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

# Question Paper Code : 60051

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

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. Mention an two merits of classical free electron theory.
2. What is meant by tight binding approximation?
3. What are direct band gap semiconductors? Give any two examples.
4. With increase of temperature the conductivity of semiconductor increases while that of metals decreases. Give reasons.
5. Define dielectric constant of a material.
6. Calculate the electronic polarizability of argon atom. Given $\varepsilon_r$ is 1.0024 at NTP and the number of atoms per unit volume is $1.5 + 10^{25}\ m^{-3}$.
7. Define Bohr magneton.
8. Will the superconductor exhibit the property of diamagnetism? Justify.
9. What are NLO materials? Give an example.
10. What is the origin of electrooptic effect?

PART B — (5 × 16 = 80 marks)

11. (a) Deduce the mathematical expression for electrical conductivity and thermal conductivity of a conducting material and hence obtain Wiedmann-Franz Law. (16)

Or

(b) Derive an expression for the density of states and based on that calculate the carrier concentration in metals. (16)

12. (a) Derive an expression for density of electrons in the conduction band and density of holes in the valence band of an intrinsic semiconductor. (16)

Or

(b) (i) Give the theory of Hall Effect and obtain the expression for Hall coefficient. (8)

(ii) Describe the construction and working of Schottkky diode. (8)

13. (a) Explain electronic, ionic and orientation polarization in dielectrics with suitable diagram. (16)

Or

(b) A dielectric material is placed in an external electric field. What is internal field at the site of an atom? Derive the expression for local field and obtain Clausius Mosotti relation. (16)

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



Or

(b) (i) Discuss Type-I and Type-II superconductors with suitable diagram. (8)

(ii) What are Cooper pairs? Give an outline of BCS theory of superconductivity. (8)

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

Or

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

(ii) What is the distinction between fluorescence and phosphorescence? (4)