



NCF-1603010802020800 Seat No. _____

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

April / May - 2017

Physics : CT-08

(Solid State Physics)

(New Course)

Time : 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 Bravais and Non Bravais lattice. **2**
 - (b) Draw (211) and (111) planes in cubic crystal. **2**
 - (c) What are color centers? **2**
 - (d) Draw first Brillouin zone in simple cubic lattice? **2**
 - (e) Define phonon and polaron. **2**
 - (f) What is superconductivity? **2**
 - (g) Define penetration depth (λ) and coherence length (ξ) **2**
in superconductors.
 - (h) What are different contributions of permanent moment **2**
of atoms in paramagnetic materials?
 - (i) Explain in brief the relationship between the T_C and **2**
 λ for ferromagnetic materials.
 - (j) What are ferromagnetic magnons? **2**
- 2** Answer any **two** of following questions : **14**
- (a) Describe in detail the X-ray, neutron and electron **7**
diffraction techniques.
 - (b) Write a note on reciprocal lattice. Comment on its **7**
significance.
 - (c) Discuss in detail the atomic scattering factor and **7**
geometric structure factor.

- 3 (a) Write a note on Schottky defects in ionic crystals. 7
(b) Write notes on (i) Frenkel defects in solids and 7
(ii) diffusion process in solids.

OR

- (a) Describe in detail the Kronig-Penney model. 7
(b) Discuss in detail the effective mass. 7
- 4 Answer any two of following questions : 14
(a) Explain in brief : 7
(i) zero electrical resistance
(ii) persistent current
(iii) critical field
(iv) Meissner effect, and
(v) isotope effect in superconductors.
(b) What is BCS theory? Discuss its outcomes in detail. 7
(c) Discuss various applications of superconductors. 7
- 5 Answer any two of following questions : Write a note on : 14
(a) Write a note on Langevin's theory of diamagnetism. 7
(b) Write a note on Langevin's classical theory of 7
paramagnetism.
(c) Describe the paramagnetism in rare earth ions and 7
iron group ions.
(d) Write a note on Weiss molecular field theory. 7
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