

## **Details of Syllabus –PhD MLT**

### **Sub: Pathology**

#### **THEME 1**

#### **GENERAL PATHOLOGY**

- Cell injury
- Apoptosis and sub cellular responses to cell injury
- Cell cycle and pathologic calcification
- Inflammation
- Hemodynamics
- Neoplasia
- Infectious diseases

#### **THEME 2**

#### **SYSTEMIC PATHOLOGY**

- Respiratory system
  - Pneumonia
  - Tuberculosis
- Kidney and lower urinary tract
  - Nephrotic syndrome
  - Nephritic syndrome
- Immunohistochemistry
  - Immunohistochemical tumour markers of various systems.

### **THEME 3**

#### **IMMUNOLOGY & IMMUNODIAGNOSTICS; GENETICS & MOLECULAR GENETICS**

- Immunopathology
- Hypersensitivity reactions
- Autoimmune diseases
- Genetics (molecular basis of human diseases)
- Biochemical and molecular basis of single gene disorders.
- Disorders with multifactorial inheritance, normal karyotype, fluorescence in situ hybridization, Cytogenetic disorders involving sex chromosomes.
- Diagnosis of genetic diseases. Direct gene diagnosis, indirect gene diagnosis, linkage analysis.

### **THEME 4**

#### **HEMATOPATHOLOGY**

- Hematopoiesis Red Blood Cells : Normal erythropoiesis, morphology Red cell disorders – inherited and acquired
- Anemia's – classification, pathophysiology and diagnosis
- Hemolytic disorders
- White Cells – Normal myelopoiesis,
- White cell disorders - inherited and acquired
- Malignant hematopoietic disorders – classification,

pathophysiology and diagnosis

- Platelet disorders – classification, diagnosis and pathophysiology
- Bone marrow examination
- Flow cytometry

## **THEME 5**

### **TRANSFUSION MEDICINE AND CHEMICAL PATHOLOGY**

- ABO and Rh blood group systems
- Other major blood group systems – clinical significance of Compatibility testing, Antibody screening and identification, clinical significance of Choice of reagents and Quality control of the same.
- Donor Screening
- Blood bags, Anticoagulant and preservative solutions
- Examination of fluids
- Renal function tests
- Disorders of Lipids
- Biochemical cardiac markers

### **Syllabus for PhD IN MLT- Unit/ Sub Biochemistry**

S. No	TOPIC
1.	<b>Structure of Cell and intracellular organelles</b>

	<ul style="list-style-type: none"> <li>• Carbohydrates,</li> <li>• lipids,</li> <li>• Proteins</li> <li>• and nucleic acids –</li> <li>• Membrane structure, glycoprotein's</li> </ul>
2.	<p>Enzymes:</p> <ul style="list-style-type: none"> <li>• Classification, factors that alter enzymes catalyzed reaction</li> <li>• Michaelis – Menton Equation</li> <li>• Competitive and noncompetitive inhibition of enzyme reactions</li> <li>• regulation enzyme activity,</li> <li>• Isoenzymes – separation and identification,</li> <li>• Plasma enzymes in clinical diagnosis. Coenzymes.</li> </ul>
3.	<ul style="list-style-type: none"> <li>• Bioenergetics and Oxidative phosphoryation;</li> <li>• free energy-exergonic and endergonic reaction,</li> <li>• high energy phosphastes,</li> <li>• components of electron transport chain-mechanism of ATP production,</li> <li>• Chemiosmotic theory,</li> <li>• inhibitor of respiratory chain.</li> </ul>
4.	<ul style="list-style-type: none"> <li>• Carbohydrate Metabolism;</li> <li>• Glycolysis,</li> <li>• TCA cycle,</li> <li>• glycogen,</li> <li>• gluconeogenesis,</li> <li>• diabetes mellitus Lipid Metabolism:</li> <li>• Synthesis and breakdown of fatty acids,</li> <li>• ketone bodies,</li> <li>• DKA,</li> <li>• Cholesterol,</li> <li>• bile acids,</li> <li>• Lipoproteins.</li> </ul>
5.	<ul style="list-style-type: none"> <li>• Protein Metabolism:</li> </ul>

	<ul style="list-style-type: none"> <li>• Synthesis and breakdown of amino acids,</li> <li>• urea cycle,</li> <li>• Specialized products from amino acids.</li> </ul>
6.	<ul style="list-style-type: none"> <li>• Molecular Biology:</li> <li>• Structure and functions DNA,</li> <li>• organization and replication,</li> <li>• transcription,</li> <li>• Protein synthesis.</li> <li>• Recombinant DNA technology</li> <li>• PCR</li> <li>• FISH</li> </ul>
7.	<ul style="list-style-type: none"> <li>• Vitamins,</li> <li>• Water and mineral Metabolism:</li> <li>• Functions and deficiency manifestations of Vitamin A, D, E, K, C, B Complex.</li> <li>• Water and electrolytes,</li> <li>• calcium, phosphorus, magnesium, iron, lead, copper,</li> <li>• trace elements (iodine, selenium, zinc).</li> </ul>
8.	<p>Clinical Enzymology: Enzymes in plasma and their origin, general principles of assay, clinical significance of enzymes and isoenzymes,</p> <p>Measurement of serum enzymes in diagnosis – cardiac and skeletal muscle enzymes, liver and biliary tract enzymes digestive, bone and gi disorders</p>
9.	<p>Disorders of carbohydrate metabolism:</p> <p>Disorders of Lipid Metabolism</p> <p>Disorders of protein metabolism:</p>
10.	<p>Disease related to organs: Liver- LFT, Jaundice, hepatitis, cholestasis Kidney- RFT, renal failure, uremia, nephritic syndrome, renal calculi, renal tubular acidosis, diabetes insipidus, dialysis.</p> <p>Early makers of renal pathology – mircoalbuminuria, albumin: creatinine ratio.</p>
11.	<p>Electrolytes and blood gas analysis – specimens for electrolyte determination- sodium, potassium, chloride, bicarbonate, determination of pCO<sub>2</sub>, O<sub>2</sub> and pH.</p>
12.	<p>Miscellaneous topics: Composition of CSF, meningitis, encephalitis, cancer, oncogenes, tumor markers, AIDS- basic concepts, diagnosis, Cytokinetics.</p>
13.	<p>General concepts of endocrinology- the endocrine system, hormones- chemical nature, classification, hormonal action- receptors, hormone receptor interaction,</p>

	regulation of gene expression by hormones, second messengers (camp, GMP, Ca++) Protein kinase cascade. Concepts of hormones assay.
14.	Hypothalamus and pituitary- anatomy, chemistry, functions, regulation. Diseases related to the hormones of these glands. Assessment of anterior and posterior pituitary.
15.	Thyroid hormones, synthesis, functions, thyroid function test in various abnormal conditions, parathyroid – hormones, synthesis, functions, diseases of parathyroid glands.  Hormones involved in calcium and phosphate metabolism. Diseases related to its metabolism.  Calcium chemistry and functions.
16.	Adrenal cortex and medulla – chemistry, synthesis, metabolic effects, pathophysiology of the adrenal cortex. Assessment of adrenal functions, Gonadal hormones – chemistry, functions, regulations and diseases related to these glands. Endocrinology of male and female infertility, pregnancy and lactation
17.	Gastrointestinal and pancreatic hormones – chemistry, synthesis, metabolic effects, regulation, diseases related to the hormones of these glands. Detection of anomalies.
18.	Nutritional requirements of carbohydrates, proteins and lipids. Deficiency states of carbohydrates, proteins and lipid. RDA, Nutritional requirements of vitamins (fat and water soluble)- Structure, functions, deficiency states, dietary source, Nutritional requirements of macro and microelements functions, deficiency states, dietary source, RDA.

## PhD in MLT- Syllabus for subject- Microbiology

### THEME 1 : GENERAL BACTERIOLOGY

- 1) History of Microbiology
- 2) Morphology and physiology of Bacteria
- 3) Classification and growth requirement of Bacteria
- 4) principles and different kinds of Microscopes
- 5) Sterilization and Disinfection procedures

- 6) Bacterial genetics
- 7) Culture methods
- 8) Antibiotic sensitivity testing
- 9) Hospital acquired infection and its prevention
- 10) Virulence factors of Bacteria

## **THEME 2 : IMMUNOLOGY**

- 1) Antigen and antibody – Definition
- 2) Antigen and Antibody reaction – Its principles and their application in the diagnosis of infective diseases
- 3) Immunity
- 4) Hypersensitivity
- 5) Tumor and transplantation immunity

## **THEME 3 : SYSTEMIC BACTERIOLOGY**

- 1) Gram positive cocci – Staphylococcus, Pneumoniae, Streptococcus
- 2) Gram negative cocci – N.gonorrhoeae, N.meningitidis
- 3) Gram positive bacilli – Corynebacterium, Mycobacteria, Clostridium, Actinomycetes, Bacillus and anaerobes
- 4) Gram negative Bacilli – Enterobacteriaceae, Pseudomonas, Vibrio, Brucella, Bordetella, Hemophilus, Yersinia
- 5) Spirochetes – Treponema, Leptospira, Borrelia
- 6) Rickettsiae, Chlamydia, Miscellaneous Bacteria

## **THEME 4 : MYCOLOGY, VIROLOGY AND PARASITOLOGY**

### Mycology

- 1) General properties of fungi
- 2) Cultivation methods
- 3) Laboratory methods for diagnosing fungal infection
- 4) Superficial and deep fungal infection
- 5) Opportunistic Fungal infection
- 6) Mycotoxin

### Virology

- 1) Classification and general properties of viruses- interferon, inclusion bodies
- 2) Cultivation of viruses and laboratory diagnostic methods of viral diseases
- 3) Pox virus, Herpes virus, Myxoviruses, enteroviruses

4) Rabies, Arbo viruses, Hepatitis, HIV, Viruses causing gastroenteritis, miscellaneous viruses

Parasitology

1) Classification- Protozoa – amoeba, flagellates, sporozoa, ciliates

2) Opportunistic Parasitic infection[

3) Helminthes

**THEME 5 : CLINICAL MICROBIOLOGY AND RECENT ADVANCES**

1) Diagnosis of various infective agents

2) Automated Methods in diagnosis of infective agents

3) Host body response in vaccination

4) Prophylaxis