

Code No.: R22AP102BS

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CMR ENGINEERING COLLEGE: HYDERABAD
UGC AUTONOMOUS
I-B.TECH-I-Semester End Examinations (Regular) –January - 2025
APPLIED PHYSICS
(Common for ECE, CSD, CSM, CSC, IT)

[Time: 3 Hours]

[Max. Marks: 60]

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

Part A is compulsory which carries 10 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

(10 Marks)

1. a) Explain briefly the physical significance of wave function (Ψ). [1M]
- b) List any two drawbacks of free electron theory. [1M]
- c) Differentiate intrinsic and extrinsic semiconductors. [1M]
- d) Sketch V-I characteristics of Zener diode both in forward and reverse bias. [1M]
- e) Determine the relative permeability of a ferromagnetic material, if a field of strength 220 amp/metre produces a magnetization 3300 amp/metre in it. [1M]
- f) Justify why solid fuel cells are considered essential energy materials. [1M]
- g) Evaluate the advantages of the sol-gel method in the synthesis of nanomaterials. [1M]
- h) Write a short note on ball milling method. [1M]
- i) Write the characteristics of laser. [1M]
- j) The refractive indices of core and cladding materials of a step index fibre are 1.48 and 1.45, respectively. Calculate numerical aperture, and acceptance angle of given optical fiber. [1M]

PART-B

(50 Marks)

- 2.a) Describe the Davisson and Germer experiment to demonstrate the wave nature of a particle. [8M]
- b) Determine the wavelength associated with an electron subjected to a potential difference of 1500 volts. [2M]

OR

- 3.a) Using energy band diagrams, classify solids into conductors, semiconductors, and insulators. [6M]
- b) Explain the E-K (energy vs. wavevector) diagram and its role in understanding the electronic structure of solids. [4M]
4. Explain the working and I-V characteristic of a p-n junction diode with suitable diagrams. [10M]

OR

- 5.a) Using appropriate diagrams, elaborate on the construction and working of a light emitting diode (LED). [8M]
- b) The energy gap of a semiconductor is 1.1 eV. Calculate the wavelength of light that would be absorbed by this semiconductor material. [2M]
- 6.a) Discuss the hysteresis property and applications of ferro magnetic materials. [5M]
- b) Differentiate between soft and hard magnetic materials. [5M]

OR

7. Discuss briefly the concepts of magnetostriction and magnetoresistance, elaborating on their applications in memory devices and magnetic field sensors. [10M]

8. Discuss the working principles, instrumentation, and applications of Scanning Electron Microscope (SEM) [10M]

OR

9.a) Explain the Chemical Vapor Deposition (CVD) techniques in terms of their working principles and applications in nanomaterial synthesis. [8M]

b) Discuss the advantages and disadvantage of CVD. [2M]

10.a) With the help of suitable diagrams, explain the construction and working of He-Ne laser. [8M]

b) Mention any four applications of lasers. [2M]

OR

11. Explain step-index optical fiber and graded index optical fiber with suitable light ray diagrams. [10M]
