BCE

03 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2068 Baishakh

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. What is galvanic cell? Write electrode reaction, net cell reaction, EMF of the cell and cell notation of given electrode couple and also predict the spontaneity of the cell reaction. [1+4]

   E° $Zn/Zn^{++} = 0.76V$, E° $Ag^+/Ag = 0.80V$
   $[Zn^{++}] = 0.01M$, $[Ag^+] = 0.1M$

2. How does an acidic buffer solution reserve its PH value on the addition of strong acid or strong base? 100ml of 0.2M CH_3COONa is mixed with 200ml of 0.3M CH_3COOH, which is 2.1% ionised in dilute solution. Find out the PH of the resulting solution. [2.5+2.5]

3. Write the adsorption theory to describe the mechanism of heterogeneous catalysis with a suitable example. How does a promoter enhance the catalytic action? List any two criteria of catalysed reactions applicable for the industries. [3+1+1]

4. Write short notes on:(any two) [2.5+2.5]
   a) Green house effect
   b) Formation and depletion of ozone layer
   c) Acid rain

5. List out four major pollutants of air, their adverse effects on human health and also write their possible remedies. [1+2+2]

6. Write the method of preparation and two important uses of each of polyurethane and diamine epoxy resin. [2.5+2.5]

7. What is biodegradable polymer? Describe the contribution of carbon fibre reinforced polymer and chalcogenide glass in engineering. [1+4]

8. a) What are transition elements? Which of the 3d series elements is not a transition element and why? [1+2]
   b) Explain why compounds of V^{+5} are colourless but those of V^{+3} are colourful. [2]

9. a) Explain the cause of origin of paramagnetism in transition elements. [3]
   b) Explain why are transition elements good for alloy formation. [2]

10. a) What is meant by effective atomic number of metal ion in the complex salt? What information does it convey? [2]
    b) Explain the formation of $[Ni(CO)_4]^\circ$ complex on the basis of VBT. Also predict its geometry and magnetism with reason. [3]

11. a) Write the basic assumptions of Werner's theory of co-ordination compounds. [3]

b) Write the IUPAC names of the following co-ordination compounds. [2]

i) $[Co(NH_3)_2\ (en)_2]Cl_3$
ii) $[Al(OH)\ (H_2O)_5]^{2+}$
iii) $K_4[Fe(CN)_6]$
iv) $K[Ag(CN)_2]$

12. What is plastic explosive? How do you prepare dynamite and gun cotton? [1+2+2]

13. a) What is paint? Write characteristics of a good paint and explain the method of application of paint in galvanised iron. [0.5+1+1]

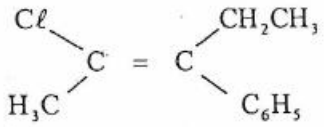
b) What is lubricant? Give an example of emulsion and solid lubricant. Mention their specific functions. [0.5+1+1]

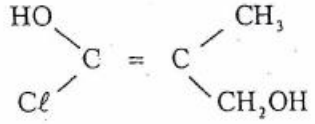
14. a) Distinguish between enantiomers and diasteromers. Write all possible stereoisomers of a compound that contain two asymmetric carbon atoms but cannot exist in meso forms. [4]

b) Write the cis and trans isomers of butenedioic acid. [1]

15. a) What is resolution? Explain the method of chemical resolution of a racemate. [3]

b) Determine E or Z configuration in the following molecules: [2]

i)


ii)


16. What is a nucleophlic substition reaction? Briefly explain SN^2 and SN^1 paths of such reaction in haloalkane. Mention the factors governing these paths. [1+2+2]

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