SUBJECT TITLE: ALLIED BIOCHEMISTRY I

SUBJECT DESCRIPTION:

This course emphasizes on various bio-molecules and its significance.

GOALS:

To enable the students to learn the basic functions, structures and biological importance of lifeless chemical compounds.

OBJECTIVES:

On successful completion of the course the students should have understood the significance of the complex bio-molecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.

UNIT-I

Carbohydrates: Monosaccharides-Definition, classification, structure and properties. Disaccharides-Definition, types, structure and biological importance. Polysaccharides-types and properties.

UNIT-II

Lipids:- Definition, Classification and properties of lipids. Types of fatty acids -saturated, unsaturated and essential fatty acids. Classification and significance of lipoproteins and phospholipids. Importance of steroids, structure and biological significance of cholesterol.

UNIT-III

Amino acids: Classification of amino acids, essential amino acids, reactions of amino and carboxyl groups of amino acids. Proteins: Definition, classification and function of Proteins, structural levels of organization (Preliminary treatment). Denaturation and isoelectric point of Proteins.

UNIT-IV

Nucleic acids: Components of DNA and RNA. Double helical structure of DNA.Structure and types of RNA. Denaturation and renaturation of DNA. Genetic code. Protein synthesis (an outline)

UNIT-V

Enzymes: Classification of enzymes with examples, coenzymes and cofactors (structures not needed). Active site: Lock and Key model, Induced fit hypothesis. Factors affecting enzyme activity. Types of inhibition of enzyme action. Chemical and industrial applications of enzymes.

Test Books:

1. Fundamentals of biochemistry – A.C. Deb New Central Book Agency, Calcutta 6th Edition.

Reference Books:

1. Biochemistry – Lehninger, Nelson, Cox-CBS Publishers
2. Harper's Biochemistry: R.K. Murray, D.K Granner, P.A. Mayes and U.W.Rodwell – Lange Medical publications, 23rd edition.
3. Textbook of Medical Biochemistry – Rana Shindae and Chatterjee.

SUBJECT TITLE: ALLIED BIOCHEMISTRY II

SUBJECT DESCRIPTION :

The nature of the diet sets the basic pattern of metabolism in the tissues. Mammals such as humans need to process the absorbed products of digestion of dietary carbohydrates, lipids and protein. These are mainly glucose, fatty acids, glycerol and amino acids respectively. The fate of dietary components after digestion and absorption constitutes intermediary metabolism. Knowledge of metabolism in the normal human being is a pre requisite to a sound understanding of abnormal metabolism underlying many diseases.

GOALS:

To enable the students to learn the basic functions, principles and concepts of metabolism.

OBJECTIVES:

Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body.

- Interrelationship between carbohydrate, fat and protein metabolism.
- Various disorders related to each metabolism

UNIT I
Bioenergetics: Basic principles of thermodynamics – entropy, enthalpy and free energy; Laws of thermodynamics, Structure of mitochondria, high-energy phosphates, oxidation-reduction reactions.

UNIT II
Metabolic pathways:
Carbohydrate metabolism: Glycolysis, TCA cycle, HMP shunt, Glycogenesis and glycogenolysis. **Disorders of carbohydrate metabolism:** Diabetes mellitus, glucosuria.

UNIT III
Protein metabolism: General pathway of amino acid metabolism – deamination, transamination and decarboxylation. Urea cycle. Glycine and phenylalanine metabolism (structures not required).

UNIT IV
Lipid Metabolism

Beta oxidation and biosynthesis of fatty acids- palmitic acid, ketone bodies.
Inter-relationship of carbohydrate, fat and protein metabolism (Flow chart only).

UNIT V
Hormones and Vitamins
Hyper and hypo secretions of pituitary, adrenal and thyroid glands.
Fat and water soluble vitamins- Sources, metabolic functions and deficiency diseases.

Text Books:
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Reference Books:
1. Biochemistry – Lehninger, Nelson, Cox-CBS Publishers
2. Harper's Biochemistry: R.K. Murray, D.K Granner, P.A. Mayes and U.W.Rodwell – Lange Medical publications, 23rd edition.
3. Textbook of Medical Biochemistry – Rana Shindae and Chatterjee.
4. An Introduction to practical Biochemistry – D.T. Plummer.

ALLIED BIOCHEMISTRY PRACTICALS

I. QUALITATIVE ANALYSIS

1.**Analysis of carbohydrates**:
a.Monosaccharides-Pentose- Xylose.
Hexoses- Glucose, Fructose,
b.Disaccharides- Sucrose, Lactose
c.Polysaccharide- Starch.

2.**Analysis of Amino acids:**
a. Histidine b. Tyrosine. c. Tryptophan d. Arginine e.Cysteine f.Methionine

II. CHARACTERISATION OF LIPIDS [Group experiment]
1. Determination of acid number.
2. Determination of iodine number.

III. SEPARATION TECHNIQUES [Demonstration]
1.Separation of amino acids by paper chromatography
2. Separation of sugars by thin layer chromatography
3.Separation of serum proteins by electrophoresis.

References:-
1.An introduction to practical biochemistry by David T. Plummer.
2.Laboratory Manual in biochemistry by Pattabiraman and Acharya.
3.Practical biochemistry by J.Jayaraman.