

SYLLABUS FOR B.Sc. BIOTECHNOLOGY (GENERAL) DEGREE PROGRAM UNDER CBCS w.e.f 2017-18 OF

SEM I & II

Course Structure for B.Sc. Biotechnology Program

SEMESTER I (F.Y.B.Sc)				
PAPER CODE	TITLE		CREDITS	TOTAL CREDITS
BT DSC I	Biochemistry & Metabolism	Theory	04	06
		Practical	02	
SEMESTER II				
BT DSC IV	General Microbiology	Theory	04	06
		Practical	02	
SEMESTER III (S.Y.B.Sc)				
PAPER CODE	TITLE		CREDITS	TOTAL CREDITS
BT DSC IX	Bio Analytical tools	Theory	04	06
		Practical	02	
SEMESTER IV				
BT DSC X	Molecular Biology	Theory	04	06
		Practical	02	
SEMESTER V (T.Y.B.Sc)				
PAPER CODE	TITLE		CREDITS	TOTAL CREDITS
BT DSC XIII	Recombinant DNA Technology	Theory	04	06
		Practical	02	
		Practical	02	
BT SEC III	Enzymology	Theory	03	04
		Practical	01	
SEMESTER VI				
BT DSC XIV	Genomics and Proteomics	Theory	04	06
		Practical	02	
BT SEC IV	Industrial Fermentation	Theory	03	04
		Practical	01	

BT DSC I - BIOCHEMISTRY & METABOLISM

UNIT I: Introduction to Biochemistry: (10 Lectures)

A historical prospective.

Amino acids & Proteins: Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Level of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins.

Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoprotein's and their biological functions.

UNIT II (10 Lectures)

Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol.

Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines & pyrimidines,. Biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and renaturation of DNA

UNIT III (20 Lectures)

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity: types & theories, Biocatalysts from extreme thermophilic and hyperthermophilic archaea and bacteria. Role of: NAD⁺, NADP⁺, FMN/FAD, coenzymes A, Thiamine pyrophosphate, Pyridoxal phosphate, lipoic-acid, Biotin vitamin B12, Tetrahydrofolate and metallic ions

UNIT IV (20 Lectures)

Carbohydrates Metabolism: Reactions, energetics and regulation. Glycolysis: Fate of pyruvate under aerobic and anaerobic conditions. Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogen synthesis. TCA cycle, Electron Transport Chain, Oxidative phosphorylation. β -oxidation of fatty acids.

PRACTICALS

1. To study activity of any enzyme under optimum conditions.
2. To study the effect of pH, temperature on the activity of salivary amylase enzyme.
3. Determination of - pH optima, temperature optima, Km value, Vmax value, Effect of inhibitor (Inorganic phosphate) on the enzyme activity.
4. Estimation of blood glucose by glucose oxidase method.
5. Principles of Colorimetry: **(i)** Verification of Beer's law, estimation of protein.
(ii) To study relation between absorbance and % transmission.
6. Preparation of buffers.
7. Separation of Amino acids by paper chromatography.
8. Qualitative tests for Carbohydrates, lipids and proteins

BT DSC IV - GENERAL MICROBIOLOGY

UNIT I (10 Lectures)

Fundamentals, History and Evolution of Microbiology.

Classification of microorganisms: Microbial taxonomy, criteria used including molecular approaches, Microbial phylogeny and current classification of bacteria.

Microbial Diversity: Distribution and characterization Prokaryotic and Eukaryotic cells, Morphology and cell structure of major groups of microorganisms eg. Bacteria, Algae, Fungi, Protozoa and Unique features of viruses.

UNIT II (10 Lectures)

Cultivation and Maintenance of microorganisms: Nutritional categories of micro-organisms, methods of isolation, Purification and preservation.

UNIT III (20 Lectures)

Microbial growth: Growth curve, Generation time, synchronous batch and continuous culture, measurement of growth and factors affecting growth of bacteria.

Microbial Metabolism: Metabolic pathways, amphi-catabolic and biosynthetic pathways

Bacterial Reproduction: Transformation, Transduction and Conjugation. Endospores and sporulation in bacteria.

UNIT IV (20 Lectures)

Control of Microorganisms: By physical, chemical and chemotherapeutic Agents

Water Microbiology: Bacterial pollutants of water, coliforms and non coliforms. Sewage composition and its disposal.

Food Microbiology: Important microorganism in food Microbiology: Moulds, Yeasts, bacteria.

Major food born infections and intoxications, Preservation of various types of foods. Fermented Foods.

PRACTICALS

1. Isolation of bacteria & their biochemical characterization.
2. Staining methods: simple staining, Gram staining, spore staining, negative staining, hanging drop.
3. Preparation of media & sterilization methods, Methods of Isolation of bacteria from different sources.
4. Determination of bacterial cell size by micrometry.
5. Enumeration of microorganism - total & viable count.