SHREE H. N. SHUKLACOLLEGE OF SCIENCE

(AFFILIATED TO SAURASHTRA UNIVERSITY)

Nr. Lalpari lake, Behind old Marketing Yard, Amargadh, Rajkot-360001,

Ph. No-9727753360

SAURASHTRA UNIVERSITY, RAJKOT SYLLABUS FOR BIOCHEMISTRY SEMESTER – I (NEP-2020)

Semester-I

Course Category	**MDC/IDC-1** **In addition to courses mentioned in SOP basket; Recommended for Physical Science, Mathematical Science, Life science Programs**
Title of the Course	**Biochemistry: Introduction to Biomolecule - I**
Course Credit	**03**
Teaching Hours per Sem.	**45**
Total Marks	**75**

Course Content	Hours
Unit I: Water and Chemical Bonds:	
• Water: Essentiality to life. Water as a biological fluid. Special properties of water. • Hypotonic, hypertonic and isotonic solutions. Effects of osmotic pressure on living cells. • Chemical Bonds: Types of bonds and Bond energy • Major types of chemical bonds -, Covalent bond, Ionic bond Resonance Bond Metallic bond, Hydrogen bond and Van der waal forces and their significance	9 hrs.
Unit II: Carbohydrates I	
Carbohydrates I: Classification and biological importance Monosaccharides: • Configuration relationship of D-aldoses, D-ketoses. • Reactions of glucose and fructose- oxidation, reduction, reducing properties, formation of glycosides, acylation, methylation, condensation - phenyl hydrazine, addition – HCN. • Stereochemistry of monosaccharides, (+) and (-), D and L, epimers, anomers, enantiomers and diastereomers. • Glucose: Elucidation of open chain structure, configuration and ring structure of glucose and mutarotation. Open and Haworth structures of galactose, mannose, ribose and fructose. • Structure and biological importance of amino sugars, deoxy sugars, sugar acids, neuraminic and muramic acid.	9 hrs.
Unit III: Carbohydrates II	
Disaccharides: Structure and Importance • Maltose, isomaltose, lactose, Sucrose , cellobiose, trehalose and Invert sugar . • Polysaccharides: Classification with examples. • Homopolysaccharides: Partial structure, occurrence and importance of starch, glycogen, inulin, cellulose, chitin, and pectin. • Heteropolysaccharides: Occurrence, importance and the structure of the repeating units of Glycosaminoglycans- heparin, hyaluronic acid, and chondroitin sulphate. • Blood group oligosaccharides. • Chemical basis of the qualitative tests: Molisch, iodine, Benedicts, Fehling's, picric acid, Barfoed's, Bial's, Seliwanoff's, osazone tests.	9 hrs.
Unit : IV Simple Lipids	9 hrs.

• Lipids: Definition, classification and biological role, • Fatty acids: Saturated [C4-C24] and unsaturated fatty acids: Nomenclature, structure &occurrence. Physical properties and chemical reactions: esterification and rancidity. • Essential fatty acids: (ω-3 & ω-6 fatty acids): structure, occurrence & biological importance • Tri-acylglycerols: simple and mixed glycerides with examples, Saponification, hydrolysis,Definition & significance of saponification value, iodine value, acid value and per-oxide value. • Waxes: Composition, importance with examples	
Unit : V Compound Lipids	9 hrs.
• Phosphoglycerides: Structure of lecithin, cephalins, phosphotidyl inositol, plasmalogens,and cardiolipins. biological role of phosphoglycerides. • Sphingolipids : Ceramides, structure and importance of sphingomyelin. Glycosphingolipids : Structure and importance of cerebrosides (galactocerebroside andglucocerebroside), gangliosides (GM_1, GM_2, GM_3). • Eicosanoids: Structure of PGE_1, PGE_2, $PGF_{1\alpha}$ and $PGF_{2\alpha}$. Biological roles of thromboxanes, leukotrienes and prostaglandins. • Plasma lipoproteins: Types and functions, composition and structure of lipoprotein.	

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Title of the Course	**Biochemistry -P: Introduction to Biomolecule - I Practical**
Course Credit	**01**
Teaching Hours per Sem.	**30**
Total Marks	**25**

Suggested laboratory experiments:

1. Safety measures and introduction to the instruments used in biochemistry laboratory
2. Importance of calibration of instruments and cleaning of glassware
3. Qualitative tests of monosaccharides.
4. Qualitative tests of Disaccharides and Polysaccharides.
5. Estimation of reducing sugar by DNSA method
6. Isolation of starch from potato.
7. Acid Hydrolysis of Starch.
8. Qualitative tests for lipids.
9. Determination of Acid Value of oils.