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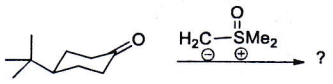
PG CBCS
M.Sc. Semester-II Examination, 2022
CHEMISTRY
PAPER: CEM 202
(ORGANIC CHEMISTRY - II)

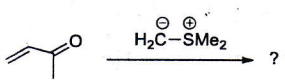
Full Marks: 40 **Time: 2 Hours**

GROUP – A

1. Answer any four questions from the following **2 x 4=8**

a) Write the structure of the product/major product in the following reactions:

i) 

ii) 

b) Give an example of a molecule possessing a chiral axis; designate its configuration in *R/S*

c) Answer any two of the following

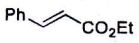
(i) Label the two H at the prochiral center of ethanol as pro-*R* / pro-*S*

(ii) Write the structure of (*S*)-cyclooctene

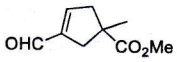
(iii) A stereoisomeric achiral molecule that cannot be called meso.

d) (i) What is AD mix α?

(ii) Give the product when AD mix α reacts with



e) For the given TGT provide a suitable retrosynthetic disconnection. In the retrosynthetic arrow mention the Tf (s) (no need to provide a forward pathway).



f) Write Woodward Hoffmann rules for cycloaddition reactions.

GROUP – B

2. Answer any four questions **4 x 4=16**

a) Answer (I) or (II)

(I) Fumaric acid is first esterified with (-)-menthol and then the resultant diester is reacted with $Fe(CO)_4$. How many products are formed? Comment on the ^1H NMR signals of the olefinic protons in the diester and the final product(s).

(II) How do you distinguish by ^1H NMR studies the *cis* and *trans* isomers of *N*-benzyl-2,6-dimethylpiperidine? Explain your answer.

(P.T.O.)

b) Write all the isomers of $CH_3(CHBr)_3CH_3$ with Fischer projection formula. Designate C-3 center as stereogenic/non-stereogenic and chirotopic/achirotopic in each isomer. Also label this center by *R/S* notation as appropriate.

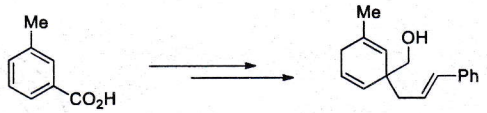
c) Answer (I) or (II)

(I) Both the diastereomers of sulfone, $RCH(SO_2Ph)CHR'$, yield upon treatment with Na(Hg) a mixture of *cis*- and *trans* alkenes in the same proportion in which the *trans* alkene predominates. Give a mechanistic interpretation for this observation.

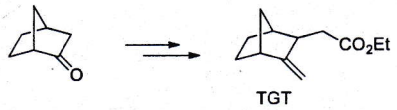
(II) Give an account of Schlosser modification of Wittig reaction in which *trans*-alkene is stereoselectively formed from even the non-stabilised ylides.

d) Answer ***any one***

(i). How do you achieve the given synthesis as shown below? Mention the proper reagents and reaction conditions. ***Mention the name of Key Tf also***



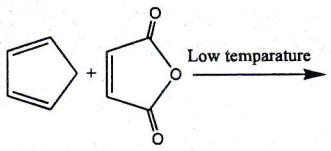
(ii). How do you achieve the given synthesis as shown below? Mention the proper reagents and reaction conditions. ***Mention the name of Key Tf also (Shapiro Tf should be used)***



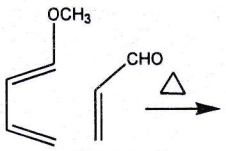
e) Write short notes on regioselectivity and site selectivity in pericyclic reactions. What are cheletropic reactions? Give an example. 1.5 + 1.5 + 2

f) Write the product in each case and explain using FMO: 2 x 2

(i)



(ii)



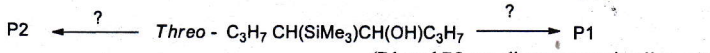
(P.T.O.)

GROUP – C

3. Answer any <u>two</u> questions **8 x 2=16**

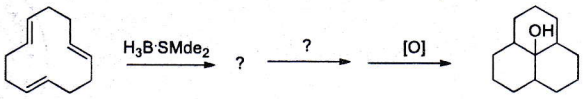
a) Answer ***any four*** from the following 4 x 2

(I) Write the structure of the appropriate reagent and product in the following equations

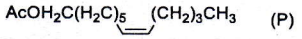


(P1 and P2 are diastereomeric alkenes)

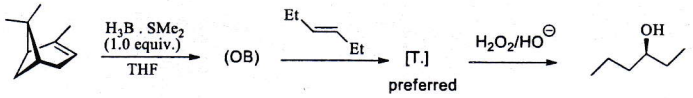
(II) Give appropriate reagents for the following transformations



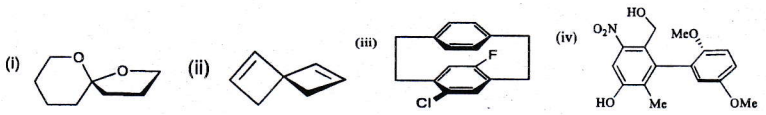
(III) Give an organoborane route to the synthesis of a moth sex pheromone (P) starting from 6-acetoxyhex-1-ene and 1-hexyne.



(IV) Draw the structures of organoborane (OB) and preferred T.S. (T) in the following enantioselective transformation.



(V) Designate the stereogenic elements in each compound in terms of *R/S* (*attempt **any two***)



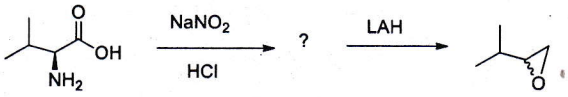
(VI) Label all the methylene Hs as pro-*R*/pro-*S* in citric acid molecule

b) What is a cycloaddition reaction? Describe the characteristic features of a cycloaddition reaction. What do you mean by *endo* selectivity? Explain with a suitable example.

2 + 3 + 3

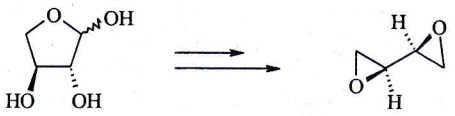
c) Answer (i) and ***any two*** from (ii), (iii) and (iv). 2 + 3 x 2

(i) Write down the stereochemistry of the final product in the following reaction:



(*S*)-Valine

(ii) How do you carry out the following synthesis?

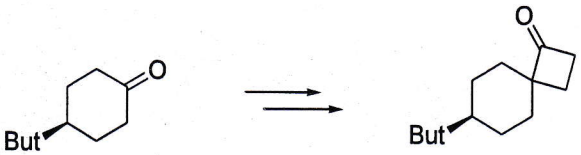


Threose

(iii) How do you achieve the given synthesis as shown below? Mention the proper reagents and reaction conditions. ***Mention the name of Key Tf also***

precursor TGT

(iv) How do you achieve the given synthesis as shown below? Mention the proper reagents and reaction conditions. ***Mention the name of Key Tf also***



precursor TGT

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