SP-680

M.Sc. (Final) Examination, 2021

CHEMISTRY

Paper – IX (A)

(Group–C)

CH-507

(Recent Trends in Physical Chemistry)

Time : 1½ Hours]   [Maximum Marks : 75

Section–A   (Marks : 2 × 10 = 20)

Note :– Answer all *ten* questions (Answer limit 50 words). Each question carries 2 marks.

(खण्ड–अ)   (अंक : 2 10 = 20)

नोट :– सभी दस प्रश्नों के उत्तर दीजिए (उत्तर-सीमा 50 शब्द)। प्रत्येक प्रश्न 2 अंक का है

Section–B   (Marks : 5 × 5 = 25)

Note :– Answer all *five* questions. Each question has internal choice (Answer limit 200 words). Each question carries 5 marks.

(खण्ड–ब)   (अंक : 5 × 5 = 25)

नोट :– सभी पाँच प्रश्नों के उत्तर दीजिए। प्रत्येक प्रश्न में विकल्प का चयन कीजिए (उत्तर-सीमा 200 शब्द)। प्रत्येक प्रश्न 5 अंक का है।

Section–C   (Marks : 10 × 3 = 30)

Note :– Answer any *three* questions out of five. (Answer limit 500 words). Each question carries 10 marks.

(खण्ड–स)   (अंक : 10 × 3 = 30)

नोट :– पाँच में से किन्हीं तीन प्रश्नों के उत्तर दीजिए। (उत्तर-सीमा 500 शब्द)। प्रत्येक प्रश्न 10 अंक का है।

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Section-A

2 each

1. Attempt all questions. Answers should not exceed **50** words in each question.

    (i)   Define the Huckel Molecular Orbital (HMO).

    (ii)   What is solvents isotopic effect ? Explain with example.

    (iii)   Define the enthalpy and Gibbs' free energy with example.

    (iv)   What is LTD model ?

    (v)   What is steric LFER ?

    (vi)   Define the Nucleofugacity with example.

    (vii)   What is Bronsted catalysis ?

    (viii) What is dipole moments ?

    (ix)   What is Cluster expension ?

    (x)   Define the Monte-Carlo methods.

Section-B

5 each

2. Write short notes on the following :

    (i)   MO energy levels

    (ii)   Curve-crossing model

Or

What is Marcus theory ? Explain with example.

3. Write short notes on the following :

    (i)   Arrhenius equation

    (ii)   Inductive substitution constant

Or

Explain the solvents effects from the curve crossing model.

4. Write short notes on the following :

    (i)   Nucleophilic and Electrophilic catalysis

    (ii)   Hydrogen bond

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Or

Explain glass transition in super cooled liquids.

5. Write short notes on the following :

   (i)   Critical constants

   (ii) IBG and HNC equation

Or

Explain additivity of pair potential approximation.

6. Explain catalysis by non-covalent binding.

Or

Discuss Cohen-Trunbull free volume model.

Section–C   10 each

7. What is isotopic effect ? Explain primary and secondary kinetic effects.

8. Explain the various empirical index of solvation and use of solvation scales.

9. Write short notes on the following :

   (i)   Hydrophobic effects electrostatic induction

   (ii) Dispersion and resonance energy

10. Discuss the X-ray scattering spectroscopy techniques for structure studies of liquid ceramics.

11. Write short notes on the following :

    (i)   Configurational entropy model

    (ii) Macedolitovitz hybrid model