2022

B.A./B.Sc.

Second Semester

CORE – 3

CHEMISTRY

Course Code: CHC 2.11

(Organic Chemistry – I)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) What is carbocation? Explain the factors that affect the stability of carbocation. 4
   (b) What is homolytic and heterolytic bond fission? Give examples. 3
   (c) What is hybridization? Explain the hybridization of nitrogen in ammonia molecule. 3
   (d) Out of $CH_3–CH2^{(-)}$ and $CH_3–CH^{(-)}–CH_3$ carbanions, which is more stable and why? 4

2. (a) What are electrophile and nucleophile? Give an example. 3
   (b) What is resonance? Show how a carbanion is stabilized by resonance. 3
   (c) What is inductive effect? How does inductive effect explain the relative strengths of organic acid. 4
   (d) Briefly explain the followings: 2×2=4
   (i) Elimination reaction (ii) Free radicals

UNIT–II

3. (a) What do you understand by enantiomers? Explain with example. 3
   (b) What is geometrical isomerism? What is the condition for a molecule to show geometrical isomerism? Give one example. 4

(c) What do you understand by R & S configuration? Illustrate the CIP sequences rule to assign R & S configuration. 4

(d) Explain erthyro and threo with suitable example. 3

4. (a) Explain the term chiral and chirality in a molecule with suitable example. 3

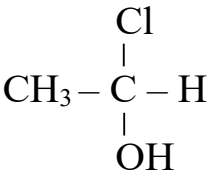
(b) Explain the following: 2×2=4

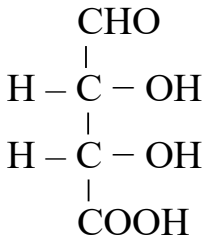
(i) symmetric and asymmetric molecule

(ii) chain and position isomerism

(c) Explain the term syn-anti rotation with an example. 3

(d) Assign R,S configuration of the following: 2×2=4

(i) 

(ii) 

UNIT–III

5. (a) How are alkanes prepared by the following? (Give equation.)

(i) Wurtz reaction 2×2=4

(ii) Corey-House reaction

(b) What is Markovnikoff's rule? Illustrate with suitable example. 3

(c) Explain why alkenes undergo electrophilic addition reaction. 3

(d) Giving chemical equation, explain what happens when 2×2=4

(i) acetaldehyde is treated with HI in presence of phosphorous?

(ii) ethyl bromide is reduced in presence of Zn-Cu?

6. (a) What is E1 and E2 reaction? Discuss the E1 mechanism by suitable example. 4

(b) Giving chemical reaction, explain what happens when 2×2=4

(i) sodium acetate is treated with NaOH in presence of soda lime?

(ii) 2-bromobutane is treated with alcoholic KOH?

(c) Discuss the free radical mechanism of halogenations of alkanes. 3

(d) Explain the trends in boiling point and melting point in alkanes. 3

UNIT–IV

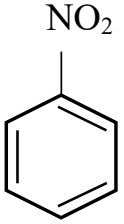
7. (a) Explain why alkynes are less reactive than alkenes towards electrophilic addition reaction. 3
   (b) How will you synthesize the following compounds from acetylene? (Give chemical reaction.) 2×2=4
   (i) Benzene (ii) Oxalic acid
   (c) What are cycloalkanes? How will you account for their reactive nature? 3
   (d) What is Baeyer's strain theory? What are its limitations? 4

8. (a) How will you bring about the following conversion? 2×2=4
   (i) Acetylene into acetic acid
   (ii) Propyne into propanone
   (b) Discuss the orbital structure of acetylene. 3
   (c) Give a brief account of nucleophilic addition reaction in alkynes. 3
   (d) Explain with energy diagram the relative stability of chain, boat and twist boat from of cyclohexane. 4

UNIT–V

9. (a) What are electrophilic aromatic substitution reaction? Discuss the mechanism of electrophilic substitution in benzene. 4
   (b) Describe activating and deactivating groups by taking one example in each case? 3
   (c) Explain why chlorine is ortho and para director but ring deactivator. 3
   (d) Predict the major product in the following reactions: 2×2=4

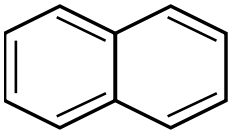
(i)  + CH_3COCl $\xrightarrow{\text{anhy. } AlCl_3}$

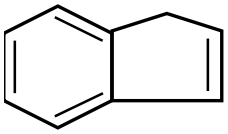
(ii)  + CH_3Cl $\xrightarrow{\text{anhy. } AlCl_3}$

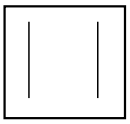
10. (a) Explain with mechanism the Friedel-craft's alkylation reaction. 4

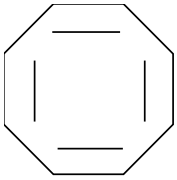
(b) Out of toluene and nitro benzene, which will be nitrated more easily and why? 3

(c) Identify the aromatic and non-aromatic compound. Justify your answer. 4

(i) 

(ii) 

(iii) 

(iv) 

(d) Give the mechanism of sulphonation of benzene. 3
