

M.SC.(Physics) Semester - 2 (CBCS) Examination**April/May-2023 (NEW COURSE)****Solid State Physics****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

-
- Q.1** Answer in brief any **seven**: **14**
- (a) What is crystalline state?
 - (b) What are symmetries? Write three fundamental symmetries.
 - (c) Give classification of defects in solids.
 - (d) Draw temperature dependent resistance plots for metals and semiconductors.
 - (e) What is superconductivity? Give examples of superconductors.
 - (f) Write any four applications of superconductors.
 - (g) Draw the spin arrangement of different magnetic materials.
 - (h) What is the failure of classical theory of paramagnetism?
 - (i) What are Slater's criteria?
 - (j) Draw the magnon spin arrangement for ferromagnetic materials. Explain the magnons in ferromagnetic materials.
- Q.2** Answer any **two** of following questions: **14**
- (a) What do you mean by approximation? Write a note on tight binding approximation.
 - (b) Explain in detail the Kronig–Penney model.
 - (c) Discuss the Bloch theorem.
- Q.3** **07**
- (a) Write a note on symmetry in crystalline solids. **07**
 - (b) Discuss in detail about the three different experimental techniques for X–ray diffraction method. **07**
- OR**
- (a) Explain in detail Schottky defects in solids. **07**
 - (b) What are plane defects in solids? Discuss the Fick's laws of diffusion. **07**
- Q.4** Answer any **two** of following questions: **14**
- (a) Describe BCS theory for superconductors with its five outcomes.
 - (b) Discuss in brief (i) zero electrical resistance, (ii) persistent current, (iii) critical field, (iv) Meissner effect and (v) isotope effect in superconductors.
 - (c) Discuss the types of superconductors. Write a note on London equations for superconductivity.
- Q.5** Answer any **two** of following questions: **14**
- (a) Write a note on Langevin's theory of diamagnetism.
 - (b) What are different contributions to paramagnetic moments? Discuss each in detail.
 - (c) Explain in depth Weiss molecular field theory.
 - (d) Discuss in detail temperature dependence of saturation magnetization in ferromagnetic materials.
