2016

M.Sc. 1st Semester Examination

CHEMISTRY

PAPER—CEM-102

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

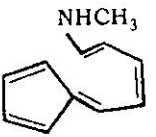
Illustrate the answers wherever necessary.

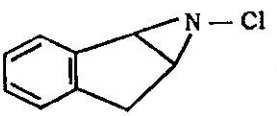
(*Organic Chemistry*)

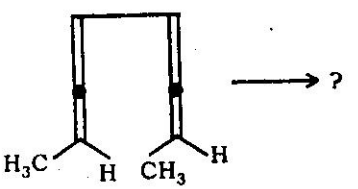
Answer any *five* questions
taking *two* questions from each group.

Group—A

1. Write down the Woodward-Hoffmann selection rules for electrocyclic reactions and predict the product/s of the following indicating frontier arbital instractions (F.O.I) :

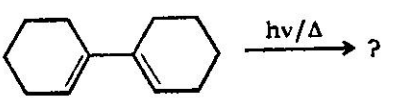
(i) 

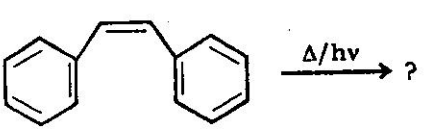
(ii) 

(iii) 

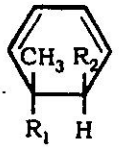
2+2+2+2

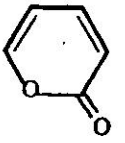
2. The following compounds are treated separately by thermal and photochemical excitations. Mention in what mode of activation the exact product is observed :

(i) 

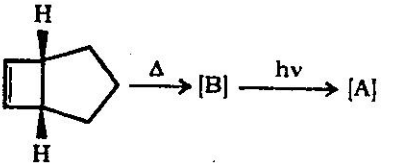
(ii) 

(Continued)

(iii) 

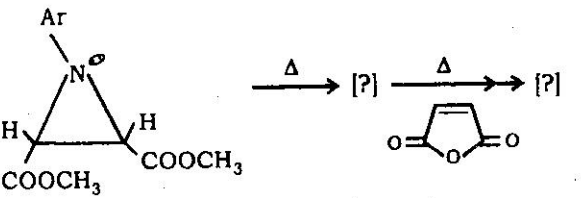
(iv) 

3. (a) The following compound (A) does not absorb photochemical irradiation but yields product (B) under thermal condition in a symmetry ferbidden path. Further compound (B) absorb light to give product (A) but the principle of microscopic reversibility is not maintained. Explain the reason and identify the product (B).

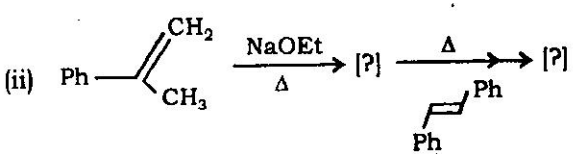


[A]

(b) (i) Complete the following transformation indicating (F.O.I) :



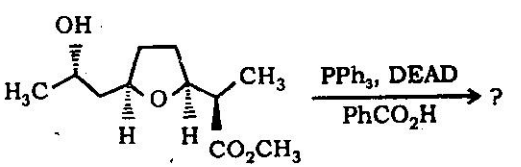
(ii)



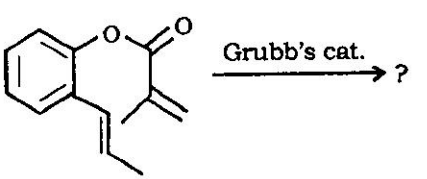
4+2+2

4. Predict the products with plausible mechanism. 2×4

(i)



(ii)



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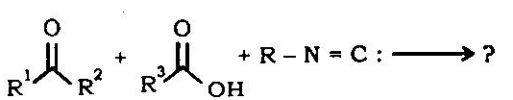
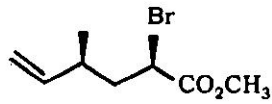
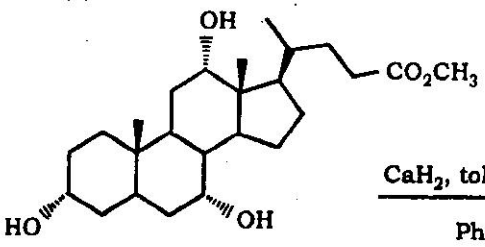


(iv) 

$\xrightarrow[CHCl_3 / H_2O]{NaN_3,\ R_4P^+Br}$?

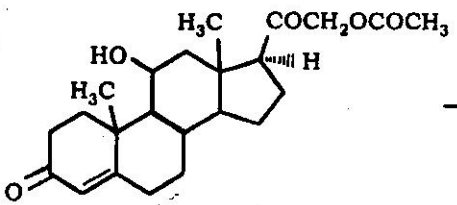
(v)

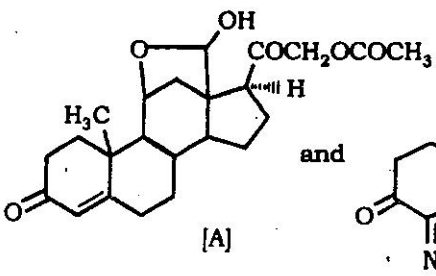


$\xrightarrow[PhCH_2NEt_3^+Cl^- \ /\ heat]{CaH_2,\ toluene\ /\ PhCOCl\ (3\ equiv.)}$?

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

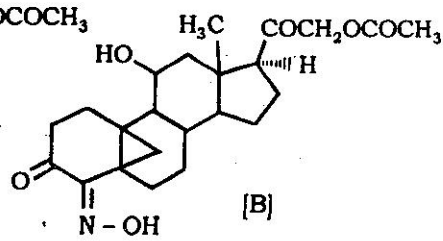
(b) **Carry out the following transformation :**

(i) 



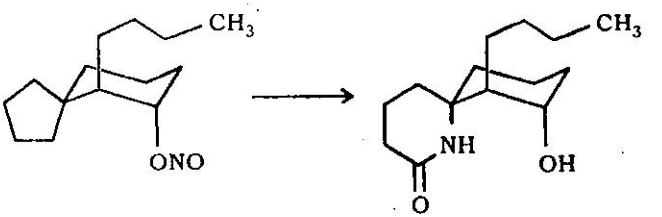
[A]

and



[B]

(ii)



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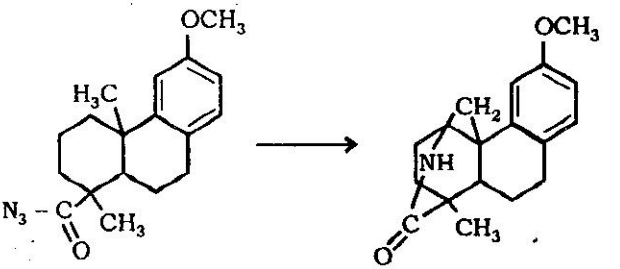
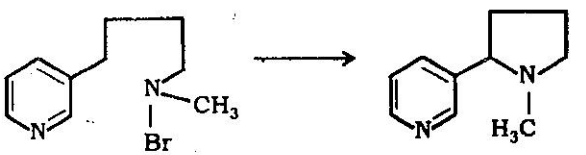


(iv)



2+3+1+1+1

Group—B

6. (a) What is "biogenetic isoprene rule" ?

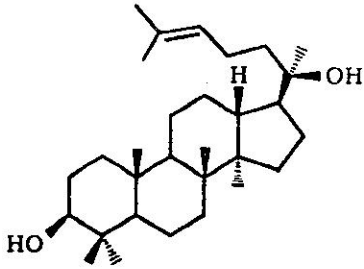
(b) Explain the formation of

(i) monocyclic,

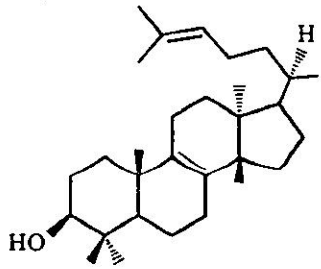
(ii) bicyclic and

(iii) tricyclic products from squalene epoxide by utilizing the "biogenetic isoprene rule". 2×4

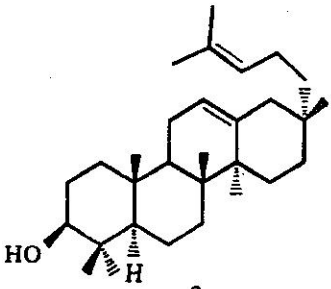
7. Synthesize the triterpenoids 1 – 7 (any *four*) from squalene epoxide (with plausible mechanism) : 2×4



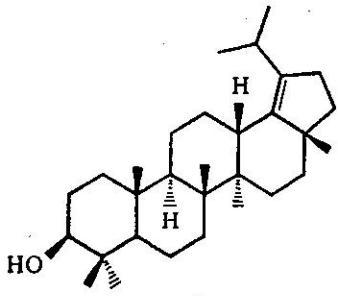
1



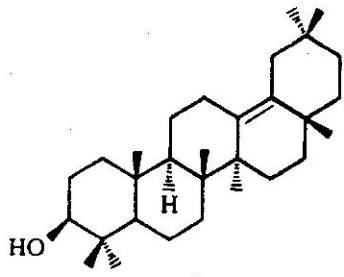
2



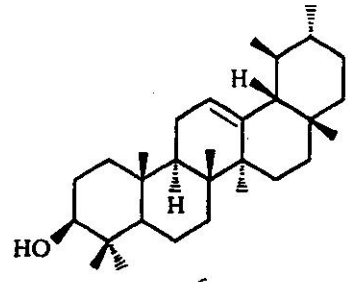
3



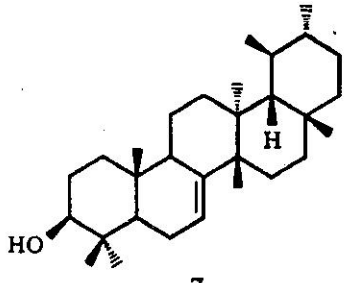
4



5

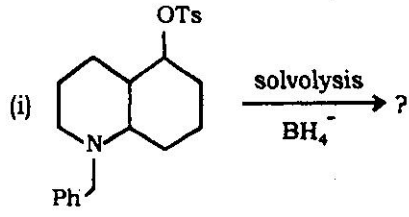


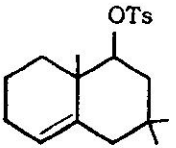
6



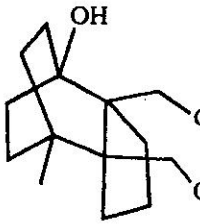
7

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

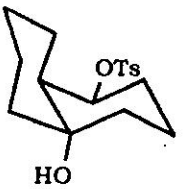


(ii) 

$\xrightarrow[(b)\ OH^-]{(a)\ B_2H_6}$?

(iii) 

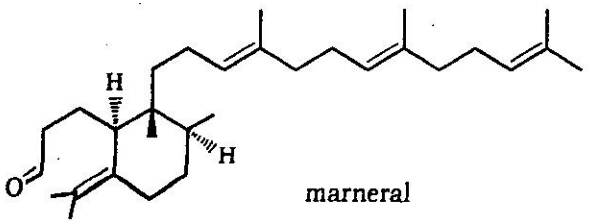
$\xrightarrow{{}^tBuOK}$?

(iv) 

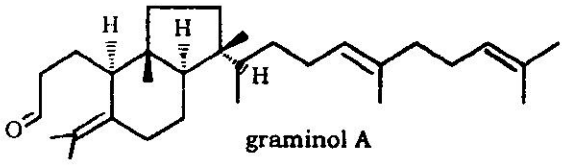
$\xrightarrow{{}^tBuOK}$?

(b) What is Grob fragmentation ? 2

(c) Synthesize one of the following :

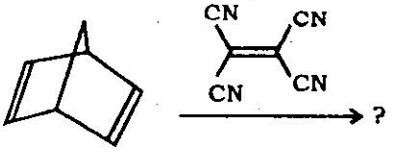
(i) 

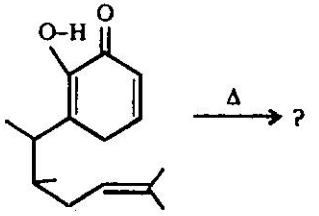
marneral

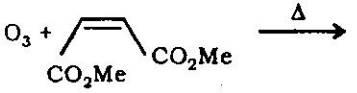
(ii) 

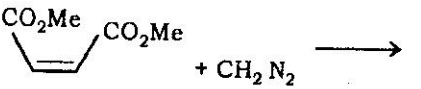
graminol A 2

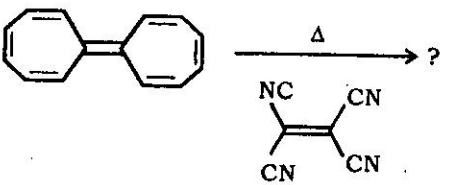
9. Predict the products of the following reaction indicating Frontier Orbital interaction (attempt any four) : 4×2

(i) 

(ii) 

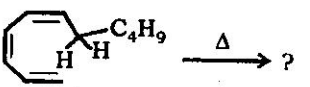
(iii) 

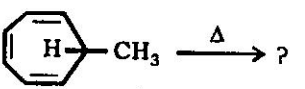
(iv) 

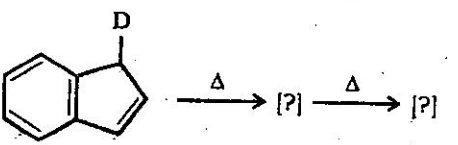
(v) 

10. (a) What is ( ) signatropic shift ? Explain with some examples.

(b) What type of H-migration occurs in the following reaction showing F.O.I in each case (attempt any *three*) :

(i) 

(ii) 

(iii) 

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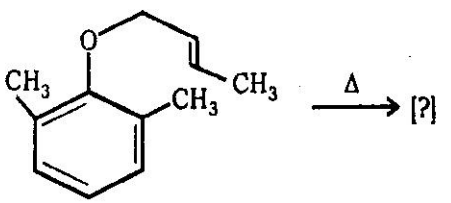

2+3×2 .