

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	1 / 1	Time	3 hrs.

Subject: - Engineering Chemistry (SH403)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

- What is buffer solution? Calculate the pH of 500 cc of 0.2 M CH_3COOH solution when 2 g of sodium acetate is added. [K_a for CH_3COOH is 1.8×10^{-4}] [1+4]
- What is Daniell cell? Answer the following question using equation (a) and (b) [1+4]
 - $\text{Fe}^{2+} (0.2\text{M}) = \text{Fe}^{3+} + e^- (0.1\text{M}), E^0 = -0.77\text{V}$, (b) $\text{Cu} (0.3\text{M}) - 2e^- = \text{Cu}^{2+}, E^0 = -0.34\text{V}$
 - net cell reaction (ii) spontaneity of redox reaction (iii) cell notation (iv) emf of cell
- What are catalytic promoter and catalytic poison? Explain their activity on the basis of adsorption theory of catalysis. [2+3]
- What are chlorofluorocarbons? Explain their photolytic reactions in the upper atmosphere [3]
 - Discuss about the air pollution caused by oxide of nonmetals? [2]
- What are the major water pollutants? Point out their adverse effect and the possible measures to control water pollution. [1+2+2]
- Write the preparation and uses of Teflon and epoxy resin. What are conducting polymers? Point out their applications in engineering field. [3+1+1]
- Give preparation and uses of the nonmetallic super conductor. [3+2]
 - Write down the main characteristic of inorganic polymers.
- Give an account for the followings:
 - Transition metals are well known to form complexes. [2]
 - Copper (I) compounds are white and diamagnetic where as copper (II) compounds are colored and paramagnetic. [2]
 - Zinc is nontypical transition metal. [1]
- Explain the variable oxidation states of transition elements. Which divalent metal has maximum paramagnetic character among the first transition metals? [2.5+1+1.5]
 - A transition metal forms alloys with other transition metals easily. Why? Explain.
- Explain how the two complexes of Ni, $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]^0$ have different structures but do not differ in their magnetic behavior (Ni = 28). [5]
- Write the IUPAC name of the following compounds/ions [2+1+2]
 - $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$
 - $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$
 - $[\text{Cr}(\text{en})_2\text{Cl}_2]^+$
 - $\text{NH}_4[\text{Cr}(\text{H}_2\text{O})_2(\text{NCS})_4]$
 - What is complex compound? What do you understand by principal and auxiliary valency of the central ion in complex compound? Illustrate them in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$.