PVP 23

Code: 23BS1203

I B.Tech - II Semester – Supplementary Examinations
DECEMBER 2024

ENGINEERING PHYSICS
(Common for EEE, ECE, CSE)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

PART – A

1.a)	Write any two differences between spontaneous emission and stimulated emission.
1.b)	Calculate the Numerical aperture and Acceptance angle of a given optical fiber, if the refractive indices of core and cladding are1.563 and1.498 respectively.
1.c)	Define space lattice and unit cell.
1.d)	What are miller indices? Explain its significance.
1.e)	Define dielectric polarizability and susceptibility.
1.f)	The magnetic permeability of a medium is $940x10^{-4}$. Calculate its relative Permeability.
1.g)	State Heisenberg's Uncertainty Principle.
1.h)	Derive the expression for de-Broglie's wavelength.
1.i)	Show the variation of Fermi level with temperature in p-type semiconductor.
1.j)	Write any two applications of Hall effect.

PART – B

					Max. Marks
UNIT-I					
2	a)	Explain the construction and working of He-Ne laser.			7 M
	b)	What is population inversion? How can it be achieved?			3 M
OR					
3	a)	Explain the principle of an optical fiber.			3 M
	b)	Distinguish between step index and graded index optical fibers.			7 M
UNIT-II					
4	a)	Derive the expression for inter planar spacing of cubical crystal systems.			5 M
	b)	Calculate the packing fraction of FCC structure.			5 M
OR					
5	a)	Explain Laue's method to determine the crystal structure.			6 M
	b)	Derive Bragg's law of X-ray diffraction.			4 M
UNIT-III					
6	a)	What is ionic polarization? Derive the expression for ionic polarizability.			6 M
	b)	Derive the Clausius-Mossotti equation in dielectric materials.			4 M
OR					

7	a)	Explain the origin of permanent magnetic moment in materials.	6 M
	b)	Explain the domain theory of ferromagnetism.	4 M
		UNIT-IV	
8	a)	Calculate the eigen values and eigen functions of a particle in one dimensional infinite potential well.	7 M
	b)	An electron is bound in one dimensional infinite potential well of width $1x10^{-10}$ m. Find the energy values in the ground state and first two excited states.	3 M
		OR	
9	a)	Derive the expression for electrical conductivity based on quantum free electron theory.	7 M
	b)	Write any three demerits of classical free electron theory.	3 M
		UNIT-V	
10		Derive the expression for the density of holes in the valence band of an intrinsic semiconductor.	10 M
		OR	
11		Explain the concept of drift and diffusion currents and derive the expression for the total current density in a semiconducting material.	10 M