

2025

M.Sc. 1st Semester Examination

CHEMISTRY

Paper : CEMC401X0

(Organic Chemistry-I)

Full Marks : 50

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions : $2 \times 4 = 8$

1. What is isoprene rule? What is "biogenetic isoprene rule"?
2. What do you mean by "Functional Group Interconversion"? Explain with a suitable example.
3. What is "Fragmentation Reaction"? Write the principles of Fragmentation Reaction. Give an example.
4. State and explain the principle of conservation of orbital symmetry in concerted reactions.
5. Plants are the source of *Renewable Phytochemicals*. Justify the statement in your own words.

P.T.O.

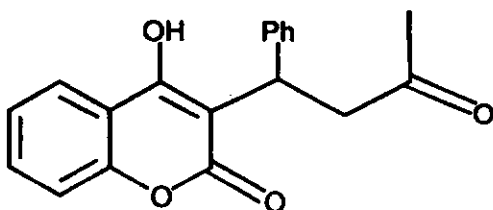
(2)

6. What do you mean by Hückel and Mobius system?

Group - B

Answer any *four* questions : $4 \times 4 = 16$

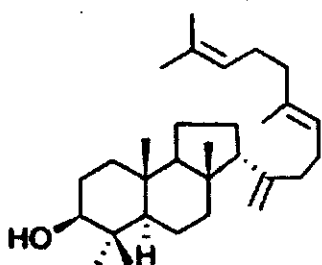
7. Examine using both FMO and Hückel-Mobius method whether the disrotatory interconversion between cyclobutene and 1,3-butadiene is a thermally or photochemically allowed process.
8. What is correlation diagram? Examine using correlation diagram whether conrotatory mode of ring-opening of 1,3-cyclohexadiene to *cis*-1,3,5-hexatriene is thermally allowed or photochemically allowed process.
9. Using retrosynthetic approach synthesize the following molecule :



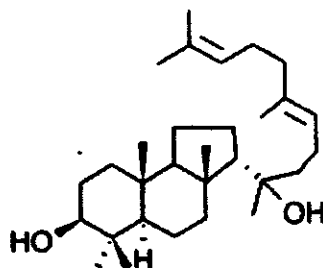
10. Explain the formation of bicyclic triterpenoids from squalene epoxide by applying the "biogenetic isoprene rule" (at least three examples).
11. What is 'biomimetic control' in chemical transformation? Give an example.

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12. Synthesize the following 6-6-5 tricyclic triterpenoids from squalene by applying biogenetic isoprene rule :



I



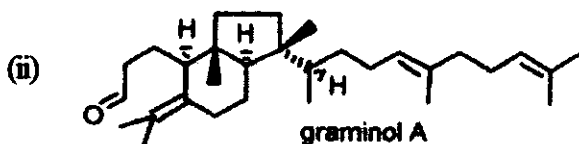
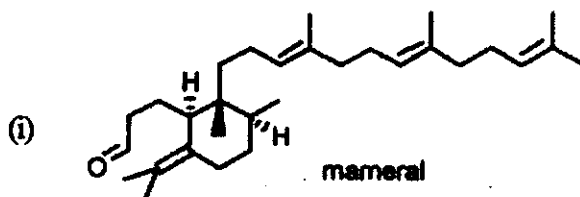
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Group - C

Answer any *two* questions : $8 \times 2 = 16$

13. (a) Synthesize the following from squalene by applying biogenetic isoprene rule and Grob fragmentation :

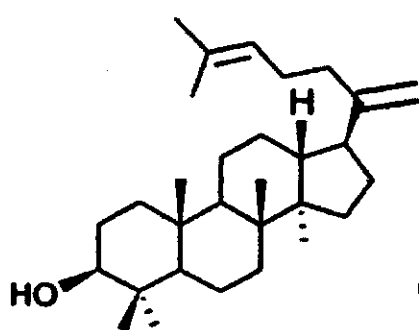
$2 \times 2 = 4$



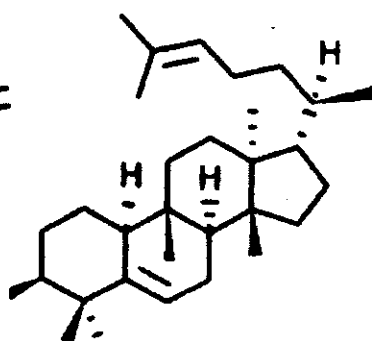
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- (b) Synthesize the following 6-6-6-5 tetracyclic triterpenoids from squalene by applying biogenetic isoprene rule : $2 \times 2 = 4$

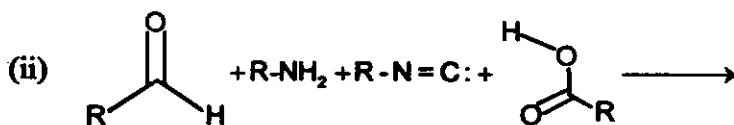
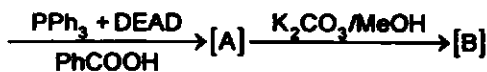
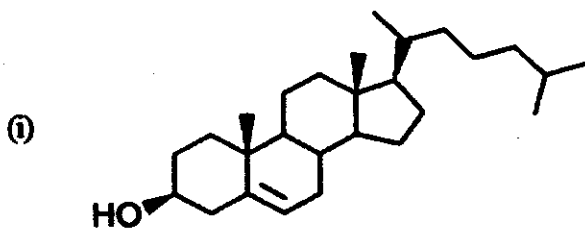


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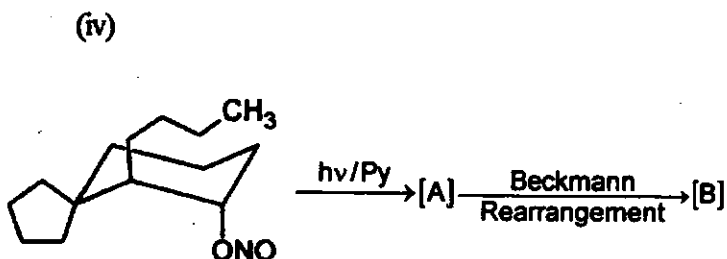
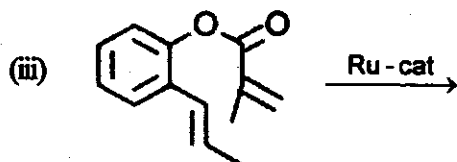


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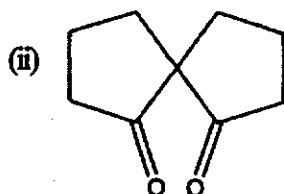
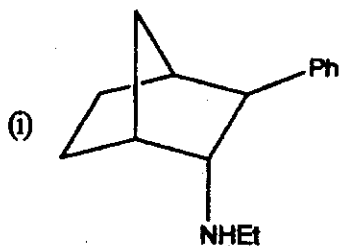
14. Predict the products with plausible mechanism : $2 \times 4 = 8$



(5)

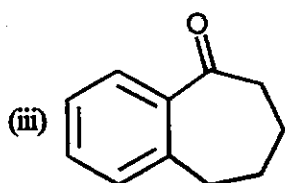


15. How will you synthesize the following compounds? Use retrosynthetic approach to start with simple available starting materials. $2\frac{1}{2}+3+2\frac{1}{2}$

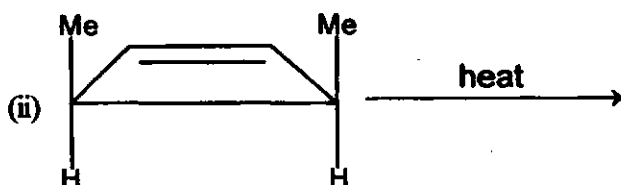
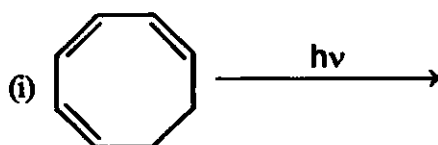


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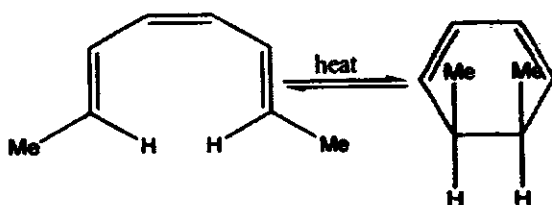


16. (a) Predict the product(s) with plausible mechanism :
2+2



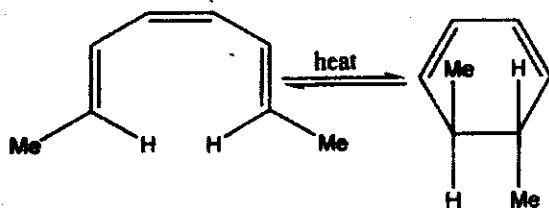
- (b) Which electrocyclic reaction will occur readily by concerted mechanism?
2

Reaction I



(7)

Reaction II



- (c) State the Woodward-Hoffmann rules for electrocyclic reactions. 2

Internal Assessment : 10 marks
