LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

SIXTH SEMESTER – **NOVEMBER 2023**

UPH 6501 – SOLID STATE PHYSICS

Date: 30-10-2023   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

PART – A

Q.No	Answer ALL questions (10 × 2 = 20 Marks)
1.	Define the Wigner-Seitz unit cell.
2.	Write a short note on crystal structure.
3.	How could you describe the carrier mobility in conductors.
4.	State the T^3 Law
5.	List the difference between Direct and Indirect Band Gaps.
6.	Mention any two properties of Intrinsic and Extrinsic Semiconductors.
7.	What does the B–H Curve represent in a magnetic material?
8.	Explain the DC Josephson Effect.
9.	Describe magnetic levitation?
10.	Briefly describe Cooper pair of electrons?

PART B

Answer any FOUR questions   (4 × 7.5= 30 Marks)

No.	Question
11.	Derive Bragg's law for X-ray diffraction in crystalline materials.
12.	Discuss the vibrations of a diatomic lattice and describe its optical and acoustical modes.
13.	Examine about the Hall Effect in Semiconductors.
14.	Describe the properties of Dia, Para, Ferro and Ferri magnetic materials in detail.
15.	Elaborate the BCS theory of superconductors.
16.	Discuss the London's Equation and the concept of Penetration Depth in superconductivity.

1

PART C

Answer any FOUR questions   **(4 × 12.5= 50 Marks)**

17.	Explain the 3D bravais lattices with suitable examples and diagrams.
18.	Describe the Powder x-ray diffractometer analysis for crystals .
19.	Derive an expression for specific heat of a solid at low, medium and high temperatures based on the Debye model.
20.	Elaborate the properties of a PN Junction semiconductor.
21.	Detail Curie's law and Weiss's Theory of Ferromagnetism.
22.	How does superconductivity works? Explain how a Type I superconductor differs from a Type II superconductor.

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