Code No : **20SH1T04**

R20

I B. TECH I SEMESTER REGULAR EXAMINATIONS, AUGUST - 2021
APPLIED PHYSICS
(Common to EEE and ECE)

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) What is interference of light? Prove that the diameter of the n^{th} dark ring in a Newton's ring set-up is directly proportional to the square root of the ring number. [10M]

   b) In Newton's rings experiment, the diameter of 4^{th} and 12^{th} dark rings is 0.4cm and 0.7cm respectively. Find the diameter of 20^{th} dark ring. [4M]

(OR)

2. a) Explain diffraction of light through a plane transmission grating. Obtain the grating equation. [10M]

   b) Light of wavelength 500nm is incident normally on a slit. The first minimum of the diffraction pattern is observed to lie at a distance of 5mm from the central maximum on a screen placed at a distance of 2m from the slit. Calculate the width of the slit. [4M]

UNIT-II

3. a) Describe the construction and working of He-Ne laser with relevant energy level diagram. List out its advantages over a ruby laser. [10M]

   b) Discuss three level and four level pumping mechanisms. [4M]

(OR)

4. a) Discuss the construction and reconstruction of image on a hologram [10M]

   b) What are the applications of holograms in industrial and medical field? [4M]

UNIT-III

5. a) Explain hysteresis of a ferromagnetic material with the help of B-H curve. [10M]

   b) Distinguish between Hard and Soft magnetic materials on the basis of B-H curve. [4M]
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(OR)

6. a) What is meant by internal field? Obtain an expression for internal field using Lorentz method. [10M]

   b) A solid contains 5 x 10^{28} identical atoms per m^3, each with a polarizability of 2 x 10^{-40} Fm^2. Assuming that internal field is given by the Lorentz relation,calculate the difference of internal field to the applied field. Given that ε_0=8.853x$10^{-12}$$Fm^{-1}$. [4M]

UNIT-IV

7. a) Write Schrodinger's equation for a particle in one dimensional box. Solve it to obtain eigen values and eigen functions and show that energies are discrete. [10M]

   b) A particle is moving in a one-dimensional potential box of infinite height and of width 2.5nm. Calculate the energy of a particle when it is in its state of least energy. [4M]

(OR)

8. a) Describe the Davisson and Germer experiment to prove that electrons possess wave nature. [10M]

   b) In Davisson Germer experiment, at what angle will the second and third order diffracted beams corresponding to the strong maximum occur? At what angle will the first order diffracted beams occur if the accelerating potential were changed from 50V to 65 V? [4M]

UNIT-V

9. a) Assuming that the Fermi level is at the middle of the forbidden gap. Obtain an expression for the concentration of electrons per unit volume in the conduction band of an intrinsic semiconductor. [10M]

   b) For an intrinsic conductor with energy gap 0.7 ev, calculate the concentration of intrinsic charge carriers at 300 K assuming m^*_e= m_0 (rest mass of electron). [4M]

(OR)

10. a) What is an energy band? Classify solids into conductors, semiconductors and insulators on the basis of band theory of solids. [10M]

    b) Explain applications of Hall effect. [4M]

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