

Code No.: AP102BS

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**CMR ENGINEERING COLLEGE: : HYDERABAD**  
**UGC AUTONOMOUS**  
**I-B.TECH-I-Semester End Examinations (Regular) - April- 2022**  
**APPLIED PHYSICS**  
**(Common to 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) Calculate the de Broglie wavelength, if an electron is accelerated from rest through a potential difference  $V=50V$ . [2M]
- b) Will the effective mass of an electron be negative? Justify your answer. [2M]
- c) Explain the formation of hole in a semiconductor. [2M]
- d) What is meant by LED? Give its principle. [2M]
- e) How does the function of a dielectric differ from an insulator? [2M]
- f) Magnetic field intensity of a paramagnetic material is  $10^4 \text{ Am}^{-1}$  at room temperature its susceptibility is  $3.7 \times 10^3$ . Calculate the magnetization in the material. [2M]
- g) Define Einstein coefficients. [2M]
- h) Calculate the refractive indices of the core and cladding material of a fiber [Given Numerical Aperture of an optical fiber = 0.22 and relative refractive index differences 0.012]. [2M]
- i) State the principle of transmission electron microscope (TEM). [2M]
- j) What is bottom-up synthesis? Give examples of bottom-up approach in nanotechnology? [2M]

**PART-B**

(50 Marks)

2. Describe Davisson and Germer experiment to demonstrate the wave nature of particle. [10M]
- OR
3. Discuss qualitatively how band theory of solids leads to the classification of solids into conductors, semiconductors and insulators. [10M]
4. Derive an expression for carrier concentration in an intrinsic semiconductor. [10M]
- OR
5. Explain the formation of PN junction Diode and V-I characteristics of the same. [10M]
6. What is meant by local field? Derive the expression for internal field in a dielectric material. [10M]
- OR
7. Explain the reason for the formation of domain structure in ferromagnetic material. How the hysteresis curve is explained on the basis of the domain theory. [10M]
8. Draw a neat diagram of Helium-Neon laser and explain its construction and working principle. Discuss its important applications. [10M]
- OR
9. Describe the construction and working principle of optical fiber and discuss the detailed advantages of fiber optic cable over metallic cable. [10M]
10. What is the origin of nanotechnology? Why do nano materials exhibit different properties explain in detail. [10M]
- OR
11. Describe the principle, construction and working of SEM (Scanning Electron Microscope) and give its limitations. [10M]

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