

Exam.Code:0905  
Sub. Code: 6650

1129  
B.E. (Mechanical Engineering)  
First Semester  
CH-101: Applied Chemistry  
(Common with ECE and EEE)

Time allowed: 3 Hours

Max. Marks: 50

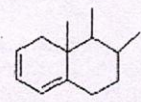
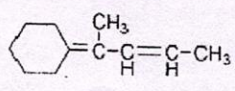
NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

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<sub>2</sub> (g), Cl<sub>2</sub>(g) and HCl (g) are 29.3,34.7 and 28.9 JK<sup>-1</sup> 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 π - π\* and n-π\* transition.  
 b) Calculate the number of vibrational degrees of freedom in following compounds:  
 (i) SO<sub>2</sub> (ii) NH<sub>3</sub> (iii) CH<sub>4</sub>  
 c) Calculate the λ<sub>max</sub> for the following compounds



(3,3,4)  
P.T.O.



(2)

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  $[\text{Co}(\text{Cl})_4]^{2-}$  and  $[\text{Co}(\text{CN})_6]^{3-}$   
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)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  ii)  $[\text{Ni}(\text{CN})_4]^{2+}$

x-x-x