

MASTER IN BIOCHEMISTRY (M.Sc.-PGBCH)

PGBCH-01 (Cell Biology and Biomolecules)

- 1 **Cell Biology:** Biochemical organization, general structure of prokaryotic and eukaryotic cell, structure of cell wall and cell membrane, nucleus, endoplasmic reticulum, mitochondria, chloroplast, golgi apparatus, ribosomes, lysosomes, cytoskeleton.
- 2 **Biomolecules:** Carbohydrates- Classification, structure and properties of monosaccharides, disaccharides and polysaccharides. Proteins- Primary, secondary tertiary and Quaternary structures, structure of hemoglobin. lipids- Types, structure and function of lipids. Enzymes- General properties, classification, enzyme catalysed reactions and kinetics. Nucleic acids structure and function of nucleotides, structures of RNA and DNA, denaturation of DNA.

PGBCH-02 (Analytical Biochemistry)

- 1 **Spectroscopy-** Visible and UV Spectroscopy and its applications.
- 2 **Chromatography-** Principle, thin layer, ion exchange and gel filtration chromatography. HPLC, FPLC
- 3 **Centrifugation-** Principles of centrifugation, types of centrifuge, differential centrifugation, density gradient, ultracentrifugation.
- 4 **Electrophoretic techniques-** general principles, electrophoresis of proteins, PAGE and SDS-PAGE, Agarose gel electrophoresis for DNA, Isoelectric-focusing
- 5 **Microscopy-** basic principles, light and electron microscopy

PGBCH-03 (Practical)

- 1 Estimation of carbohydrates using colorimetric methods.
- 2 Determination of protein using biuret reagent
- 3 Estimation of RNA using orcinol reagent
- 4 Assay of urease activity in seeds of *Cajanus cajan*.

PGBCH-04(Nutrition and Physiology)

1. **Basic Concepts** - Function of nutrients. Measurement of caloric value of food. Basal metabolic rate (BMR); factors affecting BMR. Recommended dietary allowances.
2. **Elements of Nutrition** - Dietary requirement of carbohydrates, lipids and proteins. Concepts of protein quality. Essential amino acids, essential fatty acids and their physiological function.
3. **Vitamins and Minerals** - Dietary sources, biochemical functions, requirements and deficiency diseases associated with vitamin B complex.
4. **Introduction to Physiology.** Blood - Composition and functions of plasma, erythrocytes, Leucocytes and thrombocytes. Blood coagulation.
5. **Digestive system** - Compositions, functions and regulation of saliva, gastric, pancreatic, intestinal and bile secretions.
6. **Respiration** – Air passages and lung structure, work of breathing and its regulation.

PGBCH-05(Bioenergetics and Metabolism)

1. **Bioenergetics** - General concepts. Biological oxidation-reduction reactions, redox potentials. High energy phosphate compounds-ATP, Phosphate group transfer.
2. **Coenzymes and Cofactors** - Types and function of NAD⁺, FAD, Pyridoxal phosphate and B₁₂ coenzymes.
3. **Carbohydrate Metabolism** – Glycolysis, fermentation, TCA cycle, electron transport chain, oxidative phosphorylation, gluconeogenesis. Energetics and regulation of metabolic cycles.
4. **Amino acids** - Types and classification. General reactions of amino acids metabolism, transamination, decarboxylation, deamination. Special metabolism of methionine, tryptophan and leucine.
5. **Urea cycle** – Metabolism and regulation.

PGBCH-06 (Practical's based on PGBCH-04 and PGBCH-05)

1. Tests for amino acids.
2. Separation and identification for amino acids by paper chromatography.
3. Ascorbic acid (Vitamin C) measurement by titrimetric method using dye DCPIP.
4. Microscopic study of blood cells.
5. Urea estimation of biological samples by colorimetric method.

PCBCH- 07(Microbiology and Immunology)

1. Prokaryotic and Eukaryotic cells
2. Modern approaches to bacterial taxonomy
3. Methods in microbiology, Microbial growth
4. Metabolic diversity among micro organisms
5. Host-parasite relationship, Microbial diseases with reference to tuberculosis, cholera, AIDS, Rabies, Food born diseases, Bacterial transduction, conjugation and recombination
6. Antibiotics- mode of action, mechanism of drug resistance.

PCBCH-08(Enzymology and Enzyme Technology)

1. Nomenclature and classification of enzyme
2. General Properties of enzymes- active sites, cofactors and specificity, Enzyme Kinetics, Mechanism of Enzyme, action and regulation
3. Isozymes, Multi-enzymes with principles and applications of the involved techniques,
4. Enzyme immobilization- methods, Applications, advantages and disadvantages.

PCBCH- 09

Practical based on PCBCH-07 and PCBCH-08

PCBCH- 10 (Basic Biotechnology)

1. Role of Biotechnology in medicine, Industry,
2. Agriculture and Environment, Production of bread, Beer, Cheese and antibiotics, Enzyme Biotechnology.
3. Cell Culture- Methods and applications,
4. Bio-transformations,
5. Immunochemical Applications, Microbial Polysaccharides and single cell oils, Upstream and downstream processing.
6. Microbial Biotechnology, Principles and Applications of Bio techniques, Food Biotechnology

PCBCH-11(Industrial Biochemistry)

1. Classification, Structure and properties of amino acids,
2. Structure and function of proteins, DNA- Protein and Protein- Protein interaction, protein folding and related diseases, protein, Sequencing, proteomics. Nucleic Acids,
3. Waston-Crick model of DNA, Structural Polymorphism of DNA and RNA, Biosynthesis of purines and pyrimidines, DNA- drug interaction. Carbohydrates- Classification and structure, their synthesis and breakdown.
4. Classification, structure and functions of lipids, oxidation of lipids, biosynthesis of fatty acids. Metabolomics.

PCBCH- 12

Practical based on PCBCH-10 and PCBCH-11

Books Recommended:

1. **Principles of Biochemistry:** Lehninger, Nelson and Cox. Student Edition, CBS 1439 Publishers and Distributors, Delhi.
2. **Textbook of Biochemistry and Human Biology:** Talwar and Srivastava. Eastern Economy Edition, Prentice Hall, India.
3. **An Introduction to Practical Biochemistry:** DT Plummer, Tata McGraw-Hill Publishing Co.Ltd. New Delhi.