Total No. of Printed Pages—8

2 SEM TDC CHMH (CBCS) C 3

2026

(May/June)

CHEMISTRY

(Core)

Central Library & Information Centre • Sibsagar Girls' College
Date .....

Paper : C–3

(Organic Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer from the following : 1×5=5

(a) Which is the most stable carbocation among the following?

(i) $(CH_3)_3\overset{\oplus}{C}CH_2$

(ii) $(CH_3)_3\overset{\oplus}{C}$

(iii) $CH_3CH_2\overset{\oplus}{C}H_2$

(iv) $CH_3\overset{\oplus}{C}HCH_2CH_3$

(b) Which of the following compounds does not show geometrical isomerism?

(i) 2,3-Dichloro-2-butene

(ii) 1,1-Dichloro-2-butene

(iii) 1,2-Dichloro-2-butene

(iv) 1,1-Dichloro-1-butene

(c) Order of case of halogenation in alkane is

(i) $I_2 > Cl_2 > Br_2 > F_2$

(ii) $F_2 > Cl_2 > I_2 > Br_2$

(iii) $F_2 > Cl_2 > Br_2 > I_2$

(iv) $Cl_2 > F_2 > Br_2 > I_2$

(d) The order of stability of the conformations of cyclohexane is

(i) boat > twist boat > half chair > chair

(ii) half chair > chair > twist boat > boat

(iii) chair > half chair > twist boat > boat

(iv) chair > twist boat > boat > half chair

(e) Which of the following compounds is not aromatic?

(i) 

(ii) 

(iii) 

(iv) 

UNIT—I

2. Answer the following questions : 2×3=6

(a) Draw the resonating structure of phenol.

(b) Explain that formic acid is stronger acid than acetic acid.

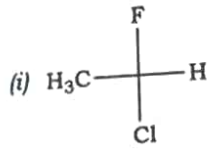
(c) Draw the energy profile diagrams of two-step reaction.

UNIT—II

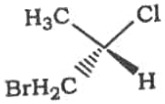
3. Answer any *four* of the following questions : 2×4=8

(a) Specify the following stereoisomers as *R* and *S* : 1×2=2

(i)

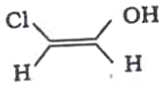


(ii)

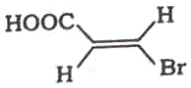


(b) Specify the following geometrical isomers as *E* and *Z* : 1×2=2

(i)



(ii)



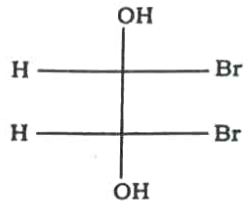
(c) Define the term Enantiomers with example.

(d) What is the difference between *threo-* and *erythro-*forms?

(e) What are distereoisomers and epimers? 1+1=2

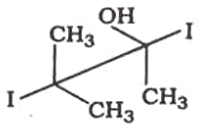
4. Interconvert the following projections as directed : 1×4=4

(a)



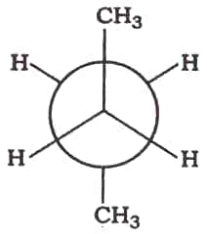
(Fisher to Sawhorse)

(b)



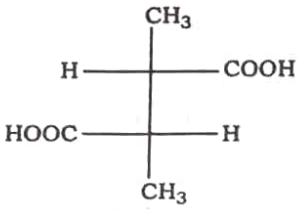
(Sawhorse to Newman)

(c)



(Newman to Fischer)

(d)



(Fischer to Newman)

UNIT—III

5. Answer any *one* of the following questions : 2

(a) What is Wurtz reaction? Explain with example. 1+1=2

(b) What is Corey-House reaction? Explain with example. 1+1=2

6. Answer the following questions : 2×7=14

(a) Write one method for preparation of alkene with example. 1+1=2

(b) Write a short note on Hofmann elimination.

(c) Write the mechanism of Wittig reaction.

(d) Acetylene exhibits acidic character. Explain.

(e) What happens when—

(i) alkene is treated with ozone;

(ii) alkene undergoes hydroboration? 1+1=2

(f) Write a short note on 1,2-addition reaction in conjugated dienes.

(g) What are the conditions for Markownikoff rule?

UNIT—IV

7. Answer the following questions :

(a) Write one method for preparation of cycloalkane with example. 1+1=2

(b) Explain why chair conformation of cyclohexane is more stable than boat conformation. 2

(c) Write a short note on Baeyer strain theory. 2

(d) Draw the energy profile diagram for the conformations of cyclohexane. 2

UNIT—V

8. Answer the following questions :

(a) Select aromatic, anti-aromatic and non-aromatic compounds from the following : ½×4=2

(i) 

(ii) 

(iii) 

(iv) 

(b) State Hückel's rule. 1

(c) What happens when (any *one*)—

(i) benzene is treated with H_2SO_4;

(ii) benzene is treated with Cl_2? 1

(d) Write the mechanism of Friedel-Crafts alkylation reaction. 2

★ ★ ★

Total No. of Printed Pages—7

2 SEM TDC CHMH (CBCS) C 4

Central Library & Information Centre * Sibsagar Girls' College
Date .....

2026

(May/June)

CHEMISTRY

(Core)

Paper : C–4

(Physical Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct option from the following : 1×6=6

(a) The adiabatic process is

(i) isochoric

(ii) isobaric

(iii) isenthalpic

(iv) isentropic

(b) The variation of enthalpy of reaction with temperature is given by

(i) Hess' law

(ii) Henry's law

(iii) Raoult's law

(iv) Kirchhoff's equation

(c) Entropy of the universe

(i) continuously increases

(ii) continuously decreases

(iii) remains constant

(iv) is zero

(d) $K_p = K_c(RT)^{\Delta n_g}$. In this expression, Δn_g denotes

(i) sum of all the gaseous molecules

(ii) sum of molecules of gaseous reactants minus sum of molecules of gaseous products

(iii) sum of molecules of gaseous products minus sum of molecules of gaseous reactants

(iv) It is one for reactions of liquid solutions

(e) $CaCO_3(g) \rightleftharpoons CaO(s) + CO_2(g)$

The pressure of $CO_2(g)$ in the above equilibrium increases when

(i) a catalyst is added

(ii) T is increased

(iii) T is decreased

(iv) an inert gas is introduced, keeping T constant

(f) The correct equation relating rise in boiling point of a solution with concentration is

(i) $\Delta T = \frac{k_b}{m}$

(ii) $\Delta T = m \times k_b$

(iii) $\Delta T = \frac{k_b}{M}$

(iv) $\Delta T = M \times k_b$

2. Answer the following questions : 2×7=14

(a) What are extensive and intensive properties? 1+1=2

(b) What do you mean by free expansion? What is the work done during such an expansion? 1+1=2

(c) The internal energy of an isolated system is constant. Explain.

(d) State and explain Hess' law of constant heat summation.

(e) Write the physical significance of chemical potential.

(f) What do you mean by partial molar properties of an open system?

(g) Define molal elevation constant. Write its unit.

UNIT—I

3. Answer any *four* of the following questions : 3×4=12

(a) Explain zeroth law of thermodynamics. State the first law of thermodynamics in two ways. 1½×2=3

(b) Give the mathematical derivation of Kirchhoff's equation. What is adiabatic flame temperature? 2+1=3

(c) Describe the efficiency of a heat engine. Write a few lines on the term 'entropy'. What is its unit? 1+1½+½=3

(d) State third law of thermodynamics. What is residual entropy? 2+1=3

(e) Derive Gibbs-Helmholtz equation. What is inversion temperature? 2+1=3

(f) Derive thermodynamic equation of state.

(g) Derive the following relation :

$$\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_P$$

UNIT—II

4. Answer any *one* of the following questions : 4

(a) Give a brief account of partial molar quantities. Write about the significance of partial molar quantities. 3+1=4

(b) Derive Gibbs-Duhem equation. What is chemical potential? 3+1=4

UNIT—III

5. Answer any *three* of the following questions : 3×3=9

(a) What is meant by degree of advancement of a chemical reaction? Write a note on fugacity. 1½+1½=3

(b) State Le Chatelier principle. Write a note on thermodynamic equilibria. 2+1=3

(c) Describe the relationship among k_c, k_p and k_x.

(d) What do you mean by free energy of mixing? Explain.

UNIT—IV

6. Answer any *two* of the following questions : 4×2=8

(a) State and explain Raoult's law. Explain how the law can be used for determining molar mass of a dissolved substance. 2+2=4

(b) Why are colligative properties called so? Name the various colligative properties. 2+2=4

(c) What is Henry's law? Define osmotic pressure. 2+2=4

★ ★ ★