

Ph.D. Medical Laboratory Technology
SEMESTER- I (Course Work)

S. No.	Component	Title of The Paper	Paper Code	Credits	Marks (Theory)		Total
					External Assessment	Internal Assessment	
1.	Paper - 1 (Core Course - I)	Research Methodology (Theory)		04	70	30	100
2.	Paper - 2 (Core Course - II)	Broad Field of Studies - Introduction to Medical Laboratory Sciences (Theory)		04	70	30	100
3.	Paper - 3 (Core Course - III)	Discipline Specific - Medical Biochemistry (Theory)		04	70	30	100
4.	Paper- 4	Publication and Ethics (Theory)		02	35	15	50
Total				14			350

Ph.D. (Medical Laboratory Technology)
SEMESTER-I (Course Work)
(Skill Paper - 1) Research methodology (Theory)
Credits – 4

Unit 1: Research Methodology- An Introduction, Research Design, Formulating the Research Topic/Question, Defining the Research Topic/Question, Approaches and Methodology for Research, Formulation of Hypothesis, Research Design, Hypothesis as a framework for scientific projects, Experimental design, taking measurements, Data Analysis, sampling, statistical tests with excel, handling data, hypothesis testing, Documentation and presentation of data, Analysis and interpretation of data, Elements / Types of Analysis. Writing of manuscript, Research Paper, Research Project, Thesis, Book chapter, Reviews.

Unit 2: Microscopy: Light Microscopy Techniques, Compound Microscopes, Dark Field, Phase contract and DIC Techniques, Fluorescence Microscopy: Techniques and Applications, Confocal microscopy, FACS Application and techniques. Electron Microscopes

Unit 3: Introduction to mass spectrometry: components of mass spectrometer, types of mass spectrometers and uses. Techniques used for purification and characterization of biomolecules: Centrifugation, Ultrafiltration, Chromatography, electrophoresis

Unit 4: Cell biology, General Approaches in cell cycle and cell death

Molecular biology, genetic engineering techniques

Introduction to metagenomics, Benefits of metagenomics in various fields.

Suggested Readings:

1. Research Methodology Methods & Techniques, C.R. Kothari – New Age international Publishers, Reprint 2008.
2. Katz, M. J. (2009). From research to manuscript: a guide to scientific writing. Springer Science & Business 3 Media
3. An Introduction to Microscopy, By Suzanne Bell, Keith Morris, CRC Press
4. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology.

Ph.D. (Medical Laboratory Technology)
SEMESTER-I (Course Work)
(Skill Paper - 2) Introduction to Medical Laboratory Sciences (Theory)
Credits – 4

Unit 1. General Microbiology:

History of Microbiology, Morphology and physiology of Bacteria, Classification and growth requirement of Bacteria, Sterilization, Disinfection procedures and Culture methods

Unit 2: General Biochemistry:

chemistry & classification of carbohydrates, proteins, amino acids, lipid, nucleic acids

Enzymes: Classification, factors that alter enzymes catalyzed reaction, Michaelis – Menton Equation
Competitive and noncompetitive inhibition of enzyme reactions, regulation enzyme activity, Isoenzymes – separation and identification, Plasma enzymes in clinical diagnosis.

Unit 3: General pathology:

Cell injury, Apoptosis and sub cellular responses to cell injury, Cell cycle and pathologic calcification, Inflammation, Hemodynamics, Neoplasia, Infectious diseases, examination of fluids.

Unit 4: Organisation & Laboratory Management:

Introduction, Objectives, Lab design, responsibilities, equipments & Instruments, Quality Control, Lab Safety. Good Laboratory Practices Responsibilities of a researcher, handling and storage of biological material, laboratory waste disposal. Management of personnel, facilities, buildings and equipment.

Suggested Readings:

1. Harper's Biochemistry. Ed. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell. Appleton and Lange, Stamford, Connecticut.
2. Principles of Biochemistry. Ed Lehninger, Nelson, and Cox. CBS publishers and distributors.
3. Prescott Microbiology
4. Biology of Microorganisms-Brock

Ph.D. (Medical Laboratory Technology)
SEMESTER-I (Course Work)
(Skill Paper - 3) Medical Biochemistry (Theory)
Credits – 4

Unit 1.

Disorders of Glucose Metabolism: Role of hormones in regulation of plasma glucose level, renal threshold value, Hyperglycemia and Diabetes mellitus: Diagnosis, prognosis and management, hypoglycemia. Glycogen storage diseases, Fructosuria, Lactose intolerance.

Disorders of lipid metabolism: Familial hypercholesterolemia, hypo and hyper

cholesterolemia, Fatty liver, Hyper and hypo lipoproteinemia, hypertriglyceridemia,

Atherosclerosis and Myocardial Infarction – Biochemical changes, Diagnosis, prognosis and management.

Unit 2.

Liver function tests: Based on abnormalities of bile pigment metabolism, changes in plasma proteins, excretion, detoxification. Role of serum enzymes in diagnosis of liver diseases.

Management of jaundice, hepatitis, cirrhosis, liver failure, hepatic coma and gall stones, and associated clinical disorders.

Unit 3.

Kidney function tests: Abnormal constituents of urine, biochemical findings, Glomerular and tubular function tests. Pathogenesis, Biochemical changes, diagnosis and prognosis:

Unit 4.

Tumor markers and molecular significances; Oncofetal protein, Oral carcinoma, mammary carcinoma, liver carcinoma, Kidney cancer, leukemia-Acute and Chronic Lymphoid Leukemia and Myeloid Leukemia

Suggested Readings:

1. Practical Clinical Biochemistry, Harold Varley, 2006. 4th and 6th editions, CBS publishers
2. Clinical Chemistry in diagnosis and treatment, Mayne, 1999, ELBS,
3. Clinical Biochemistry- Metabolic and clinical aspects, William J. Marshall, Marta Lapsley, Andrew P. Day, Ruth M. Ayling, 2014. Churchill Livingstone, Elsevier.
4. Clinical Chemistry in diagnosis and treatment, Mayne, 1999, ELBS
5. Clinical Biochemistry- Metabolic and clinical aspects, William J. Marshall, Marta Lapsley, Andrew P. Day, Ruth M. Ayling, 2014. Churchill Livingstone, Elsevier.

Ph.D. (Medical Laboratory Technology)
SEMESTER-I (Course Work)
(Skill Paper - 1) Ethics and Publication (Theory)
Credits – 2

Common for all Ph.D courses pan University