

Code No.: AP202BS

R20

H.T.No.

8

R

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

I-B.TECH-II-Semester End Examinations (Supply) - January- 2022
APPLIED PHYSICS
(Common to CSM, ECE, ME)

[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) State any two drawbacks of classical free electron theory. [2M]
- b) The wavelength associated with a moving particle is given as $\lambda=h/p$, where h is Planck's constant and p is the momentum of the particle. Calculate the wavelength of an electron moving with one tenth speed of light. [2M]
- c) How a pure semiconductor material of tetra valance is modified as p-type semiconductor? [2M]
- d) Distinguish direct and indirect band semi conductors. [2M]
- e) What is pyro-electricity and give an example of pyro-electric material? [2M]
- f) Write down the expression for atomic Bohr Magneton, indicating the terms in it. [2M]
- g) If actual lasing action takes place in Neon atoms in He-Ne laser, what is the necessity to add Helium gas atoms? [2M]
- h) Explain the principle of light propagation in an optical fiber. [2M]
- i) The size of virus is in the range 0.02 – 0.25 micron, Express it in nano dimensions. [2M]
- j) Expand the terms XRD, SEM and TEM usually used in characterization of nano materials. [2M]

PART-B

(50 Marks)

2. a) Derive time independent Schrodinger wave equation. [4M]
 - b) Obtain the energy and wave functions for a particle in infinite one dimensional potential. [6M]
- OR**
3. a) Describe qualitatively the behavior of electron in a periodically varying potential in a real crystal. [5M]
 - b) What is Uncertainty principle in terms of momentum and position and as an application of it show why electrons are not stable particles in an atomic nucleus? [5M]
4. a) Describe the phenomenon of the Hall effect, explain the applications of it. [4M]
 - b) What is intrinsic carrier concentration in a semiconductor and obtain an expression for it. [6M]
- OR**
5. a) State the principle of solar cell and detail its working. [5M]
 - b) To prepare an LED that emits red light of wavelength 690 nm, what should be the energy gap of the semiconductor material used? [3M]
 - c) What is solar cell form factor and mention its physical significance? [2M]
6. a) Discuss the Hysteresis loop in ferro magnetic material based on domain theory. [6M]
 - b) Compare dia-, para- and ferro-magnetic materials. [4M]
- OR**
7. a) Derive an expression for local field in a symmetrical dielectric crystal. [7M]
 - b) Write short notes on pizeo-electric materials. [3M]

8. a) Describe the principle, construction and working of He-Ne laser. [6M]
b) Brief the terms: (i) stimulated emission, (ii) meta-stable state, (iii) population inversion and (iv) pumping mechanism. [4M]

OR

9. a) Discuss various attenuation mechanisms in optical fibers. [5M]
b) Discuss step index and graded index types of optical fibers. [5M]
10. a) Describe any one of the top-down approaches of preparation of nano materials. [6M]
b) What is surface-to-volume ratio and how it plays important role in determining the properties of nano materials? [4M]

OR

11. a) Explain in detail the Sol-Gel process of nano material preparation. [6M]
b) Mention any four important applications of nano materials. [4M]
