TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Chaitra

Exam.	Regular		
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.*

1. What is normal hydrogen electrode? How do you measure standard reduction potential of zinc electrode? Calculate the emf of the cell at 25°C, $Ni/Ni^{++}(0.8M)$ // $Ag^{+}(0.2M)$ / Ag
   Given, E° Ni/Ni^{++} = +0.25V, E° Ag/Ag^{+} = -0.80V. [1+1+3]
2. Explain the mechanism of basic buffer. Calculate the PH of the resulting buffer solution containing 100ml of 0.5M NH_4OH and 40ml if 1 M NH_4Cl in which 20cc of 0.5HCl is added. [2+3]
3. What is catalyst promoters? How does a catalyst increase the speed of reaction? Explain with example. Explain intermediate compound formulation theory of catalysis. [1+2+2]
4. What are the main sources of water pollution? Mention the measures to control water pollution. [2+3]
5. What is meant by ozone depletion? Write consequences of global warming and its possible remedies. [2+3]
6. What are biodegradable polymers? Write down the preparation and uses of Bakelite and Epoxy resin. [1+2+2]
7. What are polyphorphazenes? How are different types of polyphorphorzenes prepared? Mention the applications of polythiazyl in engineering field. [1+3+1]
8. Variable oxidation state is the main characteristics of transition elements, explain with reference to 3d series. [5]
9. Explain the followings.
   i) Mn^{+2} is more paramagetic than Cu^{+2}.
   ii) Zn^{+2} compounds are white while Fe^{+2} compounds are colored.
   iii) Transition elements from alloys. [2+2+1]
10. a) Differentiate between double and complex salts. Predict the magnetic properties of $[Co(NH_3)_6]Cl_3$ with the help of EAN. [2+1]
    b) Write the IUPAC name of the followings: [2]
    (i) $Na_3[Al(C_2O_4)_3]$
    (ii) $[C_o(NH_3)_4Cl_2]Cl$
    (iii) $[Cr(NH_3)_6]^{3+}$
    (iv) $[Zn(OH)_4]^{2+}$
11. With the help of VBT approach, point out the differences between $[Fe(CN)_6]^{4-}$ and $[FeF_6]^{3-}$ complex ions. [2.5×2]
12. a) Show your acquaintance with liquid and semi liquid lubricants. [2.5]
    b) What do you understand by paints? Mention the requisites of a good paint. [2.5]
13. What isomerism is shown by tartaric acid and why? Write the possible forms of tartaric acid and mention enantiomers and mesocompound. [5]
14. What is SN reaction? Explain the reaction mechanism of hydrolysis of tertiary alkyl halide by aqueous NaOH. [1+4]
15. Describe the mechanism of E^1 reaction with suitable example. Give an account of Sayteff's rule. [4+1]
16. What are primary and low explosives? Write the preparation and uses of TNT and TNG. [5]

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