

## **COURSE-1.4 Biochemical Transformation and Clinical significance**

### **Block-1.4A**

- i. Carbohydrates: Glycolysis and gluconeogenesis, glycogen metabolism-synthesis and breakdown.
- ii. TCA cycle and its regulation, pentose phosphate pathway, glyoxylate cycle,
- iii. Regulation of carbohydrate metabolism. Clinical disorders – Diabetes mellitus, Lactose intolerance, glycogen storage disorder, Galactose urea, Fructose urea, and pentose urea
- iv. Bioenergetics: Electron transport chain and oxidative phosphorylation: organization of respiratory chain complexes.

### **Block-1.4B**

- i. Structure and function of components of oxidative phosphorylation. Mechanism of ATP synthesis, ATP synthetase complex.
- ii. Proton motive force, Mitchell's hypothesis, Integration of metabolism to bioenergetics.
- iii. Photosynthesis: Chemistry and structural components of photo systems I and II, light harvesting antennae complex,
- iv. Calvin cycle, C3 and C4 cycle, photorespiration.

### **Block-1.4C**

- i. Lipids:  $\beta$ -oxidation of saturated, unsaturated and branched chain fatty acids, peroxysomal  $\beta$ -oxidation and omega oxidation.
- ii. Biosynthesis of saturated and unsaturated fatty acids and branched chain fatty acids. Biosynthesis of phospholipids – de novo pathway, and interconversion.
- iii. Cholesterol biosynthesis and its regulation. Atherosclerosis and other disorders of metabolism.
- iv. Proteins: Amino acid degradation – de-amination, trans-amination and degradation of individual amino acids. Inherited diseases of proteins.

### **Block-1.4D**

- i. Urea cycle, biosynthesis of individual amino acids. In-born errors of amino acid metabolism.
- ii. Nucleotide metabolism: Pathway for degradation of purines and pyrimidine

iii. de novo synthetic pathways of ribo-nucleotides, salvage pathways, Gout, Lesch-Nyhan Syndrome.

iv. Metabolic disorders of nucleotides; biosynthesis of deoxy ribonucleotides. Regulation of degradation and biosynthesis.

#### Reference Books:

1. Nelson DL and Cox MM. Principles of Biochemistry, 5<sup>th</sup> Edition, W.H. Freeman and Company
2. Berg J, Tymoczko JL and Stryer L. Biochemistry, 5<sup>th</sup> Edition, W.H. Freeman and Company
3. Satyanarayana U and Chakrapani U. Biochemistry, 3<sup>rd</sup> Edition, Books and allied (p) Ltd.
4. Janin JL, Jain S and Jain N. Fundamentals of Biochemistry, S.Chand and Company Ltd.
5. Geoffrey L. Zubey, William W. Parson, Dennis E. Vance. Wm. 2007, Principles of Biochemistry- C. Brown Publishers.