

Course Name: Engineering Physics-I

Course Outcomes

- CO1- Understand phenomenon of interference, diffraction of light waves and variation of intensities in these phenomenon.
- CO2- Discuss polarization of light wave, double refraction and specific rotation.
- CO3- Explain solids, superconductors and conductivity variation with temperature for intrinsic semiconductors.
- CO4- Explain special theory of relativity in fields of physics and engineering.
- CO5- Understand fundamentals of quantum mechanics, Schrödinger's wave equations to deal with physics problem.

Printed Pages: 2

University Roll No.

Mid Term Examination, Odd Semester 2023-24

Program: B. Tech., Year: I, Semester: I

Subject Code: BPHS1002, Subject: Engineering Physics-I

Time: 2 Hours

Maximum Marks: 30

Section – A

Attempt All Questions

3 × 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	In Young's double slit experiment slits are 0.5mm apart and interference is observed on a screen placed at a distance of 1000 mm from the slits. It is found that 9 th bright fringe is at a distance of 8.835 mm from second dark fringe from the center pattern. Estimate the wavelength of light used.	3	1	A	P
2	Distinguish between interference and diffraction.	3	1	U	C
3	A 2dm long tube containing 48 cm ³ of sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66 deg (dm) ⁻¹ (gm/cc) ⁻¹ , Calculate the mass of sugar in solution.	3	2	A	P
4	A parallel beam of light is normally incident on a plane diffraction grating having 4250 lines per cm and a second order spectrum line is observed at angle of 30°. Find the wavelength of light.	3	1	A	P
5	Two materials were heated in a laboratory experiment for studying the variation of their conductivity with rise of temperature. It was noticed that conductivity of one material increases with rise of its temperature while no change in the conductivity of other material is seen on enhancing its temperature. Identify the nature of materials and draw their energy band gap diagram.	3			

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Section - B

Attempt All Questions

$5 \times 3 = 15$ Marks

No.	Detail of Question	Marks	CO	BL	KL
6	<p>(i) Find the temperature independent expression for conductivity of semiconductors in terms of mobilities and concentrations of charge carriers.</p> <p>(ii) Compute the temperature (T) at which the relation, $H_c(T) = 0.1H_c(0)$ will hold good for Pb. Here, $H_c(T)$, $H_c(0)$ are the critical magnetic fields of Pb at temperatures T K and 0K respectively. Given that the critical temperature (T_c) of Pb is 7.2K.</p>	5	3	A	P
7	<p>Explain the phenomenon of double refraction giving suitable diagram. Give one example of doubly refracting crystals. Also mention the salient features of O and E-rays.</p> <p align="center">Or</p> <p>Using the assumptions of Fresnel's theory for optical rotation show that the rotation of plane of polarization (θ) is given by, $\theta = \frac{\pi d}{\lambda}(\mu_L - \mu_R)$, where d is the thickness of the optically active material, μ_L and μ_R are the refractive indices of optically active material for left handed and right handed circularly polarized lights.</p>	5	2	R	F
8	<p>A Plano-convex lens of radius of curvature R rests on a plane glass plate. If a liquid of refractive index μ is introduced between the Plano-convex lens and glass plate and light from a monochromatic source of wavelength λ is made to fall normally on the lens from above, then alternate bright and dark rings are formed about the point of contact. Find the expression for the diameter of n^{th} bright ring in terms of n, μ, λ, and R.</p>	5	1	A	P