

List of Practicals

Semester I:

1. Qualitative identification of carbohydrates and proteins.
2. Normal and abnormal constituents of urine.
3. Free & total acidity in gastric juice
4. Quantitative estimation of proteins by different methods.
5. Quantitative estimation of carbohydrates.
6. Estimation of Amino Acids by Sorenson formol titration.
7. Separation of amino acids, sugars and phospholipids by chromatography.
8. Isolation of casein from milk, lecithin from egg yolk and glycogen from liver.
9. Isolation of cell organelles.

M.Sc. Biochemistry

M.Sc. Semester II (2016-18)

Paper-1. Physiology

Unit I

Composition and function of blood, plasma and blood corpuscles, functions of plasma proteins, structure and function of haemoglobin, abnormal haemoglobins, Blood coagulation - mechanism and regulation. Blood groups.

Unit II

Structure of nephron, composition and mechanism of urine formation, glomerular filtration, tubular reabsorption of glucose, water and electrolytes, tubular secretion. Regulation of water and electrolyte balance, role of kidneys and hormones in their maintenance.

Unit III

Hydrogen ion homeostasis, acid-base balance, metabolic and respiratory acidosis and alkalosis.

Respiratory unit, exchange and transport of respiratory gases in the body, role of 2,3 DPG, Bohr effect and chloride shift.

Unit IV

Classification of muscles, Structure of skeletal, smooth and cardiac muscles. Actin, myosin, tropomyosin, troponin, Z disc and H line components. The sliding filament mechanism and subcellular ion movements during the contraction cycle in skeletal muscles.

Unit V

Structure of neuron, nerve impulse, origin and transmission, neuromuscular junction, mechanism of nerve conduction. Reflex action and reflex arc.

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Paper-2. Microbial Biochemistry

Unit I

Cellular organisation of bacteria with special reference to molecular organisation of cell wall, flagella and pilli.

Identification and classification of bacteria.

Unit II

Handling and sterility maintenance in microbiological work, Methods of isolation and pure culture techniques, culture media.

Microbial nutrition, bacterial growth and its kinetics.

Unit III

Energy metabolism in bacteria- fermentation, aerobic and anaerobic respiration and bacterial photosynthesis, application of microbes in food industry, dairy products and food preservation.

Unit IV

Fermentation technology- Primary and secondary metabolites, continuous and batch type culture techniques, Types and design of fermentors, fermentation processes - brewing, manufacture of penicillin, production of other antibiotics and organic compounds, single cell proteins.

Microbial assay of vitamins and amino acids.

Unit V

Viruses- Structure, proteins, classification and methods of assay. Replication of RNA and DNA viruses. Virus-host interaction, Vaccines and prevention.

Paper 3. Nutritional Biochemistry

Unit I

Direct and indirect calorimetry, energy value of the foods, thermal equivalent of oxygen, respiratory quotient, calorogenic action of the foods, basal metabolic rate- definition and its measurement, factors affecting BMR, energy requirements of the human beings.

Unit II

Nutritional aspects of the carbohydrates- Different dietary types, available and unavailable carbohydrates, requirements, utilization and functions. Special role of the non-starch polysaccharides.

Nutritional aspects of the lipids- Different dietary types, requirements, utilization and functions. Essential fatty acids.

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Unit III

Nutritional aspects of the proteins- Quality of proteins, digestibility coefficient, net protein utilization, biological value and amino acid score, protein requirements and functions.

Unit IV

Nutritional aspects of the vitamins and minerals.

Unit V

Balanced diet- Recommended dietary allowances for different categories of human beings.
Food processing and loss of nutrients during processing and cooking. Naturally occurring anti-nutrients.
Disorders related to the nutrition - Protein energy malnutrition, Starvation, Obesity.

Paper 4. Genetics

Unit I

Mendelian Inheritance: Segregation and Independent Assortment, Extension of Mendelism: Incomplete dominance, Codominance, Multiple Allelism, Testing for Allelism, Gene Interaction, Epistasis, Pleiotropy
Linkage, recombination and crossing over

Unit II

Genetic mapping by recombination frequency in diploids: Two factor and three factor genetic crosses, Interference, Mapping functions,
Linkage detection in fungi by tetrad analysis,

Unit III

Linkage in humans: Somatic cell hybridisation,
Definitions of the gene, complementation test and its limitations, complementation mapping,
Viral genetics Recombination in bacteriophages, Genetic fine structure.

Unit IV

Genetic analysis in microbes: DNA transfer, transformation, transduction and conjugation and their mechanisms, mapping by recombination, genetic map of E. coli.

Unit V

Gene mutation: Molecular basis of mutation, Types of mutation, e.g. transition, transversion, frame shift, insertion, deletion, suppressor sensitive, true reversion and suppression, dominant and recessive, spontaneous and induced mutations, Mutagenicity testing. Chemical and physical mutagens and their actions DNA repair mechanisms, Transposable elements.

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List of Practicals Semester II:

1. Estimation of reducing sugars by Nelson Somogyi Method.
2. Estimation of maltose by DNS Method.
3. Estimation of creatinine, chloride and inorganic phosphate in urine sample.
4. Estimation of ascorbic acid and riboflavin.
5. Estimation of methionine, tyrosine and tryptophan.
6. RBC and WBC Count, Hb estimation and blood group determination.
7. Cultivation, isolation and staining of microorganisms.
8. Determination of iodine value and saponification number of fats.

M.Sc. Semester III (2016-18)

Paper 1. Enzymology

Unit I

Isolation and purification, Classification and nomenclature of enzymes.

Enzyme catalysis: enzyme specificity and the concept of active site, determination of active site. Stereospecificity of enzymes.

Unit II

Enzyme kinetics: Factors affecting rates of enzyme catalyzed reactions, unisubstrate reactions, concept of Michaelis - Menten, Briggs - Haldane relationship, Determination and significance of kinetic constants, catalytic rate constant and specificity constant, Limitations of Michaelis-Menten Kinetics.

Unit III

Classification and kinetics of multisubstrate reactions.

Reversible and irreversible inhibition, competitive, non competitive and uncompetitive inhibitions.

Unit IV

Mechanism of catalysis: Proximity and orientation effects, general acid-base catalysis, concerted acid - base catalysis, nucleophilic and electrophilic attacks, catalysis by distortion, metal ion catalysis. Theories on mechanism of catalysis.

Mechanism of enzymes action: mechanism of action of lysozyme, chymotrypsin, carboxypeptidase. Multienzyme system, Mechanism of action, regulation and coenzymes of pyruvate dehydrogenase and fatty acid synthetase complexes.

Unit V

Enzyme regulation: General mechanisms of enzyme regulation, Allosteric enzymes, sigmoidal kinetics and their physiological significance, Symmetric and sequential modes for action of allosteric enzymes. Reversible and irreversible covalent modifications of enzymes. Immobilised enzymes and their industrial applications.

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