03 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Ashad

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE, BME	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 meant by buffer capacity? A chemist desires to prepare one liter of a solution buffered at pH 9.00. How many grams of ammonium chloride have to be added to one liter of 0.20M NH_3 to make such buffer. pKa value of ammonia is 4.75 [1+4]
2. How does an electrolytic cell differ from a galvanic cell? Calculate the emf of the cell. [2+3]
   $Zn/Zn^{2+}(0.001M)//Ag^{+}(0.1M)/Ag$. The standard potential of Ag/Ag^{+} half cell is +0.80V and Zn/Zn^{2+} is –0.76V
3. Explain the terms: (a) Heterogeneous catalysis (b) Catalytic poisoning and promoters. [2+3]
4. What is meant by ozone depletion? Mention its causes and consequences. [2+3]
5. What are the major water pollutants and their harmful effects? Mention the possible measures to control water pollution. [3+2]
6. Write short notes on: (a) Polyphosphazines (b) Chalcogenide glasses. [2.5×2]
7. a) Give an account for the biodegradable and non-biodegradable polymers with suitable examples. [2.5×2]
   b) What are fiber-reinforced plastics? Write down the applications.
8. What are transsition elements? Point out the applications of these elements and their complexes. [5]
9. Compare ionisation potential and oxidation state of transition elements with representative elements. What is the effect of lanthanide contraction in properties of transition elements? Explain how colour is originated in transition metal complexes. [1+1+1+2]
10. Write assumptions of valence bond theory of complexes. Explain formation of spin paired complex on the basis of this theory. Mention its magnetic behaviour. [2+2+1]
11. What is a Chelate complex? Show Werner's representation and IUPAC name of the following complexes. (a) $[Cu(NH_3)_4]SO_4$ (b) $K[PtCl_5(NH_3)]$ [1+2+2]
12. Give an account of low and high explosives. Write the preparation and uses of TNa. [3+2]
13. a) Show your acquaintance with lubricants? Under what situations greases are used? [3+2]
    b) What do you understand by paints? Mention the requisites of a good paint.
14. a) What isomerism is shown by butenedioic acid and why? [2+3]
    b) Define enantiomers with examples. Differentiate between racemic mixture and meso-compound.
15. Explain the reaction mechanism for the hydrolysis of 3° alkyl halide by aqueous NaOH. What solvent favours the reaction mechanism? [4+1]
16. What do you mean by Elimination reactions? Explain the reaction mechanism for the dehydrohalogenation of tertiary alkyl halide. [2+3]

***