RANI RASHMONI GREEN UNIVERSITY

DEPARTMENT OF CHEMISTRY

M.Sc. Course in Chemistry

Semester IV Examination

Course ID: CHEM-CB 42O

Full Marks: 40 **Time: 2h**

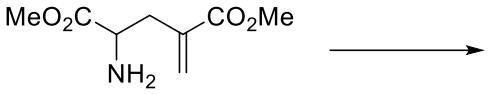
*Answer **any one** question from **each unit** in your own words with proper scientific justification.*

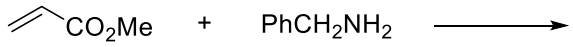
Unit-1: Stereochemistry-2

Q-1. (a) With the help of Octant rule assign the preferred conformation of (+)-*cis*-10-methyl-2-decalone that exhibits negative Cotton effect.

(b) Discuss on the conformation, interactions and the corresponding interaction energy of *trans-cisoid-trans*-perhydrophenanthrene.

(c) Predict the product in each of the following reactions and account for your answers.

(i) 

(ii) 

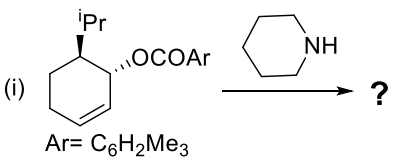
2.5+3+2.5 = 8

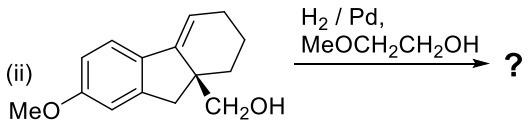
Or

Q-2. (a) What is Axial haloketone rule? Applying this rule deduce the absolute configuration of (-)-*trans*-1-decalone that upon bromination shows positive Cotton effect of the corresponding brominated product.

(b) Draw the stereo-structure of the major product in each of the epoxide opening reaction by NaOMe of *trans*-decalin-1α, 2α-epoxide and *trans*-10-methyldecalin-1α, 2α-epoxide, and justify your answer.

(c) Predict the structure of the sole/major product with proper stereochemical outcome.

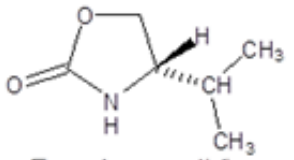
(i) 

(ii) 

3+3+(1+1) = 8

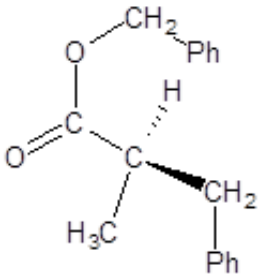
Unit 2: Asymmetric Synthesis-2

Q-3. (a) Convert (S)-valine into the Evans's oxazolidinone chiral auxiliary [X]. Subsequently, using [X] as the chiral auxiliary, convert propionyl chloride (CH_3CH_2COCl) into compound [Y]. The representative structures of [X] and [Y] are provided below.



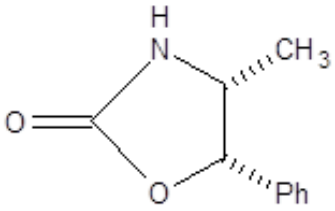
Evans's oxazolidinone chiral auxiliary

[X]



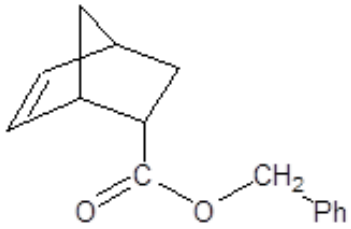
[Y]

(b) Design and synthesize a norephedrine-based chiral auxiliary [M]. Utilizing [M] as the chiral auxiliary, perform a stereoselective transformation of cyclopentadiene to obtain compound [N]. The representative structures of [M] and [N] are provided below.



norephedrine-derived auxiliary

[M]

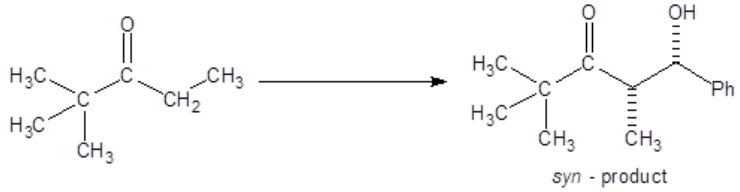


[N]

4+4 = 8

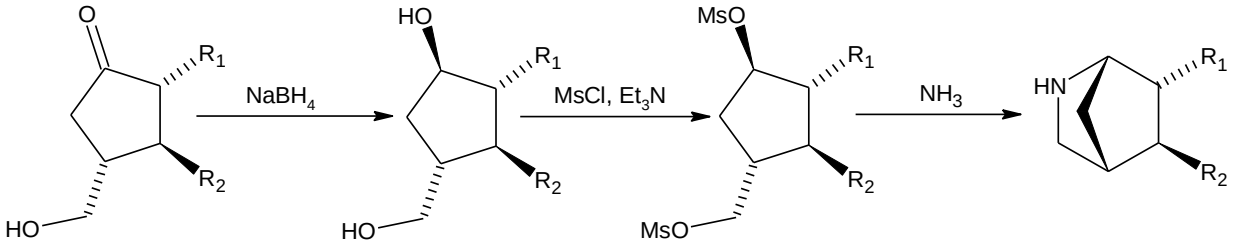
Or

Q-4. (a) Explain the following conversion:

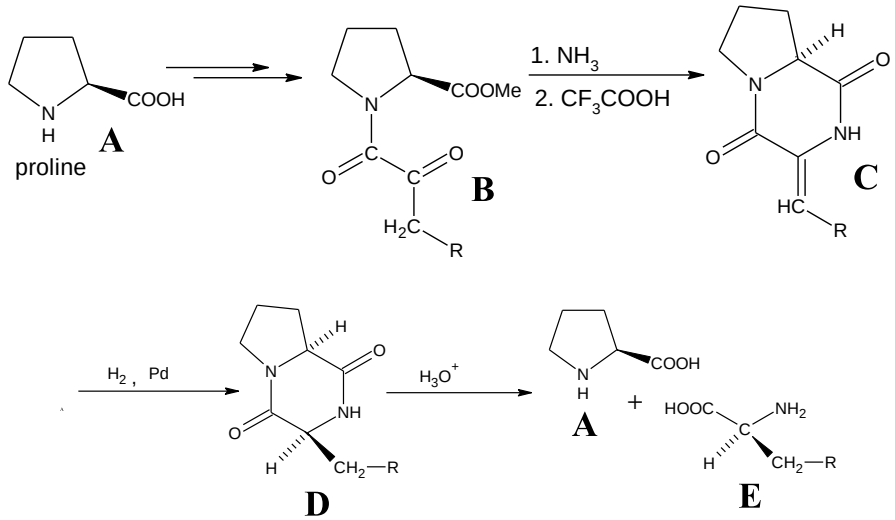


syn - product

(b) Comment on the control over stereochemistry achieved in this sequence:



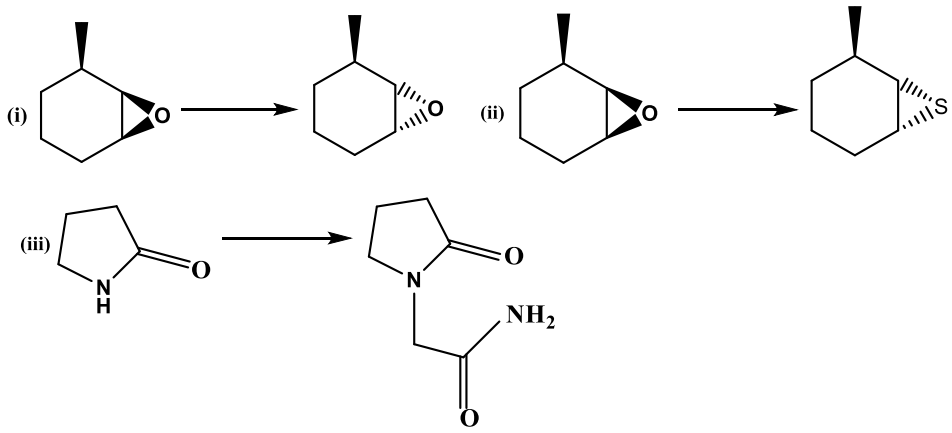
(c) Complete with reagents/condition of the conversion of A to compound B, and explain the stereochemical outcome (D) for the conversion of C to D.



2+3+3 = 8

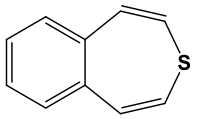
Unit 3: Heterocyclic Chemistry-2

Q-5. (a) Carry out the following conversions



(b) (i) Draw the appropriate structure of Imidazo[2,1-b] thiazole.

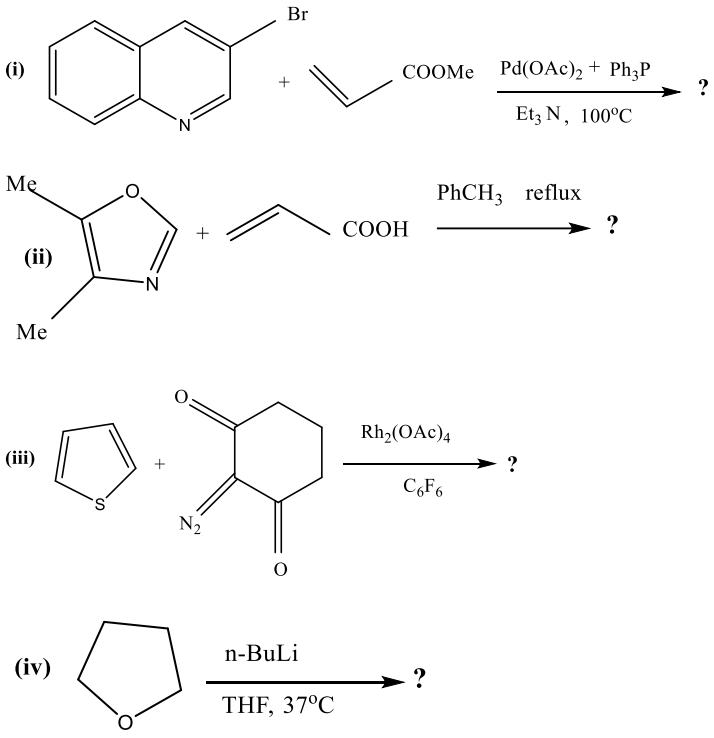
(ii) Give the IUPAC name of the following compound



2+2+2+ (1+1) = 8

Or

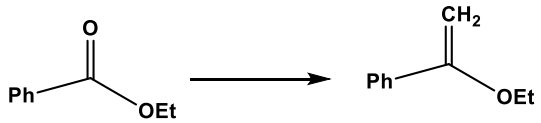
Q-6. Draw the structure of major product in the following reaction with mechanism.



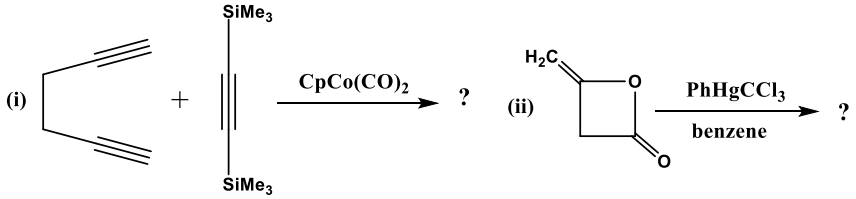
4x2 = 8

Unit-4: Organometallic Chemistry-2

Q-7. (**a)** Carry out the following conversion in one step and explain mechanistically its formation.

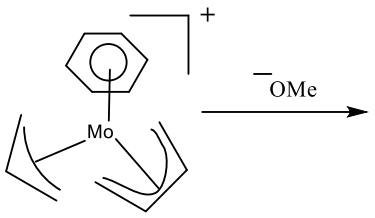


(b) Predict the product in the following reactions



(c) Write a short note on olefin metathesis.

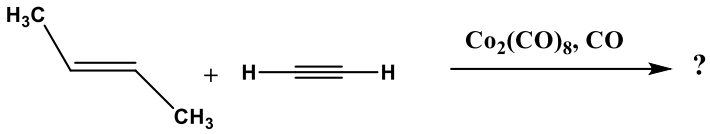
(d) Identify the main product of nucleophilic attack by methoxide ion on the following complex ion and give explanation.



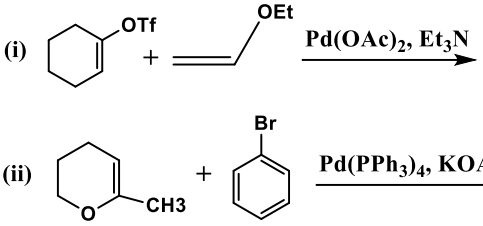
2+2+3+1 = 8

Or

Q-8. (a) Identify the product in the following reaction and explain its formation mechanistically**.**



(b) Find out the final product formed in the following reactions.



(**c**) Write a short note on Stille coupling reaction. **3+3+2 = 8**

Unit-5: Medicinal Chemistry-1

Q-9. (a) Describe the total synthesis of phenoxymethyl penicillin.

(b) Define agonist and antagonist with proper example. .

(c) Write the source of cephalosporin.

(d) Give an example of antisense drug with structure. **3.5+2+1+1.5 = 8**

Or

Q-10. (a) Describe the structure of dactinomycin mentioning five amino acids.

(b) Explain the mechanism of action of benzyl penicillin.

(c) Discuss the different methods of drug administration. Why oral route is the most preffered path?

(d) Give an example of drug for affecting the translation process on cell ribosome.

3+2+2+1 = 8