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University Roll No.....

Mid-Term Examination, Odd Semester 2021-22

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

Subject Code: BPHS0002

Subject

Name: Engineering Physics

Time: 2 Hours

Maximum Marks: 30

**Section - A**

**Note: Attempt All Three Questions.**

3 × 2 = 6 Marks

- I. In an interference pattern, the ratio between the maximum and minimum intensities is 36:1. Calculate the ratio of amplitudes and intensities of interfering waves.
- II. Distinguish between Fraunhofer and Fresnel class of diffraction.
- III. Explain the phenomenon of double refraction. Also give suitable ray diagram in relation to the phenomenon.

**Section - B**

**Note: Attempt All Three Questions.**

3 × 3 = 9 Marks

- I. What is Fresnel biprism? Giving a suitable ray diagram explain how does it create two coherent virtual sources?
- II. What do you understand by optical activity? A sugar solution in a tube of length 20 cm produces an optical rotation of  $13^\circ$ . The solution is then diluted to one third of its previous concentration. Find the optical rotation produced by 30 cm long tube containing the diluted solution.
- III. Differentiate between interference and diffraction. In Fresnel biprism experiment, the angle of prism is  $\pi/90$  radian and its refractive index is 1.5. A slit illuminated with monochromatic light is placed 20 cm behind the biprism and width of interference fringes on a screen 80 cm in front of biprism is found to be  $8.25 \times 10^{-3}$  cm. Calculate the wavelength of light used.

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**Section - C**

**Note: Attempt Any Three Questions.**

3 × 5 = 15 Marks

- I. Explain the formation of Newton's rings and deduce the expressions for the diameters of nth bright and dark rings formed in reflected light in Newton's ring experiment.
- II. Derive the expression for the intensity distribution due to Fraunhofer diffraction at a single slit. Also find the positions of central maximum and minima formed in its diffraction pattern.
- III. Define plane, circularly and elliptically polarised lights. Two plane polarised perpendicular vibrations are superposing with each other after emerging from a calcite crystal. Obtain the equation for locus of tip of resultant light vector formed due to their superposition. Also show that circularly polarised light is the special case elliptically polarised light.
- IV(a) What are superconductors? Distinguish between Type-I and Type-II superconductors.
- IV(b) Explain Meissner effect? Show that superconductors behave like perfect diamagnetic materials in their superconducting state.