UNIVERSITY OF NORTH BENGAL

CHEMISTRY

Semester- I

MAJOR COURSE

Paper Code: UCHEMAJ11001

Paper Description: ORGANIC CHEMISTRY

Paper Type: TH + PLB

Credits: Theory-03, Practical-01

Total Marks: 75 [Theory (ESE – 40); Practical (ESE – 20); CE – 10; Attendance – 05]

Theory: 45 Lectures [Each Lecture is one hour in duration]

ORGANIC CHEMISTRY

UNIT I: Basics of Organic Chemistry

Organic Compounds: Classification and Nomenclature, Hybridization.

Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation; Organic acids and bases: their relative strength.

Homolytic and Heterolytic fission; Electrophiles and Nucleophiles; Types, shape, and the relative stability of Carbocations, Carbanions, and Free radicals.

Introduction to types of organic reactions and their mechanism: Addition, Elimination, and Substitution reactions.

(12 Lectures)

UNIT II: Chemistry of Hydrocarbons

A. Carbon-Carbon sigma bonds:

Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation-relative reactivity and selectivity.

B. Carbon-Carbon pi bonds:

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb reactions, Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions, their mechanisms (Markownikov/ *Anti* Markownikov addition), hydroboration-oxidation, ozonolysis, catalytic reduction, *syn* and *anti*-hydroxylation(oxidation), addition reactions in conjugated dienes; Allylic and benzylic bromination and mechanism, e.g., propene, 1-butene, toluene, ethylbenzene.

Reactions of alkynes: Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes, and Reduction reactions.

C. Cycloalkanes:

Types of cycloalkanes and their relative stability, Baeyer strain theory. **(21 Lectures)**

UNIT III: Aromatic Hydrocarbons

Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions, and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation, and Friedel-Craft's alkylation/ acylation with their mechanism. Directing effects of the groups. **(12 Lectures)**

Reference Books:

- Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- Finar, I. L. *Organic Chemistry*, Volume 1, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
- McMurry, J.E. *Fundamentals of Organic Chemistry*, 7th Ed., Cengage Learning India Edition, 2013.
- Claiden, J.; Warren, S. & Greeves, N. *Organic Chemistry*, 2nd Ed., Oxford University Press, 2012.

- Carruthers, W. *Some Modern Methods of Organic Synthesis*, 4th Ed., Cambridge University Press, 2004.
- Loudon, M. *Organic Chemistry*, Oxford University Press, 2002.
- Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*, 6th Ed., Harlow, 1961.

ORGANIC CHEMISTRY PRACTICAL

End Semester Examination (ESE):

At the end of the semester, a practical examination will be conducted as per the following guidelines:

Marks distribution

Experiment	15 marks
Practical record notebook	03 marks
Viva-voce	02 marks

PRACTICAL — 30 HOURS

1. Checking the calibration of the thermometer
2. Purification of organic compounds by crystallization using the following solvents:

   (a) Water; (b) Alcohol; (c) Alcohol-Water
3. Determination of the melting points of organic compounds.
4. Effect of impurities on the melting point-mixed melting point of two unknown organic compounds.
5. Chromatography **(any two)**

(a) Separation of a mixture of two amino acids by ascending and horizontal paper chromatography

(b) Separation of a mixture of two sugars by ascending paper chromatography

(c) Separation of a mixture of o- and p-nitrophenol or o-and p-aminophenol by thin-layer chromatography (TLC)

Reference Books:

- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry*, Pearson Education, 2009.
- Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G. & Tatchell, A.R. *Practical Organic*

Chemistry, 5th Ed., Pearson, 2012.

- Vogel, A. *Vogel's Textbook of Practical Organic Chemistry*, 5th Ed., Pearson India, 2003.