KJ-456

M.Sc. (Chemistry)
3rd Semester Examination, June, 2020

Paper - III

Catalysis, Solid State and Surface Chemistry

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer **all** questions. The figures in the right-hand margin indicate marks.

Unit-I

1. (*a*) Define acid-base catalysis. Discuss kinetics of general and specific acid-base catalysis with suitable examples. 10

(*b*) Discuss principle of hard and soft acid and bases. 6

(*c*) What is enzyme catalysis. 4

OR

(2)

(*a*) Why Hammett equation is called linear free energy relationship (LFER) ? Discuss application of Hammett acidity function in study of kinetics of chemical reactions.　　　　　10

(*b*) Discuss any two electronic and structural effects.　　　　　6

(*c*) What is bronsted catalysis ?　　　　　4

Unit-II

2. (*a*) Define critical micellar concentration (CMC). Discuss factors affecting the CMC of surfactants. How will you determine CMC of a surfactant by any one method ?　　　　　10

(*b*) Derive Kelvin equation for vapour pressure of droplets of liquid.　　　　　6

(*c*) Write a note on microemulsion.　　　　　4

OR

(*a*) Derive the equation :　　　　　10

$$I = -\frac{1}{RT}\left[\frac{dy}{d\ln c}\right]_T$$

(*b*) Explain thermodynamics of micellization.　　　　　6

(*c*) Write note on reverse micelles.　　　　　4

(3)

Unit-III

3. (*a*) Define crystal defects. Discuss Schottky defect and Frankel defect and also their thermodynamic aspects. 10

(*b*) What is intrinsic semiconductors ? 6

(*c*) Write note on perfect and imperfect crystals. 4

OR

(*a*) Explain molecular orbital theory or band theory of semiconductors. 10

(*b*) Describe n-type semiconductors. 6

(*c*) Write note on formation of colour centre. 4

Unit-IV

4. (*a*) Discuss kinetics of addition and condensation polymerisation. 10

(*b*) Explain, why weight average molecular mass is always greater than number average molar mass of a polymer. 6

(*c*) Write a note on kinetics of polymerisation. 4

OR

(*a*) How is the molecular mass of a polymer determined by light scattering and viscometry methods ? 10

(*b*) How can you suggest the mechanism of free radical polymerisation ? 6

(*c*) Write a note on fire resistant polymer. 4

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