



## (English Version)

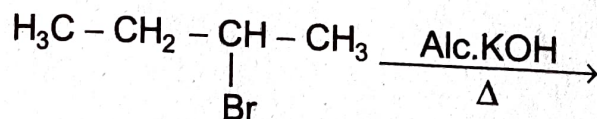
- Instructions :**
- The question paper has five parts. All parts are compulsory.
  - PART-A carries 20 marks. Each question carries 1 mark.
    - PART-B carries 06 marks. Each question carries 2 marks.
    - PART-C carries 15 marks. Each question carries 3 marks.
    - PART-D carries 20 marks. Each question carries 5 marks.
    - PART-E carries 09 marks. Each question carries 3 marks.
  - For PART-A questions, only the first written answers will be considered for evaluation.
  - Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
  - Direct answers to the numerical problems without detailed step and specific unit for final answer will not carry any marks.
  - Use log tables and simple calculator if necessary [Use of scientific calculator is not allowed].

## PART - A

- I. Select the correct option from the given choices :

(15 × 1 = 15)

- 1) The major product formed in the following reaction is



- |                  |              |
|------------------|--------------|
| a) 1-butene      | b) 2-butanol |
| c) 1-bromobutane | d) 2-butene  |





13) Match the following given in List I with List II.

List I (Elements)		List II (Their maximum oxidation states)	
i)	Thorium (Th)	a)	+7
ii)	Protactinium (Pa)	b)	+6
iii)	Lawrencium (Lr)	c)	+3
iv)	Uranium (U)	d)	+5
v)	Plutonium (Pu)	e)	+4

Choose the correct option :

- a) i - e, ii - d, iii - a, iv - b, v - c  
 b) i - e, ii - d, iii - c, iv - b, v - a  
 c) i - b, ii - a, iii - c, iv - e, v - d  
 d) i - b, ii - e, iii - c, iv - d, v - a

14) The complex  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$  is obtained in the red form when nitrite ligand is bound to cobalt through oxygen ( $-\text{ONO}$ ) and its Linkage isomer is obtained as a \_\_\_\_\_ form when nitrite ligand is bound to "Co" through nitrogen ( $-\text{NO}_2$ ).

- a) Orange  
 b) Blue  
 c) White  
 d) Yellow

15) Given below are two statements :

Statement I : Alcohols are acidic in nature; The acidic character of alcohol is due to the polar nature of the O-H bond in it.

Statement II : Alcohols are weaker acids than water.

In the light of the above statements, choose the most appropriate answer from the options given below :

- a) Statement I is incorrect but Statement II is correct  
 b) Both Statement I and Statement II are correct  
 c) Both Statement I and Statement II are incorrect  
 d) Statement I is correct but Statement II is incorrect



- II. Fill in the blanks by choosing the appropriate word from those given in the brackets : (5 × 1 = 5)

[reducing, zero, sodium alkoxide, one, pleasant, pungent]

- 16) Oxidation state of 'Ni' in  $[\text{Ni}(\text{CO})_4]$  is \_\_\_\_\_.
- 17) In Williamson ether synthesis, an alkyl halide is allowed to react with \_\_\_\_\_.
- 18) The carbohydrates which reduce Fehling's solution and Tollens' reagent are called as \_\_\_\_\_ sugars.
- 19) The lower aldehydes have sharp \_\_\_\_\_ odours.
- 20) Van't Hoff factor (i) for a non-electrolyte in a solution is \_\_\_\_\_.

### PART - B

- III. Answer **any three** of the following. Each question carries 2 marks : (3 × 2 = 6)

- 21) What are transition elements? Give an example.
- 22) Write the  $\text{S}_{\text{N}}2$  mechanism involved in the conversion of chloromethane to methanol.
- 23) What is half-life of a reaction? Represent it symbolically.
- 24) List any two nitrogenous bases commonly found in both DNA and RNA.
- 25) Write the products formed when anisole reacts with ethanoyl chloride in the presence of anhydrous  $\text{AlCl}_3$  catalyst.

### PART - C

- IV. Answer **any three** of the following. Each question carries 3 marks : (3 × 3 = 9)

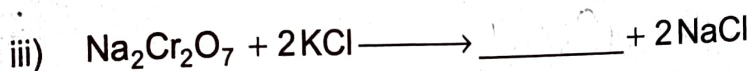
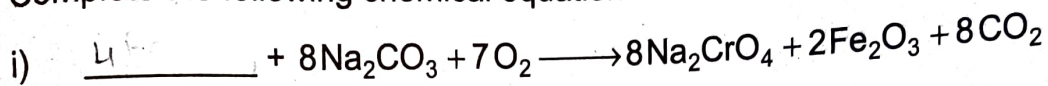
- 26) Using Valence Bond Theory : account for hybridisation, geometry and magnetic property of  $[\text{Co}(\text{NH}_3)_6]^{3+}$  ion.

[Given : Atomic number of cobalt is 27]

- ~~27)~~ What is lanthanoid contraction? Mention two consequence of it.

28) Write the geometrical isomers of the complex  $[MX_2(L-L)_2]$ , where "M", "X" and "L-L" are central metal atom/ion, monodentate ligand and didentate ligand respectively. Identify the optically inactive form of it.

29) Complete the following chemical equations :



30) Write the IUPAC name and structure of  $[Co_2(CO)_8]$  and mention the number of bridged "CO" groups.

V. Answer **any two** of the following. Each question carries 3 marks :  $(2 \times 3 = 6)$

31) Derive an integrate rate equation for the rate constant of a first order reaction.

32) Write a neat labelled diagram, cell representation and half-cell reaction of Standard Hydrogen Electrode (S.H.E.).

33) What are ideal solutions? Write two characteristics of it.

34) Mention any three factors which decides the products of electrolysis.

### PART - D

VI. Answer **any four** of the following. Each question carries 5 marks :  $(4 \times 5 = 20)$

- 35) a) Name the two monosaccharides obtained when lactose is subjected to hydrolysis. (2)
- b) What are non-essential amino acids? Mention the name of  $\alpha$ -amino acid which is optically inactive. (2)
- c) Name the hormone which mediates responses to external stimuli. (1)



36) a) When an alkyl chloride reacts with sodium iodide in dry acetone gives alkyl iodide. (3)

i) Name this reaction.

ii) Write the general equation.

iii) Mention the role of dry acetone.

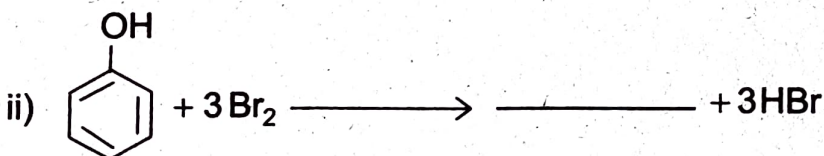
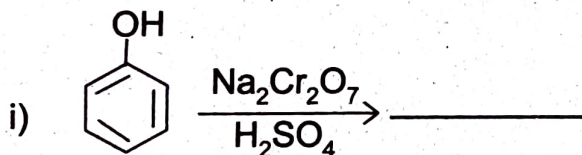
b) What is meant by racemic modification? "They are optically inactive". Give reason. (2)

37) a) Write the chemical equations involved in the preparation of methanamine through Gabriel Phthalimide synthesis. (3)

b) Illustrate the carbylamine reaction with general chemical equation. (2)

38) a) Write the steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. (3)

b) Complete the following reactions ; (2)



39) Addition of H<sub>2</sub>O to an organic compound with molecular formula C<sub>3</sub>H<sub>4</sub> in the presence of Sulphuric acid and mercury (II) sulphate gives "A". "A" oxidised with sodium hypoiodite gives "B" and "C". When "A" is heated with barium hydroxide (catalyst) forms "D" by readily loss of water. "C", upon heating with sodium hydroxide and calcium oxide in the ratio of 3 : 1 gives an organic compound "E". Write the structures of "A", "B", "C", "D" and "E".

40) a) Explain Hell-Volhard-Zelinsky reaction with chemical equation. (2)

b) Write the chemical reaction for the conversion of toluene to benzaldehyde using chromyl chloride. Name the reaction. (2)

c) Name the gas used to facilitate the nucleophilic addition of ethylene glycol to aldehydes and ketones. (1)

**PART – E**  
**(PROBLEMS)**

VII. Answer **any three** of the following. Each question carries **3** marks : **(3 × 3 = 9)**

41) Calculate the mass of a non-volatile solute which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.  
[Given : Molecular formula of octane is  $C_8H_{18}$ , Molar mass of solute  $40 \text{ g mol}^{-1}$ ]

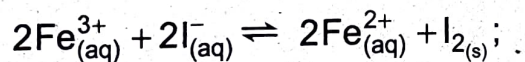
42) The rate constant for the first order decomposition of  $H_2O_2$  is given by the following equation :

$$\log k = 14.34 - 1.25 \times 10^4 K/T$$

Calculate  $E_a$  for the reaction.

[Given :  $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ]

43) The cell in which the reaction occurs



$E_{\text{cell}}^{\circ} = 0.230 \text{ V}$  at 298 K. Calculate the value of  $\log K_c$  ( $K_c$  = equilibrium constant) of the cell reaction.

44) 1.00 g of a non-electrolyte solute dissolved in 50g of benzene lowered the freezing point of benzene by 0.40 K. The freezing point depression constant of benzene is  $5.12 \text{ K kg mol}^{-1}$ . Find the molar mass of the solute.

45) Calculate the limiting molar conductivity of  $Cl^{-}$  ion by using the data :

$$\lambda_{Ca^{2+}}^{\circ} = 119.0 \text{ Scm}^2 \text{ mol}^{-1} \text{ and } \Lambda_m^{\circ} \text{ for } CaCl_2 = 271.6 \text{ Scm}^2 \text{ mol}^{-1}$$

46) A first order reaction takes 40 min for 30% decomposition. Calculate  $t_{1/2}$  (half-life period).