PVP 20

Code: 20BS1103

I B.Tech - I Semester – Regular / Supplementary Examinations
FEBRUARY - 2023

ENGINEERING PHYSICS
(Common for CSE, IT)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.
BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	What are the different types of optical fiber based on the refractive index profile of the core? Explain the propagation of light through the fibers with the help of suitable diagrams.	L2	CO1	8 M
	b)	An optical fiber cable has an acceptance angle of 20° when kept in air and core refractive index of 1.49, calculate the refractive index of cladding and the numerical aperture of the fiber.	L2	CO1	6 M
OR					
2	a)	Explain the transmission principle of an optical fiber. Summarize the advantages of fiber optic cables over conventional copper cables in communication network.	L2	CO1	8 M

	b)	An optical fiber has a core material of refractive index 1.55 and cladding material of refractive index 1.50. The light is launched into it in air. Calculate its numerical aperture.	L2	CO1	6 M
		UNIT-II			
3	a)	Explain different types of polarization mechanisms in dielectric material with suitable examples.	L2	CO1	8 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/m³.	L3	CO3	6 M
		OR			
4	a)	Define magnetization and derive the relation among $\vec{B}$, $\vec{M}$ and $\vec{H}$. What is domain theory?	L3	CO3	8 M
	b)	A paramagnetic material has 10^{28} atoms per m^3. Its susceptibility at 350 K is 2.8×10^{-4}. Calculate the susceptibility at 300 K.	L4	CO4	6 M
		UNIT-III			
5	a)	Obtain the Poisson's equation starting from the differential form of Gauss' Law. When the Poisson's equation simplifies to the Laplace's Equation?	L3	CO3	6 M
	b)	Calculate the electric field ($\vec{E}$) due to a uniformly charged solid sphere of radius R at a distance r from the center of the sphere	L3	CO3	8 M

		for three cases: r < R (inside the sphere), r = R (at the surface of the sphere) and r > R (outside the sphere).			
OR					
6	a)	State Ampere's circuital law and write down its integral form. Obtain the differential form of Ampere's circuital law starting from the integral form.	L2	CO1	6 M
	b)	State Maxwell's equations and describe the physical significance of each equation. Define all terms related to these equations.	L3	CO3	8 M
UNIT-IV					
7	a)	Distinguish among metal, semiconductor and insulator on the basis of their band structure with the help of suitable diagram. Define intrinsic and extrinsic semiconductors with suitable examples.	L2	CO1	6 M
	b)	Derive an expression for the concentration of electrons in conduction band for an intrinsic semiconductor.	L3	CO3	8 M
OR					
8	a)	Define band gap of a semiconductor. What is meant by doping and specify the purpose of doping of a semiconductor.	L2	CO1	6 M
	b)	Prove that Fermi level is located exactly middle of the conduction and valance band for intrinsic semiconductor.	L3	CO3	8 M

UNIT-V					
9	a)	Define drift and diffusion currents in semiconductor and derive their expressions.	L2	CO1	7 M
	b)	Explain the I-V characteristics of p-n junction diode with suitable diagram in forward and reverse bias.	L3	CO2	7 M
OR					
10	a)	Differentiate between direct and indirect band gap semiconductors with suitable diagrams and give examples. What type of semiconductors are used in LED?	L2	CO1	8 M
	b)	What is Hall effect? Derive the expression for Hall coefficient? Write any two applications.	L3	CO2	6 M