Course Name: Engineering Physics

Course Outcome

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.

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Mid Term Examination, Even Semester 2021-22

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

Subject Code: BPHS0002, Subject Name: Engineering Physics

Time: 2 Hours **Maximum Marks: 30**

Instruction for students: Attempt all questions. Marks are indicated against each question.

Section – A

*Attempt **All** Questions* $3 \times 5 = 15$ Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Two coherent waves of amplitudes a_1 and a_2 having a phase difference δ are superposing with each other. Deduce the expression for the intensity of the resultant wave formed by the superposition of these waves.	3	CO1	A	P
2	Define unpolarised light, plane polarised light, and plane of polarisation.	3	CO2	R	F
3	In Fresnel biprism experiment the angle of prism is $\pi/60$ radian and its refractive index is $\mu = 1.5$. Interference fringes are formed with source of wavelength 6000 Å located 10 cm from the biprism and source to screen distance is 100 cm. Find the maximum number of fringes formed in the interference pattern.	3	CO1	A	P
4	80 gram of a sugar sample is dissolved in a liter of water. The solution gives an optical rotation of 9.9^0 when placed in a tube of length 2 dm. If specific rotation of pure sugar solution is 66^0 $dm^{-1}(gm/cc)^{-1}$, then compute the percentage purity of the sample.	3	CO2	A	P
5	Explain major features of type-I superconductors.	3	CO3	U	C

Section – B

Attempt All Questions $5 \times 3 = 15$ Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Light rays from two coherent sources are superposing on a screen placed at some distance from these sources. Derive the expression for the position of bright fringes. In a two slit interference pattern 10^{th} order maximum is observed for λ = 7000 Å. Find the order of the maxima forming at this point if this source of light is replaced by a source of light of wavelength λ = 5000 Å. OR Obtain the expression for the diameters of bright rings formed due to reflected light rays in Newton's ring experiment. Diameters of 4^{th} and 12^{th} dark rings in Newton's ring experiment are 0.400 cm and 0.700 cm respectively. Find the diameter of 20^{th} dark ring.	5	CO1	A	P
2	Deduce the expression for resulting intensity due to diffraction from a single slit. Light of wavelength 5500Å is falling normally on a slit of width 22×10^{-5} cm. Calculate the angular position of second order minima on either side of central maximum.	5	CO1	A	P
3	Explain Hall effect and find out the expression for Hall coefficient in terms of Hall voltage, thickness of solid, current flowing in it and magnetic field applied. Concentration of electrons in a conductor is 5×10^{28} electrons/m^3. Estimate its Hall coefficient (electronic charge, e = 1.6×10^{-19} coulomb). OR Explain Meissner effect. Using it show that magnetic susceptibility of superconductors is -1 at or below the critical temperature in magnetic field. Transition temperature of Pb is 7.2K. Critical magnetic field for it at 5K is 3.3×10^{4} A/m. Calculate its critical magnetic field at 0 K.	5	CO3	A	P