

PANJAB UNIVERSITY, CHANDIGARH  
B.Sc. III [SEMESTER-V]  
ORGANIC CHEMISTRY

**Note :**

- (i) The question paper shall consist of nine questions comprising two questions from each unit and one compulsory question of short answer type questions covering the whole syllabus.
- (ii) Students are required to attempt **five** questions in all, **one** question from each unit and the **compulsory** question.
- (iii) Compulsory question carries six marks and remaining all questions carry four marks each.

**UNIT-I**

(8 Hrs.)

**Spectroscopy :**

Nuclear magnetic resonance (NMR) spectroscopy.

Proton magnetic resonance ( $^1\text{H}$  NMR) spectroscopy, nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants, areas of signals, interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1, 1, 2-tribromoethane, ethyl acetate, toluene and acetophenone.

**UNIT-II**

(7 Hrs.)

**Electromagnetic Spectrum : Absorption Spectra :**

Infrared (IR) absorption spectroscopy-Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds.

Problems pertaining to the structure elucidation of simple organic compounds using UV, IR and PMR spectroscopic techniques.

**UNIT-III**

(8 Hrs.)

**Carbohydrates :**

Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo

diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and esters. Determination of ring size of monosaccharides. Cyclic structure of D(+)-glucose. Mechanism of mutarotation.

Structure of ribose and deoxyribose.

An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

#### UNIT-IV

(7 Hrs.)

##### **Heterocyclic Compounds :**

Introduction : Molecular orbital picture and aromatic character of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.

Introduction to condensed-five and six-membered heterocyclics. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.