A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 52005

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Computer Science Engineering

15UPH205 - SEMICONDUCTOR PHYSICS AND OPTO ELECTRONICS

(Common to ECE and IT branches)

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. The time taken by a free electron to reach its equilibrium position from its disturbed position is reffered as CO1 -R

   (a) mean free path (b) mean free energy (c) collision time (d) relaxation time

2. At any non-zero temperature and E= E_F, the Fermi distribution function becomes CO1 -R

   (a) 0 (b) 1 (c) 0.5 (d) -1

3. --------- impurity atom is required for the preparation of N- type tetravalent semiconducting material. CO2 -R

   (a) trivalent (b) pentavalent (c) tetravalent (d) monovalent

4. The magnitude of Bohr magneton is CO2 -R

   (a) 9.27×10^{-24} Am^2 (b) 9.27×10^{24} Am^2 (c) 9.24×10^{-24} Am^2 (d) 9.27×10^{-27} Am^2

5. The electric strain produced in an atom is called as CO3 -R

   (a) ionic polarisation (b) electronic polarisation

   (c) orientational polarisation (d) space-charge polarisation

6. Super conductors exhibits --------- property CO3 -R

(a) diamagnetic (b) paramagnetic (c) ferromagnetic (d) antiferromagnetic

7. Electron tunneling via electro-absorption is referred as CO4 -R

(a) Seebeck effect (b) Franz-Keldysh effect

(c) Compton effect (d) Joule-Kelvin effect

8. The optical switching time is CO4- R

(a) $>10^{12}$ s (b) $< 10^{12}$s (c) $>10^{-12}$ s (d) $< 10^{-12}$ s

9. The light collecting efficiency of optical fiber is called CO5 -R

(a) acceptance angle (b) cladding (c) numerical aperture (d) core

10. Signal broadening at the output end of the fiber is referred as CO5 -R

(a) reflection (b) dispersion (c) rarefaction (d) diffraction

PART – B (5 x 2= 10Marks)

11. List any two de-merits of classical free electron theory CO1- R

12. Distinguish between elemental and compound semiconductors CO2-R

13. Calculate the critical current which can flow through a long thin superconducting wire of aluminum of diameter 10^{-3}. The critical magnetic field of aluminum is 7.9 X 10^3 A/m. CO3- App

14. Recall Franz Keldysh effect CO4- R

15. Recognize the two conditions required to achieve total internal reflection CO5 -R

PART – C (5 x 16= 80Marks)

16. (a) Based on classical free electron theory, find the expressions for electrical and thermal conductivity of metals. CO1- U (16)

Or

	(b)	With the aid of quantum concept, deduce mathematical expressions for density of energy states and Fermi energy of electrons at 0K	CO1- U	(16)
17.	(a)	Obtain mathematical expression to compute the conductivity of intrinsic semiconductor	CO2 U	(16)
		Or		
	(b)	(i) Distinguish between para and ferro magnetic materials	CO2-Ana	(8)
		(ii) Compare hard and soft magnetic materials	CO2 U	(8)
18.	(a)	(i) Compute the expression required for finding local field of a dielectric atom subjected to an electric field	CO3 -Ana	(10)
		(ii) Classify the dielectric materials	CO3-U	(6)
		Or		
	(b)	(i) Recognize four properties of superconductors	CO3- U	(8)
		(ii) Discriminate between Type I and Type II superconductors	CO3-Ana	(8)
19.	(a)	Describe the pulse code modulation technique along with its merits and demerits	CO4 -U	(16)
		Or		
	(b)	Explain the functioning of bipolar controller modulator and specify its two applications	CO4- U	(16)
20.	(a)	Explain the classification of fibers based on refractive index profile and modes of propagation	CO5- U	(16)
		Or		
	(b)	(i) Skectch the block diagram of fiber optic communication system and label its parts	CO5- U	(10)
		(ii) Describe the functioning of temperature sensor	CO5 -U	(6)

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