

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) State 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

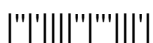
4. a) Classify the optical fibers based on refractive index profile. (10M)
- b) Write any four applications of optical fibers. (4M)

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)

