

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE, BCH	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

**Subject: - Engineering Chemistry (SH 403)**

- ✓ 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 single electrode potential? How is it originated? Illustrate it with zinc electrode.  
What is the emf of the following cell at 25°C?  
 $\text{Zn(s)}/\text{Zn}^{++}(0.2\text{M}) \parallel \text{Ag}^+(0.002\text{M})/\text{Ag(s)}$ . The standard emf of the cell is 1.54V. [1+2+2]
- Derive Henderson's equation for basic buffer. The pH of a buffer solution containing 0.1 M  $\text{CH}_3\text{COOH}$  and 0.1 M  $\text{CH}_3\text{COONa}$  is 4.74. If 0.05 mole of HCl is added to one litre of this buffer solution. What will be the pH? ( $K_a$  of  $\text{CH}_3\text{COOH} = 1.8 \times 10^{-5}$ ). [2+3]
- Write about the different types of catalysts. Explain the adsorption theory of Catalysis using suitable example. [2+3]
- How can a constant layer of ozone be naturally maintained in the stratosphere? Why is ozone layer indispensable for the existence of living beings? Explain how the use of chlorofluorocarbon has caused the depletion of ozone layer. [1+1+3]
- What are water pollutants? Write the major sources, effects and remedies of water pollution. [1+4]
- Distinguish between organic and inorganic polymer. Write the preparation and uses of Polymeric Sulphur  $(\text{PS})_n$  and Polythiazyl. [2+3]
- What is FRP? Write down the preparation and uses of Teflon and Nylon 6,6. [1+2+2]
- What are transition elements? Explain the colour formation and variable oxidation states of transition elements. [1+2+2]
- Explain. Why (i)  $\text{TiO}_2$  is colorless but  $\text{TiCl}_3$  is not. (ii)  $\text{Cu}^+$  is diamagnetic whereas  $\text{Cu}^{++}$  is paramagnetic. [2.5+2.5]
- How does double salt differ from complex salt? Draw the structure of  $\text{K}_4[\text{Fe}(\text{CN})_6]$  using Werner's postulates. Write the IUPAC name of the following:  
i)  $[\text{Ni}(\text{CN})_4]^{2-}$  (ii)  $\text{K}_2[\text{ZnCl}_4]$  (iii)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  (iv)  $\text{Na}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$  [2+1+2]
- Define complex compound. Explain the formation of  $[\text{Ni}(\text{CO})_4]$  and  $[\text{Fe}(\text{CN})_6]^{3-}$  on the basis of VBT. Also mention the magnetic property and geometry. [1+2+2]
- What low explosive? Write the preparation and important uses of the explosives obtained from toluene and glycerol. [1+2+2]
- a) List out the functions of lubricants. Explain solid lubricant with examples.  
b) What are the requisites of a good paint? [2+1+2]
- a) What isomerism is shown by butenedioic acid and why?  
b) Distinguish between enantiomers and diastereoisomers with a suitable examples. [2+3]
- Explain the reaction mechanism of hydrolysis of tert-butyl bromide. How does  $\text{SN}_1$  differ from  $\text{SN}_2$  reaction? [3+2]
- Explain the saytzeff's rule with an example. Write the reaction mechanism of dehydrohalogenation of tertiary alkyl halide. [2+3]