

Ex/SC/CHEM/PG/CORE/TH/XI-O/2025

M. SC. CHEMISTRY EXAMINATION, 2025

(3rd Semester)

CHEMISTRY

PAPER : XI-O

(Organic Chemistry Special)

Time : Two Hours

Full Marks : 40

(20 marks for each Unit)

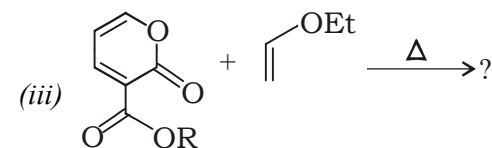
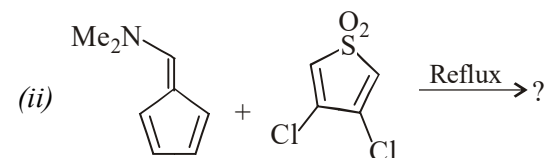
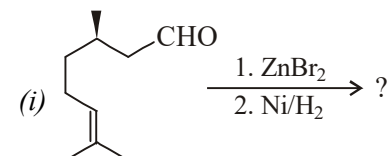
Use a separate Answer Script for each Unit.

UNIT—O-3111

1. (a) Give one example of [3, 4]-sigmatropic reaction. 1

(b) Complete the following reactions with mechanism :

1½+1½+1



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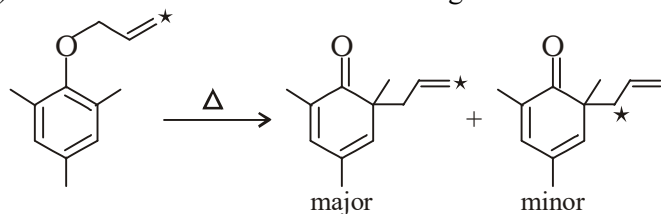
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(2)

2. Answer *any six* questions : 2½×6

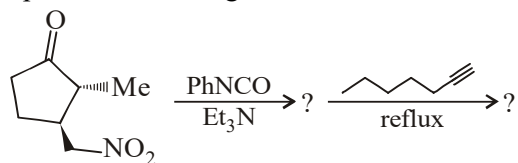
(a) Discuss in brief, the application of Klopman-Salem equation in chemical reactions.

(b) Give the mechanism of the following observation :



[* labelled ^{13}C isotope]

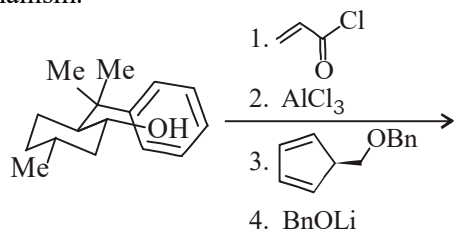
(c) Complete the following conversion with mechanism :



(d) Develop a state correlation diagram of an electrocyclic ring closure reaction of $4n\pi$ -electron system.

(e) Show the biosynthetic pathway of following conversion: squalene (C-30) to Lupenol.

(f) Predict the product of the following reaction with proper mechanism.

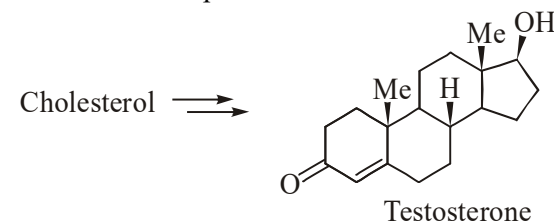


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(5)

(b) Prepare testosterone from cholesterol showing all the intermediate steps.



(c) Give an example of using 'regioselective control element' to achieve regioselectivity in the Woodward's total synthesis of cholesterol.

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(3)

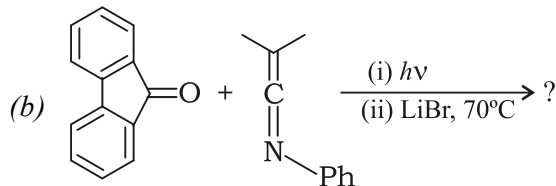
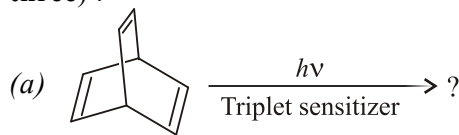
- (g) Derive the selection rule for cheletropic reaction of $(4n+2)\pi$ -electron system.
- (h) Give one suitable example of Cope rearrangement in biological system with its importance.

UNIT—O-3112

3. Answer *any two* questions : 3×2

- (a) $\text{Ru}(\text{bpy})_2\text{Cl}_2$ shows high reactivity as photoredox catalyst. Show the probable catalytic cycles of $\text{Ru}(\text{bpy})_2^{2+}$ in the visible light mediated photoredox processes.
- (b) With the help of suitable experiments prove that Barton reaction proceeds through 6-membered cyclic transition state.
- (c) Under photochemical condition, enamide system may undergo 1,3-acyl shift reaction. With the help of suitable experiment, prove that 1,3-acyl shift occurs *via* intermolecular pathway.

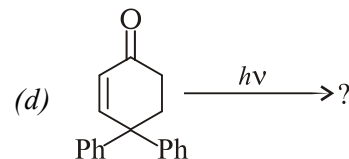
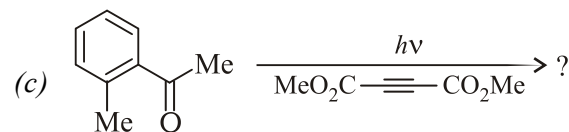
4. Write down the product(s) with probable mechanism (*any three*) : 2×3



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(4)

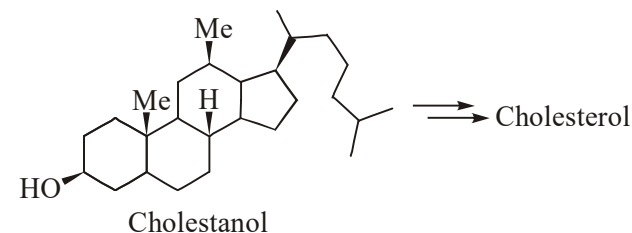


5. Answer *any one* question : 2

- (a) Explain how photoisomerization of olefin plays an important role in creating the visual sensation in our eyes.
- (b) Hofmann-Löffler-Freytag reaction proceeds *via* formation of radical intermediate. Give a suitable experimental evidence in support of the above statement.

6. Answer *any two* questions : 3×2

- (a) In Woodward's total synthesis of cholesterol, show all the intermediate steps to prepare the cholesterol from cholestanol.



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