



ED-610

M.Sc. 3rd Semester
Examination, March-April 2021

CHEMISTRY

Paper - III

Catalysis, Solids State and Surface Chemistry

Time : Three Hours] [*Maximum Marks* : 80
[*Minimum Pass Marks* : 16

Note : Answer **all** questions. The figures in the right-hand margin indicate marks. Log table or non-programmable calculator can be used.

Unit-I

1. (a) Explain hard and soft acids and bases with any two examples of each. 6
(b) What is nucleofugacity? 2
(c) Explain specific acid catalysed and base catalyzed reaction with the help of any one example. 4

DRG_128_(4)

(Turn Over)

(2)

- (d) Derive Michaelis-Menten equation for studying the kinetics of enzyme catalysed reactions. 8

OR

- (a) Discuss the catalytic role of acid and base in the mutarotation of glucose. 6
- (b) What is nucleophilicity scale? 2
- (c) Explain Bronsted catalytic law. 4
- (d) find out the expression for acid-base dissociations. 4
- (e) What are enzyme catalysed reactions? Give any two enzyme catalysed reactions. 4

Unit-II

2. (a) What is surface active agents? Classify the surfactants with example of each. 10
- (b) What is CMC? Discuss the thermodynamics of micellization. 6
- (c) Write down Laplace equation and Kelvin equation. 4

OR

- (a) Explain the following in very brief: 3×5
- (i) Micelles
- (ii) Reverse micelles
- (iii) Micro emulsion

(3)

- (iv) Hydrophobic interaction
- (v) Mass action model
- (b) What is Surface energy ? Explain surface tension capillary action. 5

Unit-III

- 3. (a) Explain point defect, line and plane defects. 6
- (b) Write any four difference between Schottky defect and Frenkel defect. 4
- (c) Explain Band theory of semiconductors. 10

OR

- (a) Explain Non stoichiometry defects. 8
- (b) Discuss the thermodynamics of Schottky and Frenkel defect. 6
- (c) What are direct and indirect gap in semiconductors ? 6

Unit-IV

- 4. (a) Write notes on the following : 8
 - (i) Fire resistant polymers
 - (ii) Liquid crystal polymers
- (b) Discuss the viscosity method for determining the molar mass of polymer. Why this method is called relative method ? 8

(4)

- (c) Equal masses of polymer molecules with $M_1 = 10,000$ and $M_2 = 1,00,000$ are mixed. Calculate \overline{M}_n and \overline{M}_w ? 4

OR

- (a) Write note on electrically conducting polymers. 6
- (b) Find out the expressions related to calculation of average dimension of various chain structure. 8
- (c) What is osmometer? Explain any one osmometer used for determination of molar mass of polymer. 6