THE OPEN UNIVERSITY OF SRI LANKA

B. Sc DEGREE PROGRAMME / STAND ALONE COURSE 2010/2011

LEVEL 5 - FINAL EXAMINATION

CHU 3126 / CHE 5126 - ORGANIC CHEMISTRY

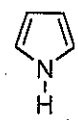
DURATION: 2 1/2 HOURS

Saturday 09th July 2011 09.30 a.m.- 12.00 p.m.

Answer any FOUR (04) questions only.

If you have answered more than four questions, only the first four answers will be marked.

1. (a) Which of the following compounds is more basic? Explain your answer.


pyrrole

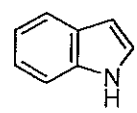

pyridine

(25 marks)

(b) Electrophilic substitution in pyrrole occurs mainly at the α-position (C-2). Explain.

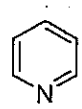
(30 marks)

(c) Electrophilic substitution in indole occurs mainly at the C-3 position rather than C-2 position. Explain.


indole

(25 marks)

(d) Predict the products of the following reactions.

(i)  $\xrightarrow[350\ °C]{H_2SO_4}$ A

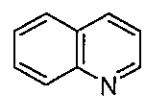
(ii)  $\xrightarrow{Ac_2O/SnCl_4}$ B

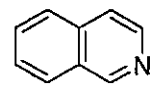
(20 marks)

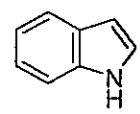
2. (a) Explain why 2-chloropyridine undergoes nucleophilic substitution much faster than 3-chloropyridine.

(40 marks)

(b) Predict the products of the following reactions.

(i)  1. $NaNH_2/\Delta$ 2. H_2O → C

(ii)  1. C_2H_5MgBr/150 °C 2. H_2O → D

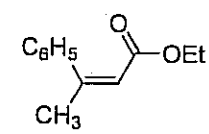
(iii)  1. $HCONMe_2/POCl_3$ 2. H_2O → E

(30 marks)

(c) How would you effect the following transformation? Give the necessary reagents and reaction conditions. (N.B. *Conversion may involve more than one step.*)

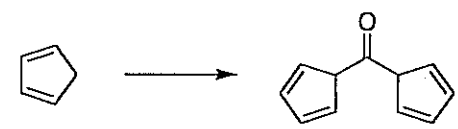
(30 marks)

3. (a) Using C_6H_5Br and $C_2H_5OC{\equiv}CH$ and any other appropriate compounds and reagents, indicate how you would synthesize the following compound.



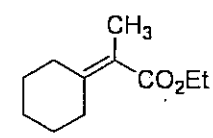
(40 Marks)

(b) Indicate how you would carry out the following synthesis.



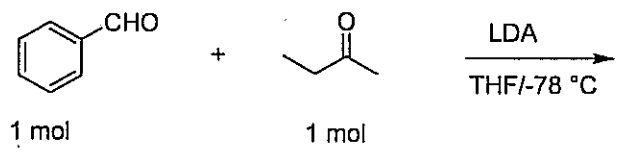
(20 Marks)

(c) Indicate how you would synthesize the following compound using organo zinc reagents?



(40 Marks)

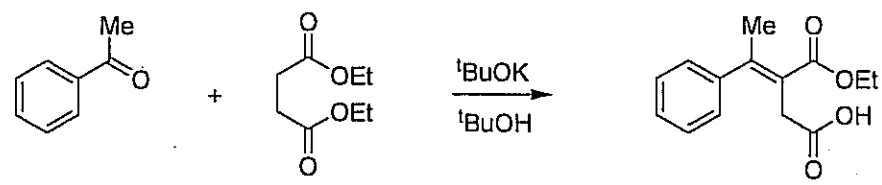
4. (a) Give the structures of the two possible products that could be formed from the following reaction. What is the predominant product? Explain why other product is not formed as the major product.



1 mol 1 mol

(40 Marks)

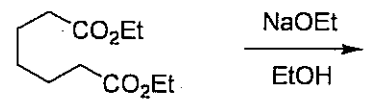
(b) (i) Give the mechanism of the following reaction. .



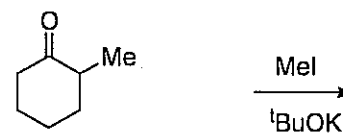
(ii) Discuss the use of the above reaction in organic synthesis.

(40 Marks)

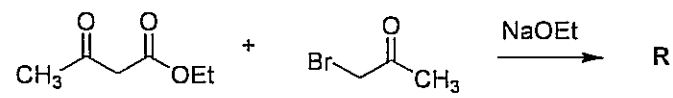
(c) Give the structures of the products **P – S** of the following reactions.

(i) 

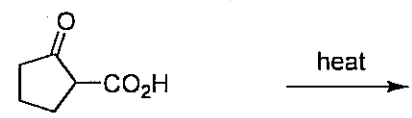
P

(ii) 

Q

(iii) 

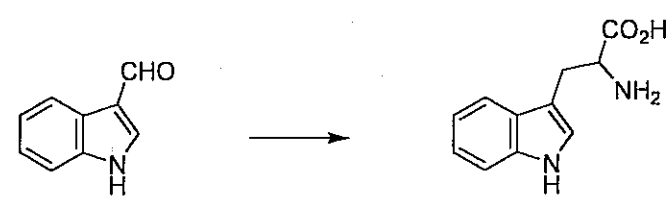
R

(iv) 

S

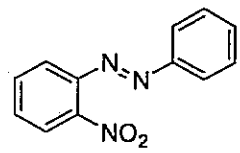
(20 Marks)

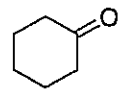
5. (a) How would you carry out the following synthesis using Erlenmeyer azlactone synthesis? (*Show all the necessary steps and intermediates in the reaction*)

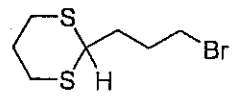


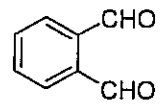
(40 Marks)

(b) Give the Structures of the product (**J** – **N**) of the following reactions?

(i)  $\xrightarrow{2\ P(OEt)_3}$ **J**

(ii)  $\xrightarrow{Me_2\overset{+}{S}-\overset{-}{C}H_2}$ **K**

(iii)  $\xrightarrow[2.\ H_3O^+/Hg^{2+}]{1.\ n\text{-BuLi}}$ **L**

(iv)  $\xrightarrow{Ph_3P=\!=\!=PPh_3}$ **M**

(v)  + NH_3 $\longrightarrow$ **N**

(25 Marks)

(c) Giving necessary reagents and conditions show how you would effect the following conversions.

(10 Marks)

(d) The following reaction scheme depicts an example of Ritter reaction. Identify the missing compounds/intermediates **R**, **S** and **T**.

$$Me_3COH + CH_3CN \xrightarrow{conc.H_2SO_4} \mathbf{R} \xrightarrow{H_2O} \mathbf{S} \xrightarrow{H_3O^+} \mathbf{T}$$

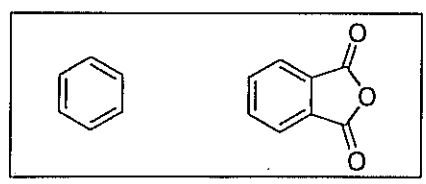
What is the significance of Ritter reaction in organic synthesis?

(25 Marks)

6. (a) Explain the following statements.
   i. Naphthalene undergoes electrophilic substitution reactions at C-1 position.
   ii. Phenanthrene is less aromatic than benzene.

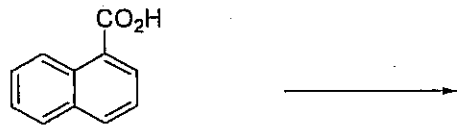
(20 marks)

(b) Outline a synthetic route for anthracene using the following organic compounds and any other appropriate reagents.

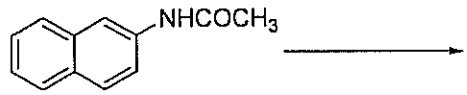


(30 marks)

(c) Predict the mono nitration products of the following substituted naphthalenes.

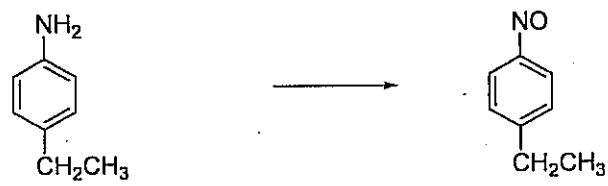
i. 

ii. 

iii. 

(20 marks)

(d) Give necessary reagents and conditions to carry out the following reactions

i. 

ii. 

iii. 

(30 marks)