Exam.Code:0905
Sub. Code: 6186

2023

B.E., First Semester

CH-101: Applied Chemistry

(Common with ECE & 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) How polymers are classified on the basis of number of monomers present in a polymer?

   (b) Why aniline absorbs at lower wavelength in acidic solution?

   (c) Define the terms hot bands and fermi resonance in the context of Infrared Spectroscopy.

   (d) Why tetrahedral complexes always form high spin complexes?

   (e) What is galvanic corrosion? **2 x 5 = 10**

PART-A

2. (a) Derive expressions for w, q, ΔE and ΔH when an ideal gas undergoes: i) isothermal reversible expansion ii) isothermal irreversible expansion. **5**

   (b) Define efficiency of an engine. Calculate the maximum efficiency of a steam engine operating between 110°C and 25°C. **2**

   (c) Define Hess's Law. What are its applications? **3**

3. (a) Explain the mechanism of Monsanto process to synthesize acetic acid. **5**

   (b) Derive Michaelis-Menton's equation to study the rate of enzyme catalyzed reactions. **5**

4. (a) What are fuel cells? Describe the construction and working of hydrogen-oxygen fuel cell. **5**

   (b) Explain the various methods to protect the metals from corrosion. **5**

P.T.O.

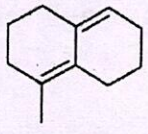
PART - B

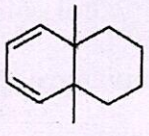
5. (a). Calculate the number average and weight average molecular mass of a given sample of polyvinylchloride having 100 molecules molecular weight 100, 200 molecules of molecular weight 1000 and 300 molecules of molecular weight 10,000. **5**

(b) Give the cationic mechanism for the polymerization of styrene. **5**

6. (a) Trans-1-phenyl-1,3-butadiene has λ_{max} = 280 nm (ε = 27,000). Calculate the concentration of a solution that has A = 0.643 at 280 nm in a 1 cm cell. **3**

(b) Calculate λ_{max} for the following compounds:

(i) 

(ii) 

4

(c) How polar solvents affect the λ_{max} value for a) n-π^* b) π-π^* transitions? **3**

7. (a) Calculate the crystal field stabilization energy in following complexes:
(i) $[Co(CN)_6]^{3-}$ (ii) $[FeCl_4]^{2-}$ iii) $[Mn(H_2O)_6]^{2+}$ **6**

(b) Explain crystal field splitting when the metal is placed in a square planar field. **4**

x-x-x