Roll No. | | | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering)

II Semester

PH 8252- PHYSICS FOR ELECTRONICS ENGINEERING

(Regulation 2012)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define thermal resistance.
2. In a solid, consider the energy level lying 0.01eV below Fermi level. What is the probability of this level not being occupied by an electron at 300 K?
3. Define minority carrier lifetime.
4. What is a Schottky diode?
5. Mention the various dielectric breakdown mechanisms in solids.
6. Calculate the electronic polarizability of argon atom. Given ε_r =1.0024 at STP and N=2.7x10^{25} atoms/m^3.
7. Distinguish dia-, para-, and ferromagnetic materials.
8. What do you mean by 'perfect diamagnetism' of a superconductor?
9. What are the boundary conditions that govern the behavior of the electric and magnetic fields of a travelling light wave?
10. What is meant by dichroism.

Part – B (5 x 16 = 80 marks)

11. Evaluate the energy levels and the corresponding wave functions of an electron in a one dimensional infinite potential well. (16)

12. a) i) Derive an expression for intrinsic carrier concentration in a pure semiconductor. (12)

    ii) The resistivity of intrinsic silicon at 270°C is 3000 Ωcm. Calculate the intrinsic carrier density. Assume μ_e=0.17 m^2/V.s and μ_h = 0.035 m^2/V.s. (4)

OR

b) i) Explain Hall effect and obtain an expression for Hall coefficient for an extrinsic semiconductor. State its applications. (12)

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ii) A copper strip 2.0 cm wide and 1.0 mm thick is placed in a magnetic field with B=1.5 wb/ m^2. If a current of 200 A is set up in the strip, calculate Hall voltage that appears across the strip. Assume R_h= $6x10^{-7}$ m^3/C. (4)

13. a) i) Explain the phenomenon of piezoelectricity. Describe how a quartz crystal is used in frequency control of oscillators. (10)

ii) Discuss the frequency dependence of various polarization processes in a dielectric material. (6)

OR

b) Explain the meaning of internal field in solids. Incorporating internal field in the expression for polarization, derive Clausius-Mossotti relation for elemental solid dielectrics. (16)

14. a) i) Explain the reason for the formation of domain structure in ferromagnetic material and how the hysteresis curve is explained on the basis of the domain theory. (10)

ii) What are hard and soft magnetic materials? Give their characteristic properties and applications. (6)

OR

b) i) Explain Giant Magneto Resistance. What is its significance? (6)

ii) What are type I and type II superconductors. Describe some practical applications of superconducting materials. (10)

15. a) Show that the refractive index of a material depends on frequency and hence derive the dispersion relation. (16)

OR

b) i) Describe the principle and construction of a white LED. (8)

ii) Explain in detail the optical anisotropy in crystals. (8)