

FACULTY OF ENGINEERING
B.E. I - Semester (Main) Examination, December 2016

Subject : Engineering Physics - I

Time : 3 Hours

Max. Marks: 70

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (20 Marks)

- 1 In Newton's ring experiment, the diameters of the 4th and 12th dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of 20th dark ring. (2)
- 2 The first order diffraction maxima due to a single slit diffraction is at $\theta = 30^\circ$ for a light of wavelength 500 nm. Find the width of the slit. (2)
- 3 Describe the Phenomenon of optical activity. (2)
- 4 Distinguish between Spontaneous and stimulated emission of radiation. (2)
- 5 Mention any four applications of an optical fibre. (2)
- 6 Piezo electric method, the velocity of ultrasonic waves can be increased by (2)
 - (a) by choosing quartz of low natural frequency
 - (b) by choosing quartz of high natural frequency,
 - (c) Increasing frequency of applied a.c. signal
 - (d) Decreasing frequency of applied a.c. signal
- 7 Define Boltzman's thermodynamical probability and entropy
- 8 The law which holds good in longer wavelength and fails for shorter wave length is known as _____ (2)
- 9 Explain the physical significance of wave function Ψ . (2)
- 10 State and explain the concept of " Displacement current". (2)

PART- B (50 Marks)

- 11 (a) Explain the formation of interference fringes by means of Fresnel's Biprism and derive the expression for fringe width. (5)
- (b) Describe the intensity distribution due to a double slit diffraction and explain why missing orders occur in this? (5)
- 12 (a) Explain the construction and working of Laurent's half shade polarimeter. (5)
- (b) Describe the experimental method for operation of a He-Ne gas laser with energy level diagram. (5)
- 13 (a) Define acceptance angle and numerical aperture. How they are related to the refractive indices of the core and cladding. (5)
- (b) What are ultrasonic waves? Describe the piezo electric method for production of ultrasonic waves (5)
- 14 (a) Derive the expression for Bose – Einstein's distribution law? (5)
- (b) Distinguish micro canonical, canonical and grand canonical ensembles. (5)
- 15 (a) Derive the expression for Schrodinger's time independent wave equation (5)
- (b) Explain Maxwell's equations in integral and differential forms. (5)
- 16 (a) Explain the diffraction due to a single slit and derive the conditions for minimum and maximum intensity. (5)
- (b) State and explain the recording and reconstruction of Hologram. (5)
- 17 (a) Apply the Schrodinger's wave equation to a particle in an infinite square well potential and obtain the expression for energy of particle. (5)
- (b) A Quartz crystal of thickness 0.005 m is vibrating in resonant condition calculate frequency Given Y for quartz : $7.9 \times 10^{10} \text{ N/m}^2$ and ρ for quartz : 2650 kg / m^3 . (5)
