

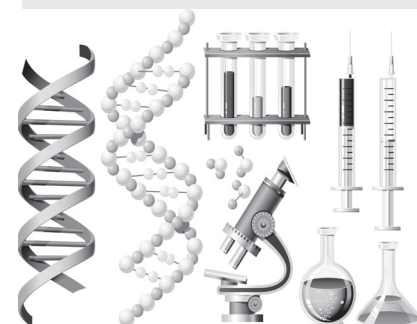
16BM203 BIOCHEMISTRY FOR MEDICAL ENGINEERS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HS	CS	SA	S	BS
45	-	30	20	48	6	12	3	5



Course Description and Objectives:

This course offers the structure and function of biological molecules, including carbohydrates, lipids, and proteins. The objectives of the course is to introduce the student to special properties of biological membranes, biochemistry.

Course Outcomes:

The student will be able to:

- explain the fundamentals of biochemistry.
- identify the DNA and RNA structures.
- know the all carbohydrates and their properties.
- know the classifications, functions and properties of proteins.
- understand the kinetics of enzymes and factors affecting enzymatic activity.

SKILLS :

- ✓ *Understand various body fluids.*
- ✓ *Interpret harnessing of energy in organ system.*
- ✓ *Replications, DNA synthesis.*
- ✓ *Interpret the basis for enzyme kinetics.*

ACTIVITIES:

- Analyze of amount of creatine.
- Estimate urea, glucose.
- Analyze Ph of different solutions.
- Analyze Chromatography of amino acids.

UNIT - 1**L-9**

INTRODUCTION TO BIOCHEMISTRY: Water as a biological solvent, Weak acid and bases, PH, buffers, Handerson-Hasselbalch equation, Physiological buffers, Fitness of the aqueous environment for living organism; Principle of viscosity, Surface tension, Adsorption, Diffusion, Osmosis and their applications in biological systems.

UNIT - 2**L-9**

CARBOHYDRATES: Classification of carbohydrates - Mono, Di, Oligo and polysaccharides. Isomerism, racemization and mutarotation .Structure, physical and chemical properties of carbohydrates; Metabolic pathways and bioenergetics – Glycol sis, glycogen sis, Glycogenolysis and its hormonal regulation; TCA cycle and electron transport chain; Oxidative phosphorylation.

UNIT - 3**L-9**

LIPIDS: Classification of lipids- Simple, Compound and derived lipids; Nomenclature of fatty acid, Physical and Chemical properties of fat; Saponification number, Reichert- Meissl number and iodine number; Metabolic pathways-Synthesis and degradation of fatty acid (beta oxidation), Hormonal regulation of fatty acid metabolism, Ketogenesis, Structural architecture, Significance of biological membrane.

UNIT - 4**L-9**

NUCLEIC ACID AND PROTEIN: Structure of purines and pyrimidines, Nucleoside, Nucleotide, DNA act as a genetic material, Chargaff's rule; Watson and crick model of DNA; Structure of RNA and its type, Classification, Structure and properties of proteins, Structural organization of proteins, Classification and properties of amino acids, Separation of protein, Gel filtration, Electrophoresis and Ultracentrifugation.

UNIT - 5**L-9**

ENZYME AND ITS KINETICS: Classification of enzymes, Apoenzyme, Coenzyme, Holoenzyme and cofactors; Kinetics of enzymes - Michaelis-Menten equation; Factors affecting enzymatic activity- Temperature, PH, Substrate concentration and Enzyme concentration, Inhibitors of enzyme action, Competitive, Non- competitive, Irreversible; Enzyme- Mode of action, Allosteric and covalent regulation, Clinical significance of enzymes, Measurement of enzyme activity and interpretation of units.

LABORATORY EXPERIMENTS

The student will be able to:

- measure the PH level of various solutions.
- quantitative estimation of glucose and other molecules.
- cerebrospinal fluid anlysis.

LIST OF EXPERIMENTS:

Total hours-30

1. Study of Plasma protein electrophoresis.
2. Study of Chromatography of amino acids.
3. Study of Colorimetry.
4. Study of Spectrophotometry.
5. Study of pH meter.
6. Study of Flame photometry-Analysis of Na and K in an unknown sample.

7. Quantitative estimation of glucose.
8. Quantitative estimation of Urea.
9. Quantitative estimation of Creatinine.
10. Quantitative estimation of Serum proteins, A/G Ratio.
11. CSF Analysis.
12. Clearance Tests-Demonstration.

TEXT BOOKS:

1. David.W.Martin, Peter.A.Mayes and Victor. W.Rodwell, "Harper's Review of Biochemistry", 19th edition, LANGE Medical Publications, 1981.
2. Keith Wilson and John Walker, "Practical Biochemistry - Principles and Techniques", Oxford University Press, 2009.

REFERENCE BOOKS:

1. Trevor palmer, "Understanding Enzymes", 1st edition, Ellis Horwood Ltd. 1991.
2. Pamela.C.Champe and Richard.A.Harvey, "Lippincott Biochemistry Lippincott's Illustrated Reviews", 1st edition, Raven publishers,1994.