May 2025
M.Sc.
Second Semester
CORE – 06
CHEMISTRY
Course Code: MCHC 2.21
(Organic Chemistry - II)

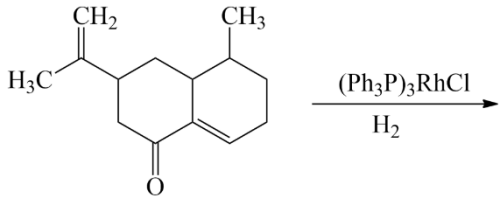
Total Mark: 70 *Pass Mark: 28*
Time: 3 hours

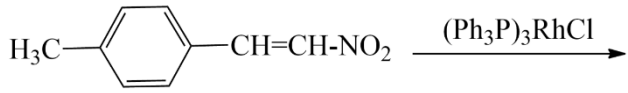
Answer five *questions, taking* one *from each unit.*

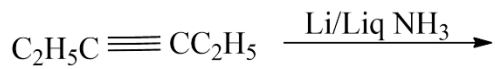
UNIT–I

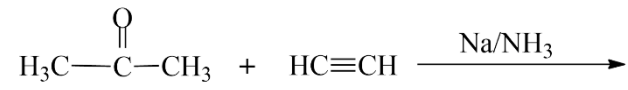
1. (a) Explain dissolving metal reductions with a suitable example. 5
   (b) Write the function of catalyst in chemical reactions. 4
   (c) Write adsorption theory and modern adsorption theory for heterogeneous catalytic reactions. 5

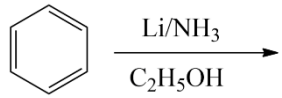
2. (a) Complete the following reactions: 1½×6=9

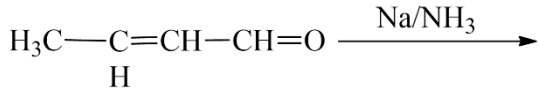
(i) 

(ii) 

(iii) 

(iv) 

(v) 

(vi) 

(b) Write the mechanism of the given reaction by taking a suitable example. 5

Alkene $\xrightarrow{Na/NH_3}$ Trans-alkene

UNIT–II

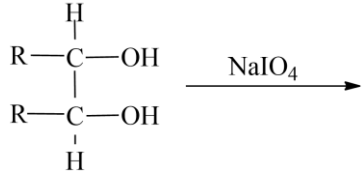
3. (a) Explain the reaction mechanism for the reduction of carbonyl group with hydrazine. 5

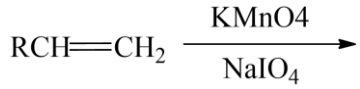
(b) Write the reaction mechanism for ozonolysis of alkene. 3

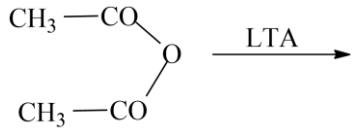
(c) Write DMSO-based Swern oxidation of primary alcohol by taking trifluoroacetic anhydride and oxalyl chloride. 3+3=6

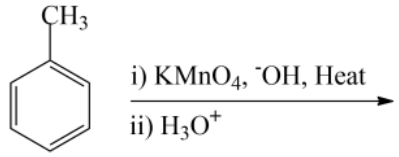
4. (a) Explain the Parikh-Doering oxidation of secondary alcohol with mechanism. 5

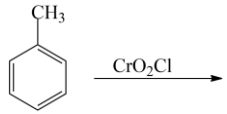
(b) Complete the following reactions: 1½×6=9

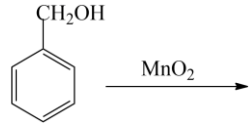
(i) 

(ii) 

(iii) 

(iv) 

(v) 

(vi) 

UNIT–III

5. (a) What are carbenoids? Write any two common methods for the preparation of carbenoids in the laboratory. 2+2=4
   (b) Compare singlet and triplet carbenes in C-H bond insertion reactions. 4
   (c) Write a note on the structure and stability of carbenes. 4
   (d) Complete the following reactions: 1×2=2
   (i) $CH_2N_2 \xrightarrow{\Delta}$
   (ii)  $+ :CBr_2 \rightarrow$

6. (a) Outline the mechanism of the Schmidt reaction for both carboxylic acids and ketones. 6
   (b) Why are nitrenes highly reactive? Discuss any three common methods to generate nitrenes. 1+3=4
   (c) Discuss the mechanistic pathway involved in the Hofmann reaction. 4

UNIT–IV

7. (a) Explain the role of free radicals in the decarboxylative bromination of carboxylic acids. 4
   (b) Describe the mechanism of the following: 3×2=6
   (i) Radical cyclization reactions in organic synthesis
   (ii) Radical coupling reactions of alkynes
   (c) Outline the steps involved in the free radical addition of HBr to alkenes. 4

8. (a) Discuss in detail the reactions of benzyne. Support your answer with suitable examples. 6
   (b) Discuss its structure, stability, and the direction of aryne bond formation. 6
   (c) Why is the triple bond in benzyne weaker and more reactive than a typical alkyne triple bond? 2

UNIT–V

9. (a) Discuss the Zimmerman-Traxler model of aldol reaction. 5
   (b) Explain the Horner-Wadsworth-Emmons reaction with its mechanism. 4
   (c) Discuss the Wittig reaction with mechanism and also mention the stereoselectivity of the reaction. 5

10. (a) Explain the following reactions with mechanisms: 4×2=8
    (i) Negishi reaction
    (ii) Heck reaction
    (b) Explain acylation of carbonyl carbon with suitable example. 4
    (c) Write a note on the Pictet-Spengler reaction. 2