PG/IS/CEM-102/14

M.Sc. 1st Semester Examination, 2014

CHEMISTRY

(*Organic*)

PAPER—CEM-102

Full Marks : 40

Time : 2 hours

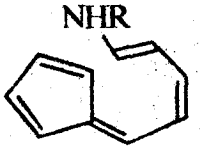
Answer any **five** questions taking at least **two** from each Group

The figures in the right-hand margin indicate marks

GROUP – A

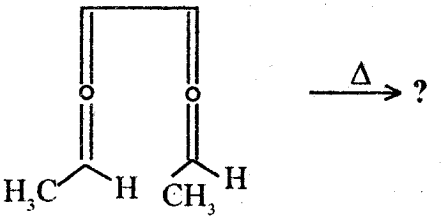
1. Write Woodward-Hoffmann selection rules for electrocyclic reactions, hence predict the product/s of the following reactions indicating Frontier-Orbital Interactions (F.O.I.) (Attempt any *three*) : $2 + 2 \times 3$

(*i*)

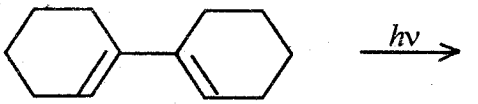


$\xrightarrow{\Delta}$?

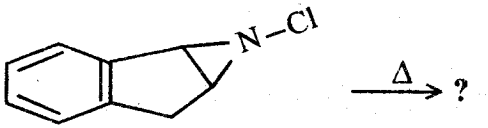
(*ii*)



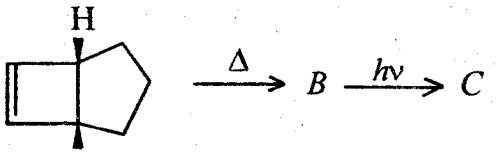
(*iii*)



(*iv*)



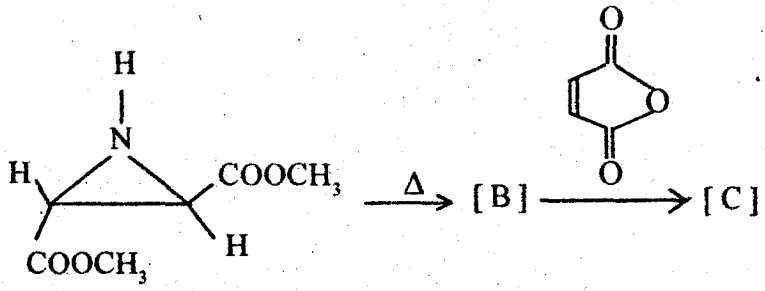
2. (*a*) Complete the following transformation ;



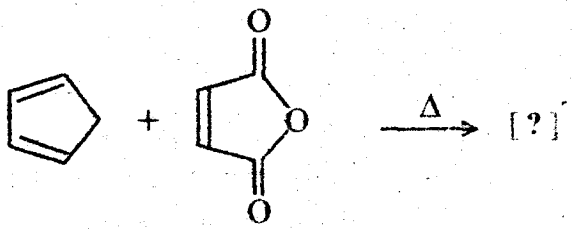
A

Identify *B* and *C* and indicate the step/s where Woodward-Hoffmann selection rule is not obeyed. Explain with justification. 6

(*b*) Predict the product of the following reaction, indicating F.O.I. and hence identify (*B*) and (*C*) : 2

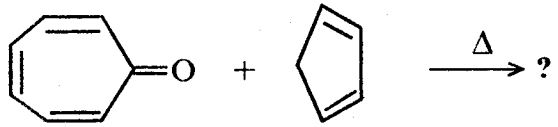


3. (*a*) What is secondary interaction in cycloaddition addition reaction ? Predict the product of the following reaction indicating the *primary* and *secondary interactions* of the Frontier orbitals ; 4

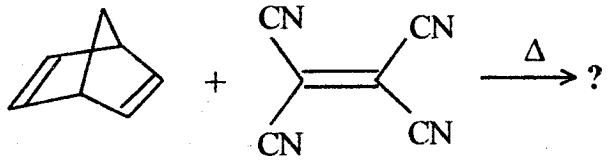


(*b*) Predict the product/s of the following reaction indicating Frontier Orbital interactions (F.O.I.). Attempt any *two* : 2×2

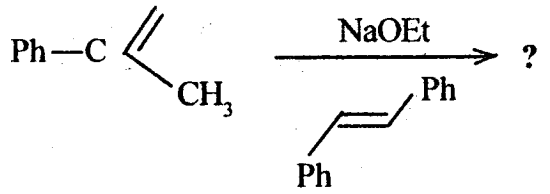
(*i*)



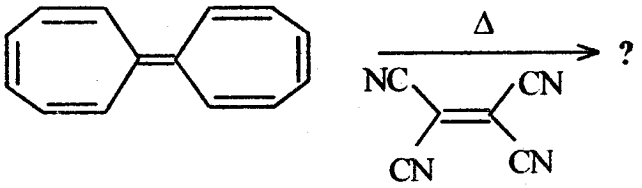
(*ii*)



(*iii*)



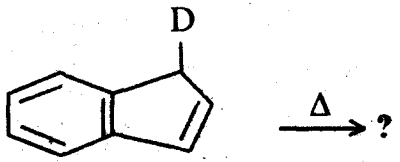
(*iv*)



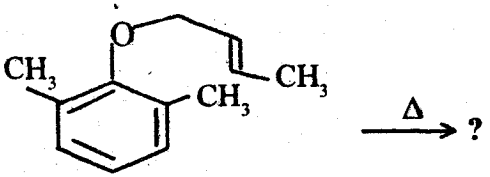
(*Continued*)

4. Define (*i*, *g*) sigmatropic shift. Illustrate with suitable examples. Predict the product/s of the following reaction indicating F.O.I. in each case. (Attempt any *three*) : $2 + 2 \times 3$

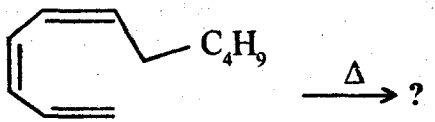
(*i*)



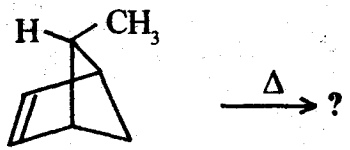
(*ii*)



(*iii*)



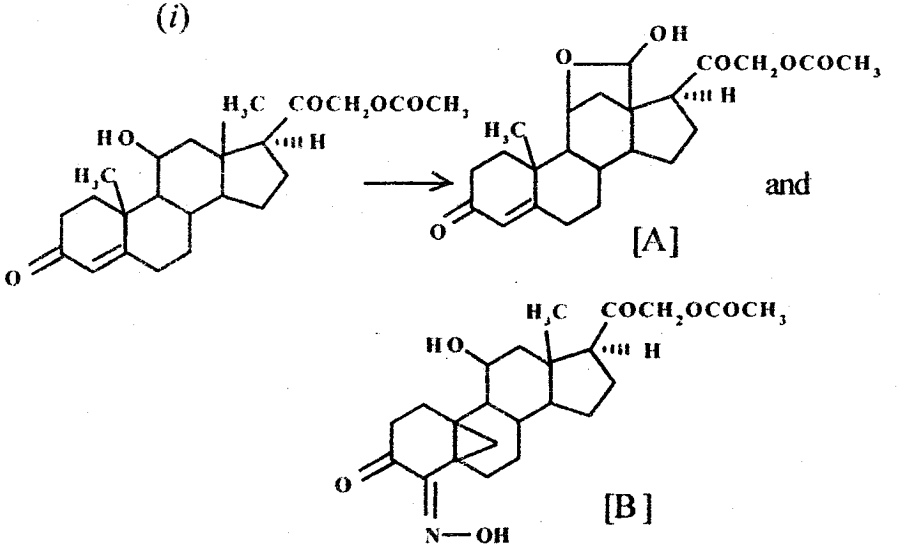
(*iv*)



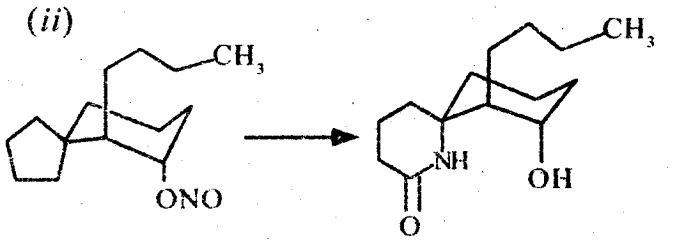
5. (*a*) What is Barton reaction ? 2

(*b*) Carry out the following transformation : 3 + 1 + 1 + 1

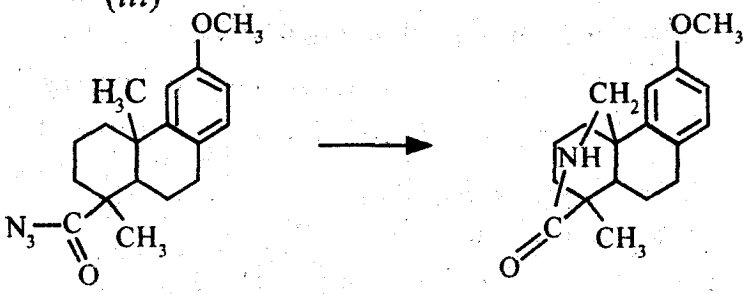
(*i*)



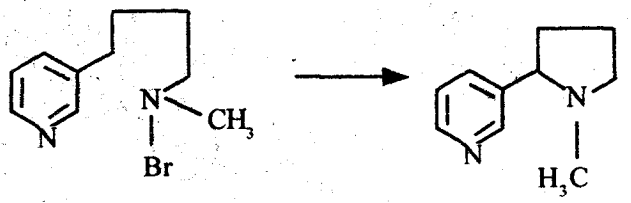
(*ii*)



(*iii*)



(*iv*)

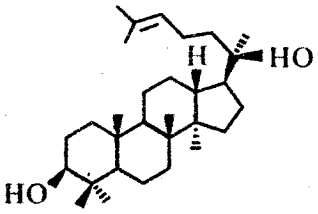


GROUP–B

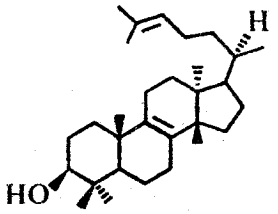
6. (*a*) What is biogenetic isoprene rule ? 2

(*b*) Explain the formation of (*i*) monocyclic, (*ii*) bicyclic and (*iii*) tricyclic products from squalene epoxide by utilizing the above rule. 2 x 3

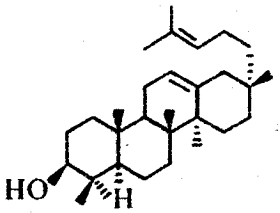
7. Synthesize (20S) dammarene-diol, **1**, butyrospermeol **2**, baccharis oxide **3**, lupeol **4**, germanicol **5**, α-amyrin **6**, isobauerenol **7**, from squalene epoxide (any *four*, with plausible mechanism) : 2 × 4



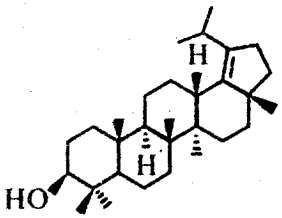
1



2



3



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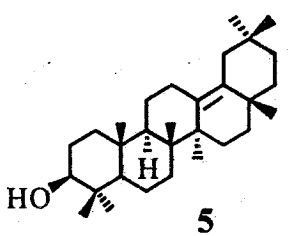

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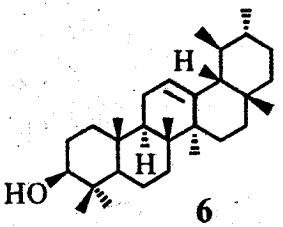

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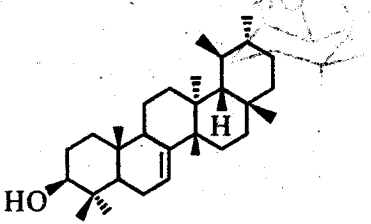
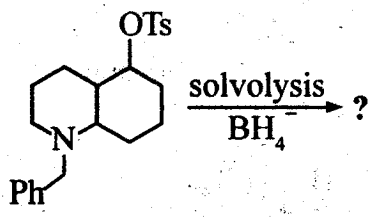


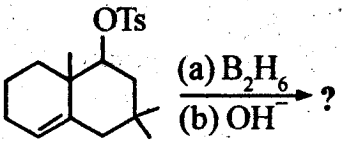
7

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

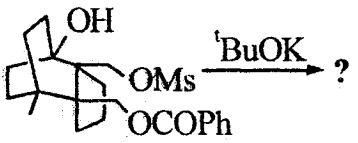
(*i*)



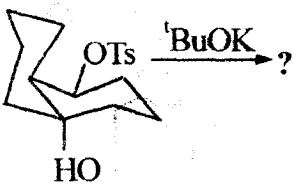
(*ii*)



(*iii*)



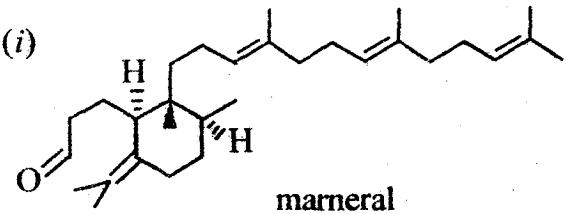
(*iv*)



(*b*) What is Grob fragmentation ? 2

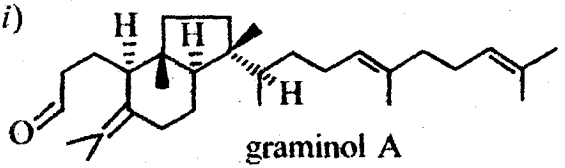
(*c*) Synthesize *one* of the following : 2

(*i*)



marneral

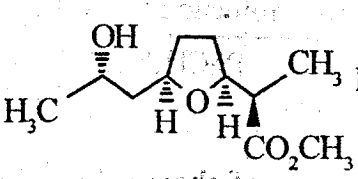
(*ii*)



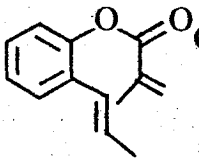
graminol A

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

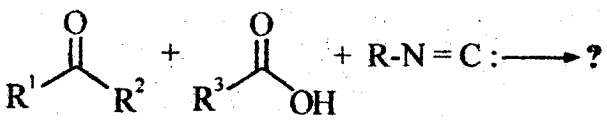
(*i*)



(*ii*)



(*iii*)



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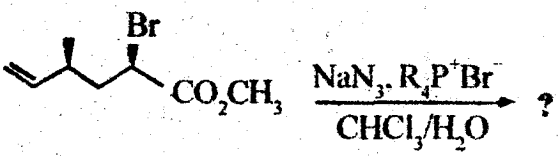
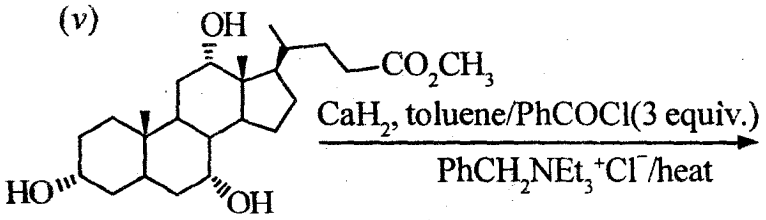


(*v*)



10. Write the different steps of chemical reactions occuring during the biosynthesis of monoterpenoids starting for mevaloic acid route. 8