

## B.Sc. 5th Semester (Honours) Examination, 2022 (CBCS)

## Subject : Chemistry

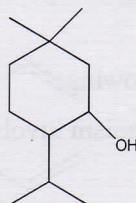
## Course : CC-XII

Time: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer any five questions from the following: 2×5=10

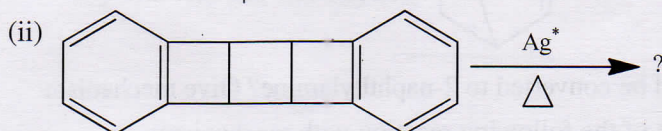
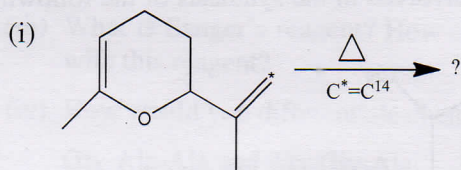
- (a) What happens when furan is treated with diazomethane in presence of CuBr?  
 (b) How would you distinguish chemically between ribose and 2-deoxy ribose?  
 (c) What do you mean by "Complimentary base pairing" in DNA?  
 (d) What is "isoprene rule"? Find out the isoprene units in the following compound.



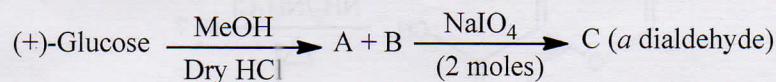
- (e) Draw the HOMO and LUMO of 1,3,5-hexatriene in thermal condition.  
 (f) Write down the R/S configuration of L-proline.  
 (g) Draw the most stable conformation of 1,3-dimethyl cyclohexane. Does it show optical activity?  
 (h) What happens to an aldopentose when warmed with dilute acid?

2. Answer any two questions: 5×2=10

- (a) Predict the product of the following reactions with explanation:
- 2½×2=5



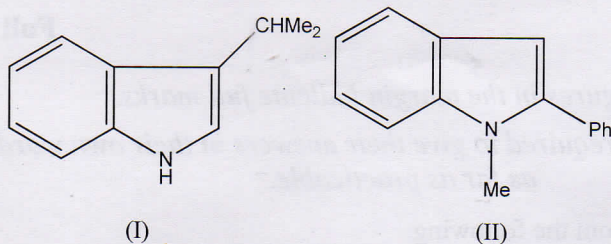
- (b) (i) Identify the compounds A – C in the following reaction sequence:
- 3



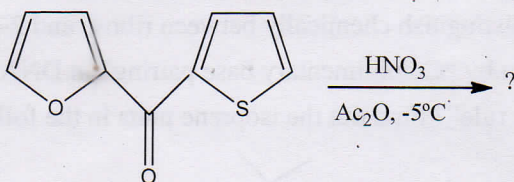
- (ii) Mutarotation of D-glucose is facile in presence of 2-hydroxypyridine instead of pyridine alone—Explain.
- 2



- (c) (i) Outline the synthesis of ( $\pm$ )-tryptophan from acetamido malonic ester. 3  
 (ii) Point out the role of DCC in direct synthesis of a dipeptide. 2
- (d) (i) What starting materials are required for the synthesis of each of the following compounds by the Fischer Indole synthesis? 2x2



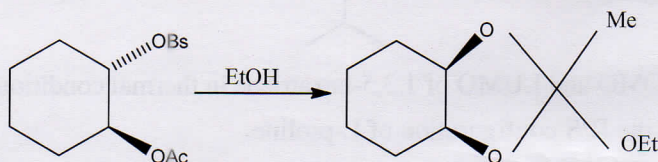
- (ii) Draw the structure of mono nitro product of the following reaction. 1



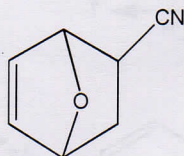
3. Answer any two questions from the following:

10x2=20

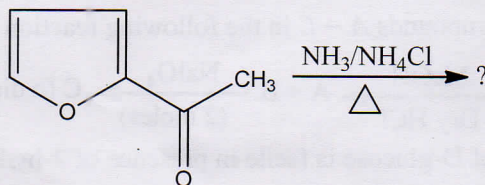
- (a) (i) Give the outline of the mechanism involved in the following reaction: 3



- (ii) Provide an explanation for the fact that under the same reaction conditions (EtONa in EtOH at 75°C), the cis-isomer of 4-tert-butylcyclohexyl tosylate undergoes a facile E2 elimination, but the trans isomer does not. 3
- (iii) Show the steps involved in the complete Hofmann exhaustive methylation of 2-methyl piperidine. 2
- (iv) Identify the diene and dienophile involved in the synthesis of the following Diels-Alder adduct. 2

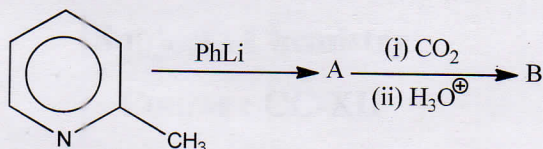


- (b) (i) How can 2-naphthol be converted to 2-naphthylamine? Give mechanism. 3  
 (ii) Predict the product of the following reaction with mechanism: 3



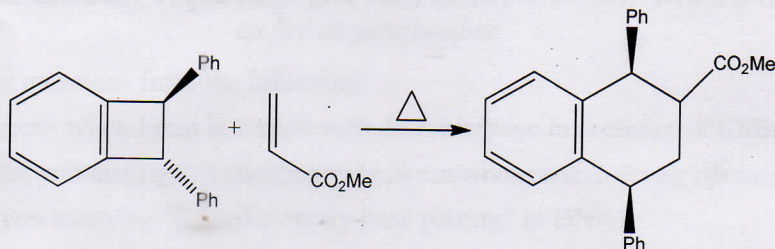


- (iii) Identify A & B in the following reaction sequence: 2

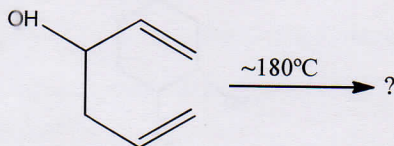


- (iv) How formylation of anthracene be carried out at its 9-position? 2

- (c) (i) Rationalise the following reaction by FMO: 3



- (ii) Give the structure of the principal organic product of the following reaction with brief explanation. 2



- (iii) An aldohexose,  $\text{C}_6\text{H}_{12}\text{O}_6$  on reduction with Na/Hg gives D-sorbitol which on reaction with excess phenylhydrazine forms an osazone which is different from the osazone of D-glucose. Write down the structure of the aldohexose explaining the reactions. 3
- (iv) Show how many moles of  $\text{HIO}_4$  will be required for the oxidation of one mole of methyl- $\alpha$ -D-glucopyranoside? 2
- (d) (i) How can  $\alpha$ -terpineol be synthesized from methyl vinyl ketone (MVK) using Diels-Alder reaction? Show the steps involved. 3
- (ii) Mention the name of purine and pyrimidine bases present in DNA. 2
- (iii) What is Sanger's reagent? How can you detect the N-terminal amino acid of a peptide with this reagent? 1+2
- (iv) How would you differentiate chemically between the following peptides? 2  
Gly-Ala-Ala and Ala-Gly-Ala