2054
B.E. (Biotechnology), Second Semester
ASC-X01: Applied Chemistry
(Common with CSE, IT & Civil)

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt **five** questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

1. (a) Write difference between conformational isomerism and configurational isomerism.

   (b) Why tetrahedral complexes form high spin complexes?

   (c) How third law can be deduced from the Nernst theorem?

   (d) What are catalytic promoter and catalytic inhibitors? Give example in each case.

   (e) How many modes of vibrations are IR active in CO_2 and H_2O?

   (5x2)

UNIT - I

2. (a) What is conformational analysis? Discuss the stability order of various cyclohexane conformations in detail.
   5

   (b) Describe the various methods to distinguish between cis- and trans-isomers.
   5

3. (a) Discuss crystal field splitting in the case of octahedral complexes.
   4

   (b) Explain the formation of inner-orbital and outer-orbital complexes on the basis of valence bond theory by taking suitable example.
   6

4. (a) Briefly explain the effect of solvent on λ_{max} for $\pi-\pi^*$ and $n-\pi^*$ electronic transitions.
   4

   (b) Calculate λ_{max} for the following compounds using Woodward-Fieser rules;
   4

   i)   ii)
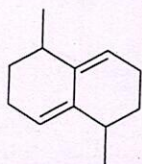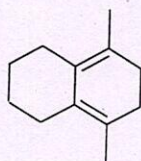
   (c) How symmetrical and unsymmetrical alkynes can be distinguished on the basis of infrared spectroscopy?
   2

P.T.O.

UNIT - II

5. (a) Calculate w, q and ΔE when 2 moles of an ideal gas expand reversibly and isothermally from 2 to 10 litres at $25^{\circ}C$. **3**

(b) Explain the working of Carnot's cycle. Derive an expression for the efficiency of a reversible heat engine working between temperatures T_1 and T_2 $(T_2 > T_1)$. **5**

(c) What is heat capacity? Prove that for a monoatomic gas $C_v = 3/2\ R$. **2**

6. (a) Discuss the mechanism of hydrogenation of alkenes using Wilkinson's catalyst. **5**

(b) Derive Michaelis-Menten's equation to study the rate of enzyme catalyzed reactions.

5

7. (a) Discuss the free radical mechanism for the polymerization of ethene. **5**

(b) Write the difference between chain-growth and step-growth polymerization. **2**

(c) A polymer mixture consists of 50 molecules of molecular weight 500 and 100 molecules of molecular weight 1000. Calculate number-average and weight-average molecular weight of the mixture. **3**

x-x-x