8. (a) What is cardiac Glycosides? Provide structure activity relationship (SAR) of cardiac glycosides. 1+2=3

(b) Which are the most commonly found derivatives of Sialic acid? Draw their structures. Write occurrence and functions of 'Sialic acid' in biological system. 1+1+3=5

(c) Provide the synthetic route of Testosterone and Progesterone from Cholesterol. 3+3=6

UNIT - V

9. (a) Describe the mechanism of action of the enzyme chymotrypsin. 5

(b) Explain the important factors on which the activity of an enzyme largely depends on. 3

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

(d) In the process of translation, what are the roles of stop codons and anticodons? Explain and provide a diagrammatic representation. 4

10. (a) Describe the process by which genetic message in DNA that has been passed to mRNA is decided and used to build proteins. Use an illustration in support of your description. 7

(b) What is the main chemical composition of the phospholipids that constitute the cell membranes? Provide the structure and comment on the role of stereochemistry of fatty acids to provide greater elasticity to the cell membranes. 3

(c) Explain the reason why uracil replaces thiamine in RNA. 3

(d) What are stop codons? 1

★★★

PG (CBCS) ODD SEMESTER EXAMINATION, 2022

CHEMISTRY

3rd Semester

Course No. : CHMCC - 302

(Organic Chemistry- III)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

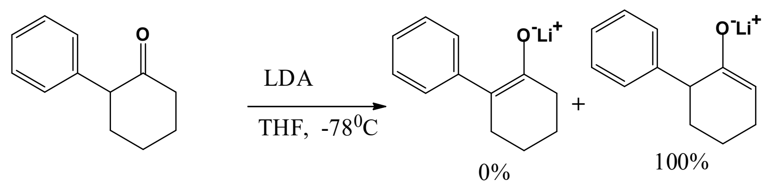
The figures in the margin indicate full marks for the questions

(Answer any five questions, taking one from each unit)

UNIT - I

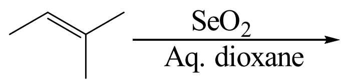
1. (a) Explain with suggestive mechanism why BuLi undergoes 1,2- addition while Me_2CuLi undergoes 1,4 addition with α,β-unsaturated ketones. 2+2=4

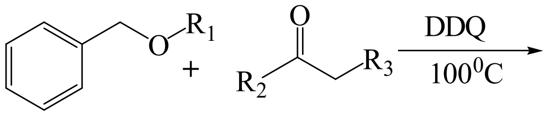
(b) Suggest the plausible mechanism with appropriate transition state for the following conversion: 3

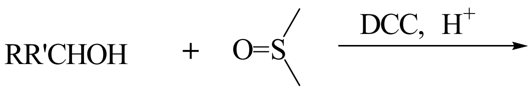


(Turn Over)

(c) Predict the product(s) for the following reaction with supporting mechanism 2+3+2=7

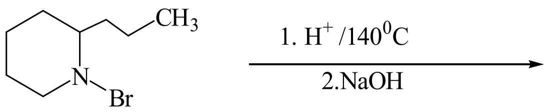
i) 

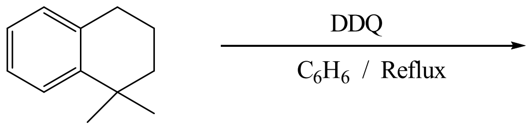
ii) 

iii) 

2. (a) How can reversal of polarity of carbonyl compounds be achieved? Synthesis decane from formaldehyde taking suitable reagents. Provide mechanism 1+3= 4

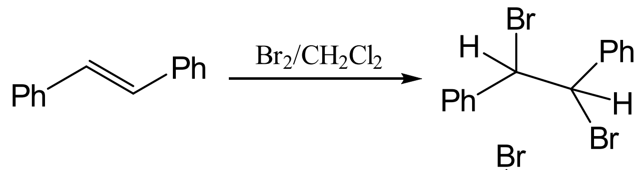
(b) Predict the product(s) and suggest appropriate mechanism in support of the products. 2+2+3=7

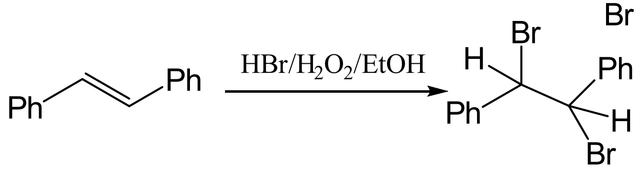
i) 

ii) 

iii) **R-X** + **R_1-Zn-X** $\xrightarrow{\textbf{PdLn}}$

(c) Predict the product(s) and suggest appropriate mechanism in support of the products. 3

(ii) Scheme I 

Scheme II 

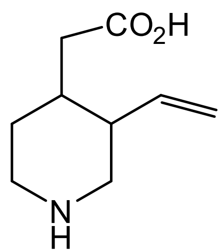
(c) Provide mechanism ofphase transfer catalysis. 3

(d) Provide two advantages and disadvantages of using water as solvent in synthesis 2

UNIT - IV

7. (a) Chemically prove that Ephedrine is erythroand Ψ-Ephedrine is threo configuration. Provide the biosynthesis of Ephedrine from L-Phenylalanine. 3+3=6

(b) Provide a schematic outline of isolation procedure of Quinine from plant sample. Quinine ($C_{20}H_{24}N_2O_2$) on treatment with chromic acid results Quininic acid ($C_{11}H_9NO_3$) and meroquinene ($C_9H_{15}NO_2$). Chemically prove that meroquinene has the following structure (A). 2+3=5



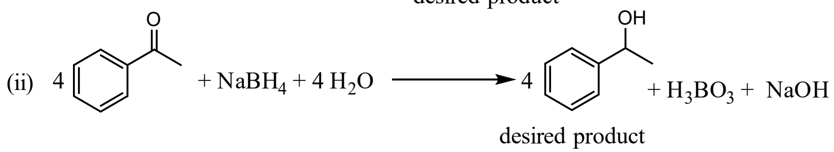
A

(c) Provide the structure of Sinigrin and Alloin and state their importance. 3

UNIT - III

5. (a) What do mean by 'atom economy' of a reaction? How does it differ from E-factor? Calculate atom economy for the following reactions: 1+1+2+2=6

(i) $C_6H_{12}O_6\ (aq) \longrightarrow \underset{\text{desired product}}{2C_2H_5OH} + 2CO_2\ (g)$

(ii) 

(b) Provide and compare the old and green methods of Ibuprofen synthesis. 2+2=4

(c) What are the benefits of microwave assisted synthesis over their conventional counterpart? 2

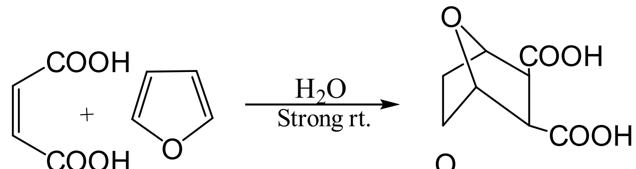
(d) How does application of microwave in chemical reactions make it 'greener'? 2

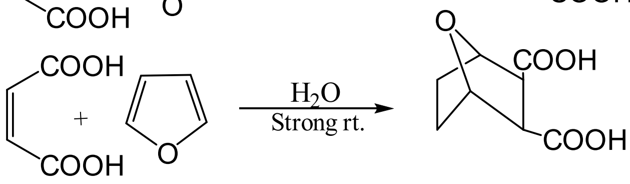
6. (a) Illustrate (with example) the following principles of green chemistry: 2+2=4

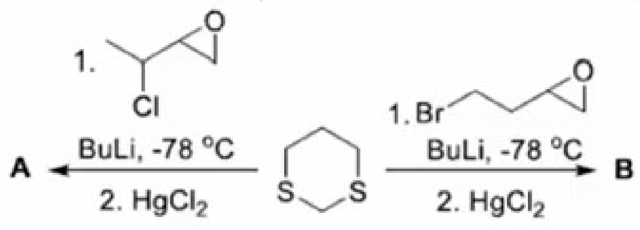
(i) Use renewable feedstock

(ii) Avoid derivatives

(b) Find the 'greener' route with justification: $2^1/_2$x2=5

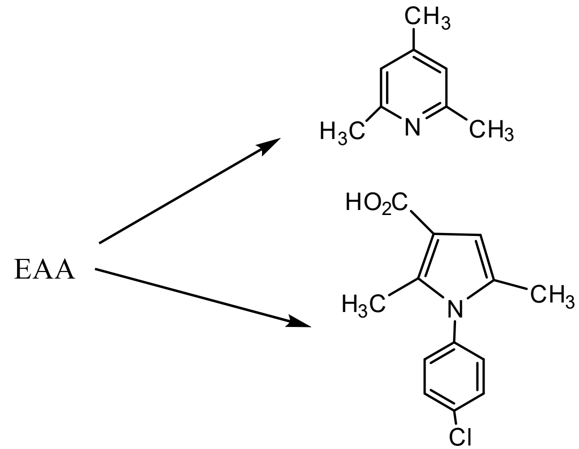
(i) Scheme I 

Scheme II 

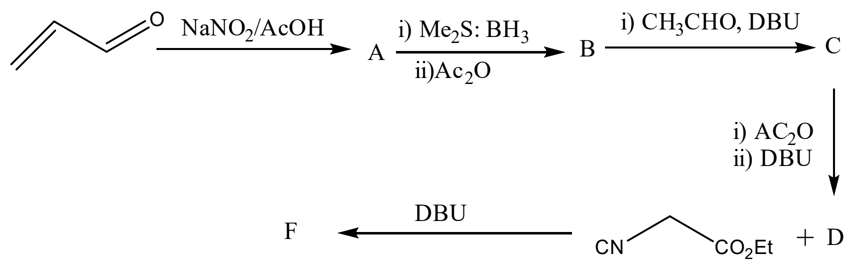


UNIT - II

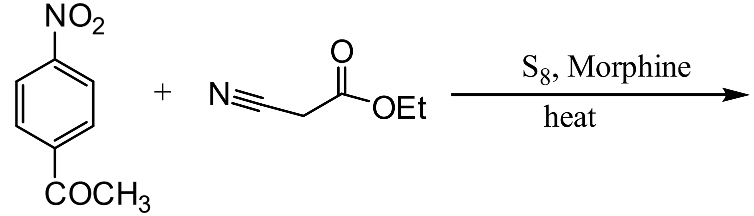
3. (a) Carry out the following conversions. Write the reaction conditions and reagents involved. 2+2=4

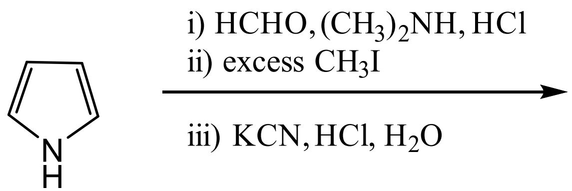


(b) Identify A-F for the following reaction sequences and provide the mechanism for the last step. $2\frac{1}{2}+2\frac{1}{2}=5$

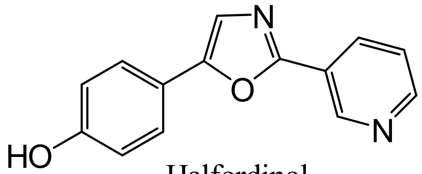


(c) Provide the major product of the following reaction (s) and suggestst appropriate mechanism. $2\frac{1}{2} \times 2 = 5$

i) 

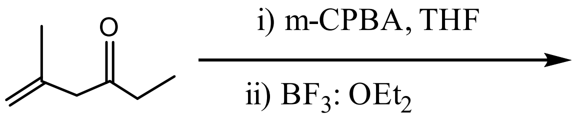
ii) 

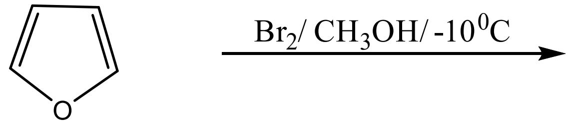
4. (a) Halfordinol a parent compound for Rutaceae alkaloids can be synthesized from a cyanohydrin and aldehyde by "Fisher oxazole synthesis". Provide the synthesis of halfordinol with proper mechanism of the reaction. $2^1/_2$

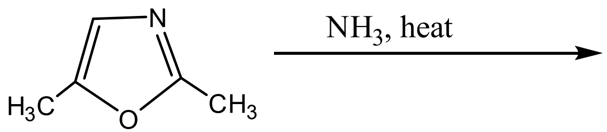


Halfordinol

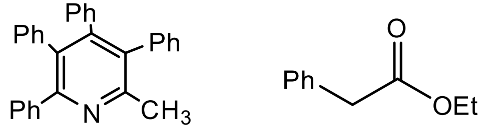
(b) Identify the product(s) of the following reaction (s) with proper explanation and mechanism. 2x3=6

i) 

ii) 

iii) 

(c) Provide a synthetic route of pyridine derivative A using ester B and a nitrile compound as starting material. $2^1/_2$



A B

(d) Identify the reagents and products (A to G). 3