Q.P. Code – 56923

Previous M.Sc. Degree Examination
OCTOBER/NOVEMBER 2014
(Directorate of Distance Education)
Physics
(DPA 530) Paper III – SOLID STATE PHYSICS

Time : 3 Hours]   *[Max. Marks : 75/85*

Instructions to Candidates :

1) Answer any **FIVE** questions from Parts **A, B** and **C** without omitting any Part.

2) Part **D** is **compulsory** for those who appear for paper with maximum marks 85.

PART – A

1. (a) Describe the seven system of crystals with suitable diagrams. **10**

   (b) Derive Bragg's law of X-ray diffraction in crystals. Discuss with the help of Ewald's sphere. **5**

2. (a) Describe Laue photograph. **7**

   (b) Explain metallic, ionic, valence and van der waal's type of bonding in crystals. **8**

3. (a) Discuss Langevin theory of Paramagnetism.

   (b) Write a note on Ferromagnetism. **9 + 6**

PART – B

4. (a) Explain qualitatively specific heat in super conducting stage. **7**

   (b) Outline the Sommerfeld's theory of electrical conductivity in metals. **8**

5. (a) Mention dielectric properties. **6**

   (b) Obtain Clausius-Mossotti relation. **9**

6. (a) Discuss the paramagnetism of free electrons. **6**

   (b) Explain thermal conductivity in metals. Discuss Wiedemann-Franz law and Hall effect. **9**

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PART – C

7.   (a)   List the properties of Bloch function.   **5**

     (b)   Explain the differences between metals, insulator and intrinsic semiconductors with examples.   **10**

8.   (a)   Explain line dislocation.   **5**

     (b)   Obtain an expression for the energy of a dislocation.   **10**

9.   (a)   Write a note on Crystal growth by solution and mention different types of crystal growth.   **5**

     (b)   Discuss the relative advantages and limitations of using X-ray and neutron diffraction in the study of crystal structure.   **10**

PART – D

10. Answer any **TWO** of the following :   **2 × 5 = 10**

     (a)   Find the reciprocal lattice of a bcc lattice.

     (b)   Derive Lorentz-Lorenz relation in dielectrics.

     (c)   Derive an expression for effective mass of hole and electrons.

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