

St.James College of Pharmaceutical Sciences St.James medical Academy River Bank, Chalakudy			
Programme:	B.Pharm	Sem.:	II semester
Name of Course: (Subject)	BP203 T. BIOCHEMISTRY (Theory)	Course Code:	009
Teaching faculty of the course	GEETHA ELIAS		

Summary of the Lecture Plan

Topic	Lectures	Hours	
1. Enzymes 07hrs	Introduction, properties, nomenclature and IUB classification of enzymes	1	
	Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)	2	
	Enzyme inhibitors with examples	1	
	Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation	1	
	Therapeutic and diagnostic applications of enzymes and isoenzymes; Coenzymes – Structure and biochemical functions	2	
2. Biomolecules 04hrs	Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.	4	
	Bioenergetics 04hrs	Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.	2
		Energy rich compounds; classification; biological significances of ATP and cyclic AMP	2
3.Carbohydrate metabolism 06hrs	Glycolysis – Pathway, energetics and significance	1	
	Citric acid cycle- Pathway, energetics and significance	1	

	HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency	1	
	Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance	2	
	Hormonal regulation of blood glucose level and Diabetes mellitus	1	
Biological oxidation 04hrs	Electron transport chain (ETC) and its mechanism.	1	
	Oxidative phosphorylation & its mechanism and substrate level phosphorylation	2	
	Inhibitors ETC and oxidative phosphorylation/Uncouplers	1	
4.Lipid metabolism 05hrs	β -Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis	1	
	De novo synthesis of fatty acids (Palmitic acid)	2	
	Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D	1	
	Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.	1	
	Amino acid metabolism 05hrs	General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders	2
		Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)	1
		Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline	1
		Catabolism of heme; hyperbilirubinemia and jaundice	1
5.Nucleic acid metabolism and genetic information transfer 10hrs	Biosynthesis of purine and pyrimidine nucleotides	2	
	Catabolism of purine nucleotides and Hyperuricemia and Gout disease	1	
	Organization of mammalian genome	1	
	Structure of DNA and RNA and their functions	2	
	DNA replication (semi conservative model)	1	
	Transcription or RNA synthesis	1	
	Genetic code, Translation or Protein synthesis and inhibitors	2	

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Major issues or Core aspects to be addressed/ covered:

Topic Title	Enzymes
	Definition of enzymes
	Nomenclature as per [E.C] Enzyme commission, Factors affecting enzyme kinetics
	Effects of each of the eight factors on enzyme kinetics; Mathematical equations for k_m & initial velocity (v); Graphical representation of Influence of substrate concentration on Velocity of reaction , using Michaelis plot and Line Weaver Burke plot
	Definition of Enzyme Inhibitor, Discuss different types of inhibitors siting examples and their effect on enzyme kinetics.
	Mechanisms of Regulation of enzymes such as induction, repression and allosteric regulation. Definition of isoenzymes, examples, functions, and their diagnostic importance. Definition of coenzymes, examples, biochemical functions and structures of coenzymes from various vitamins of B complex.
	Therapeutic and diagnostic applications of enzymes and isoenzymes;
Topic Title	Biomolecules and Bioenergetics
	Definition, classification, chemical nature and biological role of carbohydrates
	Definition, classification, chemical nature and biological role of lipids
	Definition, classification, chemical nature and biological role of amino acids and proteins
	Definition, classification, chemical nature and biological role of nucleosides, nucleotides Definition, classification, chemical nature and biological role of nucleic acids DNA & RNA.
	Bioenergetics: Concept of free energy, its definition, definition and examples of endergonic and exergonic reactions, Relationship between free energy, enthalpy and entropy; Determination of free energy from Redox potential. Definition, Classification and structures of Energy rich compounds; biological significances of ATP and cyclic AMP
Topic Title	Carbohydrates and Biological Oxidation
	Carbohydrates: Definition, pathway, energetics and significance of glycolysis and citric acid cycle
	Pathway of HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency
	Pathway and significance of gluconeogenesis, glycogenesis, glycogenolysis. Glycogen storage diseases (GSD)
	Hormonal regulation of blood glucose level and Diabetes mellitus

Biological oxidation: Electron transport chain (ETC) and its mechanism.
 Oxidative phosphorylation & its mechanism and substrate level phosphorylation
 Inhibitors ETC and oxidative phosphorylation/Uncouplers

Topic Title Lipid Metabolism and Amino acid Metabolism

Pathway of β -Oxidation of saturated fatty acid (Palmitic acid), Ketogenesis, ketolysis and ketoacidosis

Pathway for De novo synthesis of fatty acids (Palmitic acid)

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D

Disorders of lipid metabolism: Definition, biochemical abnormality and clinical features of Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

General reactions of amino acid metabolism: Definition of the terms, examples of Transamination, deamination & decarboxylation reactions with their respective enzymes and coenzymes, Reactions of urea cycle and its disorders.

Reactions involved in Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alkaptonuria, tyrosinemia)

Synthesis and significance of biological substances; dopamine, noradrenaline, adrenaline from tyrosine , synthesis of 5-HT, melatonin from tryptophan.

Explain Catabolism of heme; hyperbilirubinemia and different types of jaundice, their causes, biochemical abnormality and clinical features.

Topic Title Nucleic acid metabolism and genetic information transfer

Nucleic acid metabolism: Pathway for Biosynthesis of purine and pyrimidine nucleotides

Catabolism of purine nucleotides and Hyperuricemia and Gout disease

Genetic information transfer: Organization of mammalian genome

Compare and contrast the Structure of DNA and RNA, and their functions

Illustration of various stages of DNA replication (semi conservative model), Replication fork

Illustration of various stages of Transcription or RNA synthesis

Genetic code, Translation or Protein synthesis and inhibitors

Topic Title

Sample Questions

Topic Title	Enzymes
	Define and classify enzymes with specific examples and give E.C. number of any two enzymes.
	Explain the factors affecting enzyme kinetics .
	Explain the influence of substrate concentration on enzyme kinetics with the aid of Michaelis plot and Line Weaver Burke plot
	Define enzyme inhibitor. Explain different types of enzyme inhibition.
	What are the mechanisms of enzyme regulation?
	List the therapeutic and diagnostic uses of enzymes and isoenzymes.
Topic Title	
	Define classify and biological role of carbohydrate/ lipids/ nucleic acids/ amino acids and proteins.
	What is free energy? Define and give examples of endergonic and exergonic reactions
	How would you determine free energy from Redox potential?
	Discuss the biochemical significance of ATP.
	Classify high energy molecules. Write a note on cyclic AMP
Topic Title	Carbohydrates & Biological oxidation:
	Definition, pathway, energetics and significance of glycolysis.
	Definition, pathway, energetics and significance of citric acid cycle.
	Explain pathway of HMP shunt and give its significance. Write note on Glucose-6-Phosphate dehydrogenase (G6PD) deficiency
	Explain pathway and significance of gluconeogenesis
	Electron transport chain (ETC) and its mechanism.
	Oxidative phosphorylation & its mechanism
	Explain substrate level phosphorylation
	Inhibitors of ETC and oxidative phosphorylation/Uncouplers
	Define the terms glycogenesis and glycogenolysis. Discuss Glycogen storage diseases
	Hormonal Regulation of blood glucose level.
	Write a note on Diabetes mellitus
Topic Title	Lipid Metabolism and Amino acid Metabolism
	Pathway of β -Oxidation of saturated fatty acid (Palmitic acid)
	Explain pathway for ketogenesis, ketolysis and add a note on ketoacidosis
	Write briefly on hypercholesterolemia/ atherosclerosis/ fatty liver / obesity.
	Explain the general reactions of amino acid metabolism.
	Explain catabolism of phenylalanine and tyrosine and give their metabolic disorders
	Explain Catabolism of heme.

Discuss hyperbilirubinemia and different types of jaundice	
Topic Title	Nucleic acid metabolism and genetic information transfer
Pathway for Biosynthesis of purine / pyrimidine nucleotides	
Catabolism of purine nucleotides and Hyperuricemia and Gout disease	
Structure of DNA and their functions. Structure of RNA and their functions	
Write a note on genetic codon.	
Explain DNA replication	
Explain transcription	
Explain translation	
Topic Title	
