



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

SIXTH SEMESTER – APRIL 2022

17UPH6MC03 – SOLID STATE PHYSICS

Date: 15-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART – A

Q. No Answer **ALL** Questions **(10 x 2 = 10 Marks)**

- 1 Lattice constant of copper is 0.38 nm. Calculate the distance between (110) planes.
- 2 Define unit cell.
- 3 What are phonons?
- 4 What is doping in semiconductors?
- 5 Give two differences between intrinsic and extrinsic semiconductors.
- 6 What is the law of mass action?
- 7 Why are ferromagnetic materials preferred in making transformer cores?
- 8 State Curie's law.
- 9 Define Meissner effect.
- 10 What are HTS? Give an example.

PART – B

Answer any **FOUR** Questions **(4 x 7.5 = 30 Marks)**

- 11 State and explain Bragg's law.
- 12 Give an account on momentum of phonons.
- 13 Explain Band theory of Solids.
- 14 Distinguish between dia, para and ferromagnetic materials.
- 15 Distinguish between type 1 and type 2 superconductors.
- 16 Obtain Laue equations.

PART – C

Answer any **FOUR** Questions **(4 x 12.5 = 50 Marks)**

- 17 With a neat diagram, discuss Debye-Scherrer method of determining crystal structure.
- 18 Give an account on Einstein's theory of lattice heat capacity and discuss the cases of high and low temperature behaviour.
- 19 Describe the working of n-type and p-type semiconductors.
- 20 Discuss Langevin's theory of Diamagnetism.
- 21 Obtain London equations and discuss its significance. Deduce the expression for penetration
- 22 Deduce the dispersion relation of a linear diatomic molecule and discuss the cases.

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