Roll No. 2231051130

Physics Department

B. Tech. (Semester I) Examination, December – 2023 (Morning Session)

Subject: Engineering Physics I | **Paper Code: PHC-101**
Branch: All Branch | **Time: 03 Hours**
Max. Marks: 50

Instructions

1. All questions are compulsory. Marks allotted for each question are shown on the right hand margin.
2. The Candidates, before starting to write the solutions, should please check the Question Paper for any discrepancy, and also ensure that they have been delivered the question paper of **right course no.** and right subject title.

1	(a)	The average time that an atom retains excess excitation energy before emitting radiations is 10^{-8} sec. Find the uncertainty in the frequency of radiation emitted.	3
	(b)	Discuss Michelson-Morley experiment and discuss its null results	3
	(c)	Show that the fermi level lies exactly halfway between valence band and conduction band in intrinsic semiconductor.	2
	(d)	Mention the advantage of graded index multimode fibre.	2
2	(a)	Derive time dependent Schrodinger equations.	4
	(b)	Derive Maxwell's equations in conducting medium.	4
	(c)	In plane electromagnetic waves the magnitude of H-field is 2Amp/meter. Calculate magnitude of E-field for plane waves in free space.	2
3	(a)	Explain the hexagonal close packed structure and estimate the c/a ratio.	3
	(b)	Draw (111) (101) and (231) planes inside the unit cell of a cubic crystal.	3
	(c)	Explain density of states and Fermi-Dirac Distribution function; and their significance.	4
4	(a)	Derive Einstein's coefficients and explain its significance to laser. Describe the working of Semiconductor laser.	3+2
	(b)	Explain the losses in fibers. The sum of refractive indices if cladding and fibre is 2.95 and their difference is 0.03. Calculate numerical aperture of the fibre.	3+2
5	(a)	State the fundamental postulates of special theory of relativity. Derive the Lorentz transformation equations when making measurement from S^1 to S frame of reference. Frame S^1 is moving with velocity v along positive x-axis and S is stationary.	5
	(b)	Explain terms in detail: (1) Neutron cross section; (2) Moderator; (3) Reactor criticality.	2+2+1