BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI

(END SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER: VIII**

BRANCH: CHEMISTRY **SESSION: SP/22**

SUBJECT: CH410

TIME: 2 Hrs. **FULL MARKS: 50**

Part A (Answer any five questions: (5 X 2)= 10

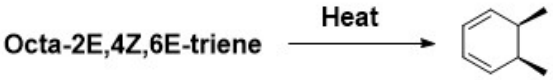
1. Explain the fate of A in case of the following pericyclic reactions on the basis of FMO theory

[A] 

(i) Photochemical electrocyclic closure
or
(ii) Thermal cycloadditions reaction with ethylene

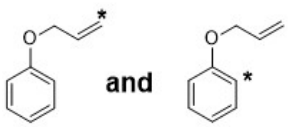
2. Which diene reacts more rapidly in Diels-Alder reactions cyclopentadiene or 1,3-butadiene briefly explain your choice?

3. Explain the following observation.



4. Explain the formation of the products.

5. Write the structures of all possible products when a 1:1 mixture of is heated together. Explain their formation. ($C^{*}= C^{14}$)



6. In some of the reactions anthracene behaves as a diene and phenanthrene behaves alkene like. Explain with suitable examples.

Part B Answer all these questions: (2+4+2+2=10)

7.Explain the following observations:

i) Furan and Pyrrole have opposite directions of the diploe moment existing in them.

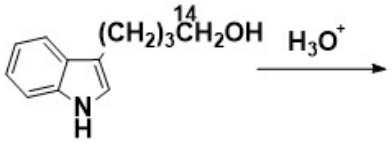
8. What happens when equimolar amounts  of and phenylhydrazine are reacted in glacial acetic acid at room temperature and then refluxed? Write down the mechanisms of the reactions involved with suitable isotopic labelling evidence.

Or

9. Explain the formation of different isomer product obtained from the reaction between ethyl acetoacetate and alpha-chloroacetone the presence of

i)aqueous NaOH, ii)NaI/EtOH/NaOEt

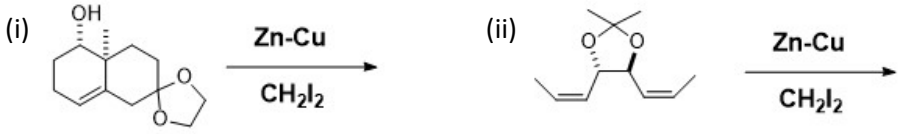
10. Predict the product(s) of the following reaction and justify:



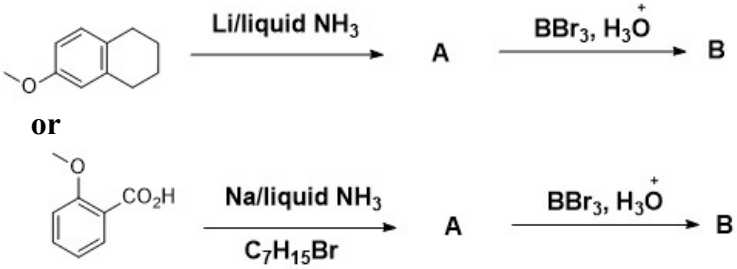
11. How one can get furan rings by taking ethyl acetoacetate as one of the starting materials? Write mechanistic details.

Part C (Answer all these questions) (2 X1=2+4+2+2)=10

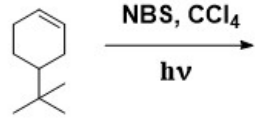
12. Predict the product(S) with plausible mechanism.



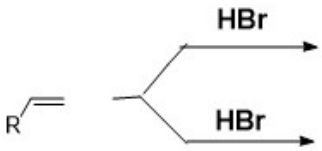
13. The major product/s and/or mechanism in the following reaction



14. Predict the product(S) with plausible mechanism.

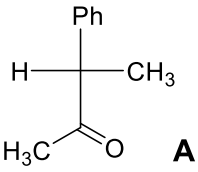


15. Predict the product(S) with plausible mechanism. Give reasons.



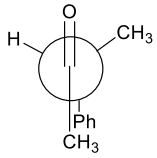
Part D (Answer all these questions): (3+3+2x2=4)=10

16. Following Cram's open chain model, identify the preferred reacting conformation as drawn below of compound **A** that leads to the formation of major product during its reduction with $LiAlH_4$.

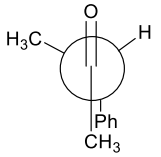


A

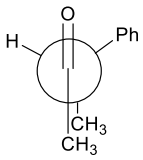
a)



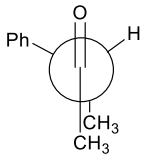
b)



c)

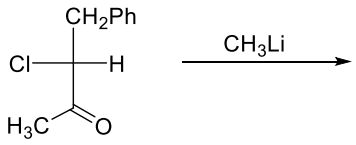


d)



From which face (*Re* or *Si*), the hydride is preferentially delivered? Show how you have arrived at the answer (that is the priority sequence).

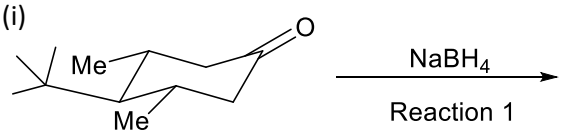
17. Draw the preferred reacting conformation of the following compound **B** in its reaction with CH_3Li as per Felkin's model. What is the basis of preference for such a conformation?



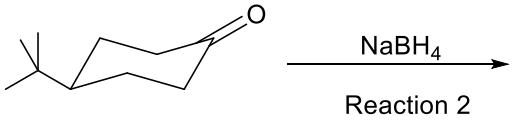
B

18. Consider the following reactions. Use Cieplak model to predict in which case, there will be greater formation of the equatorial alcohol. Justify your answer.

(i)

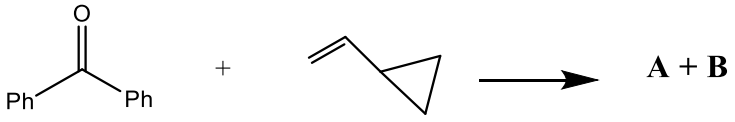


(ii)

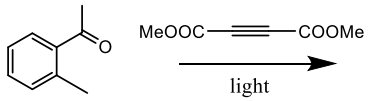


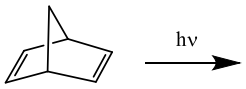
Part E (Answer all these questions): (2X2=4+2X2=4+2)=10

19. a) Show the sequential steps in depicting the mechanism of Patterno-Buchi Reaction between an alkene and a ketone. Is the reaction a pericyclic [2+2] reaction? Give reasons for your answer.
b) Identify the products A and B in the following reaction and provide mechanism of their formation.

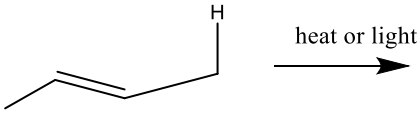


20. Predict the major product in each of the following reactions:

a) 

b) 

21. Use the PMO approach to explain the 1,3-H shift in the following reaction. Is it possible thermally or photochemically? Explain



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