



MCC-1603010802020800 Seat No. _____

M. Sc. (Sem. II) (CBCS) Examination

April / May - 2018

Physics : CT - 08

(Solid State Physics)

(New Course)

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) What are the range and sign of susceptibility (X) for various magnetic materials.? **2**
 - (b) List various magnetic contributions to the total magnetic moment of paramagnetic materials. **2**
 - (c) Draw the helical spin and canted antiferromagnetic spin arrangements. **2**
 - (d) Define the superconductivity. **2**
 - (e) What is the full form of SQUID? What is its use? Define polaron and magnon in solids. **2**
 - (g) Discuss in brief non-stoichiometry in solids. **2**
 - (h) Write the equations of Fick's laws of diffusion in solids. **2**
 - (i) What are crystalline and amorphous states of materials? **2**
 - (j) What is symmetry? **2**
- 2** Answer any **two** of following questions : **14**
- (a) Discuss the types of superconductors. Write a note on London equations for superconductivity. **7**
 - (b) Explain the BCS theory and its outcomes in detail. **7**
 - (c) Write the applications of superconductors. **7**

- 3** (a) Discuss the Langevin's classical theory of paramagnetism. **7**
- (b) Describe the paramagnetism in **7**
- (i) Rare earth ions and
- (ii) Iron group ions.

OR

- 3** (a) Describe the temperature dependence of saturation magnetization (M_s) for ferromagnetic materials. **7**
- (b) Discuss in detail the Heisenberg exchange integral and Slater's criteria. **7**
- 4** Answer any **two** of following questions : **14**
- (a) Write a note on symmetry elements. **7**
- (b) Discuss in detail the three experimental techniques for crystal structure determination. **7**
- (c) Explain scattering of X-rays and atomic scattering factor in detail. **7**
- 5** Answer any **two** of following questions: Write notes on : **14**
- (a) List various types of defects. Describe self interstitial defects in elemental solids. **7**
- (b) Write a note on Schottky defects in ionic crystals. **7**
- (c) Write a note on Kronig-Penney model. **7**
- (d) Describe the Bloch theorem. **7**