



DBZ-1603010802020800 Seat No. _____

M. Sc. (Sem. II) Examination

July - 2022

Physics : CT-08

(Solid State Physics)

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) Attempt all questions.
(2) All questions carry equal marks.
(3) Mathematical symbols have equal meanings.

- 1** Answer in brief any **seven** : **14**
- (a) Define unit cell **02**
 - (b) Explain in brief miller indices. **02**
 - (c) Give the examples of miller indices which are present in the bcc structure. **02**
 - (d) Give examples of point defects in the solids. **02**
 - (e) Define Schottky defects in the solids. **02**
 - (f) What is critical temperature for superconductors ? **02**
 - (g) What is a Josephson junction ? **02**
 - (h) What are the values of susceptibility in diamagnetic and paramagnetic materials ? **02**
 - (i) Draw the spin arrangements in antiferromagnetic and ferrimagnetic materials. **02**
 - (j) What are the examples of ferromagnetic elements. **02**
- 2** Answer any two of following questions : **14**
- (a) Write a note on vacancy defects in solids. **07**
 - (b) Write a note on diffusion in solids with explanations for the two Fick's laws. **07**
 - (c) Write a note on Bloch theorem. Draw energy bands for different electronic materials. **07**

- 3 (a) Write a note on Langevin's theorem of diamagnetism. 07
(b) Write a note on Langevin's classical theory of paramagnetism. 07

OR

- 3 (a) Write the hypotheses for Weiss molecular field theory. 07
Write a note on it.
(b) Discuss the Heisenberg exchange integral and Slater's criteria. 07

- 4 Answer any **two** of following questions : 14
(a) Discuss in detail various symmetry elements. 07
(b) Explain in detail the three different diffraction methods. 07
(c) Explain in depth three experimental techniques for XRD experiment. 07

- 5 Answer any **two** of following : 14
(a) Discuss the types of superconductors. Write a note on London equations for superconductivity. 07
(b) Discuss in brief about : 07
(i) zero electrical resistance
(ii) critical field
(iii) Meissner effect and
(iv) isotope effect in superconductors.
(c) Explain in detail the BCS theory and its outcomes. 07
(d) What are the applications of superconductors. 07