

2062

B.E. (Mechanical), Second Semester
 ASC-X01: Applied Chemistry
 (Common with ECE and EEE)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each section.

x-x-x

Question 1: Answer in brief:

1. What are the number of unpaired electron (s) in tetrahedral $[\text{Ni}(\text{CO})_4]$ complex?
2. How will you distinguish between 1- butyne and 2- butyne on the basis of IR spectroscopy?
3. ΔH and ΔS for the reaction,
 $\text{Br}_2(\text{l}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{BrCl}(\text{g})$ are 29.37kJ and 104.0JK^{-1} , respectively

Above what temperature will this reaction become spontaneous?

4. What is the functionality of $\text{CH}_2=\text{CH}-\text{CH}_2\text{OH}$ for condensation reaction with terephthalic acid?
5. State two conditions under which a catalyst loses its influence over a reaction.

(5x 2 = 10)

Section A

Question 2

- (a) What is Crystal Field Theory? How does it differ from Valence Bond Theory? (5)
- (b) Describe the bonding in $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Fe}(\text{CN})_6]^{3-}$ in terms of valence bond theory and crystal field theory. (5)

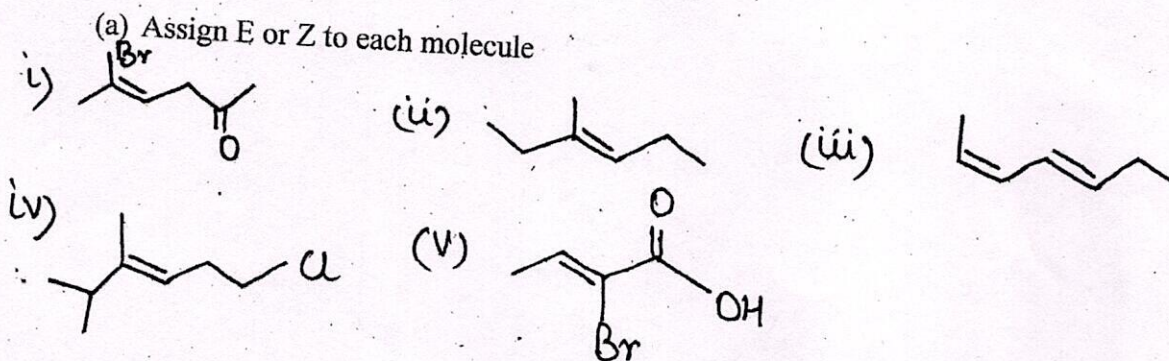
Question 3

- (a) A molecule with molecular weight 108 shows following bands in its IR Spectrum: 3300 cm^{-1} (broad peak), $3000-3100\text{ cm}^{-1}$, $2140-2180\text{ cm}^{-1}$, $1667-2000\text{ cm}^{-1}$ (four bands), 1208 cm^{-1} , 735 cm^{-1} , 697 cm^{-1} . Find its molecular structure. (5)

- (b) Ethyl acetate absorbs at 1735 cm^{-1} . At which wave number phenyl acetate is expected to absorb? Explain your answer. (5)

Question 4

(a) Assign E or Z to each molecule

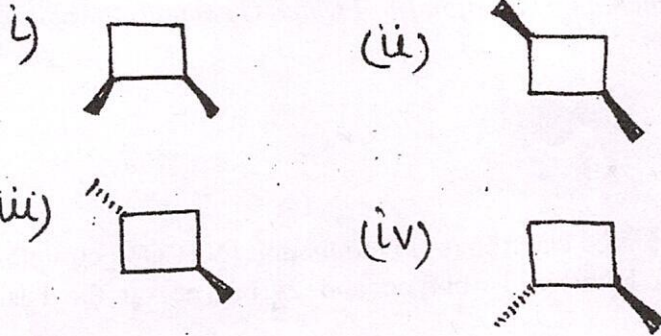


(5)

P.T.O.

(2)

(b) Among the following, determine the optically active compound:



(5)

Section B

Question 5

One kilogram water at 0°C is brought into contact with a heat reservoir at 100°C . Find

- (i) change in entropy when temperature reaches to 100°C
- (ii) change in entropy of reservoir
- (iii) change in entropy of universe
- (iv) the nature of process

Given : C_p of water = $18 \text{ Cal/g}^{\circ}\text{C}$

(10)

Question 6

Discuss the hydrogenation of alkenes using a homogeneous catalyst.

(10)

Question 7

- (a) Show the distribution of molar masses in a typical polymer sample.
- (b) Explain the properties and uses of following polymers

(5)

- (i) Epoxy resins
- (ii) Silicon resins

(5)