Ex/FCH/I/12/34/2018(S)

FINAL B. SC. EXAMINATION, 2018

(1st Semester, Special Supplementary)

CHEMISTRY (HONOURS)

PAPER - XII

ORGANIC CHEMISTRY

Time : Two hours Full Marks : 50

Use a separate answerscript for each group.

GROUP - A

1. a) Find out the point group of the twist-boat conformation of cyclohexane and also the symmetry number. $1+\frac{1}{2}$

   b) Suggest and draw the preferred conformation of each of the following compounds with brief reasoning.

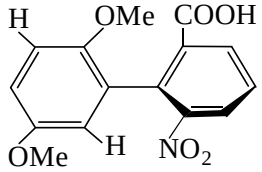
      i) *cis*-1, 3-di-*tert*-butylcyclohexane

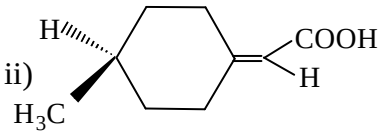
      ii) *trans*-1, 3-di-*tert*-butylcyclohexane 2

   c) Of two isomers of 4-*tert*-butylcyclohexanecarboxylic acids, which one is more acidic and why ? $1\frac{1}{2}$

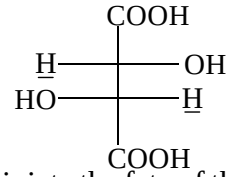
   d) Draw the conformations of *cis*-1, 2-dimethylcyclohexane and *cis*-1, 3-dimethylcyclohexane and comment on their relative stability by calculating the enthalpy value and also chirality. 1+2+1

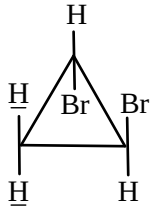
e) Assign the *R/S* to the following molecules indicating the priority of the ligands : 1×2

i) 

ii) 

f) Comment on the topic relationship of the underlined ligands in the following compounds and justify your answer. 2

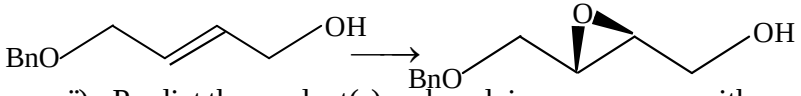
i) 

ii) 

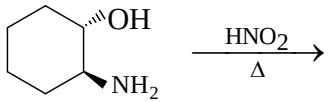
g) Deliniate the fate of the following reaction with proper reasoning (Felkin Anh model) : 2

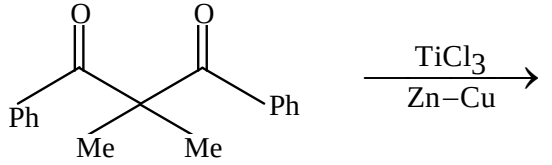
h) Attempt ***any one*** of the following questions : 2

i) Suggest reagents for the asymmtric epoxidation of the allylic alcohol to give the epoxide below :

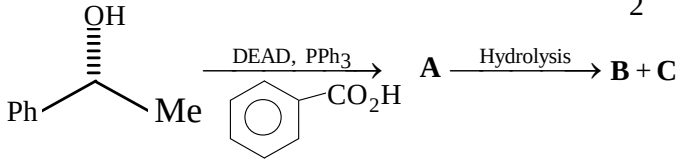


ii) Predict the product(s) and explain your answer with mechanism :

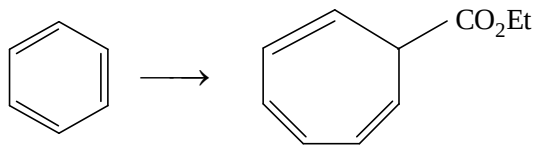


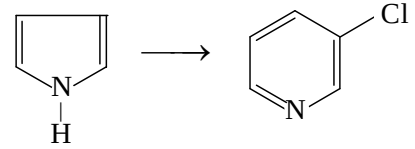
iv) 

b) Identify the product(s) **A**, **B** and **C** and draw the mechanism of formation of **A**. $1\frac{1}{2}+1\frac{1}{2}$



c) Mention the reagents for the following transformations : 1+1+1

i) 

ii) 

iii) $PhCOCMe_3 \rightarrow PhCOOCMe_3$

GROUP - B

2. Answer ***any one*** of the following questions :

   a) State Lambert-Beer's Law of absorption and comment on its limitations. 2+1

   b) Between $n - \pi^*$ and $\pi - \pi^*$ electronic transitions, which one has the higher extinction coefficient and why ? 1+2

3. Answer ***any four*** of the following questions : 2×4

   a) Calculate the energy of a mole of photon of a electromagnetic radiation of $\lambda = 400$ nm.

   b) What is auxochrome ? How does it play its role in UV-vis spectroscopy ? Explain with example.

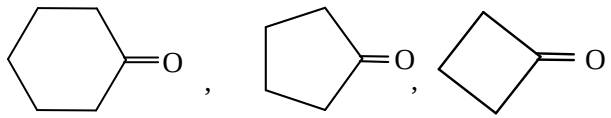
   c) Comment on the selection rule of IR-spectroscopy. Does CO_2 give IR-absorption band ? – Explain.

   d) What is shielding constant in NMR-spectroscopy ? How do you determine the –I effect of Br by NMR spectroscopy ?

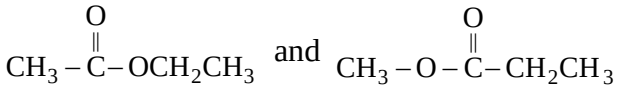
   e) Explain the effect of neighbouring group anisotropy in ^1H -NMR with proper examples.

4. Answer ***any three*** of the following questions : 2×3

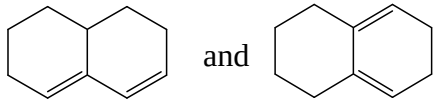
   a) Distinguish the following compounds by IR-Spectroscopy.



   b) Using $^1H - NMR$, how do you distinguish the following compounds ?



   c) Using Woodward-Fieser rule distinguish the following compounds on the basis of UV-vis spectroscopy.

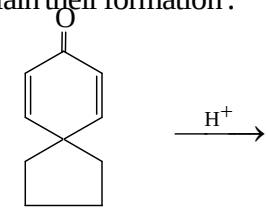


   d) State Hooke's law and comment on the effect of H-bonding on IR-bands of $-CO_2H$ group.

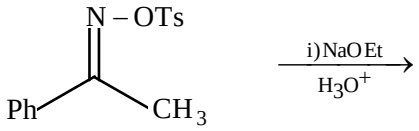
GROUP - C

5. a) Identify the product(s) of the following reactions and explain their formation : $2\frac{1}{2} \times 4$

   i)



   ii)



   iii) PhCHO +