Roll No. ☐☐☐☐☐☐☐

TPH–101

B. Tech. (First Semester)
Mid Semester EXAMINATION, 2017
(All Branches)
ENGINEERING PHYSICS

Time : 1:30 Hours]　　　　　[*Maximum Marks : 50*

Note : (i)　This question paper contains two Sections.

(ii)　Both Sections are compulsory.

Section—A

1.　Fill in the blanks/True-False :　　(1×5=5 Marks)

(a)　In Fresnel Biprism experiment the fringes formed are due to the phenomenon of ....

(b)　The He-Ne laser is a .... level laser.

(c)　The resolving power of diffraction grating is given by ....

(d)　In order to locate a zero order fringe in Fresnel Biprism experiment .... monochromatic/white light is used.

(e)　An optical fiber the refractive index of core is .... less/greater than the refractive index of cladding.

2. Attempt any *five* parts :   (3×5=15 Marks)

(a) Explain the process of stimulated emission of radiation.

(b) Draw the energy level diagram of He-Ne laser and explain why He-Ne is superior to Ruby laser.

(c) Write the conditions to obtain sustained and distinct interference pattern.

(d) Write the condition of path difference for maxima and minima formed due to a thin wedge shaped film bounded by glass plates.

(e) Write the resultant expression for intensity in N-slit Fraunhofer diffraction and draw the fringe pattern/intensity pattern graph formed on the screen due to a diffraction grating.

(f) Calculate the resolving power of a diffraction grating in second order having 40000 lines/cm.

Section—B

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

(a) Discuss displacement method to determine the distance (d) between the two virtual sources in Fresnel Biprism experiment. Also derive the necessary expression.

(b) In Fresnel biprism experiment the angle of biprism is ½° and μ = 1.5. Interference fringes are formed with a source of wavelength 5500 Å located 20 cm from the biprism and source and screen distance is 100 cm. Find the fringe width.

(c) Derive the expression for the diameter of dark rings formed in Newton's ring experiment.

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

(a) Derive the expression for the resultant intensity in Fraunhofer single slit diffraction. Also deduce the intensity and position of central maxima and minima.

(b) Light of wavelength 6000 Å is incident normally on a plane transmission grating 10000 lines/inch. Find the angle of diffraction in first order.

(c) Discuss Rayleigh criteria of least resolution.

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

(a) Discuss the construction and working of Ruby laser and draw the energy level diagram.

(b) Newton's rings are observed by using a plano-convex lens kept upon a plane glass plate. If the radius of curvature of the spherical surface of the plano-convex lens is 110 cm and the diameter of the 15th dark ring is 0.55 cm and diameter of the 10th dark ring is 0.35 cm, find the wavelength of light used.

(c) Explain the working principle of fiber optics. Deduce the expression for acceptance angle.

400