

**2025 / FYUG / ODD / SEM /
CHMDSC-202T / 460**

FYUG Odd Semester Exam., 2025

CHEMISTRY

(3rd Semester)

Course No. : CHMDSC-202T

(Functional Group Chemistry)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

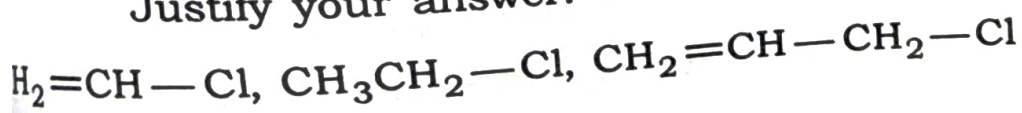
The figures in the margin indicate full marks
for the questions

UNIT—I

Answer any *two* of the following questions :

2×2=4

- (a) Cl in chlorobenzene is deactivating yet *ortho*- and *para*-directing. Explain.
- (b) Arrange the following alkyl halides in order of their reactivity towards nucleophilic substitution reaction. Justify your answer.



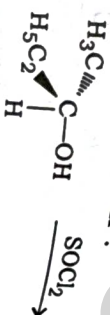
(Turn Over)

(2)

- (c) How will you convert chlorobenzene to
(i) benzene and (ii) DDT?

2. Answer any one of the following questions:

- (a) (i) $\text{CH}_3\text{CH}_2\text{Cl}$ hydrolyses slowly in aqueous medium but the reaction is rapid in the presence of catalytic amount of KI. Explain.
(ii) Complete the following reaction and write the mechanism :

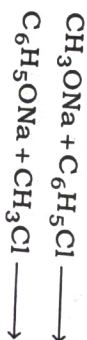


- (iii) Give the mechanistic steps and mark the major product for the following reaction :



- (iv) What happens when alkyl halide is treated with NaCN and AgCN separately? Justify your answer with reason.

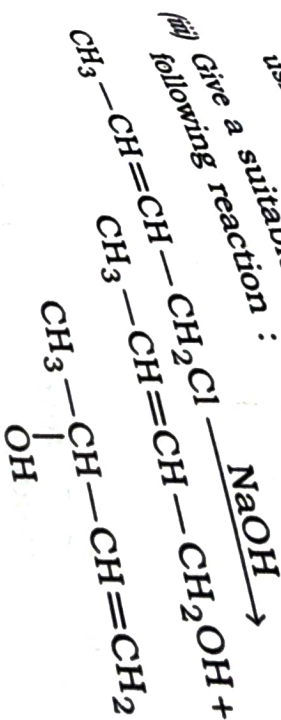
- (b) (i) Which of the following reactions will yield $\text{CH}_3-\text{O}-\text{C}_6\text{H}_5$? Justify your answer.



(3)
the mechanism of $\text{S}_\text{N}1$

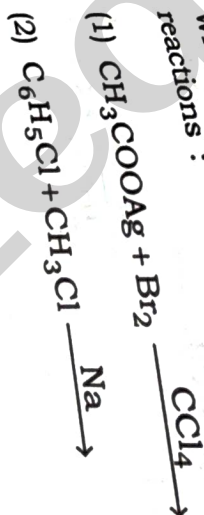
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- Explain including example.
(i) reaction suitable mechanism for the using a suitable reaction :



1 × 2 = 2

- (iv) Write the products of the following reactions :



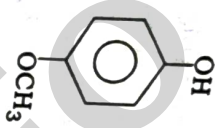
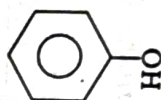
UNIT—II

Answer any two of the following questions : 2 × 2 = 4

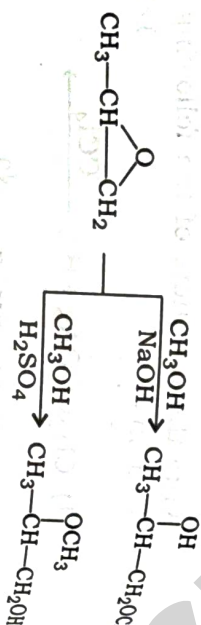
- (a) How will you synthesize 2° and 3° alcohol using Grignard reagent? Give reactions.

(4)

(b) Arrange the following increasing order of acidity. phenol in your answer with reason : Justify

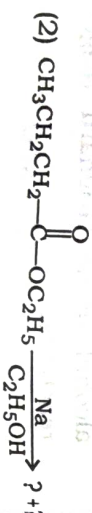
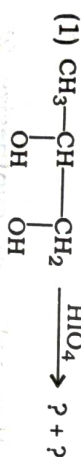


(c) Give reason to justify the following product formation :



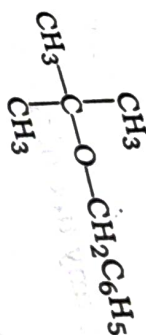
4. Answer any one of the following questions :

(a) (i) Complete the following reactions and write the mechanisms : $3 \times 2 = 6$

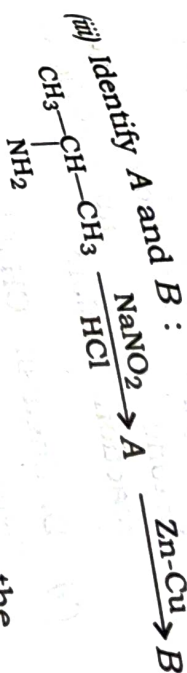


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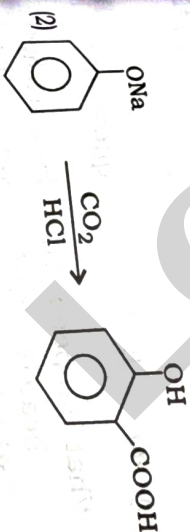
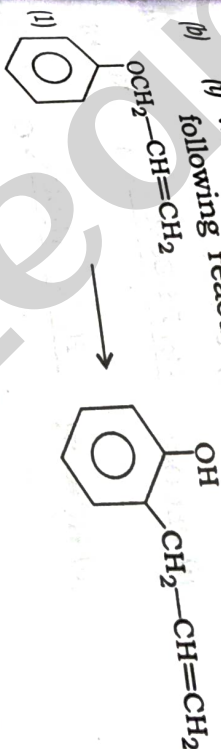
How will you synthesize the following by Williamson's synthesis? Write the mechanism of the reaction. $1 + 2 = 3$



$\frac{1}{2} \times 2 = 1$



(b) (i) Write the mechanisms for the following reactions : $3 \times 2 = 6$



$1 \frac{1}{2} \times 2 = 3$

(ii) Convert the following :



(Turn Over)

(6)

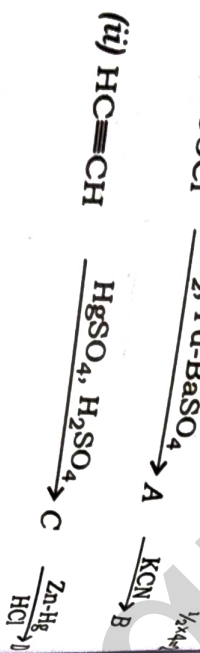
(iii) Write the chemical reaction between phenol and ferric chloride solution.

5. Answer any two of the following questions:
UNIT—III

(a) Aldehydes are more reactive than ketone towards nucleophilic addition reaction. Explain.

(b) Distinguish CH_3CHO and $\text{C}_6\text{H}_5\text{CHO}$ with chemical reactions.

(c) Identify A, B, C and D :



6. Answer any one of the following questions :

(a) (i) What happens when benzaldehyde is heated with conc. NaOH solution? Give the mechanism of the reaction.

(ii) An alkene C_6H_{12} after ozonolysis yielded two products. One of these gave a positive iodoform test

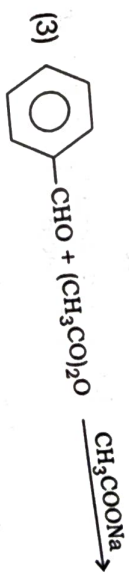
(7)

but negative Tollen's test. The other product gave a positive Tollen's test but negative iodoform test. Identify both the products and give chemical reaction of both positive iodoform and Tollen's test. 1+2=3

(iii) Give the mechanism of HCN addition to acetaldehyde. 2

(iv) Identify A, B, C and D :
 $\text{C}_6\text{H}_5\text{CHO} \xrightarrow{\text{HCN}} \text{A} \xrightarrow{\text{H}_3\text{O}^+} \text{B} \xrightarrow{\text{SOCl}_2} \text{C} \xrightarrow{\text{H}_2, \text{Pd-BaSO}_4} \text{D}$

(v) Complete the following reactions and write the mechanisms : 3×3=9



(ii) Give one example of crossed aldol condensation reaction. (Turn Over)

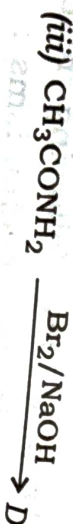
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7. Answer any two of the following questions:
UNIT—IV

(a) What happens when—

(i) maleic acid is heated—

(ii) oxalic acid is heated; in acidic medium?

(b) Convert acetic acid to propanoic acid, KMnO_4 (c) Identify A, B, C and D : $1 \times 1 = 1$ 

8. Answer any one of the following questions:

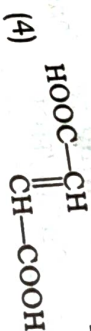
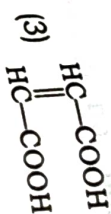
(a) (i) Explain the following : $1 \frac{1}{2} \times 2 = 3$

(1) Formic acid reduces Tollen's reagent

(2) Oxalic acid is stronger than acetic acid

(ii) Sketch the mechanism of base catalyzed hydrolysis of ester by taking a suitable reaction.

(9)

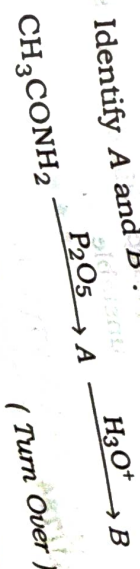
(iii) Complete the following reactions : $1 \times 4 = 4$ (b) (i) Describe the following reactions with mechanisms : $3 \times 2 = 6$

(1) Dieckmann reaction

(2) Reformatsky reaction $1 \frac{1}{2} \times 2 = 3$

(ii) Explain why—

(1) acetamide is a weak base;

(2) acid chloride is more reactive than ester towards nucleophilic substitution reaction. $\frac{1}{2} \times 2 = 1$ (iii) Identify A and B : $\frac{1}{2} \times 2 = 1$ 

(Turn Over)

(10)

UNIT-V

9.

Answer any two of the following questions:

- (a) How will you synthesize benzene sulphonic acid and vice versa?
- (b) Write a short note on diazocoupling reaction.
- (c) Complete the following reactions :
- (i) $\text{CH}_3\text{CN} \xrightarrow{\text{SnCl}_2/\text{HCl}}$
- (ii) $\text{C}_6\text{H}_5\text{NH}_2 + \text{CHCl}_3 + \text{NaOH} \longrightarrow$

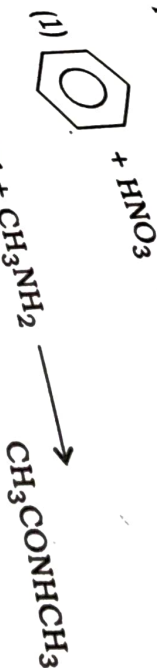
10. Answer any one of the following questions :

- (a) (i) How do 1°, 2° and 3° amines react with nitrous acid? Give the chemical reaction.
- (ii) Explain the following : $1\frac{1}{2} \times 2 = 3$
- (1) Aniline is less basic than methyl amine
- (2) Aliphatic diazonium salt is unstable

(11)

mechanisms of the $2 \times 2 = 4$

Write the mechanisms of the following reactions :



(b) How will you distinguish the following pairs of compounds? $1\frac{1}{2} \times 2 = 3$



(2) CH_3NH_2 and CH_3NO_2



(iii) Identify A and B : $\frac{1}{2} \times 2 = 1$



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