

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)**

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|-------|---|------|
| 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 ₂ 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]
