Reg. No.

B.E./ B. TECH DEGREE EXAMINATIONS, MAY 2024
First Semester
PH22151 – APPLIED PHYSICS
(Common to AI & DS, CS, EC, EE, and IT)
(Regulation 2022)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply fundamentals law of optics in different types of LASER and Optic fiber communication.	3
CO 2	Apply the principals of Quantum mechanics to study the properties of Electrons.	3
CO 3	Classify and demonstrate the fundamentals of crystals and their defects in Solids.	2
CO 4	Demonstrate a strong fundamental knowledge in wave oscillations.	2
CO 5	Apply Electromagnetic equations for various media.	3

PART- A (20 x 2 = 40 Marks)

		CO	RBT LEVEL
1.	Identify the metastable state in lasers.	1	2
2.	Mention the various pumping techniques.	1	2
3.	A light signal of 100 mW is injected into a fiber of length 1 km. The out coming signal from the other end is 40 mW. Compute the loss in dB?	1	3
4.	How do you measure the attenuation in optical fibre?	1	2
5.	State the properties of the matter waves.	2	2
6.	Calculate de-Broglie wavelength associated with an electron which is accelerated through a potential of 10 kV.	2	3
7.	How the potential energy of a free particle is zero in a one dimensional box problem?	2	2
8.	Mention the physical significance of wave function (Ψ).	2	2
9.	Identify the lattice parameters of trigonal crystal system.	3	2

10.	Compare single crystals with polycrystals.	3	2
11.	For a cubic system, sketch the planes with Miller Indices (101) and (111).	3	2
12.	Write the importance of the Burger vector.	3	2
13.	When a damped oscillator is involved, explain the energy dissipation.	4	2
14.	Analyze oscillations and waves in terms of quality factor.	4	2
15.	Differentiate standing wave from traveling waves.	4	2
16.	How forced oscillations differ from harmonic oscillations.	4	2
17.	Emphasize the role that vector potential plays in the propagation of electromagnetic waves.	5	2
18.	State Gauss divergence theorem.	5	2
19.	List any four ways that Maxwell's equations are used in electromagnetic field.	5	2
20.	Are electromagnetic waves are mechanical waves? Justify.	5	2

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain the Principle, Construction and Working of CO_2 laser with a neat diagram.	(10)	1	3

(OR)

(b)	Obtain an expression for the numerical aperture and acceptance angle and describe how light travels through optical fiber.	(10)	1	3
22. (a)	Derive an expression for the change in wavelength of an X-ray photon when it collides with an electron.	(10)	2	3

(OR)

(b)	Obtain the Schrödinger time independent and time dependent wave equations.	(10)	2	3
23. (a)	Show that the atomic packing factor of FCC and HCP are the same.	(10)	3	2

(OR)

(b) Explain crystal defects in detail with neat diagram. **(10)** 3 2

24. (a) Arrive at an expression for the particle velocity and obtain the differential equation of the travelling waves. **(10)** 4 2

(OR)

(b) Compare and contrast the analogies between mechanical and electrical oscillating system with examples **(10)** 4 2

25. (a) Derive an expression for Maxwell's four equations in differential and Integral form. **(10)** 5 3

(OR)

(b) Point out the importance of Poynting Vector and derive an expression for Poynting theorem. **(10)** 5 3

PART - C (1 x 10 = 10 Marks)
(Q.No.26 is compulsory)

	Marks	CO	RBT LEVEL
26. Derive an expression for Eigen value and Eigen functions for the 1D box using Schrodinger time independent wave equation.	**(10)**	2	3

****