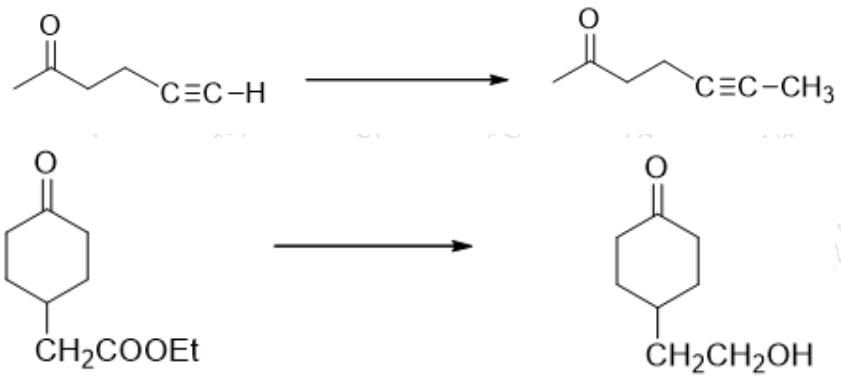
M.Sc-II Chemistry Semester-IV,
Paper-II, 09/06/2023

Time: 2:30 Hours **Marks: 60**

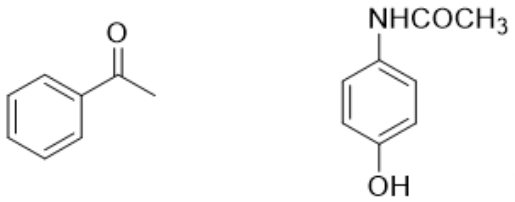
1. A. Attempt **any two** of the following: **8**

i) Suggest the synthesis of the following using the protection-deprotection protocol.



ii) Explain the term Functional Group Interconversions (FGI) and Functional Group Additions (FGA) with suitable examples.

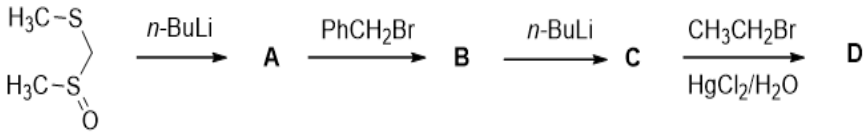
iii) Provide a retro-synthesis of the following compounds.



iv) What are acyl anion equivalent? Discuss with the conversion of formaldehyde to acetaldehyde.

B Attempt **any one** of the following: **4**

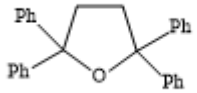
i) Complete the following reaction sequence by identifying A-D.



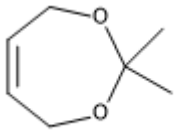
ii) Give the equation for the protection and deprotection of -OH group as MOM ether and -NH_2 as Benzyloxy carbonyl (CBz)

2. A Attempt **any two** of the following: **8**

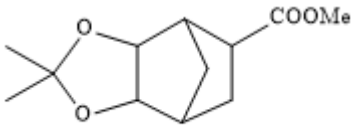
i) An important guideline in retrosynthetic analysis is to use the symmetry of the target molecule. On the basis of this guideline identify the best points of disconnection in the following molecule. Show the complete retrosynthetic pathway and the synthetic sequence.



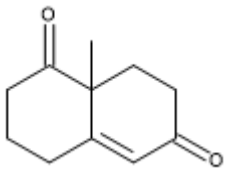
ii) For the following molecule, suggest a retrosynthetic pathway. Also write its synthesis, as per the pathway suggested by you.



iii) Propose a retrosynthetic analysis for the following molecule such that cyclopentadiene is one of the starting materials. Using this, write its synthesis from cyclopentadiene.

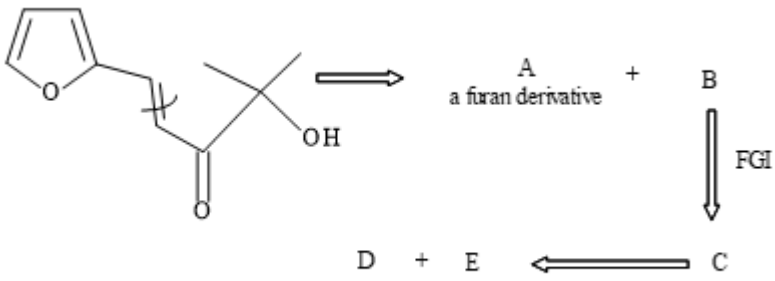


iv The synthesis of the following molecule involves a Robinson annulation reaction. With this information, write a suitable retrosynthetic analysis and the corresponding synthesis.

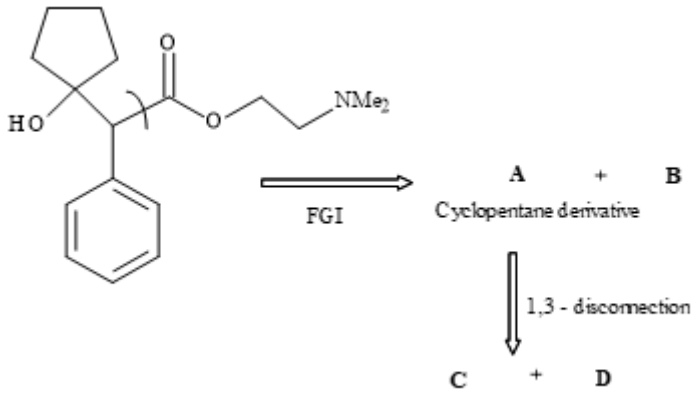


B Attempt **any one** of the following: **4**

i) Complete the following retrosynthetic analysis by drawing structures for A, B, C and D.

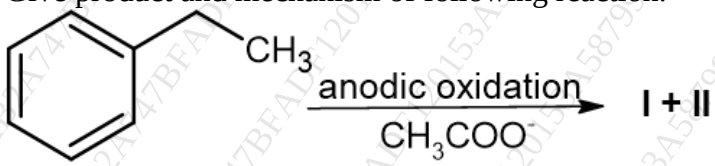


ii) Complete the following retrosynthetic pathway by drawing structures for **A, B, C and D**.



3. A Attempt **any two** of the following: **8**

i) Give product and mechanism of following reaction.



ii) Give a brief account of applications of cryptands in organic synthesis.

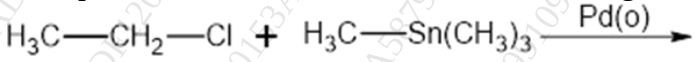
iii) Give the applications of $Sc(OTf)_3$ as a water tolerant Lewis acid catalyst in the following reactions:
Diels Alder reaction
Michael reaction
Aldol condensation
Friedel Crafts reaction

iv) What is Kolbe's reaction? Discuss the mechanism involved. Give one application.

B Attempt **any one** of the following: **4**

i) What are cyclodextrins? Discuss the structure and two applications of cyclodextrins.

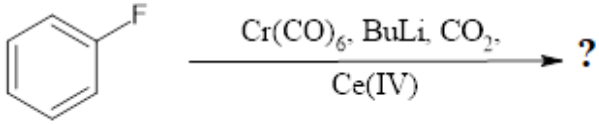
ii) Give product, name and mechanism of following reaction.



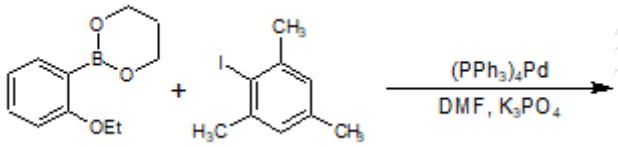
4. A Attempt **any two** of the following: **8**

i) Explain the terms reductive elimination and 18-electron rule with suitable examples.

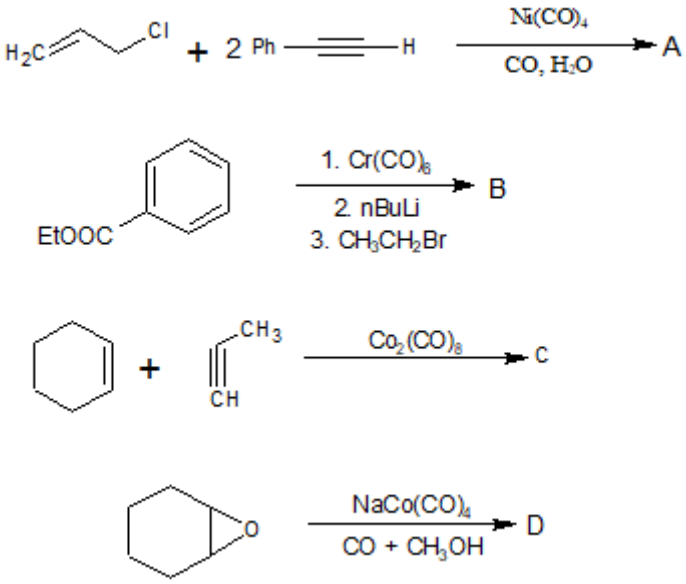
ii) Complete the following reaction and give the mechanism of the same.



iii) Give name, product and mechanism of the following reaction



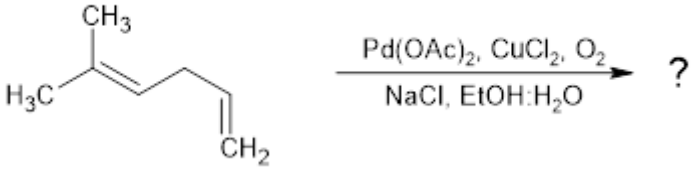
iv) Complete the following reactions by identifying A, B, C and D.



B Attempt **any one** of the following: **4**

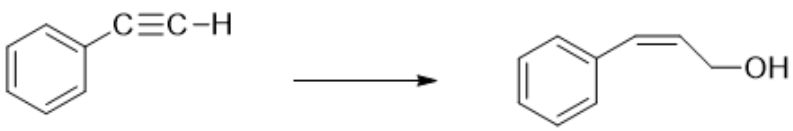
i) What is the action of SmI_2 on the following compounds - aldehydes, nitro compounds, alkyl halides and α-functionalized carbonyls.

ii) Give the product, name and mechanism of the following reaction.



5. Answer **any four** of the following: **12**

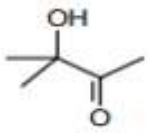
(a) How will you convert?



(b) Explain the term Convergent synthesis using suitable examples.

(c) Using functional group addition as one of the steps, write the retro analysis of phenyl cyclohexane

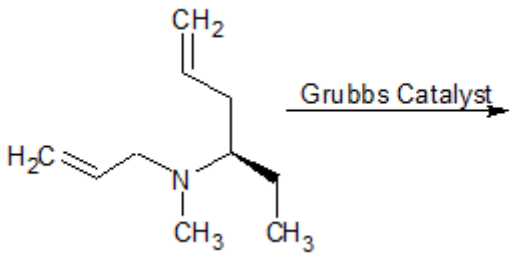
(d) How will you synthesise the following molecule from acetylene?



(e) What are micelles? Write two applications of micelle catalysed reactions.

(f) Discuss with examples cathodic reduction of olefins.

(g) Complete the following reaction and give its mechanism.



(h) Give the applications of Ce(IV) in i) synthesis of quinoxaline ii) as a deprotection agent.

****