M.Sc. 1st Semester Examination, 2015

CHEMISTRY

(*Organic*)

PAPER – CEM-102

Full Marks : 40

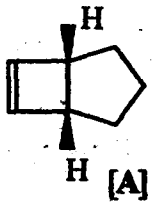
Time : 2 hours

Answer any **five** questions taking at least **two** from each Group

The figures in the right-hand margin indicate marks

GROUP – A

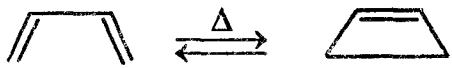
1. Write Woodward-Hoffmann rules for electrocyclic reactions. What is "principle of microscopic reversibility" ?
Complete the following transformation indicating which of the following steps do not follow the above rules and explain. Identify [B] & [C].



$\xrightarrow{\Delta}$ [B] $\xrightarrow{h\nu}$ [C] $\xrightarrow{h\nu}$ No product

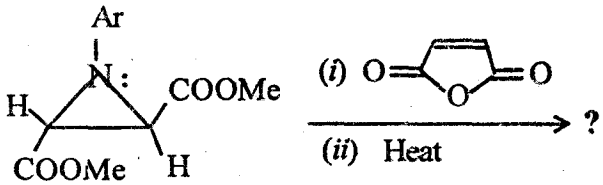
1 + 2 + 5

2. (*a*) Construct the correlation diagram for the following interconversion and indicate the symmetry allowed path under thermal condition;

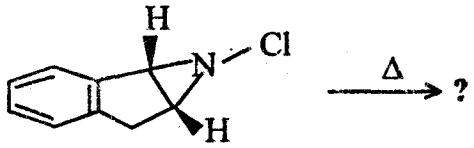


(*b*) Predict the product of the following reaction showing Frontier Orbital Interaction(F.O.I.) (Attempt any *two*) :

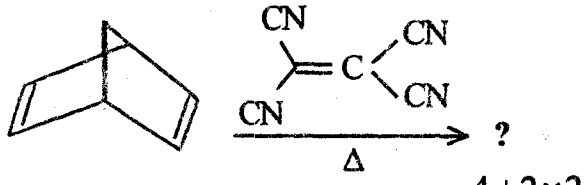
(*i*)



(*ii*)



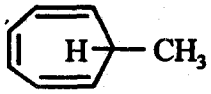
(*iii*)

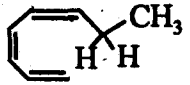


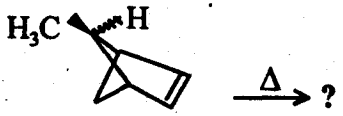
4+2×2

3. (*a*) "1, 3-H migration is difficult to achieve but 1, 3 - C migration takes place under thermal condition" – Explain the statement with proper justification indicating F.O.I.

(*b*) Predict the product of the following reactions indicating explanation with F.O.I. (Attempt any *two*) :

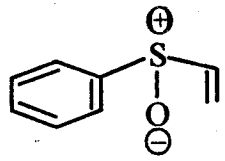
(*i*) 

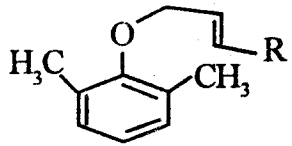
(*ii*) 

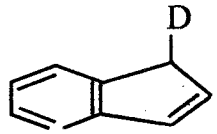
(*iii*) 

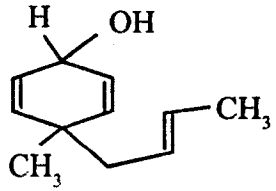
4+2×2

4. What is sigmatropic reaction ? Define (*i, j*) sigmatropic shift ? Predict the product/s of the following reactions showing F.O.I. (Attempt any *three*) : 1+1+2×3

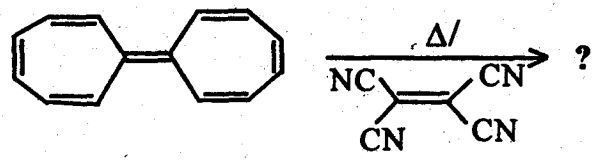
(*i*)  $\xrightarrow{\Delta}$?

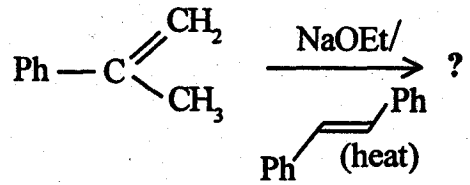
(*ii*)  $\xrightarrow{\Delta}$?

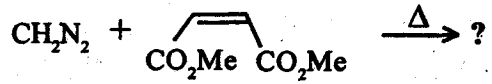
(*iii*)  $\xrightarrow{\Delta}$?

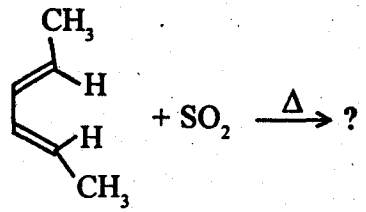
(*iv*)  $\xrightarrow[\text{treating}]{H^{\oplus}/}$?

5. What is 'Supra' and 'antarafacial' cycloaddition. Illustrate with example. Predict the product/s of the following reactions indicating F.O.I. in each case (Attempt any *three*) : $2+2\times3$

(*i*) 

(*ii*) 

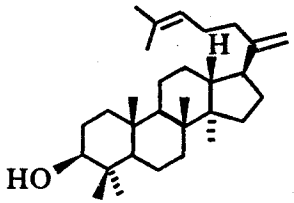
(*iii*) 

(*iv*) 

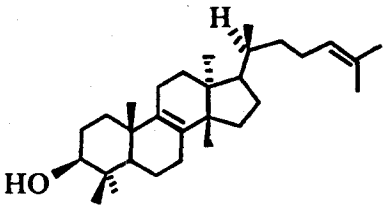
GROUP – B

6. Synthesize Dammara 20(21), 24-diene-3-ol **1**, : Tirucallol **2**, Euferol **3**, Iupeol **4**, germanicol **5**,

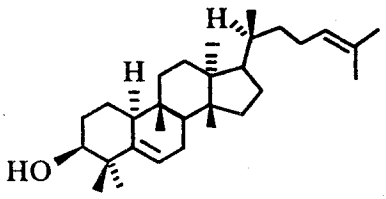
β-amyrin **6**, isobauerenol **7** from squalene epoxide (any *four*, with plausible mechanism) : 2 ×4



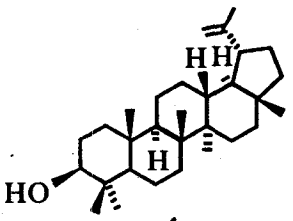
1



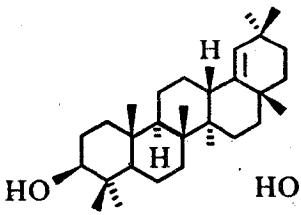
2



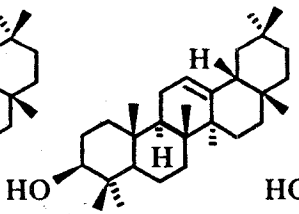
3



4



5



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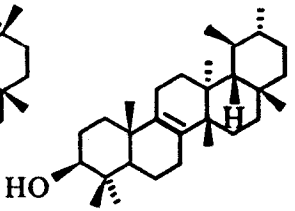
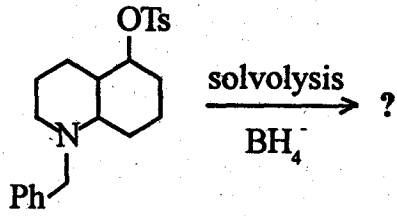


7

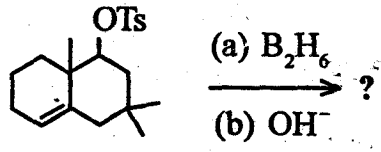
(*Continued*)

7. (*a*) Predict the products in the following transformations (any *two*) : 2×2

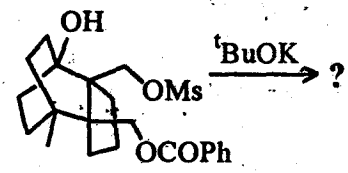
(*i*)



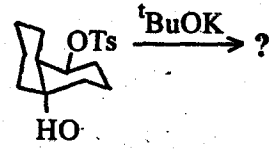
(*ii*)



(*iii*)



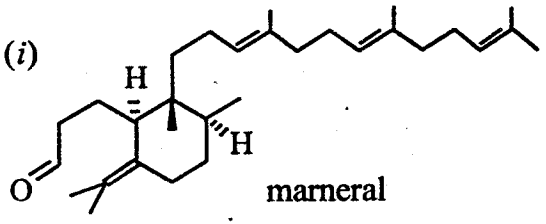
(*iv*)



(*b*) What is Grob fragmentation ? 2

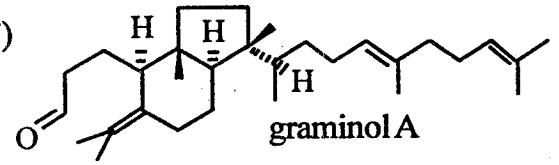
(*c*) Synthesize one of the following : 2

(*i*)



marneral

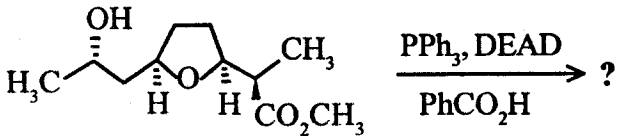
(*ii*)



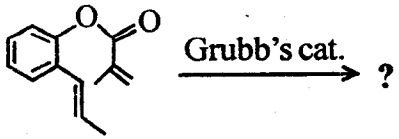
graminol A

8. Predict the products with plausible mechanism (attempt any *four*) : 2×4

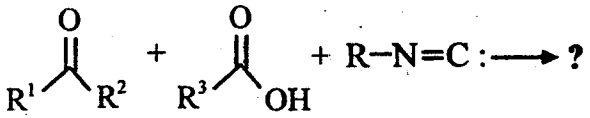
(*i*)



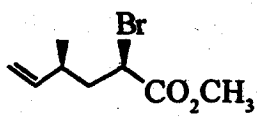
(*ii*)



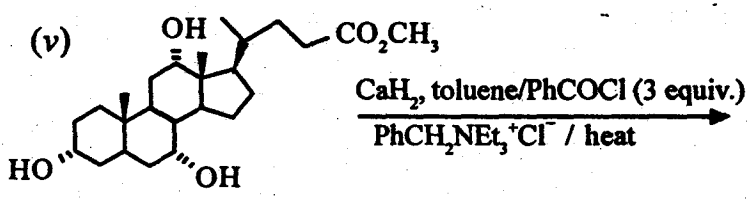
(*iii*)



(*iv*)



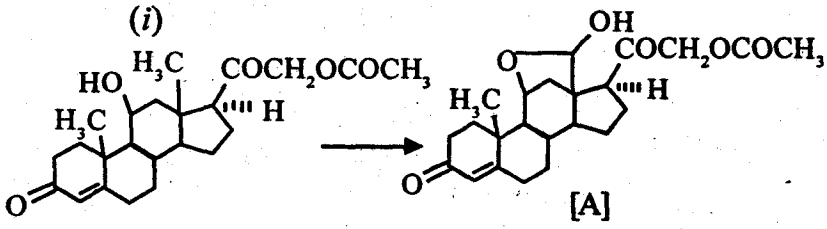
(*v*)



9. (*a*) What is Barton reaction ?

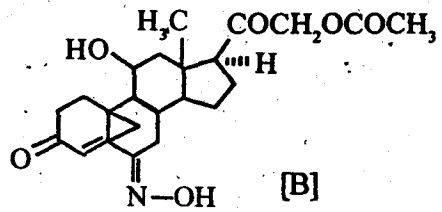
(*b*) Carry out the following transformation, indicating the reagents used for each case with mechanism :

(*i*)



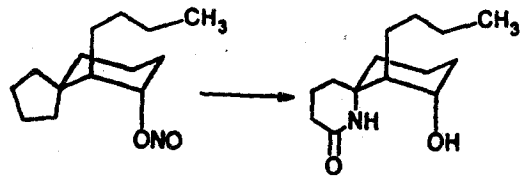
[A]

and

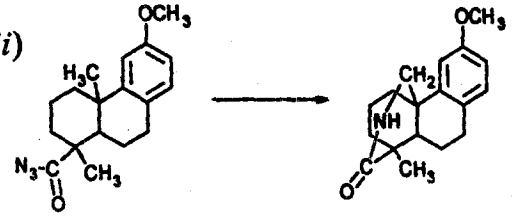


[B]

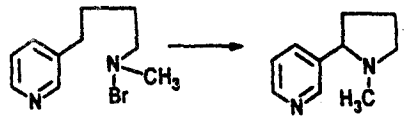
(*ii*)



(*iii*)



(*iv*)



2+3+1+1+1

10. (*a*) What is Multi Component Reaction ?

(*b*) Give an example of Ugi reaction with plausible mechanism.

(*c*) What is Olefin Methathesis reaction ? Give an example.

(*d*) What is a phase transfer catalyst and how does it work ? Give an example. 2×4