M.Sc. DEGREE EXAMINATION,NOVEMBER 2019
II Year IV Semester
Condensed Matter Physics

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What is the relation between atomic scattering factor and structure factor of a crystal?
2. What is a the use of a Madelung constant?
3. Give the sketches of the first Brillouin zones of bcc lattices.
4. Define Umklapp scattering.
5. State Bloch theorem.
6. Define Hall effect.
7. State Hund's rule
8. What are Magnons?
9. How do the properties of superconductor differ from those of normal conductors?
10. Why do superconductors expel magnetic fields?
11. What are symmetry operations?
12. Draw the variation of magnetic susceptibility with temperature for ferrimagnets.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Write down the properties of reciprocal lattices.
14. Write short notes on Phonon momentum.
15. Explain the significance of effective mass of the electron?
16. Explain the storage of magnetic energy by domain wall theory?
17. For a specimen of superconductor, the critical fields are 1.4 x 10^5 and 4.2 x 10^5 A/m at 14K and respectively.Calculate the transition temperature and critical fields at 0K and 4.2K.
18. What are Miller indices? How the orientation of a plane is specified by Miller indices?
19. What are the main characteristics of Fermi surface?

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Derive Laue equation for diffraction of x-rays by crystalline solid.
21. Derive an expression for the group velocity v_g as a function of 'k'.
22. Explain how does the Kronig - Penny model lead to the formation of energy band in solids?
23. Discuss the quantisation of electron orbits in a magnetic field.
24. Compare Type I and Type II superconductors.

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