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PG CBCS
M.Sc. Semester-I Examination, 2020
CHEMISTRY
 PAPER: CEM 102
 (ORGANIC CHEMISTRY-I)

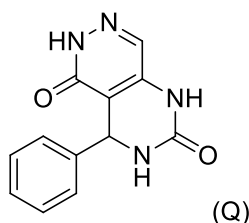
Full Marks: 40

Time: 2 Hours

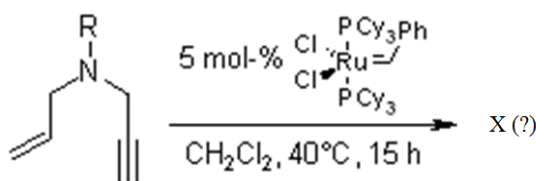
Answer any four questions:

10X4=40

1. Draw the pi-molecular orbitals of 1,3,5-hexatriene and 2,4-pentadienyl radical showing the configuration of pi electrons in the ground state and the first excited state. Identify the HOMO and LUMO of the ground state and first excited state.
2. Thermal [1,3]-sigmatropic shift of hydrogen is not observed but photochemical [1,3]- shift of hydrogen is facile. On the other hand, thermal [1,5]-sigmatropic shift of hydrogen is facile but photochemical [1,5]-shift of hydrogen is seldom observed. Explain these observations by FMO approach.
3. Give the structural formulae for the products expected from the reaction between (2E,4E)-2,4-hexadiene and maleic anhydride at high temperature and low temperature. Explain the results.
4. What are alkaloids? Write down the sources, general properties and classification of alkaloids? Give the synthesis of ricinine.
5. a) Write the product (P) formed from a single-pot reaction of benzaldehyde, ethyl acetoacetate and urea in ethanol in the presence of HCl. Give the name of the reaction and its accepted mechanism (given by Oliver Kappe). 2+ 1 + 2
 b) How do you convert the above product (P) into the following compound (Q)? 3



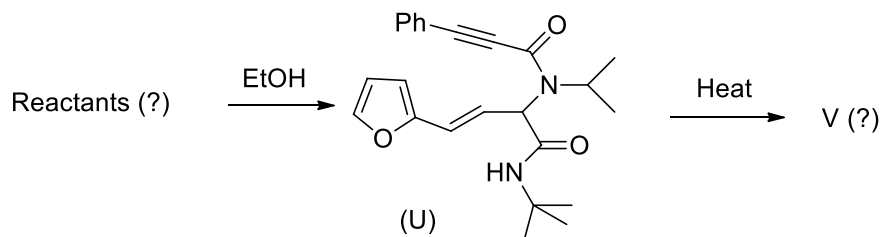
- c) Write down the structure of the product, (X), in the following reaction. 2



P.T.O.

(2)

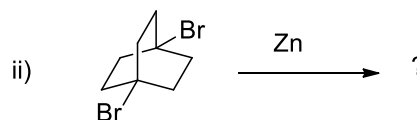
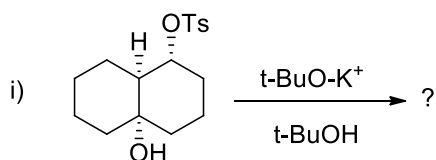
6. a) A multi-component reaction yields a compound (U) which is then heated to give a product (V). Find the structures of all the reactants and the structure of (V).



3 + 2

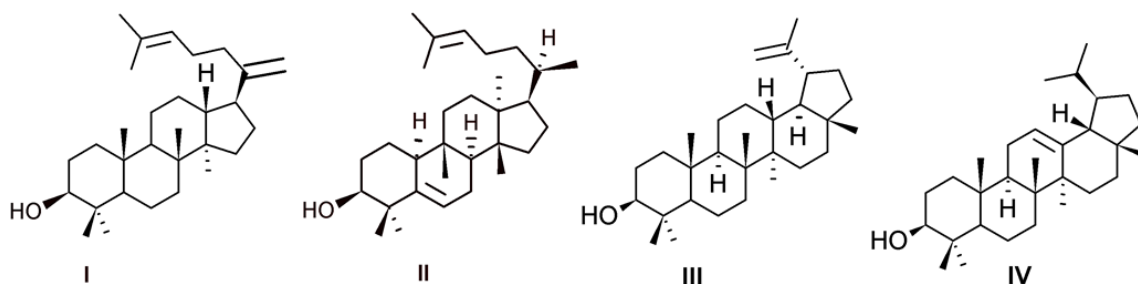
- b) Give the structure of the product, and explain its formation

5



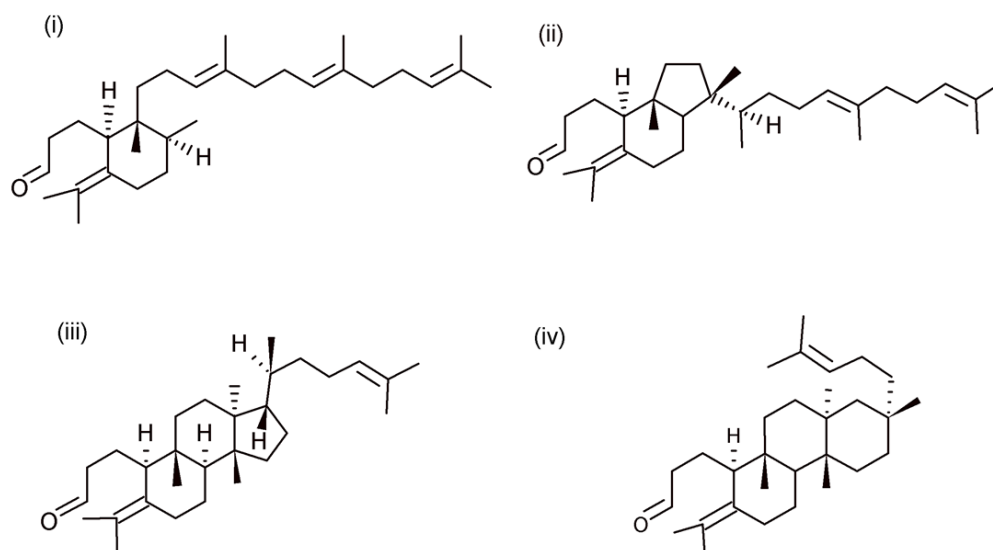
7. Synthesize the following from squalene by applying biogenetic isoprene rule:

10



8. Synthesize the following from squalene by applying biogenetic isoprene rule and Grob fragmentation

10



P.T.O.

(3)

9.(i) Answer any two:

2.5 x 2

- a) Plant based chemicals can be termed as *Renewable Chemicals*. Justify in your own words.
 b) What are terpenoids and triterpenoids?
 c) What is “biogenetic isoprene rule”?

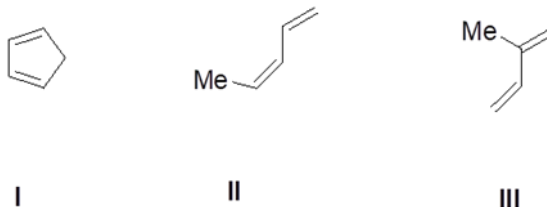
(ii) Answer any two:

2.5 x 2

Explain the formation of the following from squalene epoxide by applying the “biogenetic isoprene rule” (at least three examples each): (i) monocyclic triterpenoids (ii) bicyclic triterpenoids (iii) tricyclic triterpenoids.

10. (a) What do you mean by retrosynthetic analysis?

(b) Arrange the following compounds in order of their reactivity in Diels-Alder reactions. Give reasons in support of your answer.



(c) What is meant by [i,j] sigmatropic reaction? Illustrate with an example.

(d) What are synthones? Explain with examples.

2.5+2.5+2.5+2.5
