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Question Paper Code: R1P03

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

First Semester

Computer science Engineering

R21UPH103- ENGINEERING PHYSICS

(Common to ALL CSE allied branches)

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 1 = 10 Marks)

- In the HCP crystal structure, the edge atom can share only -----portion. CO1 -U
(a) 1/6 (b) 1/4 (c) 1/8 (d) 1/2
- A particular metal has a BCC unit cell. How many atoms of the metal are in each unit cell? CO1-U
(a) 1 (b) 4 (c) 6 (d) 2
- Which of the following is the not the property of laser? CO1-U
(a) Multicolor (b) Unidirectional
(c) Coherent (d) Intense
- Air wedge is work under the principle called CO1-U
(a) Scattering (b) Refraction (c) Dispersion (d) Interference
- In a finite Potential well, the wave function of a particle outside the box is CO1-U
(a) zero (b) infinite (c) constant (d) variable
- De-Broglie wavelength of electron accelerated through a potential of 150V is CO4-App
(a) 1.0Å (b) 1.33 Å (c) 3.14Å (d) 2.0Å
- The zero resistive materials are also generally called as ----- materials CO1-U
(a) Superconducting (b) Non-conducting (c) Semiconducting (d) Conducting

8. The Compound semiconductor emits ----- during the transfer of electron from conduction band to valence band. CO1-U
- (a) Photon (b) Phonon (c) Proton (d) Electron
9. Semiconducting material has electrical conductivity greater than ----- CO1-U
- (a) insulator (b) metals (c) alloys (d) conductor
10. Free electrons moving in the crystal can be compared to the motion of ----- CO1-U
- (a) dust particles (b) stars in sky (c) water bubbles (d) gas molecules

PART – B (5 x 2= 10Marks)

11. What are Bravais Lattices? CO1-U
12. What are the characteristics of laser? CO1-U
13. Calculate the de-Broglie wavelength of an electron which has been accelerated from rest on application of potential of 400volts. CO4- App
14. Define mean free path. CO1-U
15. Distinguish between intrinsic & extrinsic semiconductor. CO1-U

PART – C (5 x 16= 80Marks)

16. (a) (i) Show that for a cubic lattice the distance between two successive plane (h k l) is given by CO1-U (12)
- $$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$
- (ii) Show that the atomic radius of SC and HCP are the same. (4)
- Or
- (b) (i) Show that the atomic packing factor of FCC and HCP are the same. CO1-U (12)
- (ii) Show that the Coordination number of FCC and HCP are the same. (4)
17. (a) Describe a method to find the thickness of the wire using an air wedge? CO2- U (16)
- Or
- (b) Explain the construction and energy level of a CO₂ laser with the necessary diagrams. CO2-U (16)

18. (a) Compute the Compton shift of a photon for the scattering angle ($\theta = 180^\circ$) CO4-App (16)
- Or
- (b) Compute the Schrödinger time-dependent and time-independent wave equation. CO4-App (16)
19. (a) Derive the expression for electrical conductivity of metals. Show that the ratio between thermal conductivity and electrical conductivity is directly proportional to absolute temperature (T). CO1-U (16)
- Or
- (b) Derive an expression for Fermi energy (E_F) from density of energy states in a conducting material. CO1-U (16)
20. (a) Assuming the Fermi - Dirac distribution function, derive an expression for the concentration of electrons per unit volume and concentration of holes per unit volume in an intrinsic semiconductor. CO1-U (16)
- Or
- (b) Explain Hall effect in semiconductors. Derive an expression for Hall coefficient of a p-type and n-type semiconductors. Describe the experimental setup for the measurement of Hall coefficient. CO1-U (16)

