

## CMR ENGINEERING COLLEGE: : HYDERABAD

## UGC AUTONOMOUS

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

## APPLIED PHYSICS

## (Common for IT, CSD, CSM, ECE, CSC)

[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) Define Wien's displacement law. Give its limitations. [1M]
- b) Define effective mass of an electron. [1M]
- c) Why do we prefer Silicon for transistors? [1M]
- d) What is the meaning of photovoltaic effect? [1M]
- e) What are dielectric materials? Give its properties. [1M]
- f) What is the relation between relative permeability and magnetic susceptibility? [1M]
- g) What is called bottom-up approach? [1M]
- h) What is XRD technique for nanoparticles? [1M]
- i) What is the use of nitrogen and helium in CO<sub>2</sub> laser? [1M]
- j) What is total internal reflection? [1M]

**PART-B****(50 Marks)**

2. What are matter waves? Describe Davisson and Germer experiment in support of the existence of matter waves. [10M]

**OR**

3. Explain the behavior of an electron moving in a field of periodic potential using Kronig and Penny model. [10M]

4. What is Hall effect? Derive an expression of Hall-coefficient for P- type and N-type semiconductors. [10M]

**OR**

5. What is meant by photodiode? Discuss the structure, working principle and characteristics of avalanche photodiode (APD). [10M]

6. Explain various polarization mechanisms in dielectrics. [10M]

**OR**

- 7.a) Explain the theory of multiferroics and discuss the advances in multiferroics. [6M]
- b) Write the applications of solid fuel cells. [4M]

8. Explain in detail, how nanomaterials are synthesized by chemical vapor deposition (CVD)? Mention the applications of CVD method. [10M]

**OR**

9. Describe the principle, construction and working of scanning electron microscope and give its advantages and disadvantages. [10M]

10. Describe the principle, construction and working of He-Ne laser and also mention the applications of it. [10M]

**OR**

- 11.a) Derive an expression for acceptance angle of an optical fiber. [6M]
- b) Calculate Numerical aperture and critical angle, when core refractive index is 1.48, relative refractive index is 2%. [4M]

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