RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (Honours) Degree in Chemistry
Third Year - Semester II Examination – February / March 2019

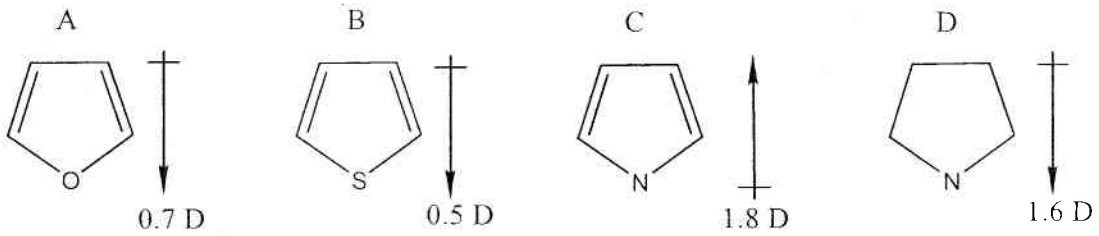
CHE 3215 – HETEROCYCLIC AND SYNTHETIC ORGANIC CHEMISTRY

Time: Two (02) hours

Answer **all** questions.

1.

a) Dipole moment of few heterocyclic compounds are given below.



i) Account for the differences of the dipole moments of A,B and C.

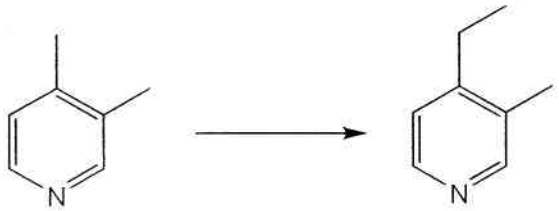
ii) Explain the reversal of dipole moment of C compared to that of D. (25 marks)

b) Justify the observation that 2-chloropyridine undergoes nucleophilic substitution much faster than 3-chloropyridine. (15 marks)

c) Giving necessary reagents and conditions, show how to carry out the following conversions.

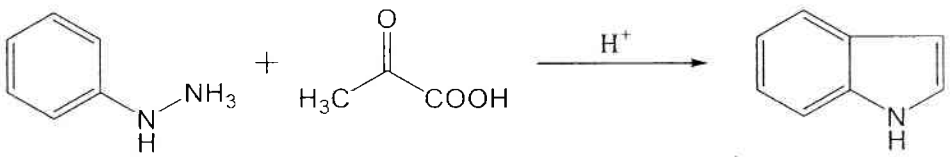
(i)

(ii)



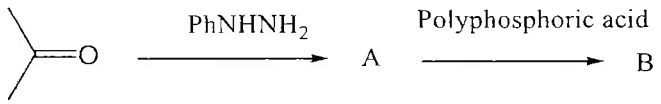
(20 marks)

d) Giving necessary reagents, conditions and appropriate mechanisms, show how you would carry out the Fisher indole synthesis.



(30 marks)

e) Give the structures of A and B of the following reaction.



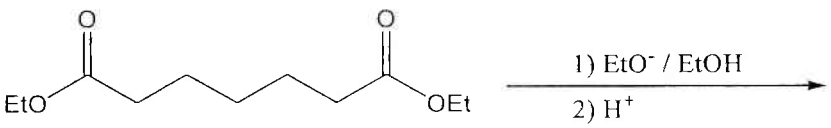
(10 Marks)

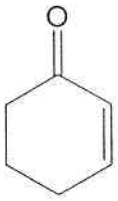
2. Write down the major product in each of the reaction given. Specify the stereochemistry and/or regiochemistry, where relevant.

a)

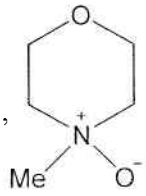
b)

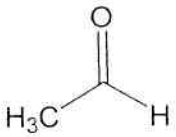
c)



d) 

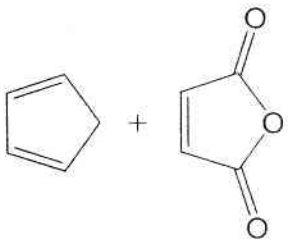
1) C_3H_7Li
2) H^+

3) OsO_4 , 

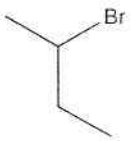
e) 

1) NaCN / HCl

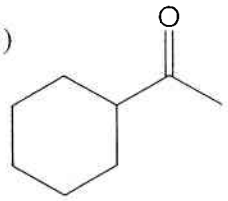
2) H_2SO_4 / H_2O /△

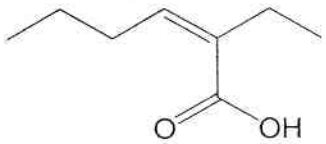
f) 

△

g) 

1) PPh_3 / THF
2) BuLi

3) 

h) 

1) $SOCl_2$

2) NH_3
3) mCPBA

(100 marks)

3.

a) Answer to the following questions considering "carbanion alkylation".

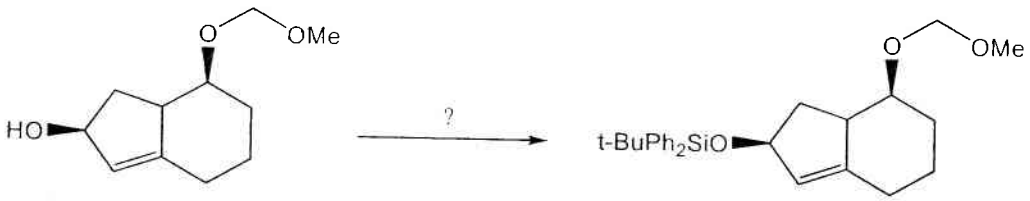
i. Defend the statement; "Alkyl Lithium (R-Li) or Grignard reagent (RMgBr) are not good candidates in carbanion alkylation".

ii. List the required thermodynamic conditions for carbanion alkylation. Explicitly describe the importance of each condition. (25 marks)

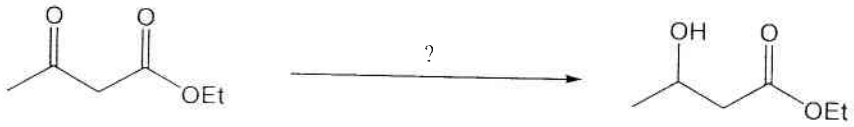
b) Write down the chemical reagents required to carry out following reactions. If reagents are added stepwise, number them accordingly.

i.

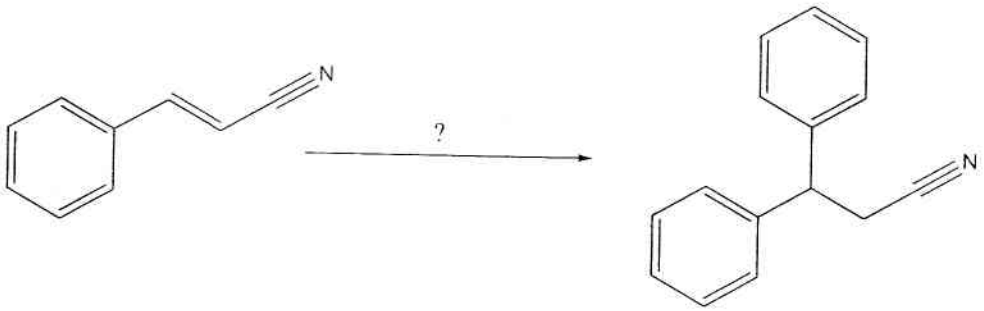
ii.



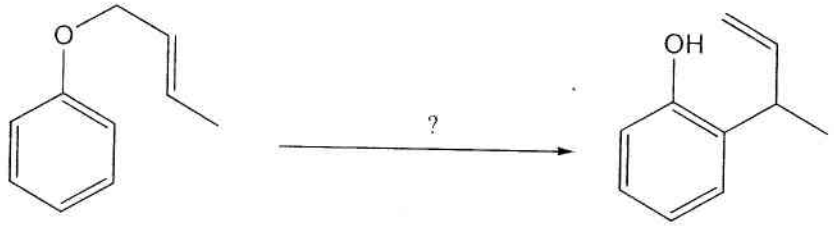
iii.



iv.



v.



(50 marks)

c) Show how to carry out the following transformation. Several steps will be required.

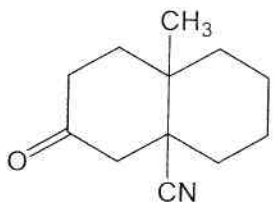
(25 marks)

4.

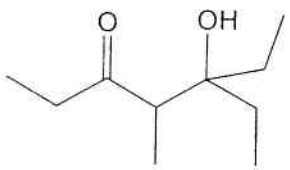
a) Comment on the stability of ylids. Discuss the impact of their stability on the product formation of Wittig reaction. (25 marks)

b) Illustrate how to synthesise following compounds, from commercially available materials. Include both retrosynthetic analysis and the actual synthetic procedure separately in your answer.

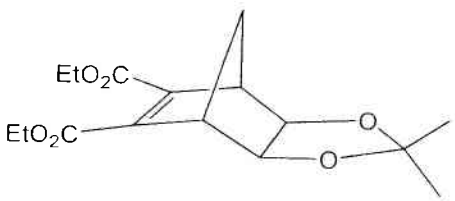
i.



ii.



iii.



(3 x 25 marks)

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