Exam.Code:0905
Sub. Code: 6650

1079

B.E. (Mechanical Engineering) First Semester
CH-101: Applied Chemistry
(Common with ECE and EEE)

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.*

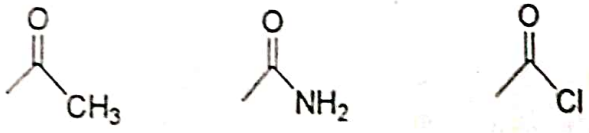
x-x-x

1. (a)Write the formula of the catalyst used in oxo and Monsanto acetic acid process. [2]
   (b) In IR spectroscopy why the region bellow 1500 cm^{-1} is called as fingerprint region ? [2]
   (c) Define β-transition temperature [2]
   (d) What are the disadvantages of valence bond theory [2]
   (e) Explain why the heat of neutralization of strong acid and strong base always higher than weak acid and weak base [2]

PART-A

2. (a) The heat of combustion of CH_4 (g) at constant volume is measured in a bomb calorimeter at 298 K and found to be -885.3 kj/mol. find the value of enthalpy change. (CH_4). [3].
   (b) Calculate the enthalpy of hydrogenation of ethylene given that the enthalpy of combustion of ethylene, hydrogen and ethane are - 1410.0, -286.2 and -1560.6 kj/mol at 298 K. [3]
   (c) Explain the working of Carnot cycle. How it is used to calculate the efficiency of an heat engine. [4]
3. (a) How Oxo process is different from Wacker process? write the stepwise mechanism for oxo process [5]
   (b) Derive Michaelis-Menton's equation for enzyme catalysis. When the reaction rate is of first order ? [5]

4. (a) Butadiene shows absorption at higher wavelength than ethylene. Explain with the help of molecular orbital diagram and Ψ function. [4]
   (b) On the basis of IR spectroscopy, how can you distinguish between the following:
   (i) Alkane, alkene and alkyne (ii) Aldehyde and ketone [4]
   (b) Which of the following will absorb at higher wave number for C=O stretching justify your answer. [2]



P.T.O.

5. (a) A polymer sample consists of 10 % by weight of macromolecules of molecular weight 10,000 an
90 % by weight of macromolecules of molecular weight 1,00,000. calculate Mn and Mw. [3]
b) Write the mechanism of cationic polymerization with examples. [3]
(c) Explain detailed synthesis, properties and uses of polyamides [4]

6. (a) Explain the electrochemical mechanism of rusting of iron in humid atmosphere [3]
(b) Discuss the construction and working of hydrogen-oxygen fuel cell [4]
(c) Discuss the factors affecting corrosion [3]

7. (a) Calculate the CFSE of the following compounds [6]
(i) $[Cu(NH_3)_4]^{2+}$, (ii)$[Co(en)_3]^{3+}$, (iii)$[Zn(Cl)_4]^{2+}$
(b) Briefly explain the crystal field splitting in (i) octahedral and (ii) square planar complexes [4]

x-x-x