CHEMISTRY PAPER–II

(Organic Chemistry–I)

Time Allowed : Three Hours **Maximum Marks : 45**

Note : (i) Attempt **five** questions in all, **one** question from each unit and the compulsory question.

(ii) All questions carry equal marks.

UNIT–I

1. (a) What is hyperconjugation ? Write down the possible hyper-conjugative structures for isopropyl carbocation. 3

(b) Discuss the effect of resonance in explaining the relative basic strength of aryl and alkyl amines. 3

(c) What is hybridisation ? Explain sp^3 hybridisation by taking an example. 3

2. (a) What are Carboncations ? Discuss the relative stability of different classes of carbocations. 3

(b) How do the methods such as 'product anlaysis' and 'isotopic labelling' help in determination of reaction mechanism ? 3

(c) What is 'average electron theory' for charge explanation of reaction intermediates ? Using this theory assign formal charge of Methyl Carbocation and Methylene. 3
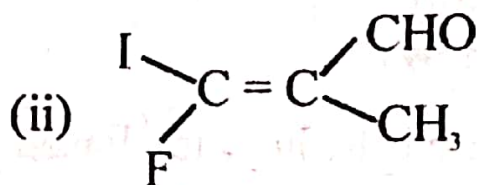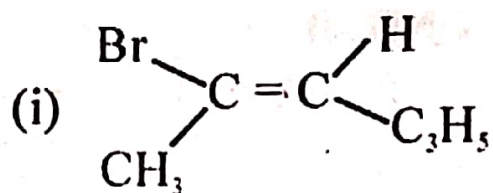
UNIT–II

3. (a) Define the terms :
   (i) Chromophore
   (ii) Bathochromic shift
   (iii) Hyperchromic shift. 3

   (b) Why are spectroscopic techniques based upon absorption spectroscopy and not emission spectroscopy ? What is the principle of UV spectroscopy ? 3

   (c) Calculate λ_{max} for 2,5-dimethylhexa –1, 3, 5 triene on the basis of Woodward-Fieser rules. 3

4. (a) What is the effect of conjugation on the UV spectra of enes ? What is it due to ? Support your answer with suitable example. 3

   (b) Write a note on Beer-Lambert Law. 3

   (c) Discuss electronic energy levels and electronic transitions in UV and Visible Spectroscopy. 3

UNIT–III

5. (a) An alcohol with molecular formula C_4H_9OH is optically active. Draw the structure of its (R) and (S) isomers and explain why those particular forms you have drawn are 'R' and 'S'. 3

   (b) What is Resolution ? Discuss the chemical method of resolution. 3

   (c) What is Walden Inversion ? Give an example. 3

6. (a) Explain :
   (i) Functional isomerism
   (ii) Keto-enol tautomerism. 3
   With examples.

   (b) By taking examples discuss that the presence or absence of chiral carbon atoms in a molecule is not the necessary and sufficient condition for the existence of optical activity. 3

   (c) Define and illustrate the terms : retention and inversion of configuration. 3

7. (a) Assign priorities and then assign E and Z configuration to the following :

(i)
$$\underset{CH_3}{\overset{Br}{>}}C = C\underset{C_3H_5}{\overset{H}{<}}$$

(ii)
$$\underset{F}{\overset{I}{>}}C = C\underset{CH_3}{\overset{CHO}{<}}$$

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(b) Discuss the conformations of n-Butane and their relative stabilities.

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8. (a) Draw the two chair conformations of methyl cyclohexane. Also draw the Newman projection formulae. Which out of the two is more stable and why ?

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(b) What are geometric isomers ? How do we find out configuration of geometric isomers on the basis of :
(i) melting point and (ii) dipole moment ?

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UNIT–V
(Compulsory Question)

9. (a) Why is ethanol a solvent of choice in UV spectroscopy ?
(b) Define localized chemical bond by taking an example.
(c) What are elimination reactions ? Give example.
(d) What is Stereoisomerism ? List the types of Stereoisomerism.
(e) Draw the structures of all isomeric ethers havingg formula $C_5H_{12}O$.
(f) What is an asymmetric carbon atom ? Give example.
(g) Give the structure of the lowest molecular mass alkyl iodide which is chiral.
(h) What are threo compounds ?
(i) What do the symbols D and L specify ?

$9\times1=9$