PVP 23

Code: 23BS1103

I B.Tech - I Semester – Supplementary Examinations - JULY 2024

ENGINEERING PHYSICS

(Common for CE, ME, IT, AIML, DS)

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 down two characteristics of LASER.
b)	Explain the working principle of optical fiber.
c)	Define lattice and basis with suitable examples.
d)	Draw the planes of Miller indices (112) and (210).
e)	Define polarization and polarizability.
f)	What is magnetic dipole moment? Mention the SI unit of magnetic dipole moment.
g)	Which phenomenon illustrates the particle nature of light? Also mention a phenomenon which illustrates wave nature of light.
h)	Define Heisenberg uncertainty Principle.
i)	Why energy bands are formed in solids?
j)	Differentiate between conductors and semiconductors.

PART – B

					Max. Marks
		UNIT-I			
2	a)	Define population inversion, pumping and meta stable state. Explain the importance of population inversion, pumping and meta stable state in LASER system.			5 M
	b)	Differentiate optical fibers based on their refractive index profile of the core and explain their construction and working principle with suitable ray diagram.			5 M
		OR			
3	a)	Explain the construction and working principle of Ruby LASER.			6 M
	b)	Light gathering capacity of an optical fibre is 0.479. If relative core cladding index difference is 0.05, calculate the refractive index of cladding when the outside medium is air.			4 M
		UNIT-II			
4	a)	Calculate the packing fraction of BCC structure with suitable diagram.			5 M
	b)	Draw all the possible crystal systems and mention their lattice parameters.			5 M
		OR			
5	a)	Explain the construction and working of the x-ray powder diffraction method and outline the pattern analysis.			6 M
	b)	Calculate the inter-planar spacing between the (221) planes of a cubic crystal of lattice constant 0.45 nm.			4 M

UNIT-III			
6	a)	Explain different types of polarizations with suitable diagrams and give examples of each type.	5 M
	b)	Explain the hysteresis loop formation with suitable diagram and explain the different parameters extracted from it. What are soft and hard magnets? Give examples.	5 M
OR			
7	a)	Derive the Clausius–Mossotti equation.	6 M
	b)	If the magnetic field and magnetic intensity are respectively 1.8 T and 1000 A/m, find relative permeability and susceptibility of a material.	4 M
UNIT-IV			
8	a)	Derive the electron matter waves of the form: $\lambda = \frac{12.27}{\sqrt{V}}$ Å, where V is the accelerating potential.	5 M
	b)	Write down the Fermi-Dirac distribution function and explain its temperature dependence with suitable diagram.	5 M
OR			
9	a)	Derive Time independent Schrodinger wave equation.	6 M
	b)	A proton is confined to a box of width L = 1.00×10^{-14} m. What are the energies of the ground and the first excited states?	4 M
UNIT-V			
10	a)	Derive an expression for electron concentration in conduction band for intrinsic semiconductor.	6 M
	b)	Distinguish between Intrinsic and Extrinsic semi conductors with suitable examples.	4 M

OR			
11	a)	Define drift and diffusion current and obtain their expressions.	5 M
	b)	Explain Hall effect and find an expression for Hall coefficient in terms of crystal dimension.	5 M