PG/IIS/CEM/202/25

M.Sc. 2nd Semester Examination, 2025

CHEMISTRY

PAPER—CEM-202

Full Marks : 50

Time : 2 hours

Answer all questions

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. Answer any *four*, with plausible mechanism, wherever applicable : 4×2

   (*a*) What is Jones reagent ? Write the mechanism of its reaction with an example.

Or

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*) Draw all the diasteroisomers of 1, 2, 3-trimethyl cyclohexane and comment on their relative stabilities.

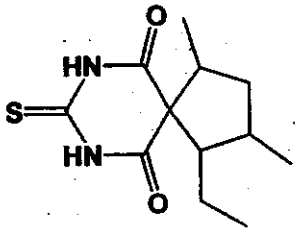
(*e*) What is axial chirality ? Give an example.

(*f*) Examine whether [$2\pi s + 2\pi s$] cyclo-addition reactions are thermally or photochemically allowed using Hückel-Mobius method.

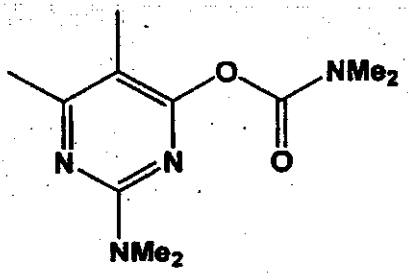
GROUP–B

2. Answer any *four* questions : 4×4

(*a*) Using retrosynthetic approach how will you synthesize the following compounds (any *one*) :



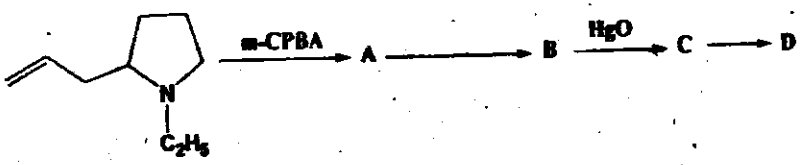
Or



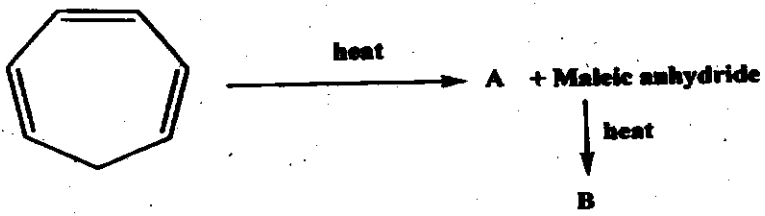
(*b*) Examine using correlation diagram whether Diels Alder reaction is thermally allowed or photochemically allowed process.

(*c*) Predict the product(s) with plausible mechanism : 2 + 2

(*i*)

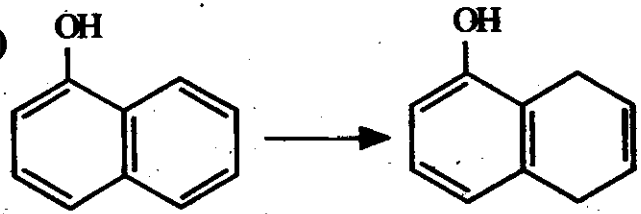


(*ii*)



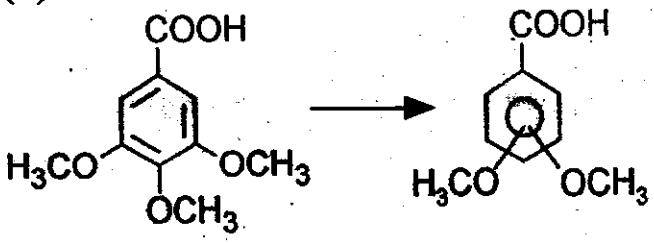
(*d*) Carry out the following transformations (with plausible mechanism).

(*i*)

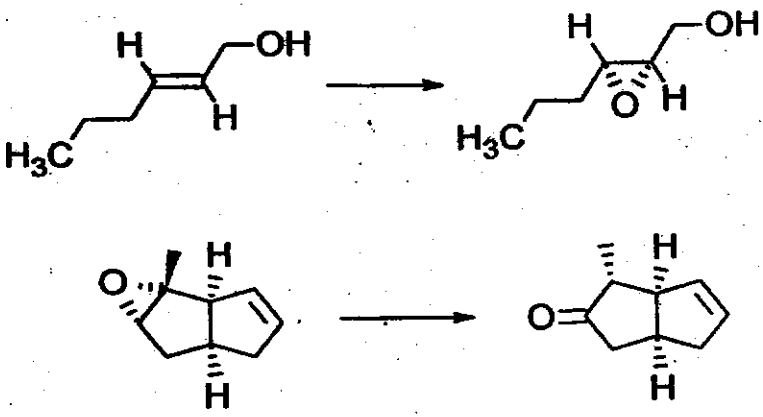


(*Continued*)

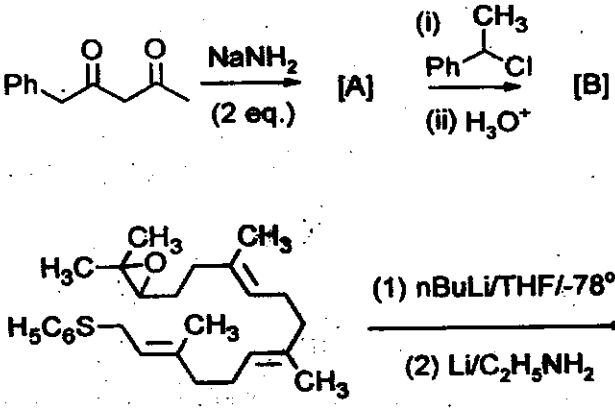
(*ii*)



(*e*) Carry out the following transformations (with plausible mechanism).



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



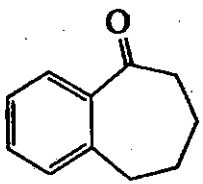
GROUP–C

8×2

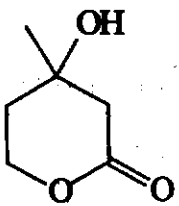
3. Answer any *two* questions :

(*a*) (*i*) Using retrosynthetic approach how will you synthesize the following compounds (any *two*) :

(*I*)

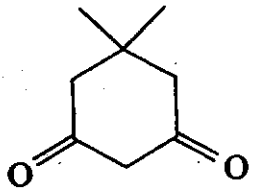


(*II*)

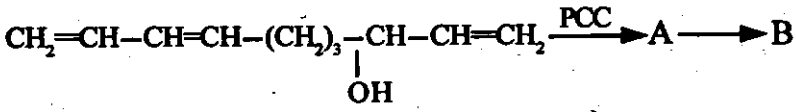


(*Continued*)

(*III*)

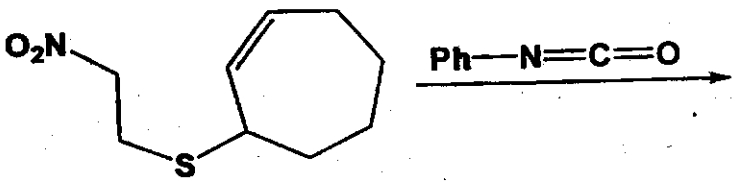


(*ii*) Predict the product(s) with plausible mechanism : 2



Or

Predict the product(s) with plausible mechanism : 2



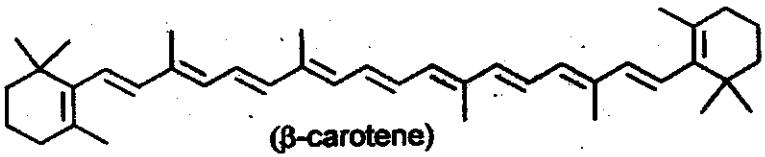
(*b*) (*i*) **What do you mean by asymmetric induction ? Explain Felkin-Anh model with a suitable example.**

(*ii*) **What do you mean by 3-alkyl ketone effect ?**

(*iii*) **What do you mean by stereospecific and stereoselective reactions ? Give suitable examples for each.** 3 + 2 + 3

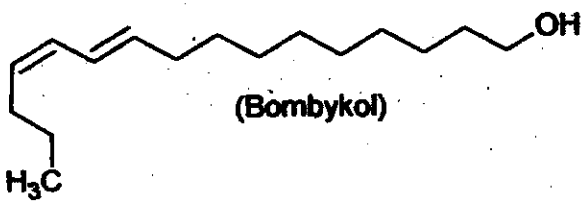
(*c*) (*i*) **Synthesize the following compounds via retrosynthetic approach (any *two*) :** 4 + 4

(*I*)



(β-carotene)

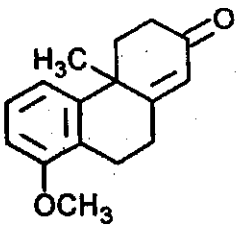
(*II*)



(Bombykol)

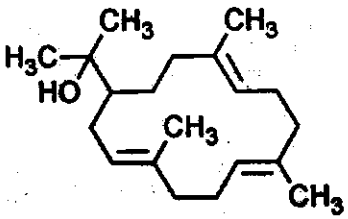
(*Continued*)

(*III*)

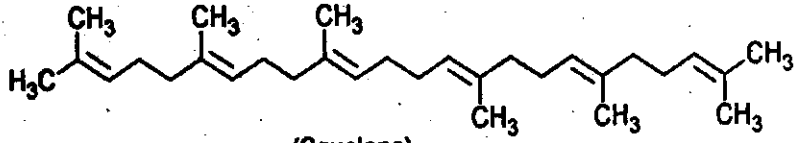


(*d*) Synthesize the following from suitable starting materials (answer i, ii and any *one* question from iii and iv :

(*i*)

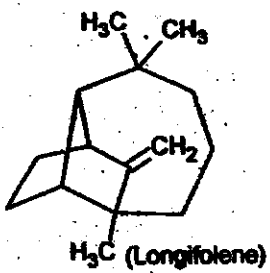


(*ii*)



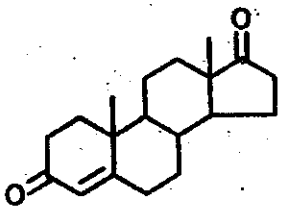
(Squalene)

(*iii*)



(Longifolene)

(*iv*)



[Internal Assessment — 10 Marks]