

Syllabus for M.Sc. Medical Biochemistry

Paper - I (General Biochemistry & Instrumentation)

- 1) History & scope of Biochemistry.
- 2) Cell structure & Biochemical function. Membrane structure & functions.
- 3) Transport through biological cell membrane.
- 4) Chemistry & biological importance carbohydrates, proteins & amino acids, lipids, nucleic acids, porphyrins glycosaminoglycans, glycoprotein's.
- 5) Chemistry of blood & hemoglobin, plasma proteins, Blood coagulation.
- 6) Enzymes & coenzymes - chemistry, nomenclature properties & mode of action of enzymes, Enzymes kinetics, factors affecting enzyme activity, enzyme inhibitions, applications of enzymes & isoenzymes.
- 7) Bioenergetics & biological oxidation - General concept of oxidation & reduction. Electron transport Chain (ETC) - functioning of ETC & inhibitors of ETC, Oxidative phosphorylation, Uncouplers and theories of Biological oxidation & oxidative phosphorylation.
- 8) Principle, working & applications of, a) Colorimetry b) Spectrophotometry c) Flame photometry d) Flurometry e) Atomic absorption spectroscopy g) Ultra centrifugation.
- 9) Principle, types & applications of , a) Electrophoresis b) Chromatography
- 10) Auto analyzers, Blood gas analyzers.
- 11) Automation in clinical; chemistry.
- 12) pH, electrodes & methods of pH determination.
- 13) Basics of mass spectroscopy, Nuclear Magnetic Resonance, chemiluminescence and Electron - microscopy.
- 14) Environmental Biochemistry - Definition, importance of pollution free & eco friendly environment, exposure to cold stress, exposure to heat, air pollution water pollution & food pollution.
- 15) Immunochemistry - The Immune system, Immunoglobins, antigen - antibody mediated immunity, mononuclear phagocytes - macrophages, elements of clinical immunity.

Paper - II (Metabolism and Nutrition)

- 1) Digestion & absorption from gastrointestinal tract.
- 2) Intermediary metabolism, metabolism of Carbohydrates, Lipids, Proteins, and Amino acids, Nucleic acids, Hemoglobin, metabolic control, energy production & regulation.
- 3) Metabolic interrelationships & regulatory mechanism.
- 4) Metabolic changes during starvation.
- 5) Energy metabolism - Calorimetry, BMR - its determination & factors affecting it, SDA of food.
- 6) Macro & micro - elements & their role in health & disease, water metabolism & its regulation.
- 7) Vitamins - chemistry, biological importance, deficiency manifestations & recommended daily allowance
- 8) Principles of Nutrition - Balanced diet & its planning, Nutritive importance of various food sources, Calorific value of food, toxins & additives, Obesity, Protein Energy Malnutrition (PEM) - Kwashiorkor & Marasmus.
- 9) Diet in management of chronic disease viz, Diabetes mellitus, Coronary artery disease, Renal disorders, Cancer, Hypertension, Anemia, Rickets & Osteomalacia.
- 10) Diet for overweight person, pregnant woman and during lactation.

Paper - III (Clinical Biochemistry)

- 1) Chemistry, composition & functions of lymph, CSF, ascetic fluid, pleural fluid, & synovial fluid.
- 2) Urine formation, excretion & urine analysis.
- 3) Composition, chemistry & functions of specialized tissues like muscle, bone, nerve, connective tissue & brain adipose tissue.
- 4) Chemistry of respiration & acid base balance & imbalance.
- 5) Hormones:- Communication among cells & tissues. Hormone - General mechanism of action of hormones, & thyroid hormones. Chemistry & functions of hormones of pancreas, and parathyroid. Local hormones. Clinical disorders of hormones, Hormones receptors.
- 6) Biochemistry of Diabetes mellitus, Atherosclerosis, Fatty liver, and obesity.
- 7) Organ function tests.
 - a) Liver function tests.
 - b) Kidney function tests.
 - c) Thyroid function tests.
 - d) Adrenal function tests.
 - e) Pancreatic function tests.
 - f) Gastric function tests.
- 8) Radioisotopes & there clinical applications.
- 9) Biochemistry of aging.
- 10) Neurochemistry in Health & Disease.
- 11) Biochemical changes in pregnancy & lactation.
- 12) Water & electrolytes balance & imbalance.
- 13) Total Quality Management of Laboratories.
- 14) Basics of Medical statistics.
- 15) Inborn errors of metabolism.
- 16) Biotransformation of Xenobiotics.
- 17) Basic concepts of Biochemical Defense Mechanism.

Paper - IV

(Molecular Biology, Biotechnology & Recent Advances in Clinical Biochemistry)

- 1) Central dogma, genetic code, protein biosynthesis & its regulation.
- 2) DNA:- Structure, functions, replications, Mutation & repair of DNA, Sequencing of nucleotides in DNA, Mitochondrial DNA, and DNA recombination.
- 3) RNA:- Composition, types, structure & functions.
- 4) Role of Nucleic acids in diagnosis of Molecular diseases & infectious diseases.
- 5) Mitochondrial DNA & diseases.
- 6) Human Genome project.
- 7) Genes & chromosomes, Gene mapping, Chromosome walking etc.
- 8) Gene expression & gene amplification & gene regulation, Oncogenes, & biochemistry of cancer.
- 9) Genetic engineering:- Recombinant DNA technology & its applications. Restriction endonucleases, Plasmids, Cosmids, Gene cloning, Gene libraries.
- 10) Basics techniques in genetic engineering.
 - a) Isolation & purification of DNA, Methods of DNA assay.
 - b) Blotting techniques - Southern, Northern & Western blotting.
 - c) Polymerase chain reaction & its applications.
 - d) Ligase chain reaction & its applications.
- 11) Tumor markers & growth factors.
- 12) Biotechnology: Gene therapy, Nucleic acid hybridization, and DNA probes, Microarray of gene probes.
- 13) Genomics and proteomics.
- 14) Medical Bioinformatics
- 15) Lipid per oxidation, free radicals & antioxidants, Nitric oxide formation & its metabolism & its role in Medicine.
- 16) Biochemistry of AIDS.
- 17) Genetic control of Immunity.
- 18) Research Methodology & Medical ethics.

Syllabus for Practical's

- 1) All undergraduate practical's and routine emergency and special investigations carried out in central clinical laboratory of the hospital, which are useful for diagnosis and prognosis of the disease.
- 2) Total Quality Management of Laboratory.
 - a) Specimen collection, handling & storage of sample.
 - b) Methods of standardization & calibration.
 - c) Methods of quality control & assessment.
- 3) Fractionation & Identification of,
 - a) Amino acids b) Sugar c) Proteins d) Lipoproteins by -
 - i) Thin Layer Chromatography
 - ii) Paper chromatography (circular, Unidimensional & two dimensional
 - iii) Gel electrophoresis - agarose, starch & Polyacrylamide Gel Electrophoresis
 - iv) Paper electrophoresis & cellulose acetate paper electrophoresis.
- 4) a) Estimation of total activity of following enzymes.
 - i) LDH & separation of its isoenzymes by polyacrylamide gel electrophoresis, Cellulose acetate electrophoresis & quantitation by densitometry.
 - ii) AST (GOT)
 - iii) ALT (GPT)
 - iv) Alkaline phosphatase
 - v) Acid phosphatase
 - vi) Amylase
 - vii) Creatine kinase its Isoenzymes
 - b) Enzyme kinetic and Determination of K_m value and effect of pH, substrate concentration & temperature on Enzyme activity.
 - c) Endocrinology: Estimation of Hormones.
- 5) Isolation of DNA and PCR technique.

- 6) Estimation of serum lipid profile.
 - i) Serum total cholesterol.
 - ii) Serum HDL cholesterol.
 - iii) Serum VLDL & LDL
 - iv) Serum Triglycerides.
 - v) Serum Phospholipids.
- 7) Estimation of Fe & Total Iron Binding capacity & ferritin.
- 8) Estimation of Glycosylated Hb.
- 9) Body fluid analysis - Urine
 - CSF
 - Ascitic fluid
 - Pleural fluid
- 10) Estimation of VMA.
- 11) Estimation of Na, K & Lithium by Flame photometer.

Dissertation:

The dissertation is compulsory for candidates registered for P.G. degree & should include candidate's own work under a supervisor, qualified for the purpose & recognized as a P.G. teacher by the University. The subject of dissertation along with synopsis (about 200 words) signed by P.G. teacher, H.O.D. & Head of the Institution will be submitted to the University. Ethics Committee of the Institution must approve the topic of dissertation.

Completed dissertation will be submitted to the University in the 5th term, that is, 6 month before the date of final examination.

M. Sc (Medical Biochemistry)

Recommended Books (Latest Editions)

Sr. No	Name of textbook	Author	Publishers
1	Harpers review of Biochemistry	Murray. K.	Appleton & Lange
2	Lehningers principles of Biochemistry	David L. Nelson	CBS
3	Biochemistry	Luberty Stryer	WH Freeman
4	Text book of Biochemistry with clinical correlations	Devlin TM	Wiley Liss
5	Biochemistry	Voet D & Voet J	John Wiley & Sons
6	Biochemistry A Functional approach	McGilvery RW	WB Saunders
7	Medical Biochemistry	N V Bhagwan	Jones & Bartlett
8	Biochemistry Acase oriented Approach	Montgomery	C V Mosby
9	Duncan's Disease of Metabolism	Bondy	Academic press
10	Molecular cell Biology	Harvey Lodish	W.H. Freeman & Company
11	Clinical Biochemistry	Latner	W B Saunders
12	Practical Clinical Biochemistry	Varley	Heinemann Medical books
13	Teitz Text book of Clinical Biochemistry	Burtis	W B Saunders
14	Clinical Chemistry, Theory, Analysis & Correlation	Kaplan	Academic press
15	Clinical Chemistry	Marshall	Churchill Livingstone
16	Molecular Biology of THE CELL.	Bruce Albert	Garland science, New York
17	Text book of Biochemistry	West & Todd	Oxford & IBH
18	Metabolic basis of inherited disease..	Stab Bury	Churchill Livingstone
19	Biochemistry	APPS	W B Saunders
20	Principles of Biochemistry	Abrham White	Mac Graw Hill Inc.
21	Clinical Biochemistry	Henry	Churchill Livingstone
22	Krauses Food, Nutrition & Diet Therapy	L.Kathleen Mahan	W B Saunders
23	Clinical Physiology of acid - base and electrolyte disorders	Rose BD	Mac Graw Hill
24	Clinical Chemistry, Principles, Procedures & Correlations	M.L.Bishop	Lippincott
25	The principles & Practice of Diagnostic Enzymology	Henry Wilkinson	Arnold Publishers Ltd.
26	Text book of Immunology. An Introduction to immunochemistry immunobiology	James T. Barrett	C.V.Mosby Company

Recommended Journals

Sr. No	Name of the Journal
1	Annual Review of Biochemistry
2	Clinical Chemistry (J)
3	Trends in Biochemical Science
4	Clinical Chemistry Reviews
5	Medical Biochemistry (J)
6	Resent Advance in Endocrinology & Metabolism
7	Resent Advance in Clinical Chemistry
8	Essays in Biochemistry, Biochemical Society, UK.
9	Indian Journal of Clinical Biochemistry (J)
10	Indian Journal of Medical Research