

Exam. Code : 210404
Subject Code : 4887

M.Sc. Chemistry 4th Semester (Batch 2020-22)

CHEMISTRY OF MATERIALS

Paper : Course—XXV

Time Allowed—3 Hours] [Maximum Marks—75

Note :— Attempt *five* questions in all, selecting at least *one* question from each section. The *fifth* question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. Elaborate the differences between the following :
 - (a) Point and plane defects.
 - (b) Intrinsic and extrinsic semiconductors.
 - (c) Dehydration and decomposition reactions.
 - (d) Band and bond theories. 4,4,3,4
2. (a) Derive an expression for the energy required to create a Schottky defect.
(b) Enlist consequences of Frenkel defect. 12,3

SECTION—B

3. (a) Describe Osmometric method for determining the molecular mass of a polymer.

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(Contd.)

- (b) Outline the physical properties of solid polymer. 4
- (c) A suspension of one gram of hemoglobin in one litre of water has an osmotic pressure of 7.2×10^{-4} atm at 27°C . Estimate the molecular mass of hemoglobin ($R = 82$ cc-atm). 6,6,3
4. (a) Discuss the kinetics of chain polymerization.
- (b) Describe the factors that affect the conductivity of doped polymers.
- (c) What are polarons and bipolarons ? Explain.
- (d) What are the advantages of conducting polymers over the pure metallic conductors ? 6,4,3,2

SECTION—C

5. (a) Throw light on composition, properties and uses of silicate glasses.
- (b) Discuss the thermodynamics of glass formation. 9,6
6. Write notes on the following :
- (a) Refractories
- (b) Glass-ceramics
- (c) Metallic glasses. 3×5

SECTION—D

7. (a) Discuss sol-gel method for the preparation of smart materials. Also mention its merits over the conventional ceramic method.
- (b) Describe the role of perovskite structure and oxidation states of copper in superconductivity. 9,6
8. (a) Explain the difference between graphite, diamond and fullerene on the basis of their structure and properties.
- (b) Elaborate the role of nanomaterials in targeted drug delivery. 9,6