



THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. DEGREE PROGRAMME / STAND ALONE COURSE 2013/2014

LEVEL 5-FINAL EXAMINATION

CMU3120-ORGANIC CHEMISTRY

DURATION: 2 HOURS

Monday 02<sup>nd</sup> June 2014

1.00 p. m. – 3.00 p. m.

Answer all questions

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

- (a) Draw the resonance structures of the following heterocyclic compounds and explain why the resonance energy of furan (16 kJ/mol) is much less than that of thiophene (25 kJ/mol).



furan



thiophene

(25 marks)

- (b) Give an example of a nucleophilic substitution reaction in a pyridine or substituted pyridine. Draw the resonance structures of the intermediate ion and indicate the most stable contributing structure.

(25 marks)

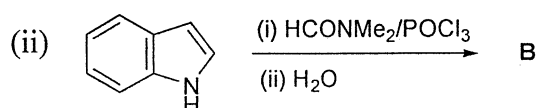
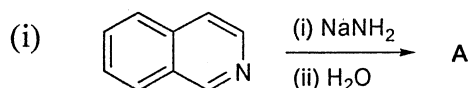
- (c) 'Pyridine undergoes electrophilic substitution very slowly like a deactivated benzene derivative and gives 3-nitropyridine'. Explain the above statement.

(25 marks)

- (d) Electrophilic substitution in pyrrole occurs mainly at  $\alpha$ -position. Explain the above statement.

(25 marks)

- (e) Predict the products of the following reactions.

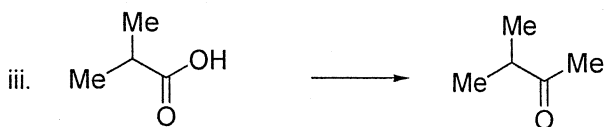
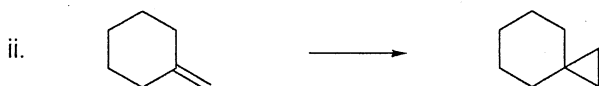


(25 marks)

2. (a) Discuss briefly the methods available for the preparation of Grignard reagents.

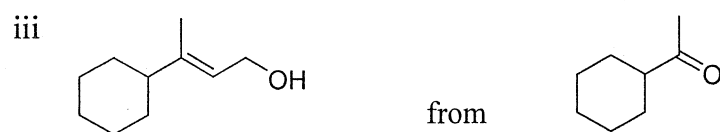
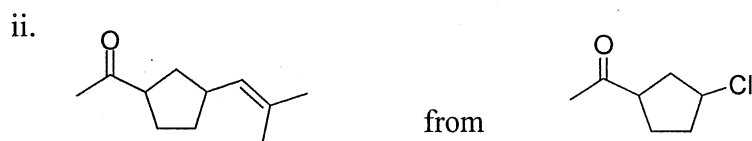
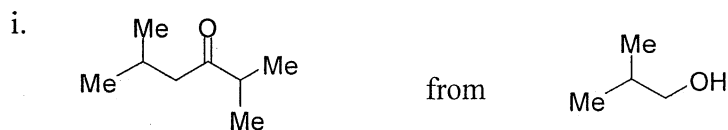
(20 Marks)

(b) Show how you would carry out any **TWO (02)** of the following syntheses using **organo metallic reagents**.



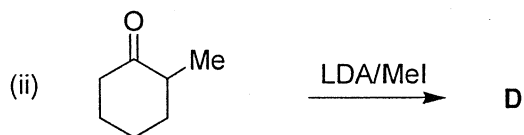
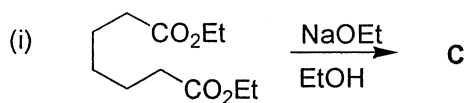
(20 Marks)

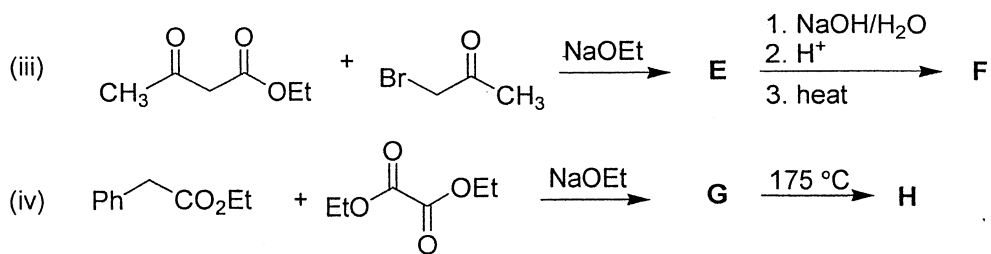
(b) Giving necessary reagents and conditions outline show how you would synthesize any **TWO (02)** the following.



(60 Marks)

3. (a) Give the structures of the compounds (C-H) of the following reactions/reaction schemes.

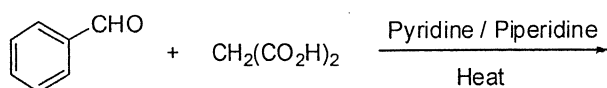




(30 Marks)

(b) Answer **either** part A or B**Part A:**

Consider the following reaction.



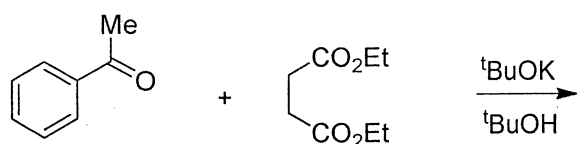
i. Giving the mechanism predict the structure of the product.

In an experiment, 0.583 g of benzaldehyde was reacted with 0.520 g of malonic acid using above reaction conditions to obtain 0.592 g of the product.

- ii. Using appropriate calculations determine the limiting reagent of the reaction?
- iii. Calculate the expected yield of the reaction and the percentage yield of the product.

**Part B:**

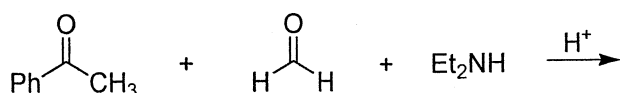
i. Giving the mechanism Predict the structure of the product of the following reaction.



ii. Indicate the use of the above reaction in organic synthesis?

(40 Marks)

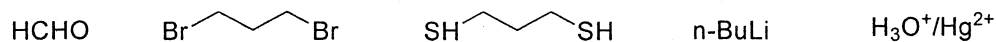
(c) Giving the mechanism predict the product of the following reaction.



(30 Marks)

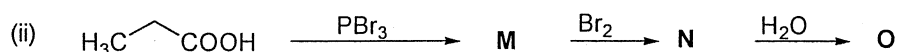
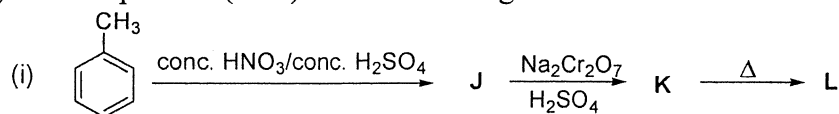
4. Show how you would synthesize **cyclobutanone** using the following compounds and reagents

*You may need some other reagents too.*



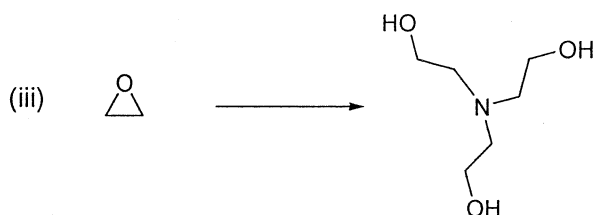
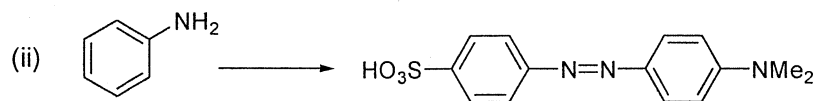
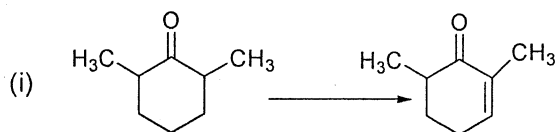
(20 Marks)

- (b) Identify the compounds (J–O) in the following reactions.



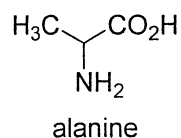
(30 Marks)

- (c) Giving the necessary reagents and conditions Indicate how you would carry out the **any TWO (02)** of the following conversions/syntheses.



(30 Marks)

- (d) How would you synthesis **alanine** using acetaldehyde as the starting material via Strecker synthesis? Give the mechanism for the reaction.



(20 Marks)