

**I B.TECH II SEMESTER REGULAR EXAMINATIONS, SEPTEMBER - 2021**  
**APPLIED PHYSICS**  
**(COMMON TO CSE, CSO, AID, CSM, CIC & IT BRANCHES)**

Time : 3 Hours

Max. Marks : 70

Note : Answer ONE question from each unit (5 × 14 = 70 Marks)

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UNIT-I

1. a) Discuss the formation of Newton's rings with reflected monochromatic light and derive the condition for diameter of dark rings. [8M]
- b) Explain why Newton's rings are in circular. [2M]
- c) In Newton's rings experiment the diameter of the 15<sup>th</sup> ring was found to be 0.590 cm and that of the 5<sup>th</sup> ring 0.336 cm. If the radius of the plano convex lens is 100cm, calculate the wavelength of the light used. What happens to ring diameter if air film is replaced with liquid of refractive index 1.5? [4M]

(OR)

2. a) Discuss the Fraunhofer diffraction at a single slit. Obtain the condition for principal maximum and minimum. [10M]
- b) A plan wave of wavelength  $5893 \times 10^{-8}$  cm is incident normally on slit of width 0.5 mm and forms a diffraction pattern on a screen placed 1 m away from the slit. Calculate the separation of first dark band on either side of the central maximum. [4M]

UNIT-II

3. a) Obtain a relation between Einstein transition probabilities of spontaneous and stimulated emission of radiation. [10M]
  - b) What is population inversion? How it can be achieved? [4M]
- (OR)
4. a) Discuss the construction and reconstruction of image on a hologram. [7M]
  - b) Explain the differences between photography and holography. Discuss the role of holograms in industrial and medical field. [7M]

UNIT-III

5. a) Explain the origin of magnetic moment in magnetic materials. [7M]
- b) Explain the hysteresis of ferromagnetic materials. How it can be used to select materials for construction of permanent magnets? [7M]

(OR)

6. a) What is meant by the polarization of a material? Discuss the behaviour of polar and non-polar dielectric materials subjected to the static electric field. [7M]
- b) What is meant by local field in a dielectric? How is it calculated for a cubic structure? [7M]

## UNIT-IV

7. a) Describe the experiment of Davisson and Germer on electron diffraction. [7M]
- b) Obtain the Schrodinger's time dependent wave equation. [7M]

(OR)

8. a) State and explain Heisenberg's uncertainty principle with suitable examples. [5M]
- b) An electron has a speed of  $1.05 \times 10^4$  m/s with an accuracy of 0.02%. Calculate the uncertainty in the position of the electron. [2M]
- c) Write down the Schrodinger's wave equation for a particle in one dimensional box. [7M]

## UNIT-V

9. a) Derive an expression for the density of electrons in the conduction band of an N- type semiconductor. [10M]
- b) Explain how the Fermi energy level of extrinsic semiconductors is dependent on carrier concentration. [4M]

(OR)

10. a) Explain the Hall effect in metal? Derive the formulae to determine hall coefficient and mobility of electrons. [10M]
- b) Write the applications of Hall effect. [4M]

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