

CMR ENGINEERING COLLEGE: HYDERABAD
UGC AUTONOMOUS

I-B.TECH-I-Semester End Examinations (Supply) -January- 2025

APPLIED PHYSICS

(Common for CSC, CSD, CSE, IT)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Write an expression for the de-Broglie wavelength associated with electron. [2M]
- b) Define zone theory (Bloch Theorem). [2M]
- c) Explain the process of formation of electron-hole pairs. [2M]
- d) How does the Fermi level play a significance role in semiconductors? [2M]
- e) What is meant by piezoelectricity and pyroelectricity. [2M]
- f) Define magnetic susceptibility and magnetic permeability. [2M]
- g) What are the characteristics of LASER? [2M]
- h) Sketch the structure of the Optical fiber. [2M]
- i) What are nanomaterials? Give examples [2M]
- j) What are the advantages of TEM? [2M]

PART-B

(50 Marks)

- 2.a) Describe the Davison and Germer experiment to prove that electrons possess wave nature. [5M]
 - b) Derive time-independent Schrodinger wave equation? [5M]
- OR**
3. Discuss the Kronig-Penny model for the motion of an electron in a periodic potential. [10M]
 4. Derive expressions for carrier concentration and Fermi energy in a intrinsic semiconductor. [10M]
- OR**
5. Explain the principle, construction and working of LED and discuss the advantages of it. [10M]
 6. What is meant by polarization in dielectrics? Obtain Clausius Mosotti equation and discuss its significance. [10M]
- OR**
7. Discuss the domain structure in ferromagnetic materials. Show how the hysteresis curve is explained on the basis of domain theory. [10M]
 8. What are the conditions required for lasing action and derive the Einstein relations in a two level system. [10M]
- OR**
9. Explain the propagation of light through the optical fiber and mention the conditions to be satisfied. Distinguish between the step Index and Graded Index optical fibers. [10M]
 10. Explain the chemical vapor deposition method to synthesis the nonmaterials. [10M]
- OR**
11. Describe the principle, construction and working of Transmission electron microscope (TEM) and give its limitations. [10M]
