INSTITUTE OF ENGINEERING

Examination Control Division

2070 Ashad

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.*

1. What is buffer and buffer capacity? To 100 ml of 0.1 M acetic acid, 0.1 gm of sodium hydroxide is added. Find the pH of the resulting solution. (pk_a for acetic acid is 4.74) [2+3]
2. How does a galvanic cell differ from an electrolytic cell? Calculate the EMF of the cell: Zn/Zn^{++} (0.001M) / / Ag^{+} (0.1M) / Ag. The standard potential of Ag/Ag^{+} half cell is 0.080 V and Zn/Zn^{++} is - 0.76 V [2+3]
3. a) What are promoters? Mention the action of promoters. [1+1]
   b) Describe the adsorption theory of catalysis with a suitable example. [3]
4. a) Write down the sources and defects of sulphur oxides. [3]
   b) Explain the causes and effects of ozone layer depletion. [2]
5. What are the major water pollutants and their harmful effect? Mention the possible measures to control water pollution. [3+2]
6. Write short notes on (i) Sulphur based polymers (ii) Chalcogenide glass. [3+2]
7. a) Give preparation and uses of Nylon.6,6 and polyurethane. [4]
   b) What are engineering applications of conducting polymer? [1]
8. a) Write the important characteristics of transition elements. [2.5]
   b) Explain the magnetic properties of the transition elements. [2.5]
9. Explain the following: [2.5+2.5]
   a) Complexes of transition elements are generally coloured.
   b) Most of the transition elements are paramagnetic.
10. What are primary and secondary valencies of metal? Explain the structure of $K_4[Fe(CN)]_6$ on the basis of Werner's theory. [2+3]
11. a) With the valence bond concept, explain the geometry and magnetic character of the complex $[Ni(CO)_4]$. Write down one of the limitations of valence bond theory. [2+1]
    b) Write the IUPAC name of the following co-ordination compounds. [2]
       i) $K_2[PtF_6]$
       ii) $K_3[Al(C_2O_4)_3]$
       iii) $[Co(NH_3)_5SO_4]Br$
       iv) $[Pt(NH_3)_4Cl_2]SO_4$
12. Explain the reaction mechanism for the hydrolysis of tertiary butyl bromide by aqueous NaOH. Differentiate between SN^1 and SN^2 mechanism. [3+2]
13. a) How do enantiomers differs with diasteoisomers? Illustrate with an example. [1+2]
    b) What isomerism is shown by 2-bromo 1-chloropropene? Mention Z and E notation for the compound. [2]
14. What are secondary explosives? Give preparation and properties and uses of GTN and TNT. [2+3]
15. What do you mean by Elimination reactions? Explain the reation mechanism for the reaction between primary alkyl halide and alcoholic NaOH. [2+3]
16. a) What are lubricating oils? Indicate their importance. [1+2]
    b) Show your familiarity with types of paints. [2]