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M.Sc. II Semester (CBCS) Degree Examination, September/October - 2022

PHYSICS

21PHY2C7L : Condensed Matter Physics

Time : 3 Hours | Maximum Marks : 70

Note : *Answer **any five** of the following questions with question no.**1** is **Compulsory**. Each question carries **equal** marks.*

1. (a) Explain in detail closed packed and loose packed crystal structures with an example. **10**

(b) What are point groups and space groups ? Explain. **4**

2. (a) Explain the powder X-ray diffraction method for the analysis of crystal structure. **10**

(b) Explain different bonding mechanisms in solids. **4**

3. (a) Obtain the expression for equilibrium concentration of Schottky defects at room temperature. **8**

(b) Obtain the dispersion relation for the lattice vibration for monoatomic solids. **6**

4. (a) Highlight the salient features of free electron theory of metals. **9**

(b) State and explain the Bloch theorem. **5**

5. (a) Explain the Hall effect in semiconductors. **5**

(b) Discuss the BCS theory of superconductivity. **6**

(c) List out the applications of Liquid crystals. **3**

6. (a) Calculate the Madelung constant for a one dimensional array in ionic crystals. **7**

(b) Obtain the expression for specific heat of solids as per the Debye's model. **7**

7. (a) Discuss the formation of energy bands in one-dimensional periodic solids based on Kronig-Penny model. **8**

(b) With neat diagrams explain the magnetic behavior of type I and type II superconductors. **6**

8. (a) Write a note on types of imperfections in crystals. **5**

(b) Discuss the principle and importance of neutron diffraction. **5**

(c) Write a note on Josephson effect. **4**

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