

2024/FYUG/ODD/SEM/  
CHMDSC-202T/190

FYUG Odd Semester Exam., 2024

CHEMISTRY

( 3rd Semester )

Course No. : CHMDSC-202T

( Functional Group Chemistry )

Full Marks : 70

Pass Marks : 28

Time : 3 hours

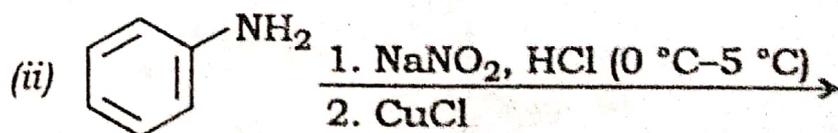
The figures in the margin indicate full marks  
for the questions

UNIT—I

1. Answer any *two* from the following :  $2 \times 2 = 4$

(a) Explain why allyl halides are more reactive than vinyl halides in nucleophilic substitution reaction.

(b) Identify the products of the following :



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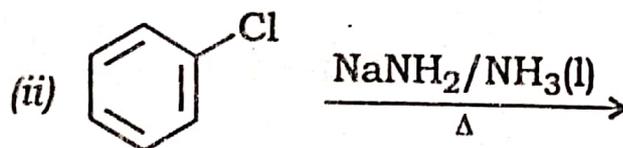
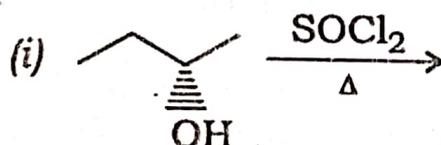


(c) Discuss the effect of solvent in the reactivity of  $S_N1$  and  $S_N2$  mechanism.

2. (a) Explain why the treatment of alkyl halides with aqueous KOH leads to the formation of alcohols but alkenes are the products in presence of alc. KOH. 3

(b) Explain with suitable example that  $S_N2$  reaction proceeds with inversion of configuration. 3

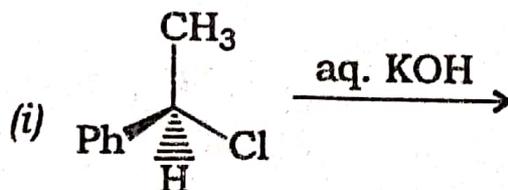
(c) Predict the product and depict the mechanism :  $2 \times 2 = 4$



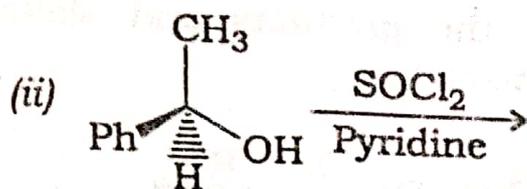
OR

3. (a) Explain why benzyl halides are more reactive than aryl halides towards Nucleophilic substitution reaction. 2

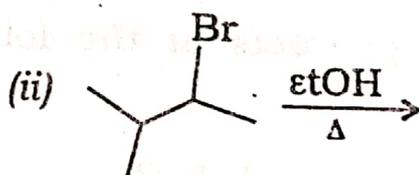
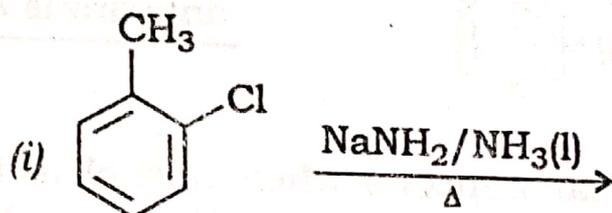
(b) Predict the product and depict mechanism :  $3 \times 2 = 6$



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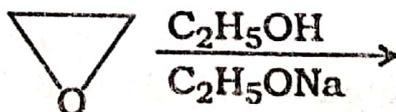
- (c) Identify the product(s) of the following reaction : 1×2=2



### UNIT—II

4. Answer any *two* from the following : 2×2=4

- (a) Explain why *p*-Nitrophenol is more acidic than ortho and meta isomers.
- (b) What happens when glycol is treated with periodic acid?
- (c) Identify the product in the following reaction :

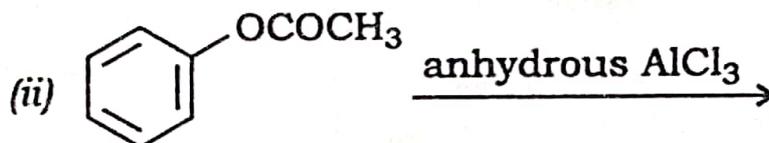
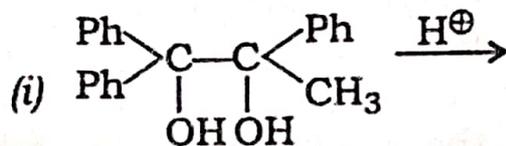


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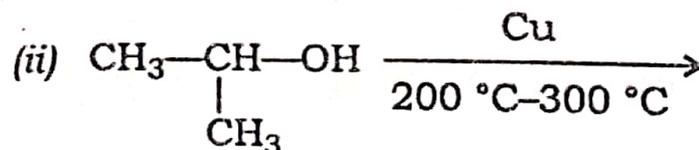
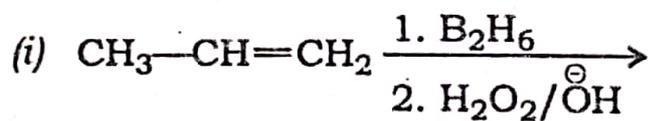
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5. (a) Identify the products and sketch the mechanism : 3×2=6



- (b) What happens when phenol is treated with bromine water? Give reaction. 2
- (c) Identify the products of the following reaction : 2

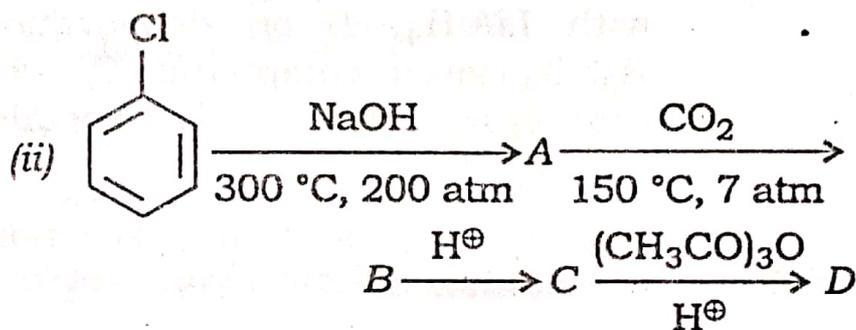
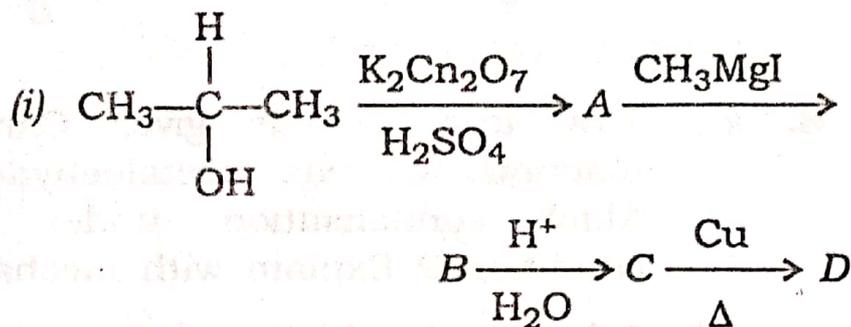


OR

6. (a) Sketch the mechanism of Reimer-Tiemann reaction. What intermediate is formed in this reaction? 3+1=4
- (b) How can Lucas reagent be used to distinguish 1°, 2° and 3° alcohol? 2

(c) Identify A, B, C and D in the following :

2×2=4



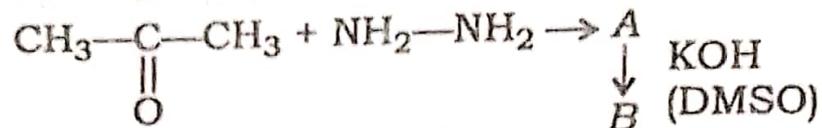
### UNIT—III

7. Answer any *two* from the following : 2×2=4

(a) How will you distinguish between ethanal and propanal? Explain with reactions.

(b) What happens when acetaldehyde is treated with HCN followed by hydrolysis?

(c) Identify A and B in the following :



8. (a) Why formaldehyde gives Cannizzaro reaction whereas acetaldehyde gives Aldol condensation under similar conditions? Explain with mechanism. 3

(b) A ketone A, which undergoes Haloform reaction, gives compound B on reduction with  $\text{LiAlH}_4$ , B on dehydration with  $\text{H}_2\text{SO}_4$  gives compound C, which on ozonolysis gives only acetaldehyde. Identify A, B and C. 3

(c) Explain the following reaction with mechanism :  $2 \times 2 = 4$

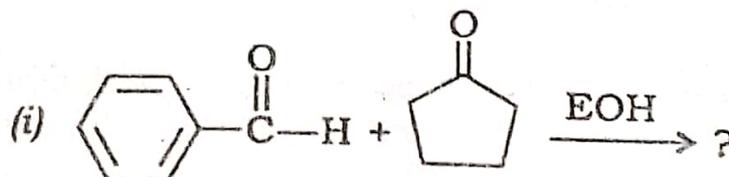
(i) Knoevenagel condensation

(ii) Benzil-Benzilic acid rearrangement

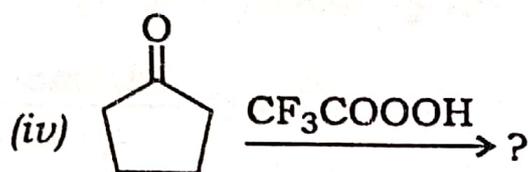
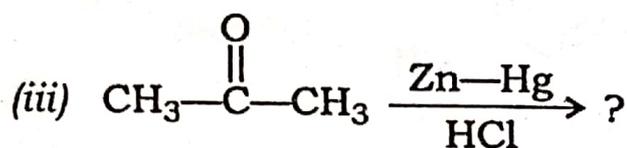
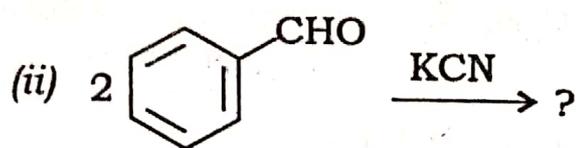
OR

9. (a) What are ylides? How alkenes can be prepared from carbonyl compounds using Wittig reaction?  $\frac{1}{2} \times 2 = 1$

(b) Predict the product and sketch the mechanism (any three) :  $2 \frac{1}{2} \times 3 = 7 \frac{1}{2}$



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#### UNIT—IV

10. Answer any *two* from the following :  $2 \times 2 = 4$

- (a) Fumaric and maleic acid give the same anhydride on heating, but fumaric acid must be heated to much higher temperature than maleic acid. Explain.
- (b) What happens when lactic acid is oxidised with Fenton's reagent? Explain with reaction.
- (c) What happens when tartaric acid is treated vigorously with HI?

11. (a) Describe the following reactions with mechanism :  $3 \times 2 = 6$

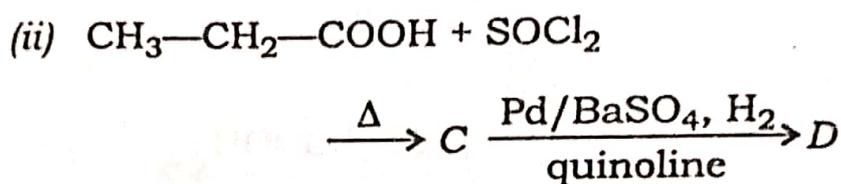
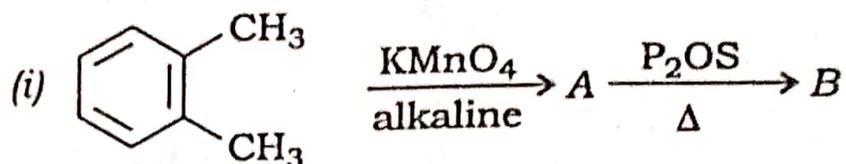
- (i) Claisen condensation  
(ii) Curtius rearrangement

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(b) Identify A, B, C and D in the following : 4

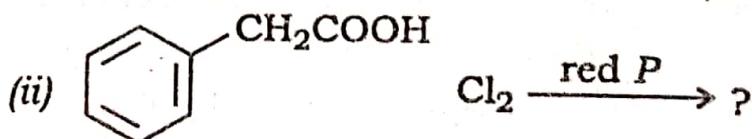
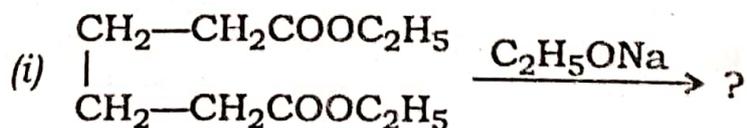


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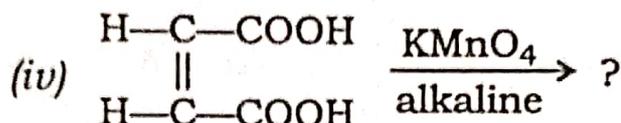
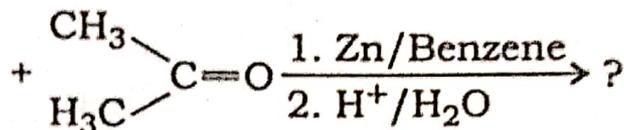
12. (a) Sketch the mechanism of acid catalysed hydrolysis of ester by taking suitable example. 3

(b) Explain Hofmann-bromamide degradation reaction with mechanism. 3

(c) Identify the products of the following reactions : 1×4=4



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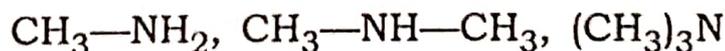


### UNIT—V

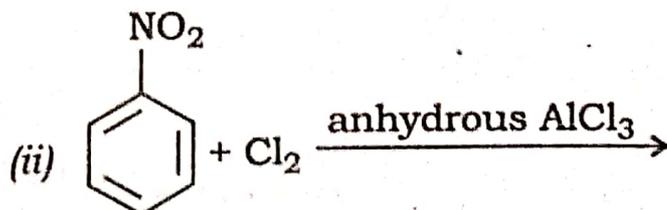
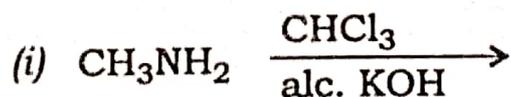
13. Answer any *two* from the following :  $2 \times 2 = 4$

(a) Explain why thioalcohols are more acidic than alcohols.

(b) Arrange the following in increasing order of basicity in aqueous solution :



(c) Complete the following reactions :



14. (a) How can the Hinsberg's test be used to distinguish 1°, 2° and 3° amine? 2

(b) Describe with mechanism the synthesis of primary amine using Gabriel-phthalimide reaction. 2

(c) Discuss briefly with mechanism : 3×2=6

(i) Mannich reaction

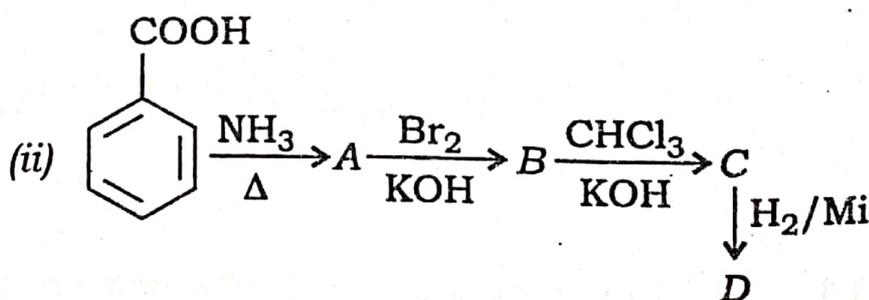
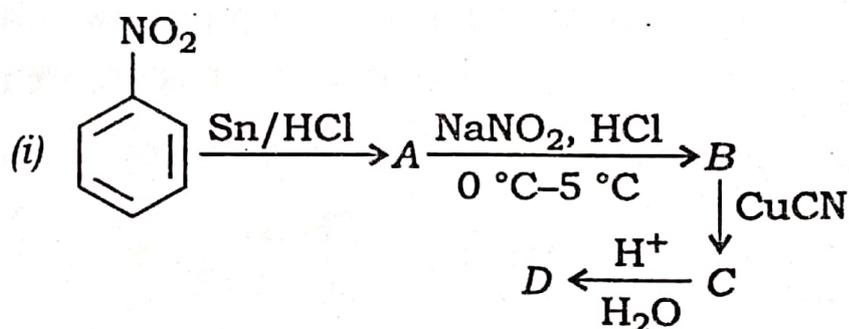
(ii) Hofmann exhaustive methylation

OR

15. (a) Describe carbylamine reaction with mechanism. 3

(b) Explain why in Hofmann elimination reaction, least substituted alkene is generally major product. 3

(c) Identify A, B, C and D in the following reaction : 2×2=4



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