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TPH–101

B. TECH. (FIRST SEMESTER)
MID SEMESTER EXAMINATION, 2019

(ALL BRANCHES)

ENGINEERING PHYSICS

Time.: 1 : 30 Hours

Maximum Marks : 50

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub questions among (a), (b) and (c) in each main question.

(iii) Total marks for each main question are **ten.**

1. Attempt any *two* parts of choice from (a), (b) and (c). (2x5=10 Marks)

   (a) Explain the formation of interference pattern in Fresnel Biprism. Also derive the expression to calculate the distance between the two virtual sources (d) using deviation method.

   (b) Derive the expression to calculate the path difference in a thin wedge shape film in reflected light.

(c) In Feresnel Biprism experiment interference pattern with X = 5500 A, zero order and 10th order maxima falls at micrometer readings 10.34 mm and 13.50 mm respectively. If wavelength is changed to 6500 A, find the changed fringe width.

2. Attempt any *two* parts of choice from (a), (b) and (c). (2x5=10 Marks)

(a) Using the expression for resultant intensity due to Fraunhofer diffraction in single slit. Deduce the intensity and angles for central maxima and minima.

(b) Derive the expression for resolving power in a diffraction grating.

(c) In a plane transmission grating, the angle of diffraction for the second order principal maxima for the wavelength 5500 A is 30°. Calculate the grating element and number of lines in 1 cm of the grating.

3. Attempt any *two* parts of choice from (a), (b) and (c). (2x5=10 Marks)

(a) Derive the expression to calculate the diameter of bright rings in Newton's ring experiment.

(b) Derive the expression for fringe width if a wedge shape film bounded by two plane surface.

(c) A Newton's ring experiment is performed with a source of light having two wavelength $\lambda_1 = 6000$ A and $X_2 = 5000$ A. It is found that nth dark ring due to X_1 coincides with (n + 1) th dark ring due to X_2. If the radius of curvature of the curved surface of the lens is 100 cm, find the diameter of the nth dark ring due to X_1.

4. Attempt any *two* parts of choice from (a), (b) and (c). (2x5=10 Marks)

(a) Derive the expression for acceptance angle and numerical aperture in an optical fiber.

(b) Write the difference between Step Index and Graded Index optical fiber:

(c) An optical fiber has core and cladding with refractive indices 1.55 and 1.4 respectively. Calculate the numerical aperture and acceptance angle.

5. Attempt any *two* parts of choice from (a), (b) and (c). (2x5=10 Marks)

(a) Deduce the expression for fringe width in Fresnel Biprism experiment.

(b) Derive the expression for resultant in N-Slit Fraunhofer diffraction.

(c) How many orders will be observed by a grating having 4000 lines per cm, if it is illuminated normally by light of wavelength 4500 Å ?

F. No. : a-8