

Code No.: AP202BS

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**CMR ENGINEERING COLLEGE: : HYDERABAD**  
**UGC AUTONOMOUS**  
**I-B.TECH-II-Semester End Examinations (Supply) - March- 2023**  
**APPLIED PHYSICS**  
**(Common for CSM, ECE, MECH, AI&DS)**

[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) What are the matter waves? Explain their properties. [2M]
- b) Explain the origin of energy band formation in solids. [2M]
- c) Distinguish between direct and indirect band gap of a semiconductors. [2M]
- d) What is a Photodiode? Give its principle. [2M]
- e) Define dielectric constant. Give its importance. [2M]
- f) What is Bohr magneton? How is it related to magnetic moment of electron? [2M]
- g) How population inversion related to laser radiation? [2M]
- h) Draw the structure of optical fiber? Give its principle. [2M]
- i) Explain surface to volume ratio. [2M]
- j) State the principle of Transmission electron microscope (TEM). [2M]

**PART-B**

**(50 Marks)**

2. Describe Davisson and Germer's experiment to verify the wave nature of matter. [10M]
- OR**
3. Explain with suitable diagrams the conduction band, valence band and forbidden band in solids and hence explain the behavior of conductors, semiconductors and insulators. [10M]
4. Derive an expression for the carrier concentration in n-type extrinsic semiconductor. [10M]
- OR**
5. Explain the principle, construction and working of Light emitting diode (LED). [10M]
6. Describe the phenomenon of electronic polarization and obtain an expression for electronic polarizability. [10M]
- OR**
7. Explain the classification of magnetic materials. [10M]
8. Explain with a neat diagrams (i) absorption (ii) spontaneous emission and (iii) stimulated emission of radiation. [10M]
- OR**
9. Define acceptance angle and numerical aperture. Obtain an expression for numerical aperture of an optical fiber. [10M]
10. What are nanomaterials? Why do nanomaterials exhibit different properties explain in detail? [10M]
- OR**
11. Describe the principle, construction and working of Scanning electron microscope (SEM) and give its limitations. [10M]

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