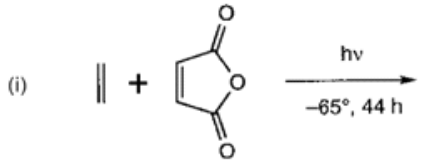
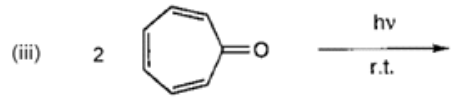
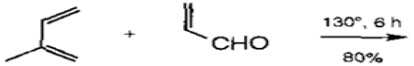
10. (a) Predict the product for the following reactions: 1×3=3



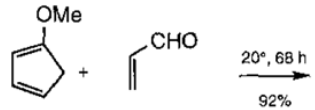


(b) Predict the major product and explain the regioselectivity exhibited by the following reactions, 2+2=4

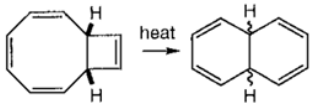
(i)



(ii)



(c) Predict the stereochemistry of the product: 2



(d) What is cheletropic reaction? 2

(e) Using correlation diagram, show the thermal feasibility of Diels Alder Reaction. 3

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PG Even Semester Examination, May 2025

CHEMISTRY

(2nd Semester)

Course No.: CHMCC-202

(Organic Chemistry-II)

Full Marks: 70

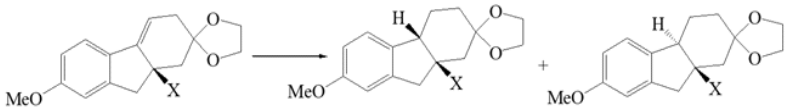
Pass Marks: 28

Time: 3 hours

The figures in the right margin indicate full marks for the question. Answer any five questions selecting one from each unit.

UNIT-I

1. (a) Explain in details the yields of the following reactions: 3

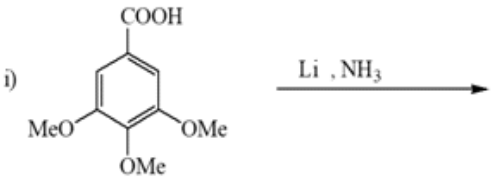


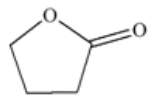
1a, X= -CH_3OH 2a, 94% 3a, 6%

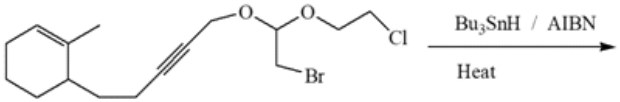
1b, X= -CO_2Me 2b, 15% 3b, 85%

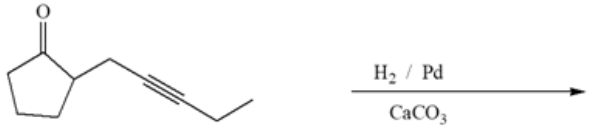
(b) Complete the following reactions and suggest plausible mechanism: 3+2+2+2+2=11

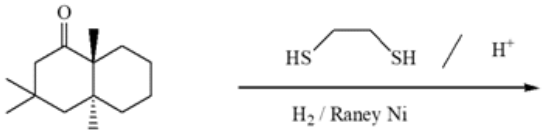
i)



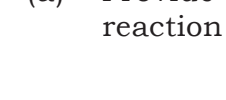
ii)  $LiAlH_4$, H_3O^+

iii)  Bu_3SnH / AIBN, Heat

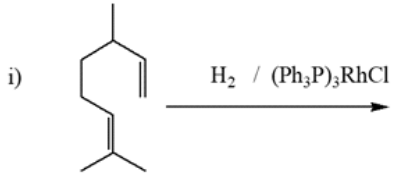
iv)  H_2 / Pd, $CaCO_3$

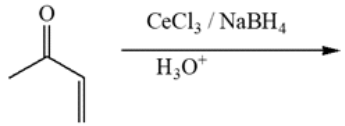
v)  HS SH / H^+, H_2 / Raney Ni

2. (a) Provide the product(s) of the following reaction with plausible mechanism: 7



(b) Write the product(s) of the following reactions and suggest mechanism: 3+2+2=7

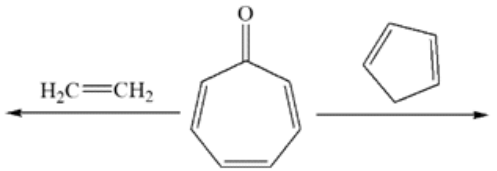
i)  H_2 / $(Ph_3P)_3RhCl$

ii)  $CeCl_3$ / $NaBH_4$, H_3O^+

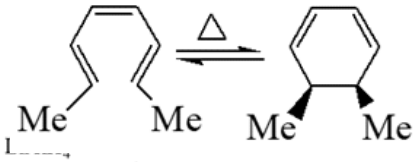
iii)  B_2H_6, H_2O_2 / NaOH

UNIT-V

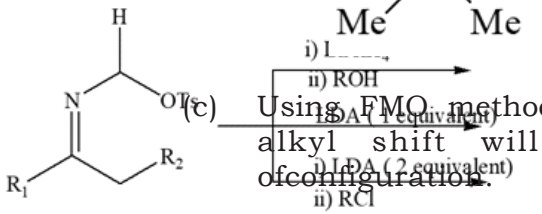
9. (a) Compare the reaction of 2,4,6-cycloheptatrienone with cyclopentadiene to that with ethene. Explain why 2,4,6-cycloheptatrienone uses two π-electrons in ore reaction and four π-electrons in the other. 3



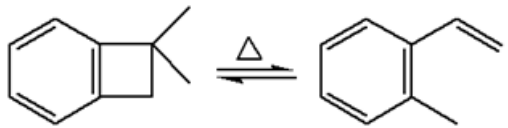
(b) With the aid of correlation diagram, explain the stereospecificity of the following reaction. 4



(c) Using FMO method visualize when [1,3]-alkyl shift will undergo inversion ofconfiguration. 4

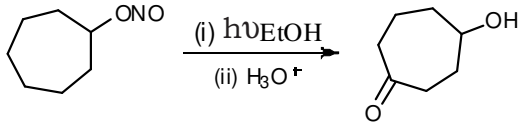


(d) Provide the mechanism for the following pericyclic reaction (Hint. Two pericyclic steps are involved), 2

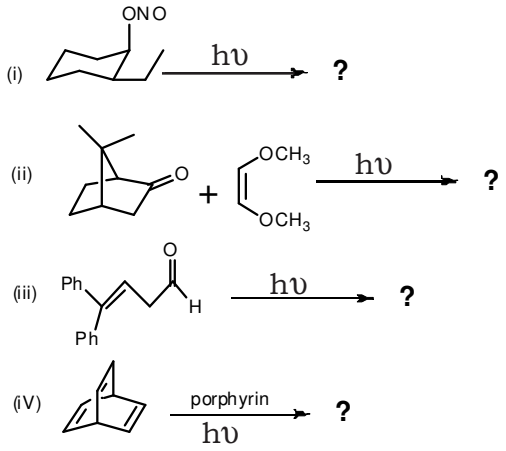


(e) What is Cope rearrangement. 1

(c) Provide mechanism for the following photochemical transformation. 2

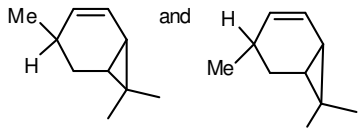


8. (a) Delineate the photochemical outcomes for the following compounds, providing appropriate mechanistic explanations to support your answer. 2×4=8



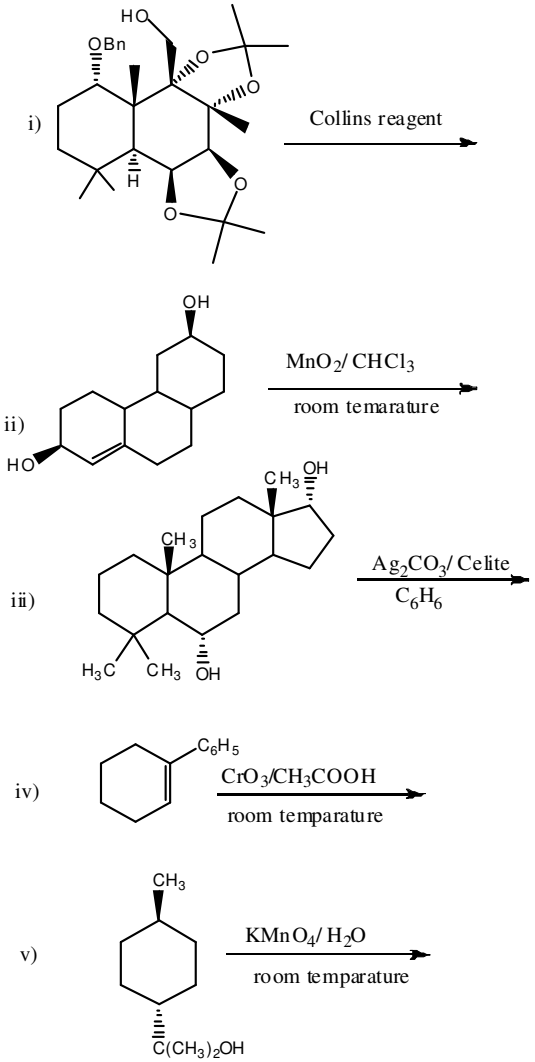
(b) Using one example for each, illustrate the key similarity between the Barton reaction and the Norrish Type-II reaction. 3

(c) Illustrate the various forms of oxygen species generated through photosensitization. How does a photosensitized oxygen species interact with the following substrates? 3

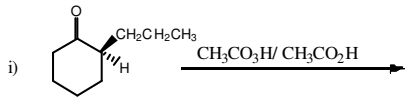


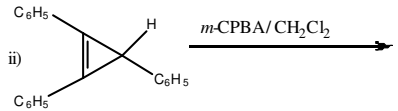
UNIT-II

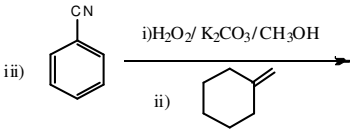
3. (a) Write the major product(s) of the following reaction(s). 1×5=5

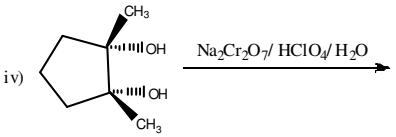


(b) Predict the product (s) of the following reaction and comment on major product and also suggest plausible mechanism. 2+2+2+3=9

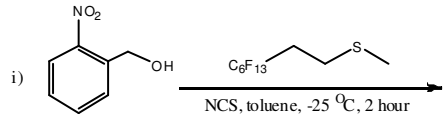


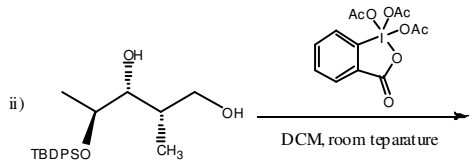


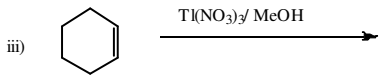




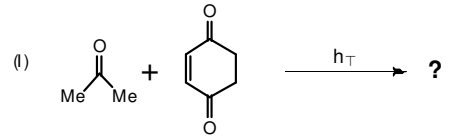
4. (a) Predict the major product of the following reaction (s) and suggest plausible mechanism. 3×3=9



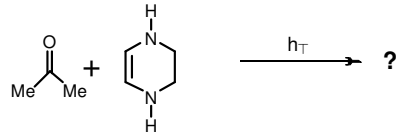


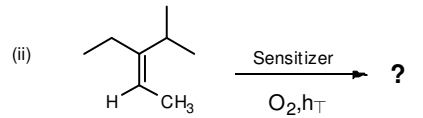


Conclude each comparison with a brief statement highlighting the key distinction between the two. 4+3+3=10

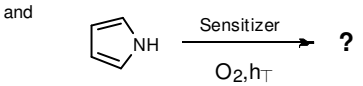


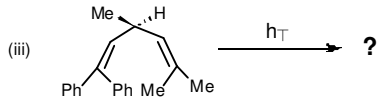
and



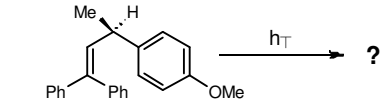


and

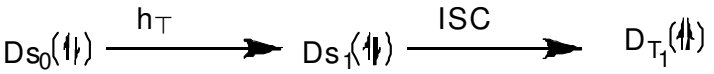




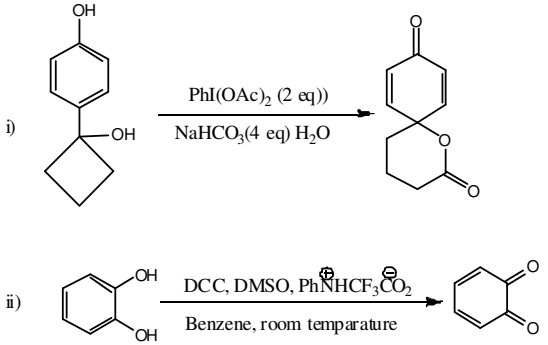
and



(b) Describe the concepts of sensitization and quenching by outlining three possible energy transfer pathways that can occur following the photoexcitation of a sensitizer (D) in the presence of a quencher (A). Indicate the correct electron spin states involved in each process. 2

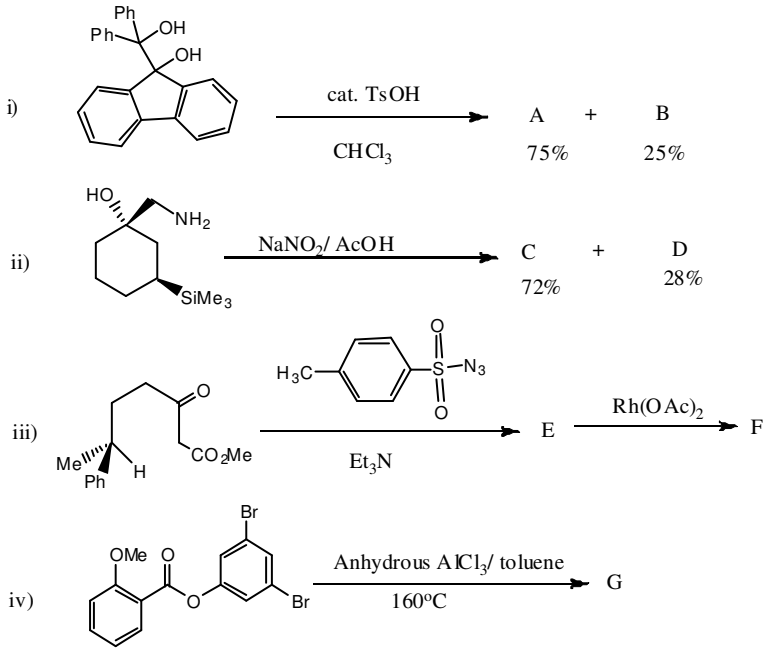


(b) Provide the mechanism of the following transformation. 2½x2=5



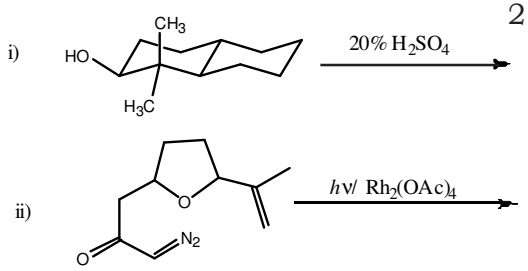
UNIT-III

5. (a) Provide A to G for the following reaction(s) and suggest plausible mechanism for the following conversions. 3+3+3+2=11

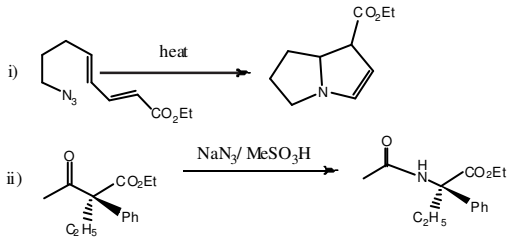


(b) What happens when $PHCH_2COCl$ is treated with 2 equivalents of diazomethane and the resultant product is allowed to react with Ag_2O in water? Give mechanism of all reaction(s). 3

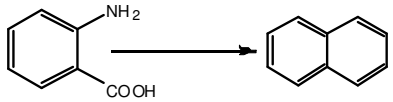
6. (a) Provide the major product of the following reaction and suggest plausible mechanism. 2½x2=5



(b) Provide mechanism of the following transformation. 2



(c) Carry out the following transformation, provide the reagent(s), reaction condition required for it and also suggest the mechanism of the reactions involved. 4



UNIT-IV

7. (a) Compare the photochemical behaviour of the following pairs of compounds by presenting detailed reaction mechanisms.