ENGINEERING PHYSICS
BE 1st SEMESTER (ME/IT/EE/AE) / BE 2nd SEMESTER (EC/CE/ CIVIL)
SUB CODE: CC107 Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	00	02	05	04	03	70	30	20	30	150

LEARNING OBJECTIVES:
The educational objectives of this course are

- The syllabus of Engineering Physics highlights the basic concepts of Physics to all branches of Engineering and Technology.
- With the knowledge of Physics, basic principles of Engineering can be understood easily.
- To acquaint students with modern techniques in Physics which can be applied in the field of Engineering and Technology.
- To develop an ability to identify, formulate and solve various engineering problems through and laboratory methods.

OUTLINE OF THE COURSE:

Unit No.	Title of Unit
1.	SOUND AND PROPERTIES OF MATTER
2.	OPTICS
3.	MODERN PHYSICS AND INSTRUMENTATION
4.	MATERIAL SCIENCE

Total Hours (Theory) : 45, Total Hours (Practical) : 30, Total Hours : 75
DETAILED SYLLABUS OF ENGINEERING PHYSICS:

No.	Topics	Lecture (Hours)	Weight Age (%)
UNIT-1	**SOUND AND PROPERTIES OF MATTER**	**11**	**25%**
1.	ULTRASONICS & ARCHITECTURAL ACOUSTIC; Introduction, Properties of ultrasound, Production of ultrasonics (Piezoelectric & magnetostriction oscillator), determination of wavelength-velocity of ultrasound in liquid, Applications of ultrasonics; Acoustics of buildings, loudness and intensity of sound, reverberation time and absorption of sound, determination of absorption coefficient of material, Sabine's Formula.		
2.	ELASTICITY; Introduction, Determination of co-efficient of rigidity of wire, Bending beam, Bending Moment of the beam, Cantilever, Theory of Cantilever loaded at One End, Cantilever Supported at two Ends and Loaded in the Middle, determination of Young's modulus.		
UNIT-2	**OPTICS**	**11**	**25%**
3.	LASER; Characteristics of Laser, spontaneous and stimulated emission, population Inversion, Einstein coefficients, Solid State (Nd-YaG) Laser, Gas (CO_2) laser, Semiconducting laser, Holography, Applications of Lasers, Introduction of MASER.		
4.	FIBRE OPTICS; Introduction, basic principle and criteria, construction of Fibre Optics (FO), FO Communication system, Acceptance Angle and Numerical Aperture, Types of FO, Applications of FO.		
5.	OPTOELECTRONIC DEVICES; LED, Solar cell, LDR, Laser diode.		
UNIT-3	**MODERN PHYSICS AND INSTRUMENTATION**	**12**	**25%**
6.	ARTIFICIAL RADIOACTIVITY; Artificial or Induced radioactivity, Artificial transmutation, Half life period and Energy Ranges of Radioisotopes, applications of Artificial radioactivity.		
7.	CRYSTAL STRUCTURE AND X-RAYS DIFFRACTION; Introduction of Crystal Structure, Space lattice, Basis, Unit cell, Lattice parameter, Bravais lattices, Crystal systems, Directions and planes in crystals, Miller indices, Relation between Interplaner spacing and cubic edge, Atomic radius and packing fractions of SC, BCC, FCC, X-ray Diffraction, Bragg's condition for X-ray diffraction, Experimental method to find crystal structure (Laue method, Powder method), Industrial application of X-rays.		
8.	INSTRUMENTATION; Introduction to Electron Microscopy (TEM, SEM), Geiger-Muller counter (Radiation detector), Multimeter, Cathode Ray Oscilloscope (CRO).		

UNIT-4	MATERIAL SCIENCE	11	25%
9.	BAND THEORY OF SOLIDS; Introduction, Metals, Insulators and Semiconductors, Energy band gap, Fermi Level and Fermi energy, Hall effect and its importance, Superconductivity, Properties of superconductors, Types of superconductors (Type-I and Type-II), London's Penetration depth, Applications of Superconductors.		
10.	NANOMATERIALS AND NDT; Introduction to Nanomaterials and Shape Memory Alloys (SMA); Synthesis, Properties and Applications of Nanomaterials and SMA; Introduction to Non Destructive Testing (NDT), Objectives of NDT, Liquid/Dye Penetrant method, Ultrasonic Inspection method, Radiography method, Eddy Current method.		

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and Practicals which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments which carries 05 marks.
- Classroom participation and involvement in solving the problems in Class rooms carries 05 marks.
- Viva-Voce/Practical exam will be conducted at the end of the semester.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the laboratory related to course contents.
- To build an appreciation for the concept being taught in lectures.

STUDENTS LEARNING OUTCOME:

At the end of semester,

- The student would be able to apply the concepts of physics and its applications in various branches of engineering.
- The student's ability to identify, formulate and solve related engineering problems.
- The student's ability to use the techniques, skills and modern tools of physics necessary for engineering and technological applications.
- The student's ability to design and conduct experiments related to engineering.
- The student's ability to analyze, interpret data and solve related problems.

REFERENCE BOOKS/TEXT BOOK:

1. Modern Engineering Physics; A.S. Vasudeva, S. Chand & Company Ltd, New Delhi.
2. Engineering Physics; Dattu R. Joshi, Tata McGraw Hill Edu. Pvt. Ltd., New Delhi.
3. A Textbook of Engineering Physics; M.N. Avadhanulu & P.G. Kshirsagar, S. Chand and Company Ltd, New Delhi.
4. Engineering Physics; G. Aruldhas, PHI Learning Private Ltd., New Delhi.
5. Applied Physics for Engineers, Neeraj Mehta, PHI Learning Private Ltd., New Delhi.
6. Engineering Physics; G. Vijayakumari, Vikas Publication House Pvt. Ltd., New Delhi.

LIST OF PRACTICALS IN ENGINEERING PHYSICS

Practical 1.	Simulation of nuclear radioactive decay.
Practical 2.	Measurement of Intensity Level (in dB) of various Sounds.
Practical 3.	Analyze the Miller Indices of crystal using x-rays diffraction pattern.
Practical 4.	Verify de-Broglie Relation using x-rays diffraction pattern of crystal.
Practical 5.	Use of Multimeter.
Practical 6.	Measure the Threshold & Breakdown voltage of diodes (Si, Zener, LED).
Practical 7.	Measure the value of Planck's constant using various LED.
Practical 8.	Approximate the wavelength of LASER using diffraction grating.
Practical 9.	Estimate the Numerical Aperture of Fibre Optics.
Practical 10.	Application of Solar Cell.
Practical 11.	Use of materials via Young's Modulus method.
Practical 12.	Application of given body by using Moment of Inertia Table method.
Practical 13.	Application of Nanomaterials and Shape Memory Alloys by demonstration.