

Reg. No. :

Question Paper Code : 21140

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

Second Semester

Computer Science and Engineering

PH 8252 — PHYSICS FOR INFORMATION SCIENCE

(Common to Information Technology)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Thermal conductivity.
2. Explain the terms: (a) Drift velocity and (b) carrier mobility.
3. Distinguish between intrinsic and extrinsic semiconductor.
4. Explain direct and indirect band gap semiconductors.
5. Define magnetic permeability and susceptibility.
6. Find the relative permeability of the ferromagnetic material if a magnetic field of strength 220 A/m produces magnetization of 3300 A/m in it.
7. How are optical materials classified?
8. Define Exciton.
9. What are the classifications of nano materials?
10. Explain quantum dot laser.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive expressions for electrical conductivity on the basis of classical free electron theory.
(ii) State and prove the wiedmann — Franz law.

Or

(b) (i) According to band theory a completely filled band or empty band is not associated with electrical conduction. Only partially filled band is responsible for electrical conduction. Explain why?

(ii) Find the drift velocity of free electrons in a copper wire of cross sectional area 10 mm^2 when the wire carries a current of 100 A. Assume that each copper atom contributes one electron to the free electron gas. Density of copper is 8969 kg/m^3 and its atomic weight is 63.54. [$N_A = 6.02 \times 10^{26}/\text{K.mol}$]

12. (a) Discuss with necessary theory the variation of Fermi level with temperature in an extrinsic semiconductor.

Or

(b) What is Hall effect? Derive an expression for Hall coefficient. Describe an experiment for the measurement of the Hall coefficient.

13. (a) Explain the terms diamagnetism, paramagnetism, ferromagnetism, anti ferromagnetism and ferrimagnetism on the basis of magnetic dipoles of the atoms.

Or

(b) (i) Explain important magnetic properties of ferromagnetic materials.

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

14. (a) Explain with a neat sketch the basic principle, working, advantage and the applications of LED.

Or

(b) (i) What is meant by absorption? Explain the phenomena of absorption of light in metals, insulators and semiconductors.

(ii) Explain the principle of solar cell.

15. (a) What is meant by carbon nanotubes? Explain the properties and application of carbon nanotubes.

Or

(b) Applying Schrodinger equation write about quantum confinement in quantum wells, quantum wires and quantum dots