PG Odd Semester (CBCS) Exam., December—2017

CHEMISTRY

(3rd Semester)

Course No. : CH–302 (C)

(Organic Chemistry—III)

Full Marks : 75
Pass Marks : 30

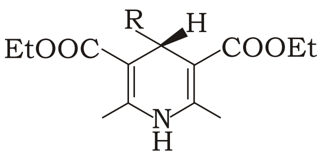
Time : 3 hours

The figures in the margin indicate full marks for the questions

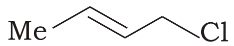
Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Predict the products and depict the mechanisms of the following (any *three*) : 2×3=6

(i)  $\xrightarrow{\text{DDQ}}$?

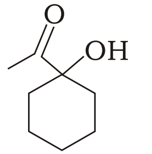
(ii) $PhCH_2C(=O){-}OCH_2CH_3 \xrightarrow[\text{2) } H_2O]{\text{1) DIBAL-H}} ?$

(iii)  $\xrightarrow[\text{(Gilman reagent)}]{RCu,\ BF_3}$?

(iv) Ph—Cl + Ph—MgBr $\xrightarrow{\text{cat. Ni/Ligands}}$?

(b) Discuss the mechanism of Hofmann-Loffler-Freytag reaction. 3

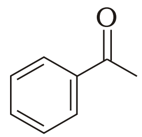
(c) How does 1,3-dithiane induce reactivity reversal? Provide a method of synthesis of

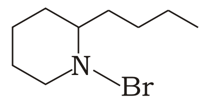


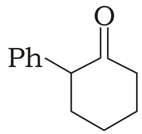
2+2=4

(d) What is Miyaura reaction? 2

2. *(a)* Predict the products with mechanism of the following : 2×3=6

(i)  $\xrightarrow[\text{trioxane}]{SeO_2}$?

(ii)  $\xrightarrow[\text{2) NaOH}]{\text{1) } H_2SO_4\text{, 140 °C}}$?

(iii)  $\xrightarrow[\text{2) } CH_3I]{\text{1) LDA, THF, –78 °C}}$?

(b) How is Gilman reagent prepared? Provide the use of Gilman reagent taking a suitable example (with mechanism). 1+2=3

(c) What is Negishi reaction? Provide the reaction and depict its mechanism. 1+3=4

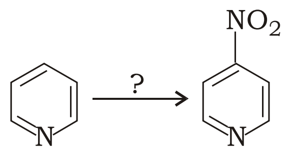
(d) Provide the mechanism of the following reaction : 2

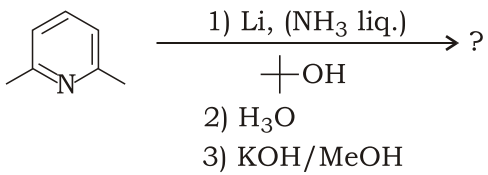
$$PhCOOH + PhOH \xrightarrow{DCC} Ph—COO—Ph$$

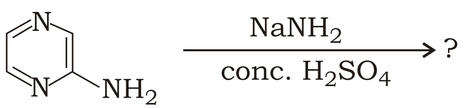
UNIT—II

3. (a) What is Chichibabin reaction (with mechanism)? 2

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

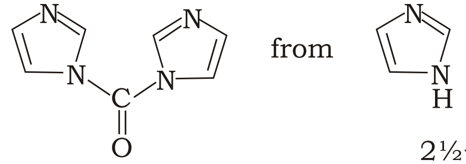
(i) 

(ii) 

(iii) 

(c) How will you synthesize the following?

(i) 

(ii) 

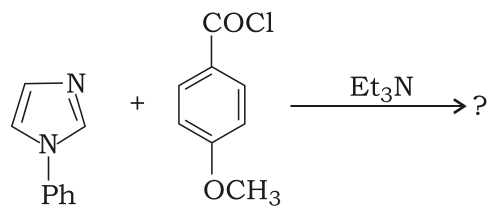
2½+2½=5

(d) What is Shapiro reaction? 2

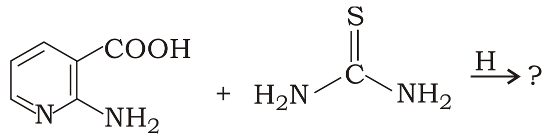
4. (a) Provide the synthesis of 1,3-thiazole derivative from thioamide and an -haloketone. 2

(b) Predict the products and depict the mechanisms of the following : 2½×4=10

(i) 

(ii) 

(iii) 

(iv) 

(c) Provide the general methods of synthesis of *(i)* imidazole, and *(ii)* pyrimidine. 1½+1½=3

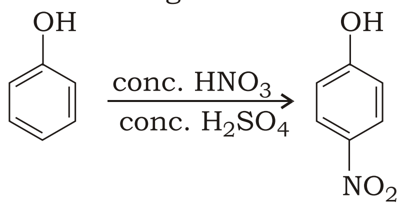
UNIT—III

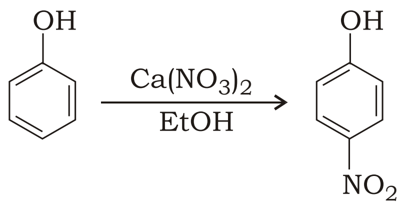
5. (a) What are the 12 principles of Green chemistry? Explain any two of them. 3+1½+1½=6

(b) Calculate the Atom Economy for the following reaction : 2

$$CaCO_3 \longrightarrow \underbrace{CaO}_{\text{Desired product}} + CO_2$$

(c) Compare and find out the greener method from the following : 3

Scheme *I* 

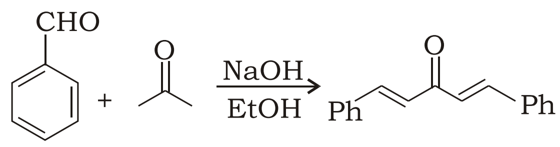
Scheme *II* 

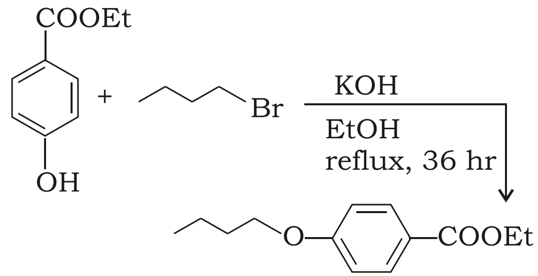
(d) Discuss the mechanism and scope of phase-transfer catalysis. 3

(e) What is E-factor? 1

6. (a) How does Green chemistry cater to provide sustainable chemistry? 2

(b) Provide greener alternative to the following reactions with justification : 2+2=4

(i) 

(ii) 

(c) How does renewable feedstock make a chemical process green? 2

(d) Provide *(i)* the Boot's method, and *(ii)* Green synthesis of ibuprofen. 2½+1½=4

(e) What are biodegradable polymers? Provide an example of a biodegradable polymer with synthesis. 1+2=3

UNIT—IV

7. *(a)* Elucidate the structure and provide the synthesis of Geraniol. 2+2=4

(b) Draw the absolute configuration of cholesterol and provide its natural synthesis. 2+3=5

(c) Outline the laboratory synthesis of -carotene. 3

(d) Discuss the synthesis of progesterone. 3

8. *(a)* Discuss the structure elucidation and synthesis of menthol. 4

(b) How will you convert morphine to morphol? 3

(c) What happens when ephedrine is boiled with conc. HCl? Rationalize the formation of the product. 5

(d) Provide the synthesis of testosterone. 3

UNIT—V

9. *(a)* Explain what is the 'induced fit' model for enzyme-catalysed reactions. 4

(b) Illustrate the mechanism of action of lysozyme. 5

(c) What are essential fatty acids? Give examples. Explain their stereochemistry to depict their advantages over other types of animal fats. 2+2=4

(d) Draw the double-helix structure of DNA, showing the H-bonded interactivities. 2

10. *(a)* Illustrate the mechanism of actions of chymotrypsin. 5

(b) Describe Merrifield synthesis of a tripeptide (gly-ala-gly). 5

(c) Discuss the M-terminal and C-terminal amino acid sequencing of peptide. 1½+1½=3

(d) Write a brief note on replication of DNA. 2

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