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TPH–201

B. TECH. (SECOND SEMESTER)

MID SEMESTER

EXAMINATION, March, 2024

ENGINEERING PHYSICS

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Calculate the distance between two virtual coherent sources in Fresnel's biprism experiment using, (i) displacement method and (ii) deviation method. (CO1)

OR

(b) The distance between the slit and biprism and between biprism and eyepiece are

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45 cm each. The obtuse angle of biprism is 178° and its refractive index is 1.5. If the fringe width is 1 5.6 × 10^{-3} cm, find the wavelength of light used. (CO1)

2. (a) Why Newton's rings are circular ? How can we use Newton's ring pattern to calculate the refractive index of a liquid ? (CO1)

OR

(b) The Newton's rings are seen in reflected light of wavelength 5896 Å. The radius of curvature of plano-convex lens is 0.9 meter. An air film is replaced by a liquid whose refractive index is to be calculated under the conditions if 14th ring and its diameter is 5.1 mm. (CO1)

(a) How does a single slit cause diffraction pattern ? Derive the expression for the intensity in this case. (CO1)

OR

(b) Find the angular width of the central bright maximum in the Fraunhofer diffraction pattern of slit of width 12 × 10^{-5} cm when the slit is illuminated by monochromatic light of wavelength 6000 Å. (CO1)

4. (a) Explain the phenomena of double refraction with the help of a suitable diagram. Also describe the difference between E-ray and O-ray. (CO2)

OR

(b) The polarizer and analyzer are adjusted to obtain maximum transmitted intensity. Through what angle should the analyzer be rotated to reduce the intensity, (i) half and (ii) one fourth. (CO2)

5. (a) Explain the production of plane, circular and elliptical polarized light through mathematical equations. (CO2)

OR

(b) Calculate the thickness of a calcite plate which would convert plane-polarized light into circularly polarized light. The principal refractive indices are $\mu_o = 1.658$ and $\mu_e = 1.486$ at wavelength 5890 Å of light used.