PG/IIS/CEM-202/14

M.Sc. 2nd Semester Examination, 2014

CHEMISTRY

(*Organic*)

PAPER –CEM-202

Full Marks : 40

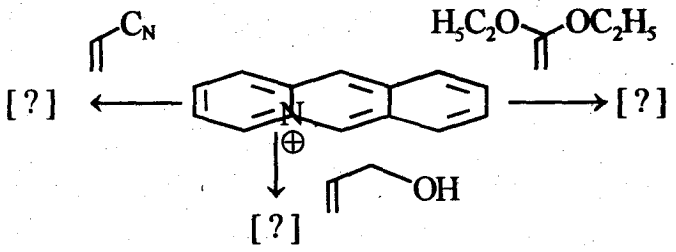
Time : 2 hours

Answer any **five** questions taking at least **two** from each Group where **Q. No. 5** or **6** is compulsory

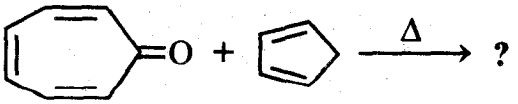
The figures in the right-hand margin indicate marks

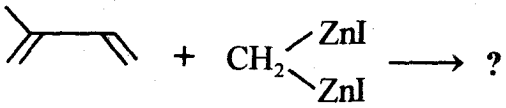
GROUP – A

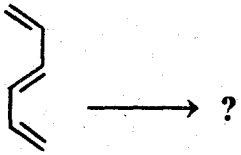
1. (*a*) Predict the products of the following reactions and indicate which one is faster and why ? 2



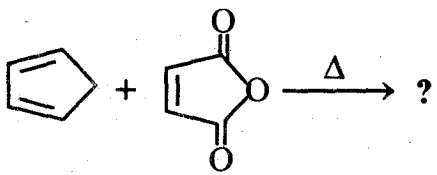
(*b*) Define "periselectivity" and 'site selectivity" and hence predict the products of the following reactions (attempt any *two*) : 2 + (2 × 2)

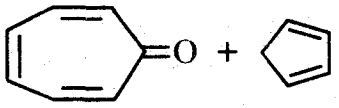
(*i*) 

(*ii*) 

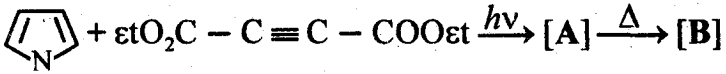
(*iii*) 

2. (*a*) What is secondary interaction in pericyclic reaction ? Predict the product of the following reactions indicating frontier orbital interaction (F. O. I)in each case and indicate the stable product. 1 + (2 × 2)

(*i*) 

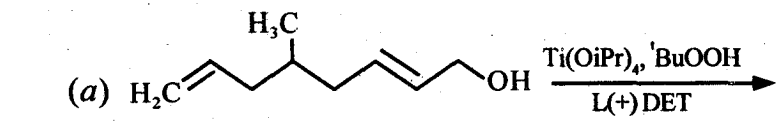
(*ii*)  ⟶ ?

(*b*) The following reaction scheme gives the product as : 3

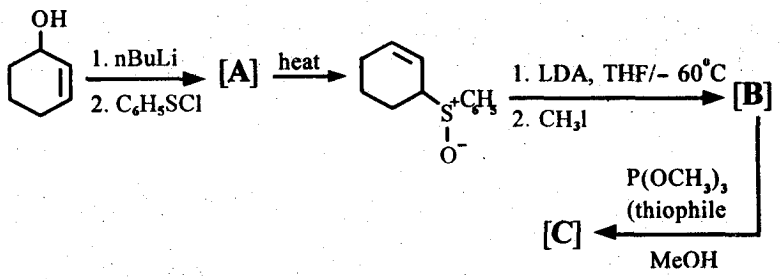


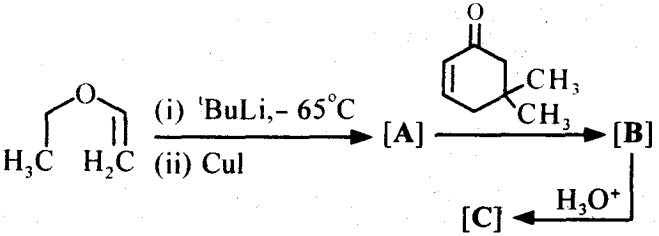
Identify **A** and **B**

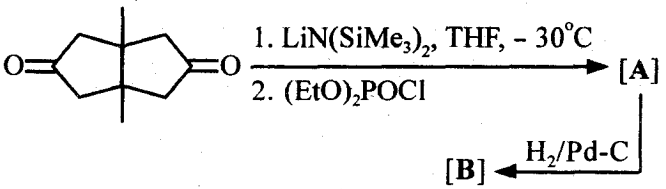
3. Predict the product(s) (any *four*, with plausible mechanism) : 4 × 2

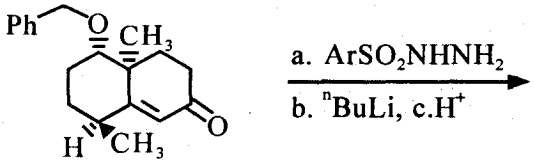
(*a*) 

(*b*)



(*c*) 

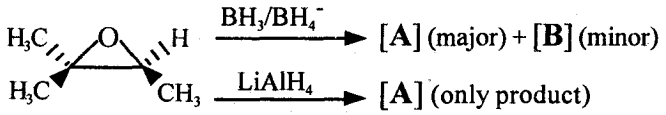
(*d*) 

(*e*) 

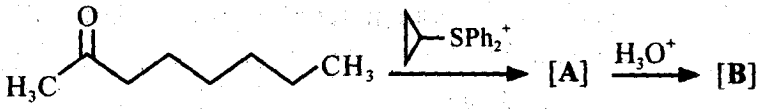
4. (*a*) What is AD-mix ? Give an example of asymmetric transformation using AD-mix. 3

(*b*) Write the structures of **[A]** and **[B]** and explain their formation : 3 + 2

(*i*)



(*ii*)

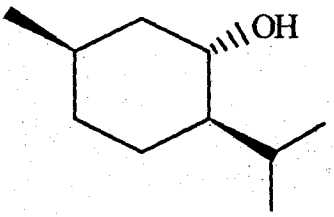


GROUP – B

5. (*a*) Draw the structures of most stable conformers for the given molecules : 1 × 4

(*i*) Meso-2, 3-butane-diol ;

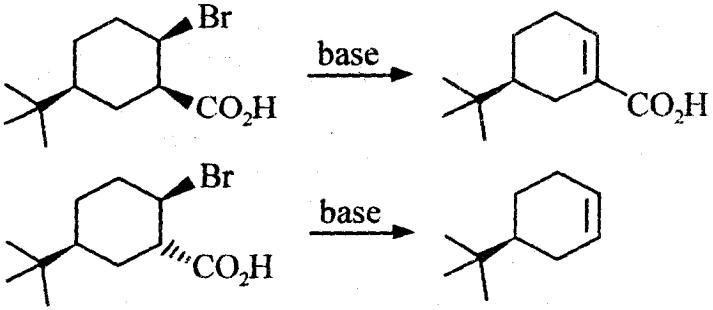
(*ii*) Cyclohexane-1,4-dione ;

(*iii*) 

(*iv*) *cis*-1-tertbutyl-2-methyl cyclohexane,

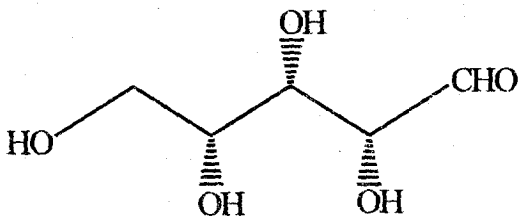
(*v*) *trans*-1-tertbutyl-3-methyl cyclohexane.

(*b*) Account for the contrasting results in these two reactions (explain in terms of conformational analysis) : 2 × 2



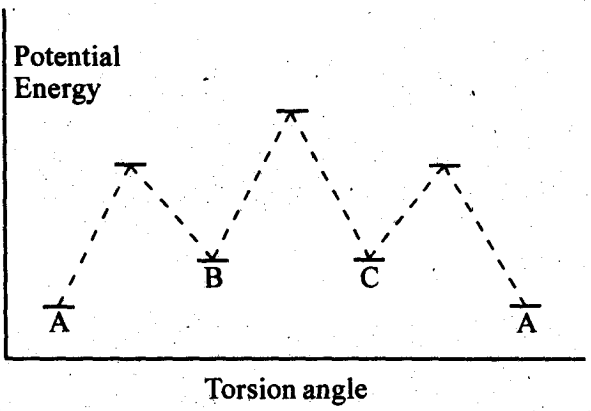
6. (*a*) How many chiral centers are there in 9, 10-dimethyl decalins ? Write 3d structures of those conformers and show in them the *gauche-butane* interactions. 4

(*b*) How many chiral centers are there in the following compound ? How many stereo isomers are possible ? Assign the stereogenic centers as R or S ? 4

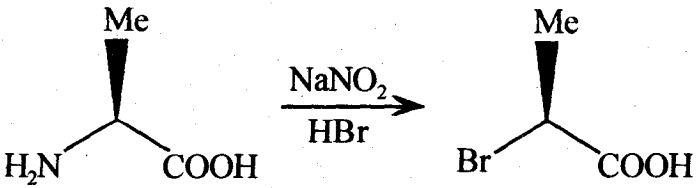


7. (*a*) The observed rotation of a 0·3 g of cholesterol in 15 ml of $CHCl_3$ contained in 10 cm long polarimeter tube is $-0{\cdot}78^{\circ}$. Calculate specific rotation of cholesterol. When (+)-cholesterol was mixed to the above (–)-cholesterol, the mixture had a specific rotation of -13°. What is the fraction of the (+)-cholesterol ? 2

(*b*) The following is the energy profile drawing of 1,1-dibromo-2-methylpropane, draw the appropriate Newman conformations of A, B and C. 3

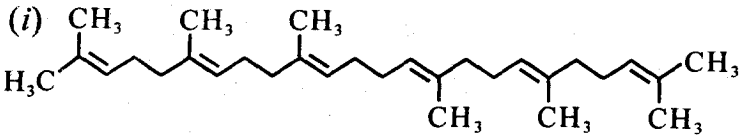


(*c*) Account for the stereochemistry of the following reaction. 3

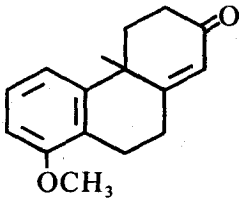


8. Synthesize the following (any *four*) : 4 × 2

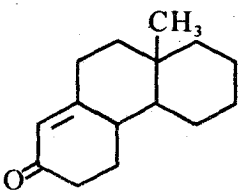
(*i*)

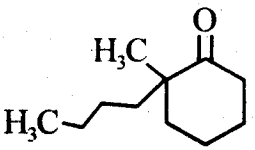
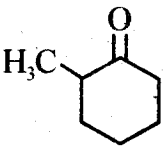


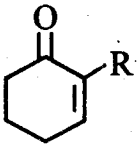
(*ii*)



(*iii*)



(*iv*)  from 

(*v*)  from