

Code No.: AP102BS

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
I-B.TECH-I-Semester End Examinations (Supply) - January- 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) What is the Born's interpretation of the wave function? [2M]
- b) Define effective mass of an electron. [2M]
- c) Differentiate the n-type and p-type semiconductors with their Fermi level diagram. [2M]
- d) Sketch typical illumination characteristics for a photodiode. [2M]
- e) Mention the types of polarization mechanism occurred in dielectric materials. [2M]
- f) Define magnetic moment and intensity of magnetization. [2M]
- g) Explain the need of population inversion in the production of lasers. [2M]
- h) Explain the basic principle of light propagation in optical fiber. [2M]
- i) Explain 0D, 1D, 2D and 3D nanomaterials. [2M]
- j) Explain the phenomenon of Quantum Confinement in nanomaterials. [2M]

PART-B

(50 Marks)

2. a) Derive the Schrödinger's time independent wave equation for a free particle. [6M]
 - b) What is the physical significance of wave function and explain Heisenberg Uncertainty principle. [4M]
- OR**
3. a) Give brief account of Kronig-Penny model. What are its main conclusions? [6M]
 - b) Mention the drawbacks of classical free electron theory. [4M]
4. a) Derive the relation between intrinsic carrier concentration and absolute temperature. [6M]
 - b) Explain Hall Effect and its importance. [4M]
- OR**
5. a) Explain the construction, working principle and applications of Solar Cell. [6M]
 - b) Draw I-V characteristic curve of a PN junction diode and explain. [4M]
6. a) What is meant by local field? How it is calculated for a cubic structure? [6M]
 - b) Deduce Clausius-Mossotti equation. [4M]
- OR**
7. a) Compare the properties of dia, para and ferromagnetic materials. [6M]
 - b) Distinguish between soft and hard magnetic materials. [4M]
8. a) Explain the Construction and working principle of He-Ne laser. [6M]
 - b) Mention the applications of LASERS in medical field. [4 M]
- OR**
9. a) Derive an expression for Numerical Aperture and acceptance angle of optical fiber in terms of refractive indices. [6M]
 - b) Discuss the various types of optical fibers. [4M]
10. a) Explain in detail size, surface and morphological analysis of nanostructures using SEM. [6M]
 - b) Why nanomaterials exhibit different properties? Explain. [4M]
- OR**
11. a) Explain with a neat diagram TEM setup and its use in analyzing nanostructures. [6M]
 - b) Mention the applications of nanomaterials in different fields. [4M]
