

## **MB1PG01 - BIOCHEMISTRY**

**Number of Hours / Week: 4**

**Credits: 4**

### **UNIT I**

#### **Brief Review of Basic Biochemistry**

**Properties of water and aqueous solution:** Water as biological solvents; acid bases and buffers; physiological buffers; Henderson Hasselbach equations; fitness of aqueous environment for living organisms.

**Functional groups:** Structure and reactions; Review of organic reaction: classification; mechanisms **Stabilizing interactions:** Covalent bonds; Ionic bonds; Disulfide linkages; Non-covalent interactions: Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.

### **UNIT II**

**Biomolecules:** Composition; basic structure and function of biomolecules: carbohydrates, lipids, proteins, nucleic acids and vitamins.

**Hormones:** Classification; site of formation, target organs; mechanism of action of peptide and steroid hormones (with suitable examples).

### **UNIT III**

#### **Carbohydrates:**

Mono, di ,oligosaccharides, Glycosidic bonds; glycoproteins (O- linked and N- linked), glycolipids; **Polysaccharides:** Classification: Homopolysaccharides (Cellulose, Starch, Chitin, and Glycogen), Heteropolysaccharides, bacterial peptidoglycans, flagellin, lipopolysaccharides, chitin, glycosaminoglycans, hyaluronic acid, and heparin and their Structural characteristics and functions, bacterial polysaccharides Purification and Characterization of polysaccharides from biological systems.

### **UNIT IV**

#### **Complex Lipids:**

**Glycerophospholipids:** Structure and function of (Phosphatic acid, cardiolipin, Phosphatidyl serine, Phosphatidyl ethanolamine, Phosphatidyl glycerol, Phosphatidyl choline, Phosphatidyl inositol), CDP-diacylglycerol, Lung surfactants.

**Glycosphingolipids:** Structure and function of Sphingosine, ceramides & sphingomyelins, cerebroside, globosides, gangliosides, sulfatides .

**Eicosanoids:** Prostaglandins, Leukotrienes and Thromboxanes: Chemistry, formation and physiological function.

**Steroids:** Steroids in animal system: Glucocorticoids, mineralocorticoids and Sex hormones (Site of biosynthesis, functions and mechanism of action); Sterols in Plant system: Phytohormones: Brassinosteroids (functions); Sterols in microbial system: Microbial transformation of steroids .

### **UNIT V**

#### **Macromolecules: Structure and Function:**

**Protein structure and function:** Primary, Secondary, Tertiary and Quarternary structure of Proteins w.r.t: Globular protein (eg: Hemoglobin and Myoglobin), Fibrous protein: (Collagen), Membrane Protein (ATP synthetase), Protein sequencing, Evolutionary divergence of organisms and its relationship to protein structure and function.

**Nucleic acid structure and function:** Introduction, Phosphodiesterbonds, melting of the DNA molecule; Re association kinetics, structure of tRNA .

### References:

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3. David L. Nelson Michael M. Cox *Lehninger Principles of Biochemistry*, W. H. Freeman; Fourth Edition edition (April 23, 2004) ISBN-10: 0716743396 ISBN-13: 978-0716743392.
4. E.S. West, W.R. Todd, H.S. Mason and J.T. van Bruggen, *A Text Book of Biochemistry*, Oxford and IBH Publishing Co., New Delhi, 1974
5. Donald Voet, Judith G. Voet *Biochemistry* (2004) John Wiley & Sons Inc ISBN: 047119350X ISBN-13: 9780471193500, 978-0471193500
6. Geoffrey L Zubay, William W Parson, Dennis E Vance; *Principles Of Biochemistry* (1995) Mcgraw-hill Book Company – Koga ISBN:0697142752 ISBN-13: 9780697142757, 978-0697142757
7. Robert Horton H , Laurence A Moran, Gray Scrimgeour K *Principles Of Biochemistry*, (2006): Pearsarson 4/e ISBN: 0131977369, ISBN-13:9780131977365, 978-0131977365
8. Jeremy M.berg John L.tymoczko Lubert Stryer *Biochemistry* (2007) B.i.publications Pvt.Ltd 6th Edition ISBN:071676766X ISBN-13: 9780716767664, 978-716767664
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