LJ-456

M.Sc. Chemistry

3rd Semester Examination, July-Dec., 2020

Paper - III

Catalysis, Solid 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.

Unit-I

1. (*a*) Derive the Michaelis-Menten equation. 10

(*b*) Write notes on the following : 5×2

(*i*) Protonation constant

(*ii*) The α-effect

OR

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(*a*) What are the specific and general acid-base catalysis ? Derive the rate equation for a general acid-catalyzed and specifically hydrogen ion catalysed reactions. 10

(*b*) Differentiate between nucleophilicity and basicity. 5

(*c*) Write a note on nucleofugacity. 5

Unit-II

2. (*a*) Derive Gibb's adsorption isotherm for adsorption from solution. To what extent it agree with experimental verification ? 10

(*b*) Define critical miscelle concentration. Describe the method of determination of critical micelle concentration. 5

(*c*) Explain the term 'Hydrophobic interaction'. 5

OR

(*a*) What are Micelles ? Describe micellization and explain its mechanism and thermodynamics. 10

(*b*) Derive Kelvin equation for vapour pressure of droplet of liquid. 5

(*c*) Write a note on Microemulsion. 5

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Unit-III

3. (*a*) What are point defects ? Discuss thermodynamics of Schottky defect in ionic solids. 10

(*b*) Write brief notes on the following : 5×2

(*i*) Line and plade defects

(*ii*) Non-stoichiometric defect

OR

(*a*) What are perfect and imperfect crystals ? Discuss intrinsic and extrinsic defects in crystalline soilds. 10

(*b*) What are the color centres ? Discuss origin and significance of color centres in studies of crystalline solids. 10

Unit-IV

4. (*a*) What are electrically conducting polymers ? Explain briefly on the following : 5+10

(*i*) Polyacetylene

(*ii*) Poly (para-phenylene)

(*b*) Discuss the chain configuration of macro-molecules 5

OR

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(*a*) What do you mean by chain configuration of macromolecules ? Describe the various calculations involved in determining average dimensions of chain structure. 10

(*b*) Write notes on the following : 5×2

(*i*) Liquid crystal polymer

(*ii*) Light scattering method of molecular mass determination

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