

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE COURSE IN CHEMISTRY**  
**SYLLABUS WITH EFFECT FROM 2020-2021**

**BCY-DSC11**

**CORE-XI: ORGANIC CHEMISTRY –II**

Learning Outcomes

1. Learning the chemistry of biopolymers – carbohydrates and proteins
2. Understanding vitamins
3. Learning the chemistry of natural products – alkaloids and terpenoids
4. Learning the mechanism of various types of molecular rearrangement
5. Introduced to the concepts of stereochemistry

Semester	Subject Title	Total Hours	Credit
VI	ORGANIC CHEMISTRY –II	75	5

**UNIT I: CHEMISTRY OF CARBOHYDRATES (15 hrs)**

Carbohydrates –Definition and Classification of carbohydrates with examples. Mono saccharides- glucose and fructose - epimers and anomers with examples.Mechanism muta rotation, osazoneformation.Absolute configurations of glucose and fructose.Structural elucidation of glucose and fructose (including cyclic and Haworth structure).Interconversions, ascending and descending the sugar series.Disaccharide - Sucrose, Maltose - Structural elucidation. Polysaccharide - Starch and Cellulose (Elementary treatment).

**UNIT II: CHEMISTRY OF PROTEINS AND VITAMINS (15 hrs)**

Amino acids - Classification, General methods of preparation and reactions, zwitter ion, isoelectric point.Peptides and proteins - Peptide linkage- Preparation of dipeptides by Bergmann's method Classification of proteins, primary structure (End group analysis - Sanger's method and Edman method) - secondary structure, tertiary structure, denaturation.

Vitamins - Classification, biological importance of Vitamins. Structure of vitamin C.

**UNIT III: CHEMISTRY OF ALKALOIDS AND TERPENOIDS (15 hrs)**

Chemistry of natural products - Alkaloids - Isolation, classification, general methods of elucidating structure.Structural elucidation of nicotine and piperine.Terpenes-classification , isoprene rule, special isoprene rule - isolation and structural elucidation of citral,  $\alpha$ - terpeniol and menthol.

**UNIT IV: MOLECULAR REARRANGEMENTS (10 hrs)**

Molecular rearrangements - Types of rearrangements, Mechanisms for the following rearrangements :pinacol- pinacolone, benzil- benzilic acid, benzdine, Favorskii, Claisen, Fries, Hofmann, Curtius, Schmidt and Beckmann.

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**Unit-V: STEREOCHEMISTRY OF ORGANIC COMPOUNDS (20 hrs)**

Stereoisomerism - definition, classification into geometric and optical isomerism. Optical isomerism - Optical activity, asymmetric centre(chirality), symmetry elements ( $\sigma_n$ ,  $S_n$  and  $i$ ), relative and absolute configurations, concept of enantiomerism and diastereoisomerism; Racemisation - methods of Racemisation (by substitution and tautomerism), Resolution - methods of resolution (by mechanical, seeding and biochemical), Walden inversion. Projection formulae- Fischer, flying wedge, Sawhorse and Newmann projections, notation of optical isomerism: Cahn- Ingold and Prelog rules, R and S notations for one and two chirality (stereogenic) centres, erythro and threo representations. Geometrical isomerism: cis - trans; syn- anti; E - Zdescriptors.

**TEXTBOOK**

1. Bahl BS and ArunBahl, Advanced Organic Chemistry, 12<sup>th</sup> ed., Sultan Chand and Co., New Delhi, 1997.
2. Chemistry of Natural Products: A Unified Approach, N R Krishnaswamy, Universities Press Private Limited, Chennai, 2010

**BOOKS FOR REFERENCE**

1. Finar IL, Organic Chemistry, Vol. 1&2, 6<sup>th</sup> ed., Addison Wesley Longman Ltd., London, 1996.
2. Morrison RT, Boyd RN, Organic Chemistry, 4<sup>th</sup> ed., Allyn& Bacon Ltd., New York, 1976.
3. Pine SH, Organic Chemistry, 4<sup>th</sup> ed., McGraw-Hill International Book Company, (1986)
4. Peter Sykes A, Guidebook to Mechanism in Organic Chemistry, 6<sup>th</sup> ed., Pearson Education, 2003.
5. Kalsi PS, Stereochemistry of Organic Compounds: Principles and Applications, New Age International, 2011.
6. Sujata V Bhat, Nagasampagi BA, and MeenakshiSivakumar, Chemistry of Natural Products, Springer, 2006.
7. Agarwal OP, Organic Chemistry Reactions & Reagents, 49<sup>th</sup> ed., Goel Publishing House, 2014.
8. Ahluwalia, V.K., Kidwai, M., New trends in Green Chemistry, 1<sup>st</sup> ed., Anamaya Publishers, New Delhi, 2004.
9. Anatas P.T., and Warner J.C., Green Chemistry Theory and Practice