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PHS 556

IV Semester M.Sc. Degree Examination, Sept./Oct. 2022
PHYSICS
Condensed Matter Physics – IV
(CBCS)

Time : 3 Hours

Max. Marks : 70

Note : Answer **any four full** questions, choosing **one** from **each Part (I to IV)** and Part – V is **compulsory**.

PART – I

1. a) Give a brief account on classification of point defects in crystals. **5**
b) Using a pictorial representation, distinguish between Schottky and Frenkel defects. Obtain an equilibrium concentration for Frenkel defects. **10**
2. a) What are dislocations ? Explain edge and screw dislocations. **6**
b) Explain the terms : **9**
 - i) thermoluminescence
 - ii) electroluminescence.

PART – II

3. a) State the salient features of sputter deposition of thin films and distinguish between the DC and RF sputtering techniques. **10**
b) Give a brief account on spin coating of thin films. **5**
4. a) Explain any one of the methods of estimation of thin film thickness. **6**
b) Discuss the applications of thin films in optical and magnetic recording. **9**

PART – III

5. a) Discuss the thermodynamics of superconductivity. **9**
b) Explain the magnetic flux quantization in a superconducting ring. **6**

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6. a) Explain the theory of ac Josephson effect and show that how this can be utilized in a precision to determine the value of $\hbar/e$ **9**
b) Write a note on SQUIDS. **6**

PART – IV

7. a) Discuss the classification of polymers based on molecular forces. **7**
b) Distinguish between the number average and the weight average molecular weights in polymers. **8**
8. a) Explain with schematic the nematic, smectic and cholesteric liquid crystalline phases. **9**
b) Write a note on the applications of liquid crystals in displays. **6**

PART – V

9. Answer **any two** questions :
a) Give a brief account on polarons and excitons in ionic crystals. **5**
b) Explain the nucleation and growth mechanisms of thin films. **5**
c) Write a note on high T_c superconductor. **5**
d) Explain the process of condensation polymerization. **5**
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