

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / I	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 salt bridge? Write its functions. Write electrode reaction, net cell reaction, EMF of the cell at 25°C and cell notation of the following electrode couple and also predict the spontaneity of the cell reaction. [1+1+3]  
 $E^\circ \text{Fe}/\text{Fe}^{++} = 0.44\text{V}, \quad E^\circ \text{Ag}/\text{Ag}^+ = -0.80\text{V}$   
 $[\text{Fe}^{++}] = 0.01\text{M}, \quad [\text{Ag}^+] = 0.1\text{M}$
- What is buffer capacity? Write the characteristics of buffer solution. 200 ml of 0.1M  $\text{C}_6\text{H}_5\text{COONa}$  is mixed with 400 ml of 0.2 M  $\text{C}_6\text{H}_5\text{COOH}$  at 30°C dilute solution. Calculate the pH of solution. [1+2+2]
- Explain the terms: (a) Acetocatalyst (b) Catalytic poisoning and (c) Promoters. [2+3]
- Explain the mechanism of ozone layer depletion. Write its preventive measures and secondary pollution effects in troposphere. [2+1.5+1.5]
- Define soil pollution. Write the major sources of soil pollution, their negative effects and control measures. [1+2+2]
- Write short notes on: [2.5×2]
  - Polyphosphazene
  - Chalcogenide glasses
- Give an account for biodegradable and non biodegradable polymer with suitable example.
  - What are fibers reinforced plastics? Write down the characteristics and its application. [2.5+2.5]
- What are transition elements? How do they show: (i) catalytic behaviour (ii) coloured ions and (iii) variable oxidation states? [0.5+1.5+1.5+1.5]
- Explain the formation of  $[\text{NiCl}_4]^{2-}$  and  $[\text{Ni}(\text{CN})_4]^{2-}$  on the basis of VBT of coordination compounds. [2.5×2]
- Write the formula of the following IUPAC name: [2]
    - Potassium penta cyano nitrosyl ferate (III)
    - Pentaammine chloro cobalt (III) ion
    - Tetracarbonyl cobalt (O)
    - Pentamminenitrito cobalt (III) sulphate
  - " $[\text{Fe}(\text{CN})_6]^{4-}$  is diamagnetic but  $[\text{Fe}(\text{CN})_6]^{3-}$  is paramagnetic" justify. [1.5+1.5]

11. What are lubricants? What are the characters of good lubricants? What is emulsion paint? Write its applications? [1+2+1+1]
12. Define explosive. How it is used for defense purpose? What are the uses of TNT, TNG and cellulose nitrate? [1+1+1+1+1]
13. What are geometrical isomers? Geometrical isomer is not possible in the compound  $\text{CH}_3\text{CH}=\text{CH}_2$  explain. Why are trans isomers more stable than cis-isomers? [1+2+2]
14. What is a nucleophilic substitution reaction? Differentiate between  $\text{SN}^2$  and  $\text{SN}^1$  reactions. Write the factors affecting  $\text{SN}^2$  and  $\text{SN}^1$  reactions. [1+2+2]
15. Explain reaction mechanism for dehydrohalogenation of tertiary butyl bromide. What solvent favours the reaction mechanism? [4+1]
16. Write ground state electronic configuration of 3d transition series. How do you explain the formation of complexes by 3d transition elements? [2+3]

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