PG/IIS/CEM/202/23

M.Sc. 2nd Semester Examination, 2023

CHEMISTRY

PAPER – CEM-202

Full Marks : 40

Time : 2 hours

The figures in the right hand margin indicate marks

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

GROUP–A

1. Predict the product(s) any *four* with plausible mechanism : 2×4

   (*a*) What is Shapiro reaction ? Give an example.

   (*b*) What is Peterson Olefination reaction ? Give an example.

(*c*) What is Swern Oxidation reaction ? Give an example.

(*d*) What are chelotropic reactions ? Give an example.

(*e*) What do you mean by 2-alkyl ketone effect ?

(*f*) What is meant by endo rule ?

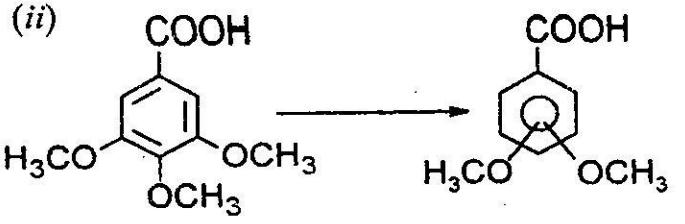
GROUP–B

Answer any **four** questions : 4×4

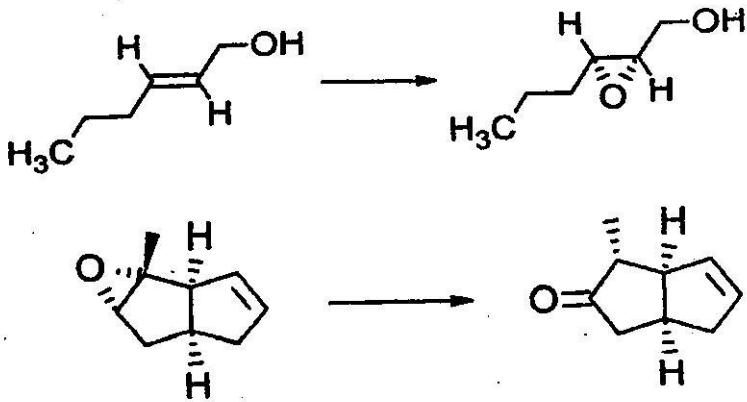
2. (*a*) Carry out the following transformations (with plausible mechanism) :

(*i*)

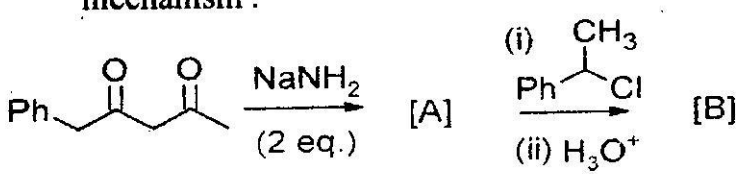
(*ii*)

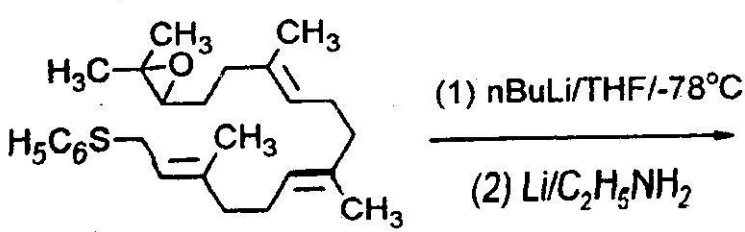


(*b*) Carry out the following transformations (with plausible mechanism) :



(*c*) Predict the product(s) with plausible mechanism :

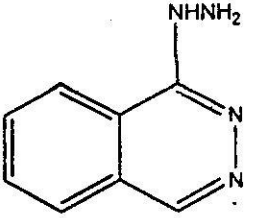




(*d*) What do you mean by Hückel and Mobius array ? Examine using PMO method whether [$2\pi s + 2\pi s$] cycloaddition reactions are thermally or photochemically allowed.

(*e*) Explain the Felkin-Anh model with a suitable example. How will you account for the reversal of diastereoselectivity in the reaction of Li-enolate derived from pinacolone with a series of aldehydes, RCH (Ph)CHO, when the steric bulk of R increases over a certain limit (R = ^{t}Bu) ?

(*f*) How will you synthesize the following compounds ? Use retrosynthetic approach to start with simple available starting materials.



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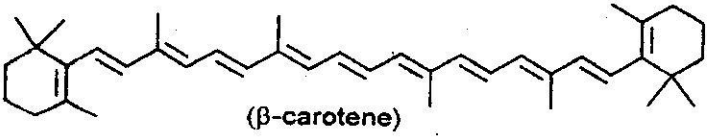
GROUP–C

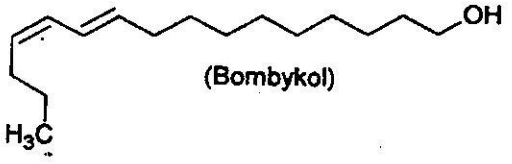
Answer any **two** questions : 8×2

3. (*I*) Synthesize the following compounds via retrosynthetic approach : $3 + 3 + 2$

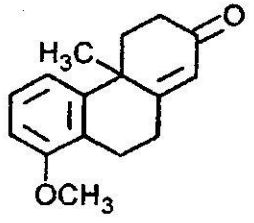
(*i*)



(*ii*)



(*iii*)

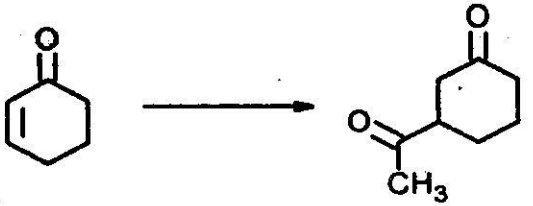


(*II*) *Carry out the following transformations* (with plausible mechanism) : 2×4

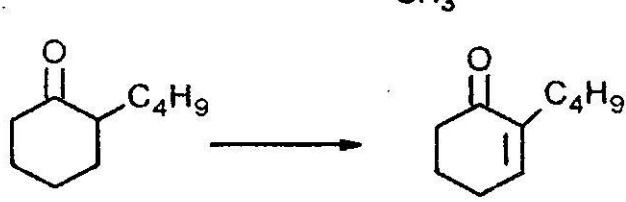
(*i*)

(*ii*)

(*iii*)

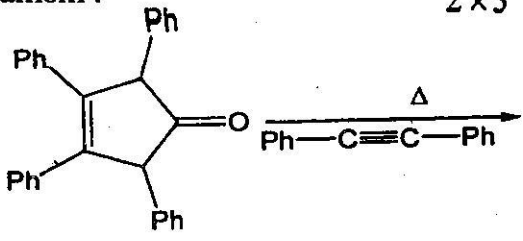


(*iv*)



(*III*) (*a*) Predict the product(s) with plausible mechanism : 2×3

(*i*)



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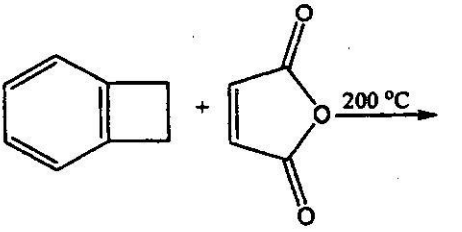
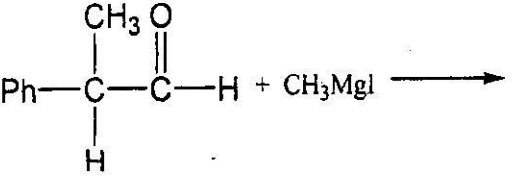
(*ii*)



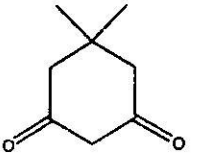
(*iii*)



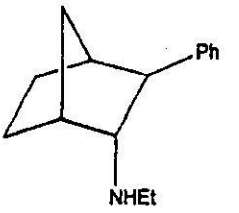
(*b*) Draw all the diasteroisomers of 1, 2, 4-trimethyl cyclohexane and comment on their stabilities. 2

(*IV*) (*a*) Using retrosynthetic approach synthesize the following molecules : $2\frac{1}{2}+2\frac{1}{2}$

(*i*)



(*ii*)



(*b*) What is axial chirality ? Explain *P* and *M* helicity with suitable examples. 3