03 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Ashwin

Exam.	Back		
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 meant by Normal Hydrogen Electrode? Discuss its use to measure standard electrode potential of copper electrode. Calculate Emf of the following cell at 20°C.

   $Al(s) / Al^{+3}(0.2M) // Cu^{+2}(0.1M) / Cu(s)$
   Given: $E^0_{Al/Al^{+3}} = +1.66V$ and $E^0_{Cu/Cu^{+2}} = -0.34$ V [1+1.5+2.5]

2. What is meant by 'buffer solution' and buffer action? A litre of solution containing 0.5 mole of CH_3COOH and 0.5 mole of CH_3COONa provides a buffer of pH 4.74. Calculate the pH of solution after the addition of 0.02 mole NaOH [$K_a = 1.8\times10^{-5}$] [2+3]

3. Define Heterogenous catalysis. What are the general characteristics of a catalyst? Explain adsorption theory of catalysis. [1+2+2]

4. Write short notes on: [2.5+2.5]

   a) Global warming b) Acid Rain

5. What is soil pollution? Point out major soil pollutants, their effects and possible remedies? [1+4]

6. a) Why do the transition elements form complexes? [2.5]

   b) Why do the transition metals exhibit variable valency? [2.5]

7. a) What are transition elements? Which of the d-block elements are not considered as typical elements and why? [1+2]

   b) Write the electronic configuration and group of the following elements Cr, Fe, Cu and Zn. [2]

8. $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$, both are octahedral complexes. Explain the difference between these two complexes on the basis of VBT. [5]

9. a) How do you distinct a double salt from a complex salt?

   b) Write the IUPAC names of the following co-ordination compounds.

   (i) $[Co(H_2O)_2(OH)_4]^-$ (ii) $[Ni(CN)_4]^{2-}$

   (iii) $K_3[Al(C_2O_4)_3]$ (vi) $[Cu(NH_3)_4]SO_4$ [3+2]

10. Define the following terms with example. [1×5]

    a) pigment b) thinner c) solid lubricant d) varnishes e) lacquers

11. Write the differences between organic and inorganic polymers. Write the preparation and applications of polyphosphazines. [2+3]

12. Write the method of preparation and two important uses of Bakelite and polyurethane. [2.5+2.5]

13. Write preparation and two important uses of

a) TNT b) TNG [2.5+2.5]

14. How do enantiomers differ from diasteromers? Write all the possible stereoisomers of a compound that contain two asymmetric carbon atoms. [3+2]

15. What is - elimination reaction? Explain the reaction mechanism for the dehydrohalogenation of primary alkyl halide. [1+4]

16. What are the factors affecting S_N^1 and S_N^2 reactions. Explain SN^2 reaction mechanism with reference to hydrolysis of alkyl halide. [2.5+2.5]

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