PG/IS/CEM/102/24

M.Sc. 1st Semester Examination, 2024

CHEMISTRY

(*Organic Chemistry*)

PAPER—CEM-102

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* questions : 2×4

   (*a*) Predict the products of thermal electrocyclic ring closure of (2E,4Z,6Z, 8E)-2,4,6,8- decatetraene with justification.

(*b*) What do you mean by "Functional Group Interconversion" ? Explain with a suitable example.

(*c*) State and explain the principle of microscopic reversibility.

(*d*) What is isoprene rule ? What is biogenetic isoprene rule ?

(*e*) Plant based chemicals can be termed as Renewable Chemicals. Explain.

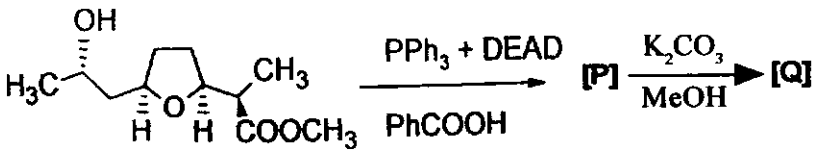
(*f*) What is phase transfer catalyst ? Give an example and its mechanism (in brief).

2. Answer any *four* questions : 4 × 4

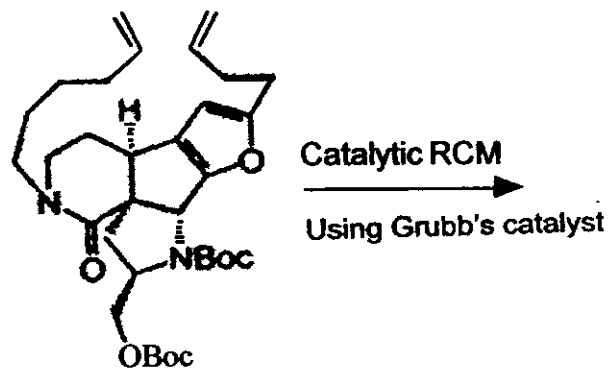
(*a*) What do you mean by Hückel and Mobius system ? Examine using PMO method whether conrotatory ring closure of 1,3-butadiene to cyclobutene is thermally of photochemically allowed. 2 + 2

(*d*) Predict the products with plausible mechanism :

(*i*)



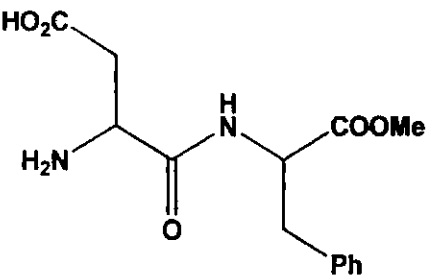
(*ii*)



(*e*) Synthesize the following 6-6-6-5 tetracyclic triterpenoids from squalene by applying biogenetic isoprene rule :

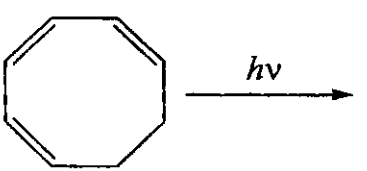
(*Continued*)

(*b*) Give the proper retrosynthetci analysis and forward synthesis of the following compound : 4

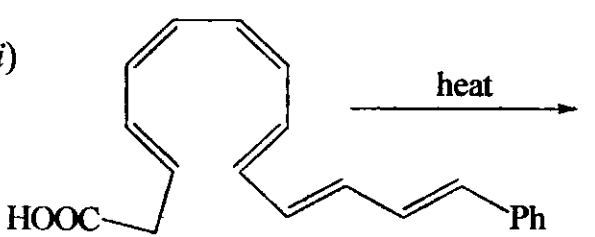


(*c*) Complete the reactions and give the stereochemistry of the products : 2 + 2

(*i*)



(*ii*)



3. Answer any *two* questions : 8×2

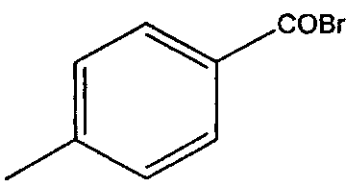
(*a*) (*i*) Give an example of an electrocyclic reaction which does not occur although it is symmetry allowed. Give proper reasons to support your answer. 2

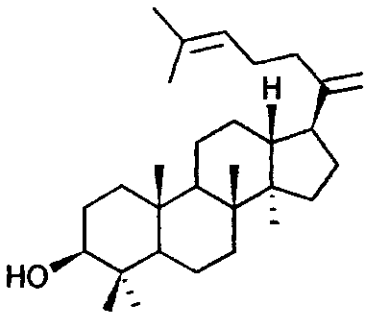
(*ii*) What is correlation diagram ? 2

(*iii*) Using correlation diagram examine whether conrotatory mode of ring -opening of cyclobutene to 1,3-butadiene is thermally allowed or photochemically allowed process. 4

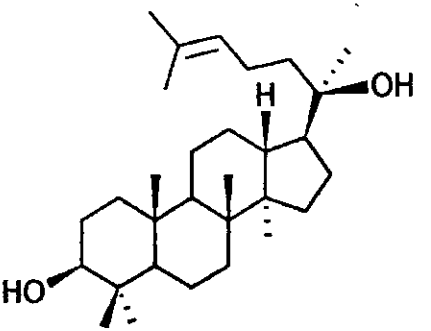
(*b*) Using retrosynthetic approach synthesize the following molecules : 2 × 4

(*i*)



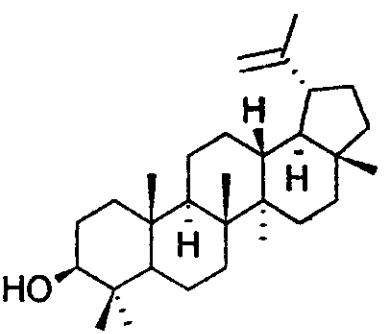


I

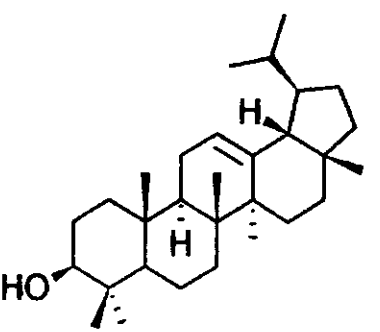


II

(*f*) Synthesize the following 6-6-6-6-5 pentacyclic triterpenoids lupeol (**III**) and neolupenol (**IV**) from squalene :

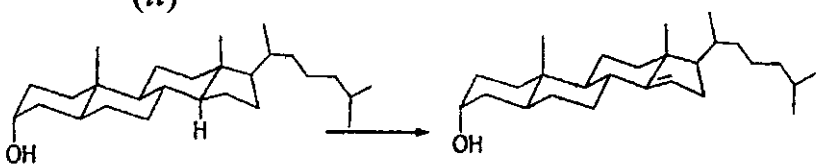


III

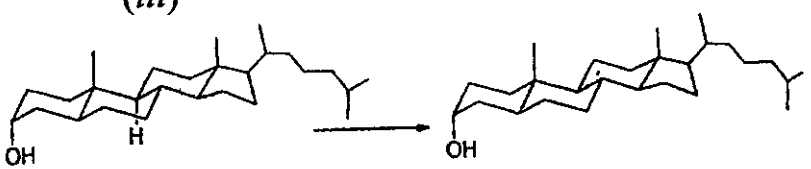


IV

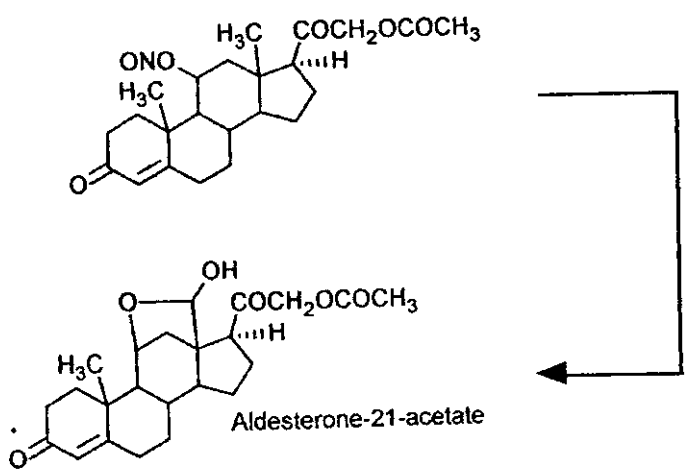
(*ii*)



(*iii*)

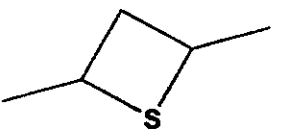


(*iv*)

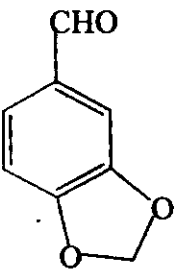


(*Continued*)

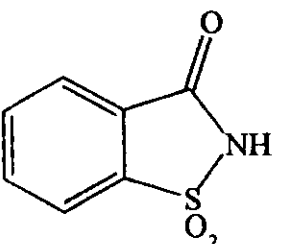
(*ii*)



(*iii*)

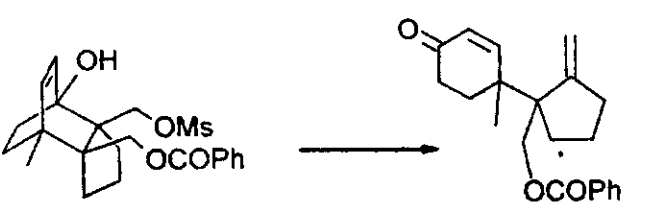


(*iv*)

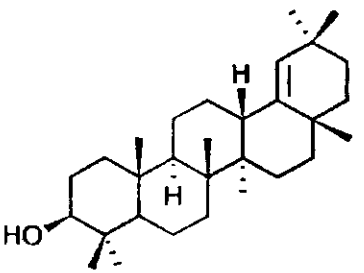


(*c*) Carry out the following transformations (any *three*) :

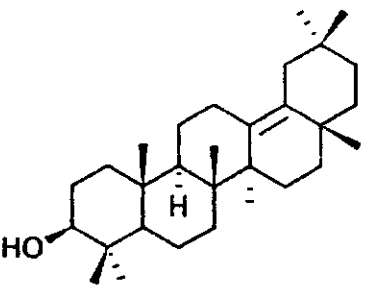
(*i*)



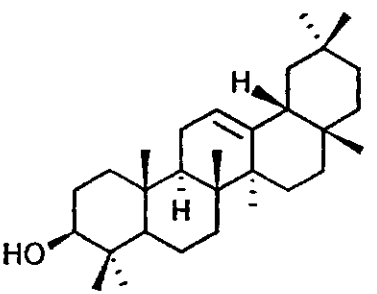
(*d*) Synthesize any *two* of the following 6-6-6-6-6 pentacyclic triterpenoids germanicol (V), δ-amyrin (VI) and β-amyrin (VII) from squalene :



V



VI



VII

[Internal Assessment — 10 Marks]