Reg. No. : E N G G T R E E . C O M

Question Paper Code : 30313

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Second Semester

Aeronautical Engineering

PH 3205 — APPLIED PHYSICS

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Weidemann - Franz law.
2. What is the concept of hole?
3. What are Indirect bandgap semiconductors? Give any two examples.
4. With increase of temperature the conductivity of conductor decreases while that of semiconductor increases. Give reasons.
5. Define dielectric constant of a material.
6. List out any two application of Barium titanate ($BaTiO_3$).
7. State curie temperature.
8. Which factor influences the critical current density of the superconductor?
9. What are NLO materials? Give an example.
10. Define Luminescence.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the merits of classical free electron theory and deduce the mathematical expression for electrical conductivity and thermal conductivity of a conducting material. (16)

Or

(b) Describe briefly about density of states and obtain an expression for the density of states for a metal. (16)

12. (a) Derive an expression for density of electrons in the conduction band and also explain how the Fermi level varies with concentration of impurities in N-type semiconductors. (16)

Or

(b) (i) Describe the construction and working of Schottkky diode. (10)

(ii) Distinguish between Direct and Indirect band gap semiconductors. (6)

13. (a) Explain the different types of polarisation mechanism in dielectrics with suitable diagram. (16)

Or

(b) What is internal field in solid dielectrics? Derive the expression for local field and obtain Clausius Mosotti relation. (16)

14. (a) Briefly explain the hysteresis on the basis of domain theory of ferromagnetism. (16)

Or

(b) (i) Explain BCS theory of superconductivity with special note on Cooper pairs. (10)

(ii) Distinguish between Type-I and Type-II superconductors. (6)

15. (a) Briefly describe the phenomenon of dispersion, group velocity and group index. (16)

Or

(b) (i) Describe briefly the phenomenon of luminescence and polarization. (12)

(ii) Distinguish fluorescence and phosphorescence. (4)