Code No: R201207 **R20** SET - 1

I B. Tech II Semester Regular Examinations, September- 2021

APPLIED PHYSICS

(Common to **EEE, ECE, EIE, ECT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DS)**

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1. a) Explain the interference of light due to thin films. (7M)

   b) What is the thinnest soap film (excluding the case of zero thickness) that appears black when viewed by reflected light with a wavelength of 480 nm? The index of refraction of the film is 1.33 and there is air on both sides of the film. (3M)

   c) Sate and explain the principle of the superposition theorem. (4M)

Or

2. a) Give the theory of Fraunhofer diffraction due to a single slit and hence obtain the condition for bright and dark bands. (7M)

   b) Fraunhofer diffraction pattern due to a single slit of width 0.2 mm is being obtained on a screen placed at a distance of 2 metres from the slit. The first minima lie at 5 mm on either side of the central maximum on the screen. Find the wavelength of light. (3M)

   c) How polarized light is different from unpolarized light? Explain. (4M)

UNIT-II

3. a) Explain quantum processes involved in the interaction of radiation with matter. (7M)

   b) Discuss the construction and working of the He-Ne laser with its neat energy diagram and explaining its advantages and disadvantages over the Ruby laser. (7M)

Or

4. a) Clasify the optical fibers based on refractive indux profile. (10M)

   b) Write any four applications of optical fibers. (4M)

UNIT-III

5. a) Discuss the dual nature of matter waves with suitable examples. Explain the significance and normalization of the wave function. (7M)

   b) Obtain the expression of the time-dependent Schrodinger wave equation for a given wave function. (7M)

Or

6. a) Derive the expression for the density of energy states in metals. (7M)

   b) Write a note on Bloch's theorem and explain energy band formation in solids. (7M)

UNIT-IV

7. 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) Define polarizability. Write a short note on piezoelectricity. (7M)

Or

8. a) Explain the hysteresis curve shown by ferromagnetic materials based on domain theory. (9M)

   b) Distinguish between soft and hard magnetic materials. (5M)

UNIT-V

9. a) Derive an expression for majority carrier concentration of an N-type semiconductor. (7M)

   b) Explain how the Fermi energy level of an extrinsic semiconductor varies with carrier concentration. (7M)

Or

10. a) Distinguish between Type I and Type II superconductors. (6M)

    b) What are the super electrons? Explain the BCS theory of superconductivity. (9M)