LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **PHYSICS**

FOURTH SEMESTER – **APRIL 2022**

PPH 4503 – SOLID STATE PHYSICS

Date: 20-06-2022 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART – A

Q. No. Answer **ALL** the questions **(10 x 2 = 20 Marks)**

1 Enumerate the types of symmetry operations.

2 Draw crystalline planes having miller indices (100) and (110).

3 State the reason for the existence of the energy gap.

4 When will an electron acquire a negative mass?

5 Define normal process.

6 Define Photon-phonon interaction.

7 State Hund's Rule.

8 Enumerate the susceptibility range for dia, para, ferro and antiferromagnetic materials.

9 State Meissner effect.

10 Define coherence length in superconductor.

PART – B

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

11 Explain the atomic scattering factor and structure factor in X-ray diffraction phenomena.

12 Explain the various zone schemes.

13 Describe the formation of P-type and N-type semiconductor.

14 Discuss the effect of magnetic field on Fermi surface.

15 Explain the Langevin's classical theory of diamagnetism.

16 Distinguish type I and II superconductors.

PART – C

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

17 Discuss the mathematical methods of various symmetry operations.

18 Explain the Kronig – Penny model of an electron in potential well.

19 Derive the expression for carrier concentration of Intrinsic semiconductor.

20	Discuss the thermal conductivity of solids and explain it due to electron and phonons.	
21	Based on the Weiss theory of ferromagnetism, obtain an expression for magnetization and illustrate its variations with temperature with necessary plots.	
22	Explain London's theory with London penetration length and coherence length.	

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