory Physics	2	2
Total		**23**	**30**

Semester-II			
Part	**List of Courses**	**Credit**	**Hours per week(L /T/P)**
Part-I	Tamil	3	6
Part-II	English	3	4
Part-III	CoreTheory2– Heat, Thermodynamics and Statistical Physics	5	5
	Core Practical2–Physics Practical II	3	3
	Allied Theory2–Allied Mathematics II	5	6
Part-IV	**Skill Enhancement Course-SEC-2** ASTROPHYSICS	1	2
	Skill Enhancement Course-SEC3 (Discipline/Subject Specific) – Physics for Competitive Examinations	1	2
	Naan Muthalvan /Basic Physics	2	2
Total		**23**	**30**

Second Year Semester-III

Part	List of Courses	Credit	Hours per wee k(L/ T/P)
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	Core Theory3–Mechanics	4	4
	Core Practical 3–Physics Practical III	2	2
	Allied Theory1–Allied Chemistry I	4	4
	Allied Practical1–Allied Chemistry Practical I	2	2
Part-IV	**Skill Enhancement Course-SEC-4** (Maintenance of Electrical appliances)	2	2
	Naan Muthalvan / Instrumentation physics I	2	2
	EVS	2	2
Total		**24**	**30**

Semester-IV

Part	List of Courses	Credit	Hours per week(L/ T/P)
Part-I	Tamil	3	6
Part-II	English	3	6
Part-III	Core Theory 4–Optics and Laser Physics	4	4
	Core Practical 4–Physics Practical IV	2	2
	Allied Theory 2– Allied Chemistry II	3	4
	Allied Practical2– Allied Chemistry Practical II	3	2
Part-IV	**Skill Enhancement Course-SEC-5** (Maintenance of Electronic appliances)	2	2
	Naan Muthalvan/ Instrumentation Physics II	2	2
	Value Based Education	2	2
Total		**24**	**30**

Third Year Semester-V

Part	List of Courses	Credit	Hours per week(L/ T/P)
Part-III	Core Theory5–Electricity, Magnetism and Electromagnetism	4	5
	Core Theory6–Atomic and Nuclear Physics	4	5

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	Core Theory7–Analog and Communication Electronics	3	5
	Core Practical5–Physics Practical V	3	3
	Core Practical6–Physics Practical VI	3	3
	Core–Project (Group)	2	4
	Elective Course1(Generic/Discipline Specific) EC1. Spectroscopy EC2.Mathematical Physics EC3.PythonProgramming and Basics of AI and Data Science	2	3
Part-IV	Internship/Industrial/Visit/Field Visit/Knowledge Updating Activity	2	-
	Naan Muthalvan/MODERN PHYSICS	2	2
Total		**25**	**30**

Semester–VI

Part	**List of Courses**	**Credit**	**Hours per week (L/T/P)**
Part-III	Core Theory 8–Relativity and Quantum Mechanics	4	6
	CoreTheory9–Solid State Physics	4	6
	CoreTheory10–Digital Electronics and Microprocessor 8085	4	6
	CorePractical7–PhysicsPracticalVII	2	3
	CorePractical8–PhysicsPracticalVIII	2	3
	Elective Course2(Generic/Subject Specific) EC4 Energy Physics EC5 Material Science EC6 Nanoscience and Nanotechnology	2	4
Part-IV	Naan Mudhalavan /APPLIED PHYSICS	2	2
Part-V	Extension Activity, NSS/NCC/YRC/Physical Education (Outside College Hours)	1	-
Total		**21**	**30**

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For Internship / Industrial Visit/Field Visit/Knowledge Updating Activity (Internal 50 marks External 50 Marks). Report should be submitted at the end of this semester and evaluated by external examiner

Core – Project – It must be the Group Project - Each group consists of maximum of five students - Project must be related to the Physics subject- Readymade projects not allowed Downloadedprojectsnotallowed-Bothexperimentalandtheoreticalprojectsareallowed Group Project report will be submitted during practical examination External50 marks will be evaluated by the external examiner. viva voce Examination (Internal 50 marks External 50 marks)

Students who failed in the Naan Muthalvan examination can write the paper MODERN PHYSICS

Semester V ELECTIVE COURSES(EC)Select any one course

EC1. Spectroscopy

EC2.Mathematical Physics

EC3.PythonProgramming and Basics of AI and Data Science

Extension Activity (Internal 50marks External 50Marks)

Students who failed in the Naan Muthalvan examination can write the paper APPLIED PHYSICS

Semester VI ELECTIVE COURSES (EC) Select any One courses

EC 4. Energy Physics

EC5. Material Science

EC6.Nanoscience and Nanotechnology

*Reappearance for the Naan Mudhalvan Course (External Examination for 100 marks).

Note: 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 components, IV and V, have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree**.**

Illustrative B.Sc. Physics Curriculum Design

First Year Semester-I			
Part	**List of Courses**	**Credit**	**Hours per week (L/T/ P)**
Part-I	Tamil	3	6

Part-II	English	3	6
Part-III	CoreTheory1–PropertiesofMatterandAcoustics	5	5
	Core Practical1–PhysicsPracticalI	3	3
	AlliedTheory1–AlliedMathematicsI	5	6
Part-IV	**Skill Enhancement Course SEC-1** PHYSICSFOR EVERYDAYLIFE	2	2
	Foundation Course– Introductory Physics	2	2
Total		**23**	**30**

T – Theory and P - Practical

Semester-II			
Part	**List of Courses**	**Credit**	**Hours per week(L/T/P)**
Part-I	Tamil	3	6
Part-II	English	3	4
Part-III	CoreTheory2–Heat,Thermodynamics and Statistical Physics	5	5
	Core Practical2–Physics PracticalI I	3	3
	AlliedTheory2–Allied Mathematics II	5	6
Part-IV	SkillEnhancementCourse-SEC-2ASTROPHYSICS	1	2
	SkillEnhancementCourse-SEC-3(Discipline/Subject Specific) – Physics for Competitive Examinations	1	2
	NaanMuthalvan/BasicPhysics	2	2
		23	**30**

 # The Naan Mudhalvan substitute course for semesters II through VI is only available to individuals who is absent or fail, and they have to appear for external exams for 100 marks.

Courses - PSOs mapping

Title of the course	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	Total score
Properties of Matter and Acoustics	3*	3*	3*	3*	3*	3*	3*	21
Physics For Everyday Life	3*	3*	3*	3*	3*	3*	3*	21
Introductory Physics	3*	3*	3*	3*	3*	3*	3*	21
Allied Physics I	3*	3*	2**	3*	2**	3*	2**	18
Heat, Thermodynamics & Statistical Physics	3*	3*	2**	3*	2**	3*	2**	18
Astrophysics	3*	3*	2**	3*	2**	3*	2**	18
Physics For Competitive Examinations	3*	3*	2**	3*	2**	3*	2**	18
Allied Physics II	3*	3*	2**	3*	2**	3*	2**	18
Total score of all courses contributing to PSO	24	24	19	24	19	24	19	

Each Course has to address a minimum of 4 PSO. Level of contribution of the Course towards attaining PSOs. 0 – No Contribution 1 – Low Level 2 – Medium Level 3 – High Level

* It is the roundoff of the average (10/4) calculated from PSO1 column of the Cos – PSOs mapping table of the course Properties of Matter and Acoustics.

** It is the roundoff of the average (7/4) calculated from PSO5 column of the Cos – PSOs mapping table of the course Heat, Thermodynamics and Statistical Physics.

B.Sc. Physics Core Component Syllabus

Syllabus for different Courses of B.Sc. Physics

Subject Code	Subject Name	Category	L	T	P	Credits	Hours	Marks		
								CIA	Ext	Total
	Properties of Matter and Acoustics	Core 1–	5			5	5	25	75	100

Course Outcome

CO1: Define Hooke's law, stress, strain, and Poisson's ratio; **state** the formulas for elastic constants and the work done in stretching a wire.

Explain the distinct regions of the stress-strain diagram; **describe** the derivation of relations between elastic constants and the working mechanism of a torsion pendulum (with and without masses) to determine the rigidity modulus.

CO2: Compute the bending moment, depression, and elevation in structural beams; **apply** experimental methodologies (cantilever depression, uniform bending via microscope, and non-uniform bending) to practically determine the Young's modulus of a given material.

CO3: Differentiate between streamline and turbulent fluid flows; **analyze** the distribution of molecular forces to derive excess pressure in spherical/cylindrical drops and bubbles; **investigate** fluid velocity profiles using Poiseuille's equation and Stoke's formula for terminal velocity.

CO4: Appraise the composition of two collinear or orthogonal SHMs (Lissajous figures); **assess** the effects of damping, forcing, and sharpness of resonance in vibrating systems; **critically evaluate** factors affecting the acoustics of buildings and methods to optimize reverberation time.

Formulate mathematical models for transverse vibrations in strings; **design/setup** experimental configurations using a sonometer (for AC frequency) or Melde's string apparatus to synthesize and measure precise frequencies; **propose** design solutions for producing and detecting ultrasonic waves using the Piezoelectric crystal method for industrial applications.

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 a wire –Twisting couple on a cylinder – Rigidity modulus by torsion pendulum (with and without masses).
	UNIT II: BENDING OF BEAMS: Expression for the bending moment – Expression for depression at the loaded end of the cantilever–Experiment to determine Young‘s modulus by cantilever depression. Experiment to find Young‘s modulus by non-uniform bending. Uniform bending – Expression for elevation – Experiment to determine Young‘s modulus by uniform bending method using microscope.
	UNITIII: FLUID DYNAMICS: Surface tension: definition –molecular forces -Excess pressure over curved surface – application to spherical and cylindrical drops and bubbles. **Viscosity:** definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille‘s formula – terminal velocity and Stoke‘s formula.
	UNIT IV: WAVES AND OSCILLATIONS Simple Harmonic Motion(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 – factors affecting the acoustics of buildings. **Ultrasonic waves:** Production of ultrasonic waves – Piezoelectric crystal method – Detection of ultrasonic waves-application of ultrasonic waves.

Recommended Text	1. D.S.Mathur,2010,Elements of Properties of Matter,S.Chandand Co. 2. BrijLalandN.Subrahmanyam,2003,Properties of Matter,S.ChandandCo 3. D.R.KhannaandR.S.Bedi,1969,Textbook o fSound,AtmaRamandsons 4. Brijlal and N.Subrahmanyam, 1995, A Text Book of Sound, Second revised edition,Vikas Publishing House. R.Murugesan,2012, Properties of Matter, S.Chandand Co.
Reference Books	1. C.J.Smith,1960,General Properties of Matter,OrientLongman Publishers 2. H.R.Gulati,1977,Fundamental of General Properties o fMatter,Fifth edition,R. Chand and Co. A.P French,1973, Vibrationand Waves,MITIntroductoryPhysics, Arnold-Heinmann India.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

CO-PO & CO-PSO Mapping Matrix

Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	2	2	2	2	2	2	3	2	2	2	2	3	2
CO2	2	3	3	2	2	3	3	3	3	3	3	2	2	3
CO3	2	3	2	3	3	2	2	3	3	2	3	3	2	2
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total	**10**	**11**	**10**	**10**	**10**	**10**	**10**	**12**	**11**	**10**	**11**	**10**	**10**	**10**

Level of Correlation between COs and POs, COs and POs

0 – No Correlation 1 – Low 2 – Medium 3 – High

COURSE	**FIRST SEMESTER–CORE PRACTICAL1**
COURSETITLE	**PRACTICAL1**
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter& Acoustics, setup experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

List of Practical

Minimum of Six Experiments from the list

1. Determination of rigidity modulus without masses using a Torsional pendulum.
2. Determination of rigidity modulus with masses using a Torsional pendulum.
3. Determination of moment of inertia and g‘ using a Bifilar pendulum.
4. Determination of Young‘s modulus by uniform bending using pin and microscope.
5. Determination of Young‘s modulus by non-uniform bending using scale and telescope.
6. Determination of Young‘s modulus by the cantilever depression method.
7. Determination of rigidity modulus by static torsion.
8. Determination of Y,n and K by Searle‘s double bar method.
9. Determination of the frequency of AC by using a sonometer.
10. Determinationofsurfacetensionandinterfacialsurfacetensionbythedropweight method.
11. Determination of the co-efficient of viscosity by Stokes ‘method.
12. Determination of Poisson‘s ratio of a rubber tube.
13. Determination of viscosity by Poiseullie‘s flow method.
14. Determination of frequency of an electrically maintained tuning fork.
15. Determination of g using a compound pendulum.

Subject Code	Subject Name	Category	L	T	P	Credits	Hours	Marks		
								CIA	Ext	Total
	PHYSICS FOR EVERYDAY LIFE	SEC 1	**2**			**2**	**2**	**25**	**75**	**100**

Course Outcome

CO1: Remember – **Identify** the structural parts of a bicycle; **state** the basic laws of motion that govern rocket propulsion, space travel, and bouncing balls; **recall** Hooke's law in the context of spring scales.

Understand – **Explain** how a spring scale measures weight, the energy transformations in bouncing balls, the mechanical advantages of gears in a bicycle, and the fundamental physics principles behind orbital mechanics and rocket thrust.

CO2: Apply the principles of refraction and polarization to explain the function of vision corrective lenses and Polaroid glasses; **compute** parameters related to UV protection metrics; **demonstrate** how laser properties are applied practically to generate and reconstruct a holographic image.

CO3: Deconstruct the working mechanisms of domestic appliances to **analyze** their internal physical processes (e.g., thermodynamic cooling cycles in refrigerators, electromagnetic induction in ceiling fan/wet grinder motors, joule heating in filament bulbs, and forced convection in hair driers).

CO4: Appraise the efficiency of online vs. offline solar power systems; **critically evaluate** the performance criteria of solar water heaters and photovoltaic cells based on the solar constant; **assess and judge** the socio-technological impact of the breakthroughs made by C.V. Raman, H.J. Bhabha, Vikram Sarabhai, S. Chandrasekhar, and APJ Abdul Kalam.

Design a basic schematic layout for a sustainable household solar photovoltaic network based on variable load demands; **formulate** comprehensive research reviews or modern case studies linking the foundational physics of landmark Indian scientists to contemporary advancements in national aerospace, nuclear energy, and astrophysics frameworks.

Course details	**UNIT: 1** MECHANICAL OBJECTS: Spring scales–bouncing balls– bicycles– rockets and space travel.
	UNIT: 2 OPTICAL INSTRUMENTS AND LASER: vision corrective lenses – Polaroid glasses – UV protective glass – holography and laser.

	UNIT: 3 PHYSICS OF HOME APPLIANCES: filament bulb–ceiling fan– Hair drier–refrigerator– wet grinder
	UNIT: 4 SOLAR ENERGY: Solar constant–General applications of solar energy – Solar water heaters – Solar Photovoltaic cells – online- Offline solar power system.
	UNIT: 5 INDIAN PHYSICIST AND THEIR CONTRIBUTIONS: C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Dr. APJ Abdul Kalam and their contribution to science and technology.
Recommended Text	R.S.Agarwal-Objective arithmetic, Published by S.Chand & Co Ltd.,2018.
Reference Books	1. 1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019. 2. For the love of physics, Walter Lawin, FreePress,NewYork,2011.

Mapping of Course Outcomes (COs) with Programme Outcomes(POs) and Programme Specific Outcomes (PSOs)

Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	2	2	2	2	2	2	3	2	2	2	2	3	2
CO2	2	3	3	2	2	3	2	3	3	3	3	2	2	3
CO3	2	3	2	3	3	2	3	3	3	2	3	3	2	2
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total	**10**	**11**	**10**	**10**	**10**	**10**	**10**	**12**	**11**	**10**	**11**	**10**	**10**	**10**

Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**Credits**	**Hours**	**Marks**		
								CIA	**Ext**	**Total**
	INTRODUCTORY PHYSICS	**FOUNDATION COURSE**	**2**			**2**	**2**	**25**	**75**	**100**

Course Outcome

CO1: Define scalars, vectors, units, dimensions, and standard physics constants; **list** the fundamental forces of nature (gravitational, electrostatic, magnetic, electromagnetic, and nuclear).

Explain vector operations (addition, subtraction, resolution); **describe** the physical mechanisms of centripetal and centrifugal forces; **distinguish** between the operational realms of nuclear and electromagnetic forces.

CO2: Apply the work-energy theorem to compute kinetic and potential energy variations; **calculate** power outputs of mechanical systems; **solve** real-world engineering problems by applying the conservation laws of linear and angular momentum.

CO3: Categorize and model diverse motion typologies (linear, projectile, circular, angular, and simple harmonic motions); **differentiate** between streamline and turbulent fluid profiles; **critically analyze and compare** the wave propagation characteristics of light waves vs. sound waves.

CO4: Appraise the thermal and electrical performance variations among conductors, semiconductors, and insulators; **critically evaluate** the transition thresholds and operational parameters governing superconductors under varying external fields.

Formulate predictive material-selection blueprints or schematic profiles for electrical/thermal systems based on specific insulation or conduction requirements; **propose** innovative, conceptual designs utilizing the unique zero-resistance properties of superconductors for futuristic energy grids.

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 forces – Mechanical Forces like, centripetal, centrifugal forces.
	UNIT III: Work, Power and Energy: Work done by the force Power Kinetic energy – potential energy – work energy theorem – principle of conservation of Energy Work-Energy Theorem - Conservation laws of momentum,–angular momentum.

	UNIT IV: Types of motion: Linear, Projectile, Circular, Angular, Simple Harmonic motions – stream line and turbulent motions – wave motion – comparison of light and sound waves .
	UNIT V: Properties and types of materials : Conductors, Semi-Conductors and Insulators – Thermal and Electric Properties – Introduction toS uper Conductors.
Recommended Text	1. D.S.Mathur,2010, Elements of Properties of Matter, S.Chand & Co 2. BrijLal&N.Subrahmanyam,2003,PropertiesofMatter, S.Chand & Co. 3. H.R.Gulati,1977, FundamentalofGeneral Propertiesof Matter, Fifthedition,S.Chand&Co.
Website and e-Learning Source	http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)and Programme Specific Outcomes (PSOs)

Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	2	2	2	2	2	2	3	2	2	2	2	3	2
CO2	2	3	3	2	2	3	2	3	3	3	3	2	2	3
CO3	2	3	2	3	3	2	3	3	3	2	3	3	2	2
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total	**10**	**11**	**10**	**10**	**10**	**10**	**10**	**12**	**11**	**10**	**11**	**10**	**10**	**10**

Subject Code	Subject Name	Category	L	T	P	Credits	Hours	Marks		
								CIA	Ext	Total
	ALLIED PHYSICS I	**Elective I**	**4**			**3**	**4**	**25**	**75**	**100**

Course Outcome

CO1:*:* **Define** Hooke's law, elastic moduli, surface tension coefficients, and the parameters of mean free path and viscosity.

: **Explain** the molecular interpretation of surface tension, the analogy between liquid flow and electric current flow, transport phenomena in gases, and the mechanics of a twisting couple acting on a wire

CO2: Apply the principles of uniform bending and torsional oscillation to determine Young's and rigidity moduli; **compute** fluid velocity fields using Poiseuille's and Stokes' equations; and **use** potentiometer principles to calibrate voltmeters and ammeters.

CO3: Differentiate between synclastic and anticlastic surfaces to analyze excess pressure conditions; **compare** Fresnel vs. Fraunhofer diffraction profiles; and **investigate** heat transfer behaviors via Lee's disc configurations, Newton's law of cooling, and black body radiation graphs.

CO4:*:* **Assess** the production and detection parameters of plane, elliptically, and circularly polarized light through wave plates; **critically evaluate** the interrelationships between magnetic variables and **categorize** structural material properties across Dia, Para, and Ferro-magnetic regimes.

K6: Create: **Formulate** explicit laboratory schematic workflows or experimental parameters to determine thin wire dimensions via air wedge interference fringes or calculate spectral wave lengths utilizing plane diffraction gratings under normal incidence.

Course details	**Unit I Elasticity and Bending** Hooke's law – Elastic moduli – Work done in stretching a wire–Expression for bending moment–uniform bending-Experiment to determine Young's modulus using pin and microscope–Twisting couple of a wire – Expression for couple per unit twist–Work done in twisting – Experimental determination of rigidity modulus of a wire using Torsion pendulum.

	Unit II Surface tension and Viscosity **Surface tension:** Definition– Examples –Molecular interpretation– Expression for excess of pressure inside a synclastic and anticlastic surface–Application to spherical and cylindrical drops and bubbles. **Viscosity:** Coefficient of viscosity – Rate of flow of liquid in a capillary tube –Poisueuille's formula –Analogy between liquid flow and current flow– Stokes' formula for highly viscous liquid (Dimension method) – Experimental determination of viscosity of highly viscous liquid (stokes' method)
	Unit III Thermal Physics Mean free path– Expression for mean free path (Zero order approximation) – **Transport phenomena** – Expression for thermal conductivity **Conduction** in solids – coefficient of thermal conductivity – Lee's disc method to determine thermal conductivity of a bad conductor –Wiedmann–Franz's law– **Convection**: Newton's law of cooling – Experimental verification – **Radiation**: Black body radiation – Salient features of black body radiation curve.
	Unit IV Optics **Interference:** Condition for interference–Air wedge–determination of thickness of a thin wire **Diffraction:** Fresnel &Fraunhofer diffraction–Plane diffraction grating–experiment to determine wavelength (normal incidence) **Polarization:** Definition –Polariser and analyser–Production and detection of plane, elliptically and circularly polarized light.Double refraction–quarter wave and half wave plate.
	Unit V Electricity and Magnetism **Electricity:** Electric current – current density – Expression for current density-Ohm's law – Kirchoff's laws –Potentiometer - principle – calibration of

	voltmeter and ammeter. **Magnetism:** Definition of magnetic induction **B**, Magnetic field intensity **H**, Intensity of magnetization **M** – Relation between **M**, **B** and **H.** Permeability and susceptibility–Classification of magnetic materials -Properties of Dia, Para and Ferro magnetic materials.
Recommended Text	**"Elements of Properties of Matter"** by *D.S. Mathur* **"A Textbook of Optics"** by *N. Subrahmanyam, Brij Lal, and M.N. Avadhanulu* (Publisher: S. Chand & Company) **"Electricity and Magnetism"** by *R. Murugeshan* (Publisher: S. Chand & Company)
Reference books	**"Heat and Thermodynamics"** or **"A Textbook of Thermal Physics"** by *Brij Lal and N. Subrahmanyam* (Publisher: S. Chand & Company)

Mapping of Course Outcomes (COs) with Programme Outcomes(POs)and Programme Specific Outcomes (PSOs)

Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	1	1	2	0	1	0	3	1	1	2	0	3	1
CO2	2	3	3	2	0	2	2	3	3	3	3	2	2	2
CO3	2	3	2	2	0	1	0	3	3	2	3	1	2	1
CO4	2	3	3	3	1	3	2	3	3	3	3	3	3	3
Total	**9**	**10**	**9**	**9**	**1**	**7**	**4**	**12**	**10**	**9**	**11**	**6**	**10**	**7**

COURSE	**ALLIED PHYSICS PRACTICAL**
COURSETITLE	**PRACTICAL I**
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter& Optics-setup experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

ALLIED PRACTICAL – I

(6 experiments compulsory)

1. Youngs modulus – non uniform bending – pin and microscope
2. Youngs modulus – uniform bending – optic lever and telescope
3. Torsional pendulum – Rigidity modulus
4. Compound pendulum – determination of 'g'
5. Co-efficient of viscosity - Stoke's method
6. Thermal conductivity of a bad conductor -Lee's disc method
7. Airwedge – thickness of a wire
8. Newton's rings – determination of radius of curvature
9. Spectrometer– prism – refractive index
10. Spectrometer–grating– wavelength –normal incidence method

Subject Code	Subject Name	Category	L	T	P	Credits	Hours	Marks		
								CIA	Ext	Total
	HEAT,THERMODYNAMICS&STATISTICALPHYSICS	Core 1I–	**5**			**5**	**5**	**25**	**75**	**100**

Course Outcome

CO1: Define specific heat capacity, Boyle temperature, temperature of inversion, entropy, and the Zeroth, First, Second, and Third laws of thermodynamics.

Explain Meyer's relation, the Joule-Kelvin effect, the physical mechanism of gas liquefaction via Linde's process, and the core differences between classical and quantum statistics.

CO2: Apply Maxwell-Boltzmann and Fermi-Dirac statistics to derive distribution functions; **calculate** system parameters using different types of ensembles in phase-space; and **use** Lee's disc experimental criteria to determine the thermal conductivity of a bad conductor.

CO3: Analyze and compare the construction, working principles, and thermal efficiencies of Carnot, petrol, and diesel engines; **differentiate** between entropy changes in reversible and irreversible processes; and **investigate** black body energy distribution curves using Wien's, Rayleigh-Jean's, and Planck's radiation laws.

CO4:Evaluate changes in state variables using T-S diagrams and Maxwell's thermodynamical relations; **critically appraise** first latent heat transitions using the Clausius-Clapeyron equation;

and **assess** the accuracy of Joly's method and the Porous Plug experiment.

Formulate theoretical mathematical models to bridge macrostates and microstates within designated phase-spaces; **propose** efficient layout designs for low-temperature industrial cooling or radiation traps based on Ferry's black body setup and Stefan's law.

Course details	**UNIT:1 CALORIMETRY:** Specific heat capacity – specific heat capacity of gases $C_P$and C_V– Meyer's relation – Joly's method for determination of C_V. **LOWTEMPERATUREPHYSICS:** Joule-Kelvin effect – Porous plug experiment –Boyle temperature – temperature of inversion – liquefaction ofgas by Linde's Process.
	UNIT:2THERMODYNAMICS-I: ZerothlawandFirstlawofthermodynamics– heat engine–efficiencyofheatengine–Carnot'sengine,construction,workingand efficiency of petrol engine and diesel engines.
	UNIT:3 THERMODYNAMICS-II: Second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram – Maxwell's thermodynamical relations –Clasius-Clapeyron's equation (first latent heat equation) –Third law of thermodynamics.
	UNIT:4 HEAT TRANSFER: Modes of heat transfer: conduction, convection and radiation. **Conduction:** thermal conductivity –determination of thermal conductivity of a bad conductor by Lee's disc method. **Radiation:** black body radiation (Ferry's method) – distribution of energy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation –Stefan'slaw. Law.
	UNIT:5 STATISTICALMECHANICS: Definition of phase-space–micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function –Fermi-Dirac statistics – expression for distribution function.

Recommended Text	1. BrijlalandN. Subramaniam, 2000, Heat and Thermodynamics, S.Chandand Co. 2. NarayanamoorthyandKrishnaRao,1969,Heat,TriveniPublishers,Chennai. 3. V.R.KhannaandR.S.Bedi,19981stEdition,TextbookofSound, Kedharnaath Publish and Co, Meerut 4. BrijlalandN.Subramanyam,2001,WavesandOscillations,Vikas Publishing House, New Delhi. 5.Ghosh,1996,TextBookofSound,S.ChandandCo. R.MurugeshanandKiruthigaSivaprasath,ThermalPhysics,S.ChandandCo.
Reference Books	1. J.B.RajamandC.L.Arora,1976,Heat and Thermodynamics,8 t hedition, S.Chandand Co. Ltd. 2. D.S.Mathur,HeatandThermodynamics,SultanChandandSons. 3. Gupta,Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co. 4. Resnick, Hallida yan dWalker,2010,Fundamentals of Physics,6thEdition. Sears,Zemansky,HughD.Young,RogerA.Freedman,2021University Physics with Modern Physics 15th Edition, Pearson

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Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	1	1	2	0	1	0	3	1	1	2	0	3	1
CO2	2	3	3	2	0	2	1	3	3	3	3	2	2	2
CO3	2	3	2	2	0	1	0	3	3	2	3	2	2	2
CO4	2	3	3	3	1	3	2	3	3	3	3	3	3	3
Total	**9**	**10**	**9**	**9**	**1**	**7**	**3**	**12**	**10**	**9**	**11**	**7**	**10**	**8**

Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**Credits**	**Hours**	**Marks**		
								CIA	**Ext**	**Total**
	ASTROPHYSICS	**SEC2**	**2**			**1**	**2**	**25**	**75**	**100**

Course Outcome

CO1: Define optical metrics (magnifying power, brightness, resolving power, f/a ratio); **state** Bode's law; and **list** the layers of the solar atmosphere (photosphere, chromosphere, corona) and types of eclipses.

Explain the mechanical differences between reflecting and refracting telescopes; **describe** the working of radio and space-based telescopes (Hubble); and **interpret** the 11-year solar cycle, sunspots, solar flares, and planetary transit mechanics.

CO2: Apply optical ratios and magnifying formulas to calculate telescope parameters; **compute** planetary distances using Bode's law; and **use** cosmological redshift parameters to solve observational velocity and expansion metrics within localized galactic structures.

CO3: Differentiate between minor solar system bodies (meteors, meteorites, comets, asteroids) across the Kuiper belt and Oort cloud; **analyze** the geometric alignments causing total/partial solar and lunar eclipses; and **investigate** galactic structure types, rotation curves, and the historical timeline of the universe post-Big Bang.

CO4: Assess and plot the lifecycle transitions of low, intermediate, and massive stars using the Hertzsprung-Russell (H-R) diagram; **critically evaluate** the Chandrasekhar limit; and **appraise** the underlying signatures behind the detection of gravitational waves and extreme stellar remnants (white dwarfs, neutron stars, pulsars, black holes).

Formulate comprehensive astrophysical life-cycle models explaining how core mass variations determine a star's transmutation into a supernova or a black hole; **propose** conceptual observational array designs optimizing data extraction from combined electromagnetic (optical/radio) and gravitational wave detectors.

Course details	**UNIT I: TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes–detectors and image processing–radio telescopes–Hubble Space telescope.
	UNIT II: SOLAR SYSTEM: Bode's law of planetary distances–meteors, meteorites, comets, asteroids– Kuiper belt – Oort cloud – detection of gravitational waves.
	UNIT III: ECLIPSES: types of eclipses – solar eclipse – total and partial solar eclipse – lunar eclipse – total and partial lunar eclipse – transits. **THE SUN:**physical and orbital data – solar atmosphere – photosphere – chromosphere – solar corona – prominences – sunspots – 11year solar cycle –

	solar flares.
	UNIT IV: STELLAR EVOLUTION: H-R diagram – birth and death of low mass, intermediate mass and massive stars –Chandrasekar limit –white dwarfs – neutron stars – pulsars – black holes – supernovae
	UNIT V: GALAXIES: Our Milky Way - Galactic structure - Galactic rotation - Galaxy types - Galaxy formation; Cosmology: Expansion of theUniverse - redshifts - supernovae - the Big Bang - history of the Universe.
Recommended Text	1. Baidyanath Basu,(2001).An introduction to Astrophysics,Second printing, Prentice – Hall of India (P) Ltd, New Delhi 2. K.S.Krishnaswamy,(2002),Astrophysics–a modern perspective, New Age International(P)Ltd,New Delhi
Reference Books	1. Shylaja,B.S.andMadhusudan,H.R.,(1999),Eclipse:A Celestial Shadow Play, Orient Black Swan,

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)and Programme Specific Outcomes (PSOs)

Course Outcomes (COs)	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1	3	1	1	2	0	1	0	3	1	1	2	0	3	1
CO2	2	3	3	2	0	2	0	3	3	3	3	2	2	2
CO3	2	3	2	2	0	2	0	3	3	2	3	1	2	1
CO4	2	3	3	3	1	3	2	3	3	3	3	3	3	3
Total	**9**	**10**	**9**	**9**	**1**	**8**	**2**	**12**	**10**	**9**	**11**	**6**	**10**	**7**

Subject Code	**Subject Name**	**Category**	**L**	**T**	**P**	**Credits**	**Hours**	**Marks**		
								CIA	**Ext**	**Total**
	PHYSICS FOR	**SEC3**	**2**			**1**	**2**	**25**	**75**	**100**

	COMPETITIVE EXAMINATIONS									

Course Outcome

CO1: Recall and explain the fundamental concepts of mechanics, properties of matter, heat, thermodynamics, electricity, magnetism, optics, sound, and nuclear physics.

CO2: Apply the principles of friction, impact, viscosity, surface tension, thermodynamic processes, electric fields, and sound propagation to solve numerical and analytical problems.

CO3 Analyze the behavior of physical systems using thermodynamic laws, Gauss theorem, optical phenomena, ultrasonics, and nuclear models.

CO4: Evaluate and justify physical phenomena related to material properties, wave propagation, electromagnetic fields, and nuclear energy applications, and formulate solutions to complex scientific problems.

Course details	**UNIT I: MECHANICS** Centre of gravity - Centre of gravity of a solid hemisphere - Hollow hemisphere - Friction – Laws of friction - angle of friction - Impact - Laws of Impact - Direct and oblique impact - Impact between two spheres - Loss of Kinetic energy.
	UNIT II: PROPERTIESOFMATTER Viscosity of liquids - Highly viscous liquids – Searle‘s method- Surface Tension -Method of drops - Surface tension of mercury - Laws of osmotic pressure and experimental determination of osmotic pressure.
	UNIT III: HEATANDTHERMODYNAMICS Vanderwaal's equation - Critical constants and Vanderwaal‘s constant - Isothermal, adiabatic, isobaric,isochoric processes and entropy changes **ELECTRICITYANDMAGNETISM** Coulomb‘s law - Permittivity of free space - Relative permittivity - Electric field - Intensity of field due to a point charge - Gauss theorem and its application - Ohm's law - Resistivity and conductivity.

	UNIT IV: OPTICS Snell'sLaw-Laws of reflection and refraction from Fermat's principle; Coherent and Incoherent sources, Scattering of light and polarization. **SOUND** Velocity of sound in solids and gases –Theory and experiment - Ultrasonics - properties and applications
	UNIT V: NUCLEARPHYSICS Properties of nucleus-size, charge, mass, angular momentum, parity and spin -Nuclear magnetic dipole moment-Binding energy-Packing fractions- Semi-empirical mass formula and applications; Nuclear fission and fusion
Recommended Text	1. D.S.Mathur,Mechanics,RevisedEdition2012,S.ChandandCompany Ltd., 2. Brij Lal, N. Subrahmanyam, Properties of Matter, Eurasia Publishing House Limited, 1993. 3. Brij Lal, N. Subrahmanyam , Heat Thermodynamics and Statistical Physics, Revised Edition 2018, S.Chand and Company Ltd., 4. RMurugeshan,ElectricityandMagnetism,2017,S.Chandand Company Ltd., 5. Subrahmanyam. N, Brijlal and Avadhanulu. M.N, 2014, A textbook of optics, 25th Edition, S.Chand and Co. 6. N. Subrahmanyam, *Brij Lal*., *A Textbook of Sound,* Vikas Publishing House, 1985. *D.C.Tayal,NuclearPhysics*;2009,HimalayaPublishingHouse.,
Reference Books	1. J.B.RajamandC.L.Arora,1976,HeatandThermodynamics,8thedition, S.Chandand Co. Ltd. 2. D.S.Mathur,HeatandThermodynamics,SultanChandandSons. 3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand and Co. 4. Resnick,HallidayandWalker,2010,FundamentalsofPhysics,6th Edition. Sears, Zemansky, Hugh D.Young,RogerA. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.

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Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	1	1	2	0	1	0	3	1	1	2	0	3	1
CO2	2	3	3	2	0	2	1	3	3	3	3	1	2	2
CO3	2	3	2	2	0	2	1	3	3	2	3	2	2	2
CO4	2	3	3	3	1	3	2	3	3	3	3	3	3	3
Total	**9**	**10**	**9**	**9**	**1**	**8**	**4**	**12**	**10**	**9**	**11**	**6**	**10**	**8**

Subject Code	Subject Name	Category	L	T	P	Credits	Hours	Marks		
								CIA	Ext	Total
	ALLIED PHYSICS II	**Elective II**	**4**			**3**	**4**	**25**	**75**	**100**

Course Outcome

CO1: Recall and explain the fundamental concepts of semiconductor devices, digital electronics, relativity, quantum mechanics, atomic structure, and nuclear physics.

CO2: Apply the principles of PN junction diodes, logic gates, binary arithmetic, Lorentz transformations, Schrödinger equations, and nuclear properties to solve scientific problems.

CO3: Analyze the operation of electronic circuits, digital systems, relativistic phenomena, quantum mechanical systems, atomic models, and nuclear models using appropriate physical theories.

CO4: Evaluate and formulate solutions related to modern electronics, quantum physics, atomic and nuclear phenomena, and assess the role of scientific organizations such as DAE and IAEA in technological advancement.

Course details	**Unit I Basic Electronics** PN junction diode - forward and reverse bias-diode characteristics - Zener diode –VI characteristic of a Zenerdiode – Rectifier – Bridge rectifier construction and working – regulated power supply –USB cell phone charger.
	Unit II Digital Electronics Decimal and binary numbers – binary to decimal and decimal to binary conversion –Binary addition and subtraction– Basic logic gates OR,AND,

	NOT (Symbol, Boolean equation, truth table, circuit and working) – NAND, NOR, EX-OR(Symbol, Boolean equation, truth table only) – DeMorgan's theorem.
	Unit III Relativity and Quantum Mechanics **Relativity:** Frames of references – Galilean transformation equations – Postulates of special theory of relativity –Lorentz transformation equations – Length contraction – Time dilation. **Quantum Mechanics:** Wave function and its properties – Physical significance of wave function – Postulates of quantum mechanics – Heinsenberg's uncertainty principle – Time dependent Schroedinger wave equation – stationary state Schroedinger wave equation.
	Unit IV Atomic Physics Bohr atom model –vector atom model –quantum numbers – Pauli's exclusion principle – L-S coupling, j-j coupling – magnetic dipole moment due to orbital motion and spin motion of the electron – total magnetic moment.
	Unit V Nuclear Physics Introduction – Classification of nuclei – General properties of nucleus – Nuclear size, Nuclear mass, Nuclear density, Nuclear charge, Nuclear spin & Nuclear magnetic dipole moments–Mass defect – Binding energy – Binding energy curve – Nuclear forces – Properties –liquid drop model–magic numbers – Shell model Introduction to DAE, IAEA
Recommended Text	1. Basic Electronics – B. L. Theraja S. Chand Publishers 2. Principles of Electronics – V. K. Mehta and Rohit Mehta S. Chand Publishers 3. Digital Principles and Applications - Albert Paul Malvino& Donald P.Leach 4. Modern physics – R.Murugesan S. Chand Publishers
Reference Books	Modern Physics– D.I SeghalK.I. Chopra &N. K. Seghal, Sultan Chand and sons Publishers

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Course Outcomes (COs)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO1	3	1	1	2	0	1	0	3	1	1	2	0	3	1
CO2	2	3	3	2	0	2	1	3	3	3	3	1	2	2
CO3	2	3	2	2	0	2	1	3	3	2	3	2	2	2
CO4	2	3	3	3	2	3	2	3	3	3	3	3	3	3
Total	**9**	**10**	**9**	**9**	**2**	**8**	**4**	**12**	**10**	**9**	**11**	**6**	**10**	**8**

COURSE	**ALLIED PHYSICS PRACTICAL**
COURSETITLE	**PRACTICAL II**
CREDITS	3
COURSE OBJECTIVES	Apply various physics concepts to understand the concepts of basic and digital electronics- setup experimentation to verify theories, able to do error analysis and correlate results

ALLIED PRACTICAL – II

(6 experiments compulsory)

1. Verification of truth tables of basic logic gates using discrete components
2. Verification of truth tables of basic logic gates using ICs
3. Characteristics of pn junction diode
4. Characteristics of Zener diode
5. NOR as universal building block
6. NAND as universal building block
7. Verification of De Morgan‘s theorems using logic gate ICs
8. Potentiometer - calibration of voltmeter (low range)
9. Potentiometer – calibration of ammeter
10. LCR series resonance circuit
11. LCR parallel resonance circuit

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