Program : **Diploma in Engineering and Technology**	
Course Code : **2003**	Course Title: **Applied Physics-II**
Semester : **2**	Credits: **3**
Course Category: **Basic Science**	
Periods per week: **3 (L:3 T:0 P:0)**	Periods per semester: **45**

Course Objectives:

- To provide students with a broad understanding of physical principles of the universe to help them develop critical thinking and quantitative reasoning skills
- To help the diploma engineers in applying the basic concepts of physics to solve broad-based engineering problems

Course Prerequisites:

Topic	Program/Course name
Basic knowledge in Physics	Secondary School

Course Outcomes

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive Level
CO1	Calculate the characteristics of waves.	10	Applying
CO2	Compute the power of lens	11	Applying
CO3	Convert galvanometer into ammeter and voltmeter	11	Applying
CO4	Explain the basic principles of semiconductor physics, photoelectric effect, LASER action and nanoscience	11	Understanding
	Series Test	2	

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	3						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1- Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Calculate the characteristics of waves.**		
M1.01	Discuss simple harmonic motion and its properties.	3	Understanding
M1.02	Apply the basic knowledge of wave motion to calculate the characteristics of waves	3	Applying
M1.03	Define ultrasonic waves and list its applications.	2	Understanding
M1.04	Familiarize with the parameters of acoustics of buildings.	2	Understanding
Module 1: Wave motion and its applications Periodic motion, Simple Harmonic Motion (SHM): Definition and examples, Projection of a uniform circular motion along a diameter, Expressions for displacement, velocity, acceleration, time period and frequency Waves: Transverse and longitudinal waves with examples, Sound and light waves, Characteristics of a wave- velocity, frequency, wavelength, amplitude and phase, Relation between frequency, wave velocity and wavelength, principle of superposition of waves and beat formation, ultrasonic waves: properties and its applications, (numerical problems) Acoustics of buildings: reverberation, reverberation time, echo, noise, methods to control reverberation time.			
CO2	**Compute the power of lens**		
M2.01	Explain basic laws of optics and establish the image formation in case of convex lens.	3	Understanding

M2.02	Apply distance relation to find the power of lens and discuss various lens defects.	3	Applying
M2.03	Explain the working of optical instruments.	2	Understanding
M2.04	Describe total internal reflection and propagation of light through optical fiber.	3	Understanding
	Series Test – I	1	

Module2: **Optics**

Laws of reflection and refraction, refractive index, concave and convex lens, image formation by convex lens, distance formula connecting u, *v* and *f* for lenses, power of lens(problems based on distance formula and power of lens), magnification, lens defects (Chromatic aberration and Spherical aberration). Optical instruments: working and uses of simple microscope and astronomical telescope

Total internal reflection, critical angle and conditions for total internal reflection, light propagation in optical fiber, fiber types, applications of optical fiber in telecommunication and medical field.

CO3	**Convert galvanometer into ammeter and voltmeter**		
M3.01	Explain Coulomb's law, electric field, electric potential etc.	2	Understanding
M3.02	Discuss Ohm's law and apply it to calculate the effective resistance in electrical circuits	3	Applying
M3.03	Apply Kirchhoff's laws to explain the working of a meter bridge	2	Applying
M3.04	Discuss magnetic effect of electric current and apply it to explain the working of moving coil galvanometer, ammeter and voltmeter	4	Applying

Module 3: Electromagnetism

Coulomb's law, unit of charge, Electric field, Electric potential, Capacitor, Capacitance and its units, Electric Current and its units, Direct and alternating current, Ohm's law and its verification, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding (numerical problems related to Ohm's law and law of resistance), Kirchhoff's laws, Wheatstone bridge and its applications (meter bridge)

Magnetic field and its unit, concept of electromagnetic induction, Faraday's laws, Lorentz force, Force on a current carrying conductor, construction and working of moving coil galvanometer, conversion of a galvanometer to voltmeter and ammeter,

(numerical problems related to ammeter and voltmeter)			
CO4	**Explain the basic principles of semiconductor physics, photoelectric effect, LASER action and nanoscience**		
M4.01	Discuss the basic principles of semiconductor devices such as diodes and transistors.	4	Understanding
M4.02	Explain photoelectric effect and its applications.	2	Understanding
M4.03	Discuss the principles of LASER action and explain the working of semiconductor laser and He – Ne laser.	3	Understanding
M4.04	Summarize the basic concepts of nanoscience and its importance	2	Understanding
	Series Test – II	1	

Module 4: Modern Physics

Semiconductor Physics: Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, Transistor, Types (pnp and npn), mention applications of transistors and diodes.

Photoelectric effect (elementary ideas only), Photocells, Solar cells; working principle and engineering applications.

Lasers: Principle of laser - Energy levels, stimulated absorption, spontaneous and stimulated emission, population inversion, pumping methods, characteristics of laser. Types of lasers; He-Ne and semiconductor lasers, engineering and medical applications of lasers.

Nanoscience and Nanotechnology - Introduction, nanoparticles and nanomaterials, applications

Text /Reference:

T/R	Book Title/Author
T1	Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
R2	Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
R3	Concepts of Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
R4	Fundamentals of Physics, Halliday/Resnick/Walker, Wiley India Pvt. Ltd
R5	Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.