

Roll No.

TPH-101

B. TECH. (FIRST SEMESTER)

MID SEMESTER EXAMINATION, 2018

(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) Interference in Fresnel's biprism is due to division of amplitude of coherent sources.

(True/False)

(b) Optical fibers work on phenomena.
(Polarization/Interference)

(c) Interference in Newton's ring is due to division of wave-fronts of two coherent sources
(True/False)

(2)

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- (d) Interference in Newton's ring takes place (Between source and tilted glass plate or air wedge formed between curved surface of lens and glass plate).
- (e) LASER is a temporally and spatially coherent light. (True/False)
2. Attempt any *five* parts : (3×5=15 Marks)
- (a) Draw the energy level diagram of a Ruby laser.
- (b) Categorize the optical fibers based on their transmission properties and structure.
- (c) Explain the stimulated emission of radiation.
- (d) Write the possible mode of transmission in a fiber optic.
- (e) Write the conditions of a sustained interference.
- (f) Write the applications of a Newton's ring experiment.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Derive condition of dark and bright fringes in Newton's ring experiment.

(3)

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- (b) Derive the Einstein's co-efficient.
- (c) A yellow line ($\lambda = 6000\text{\AA}$) of *n*th order superimpose on a blue line ($\lambda = 4800\text{\AA}$) of next higher order in a diffraction grating. Calculate the grating element (given $\theta = \sin^{-1}(3/4)$).
4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
- (a) Discuss the deviation method to determine the distance between virtual light sources in Fresnel's biprism experiment.
- (b) The numerical aperture of a fiber optics is 0.56 and the refractive index of core is 1.62. Find the acceptance angle and refractive index of cladding
- (c) In Newton's ring experiment the diameter of 14th ring is 0.580 cm and the diameter of 6th ring is 0.347 cm. Find the wavelength of light used (radius of curvature of plano-convex lens is 120 cm).

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

- (a) Derive the expression of the numerical aperture of an optical fiber.
- (b) Discuss the position and intensity of secondary maxima in single slit Fraunhofer experiment.
- (c) A grating can resolve wavelength difference of 6 \AA at a mean wavelength of 6000 \AA in second order. Find the number of lines per inch on grating.