

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.

M.Sc.(Physics) - END SEMESTER EXAMINATIONS APRIL - 2023

SEMESTER - IV

20PPHCT4010 - Condensed Matter Physics

Total Duration : 2 Hrs. 30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. List down the various types of crystal lattices with examples.
2. Find out the atomic packing fraction of a FCC structure.
3. Describe on phase and group velocities.
4. Using band theory, distinguish the types of materials.
5. State Bloch theorem and describe its significance.
6. What are magnons? Describe on the thermal excitation of magnons.
7. Explain Meissner effect in superconductors.
8. Distinguish between type I and type II superconductors.

Section C

I - Answer any **TWO** questions ($2 \times 10 = 20$ Marks)

9. Derive the expression for van der Waals – London interaction and hence show that the interaction energy is inversely proportional to the 6th power of the distance between the dipoles.
10. Deduce the dispersion relation for vibrational modes in crystals with two atoms per lattice.
11. Explain the behaviour of an electron in a one dimensional periodic potential using Kronig – Penney model.
12. Discuss in detail the quantum theory of paramagnetism.

II - Compulsory question ($1 \times 10 = 10$ Marks)

13. Explain in detail the AC Josephson effect in superconductors.
