PVP 23

Code: 23BS1203

I B.Tech - II Semester – Supplementary Examinations
DECEMBER 2025

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)	Explain importance of Metastable state in Lasers.
b)	Define Acceptance angle of an optical fiber.
c)	Obtain the relation between the Lattice constant(a) and the atomic radius(r) in the case of BCC Unit cell.
d)	Identify X-Ray techniques for determination of a crystal structure.
e)	Show that $\chi_e = (\varepsilon_r - 1)$.
f)	Deduce the relation between χ and μ_r.
g)	State the normalization condition for the wave function 'ψ'
h)	Define Density of energy states.
i)	Define Drift and Diffusion currents.
j)	Distinguish between P type and N type semiconductors.

PART – B

			Max. Marks
		UNIT-I	
2	a)	Explain the principle, construction and working of Ruby LASER with suitable diagram.	5 M
	b)	Explain stimulated emission and spontaneous emissions for a Laser System.	5 M
		OR	
3	a)	Classify different types of optical fibres based on their refractive index profile with neat diagrams.	5 M
	b)	Calculate the angle of acceptance of a given optical fibre, if the refractive index of the core and the cladding are 1.56 and 1.49 respectively.	5 M
		UNIT-II	
4	a)	Calculate the number of atoms per unit cell, atomic radius, co-ordination number and packing factor for Body Centerd Cubic Structure.	5 M
	b)	Calculate the value of d-spacing for (110) planes in a rock salt crystal if a = 2.814 A^o.	5 M
		OR	
5	a)	Describe the powder method with a suitable diagram for determination of crystal structure and outline its four advantages.	5 M
	b)	Calculate the glancing angle on the (100) plane of a cubic rock salt crystal (a=2.814 A^o) corresponding to second order diffraction maxima for x-rays of wavelength λ = 0.71 A^o.	5 M

UNIT-III			
6	a)	Explain the concept of internal field in solids and derive relation for the static dielectric constant of elemental solid dielectric and polarizability.	5 M
	b)	The dielectric constant of the He gas at NTP is 1.0000684. Calculate the electronic polarizability of the gas containing 2.7×10^{25} atoms/m^3.	5 M
OR			
7	a)	Classify magnetic materials based on their magnetic moment. Explain in detail.	5 M
	b)	Explain Domain theory for ferromagnetic materials.	5 M
UNIT-IV			
8	a)	Obtain the solution for energy of a free particle of mass 'm' confined in a one dimensional infinite potential well of width 'L'.	5 M
	b)	An electron is bound in a one dimensional infinite well of width $1A^o$. Find the energy values in the ground state and first two excited states.	5 M
OR			
9	a)	Explain the classical free electron theory. Write down its merits and demerits.	5 M
	b)	Explain the concept of fermi energy. Represent variation of Fermi energy with temperature.	5 M
UNIT-V			
10	a)	Derive an expression for density of electrons in conduction band of an Intrinsic semiconductor.	5 M
	b)	Explain origin of band theory of solids and classify materials according to band theory.	5 M

OR			
11	a)	Derive an expression for the carrier concentration of N-type extrinsic semiconductor.	5 M
	b)	Derive an expression for Hall voltage and mention the applications of Hall effect.	5 M