PG Odd Semester (CBCS) Exam., December—2018

CHEMISTRY

(3rd Semester)

Course No. : CHMCC–302

(Organic Chemistry—III)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

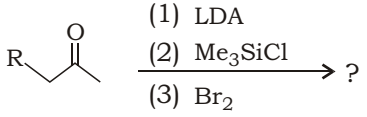
The figures in the margin indicate full marks for the questions

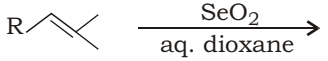
Answer **five** questions, taking **one** from each Unit

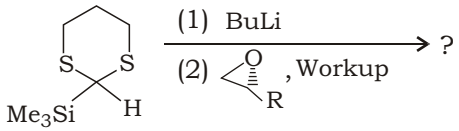
UNIT—I

1. *(a)* Explain with suggestive mechanism why BuLi undergoes 1,2-addition with , -unsaturated ketones, whereas Me_2CuLi undergoes 1,4-addition with the same. 2+2=4

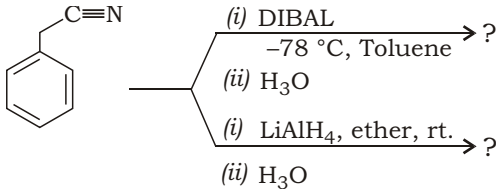
(b) Predict the product(s) of the following reactions and suggest plausible mechanism : 2+3+3=8

(i) 

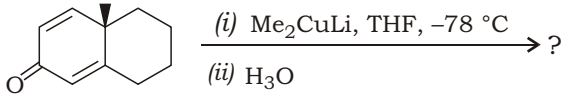
(ii) 

(iii) 

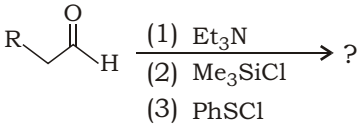
(c) Predict the product(s) of the following reactions : 1+1=2

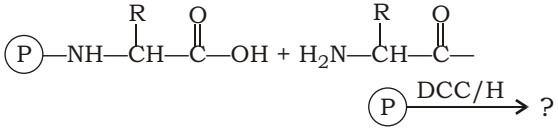


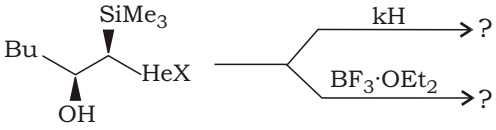
2. *(a)* How is Gilman reagent prepared? How can the reactivity of Gilman reagent be modified? Provide the mechanism for the following conversion : 1+1+3=5



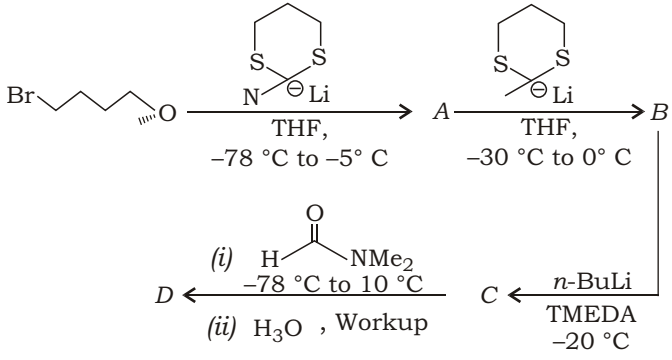
(b) Suggest a plausible mechanism for the following transformations : 2+2+3=7

(i) 

(ii) 

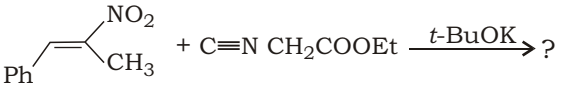
(iii) 

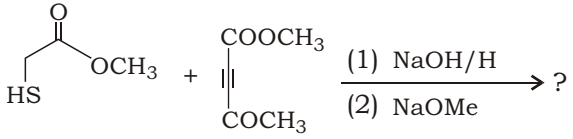
(c) Identify *A* to *D* in the following reaction : ½×4=2

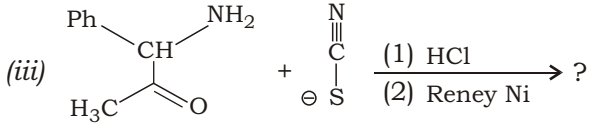


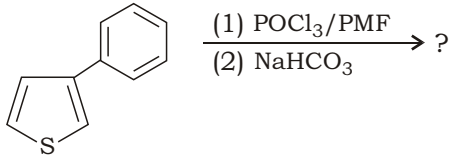
UNIT—II

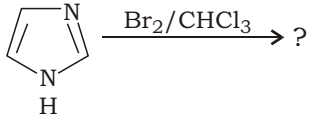
3. *(a)* Predict the major products of the following reactions with plausible mechanism : 2×5=10

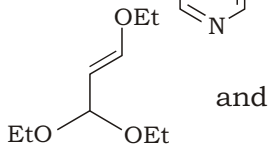
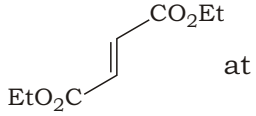
(i) 

(ii) 

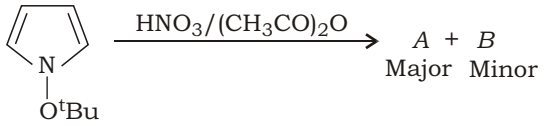
(iii) 

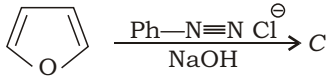
(iv) 

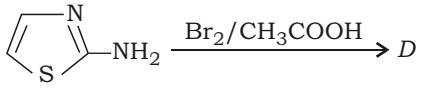
(v) 

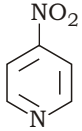
(b) How can  be prepared from  and  at 95 °C ? Provide the mechanism. 2

(c) Complete the following reactions : ½×4=2

(i) 

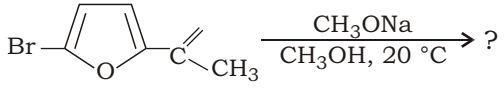
(ii) 

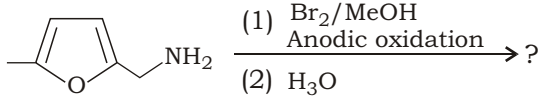
(iii) 

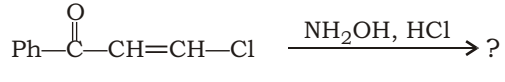
4. *(a)* Provide suitable strategy for obtaining 

from pyridine. Suggest the mechanism. 2

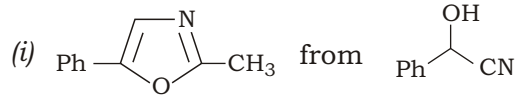
(b) Complete the following reactions and provide the mechanism : 2×3=6

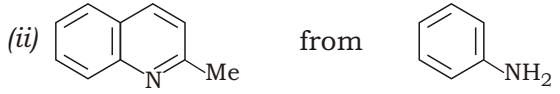
(i) 

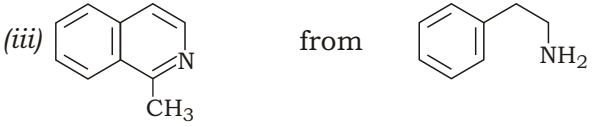
(ii) 

(iii) 

(c) Strategize the synthesis for the given transformations to ensure minimum side-product. (Provide the reaction condition and mechanism.) 2×3=6

(i) 

(ii) 

(iii) 

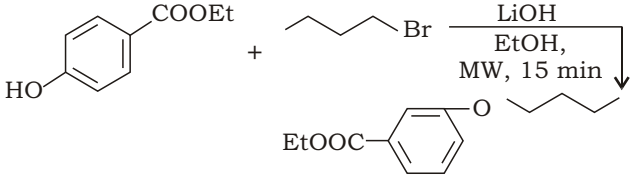
UNIT—III

5. *(a)* Provide the traditional route and greener route for synthesis of adipic acid. Provide comparison. 2+1=3

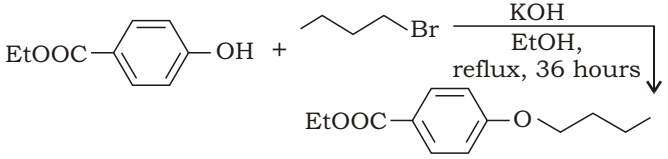
(b) What are the benefits of microwave-assisted synthesis over their conversional counterpart? 2

(c) Find the 'greener' route with justification : 3×3=9

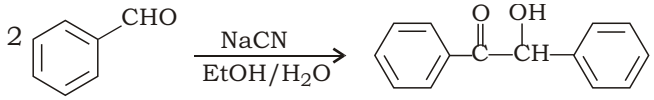
(i) Scheme I :



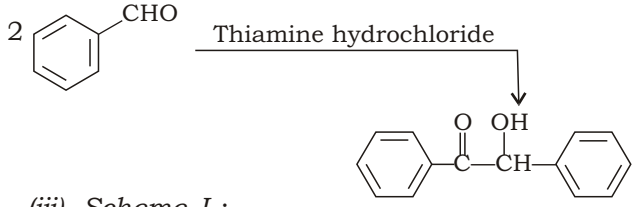
Scheme II :



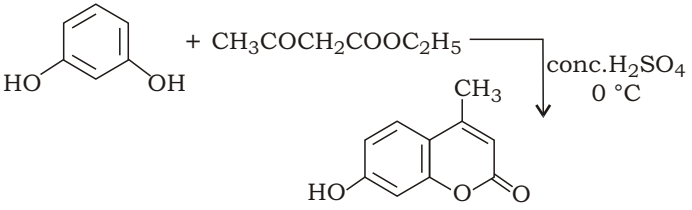
(ii) Scheme I :



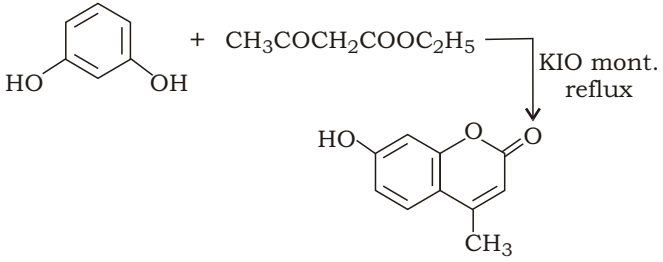
Scheme II :



(iii) Scheme I :



Scheme II :

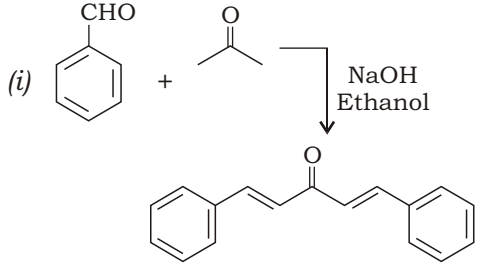


6. *(a)* What is the difference between Environmental Science and Green Chemistry? 2

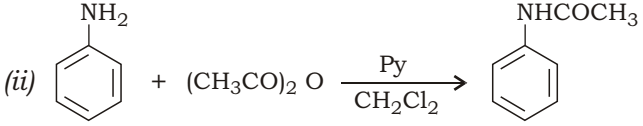
(b) How can a chemical process be made energy efficient? 1

(c) Suggest 'greener' method of synthesis for the following reactions, with justification on the superiority of your suggested method over the given methods : (1+2)×3=9

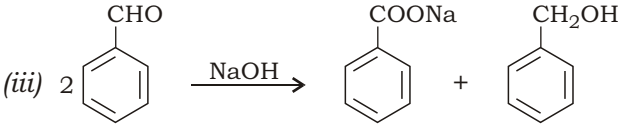
(i)



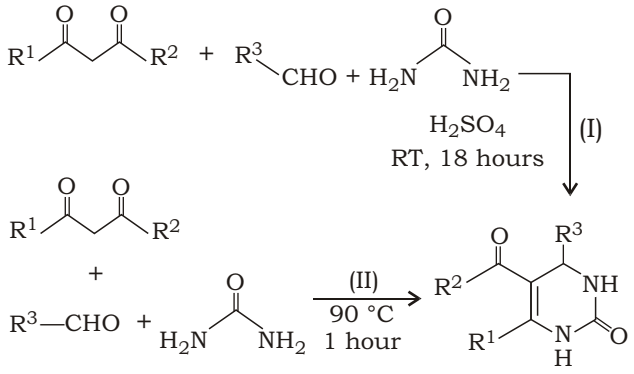
(ii)



(iii)



(d) Compare the following two processes in the light of Green Chemistry concepts : 2



UNIT—IV

7. *(a)* Provide the synthetic scheme along with the reagents and reaction conditions of (–) quinine from benzaldehyde. 6

(b) What is cardiac glycoside? Discuss structure-activity relationship of cardiac glycosides. 1+3=4

(c) Define steroid with example. 1½

(d) Provide the synthetic scheme for L-ascorbic acid from D-glucose. 2½

8. *(a)* Draw the structure in chair form of N-acetyl neuraminic acid. State occurrence and biological importance of sialic acid. 1+2=3

(b) Draw the structure of one S-glycoside and one C-glycoside and state their applications. 1+1=2

(c) State the biological importance of progesterone and provide the synthetic scheme of progesterone from stigmasteryl acetate. 2+3=5

(d) What will happen when ephedrine is *(i)* heated with HCl and *(ii)* treated with HNO_2? 2

(e) Provide a synthetic scheme of -ephedrine from CH_3CH_2CHO. 2

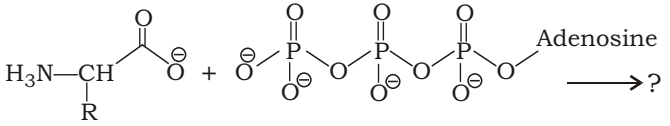
UNIT—V

9. *(a)* Describe the mechanism of action of the enzyme chymotrypsin. 4

(b) Provide the synthesis of Gly-Ala-Gly by solid-state process. 4

(c) What is Sangar's method of peptide sequencing? 2

(d) Complete the following biosynthetic process :



Provide each step of twin biochemical process. 4

10. *(a)* What are exon and intron? Explain the process of RNA splicing to highlight that different proteins can be prepared from the same gene. 2+2=4

(b) Explain why DNA contains thymine instead of uracil. 3

(c) Explain the formation of cephalin from glycerol. Indicate the stereochemical significance and outcome of the biosynthesis. What are the roles of cephalin? 3+2+1=6

(d) Provide the structure of purine bases of nucleic acid. 1

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