



THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME / STAND ALONE COURSE 2016 / 2017

LEVEL 4 - FINAL EXAMINATION

CMU2221 / CME4221 - ORGANIC CHEMISTRY I

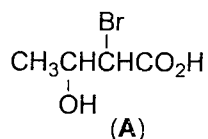
DURATION: 3 HOURS

Thursday 11th January 2018

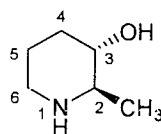
9.30 a. m. - 12.30 p. m.

ANSWER ALL QUESTIONS

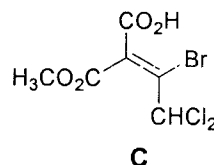
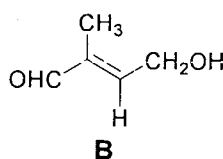
1. (a) (i) How many stereoisomers are possible for compound A?



- (ii) Draw the stereoisomers of A using Fischer projection formulae to show the stereochemistry at the chiral carbon atom. (*Label the structures you drew.*)
- (iii) Identify a pair of enantiomers
- (iv) Identify a pair of diastereoisomers.
- (20 Marks)
- (b) (i) Designate the configuration of the tetrahedral stereocenters (chiral centers) of the following compound as R or S. (*carbon atoms are numbered for your convenience*)

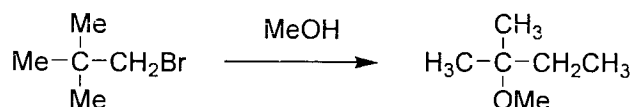


- (ii) Designate the configuration of the double bonds of following compounds as E or Z.



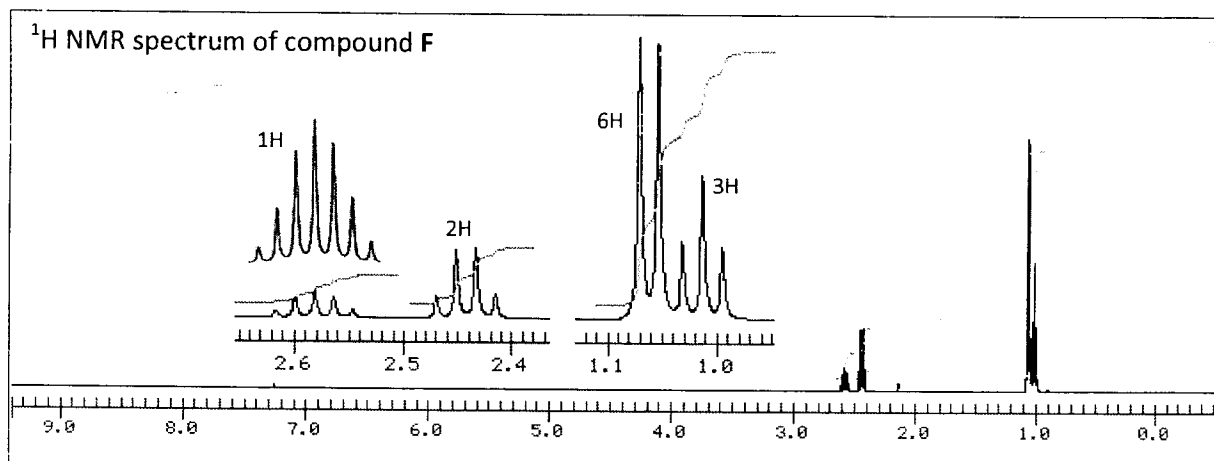
(20 Marks)

- (c) Give the mechanism of the following reaction.



(10 Marks)

- (d) ^1H NMR spectrum of compound **F** ($\text{C}_6\text{H}_{12}\text{O}$) along with some useful expansions is given below. The IR spectrum of **F** showed a strong absorption at 1718 cm^{-1} among other peaks while no absorptions are observed above 2900 cm^{-1} .

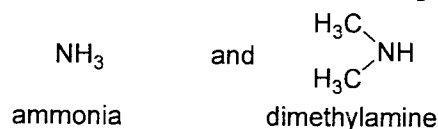


- What information with respect to **F** is obtained from IR spectroscopic data?
- Identify the spin systems present in **F**.
- Deduce the structure of **F**.

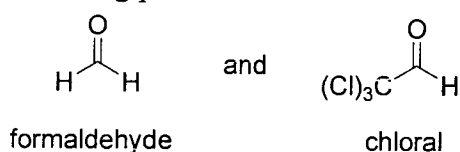
(30 Marks)

3. (a) Answer the following parts (i) and (ii).

- (i) Giving reasons state which compound is more basic out of the following pair.

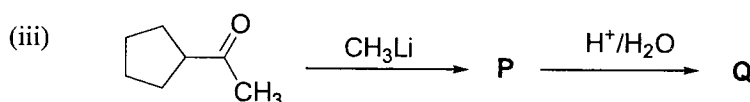
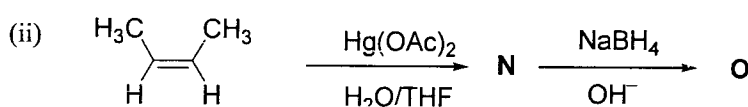


- (ii) Giving reasons state which compound forms the more stable hydrate out of the following pair.



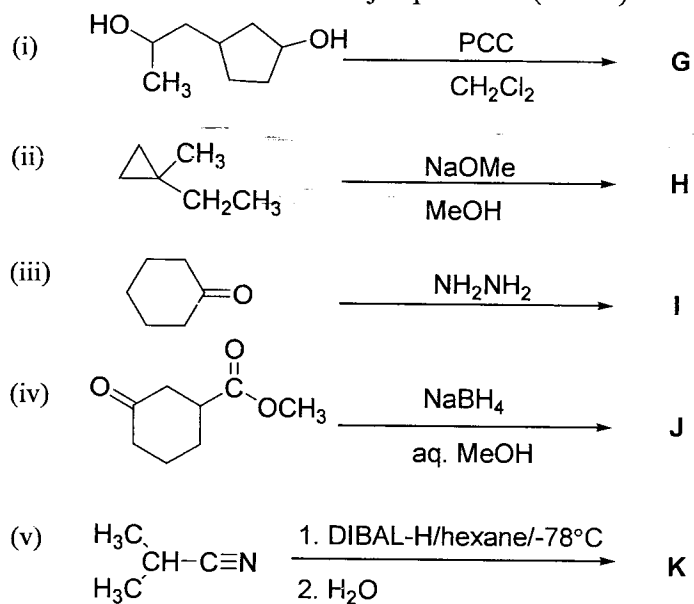
(20 marks)

- (b) Give structures of the intermediates and the products (**L - Q**) of the reaction schemes given below.



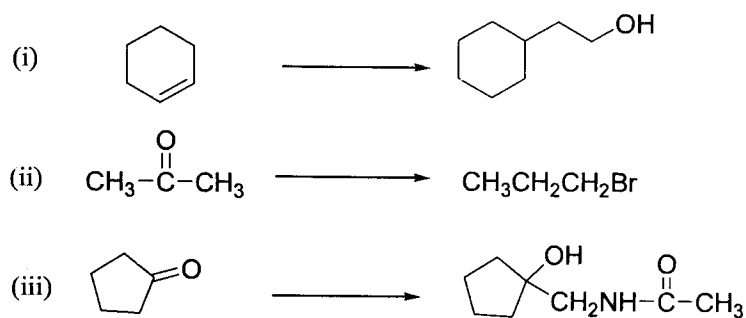
(30 marks)

(c) Give the structures of the major products (**G - K**) of the following reactions.



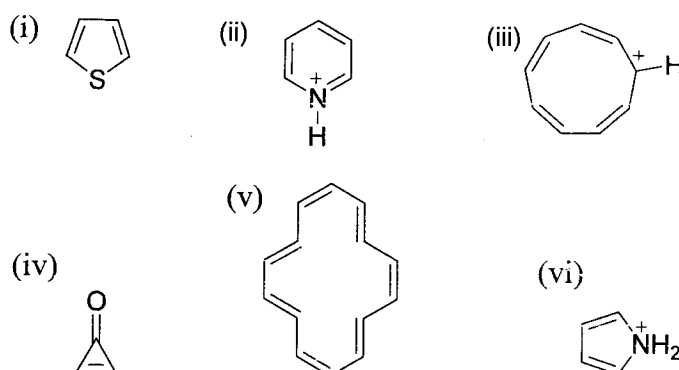
(25 marks)

(d) Giving suitable reagents and conditions show how any **ONE (01)** of the following conversions can be carried out.



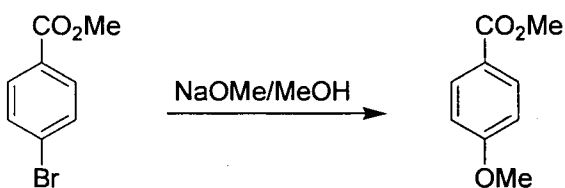
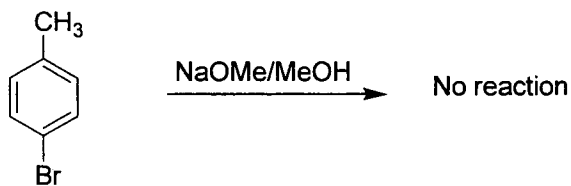
(25 marks)

4. (a) Use the Hückel rule to indicate whether the following species are aromatic or anti-aromatic. Explain your answer.



(30 marks)

- (b) (i) Consider the structure of the intermediate σ -complexes that could be formed in the electrophilic substitution of nitrobenzene ($C_6H_5NO_2$) and explain why the nitration occurs mainly at the *meta* position with deactivation of the nucleus.
- (ii) Explain why *p*-bromotoluene does not react with NaOMe in MeOH but methyl *p*-bromobenzoate reacts with NaOMe in MeOH to give methyl *p*-methoxy benzoate.

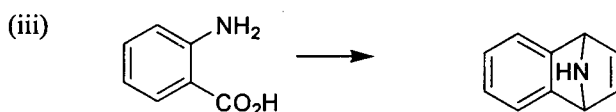
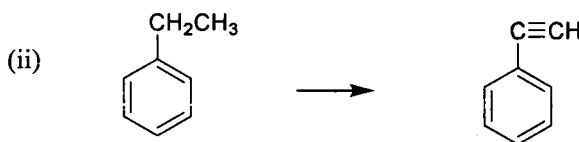
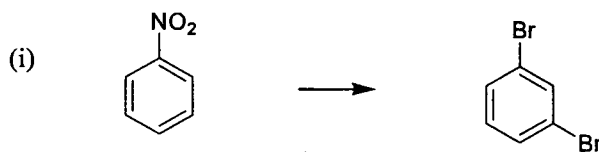


Draw the structures of the intermediate of the above reaction and explain your answer.

(40 marks)

- (c) Giving necessary reagents and reaction conditions indicate how you would carry out any **TWO (2)** of the following conversions.

N.B. Conversions may involve more than one step.



(30 marks)

-----Copyrights reserved -----