

**5/H-23 (v) (b) (Syllabus-2015)**

**2019**

**( October )**

**CHEMISTRY**

**( Honours )**

**( Chem-H-501 )**

**( Part-B : Organic Chemistry-I )**

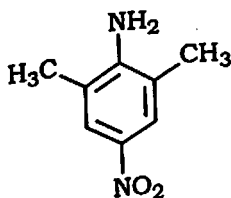
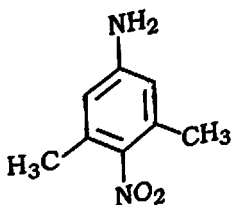
**Marks : 37**

**Time : 2 hours**

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

1. (a) Which of the following two compounds is more basic and why?

2



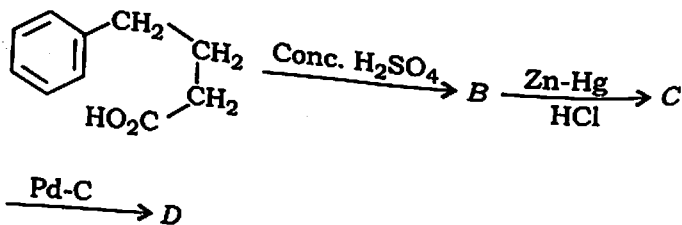
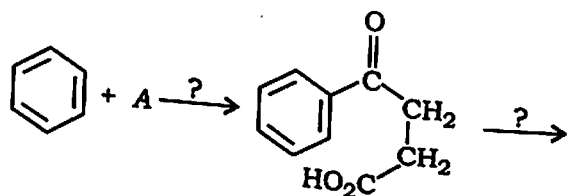
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( 2 )

(b) Explain, on the basis of structure, why  $\text{BF}_3$  acts as a Lewis acid. 1½

(c) "Lower the value of  $\text{pK}_a$ , stronger is the acid." Comment. 1

(d) Complete the following sequence of reactions and write down the structure of the missing compounds and reagents : 3



(e) In naphthalene,  $\alpha$ -position is more reactive than  $\beta$ -position. Explain. 1½

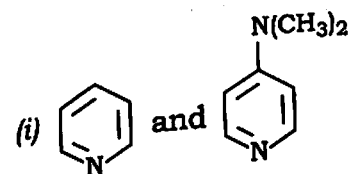
( 3 )

OR

2. (a) State the Lewis concept of acid and base. 2

(b) Can a proton ( $\text{H}^+$ ) be regarded as an acid according to Bronsted and Lewis definition? 1

(c) Which is the stronger acid or base in the following pairs of compounds? 1½



(ii)  $\text{BF}_3$  and  $\text{BCl}_3$

(iii) Nitromethane and methanol

(d) What happens when anthracene is treated with the following? 1×2=2

(i)  $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$

(ii)  $\text{Cl}_2/\text{CS}_2$

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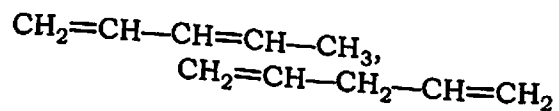
(e) What happens when  $\beta$ -naphthol is treated with ferric chloride? 1

(f) Naphthalene undergoes acylation mainly at  $\alpha$ -position in  $\text{CS}_2$  whereas in nitrobenzene as solvent, the major product is  $\beta$ -acetylnaphthalene. Explain. 1½

3. (a) What is the difference between conformation and configuration? Draw the possible conformations for *n*-butane and arrange them in order of their stability. 2½

(b) Draw all the possible conformations of *cis*- and *trans*-1,3-dimethylcyclohexane. Comment on their relative stability based on steric interactions. 2

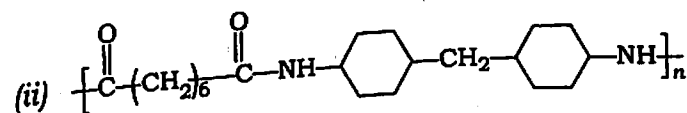
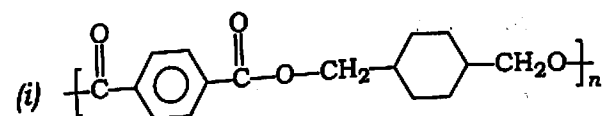
(c) Which out of the following compounds is more stable and why? 1



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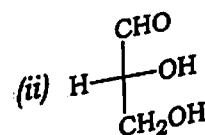
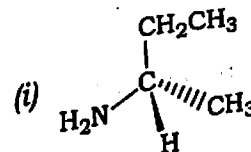
(d) State the key differences between addition polymerization and condensation polymerization. 1½

(e) Identify the monomers required for the synthesis of the following step-growth polymers : 2



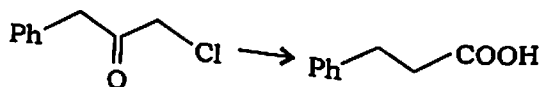
OR

4. (a) Assign *R/S* designation to the following compounds : 1×2=2



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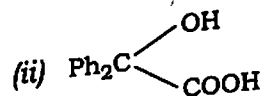
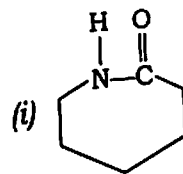
- (b) Explain the stereochemical aspects of the bromination of *Z*-2-butene. 2
- (c) Predict the product of the following reaction : 1  
1,3-butadiene + Maleic anhydride  $\rightarrow$  ?
- (d) How will you synthesize 1,3-butadiene from 1-butene? 1
- (e) Write short notes on the following :  $1 \times 3 = 3$   
(i) Ziegler-Natta polymerization  
(ii) Urea-formaldehyde resin  
(iii) Synthetic rubbers
5. (a) Point out the similarities of the pinacol-pinacolone rearrangements with Wagner-Meerwein rearrangements. 2
- (b) How will you bring about the following conversion?  
  
Write the mechanism and identify the key intermediate. 2

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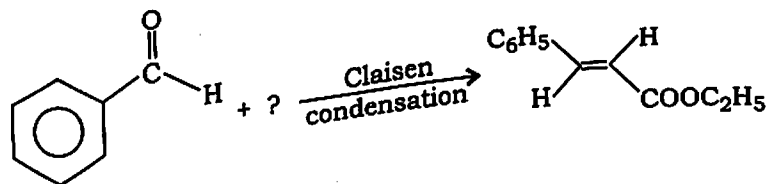
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- (c) Outline routes to the formation of the following compounds from the readily available starting materials (write mechanisms) :  $1\frac{1}{2} \times 2 = 3$



- (d) Complete the following reaction giving mechanism : 2



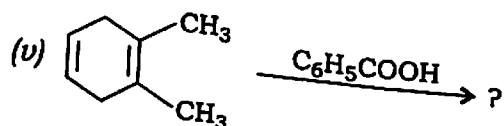
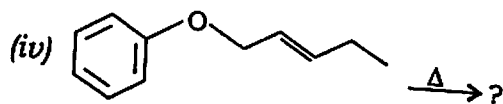
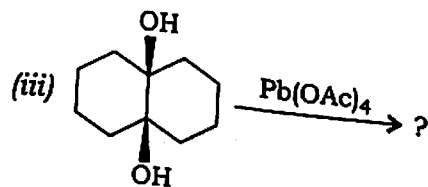
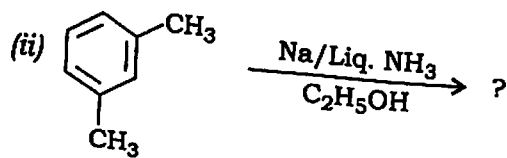
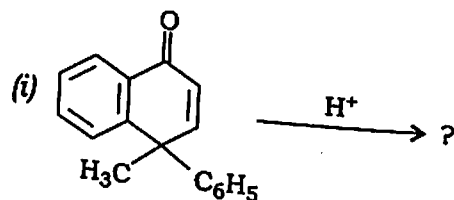
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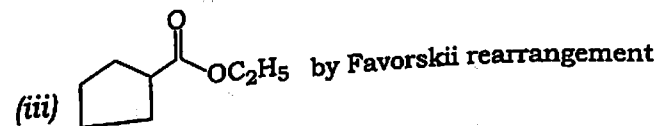
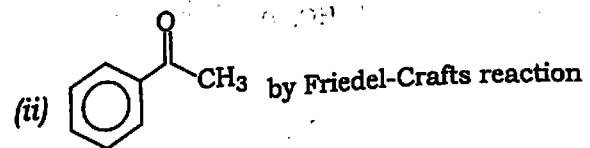
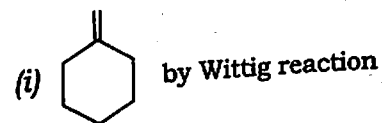
OR

6. (a) Complete the following reactions giving mechanisms (any three) : 2×3=6



( 9 )

- (b) How will you synthesize the following compounds? Give mechanisms (any two) : 1½×2=3

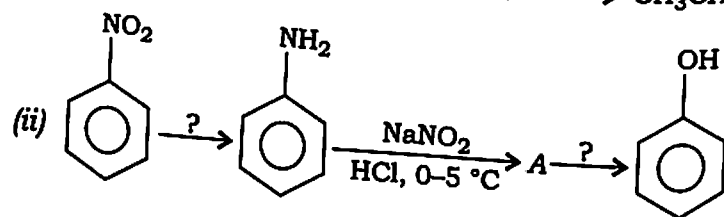
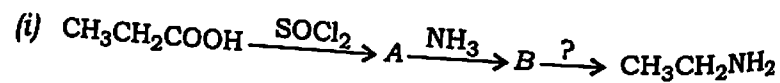


7. (a) Quinoline undergoes electrophilic attack in the benzene ring while the nucleophilic attack takes place in the pyridine ring. Explain. 2
- (b) Write a short note on Fischer indole synthesis giving mechanism. 2
- (c) What are microwave-assisted reactions? How does microwave promote chemical reactions? 3

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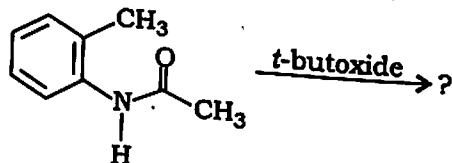
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(d) Identify the missing reagents/products in the following transformations :  $1\frac{1}{2} \times 2 = 3$

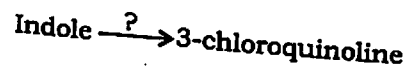


OR

8. (a) Complete the following with mechanism :  $2\frac{1}{2}$



(b) Complete the following reaction with suitable mechanism :  $1\frac{1}{2}$



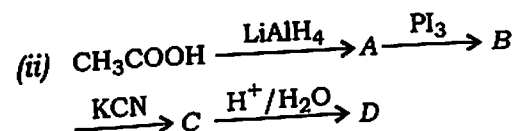
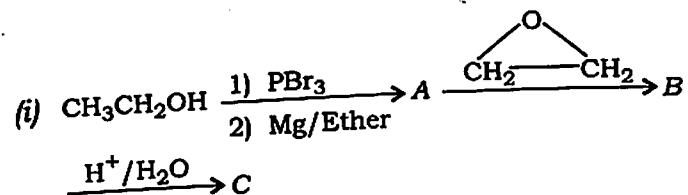
(c) Discuss the following based on the principles of green chemistry :  $1\frac{1}{2} \times 2 = 3$

(i) Choice of reaction conditions in chemical reactions

(ii) The selection of a solvent for a product synthesis

( 11 )

(d) Identify the missing products in the following transformations :  $1\frac{1}{2} \times 2 = 3$



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