2021
M.Sc.
Third Semester
DSE – 01
PHYSICS
Course Code: MPHD 3.11 (A)
(Condensed Matter Physics - II)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. Obtain an expression for the equilibrium concentration of Schottky defects at a given temperature in an ionic crystal. In a particular crystal the energy required to move an atom from the interior of the crystal to the surface is 1 eV. What is the proportional of vacancies present in the crystal at 1000 K and 300 K? 12+2=14
2. Explain interstitial defects. Discuss edge and screw dislocations with neat diagrams. 4+10=14

UNIT–II

3. Write a short note on BCS theory of superconductivity. Explain ac and dc Josephson's effect. A Josephson junction with a voltage difference of 650 μV radiates electromagnetic radiation. Calculate its frequency. 4+4+4+2=14
4. Explain type I and type II superconductors. How does a superconductor differ from a normal conductor? 12+2=14

UNIT–III

5. Compare the different properties of bulk and nano-materials. 14
6. Explain magnetic behaviour of nano-particle. 14

UNIT–IV

7. Write a detailed note on nucleation and growth of nano-materials. 14
8. Explain electrical properties of semiconductor thin films. 14

UNIT–V

9. Explain AFM analysis of NPs. What is the difference between SEM and TEM? 10+4=14
10. Explain sol-gel synthesis for producing nano-materials? Discuss spin coating method for deposition of nano-materials with neat sketch. 7+7=14
