

CHEMISTRY Paper–XVIII

(Organic Chemistry–A)

Time Allowed : Three Hours

Maximum Marks : 22

Note : Attempt five questions in all, choosing one question from each Unit and Question No. 9 is compulsory.

UNIT – I

1. (a) A compound having molecular formula $C_9H_{11}Br$ exhibits the following set of PMR data :
Singlet δ 7.25, 5H; doublet δ 2.75, 2H; complex multiplet δ 3.40, 1H; doublet δ 1.45, 3H. Elucidate the structure of the compound.
- (b) Define the following terms :
(i) Chemical Shift
(ii) Spin-spin coupling 2,2
2. (a) An organic compound with molecular formula C_7H_6O gave the following data :
UV : 249.5 nm, 328 nm
IR; 3086, 2841, 2763, 1700, 1595, 1500, 1455, 745, 685 cm^{-1}
PMR : τ 0.14 singlet, 1H, τ 1.8-1.95, multiplet, 2H, 2.2-2.4, multiplet, 3H.
- (b) In a given organic compound two kinds of protons exhibit signals at 50 and 200 Hz using a 60 MHz PMR spectrometer. What will be their relative positions using a 90 MHz spectrometer ? Also convert the position of signal at 50 Hz into δ units. 2,2

UNIT – II

3. (a) How will you distinguish diethyl ether from ethanol on the basis of their IR data ?
- (b) What are molecular vibrations ? Give its different types. 2,2

4. (a) Describe fundamental vibrations and overtones. Why are some fundamental vibrations IR inactive ?
- (b) An organic compound with molecular formula C_4H_8O , gives the following spectral data :
- IR : 1715 cm^{-1}
- $^1\text{HNMR}$: δ 1.06 (t, 3H), δ 2.14 (s, 3H) and 2.43 (q, 2H)
- Deduce the structure of the compound. 2,2

UNIT – III

5. (a) What are epimers and anomers ? Give one example of each.
- (b) Give the mechanistic details of Ruff degradation of carbohydrates, explaining with the help of an example. 2,2
6. (a) Write a short note on Killiani Fischer synthesis.
- (b) Draw the Fischer projection formula and the Howarth projection formula for Maltose. 2,2

UNIT – IV

7. (a) Draw both the molecular orbital and resonating structures of pyrrole.
- (b) Write a short note on the mechanism of Chichibabin reaction. 2,2
8. (a) Write a short note on Paal Knorr synthesis giving its detailed mechanism.
- (b) Discuss in detail the mechanism for Skraup synthesis. 2,2

(Compulsory Questions)

9. (i) What is TMS ? Give its structure.
- (ii) Explain the $^1\text{HNMR}$ of benzaldehyde.
- (iii) Define and explain Hooke's Law ?
- (iv) What are polysaccharides ? Give two examples.
- (v) What are condensed ring heterocycles ?
- (vi) Give any *one* reaction for the reduction reaction of indole. $6 \times 1 = 6$