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

(*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

(*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

(*c*) Equal masses of polymer molecules with $M_1 = 10,000$ and $M_2 = 1,00,000$ are mixed. Calculate $\overline{Mn}$ and $\overline{Mw}$? 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