



Department of Biotechnology	LP: BT22303 Rev. No: 00 Date: 01/08/2023
B.E/B.Tech/M.E/M.Tech : Biotechnology PG Specialisation : Not applicable Sub. Code / Sub. Name : BT22303/Biochemistry Unit : I	Regulation: 2022

Unit Syllabus: Dogma of Biomolecules

9

Importance of biochemistry in medicine, Tendency of water in group transfer, Implications of pH, pK and buffers, Classification, Structural and functional properties of amino acids, proteins and enzymes, cofactors and coenzymes

OBJECTIVE: To acquire the fundamental knowledge on functional aspects of amino acids, protein, and enzymes

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Importance of biochemistry in medicine as case study.	T1(62, 130-132, 150, 168)	BB/LCD
2.	Tendency of water in group transfer and buffering against pH changes in biological.	T1(47-60)	BB/LCD
3.	Tendency of water in group transfer and buffering against pH changes in biological.	T1(47-60)	BB/LCD
4.	Implications of ph, pk and buffers on biological systems.	T1(60-70) T5(41-76)	BB/LCD
5.	Classification, structural and functional properties of amino acids.	T1(75-106) T5(41-76) R1(533-540)	BB/LCD
6.	Classification, structural and functional properties of proteins.	T1(75-106), T4 (60-70) R1(533-540)	BB/LCD
7.	Classification, structural and functional properties of enzymes.	T1(191-193), T4 (60-70)	BB/LCD
8.	Involvement of cofactors in metabolism and catalysis.	T1(202-211), T4 (50-55)	BB/LCD
9.	Involvement of coenzymes in metabolism and catalysis.	T1(202-211), T4 (60-70)	BB/LCD

Content beyond syllabus covered (if any):

Introduction of enzyme-substrate reaction.



Sub. Code / Sub. Name : BT22303-Biochemistry
Unit : II

Unit Syllabus: Metabolism of Carbohydrates

9

Classifications of Carbohydrates, Biological Significance of Monosaccharides, Oligosaccharides and polysaccharides. Metabolism of Carbohydrates – Glycolysis, Citric Acid Cycle, pentose phosphate pathway, gluconeogenesis, glycogenesis and glycogenolysis.

OBJECTIVE: To impart knowledge on the classification and metabolism of carbohydrates.

Session No *	Topics to be covered	Ref	Teaching Aids
10.	Introduction about carbohydrate and their classification.	T4(102-111)	BB/LCD
11.	Importance of monosaccharides and disaccharides in metabolism in cells.	T1(235-239)	BB/LCD
12.	Importance of polysaccharides (starch and glycogen) in metabolism in cells.	T1(243-244)	BB/LCD
13.	Metabolism of carbohydrates through glycolysis.	T1(245-248) R2(113-123)	BB/LCD
14.	The beginning of citric acid pathway from the glycolysis and the resulting atp production.	T 1(528-546) R2(123-136)	BB/LCD
15.	Hmp pathway – shunt pathway for the nucleotide biosynthesis.	T1(528-546)	BB/LCD
16.	The formation of glucose from other substrates through gluconeogenesis pathway.	T1(551-557)	BB/LCD
17.	The formation of glycogen from glucose through glycogenesis pathway.	T1(558-559)	BB/LCD
18.	Breakdown of glycogen to glucose through glycogenolysis.	T1(616-637)	BB/LCD

Content beyond syllabus covered (if any):

The connecting perspectives of carbohydrate metabolisms.

* Session duration: 50 mins



Sub. Code / Sub. Name : BT22303-Biochemistry
Unit : III

Unit Syllabus: Metabolism of Fatty acids

9

Classification of lipids, biological significance of Essential Fatty Acids, Triglycerides, Phospholipids and Sterols. Metabolism of lipids, Oxidation of fatty acids, β – oxidation, Biosynthesis of Ketone bodies & Cholesterol.

OBJECTIVE: To impart knowledge on the metabolism of fatty acids.

Session No *	Topics to be covered	Ref	Teaching Aids
19.	Introduction and classification of lipids.	T1(343-349), T4 (111-113)	BB/LCD
20.	Major biological significance of essential fatty acids for human health.	T4(190-196)	BB/LCD
21.	Triglycerides - the storage form of fatty acids in tissues.	T4(114-115)	BB/LCD
22.	Prominence of phospholipids and sterols in tissues.	T4(116-119, 417)	BB/LCD
23.	Digestion, mobilization and transport of lipids through cells.	T1(631-636)	BB/LCD
24.	Digestion, mobilization and transport of lipids through cells.	T1(631-636)	BB/LCD
25.	Oxidation of long chain fatty acids in energy yielding pathway.	T1 (637-643)	BB/LCD
26.	β – Oxidation of fatty acids in mitochondria and the energy synthesis.	T1 (644-649)	BB/LCD
27.	Biosynthesis of ketone bodies & cholesterol and their biological significance.	T1 (650-652), T4 (219-229)	BB/LCD

Content beyond syllabus covered (if any):

Metabolism of non-essential fatty acids and their importance in human health.

* Session duration: 50 mins



Sub. Code / Sub. Name : BT22303-Biochemistry
Unit : IV

Unit Syllabus: Bioenergetics**9**

Bioenergetics and the role of ATP, Biological oxidation, Respiratory chain, Chemiosmotic Theory, Oxidative Phosphorylation, Uncouplers, Calculation of ATP during oxidation of glucose and Fatty acid.

OBJECTIVE: To provide an insight on the different metabolic pathways and the energy production.

Session No *	Topics to be covered	Ref	Teaching Aids
28.	Biological oxidation - oxidation-reduction Reactions in the biochemical systems.	T4(86-91)	BB/LCD
29.	Electron transport chain – respiratory chain in the aerobic organisms for ATP synthesis.	T4(92-101) T2(593-607)	BB/LCD
30.	Generation of high-energy intermediate by oxidative phosphorylation.	T4(92-101) T2(609-619)	BB/LCD
31.	Generation of high-energy intermediate by oxidative phosphorylation.	T4(92-101) T2(609-619)	BB/LCD
32.	Uncouplers – oxidation dissociation in respiratory chain.	T4(95-97)	BB/LCD
33.	High energy compounds involves thiol esters of coenzyme a, acyl carrier protein, amino acid esters.	T4(82-85)	BB/LCD
34.	Coenzymes – catalytic activity and substrate shuttle.	T1(184-185), T4(50-51)	BB/LCD
35.	Role of ATP cycle in transfer of high-energy phosphate.	T4(83-84)	BB/LCD
36.	Calculation of ATP during oxidation of glucose and fatty acids.	T1(734-735), T4(142-143)	BB/LCD

Content beyond syllabus covered (if any):

Balance sheet of ATP in all pathways

* Session duration: 50 mins



Sub. Code / Sub. Name : BT22303-Biochemistry
Unit : V

Unit Syllabus: Metabolism of Amino acids and Nucleic acids**9**

Biosynthesis of essential Amino acids, Nitrogen balance, Urea cycle, Biosynthesis of purine and pyrimidine and their catabolism.

OBJECTIVE: To illustrate the synthesis and metabolism of amino acid and nucleic acid.

Session No *	Topics to be covered	Ref	Teaching Aids
37.	Biosynthesis of essential Amino acids as metabolic precursor	T1(844-854)	BB/LCD
38.	Biosynthesis of essential Amino acids as metabolic precursor	T1(844-854)	BB/LCD
39.	Metabolism of lysine and methionine	T1(865-867)	BB/LCD
40.	Nitrogen balance- equilibrium of nitrogen uptake in human	T4(479)	BB/LCD
41.	Nitrogen balance- equilibrium of nitrogen uptake in human	T4(479)	BB/LCD
42.	Metabolic fates of amino acid in urea cycle	T1(682-687)	BB/LCD
43.	Metabolic fates of amino acid in urea cycle	T1(682-687)	BB/LCD
44.	Biosynthesis of purine and its catabolism	T4(293-302) T3(807-838)	BB/LCD
45.	Biosynthesis of pyrimidine and its catabolism	T4(293-302) T3(807-838)	BB/LCD

Content beyond syllabus covered (if any):

Metabolism of non-essential Amino acids


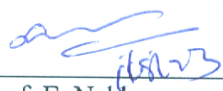
* Session duration: 50 mins

**TEXTBOOKS:**

1. David L. Nelson and Michael M. Cox, "Lehninger's Principles of Biochemistry", 7th Edition, W. H. Freeman Publisher, 2017.
2. Donald Voet, "Fundamentals of Biochemistry", 5th Edition, John Wiley Publishers, 2016.
3. Thomas M. Devlin, "Biochemistry with Clinical Correlations", 7th Edition, John Wiley and Sons, 2011.
4. Murray R.K., David, A, Bender, Kathleen M, Botham, Peter J. Kennelly, Victor W. Rodwell, P Anthony P, Weil D.K and Mayes P.A, "Harpers illustrated Biochemistry", 28th Edition, Mc Graw Hill publishers, 2009.
5. Stryer L, "Biochemistry". 5th Edition, W. H. Freeman and company, 2002.

REFERENCE BOOKS:

1. Carl, A.B, Edward R. A and Nobert W. T, "Textbook of Clinical chemistry", 3rd Edition, WB. Saunders Company, 1999.
2. John W Baynes, Marek H. Dominiczak, and Hab Med, "Medical Biochemistry", ELSEVIER Publications, 2018.

	Prepared by	Approved by
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Date	01-08-2023	01-08-2023
Remarks:	Nil	
Remarks:	Nil	

*If the same lab plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD