

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

Subject: - Engineering Chemistry

- ✓ 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. How does electrode potential originate? Define standard electrode potential? Write the cell notation, and cell reaction for Zn-Cu cell. [2+1+2] 2
What is buffer solution? Calculate the pH of resulting solution when 0.005 mole of KOH is added to 200 ml of 0.1N acetic acid solution. ($pK_a = 4.74$). [1+4] 2
3. What is meant by homogeneous catalysis? Describe the intermediate compound formation theory of catalysis with a suitable example. List the criteria for choosing a catalyst for industrial application. [1+3+1] 4
4. a) What are chlorofluorocarbons? Give their photolytic reactions in the upper atmosphere. [3]
b) Why oxides of sulphur and nitrogen are assumed as air pollutants? [2] 2
5. Point out four major pollutants of water, their adverse effect on human health and also mention their possible remedies. [2+1+2] 3
6. Describe the preparation and uses of polyphosphazenes and polymeric sulphur (PS)_n. [5]
7. What are double and complex salts? Write the formulae of the following co-ordination compounds. [2+3] 3
 - a) Dibromotetraaquo chromium (III) chloride
 - b) Potassium hexacyanocobaltate (II)
 - c) Tetrabromocuprate (II)
 - d) Tetraamminedichlorocobalt (III)
 - e) Hexacyanoferrate (III) ion
 - f) Sodium trioxalato aluminate (III)
8. a) What are principal and auxiliary valencies of the metal ion in the complex compound? Illustrate them in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$. [2]
b) Show your familiarity with electronic interpretation of complexes. [3]
Explain the followings: [3+2] 4
 - a) Transition elements are good in forming complexes
 - b) Show your acquaintance with application of 3-d transition elements.
10. What are transition elements? Explain the following features of transition elements; [1+2+2] 3
 - a) Variable oxidation state
 - b) Magnetic properties

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11. Define explosives? Give the preparation, properties and uses of trinitrotoluene (TNT).
What are plastic explosives?

[1+3+1] 4

12. Define lubricants and mention their functions. Name different types of liquid lubricants with examples. Show your familiarity with types of paint.

[2+1+2] 2

13. a) What are geometrical isomers? Draw the structure of 2-Chloro-3-methylpent-2-ene and specify Z and E configuration.

[1+1]

b) Illustrate enantiomerism with an example. Mention a typical organic molecule which exhibits distereomerism.

[1+2]

14. Describe the mechanism involved in the reaction between a tertiary alkyl halide and aqueous caustic potash. How does S_N2 reaction differ from S_N1 in its stereochemistry?

[4+1]

15. a) Write the mechanism of bimolecular elimination reaction.

[2]

b) Mention the effect of nucleophile, substrate and solvent on nucleophilic substitution reaction mechanisms.

[3]

16. What are bio-degradable and nonbiodegradable polymers? Mention the uses of epoxy resin and fibre reinforced polymer.

[2+3]

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