2123
B.E., First Semester
ASC-X01: Applied Chemistry
(Common with CSE, ECE, MEC, EEE, IT and 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 Part.

x-x-x

1. (a) Define fingerprint region in IR spectroscopy   [2]
    (b) What are the condition for molecules to be optically active   [2]
    (c) Write the chemical formula of the catalysts used for oxo and wacker's process. [2]
    (d) Discuss spectrochemical series.   [2]
    (e) State the measurements used to determine M_n and M_w for polymers [2]

PART-A

2. (a) Calculate the bond order and spin only magnetic moment of N_2, NO^+ with the help of MO diagram.   [3]

    (b) Discuss in details the crystal field splitting in case of square planar complex   [4]

    (c) Calculate the CFSE and predict the colour of $Cu(CN)_4^{2-}$, and $Ni(en)_3^{2+}$ (en = ethylenediamine)   [3]

3. (a) Identify the chiral centres for the following compound and assign R, S configuration by explaining the rotation   [4]


i)   ii)
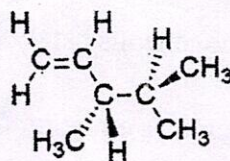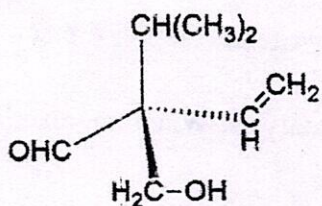
    (b) How the energy profile diagram during flipping of rings between to chair conformer of cyclohexane .   [6]

P.T.O.

4. (a) Increased conjugation accounts for higher wavelength in electronic spectroscopy. Explain with the help of molecular orbital diagram and Ψ function. [4]

(b) Discuss the selection rules of UV-Visible spectroscopy [2]

(c) Discuss the order in which the following will absorb for C=O stretching; justify your answer. [4]
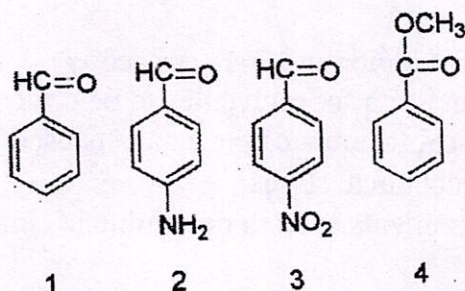
PART-B

5. (a) Two moles of an ideal mono-atomic gas at 25 °C expand reversible and adiabatically from a volume 5 to 10 dm^3. Calculate q, W, ΔE and ΔH ($C_v = 3/2\ R$) [3]

(b) Define entropy. Derive expressions of entropy change for an ideal gas with respect to pressure, volume and temperature. [5]

(c) Define reversible and irreversible process? [2]

6. (a) Explain how the homogeneous catalyst works and write the stepwise mechanism for oxo process. [5]

(b) Derive Michaelis-Menton's equation for enzyme catalysis. When the reaction rate is of firs order ? [5]

7. (a) Explain the mechanism of anionic and cationic Polymerization by giving suitable examples. [4]

(b) Discuss detailed synthesis and uses of polystyrene [3]

(c) A polymer sample consists of 10 % by weight of macromolecules of molecular weight 10,000 and 90 % by weight of macromolecules of molecular weight 1,00,000. calculate M_n and M_w. [3]

x-x-x