

KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(5 Pages)

Reg. No:

Question Code No : 25003302

Sub Code : 24PMPH32

PG Degree - End Semester Examinations, November 2025

Third Semester

M.Sc. PHYSICS

Condensed Matter Physics

(For those who joined in July 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

PART A – (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

1. Give an example of simple cubic crystal
(a) NaCl (b) As
(c) Sb (d) Cd
2. The value of Madelung constant for NaCl is
(a) 2.75 (b) 1.7
(c) 3.75 (d) 1.75
3. The mobility of electron in metal is given by

- (c) Parallel (d) All the above
9. Type I superconductors are classified as
- (a) Hard (b) Soft
- (c) Sometimes hard (d) Always hard
10. The cooper pairs are
- (a) Pair of two electrons (b) Pair of two protons
- (c) Pair of two photons (d) All the above

PART - B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

11. (a) What are miller indices? Explain with an example.

(OR)

- (b) List the properties of liquid crystal.

12. (a) What are Brillouin Zones?

(OR)

- (b) Describe about Umklapp process.

13. (a) Give the band theory of metals.

(OR)

- (b) Give the theory of free electron gas in three dimensions.

14. (a) Outline the quantum theory of paramagnetism.

(OR)

(b) Describe about phonons.

15. (a) Explain about Meissner effect.

(OR)

(b) Discuss about DC Josephson effect.

PART - C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 600 words.

16. (a) Define Bragg's law. Explain crystal diffraction.

(OR)

(b) Describe about atomic form factor.

17. (a) Discuss about phonon momentum.

(OR)

(b) Describe Debye's theory of lattice heat capacity.

18. (a) Discuss about Kronig-Penney model.

(OR)

(b) Describe the experimental method of Hall effect.

19. (a) Explain the adiabatic demagnetisation.

(OR)

(b) Give the theory of anti-ferromagnetism of materials.

20. (a) Derive an expression of London equation.

(OR)

(b) Explain about SQUIDS.