LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

SIXTH SEMESTER – **APRIL 2023**

16/17/18UCH6MC03 – SYNTHETIC ORGANIC CHEMISTRY AND HETEROCYCLIC COMPOUNDS

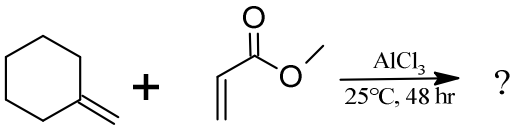
Date: 05-05-2023 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

Part-A

Answer ALL questions. **(10 × 2 = 20 Marks)**

1. Define the term "Synthon" and "Synthetic equivalent".
2. What is retrosynthetic analysis?
3. Mention the significance of hydroboration and oxidation reaction.
4. Write any one synthetic use of $NaBH_4$.
5. Identify the product and the name reaction of the following reaction.

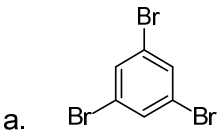


6. State the Woodward-Hoffman rules for electrocyclic reactions.
7. Predict the aromaticity of the following compounds using Huckel's rule.
   (i) Pyrrole (ii) Furan (iii) Thiophene (iv) Pyridine
8. Why is piperidine is more basic than pyridine?
9. How is tetrahydofuran prepared?
10. Give the structure of the following compounds:
    (i) Indole (ii) Isoindole (iii) Quinoline (iv) Isoquinoline

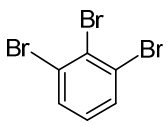
Part-B

Answer any EIGHT questions. **(8 × 5 = 40 Marks)**

11. Convergent synthesis is better than linear synthesis. Justify with examples.
12. Demonstrate the significance of activating groups in the synthesis of the following compounds.



a.



b.

13. Analyse the mechanism of Birch reduction and the impact of substituents on product formation with examples.
14. Compare the mechanism of Clemmensen and Wolf-Kishner reduction.
15. Indicate the characteristic features of pericyclic reactions.

16. Demonstrate that the [4+2]-cycloaddition reaction proceed under thermal conditions with FMO approach.
17. Explain the mechanism and salient features of Claisen rearrangement.
18. Illustrate the position of electrophilic and nucleophilic substitution of pyrrole.
19. Write any one method of preparation for furan, pyrrole and thiophene.
20. Write and explain the mechanism of Chichibabin reaction.
21. Explain the mechanism Fischer indole synthesis.
22. Give any five electrophilic substitution reactions of indole.

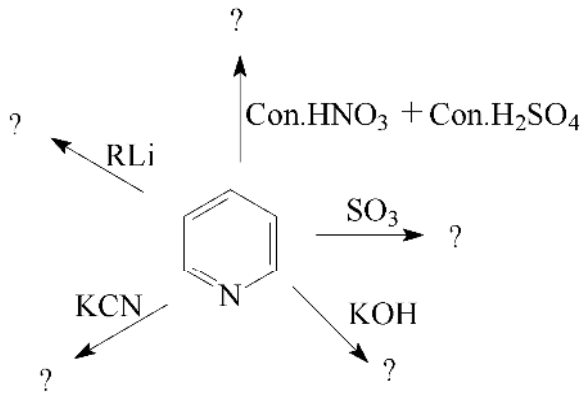
Part-C

Answer any FOUR questions. **(4 × 10 = 40 Marks)**

23a. Mention the advantage and disadvantages of protecting groups in organic synthesis. **(6)**

b. How will you synthesis the following compound based on umpolung approach? **(4)**

24. Compare the reactivity and selectivity of LAH, $NaBH_4$ and $NaCNBH_3$ reagents.
25. Appraise the synthetic utilities of Claisen, [1,5]-sigmatropic and Sommelet Hauser rearrangements.
26. Outline the mechanism of synthetic applications of oxidation with Cr(VI) and Mn(VII) reagents with suitable examples.
27. Describe the mechanism of Skaraup synthesis of quinoline and Bischler-Napieralski synthesis of isoquinoline.
28. Predict the product of the following reactions.



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