

## PG Odd Semester (CBCS) Exam., December—2016

## CHEMISTRY

## ( 3rd Semester )

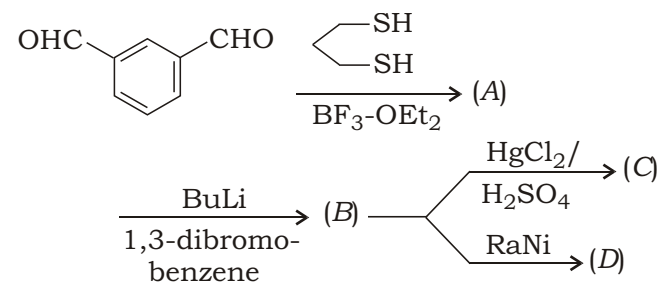
Course No. : CH-302 (C)

## ( Organic Chemistry—III )

*Full Marks : 75**Pass Marks : 30**Time : 3 hours**The figures in the margin indicate full marks for the questions*Answer **five** questions, selecting **one** from each Unit

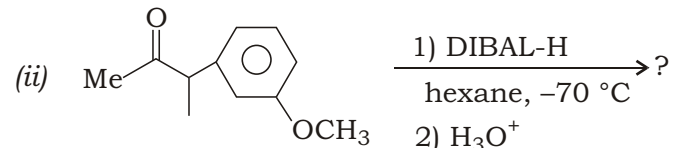
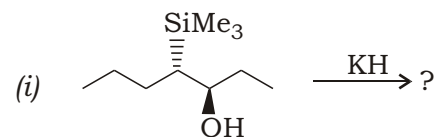
## UNIT—I

1. (a) What are Gilman reagents? Provide a preparation of such a reagent in the laboratory. 1+2=3
- (b) (i) Complete the following reaction and suggest plausible mechanism.

Mention the step where reversal of polarity is observed : 4+2=6

- (ii) Explain why  $\text{HgCl}_2$  is necessary for the hydrolysis of dithiane. 2

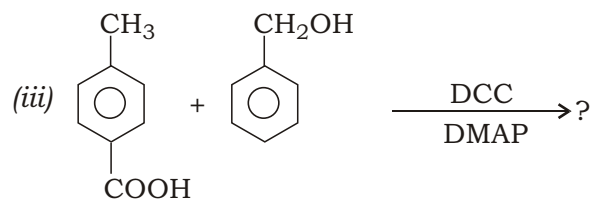
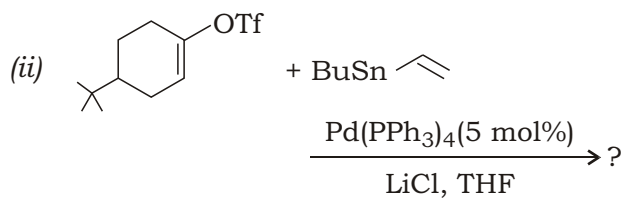
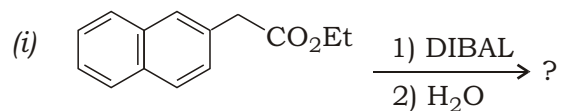
- (c) Predict the product(s) of the following reactions along with plausible mechanism : 2+2=4



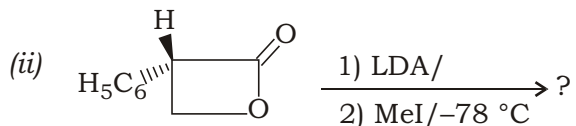
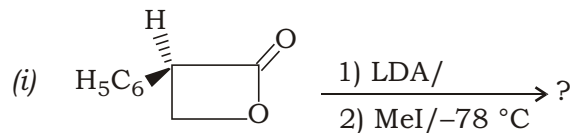
2. (a) Explain with suggestive mechanism why  $\text{BuLi}$  undergoes addition with  $\alpha,\beta$ -unsaturated ketones whereas  $\text{Me}_2\text{CuLi}$  undergoes 1,4-addition with the same. 2+2=4

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(b) Predict the product(s) of the following reactions and suggest plausible mechanisms : 2+3+2=7



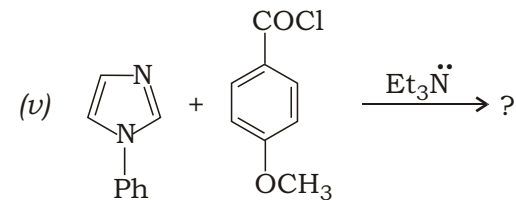
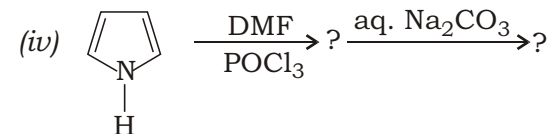
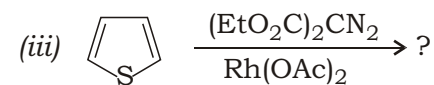
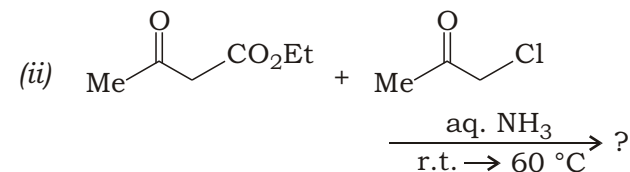
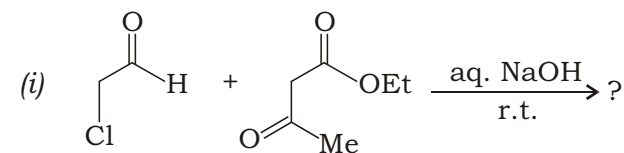
(c) Suggest a plausible mechanism for the following transformation : 4



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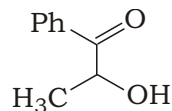
UNIT—II

3. (a) Delineate the outcome of the following reactions with the support of mechanism : 2½×5=12½

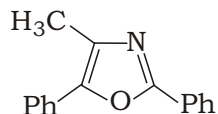


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(b) Explain how



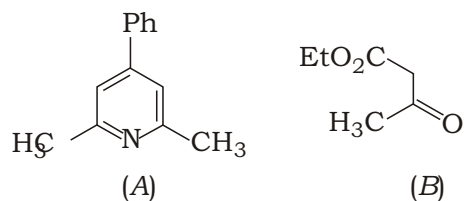
can produce



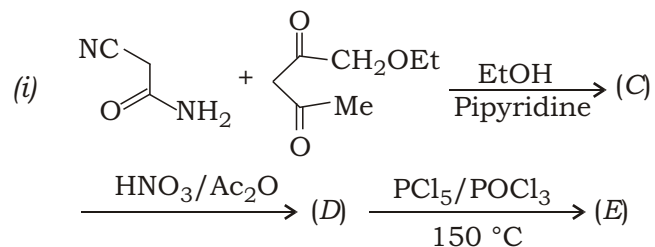
2½

4. (a) Describe the synthesis of pyridine derivative (A) from  $\alpha$ -ketoester (B) and the appropriate aldehyde, and ammonia. Provide a plausible mechanism of the reaction involved in the synthesis :

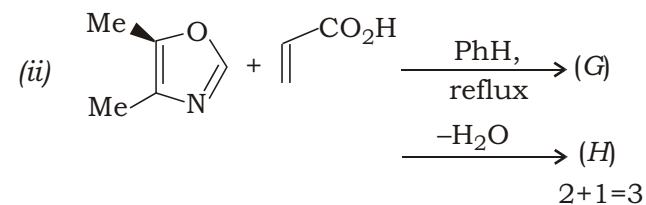
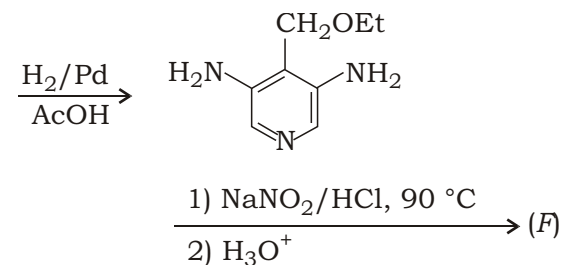
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- (b) Complete the following reactions by predicting the intermediates (C) to (H) :



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- (c) What happens when (provide mechanism for the formation of the products)—



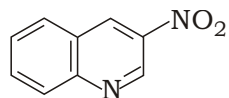
$n\text{-BuLi/Et}_2\text{O}$ , at  $78\text{ }^\circ\text{C}$  and then with  $\text{Ph}-\text{C}\equiv\text{N/aq. HCl}$ ;

- (ii) aniline is treated with glycerol in the presence of concentrated sulphuric acid and nitrobenzene at about  $130\text{ }^\circ\text{C}$  and then the product is oxidized;

- (iii) 2-Bromoisquinoline is treated with  $\text{NaNH}_2$  and  $\text{NH}_3$  (liq) at  $-33\text{ }^\circ\text{C}$ ?  
 $2\frac{1}{2}\times 3=7\frac{1}{2}$

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- (d) Provide a strategy to control the production of



from quinoline. Provide mechanism.  $1\frac{1}{2}$

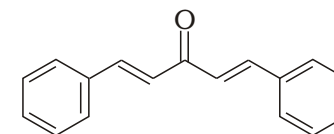
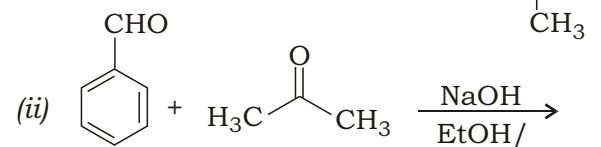
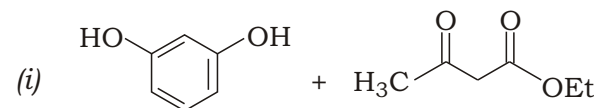
UNIT—III

5. (a) Provide and compare the old and green methods of Ibuprofen synthesis.  $2\frac{1}{2}+1\frac{1}{2}=4$
- (b) What is the percentage atom economy for the reaction for making hydrogen by reacting coal with steam?  $2\frac{1}{2}$
- (c) Mention the advantages and disadvantages of using water as solvent in organic synthesis.  $2\frac{1}{2}$
- (d) Conventional bromination of *trans*-Stilbene involves the use of molecular bromine. Depict the reaction and propose a green alternative to this process with justification.  $1+2=3$
- (e) Provide one environmentally benign alternative to the following conventional reaction schemes and state the major

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advantage of your proposed alternatives :

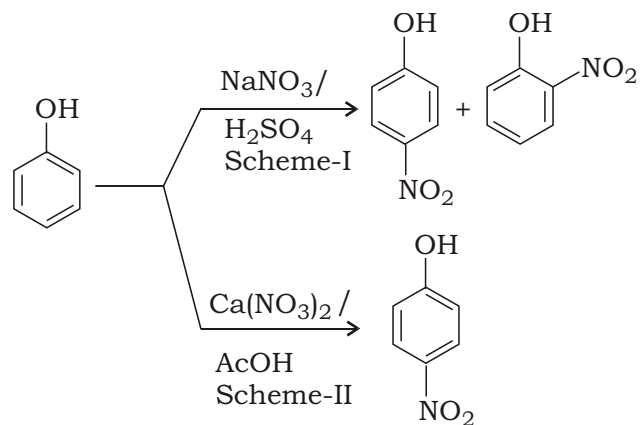
$1\frac{1}{2}\times 2=3$



6. (a) Illustrate (with examples) the following principles of Green chemistry :  $2+2=4$
- (i) Use renewable feed stock
- (ii) Avoid derivatives
- (b) Hydrazine ( $N_2H_4$ ) is used for rocket fuel. Calculate the percentage atom economy for hydrazine production :  $2\frac{1}{2}$
- $2NH_3 + NaOCl \rightarrow N_2H_4 + NaCl + H_2O$

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- (c) How is ultrasound employed to energise chemical reactions? 2
- (d) Compare the greenness between the following two schemes :  $1\frac{1}{2}+1\frac{1}{2}=3$



- (e) Why is phase-transfer catalysis considered 'Green'? With a suitable diagram explain the mechanistic process involved in a phase-transfer catalysis.  $3\frac{1}{2}$

UNIT—IV

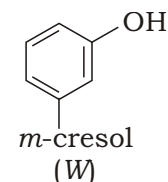
7. (a) What happens when ephedrine is boiled with concentrated HCl? Rationalise the formation of the product. 5

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( Turn Over )

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- (b) Provide the structures of four enantiomeric pairs of menthol. Outline the synthesis of ( ) menthol from compound (W).  $2+3=5$



- (c) Discuss the isolation, constitution and synthesis of progesterone.  $1+1\frac{1}{2}+2\frac{1}{2}=5$

8. (a) Outline the biosynthesis and laboratory synthesis of  $\beta$ -carotene.  $2+3=5$
- (b) What is the chemical relation of vitamin A with carotenoids? 2
- (c) Convert morphine to morphol. 3
- (d) Draw the absolute configuration of cholesterol and state the natural synthesis of cholesterol.  $1\frac{1}{2}+3\frac{1}{2}=5$

UNIT—V

9. (a) (i) Explain the synthesis of mRNA from a DNA blueprint with illustrations and description of template strand and sense strand. 3

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( Continued )

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- (ii) "A gene is not necessarily a continuous sequence of bases." Explain the statement. 1
- (b) Explain the role of Asp 102, His 57, and Ser 195 present in the chymotrypsin on its activity. 5
- (c) Explain the important factors on which the activity of an enzyme largely depends upon. 3
- (d) What are essential fatty acids? Provide the structure of any one of them and mention the natural source of it.  $1+1\frac{1}{2}+\frac{1}{2}=3$
10. (a) Provide a chemical method each for N- and C-terminal amino acid sequencing of protein.  $2+2=4$
- (b) (i) How is the fluidity of cell membranes controlled by the fatty acid components? Explain with structural representations.
- (ii) What is the absolute configuration of phosphoacylglycerols? What types of phosphoacylglycerols are prone to oxidation and how can that be prevented?  $3+(1\frac{1}{2}+1)=5\frac{1}{2}$

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- (c) How many forms can naturally occurring DNA exist in? Explain how these forms are characterised. What properties of the functional groups determine the binding of DNA with anti-cancer agents? Explain.  $1+2\frac{1}{2}+2=5\frac{1}{2}$

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