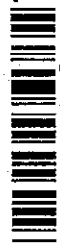


- 2 Attempt any four : 5×4
- (a) What are coherent sources? How can coherent sources be obtained in practice?
  - (b) Explain how the wavelength of light can be determined with Fresnel's biprism experiment.
  - (c) When a thin sheet of transparent crystal of thickness  $6.3 \times 10^{-4}$  cm is introduced in the path of one of the interfering beams, the central fringe shifts to a position occupied by the sixth fringe. If wavelength is  $5460 \text{ \AA}$ , find the refractive index of the crystal.
  - (d) Define diffraction phenomenon of light. What are its type? What are the conditions for diffraction of light?
  - (e) What is a diffraction grating? Derive an expression for its resolving power.
  - (f) In a diffraction phenomenon using double slit, calculate (i) the distance between the central maximum and the first minimum of the fringe envelope and (ii) the distance between any two consecutive double slit dark fringes. Given  $\lambda = 5000 \text{ \AA}$ , slit width = 0.02 mm, spacing between two slits = 0.10 mm, screen to slits distance = 100 cm.
- 3 Attempt any two : 10×2
- (a) Describe how, with the help of a Nicol prism and a quarter wave plate, plane, circularly and elliptically polarized lights are produced and detected.
  - (b) Define specific rotation. Describe the construction and working of the half shade polarimeter. Explain how it is used to determine the specific rotation of sugar solution.

- (c) Explain the principle, construction and working of a He-Ne laser with suitable diagrams.
- 4 Attempt any two : 10×2
- (a) Derive Maxwell's equations from the basic laws of electromagnetism.
  - (b) By using Maxwell's equations develop wave equation for a transverse electric and magnetic fields in free space. Also derive expression for the velocity of electromagnetic waves.
  - (c) Draw the hysteresis curve for a typical ferromagnetic material and explain it based on domain theory.
- 5 Attempt any two : 10×2
- (a) Write an essay on superconductivity bringing out the importance of London's equations in explaining several experimental facts related to this phenomenon.
  - (b) What is Meissner effect? What are Type I and Type II superconductors? How does the critical magnetic field vary with temperature in Type I and Type II superconductors?
  - (c) Derive Schroedinger time independent and time dependent equations for matter waves. What is the physical significance of wave functions used in this equation?



PAPER ID : 9913

TPH-201

Printed Pages : 3

Paper ID and Roll No. to be filled in your Answer Book

Roll No.

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**B. Tech.**

(SEM. II) (EVEN SEM.) EXAMINATION, 2013

**PHYSICS**

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all questions, the marks assigned to each question is indicated at question itself.

**1** Attempt any four : **5×4**

- (a) What is Galilean Transformation? Derive Galilean transformation equations.
- (b) The rest mass of an electron is  $9.1 \times 10^{-28}$  g. What will be its mass if it is moving with  $(4/5)^{\text{th}}$  of speed of light. Also deduce the fraction increase of mass of a particle for velocity  $0.1 c$ .
- (c) Deduce Einstein mass energy relation equation, considering the variation of mass with velocity.
- (d) What is black body? State and explain Kirchhoff's law of heat radiations.
- (e) What is meant by black body radiation? Explain briefly the energy distribution in a black body spectrum with diagram.
- (f) What is Compton effect? Derive an expression for the frequency of the scattered photon in terms of the frequency of the incident radiation and scattering angle.