2023
B.A./B.Sc.
First Semester
GENERIC ELECTIVE – 1
CHEMISTRY
Course Code: CHG 1.11
(Conceptual Organic Chemistry)

Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

Answer five questions, taking one from each unit.

UNIT–I

1. (a) Define hybridisation. Give the hybridisation, structure and shape of CH_4 and C_2H_4. 1+2+2=5
   (b) What is inductive effect? Give one example of a system where this system is operative. 3
   (c) Explain how carbonium ions, carbanion ions and free radicals are obtained. 6

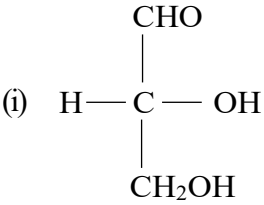
2. (a) Explain hyperconjugation with one example. 3
   (b) Write short notes on the following: 2×2=4
      (i) Electromeric effect
      (ii) Stability of free radicals
   (c) Predict the aromaticity of cyclobutane, pyrole and furan using Huckel's rule. 3
   (d) What is heterolytic bond fission? What are the conditions favourable for heterolytic bond fission to take place? 4

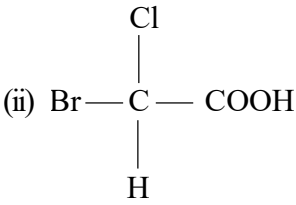
UNIT–II

3. (a) A primary alcohol of formula $C_5H_{12}O$ is optically active. Draw its structure. 2
   (b) Define geometrical isomerism. What are the conditions required for a molecule to show geometrical isomerism? 2+2=4

(c) Differentiate between racemic mixture and meso form with suitable example. 4

(d) What is R & S nomenclature? Assign R & S configuration to each of the following: 2+1+1=4





4. (a) What are conformers? Draw and explain the important conformation of ethane with its potential energy diagram and predict the most stable conformer. 1+3 =4

(b) Write notes on the following: 2+2=4

(i) Relative and absolute configuration

(ii) Threo and erythro designation

(c) Explain CIP rule for specifying R, S system. 4

(d) Draw the Fischer representation and Wedge formula of tartaric acid. 2

UNIT–III

5. (a) Explain cross-Cannizzaro's reaction with suitable chemical reaction. 4

(b) Discuss the hydroboration-oxidation reaction of alkene with chemical reaction. 3

(c) Explain Claisen reaction with chemical reaction. 4

(d) Explain the chemical reaction of hydrogenation of acetylene. 3

6. (a) Explain anti-Markovnikov's rule with suitable example. 3

(b) Explain aldol condensation with chemical reaction. 4

(c) Complete the following reactions: 2×2=4

(i) $CH_3CH=CH_2 + H_2O + \text{dil. } H_2SO_4 \rightarrow$

(ii) $CH_3CH=CH_2 + B_2H_6 + H_2O_2 \rightarrow$

(d) What happens when acetone is treated with hydrogen cyanide? Give the chemical reaction. 3

UNIT–IV

7. (a) Explain with mechanism, the reaction of chlorine to methane to form chloromethane in presence of sunlight. 4
   (b) Distinguish between E1 and E2 mechanism. 4
   (c) What are vicinal dihalides? With chemical reaction, discuss the dehalogenation of vicinal dihalide. 4
   (d) Complete the reaction: $CH_3CH_2Br + NH_3 \xrightarrow{\Delta}$ 2

8. (a) What is nucleophilic substitution reaction? Show the mechanism of S_N2 reaction. 1+3=4
   (b) Differentiate between elimination reaction and substitution reaction. 4
   (c) Give the reactivity order 1°, 2° and 3° alkyl halide towards S_N1 reaction. Give reason. 1+2=3
   (d) Explain Kolbe's electrolysis with chemical reaction. 3

UNIT–V

9. (a) Give the mechanism of Friedel-Crafts acylation of benzene. 4
   (b) Give chemical reactions when: 2×2=4
      (i) Toluene reacts with hot acidic $KMnO_4$ with concentrated nitric acid
      (ii) Toluene reacts with acidic manganese dioxide
   (c) Explain why the chlorine atom (–Cl) acts as a ortho-para director. 3
   (d) Write the mechanism for nitration of benzene. 3

10. (a) Explain with chemical reaction, the halogenations of benzene. 4
   (b) Write a note on directive influence of nitro group ($-NO_2$). 3
   (c) Write the mechanism for halogenation of benzene. 3
   (d) Complete the reactions: 2×2=4

      (i) $CH_3COCl + H_2 \xrightarrow[PdSO_4]{Pd}$

      (ii) $CH_3CONH_2 \xrightarrow{LiAlH_4}$
