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TPH–101

B. Tech. (First Semester)
Mid Semester EXAMINATION, 2016
(All Branches)
ENGINEERING PHYSICS

Time : Two Hours] [*Maximum Marks : 60*

Note : (i) This question paper contains *three* questions with alternative choice.

(ii) All questions are compulsory.

(iii) Each question carries four Parts (a), (b), (c) and (d). Attempt either Parts (a) and (b) or (c) and (d) of each question.

(iv) Each Part carries ten marks. Total marks assigned to each question are twenty.

1. (a) What are coherent sources ? Explain Fresnel's Biprism experiment with diagram. Derive the expression for fringe width.

(b) A parallel beam of light 589 nm strikes a film of oil 1.46. If the 8th dark ring be seen, when viewed at an angle of 30° to the normal, calculate the thickness of the film.

Or

(c) Prove that in Newton's ring experiment the diameters of dark rings are directly proportional to the square root of natural numbers and also determine the wavelength of monochromatic light.

(d) In Newton's ring experiment the diameter of 4th and 12th dark rings is 0.4 cm and 0.7 cm respectively. Deduce the diameter of 20th dark ring.

2. (a) What is the difference between Fresnel's and Fraunhoffer diffraction. Show that for Fraunhoffer single slit diffraction the ratio of relative intensities of the principle maximum, first maximum, second maximum ..... are, $1 : 4/9\,\pi^2 : 4/25\,\pi^2 : 4/49\,\pi^2$ ..... etc.

(b) In a plane transmission grating, the angle of diffraction for the second order principal maximum for the wavelength 500 nm is 30°. Calculate the number of lines in one centimeter of the grating.

Or

(c) What are quarter and half wave plate ? How are these plates useful for production and detection of circularly and eliptically polarized light. Explain the construction and working of Laurent's half shade polarimeter.

(d) Find the minimum number of lines in a plane diffraction grating to just resolve the sodium doublet (5890 Å & 5896 Å) in the :

(i) First Order

(ii) Second Order

3. (a) Explain the construction and working of Ruby laser. How is it different with He-Ne laser ?

(b) 80 gm of impure sugar when dissolved in a litre of water gives an optical rotation of 9.9°, when placed in a tube of length 20 cm. If the specific rotation of sugar is 66°, find the percentage purity of the sugar sample.

Or

(c) What is plane diffraction grating ? Discuss its theory and derive the condition for secondary maxima and minima.

(d) A certain ruby laser emits 10 J pulses of light whose wavelength is 694 mm. What is the minimum number of chromium ions in the ruby laser ?