SYLLABUS OF BIOCHEMISTRY

UGBCH -01
INTRODUCTION TO BIOCHEMISTRY

Block-I

Unit-01 History and Scope of Biochemistry

Block-II

Unit-01 Amino Acids: Structure and functions

Uit-02 Proteins: Basic molecules of life, nature peptide conformation structure, classification and

Block III

Unit-01 Carbohydrates: General Structure, Structural details of glucose, Starch and classification and function, Glycogen

Unit-02 Lipids: Classification, role of fatty saturated and unsaturated fatty acids in lipid biosynthesis.

Block IV

Unit-01 Nucleic Mudeic acids: Purines, Pyrimidines, Nucleorides types and functions of RNA & DNA

Unit-02 Vitamins: Types and functions.

UGBCH -02
INTERMEDIARY METABOLISM

Block-I

Unit-01 Bioehergetics: Introduction and its role
Unit-02 Metabolism of carbohydrates: Glyorysis, Kreb's cyde, electron transport system in mitochondria, Oxidative phosphorylation and mechanism of ATP synthesis

Block –II

Unit-01 Photosynthesis: Pigments of Photosynthesis, Oxygenic and an Oxygenic Photosynthesis, Photo system I and photo system II, Cyclic and non-cyslic photo phosphorylation, calvin clycle.

Block-III

Unit-01 Protein Biosynthesis: transcription, role of ribosome's in protein sgnthesis, translation, genetic code, protein processing, difference in protein synthesizing machinery in prokaryotes and eukaryotes.

Block-IV

Unit-01 Metabolism of lipids; catabolism of triglycerides, biosynthesis of chotesterol, B-Oxidation of fatty acids.

UGBCH -03

BIO ANALYTICAL TECHNIQUES

Block-I

Chromatography

Unit-01 Principals of partition chromatography; exchange, gel filtration chromatography, chromatography (HPCL) oaper, thin layer. Ion High pressure liquid.

Block II

Spectroscopy

Unit-01 Concepts of Spectroscopy , Beer-Lambert's law, Visible and UV Spectroscopy, Applications of colorimetry.

Block-III

Electrophoresis

Unit-01 Principles of Electrophoresis, Separation of proteins by PAGE and SDS-PAGE, Agarose gel Electrophoresis of separation of nucleic acids.

Block-IV

Centrifugation

Unit-01 Principles of Centrifugation, Differential Centrifugation, Applications of Centrifugation and Density Gradient.

UGBCH -04

NUTRITIONAL BIOCHEMISTRY

Block-I

Elements of Nutrition

Unit-01 Dietary requirements of carbohydrates, lipids and proteins. Essential amino acids, essential fatty acids and their physiological functions. Malnutrition.

Block-II

Basal Metabolic Rate (BMR)

Unit-01 Concept of BMR, Factors affecting BMR, Measurement of fuel value of foods.

Block-III

Minerals

Unit-01 Nutrition importance of dietary calcium, phosphorus, magnesium, iron, iodine, zinc and copper.

Block-IV

Vitamins

Unit-01 Biochemical functions, requirements and deficiency diseases associated with vitamin B Complex, C and A,D,E, and K Vitamins.

UGBCH -06

IMMUNOLOGY

Block-I- Introduction to immune system

Unit-01 Innate and acquired immunity

Block-II-Nature of Antigen and Antibody

Unit-01 Criteria of Antigen city, Hap tens; Classification, types and functions of antibodies, antigenic determinants of immunoglobulins

Block III-Diversity in Immune System

Unit-01 Clonal Selection theory, concept of antigen specific receptor, generation of antibody diversity, T-Cell receptor diversity.

Block-IV-Measurement of antigen-antibody Interactions

Unit-01 Agglutination, Precipitations, opsonizatcon, gel diffusion (Ouchterlony double immune diffusion), Enzyme linked immunosorbent assay

Block-V-Disorderds of Immune Responses

Unit-01 Autoimmunity and Acquired immunodeficiency, immune tolerance and hypersensitivity

UGBCH -07

ENZYMOLOGY

Block-I-Classification and Kinetics of Enzymes

Unit-01 Enzymes classification, Concept of ES Complex, Michaelis- Menten equation, Different plots for the determination of Km, Vmax and their physiological significances.

Block-II-Enzyme Inhibition

Unit-01 Reversible and irreversible inhibition, competitive, non-competitive and un-competitive inhibition.

Block-III-Mechanism of Enzyme Action

Unit-01 Acid-base catalysis, chemical modification of active site group; mechanism of action of chymotrypsim and lysozyme

Block-IV-Enzame Regulation

Unit-01 General Mechanisms of enzyme regulation, feed back inhibition, Allosteric enzymes, positive and negative cooperatively with special reference to aspartate transcarbamoylase and phosphofructo kinase.

Block-V-Multienzyme System

Unit-01 Enzyme- enzyme, mechanism of action and regulation of pyruvate dehydrogenase, isoenzymes.

UGBCH -08

PLANT BIOCHEMISTRY

Block-I-Electron Transport System in Plants

Unit-01Oxidative phosphorylation, mitochondrial respiratory complexes, orgamisation of electron carriers, mechanism of ATP Synthesis .

Block II-Nitrogen Metabolism

Unit-01 Assimilation of nitrate, enzyme of nitrate reduction and their regulation, incorporation and assimilation of ammonia into organic compounds.

Block III-Photosynthesis

Unit-01 Photosynthetic apparatus and pigments involved in photosynthesis, photosystems, Hill reaction, generation of NADPH and ATP, light harvesting complexes, path of carbon in photosynthesis, C3 and C4 pathway of carbon reduction, photorespiration

Block IV-Secondary Plant Metabolism

Unit -01 Classification and biosynthesis of Terpenes, Lignins, Waxes and Alkaloids

Block- V-Stress Metabolism in Plants

Unit-01 A biotic and biotic Stress; Salinity, Water Stress, Chilling, Heat, Pathogenesis, Heavy metals and their impact on plant growth and metabolism

UGBCH-09

Statistical Methods

BLOCK – I . Data Collection and Its Representation

Unit-I- Data Collection and Tabulation :

Meanings, Definitions and Applications of Statistics, Measurements and Scale, Measurements of qualitative data, Methods of data collection, Types of data.

Unit-II- Representation of Data- I (Diagrammatical representation):

Frequency distribution, Tabulation of data, Diagrammatical Representation of data, Bar diagram, Multiple bar diagram, Divided bar diagram, Percentage bar diagram, Pie chart, Pictogram, leaf chart,

Unit-II- Representation of Data- I (Graphical representation):

Graphical representation of frequency distribution, Histogram, Frequency polygon, Frequency curve, Ogive.

BLOCK – II . Measures of Central Tendency and Dispersion

Unit-I- Measures of Central Tendency :

Types of measures of central tendency, Arithmetic mean, Fundamental Theorems on

Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Percentiles, Deciles, and Quartiles.

Unit-II- Measures of Dispersion :

Types of measures of Dispersion, Range, Mean Deviation, Variance and Standard deviation, Effect of change of origin and scale, Relationship between measures of central tendency and measures of dispersion, Coefficient of variation.

BLOCK – II . Moments, Skewness and Kurtosis

Unit-I- Moments, Raw Moments and Central Moments :

Definition of moments, raw moments for ungrouped data, raw moments for grouped data, Central moments, Factorial moments, Interrelationship between various moments, effect of change of origin and scale on moments, Charlier's checks, Sheppard"s correction for moments.

Unit-II- Skewness and Kurtosis :

Definition of skewness, Measures of skewness, Pearson's coefficient, Bowley's coefficients, Kurtosis, Measures of Kurtosis, effect of change of origin and scale.

UGBCH-11

Spectroscopy

Block-I Basic Concept and Rotational Spectra

Unit-01 Spectra of Atoms

Unit-02 Symmetry of Molecules

Unit-03 Rotational Spectra

Block-II IR and Raman Spectra

Unit-04 Vibratinal Spectra of Diatomic Molecules

Unit-05 Infrared Spectra of Polyatomic Molecules

Unit-06 Raman Spectroscopy

Block-III Electronic Spectra and Instrumentation

Unit-07 Electronic Spectra-I born- Oppenheimer Appoximation, Electronic States of Diatomic Molecules, Franck- Condor, Principal, Electronic Spectra, Polyatomic Molecules, Carbonyl Chromophore

Unit-08 Electronic Spectra-II Models for Metal, ligand and Interactions, Crystal field theory, Deexcitation Processes in electronic Spectroscopy

Unit-09 Optical Spectroscopy: Instrumentation and Sampling

Block-IV Resonance Spectroscopy and Mass Spectrometry

Unit-10 Nuclear Magnetic Resonance Spectroscopy

U nit-11 Electron Spin Resonance Spectroscopy

Unit-12 Mass Spectrometry

Unit-13 Exercises in Problem Solving using IR, UV, NMR and Mass Spectral Techniques

UGBCH-(L)-1

Practical's based on UGBCH-01 &02

UGBCH-(L)-2

Practical's based on UGBCH-05 &06

UGBCH-(L)-3

Practical's based on UGBCH-07 &08