PVP 23

Code: 23BS1103

I B.Tech - I Semester – Regular Examinations - JANUARY 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.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define pumping and population inversion.	L2	CO1
1.b)	What are critical angle and acceptance angle?	L2	CO1
1.c)	Why are x-rays diffracted by crystals?	L3	CO3
1.d)	How many Bravais lattices are possible for tetragonal crystal system? Mention the lattice parameters for the same system.	L3	CO3
1.e)	Define orientational polarization. Give examples.	L3	CO3
1.f)	Define magnetic field intensity and magnetization.	L2	CO1
1.g)	Write down two properties of wave function.	L3	CO3
1.h)	Differentiate between classical and quantum particles.	L3	CO3
1.i)	Define Fermi level. What is its importance?	L4	CO4
1.j)	What is Hall coefficient? Mention one application of Hall effect.	L3	CO2

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Explain absorption, spontaneous and stimulated emission of radiation with suitable energy diagram.	L2	CO1	6 M
	b)	Calculate the critical angle and acceptance angle for a step index fiber in which the refractive index of core is 1·53 and the refractive index of cladding is 2.5 % less than that of core.	L3	CO2	4 M
OR					
3	a)	Explain the construction and working principle of He-Ne LASER.	L3	CO2	5 M
	b)	Explain the different mechanisms of losses in optical fibre.	L2	CO1	5 M
UNIT-II					
4	a)	Calculate the packing fraction of FCC structure with suitable diagram.	L3	CO3	6 M
	b)	Draw the planes of Miller indices (110), (111), (001) and (112).	L4	CO5	4 M
OR					
5	a)	Explain the construction and working of x-ray diffraction method by Laue. Mention its applications.	L3	CO3	5 M
	b)	Derive an expression for the inter-planar spacing (d_{hkl}) between the planes (*hkl*) for a cubic lattice of lattice constant *a*.	L3	CO3	5 M

UNIT-III					
6	a)	Derive the relation between susceptibility (χ) and relative permeability (μ_r) of a magnetic material.	L3	CO3	5 M
	b)	Classify different types of magnetic materials with suitable examples and mention their properties.	L4	CO5	5 M
OR					
7	a)	The electronic polarizability of the Ar atom is 1.7×10^{-40} F.m^2. What is the static dielectric constant of Ar gas at 300 K if the dielectric contains 1.67×10^{27} atoms/m^3.	L4	CO5	5 M
	b)	Explain the formation of domains and domain walls in magnetic materials.	L3	CO3	5 M
UNIT-IV					
8	a)	Obtain an expression for the Schrodinger's time independent one-dimensional equation for an electron of mass *m* moving in a potential *V*(*x*).	L3	CO3	6 M
	b)	A proton and electron have the same de Broglie wavelength. Calculate the ratio of velocities of proton and electron. Which particle is moving faster?	L4	CO5	4 M
OR					
9	a)	Write down the postulates of quantum free electron theory.	L3	CO3	4 M
	b)	Derive an expression for electrical conductivity (σ_e) based on quantum free electron theory.	L3	CO3	6 M

UNIT-V					
10	a)	Differentiate among conductors, semiconductors and insulator based on band theory.	L4	CO4	4 M
	b)	Define intrinsic and extrinsic semiconductors with suitable examples. Explain the formation of p-type and n-type semiconductors with suitable diagrams.	L3	CO2	6 M
OR					
11	a)	Calculate the carrier concentration of n-type semiconductor.	L3	CO2	8 M
	b)	Write down the Einstein's equation and explain it.	L3	CO2	2 M