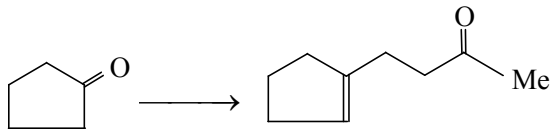
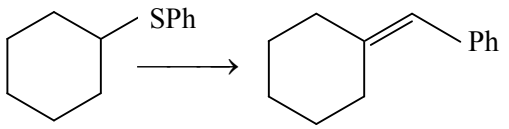
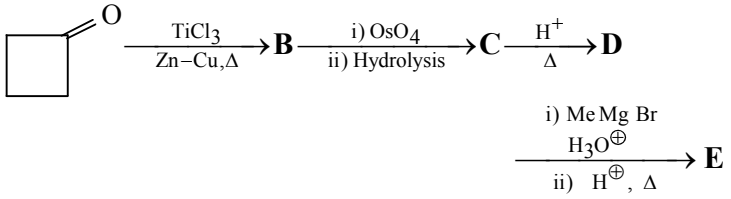
ii) 

(Shapiro reaction)

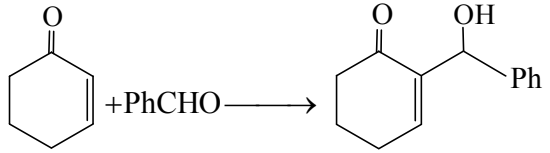
iii) 

(Julia-olefination reaction)

c) Identify the products **B**, **C**, **D** and **E** 2



d) Mention the reagent with structure for the following reaction. $\frac{1}{2}$



Ex/CHEM/H/3/XII/A/34/2019

FINAL B. SC. EXAMINATION, 2019

(1st Semester)

CHEMISTRY (HONOURS)

PAPER - XII

ORGANIC CHEMISTRY

Time : Two hours Full Marks : 50

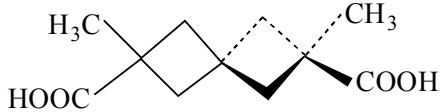
Use a separate answerscript for each group.

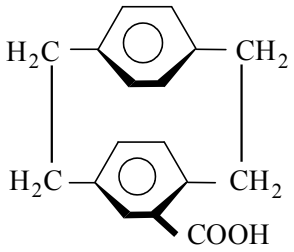
GROUP - A

1. a) What do you mean by the C_2-pathway of inversion of cyclohexane chair form ? Draw the energy diagram of this inversion path. 1+2

   b) Comment on the relative stability by calculating the enthalpies and chirality of *cis*-1, 4-dimethylcyclohexane and *trans*-1,4-dimethylcyclohexane. 2+1

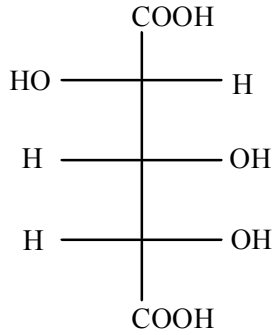
   c) Assign the *R*/*S* descriptors to the following molecules indicating relative priority of the ligands. 1+1

i) 

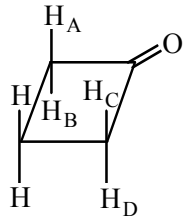
ii) 

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

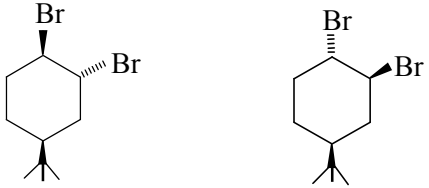
i) Comment on the chirotopicity and stereogenicity of the C-3 centre of the following molecule. Justify.



ii) Delineate the topic relationship of H_A with H_B, H_C and H_D in the following molecule and explain your answer.



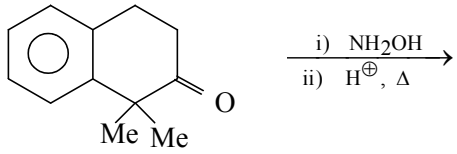
e) Which of the following two compounds have higher dipole moment ? Explain your answer. $1\frac{1}{2}$

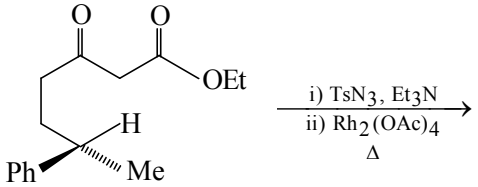


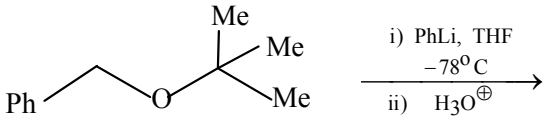
d) Is it always true that chemically equivalent protons are always magnetically equivalent ? Justify with proper examples. 2

GROUP - C

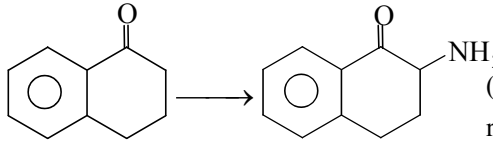
5. a) Predict the major product(s) and propose the mechanism of the following reactions. $2\frac{1}{2}\times3$

i)


ii)


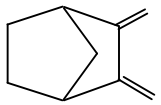
iii)


b) How can you carry out the following transformations using the reaction mentioned in the parentheses in one of the steps ? 2×3

i)


(Neber rearrangement)

3. a) Calculate the absorption maximum in the UV-spectrum of the compound '**A**'. 1



A

b) How do you distinguish between *cis*- and *trans*-stilbene by UV-vis spectroscopy ? 1

c) How will you distinguish between K-band and R-band which arises due to electronic excitation in the carbonyl group of a ketone ? Do you expect any shift in their position of absorption maxima and intensity by using more polar solvent ? 2+1

4. a) What is magnetogyric ratio and how does it affect the energy difference between two states and nuclear species sensitivity to the NMR-experiment. 1+1

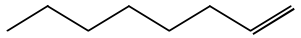
b) How will you differentiate between first order and non-first order PMR spectra ? Answer with plausible examples. 1

c) Write two plausible acyclic isomers corresponding to the molecular formula of C_4H_8O and comment on their ^1H-NMR signals. 2

f) With the help of Felkin-Anh model predict the major product of the following reaction. 2

(*S*)-PhCH(Me)COMe $\xrightarrow[\text{ii) Aq. } NH_4Cl]{\text{i) PhLi in dry THF}}$

g) Predict the product(s) of the following reaction and explain with mechanism. 2



h) Explain, why for the 4-*t*-butylcyclohexyl bromides, the *cis*-isomer reacts 60 times faster than the *trans* isomer with sodium thiophenate (PhS^-Na^+) in aq. ethanol ? $1\frac{1}{2}$

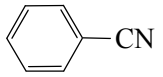
GROUP - B

2. a) Comment on the influence of ^-I effect on the wave number of IR-absorption with proper examples. $1\frac{1}{2}$

b) Discuss at least three types of compounds for which the study of finger print region in IR spectra is most essential. $1\frac{1}{2}$

c) How will you distinguish the following pairs of compounds with the help of IR-Spectroscopy? 2

i) Maleic acid and Fumaric acid

ii)  and