Revised syllabus Semester II

Effective from Academic year 2016-17

First Year	Semester I		Semester II	
4 credits	*101: Biomolecules*		*103: Biomolecules Adv.*	
	Unit 1:	Nature and Scope of Biochemistry Origin of life	Unit 1:	Complex carbohydrates
	Unit 2:	Carbohydrate chemistry	Unit 2:	Proteins
	Unit 3:	Amino acids	Unit 3:	Complex lipids and sterols
	Unit 4:	Lipid chemistrY	Unit 4:	Nucleic acids
3 credits	*102: Practical*		*104: Practical*	
2 credits	*Biochem Elec:*		*Biochem Elec:*	
	101:Elective: Nutrition & dietetics		*103:* Environmental studies	
	102:Elective: Food adulteration			

Semester II

103: Biomolecules Adv. *(4 credits)*

Unit 1: Complex carbohydrates

Oligosaccharides: Occurance, structure, chemical name, functions and importance of: maltose, sucrose, lactose,cellobiose, trehalose, raffinose.

Polysaccharides: Occurance, structure,chemical name, functions and importance of: starch, glycogen, cellulose, hemicelluloses, dextrin, chitin, inulin, dextran, pectin,agar.

Carbohydrate derivatives of biological importance: amino sugars, deoxy sugars, sugar phosphates, blood group polysaccharides, cell wall polysaccharides, teichoic caid, muramic acid, sialic acid, mucopeptides.

Glycosaminoglycans: Occurarance, structure and functions oaf hyaluronic acid, heparin, chondroitin sulphates, A, B and C, Glycoproteins and preoteoglycans.

Unit 2: Proteins

Peptides, structure, formation and characteristics of peptide bonds
Proteins: Classification based on solubility, shape and composition.
Functions of proteins

Properties of Protein: Isoelectric pH of proteins, Hydration, Solubility, Salting-in and Salting-out or proteins, Precipitation of proteins by acid reagents, antibodies, heavy metals, heat, extreme pH changes, denaturation and renaturation of proteins.

Chemical properties of proteins: Color reactions: Ninhydrin reaction, Hopkin-Coles reaction, Ehrlich,s raction, Nitropruside reaction, Sakaguchi's reaction, Xanthoproteic reaction, Millon's raction, Sullivan's reaction, Pauly's reaction, Folin-Phenol reaction, Biuret reaction

Structure of proteins: Primary, Secondary, Tertiary and Quaternary structures. (Brief Quaternary Structure of Hemoglobin)

Determination of amino acid sequence in proteins and its significance

Biological importance (functions) of Complex Proteins- Glycoprotein, Lipoproteins and Riboproteins

Unit 3: Complex lipids and sterols

Phospholipids- Structures,Properties and Functions.Glycerophospholipids: Classification, properties and functions of lecithin, Cephalins

Plasmalogens, phosphatidyl serine, phosphatidyl inositol (Only Structures)

Sphingolipids: Classification, properties and functions of cerebrosides, gangliosides

Sulpholipids, gangliosides, proteolipids, and prostaglandins (in brief)

Classification, Structure of sterols, Structure, Functions, Properties & Colour reactions of cholesterol

Unit 4: Nucleic acids

Introduction to nucleic acids, Composition of DNA and RNA

Nitrogenous bases: structure, linkages and properties of normal and rare Bases

Sugars Types & structures, Nucleosides and nucleotides

Different types of naturally occurring Nucleotides: structure & functions

DNA: Important features of DNA double helix structure.

RNA: Different types, structures, functions
Differences and similarities between RNA & DNA

Ref:

1. Berg JM, and Tymoczko TJ Stryer L,: Biochemistry (ed 6)
2. Conn EE, Stumpf PK, Bruening G and Doi RH: Outlines of Biochemistry (1987)
3. David Ucko: Living chemistry (1977/ 1986).
4. Deb AC: Fundamentals of Biochemistry 2000
5. Donald Voet and Voet J: Biochemistry (ed 4) 2011
6. Jeoffrey Zubay: Origin of life on the earth and in the cosmos (2^{nd} ed) 2000. Academic Press
7. Jeoffrey Zubay: Principles of Biochemistry (1996)
8. Murray RK, Rodwell VW: Harpers review of Biochemistry (ed 25) 2000
9. Nelson DL and Cox MM: Lehninger's Principles of Biochemistry (ed 5) 2008
10. Rama Rao AV: A text book of Biochemistry (10^{th} ed) 2006
11. Rodney Boyer: Concepts in Biochemistry (3rd ed)
12. West and Todd: Text book of Biochemistry (ed 4) 1970
13. White A, Handler P and Smith EL: Principles of Biochemsitry (6^{th} ed) 1978

104: Practicals *(3 credits)*

Duration: 2hr **Marks: 100** **Total 45 hrs**

Experiments involving Oxidometry

1. Use of potassium permanganate in the estimation of Iron.
2. Use of potassium permanganate in the estimation of Oxalate.

Experiments involving Iodometry

3. Use of potassium dichromate in the standardization of sodium thiosulphate.
4. Estimation of Copper by iodometry.

Experiments involving Qualitative Analysis

5. Qualitative analysis by colour reactions of Amino Acids.
6. Qualitative analysis of proteins (gelatine, egg albumin) by colour reactions
7. Precipitation/ denaturation test for proteins by
    1. Heat
    2. pH (conc. HCl, 5/10 N NaOH, Distilled water)
    3. Acids (TCA and Sulphosalicylic acid).
    4. Heavy metals (Lead, Copper, Zinc, Barium Salts)
8. Analysis of physical property of lipids: Solubility Test, Oil Spot Test, Emulsification Test, Saponification Test.
9. Analysis of chemical properties of lipids: colour reactions of cholesterol.

Experiments involving Colorimetric Estimations

10. Use of Single Cell Colorimeter, its construction and operation. (Demo).
11. Estimation of Protein by Biuret method.
12. Estimation of DNA by DPA method.
13. Estimation of RNA by Orcinol method.
14. Estimation of Sugar by DNSA method

Ref:

1. Jayaraman, J: Laboratory manual in Biochemsitry
2. Malhotra VK: Handbook of practical biochemistry
3. Mukherjee L: Medical Laboratory Technolgy, Vol 1,2,3.
4. Plummer: An Introduction ot Practical Biochemistry.
5. Sadasivan and Manickam: Biochemical methods.
6. Standard methods for the examination of water and waste water (13^{th} ed)
7. Varley H: Practical Clinical Biochemistry.
8. Laboratory handbook on biochemistry. By S.Shanmugam, T. Sathish Kumar, K.Paneer Selvam (PHI Learning Pvt. Ltd., New Delhi.)