1129
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 Unit.*

x-x-x

I.   Answer the following:-

a) Explain the factors that can affect the crystallinity of polymers.

b) State the disadvantages of crystal field theory

c) What is differential aeration corrosion

d) Write the difference between auxochrome and chromophore with examples

e) Give two definitions of second law of thermodynamics   (5x2)

UNIT – I

II.   a) The molar heat capacities at constant pressure of H_2 (g), Cl_2(g) and HCl (g) are 29.3,34.7 and 28.9 JK-1 respectively. If the heat of formation of HCl (g) at constant pressure at 293 K is -91.2 KJ, what will be its heat of formation at 315 K?

b) Calculate the enthalpy of formation of methane given that the enthalpy of combustion of methane, graphite and hydrogen are -890.2, -393.4 and 285.7 kj/mol at 298 K.

c) Derive Gibbs-Helmholtz equation.   (3,3,4)

III.   a) What is wacker process ? Explain its stepwise mechanism for the catalytic cycle

b) Derive Michaelis-Menton's equation for enzyme catalysis. When the reaction rate is of first order ?   (2x5)

IV.   a) Discuss the effect of the solvent on $\pi - \pi^*$ and $n-\pi^*$ transition.

b) Calculate the number of vibrational degrees of freedom in following compounds:
(i) SO_2 (ii) NH_3 (iii) CH_4

c) Calculate the λ_{max} for the following compounds

(3,3,4)
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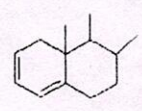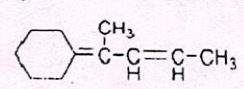
UNIT – II

V.   a).write the difference between thermoset and thermoplastic

b) Explain the mechanism of Zeigler Natta Polymerization.

c) Explain detailed synthesis, properties and uses of epoxy resins.   (3,3,4)

VI.   a) write the difference between pitting and waterline corrosion

b) Discuss the construction and working of methanol-oxygen fuel cell

c) Discuss the prevention measures for the corrosion   (3,4,3)

VII.   a) Predict the color and spin-only Magnetic Moment for $[Co(Cl)_4]^{2-}$ and $[Co(CN)_6]^{3-}$

b) Briefly explain the crystal field splitting in (i) tetrahefral and (ii) square planar complexes.

c) Calculate the CFSE of the following compounds   (4,4,2)

    i) $[Fe(H_2O)_6]^{2+}$ ii) $[Ni(CN)_4]^{2+}$

x-x-x