



Registration number:

Date:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc. (ORGANIC CHEMISTRY) - III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2022
(Examination conducted in December 2022)
OCH 9322 – CHEMISTRY OF HETEROCYCLIC COMPOUNDS,
BIOMOLECULES AND NATURAL PRODUCTS

Time- 2 ½ hrs

Max Marks-70

This question paper contains TWO printed pages and THREE parts

Part A

Answer any SIX of the following questions

(6 x 2 = 12)

1. What are proteoglycans? Give an example.
2. What are the starting materials required for the synthesis of pyridazine?
3. Write the structures of benzothiophene and isobenzothiophene.
4. How do you determine the number of C-methyl groups present in terpenes?
5. Draw the structure of an alkaloid which contains indole ring.
6. Give the biological significance of prostaglandins.
7. What are the functions of vitamin B₁₂?
8. Write the chemical equation of Diels-Alder reaction of 1,3,5-triazine.

Part B

Answer any FOUR of the following questions.

(4 x 12 = 48)

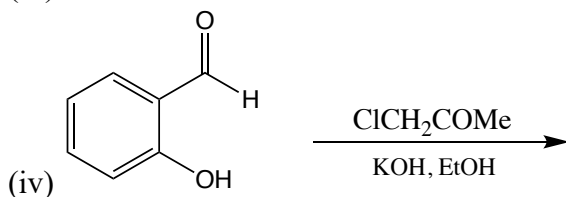
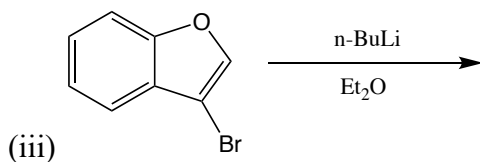
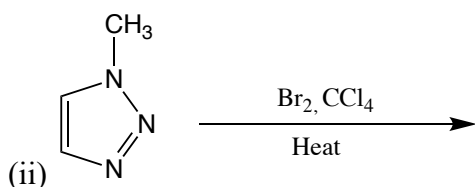
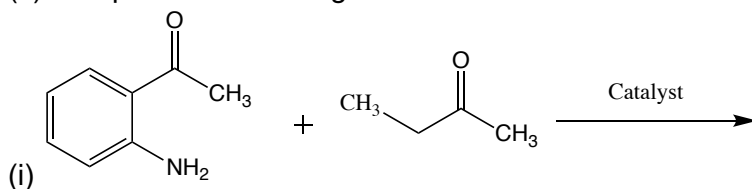
9. (a) Give the biosynthetic pathway for α -pinene starting from isopentenyl pyrophosphate.
(b) Draw the partial structure of chondroitin sulphate and cellulose nitrate. Give their biological significance. **(6+6)**
10. (a) Write the mechanism of synthesis of pyrimidine (1,3-diazine) using amidine as starting material. Give an example of C-C bond formation reaction of pyrimidine with organometallic compound.
(b) Discuss the reactivity of indole towards electrophilic substitution reaction using suitable examples. What happens when indole is treated with
(i) allyl bromide (CH=CH-CH₂Br) in the presence of Grignard reagent;
(ii) butyllithium followed by carbon dioxide? **(6+6)**
11. (a) Give the structural elucidation of quinine.
(b) Describe the steps involved in the synthesis of reserpine. **(6+6)**
12. (a) Describe the Corey's synthesis of farnesol from trans-geranyl acetone.
(b) Discuss the structural elucidation of haemin. **(6+6)**
13. (a) Explain the various steps involved in the stereoselective synthesis of bombykol.

(b) Give the pathway for the conversion of arachidonic acid to PGE₂. Mention the name of the enzyme that catalyses this conversion. **(6+6)**

14. (a) Write the chemical reactions for the action of acid on (i) pyrrole (ii) furan, and (iii) thiophene. Give any one method of synthesis of thiophene (mechanism is not required).

(b) Explain Merrifield synthesis of peptides.

(c) Complete the following reactions: **(4+4+4)**



Part C

Answer any TWO of the following questions.

(2 x 5 = 10)

15. A bicyclic terpene **A** with molecular formula C₄₀H₅₆ has λ_{max} = 456 nm and on catalytic hydrogenation, it absorbs 11 moles of hydrogen. This terpene (**A**) on oxidation gives β-ionone (**B**) and geronic acid (**C**). Give the structures of **A**, **B** and **C**.

16. How would you use 1,4-diketones in the synthesis of 5-membered and 6-membered heterocyclic compounds? Give suitable example in each case.

17. (a) Compound **A** having an amino group reacts with an aldehyde to give imine **B** as an intermediate which on treatment with HCl gives tetrahydroisoquinoline. Write the structures of **A** and **B**.

(b) What is the name of heteropolysaccharide which is found in skin and made up of L-iduronate and N-acetyl-D-galactosamine. Draw its structure. **(2+3)**

x-----End of questions-----x