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Question Paper Code:R2P05

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Second Semester

Electrical and Electronics Engineering

R21UPH205 - PHYSICS FOR ELECTRONICS ENGINEERING

(Regulations R2021)

(Common to ECE Engineering branches)

Duration: Three hours

Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. The material emits photon during the transfer of electron from conduction band to valence band is CO1- U
(a) Silicon (b) Germanium (c) Gold (d) Gallium Arsenide
2. When the high resistivity material (Nichrome) is connected in AC current CO1- U
(a) Heat produced (b) Cool (c) No effect (d) Melt the wire
3. The probability of occupancy of Fermi level at any temperature other than 0 K is CO1- U
(a) Zero (b) one (c) infinity (d) 0.5
4. The compound semiconductor have ----- and carrier mobility CO1- U
(a) Low forbidden gap (b) Less forbidden gap
(c) Large forbidden gap (d) None of these
5. Which of the following is a weak magnet? CO2- U
(a) Ferromagnetic material (b) Antiferromagnetic
(c) Ferromagnetic material (d) Antiferromagnetic
6. The magnetic permeability of a paramagnetic substance is CO2- U
(a) >1 (b) <1 (c) 1 (d) None of these

7. How does ionic polarization occur? CO2- U
 (a) Splitting of ions (b) Passing magnetic field
 (c) Displacement of cations and anions (d) Never occurs
8. The fastest polarization is CO2- U
 (a) ionic polarization (b) space-charge polarization
 (c) Oriental polarization (d) Electronic polarization
9. Which one of the following nano materials comes under two dimensional? CO2- U
 (a) Nanoparticles (b) Nanorods
 (c) Nanofilms (d) Bundle of Nanowires
10. The size of a modern transistor is between _____ meters? CO5-App
 (a) 40 micron (b) 4.6 micron
 (c) 200-300 micron (d) None of the above

PART – B (5 x 2= 10 Marks)

11. Define Fermi level and Fermi energy in metals with its importance. CO1- U
12. What are direct and indirect bandgap semiconductors? CO1- U
13. Define the property retentivity and coercivity in hysteresis. CO2- U
14. What is meant by a local field in the context of dielectric medium? CO2- U
15. What are the optical materials? CO2- U

PART – C (5 x 16= 80Marks)

16. (a) Derive the expression for electrical conductivity and thermal conductivity in metals. Derive Lorentz number. CO3-App (16)
 Or
 (b) Obtain the Fermi Dirac distribution function. Explain how the function varies with temperature? CO3-App (16)
17. (a) Derive an expression for the electrical conductivity of intrinsic semiconductors. How will you determine the energy gap of an intrinsic semiconductor? CO3-App (16)

Or

- (b) What is Hall effect? Show that for a p – type semiconductor the Hall coefficient R_H is given by $1/pe$. CO3-App (16)
18. (a) Describe the ferromagnetic domain theory in detail and how will you account hysteresis of ferromagnetic material based on domain theory. CO2- U (16)
- Or
- (b) Explain dia, para and ferro magnetic materials on the basis of spin. Distinguish between soft and hard magnetic materials. CO2- U (16)
19. (a) Derive an expression for Langevin-Debye equation. CO5- App (16)
- Or
- (b) Arrive at the expression for dielectric power loss and explain how it varies with frequency of the applied voltage. CO5- App (16)
20. (a) Compare the quantum confinement and resulting structures like Quantum dots, quantum wells and their physical significance. CO2- U (16)
- Or
- (b) Describe single electron phenomena and single electron transistor. CO2- U (16)

