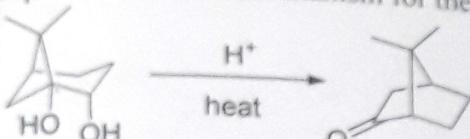


NOTE: Attempt answer for all parts of a question together.

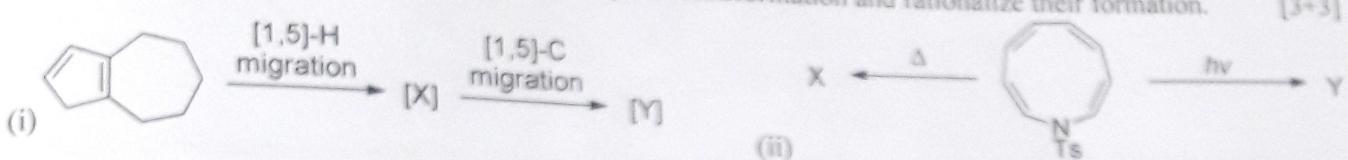
Q1.

(a) Propose the reaction mechanism for the given transformation.



[3]

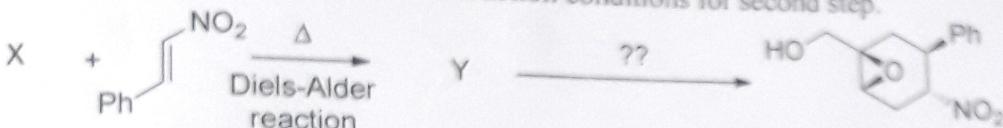
(b) Write the structures of X and Y for the given pericyclic transformation and rationalize their formation.



[3+3]

Q2.

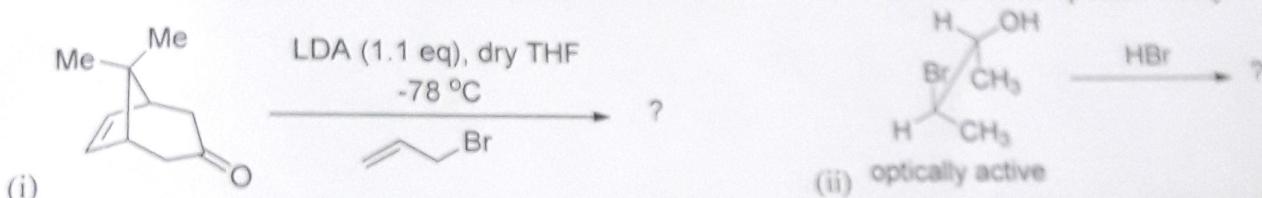
(a) Assign the structures of X and Y and reaction conditions for second step.



[3]

(b) Write the structure of product(s) for the given transformations and comment on their optical activity.

[3+3]



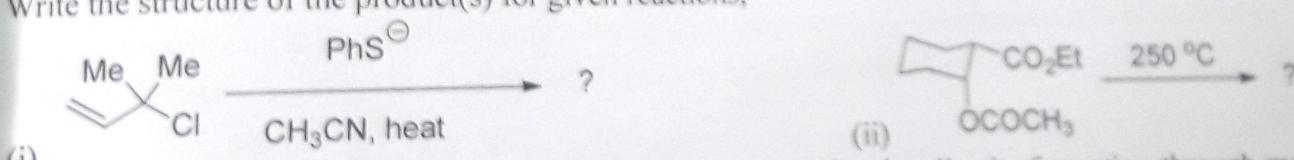
Q3.

(a) Write the molecular orbital diagram of LUMO for 1,3,5-hexatriene and assign the number of nodes.

[3]

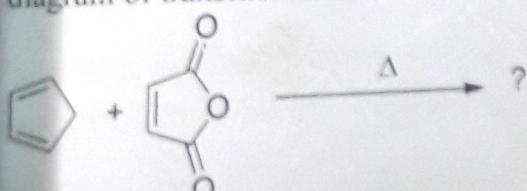
(b) Write the structure of the product(s) for given reactions;

[3]



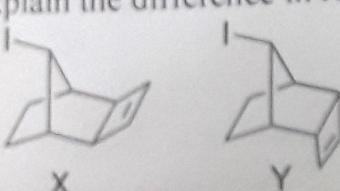
(c) Write the structure of most favored (endo/exo) product(s) and rationalize its formation through molecular orbital diagram of transition state.

[1.5+1.5]



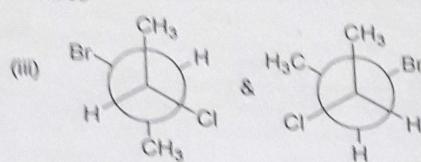
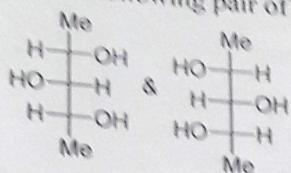
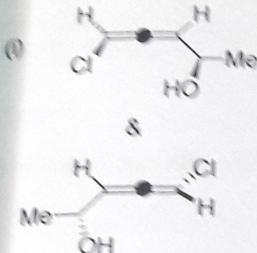
[3]

(d) Explain the difference in reaction rates for nucleophilic substitutions of compounds X and Y.



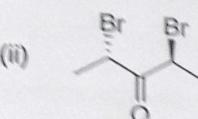
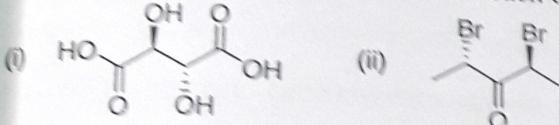
NOTE: Attempt answer for all parts of a question together.

Q1. (a) Assign the relationship between the following pair of structures [4]

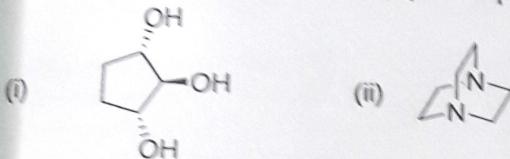


(b) Draw the possible staggered conformations of meso- and optically active form of 2,3-dichlorobutane. [4]

(c) Identify chiral/achiral molecules from each of the following molecules [2]

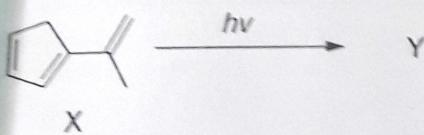


(d) Identify by drawing symmetry planes present in each of the following molecules [3]

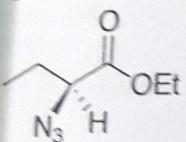


(e) Molecular formula C<sub>5</sub>H<sub>8</sub> represents two isomeric allenes. One is achiral and the other is resolvable. Identify the allenes. [2]

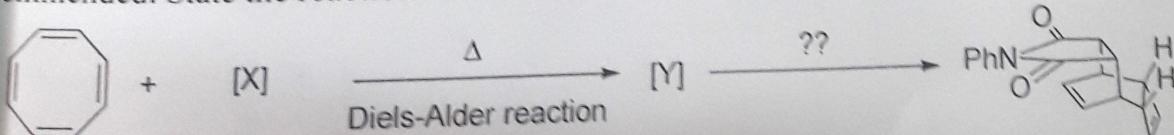
Q2. (a) Compound X easily converts to a more stable compound Y under photochemical conditions. Predict the structure of B and explain its formation through pericyclic reaction? [5]



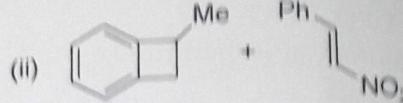
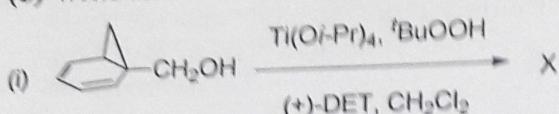
(b) Write synthetic steps with proper reaction conditions for the asymmetric synthesis of given azido compound from butane-1-ol using chiral auxiliary approach (Choose auxiliary and other reactants yourself) [10]



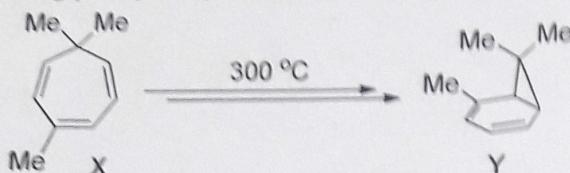
Q3. (a) Predict structures of X and Y for the given transformations? Three-dimensional drawings are recommended. State the reaction conditions and mode of pericyclic reaction in second step? [4+2]



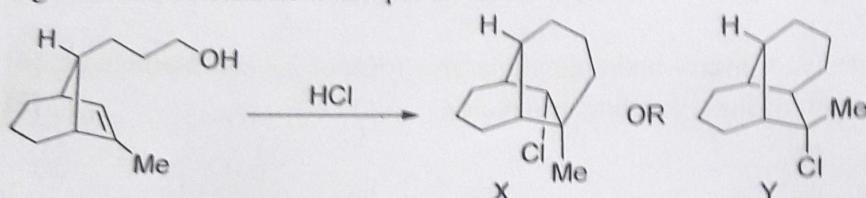
(b) Write the structure of the products for the given transformation with correct stereochemistry?



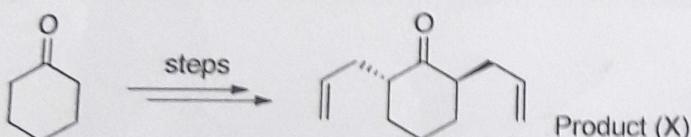
(c) Explain the two step conversion from X to Y by indicating the structure of intermediate compound [1.5+2]



Q4. (a) Predict the most suitable product (X or Y) for the given transformation. Explain its formation through reaction mechanism and predict the reaction selectivity.



(b) Write all the synthetic steps with reaction conditions for the asymmetric synthesis of product (X) from cyclohexanone.



(c) Compound X showed observed rotation of  $-97.50^\circ$  when present in the enantiomeric ratio (97.5 : 2.5, e.e.). Calculate the optical rotation of enantiomerically pure compound X.

-----\*\*GOOD LUCK\*\*-----