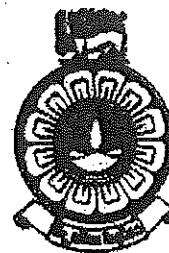


The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc. Degree Programme



| | |
|------------------------------|---------------------------------------|
| Department | : Chemistry |
| Level | : 5 |
| Name of the Examination | : Final Examination |
| Course Code and Title | : CYU5303 Organic Chemistry II |
| Academic Year | : 2021/2022 |
| Date | : 07.10.2022 |
| Time | : 02.00 p.m.- 04.00 p.m. |
| Duration | : 2 hours |
| Index number | : |

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Four** questions in **five** pages.
3. **Answer All FOUR (04) questions. All questions carry equal marks.**
4. **Answer for each question should commence from a new page.**
5. Draw fully labelled diagrams where necessary.
6. Having any unauthorized documents/ mobile phones in your possession is a punishable offense
7. Use blue or black ink to answer the questions.
8. Circle the number of the questions you answered in the front cover of your answer script.
9. Clearly state your index number in your answer script

1) Answer any **FOUR (04)** parts from (a) – (e).

a) Provide a mechanism for the reaction of 2-chloropyridine with NaOEt and explain the behavior of 3-chloropyridine with NaOEt.
(Hint: Consider the resonance structures of pyridine)

(25 marks)

b) Give the product resulting from heating pyridine with NaNH₂ followed by the addition of H₂O. Suggest a mechanism and explain the orientation of the reaction.

(25 marks)

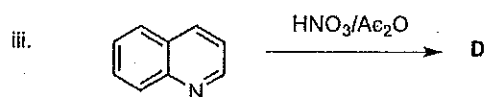
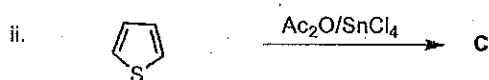
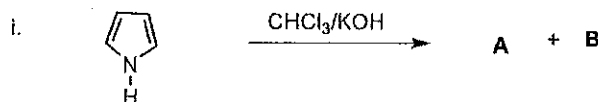
c) Compare the acidities of the methyl H's of 2-methylpyridine and 4-methylpyridine with 3-methyl pyridine.

(25 marks)

d) Explain why electrophilic substitution in indole occurs mainly at the C-3 rather than the C-2 position.

(25 marks)

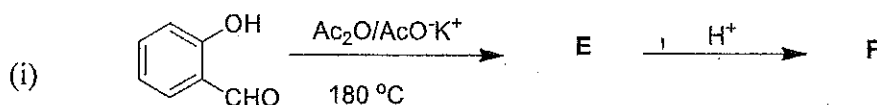
e) Give the structures of the major products **A, B, C, and D** of the following reactions.



(25 marks)

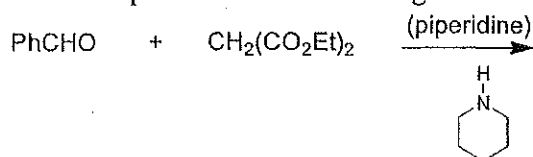
2) Answer any **FOUR (04)** parts from (a) – (e).

a) Give the structures of the products **E-I** of the following reactions.



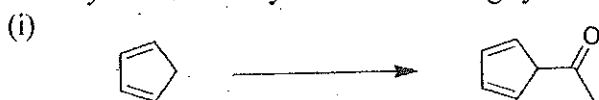
(25 marks)

b) Predict the product of the following reaction. Give the mechanism for the reaction.



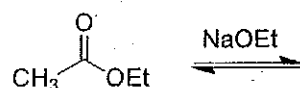
(25 marks)

c) Show how you would carry out the following syntheses using **organometallic reagents**.



(25 marks)

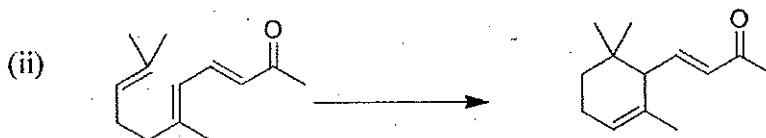
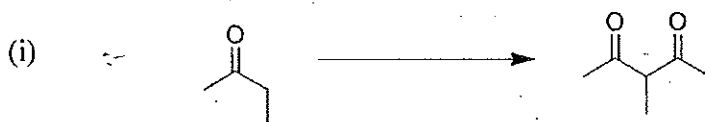
d) i) Predict the product of the following Claisen condensation reaction. Give the mechanism for the reaction.



ii) Give the expected product from the Claisen condensation of $(\text{C}_2\text{H}_5)\text{CHCOOEt}$. Explain the reasons for achieving this product.

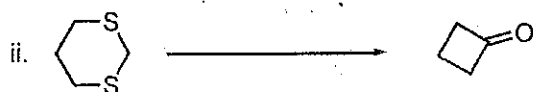
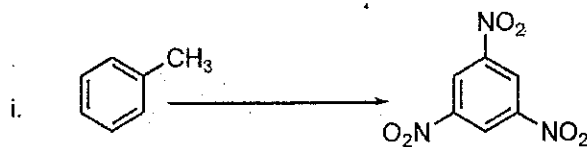
(25 marks)

e) Give the necessary reagents and/or conditions for the following reactions.



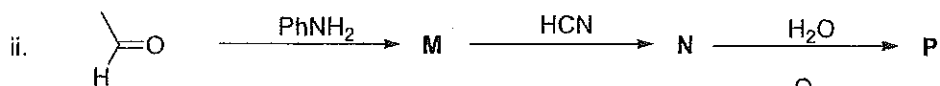
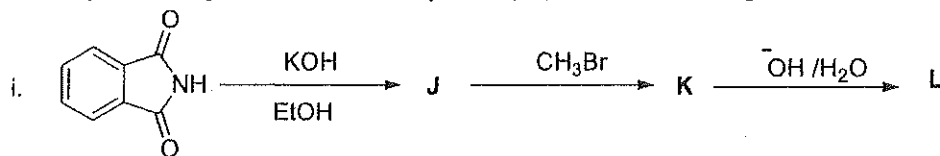
(25 marks)

3) a) Giving correct reagents and conditions, show how you would carry out the following synthesis.



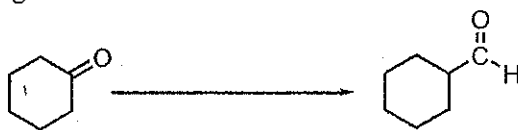
(40 marks)

b) Identify the compounds J – S in any two (02) of the following reactions.



(30 marks)

c) Giving the mechanism show how you would carry out the following synthesis using $\text{BrCH}_2\text{OCH}_3$ via the Wittig reaction.

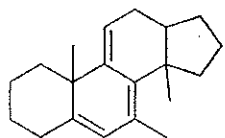


(30 marks)

4) a) Briefly explain the different types of electronic transitions possible in $\text{CH}_2=\text{CHCHO}$ with a suitable energy diagram.

(20 Marks)

b) Using Woodward Fieser rules, calculate the λ_{max} of compound T.

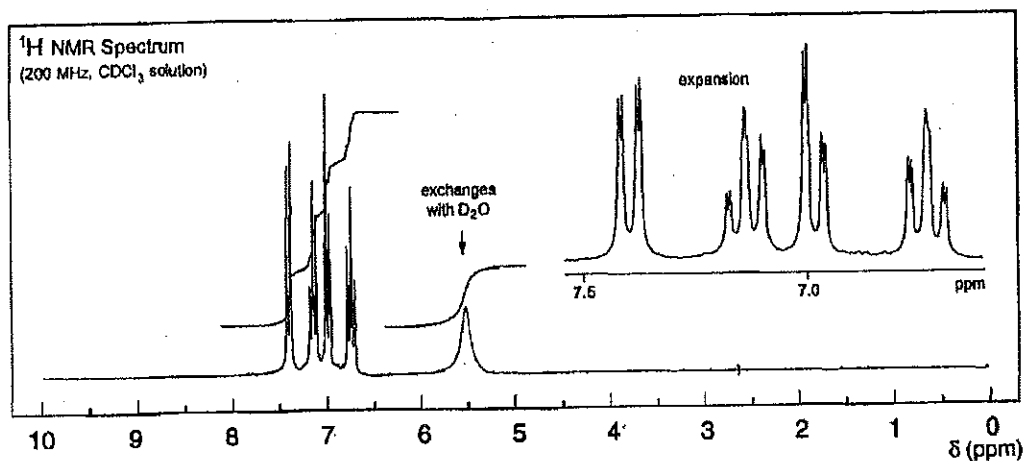
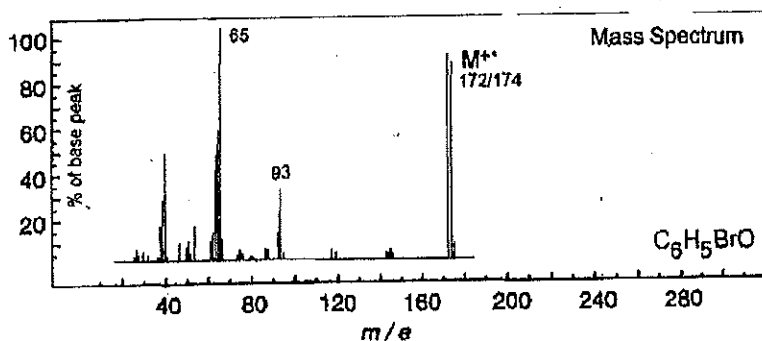
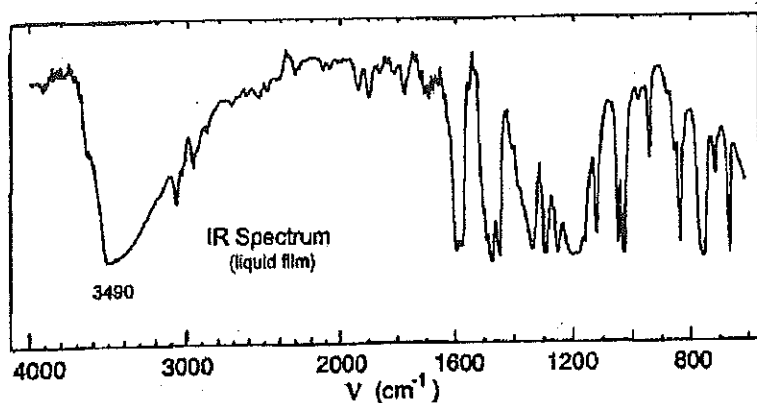


Compound T

(20 marks)

| | |
|---|--------|
| Base value for heteroannular or transoid diene | 214 nm |
| Base value for homoannular or cisoid diene | 253 nm |
| Increments for | |
| Double bond extending conjugation | +30 |
| Alkyl substituent or ring residue | +5 |
| Exocyclic double bond | +5 |
| Polar groupings: | |
| OAc | +0 |
| OAlk | +6 |
| SAlk | +30 |
| Cl, Br | +5 |
| N(Alk) ₂ | +60 |
| Solvent correction* | +0 |

c) Given below are IR, Mass, and ^1H NMR spectra of compound W ($\text{C}_6\text{H}_5\text{OBr}$). (Hint- atomic weight of Br=79 amu)



- (i) What are the functional groups present in W?
- (ii) Calculate the degree of unsaturation for compound W.
- (iii) How many different types of protons are present in compound W?
- (iv) Deduce the structure of compound W.
- (v) Give the structure of the ion at $m/e=172$ and show the fragmentation pathway leading to the ion at $m/e=93$ for compound W.

(60 Marks)

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