ED-306

M.Sc. 1st Semester
Examination, March-April 2021

CHEMISTRY

Paper - II

Concepts in Organic Chemistry

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer **all** questions. The figures in the right-hand margin indicate marks.

Unit-I

1. (*a*) Which type of molecules exhibit delocalized bonding ? Discuss the molecular orbital picture to explain delocalized bonding and aromaticity of benzene. 5

(*b*) Explain the following :

(*i*) Aromaticity of 4π and 8π electron system 5

(*ii*) Conjugation and cross conjugation 5

(*iii*) Cyclopentadienyl cation is antiaromatic while cyclopropenyl cation is aromatic 5

OR

(*a*) Explain bonding in fullerenes. 6

(*b*) Heat of hydrogenation of cyclohexene is –28.6 k cal/mole. The observed heat of hydrogenation of benzene to cyclohexane is –49.8 k cal/mole. Find out the resonance energy of benzene. 4

(*c*) Explain aromaticity on the basis of Huckel rule. Explain the aromaticity of azulenes. 10

Unit-II

2. (*a*) Define conformation and configuration. Draw the various conformers of disubstituted cyclohexanes. Which conformer will be more stable and why ? 8

(*b*) Discuss optical activity of allenes and spiranes. 8

(*c*) Explain the term chiral and achiral with suitable examples. 4

OR

Explain the following terms : 5×4

(*a*) Optical purity

(*b*) Methods of resolution

(*c*) Hybridization of atoms

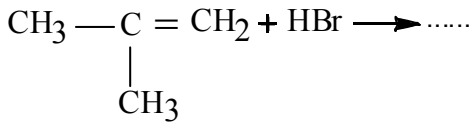
(*d*) Synthetic organic chemistry

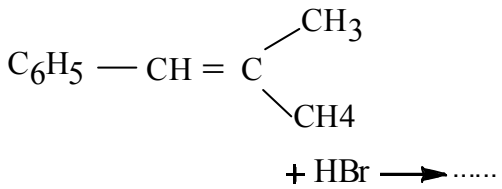
Unit-III

3. (*a*) Account for generation, structure, stability and chemical reactions of carbocations. 10

(*b*) Give the mechanism of Hunsdiecker reaction. 6

(*c*) Complete the following reactions and indicate reaction intermediate in each case – 4

(*i*) 

(*ii*) 

OR

(*a*) Explain E_1 and E_2 mechanisms. 10

(*b*) Describe the generation and reactivity of nitrene. 5

(*c*) Write a note on Saytzeff's rule. 5

Unit-IV

4. (*a*) Classify pericyclic reactions and explain correlation diagram taking example of 1, 3, 5 – hexatriene and 1, 3 – hexadiene system. 10

(*b*) Explain the following : 5×2

(*i*) Ene reaction

(*ii*) Cope rearrangement

OR

(*a*) Describe with suitable example of 3, 3 and 5, 5 – sigmatropic rearrangements. 10

(*b*) Explain the following : 5×2

(*i*) 1, 3 dipolar cycloaddition reaction

(*ii*) Woodward-Hoffmann selection rule.

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