

ALIGARH MUSLIM UNIVERSITY, ALIGARH
FACULTY OF MEDICINE
SYLLABUS FOR
MASTER OF MEDICAL LABORATORY SCIENCE

Basic Haematology

Introduction to blood, its composition, function and normal cellular components Anticoagulants, Collection and preservation of blood sample for various hematological investigations, Haematopoiesis - Erythropoiesis, Leucopoiesis, Thrombopoiesis. Morphology of normal blood cells, Haemocytometry, RBC Count, Total leucocytes count (TLC), Platelet Count., Absolute Eosinophil count, Quantitative disorders of Leukocytes Cause and significance Morphologic Alterations in Neutrophils, Normal Hemostasis & physiological properties of coagulation factors Hemoglobin: definition, types, structure, synthesis and degradation, Haemoglobinometry

Applied Haematology

Anemia- Introduction, Classification, Microcytic hypochromic anemia, Macrocytic anemia, Normocytic normochromic anemia, Laboratory diagnosis of Iron deficiency anemia, Laboratory diagnosis of Megaloblastic anemia & Pernicious anemia Classification and Laboratory diagnosis of Hemolytic anemia, Definition, classification and laboratory diagnosis of Leukemia Bleeding disorders, Introduction Causes of bleeding disorders, Types of bleeding disorders, Inherited bleeding disorders, Acquired bleeding disorders Laboratory diagnosis of bleeding disorders, Thrombosis, Causes of thrombosis, Laboratory approach for investigating thrombosis. Safety precautions in Haematology, Basic concepts of automation in Haematology, Coagulometer, Bone marrow examination, Composition and functions, Red cell anomalies, Lupus Erythematosus (L.E) cell phenomenon. Quantitative assay of coagulation factors, Karyotyping, Cyto-chemical staining: Principles, method and significance

Clinical Pathology

Liver Function Test – Jaundice and its types- clinical aspects, Semen Analysis, Pregnancy Tests- ANC profile, Glucose Tolerance Test, Renal Functions Test (RFT) Thyroid Function Test, Pancreatic Function Test, Complete Urine analysis- Physical, Chemical, Microscopic examination, Cerebro-spinal fluid, Basic concept and lab diagnosis of- Diabetes Mellitus, Atherosclerosis, Myocardial infarction, Nephrotic and Nephritic Syndrome

Applied Histopathology

Microscopy: Working principle Applications of various types of microscopes i.e. compound microscope, dark field, polarizing, phase contrast, interference and fluorescent microscope Collection and transportation of specimens for histological examination, Basic concepts of fixation- Various types of fixatives, Decalcification, Processing of various tissues for histological examination- Dehydration, Clearing, Infiltration, Types of Processors, Embedding: Definition, Various types of embedding media. Section Cutting, Microtome Knives, Mountants,

Classifications of Dyes, Types of Stains, Mordants and Accentuators, Metachromasia, Preparation of Stains, General Staining Procedures for Paraffin Infiltrated and Embedded tissue, Nuclear Stains and Cytoplasmic stains, Equipment and Procedure for manual Staining and Automatic Staining Technique, Haematoxylin and Eosin Staining, various types of Haematoxylin, Cryostat sectioning, its applications in diagnostic histopathology. Special Staining Procedures for detection of Connective tissue elements, Trichrome staining, muscle fibers, elastic, reticulin fibers, collagen fibers etc. Metachromatic staining such as Toluidine blue on frozen sections Principles of metal impregnation techniques. Demonstration and identification of minerals and pigments, removal of Pigments/artifacts in tissue sections, Demonstration of Proteins & nucleic acid, Carbohydrates, lipids, fat & fat like substances, bacteria and fungi in tissue section, Enzyme histochemistry, Immunohistochemistry, Museum techniques, Electron Microscopy

Blood Banking

Introduction to Blood Banking, History and discovery of various blood group systems, ABO blood group system, Rh and other major blood group system, Sources of error in blood grouping and their elimination, ABO grouping, Rh grouping, Compatibility test in blood transfusion-Major cross matching, minor cross matching, Complications and hazards of blood transfusion, Laboratory investigations of transfusion reactions and mismatched blood transfusion. Various anticoagulants used to collect blood for transfusion purposes, Selection of donor and procedure for collection of blood from a healthy donor Packed red cells, washed red cells and FROZEN Red cells, Platelet Rich Plasma (PRP), Platelet concentrate and frozen platelets. Fresh plasma (FP), Fresh Frozen Plasma (FFP) and cryoprecipitate Haemopheresis: pertaining to Leucocytes, platelets and plasma. Quality control in blood bank

Cytopathology

Procedure and Preparing smears from fine needle aspirates from various organs, Staining and mounting of FNAC smears, Cryostat sectioning, its applications in diagnostic cytopathology, Vital staining for Sex Chromatin, Aspiration cytology: Principle, Indications & utility of the technique with special emphasis on role of cytotechnologist in FNAC clinics, Exfoliative cytology (Papanicolaou technique for the staining of cervical smears, Cervical cytology, Fluid Cytology, Urine, CSF, Body Fluids (Pleural, Pericardial, Ascitic, Automation in cytology Liquid based cytology: Principles and preparation, Cytocentrifuge, molecular cytology, Cell Block and Immune-cytochemistry, Screening of cytosmears for malignant cells

Biochemical Metabolism

Carbohydrate Metabolism- Introduction, digestion, absorption, glycolysis, citric acid cycle, gluconeogenesis, glycogenolysis, glycogenesis Disorders of carbohydrate metabolism Protein Metabolism- Introduction, properties, digestion, absorption, synthesis, metabolism, urea cycle Disorders of protein metabolism, Lipid Metabolism-Introduction, digestion, absorption, lipoproteins, fatty acid biosynthesis, oxidation Nucleic Acid- Introduction, functions, energy carriers Enzymes-Introduction, properties, mechanism, kinetics, inhibitors

Applied Clinical Biochemistry

Laboratory safety, quality control, assay procedures, normal ranges, Estimation of glucose, proteins, urea, uric acid, creatinine, bilirubin, lipids, Electrolytes (Na, K, Cl, Ca, P), Radioisotopes, ELISA, automation

Immunology & Molecular Biology

Immune system, cells, response, organs, Molecular biology techniques (PCR, gel electrophoresis, Western blot), DNA structure, replication, gene expression

Genetics- Heredity, Mendel's laws, chromosomal basis, gene mapping, DNA structure, replication, vectors, plasmids

General Microbiology

Introduction of Medical Microbiology, Safety measures in Clinical Microbiology, Care and maintenance of Glassware and equipment used in Microbiology labs, Microscopy, Physical and Chemical Sterilization methods, Biomedical waste management and segregation methods, General characteristics & classification of Microbes with special reference to prokaryotes & eukaryotes, Morphological classification of bacteria, Bacterial cell structure, Growth and Nutrition of Microbes, Physical conditions required for growth, Growth curve of bacteria, Bacterial Culture media and transport media, Aerobic & anaerobic culture methods, Introduction to Immunology, Care & handling of laboratory animals

Systematic Bacteriology

Staining techniques and Biochemical tests used for bacterial Identification, General characteristics, pathogenesis and laboratory diagnosis of the following bacteria; Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Haemophilus, Corynebacterium, Enterobacteriaceae, Yersinia, Vibrio, Aeromonas, Clostridia, Mycobacterium, Spirochetes, Bordetella and brucella, Mycoplasma and Ureaplasma, Rickettsia, Chlamydia, Actinomyces, Pseudomonas and Burkholderia, non-sporing anaerobic cocci and bacilli

Applied Bacteriology

Laboratory strategy in the diagnosis of various infections; Septicemia and bacteremia, Upper Respiratory tract infections, Lower respiratory tract infections, Wound, skin, and deep sepsis, Urinary tract infections, Genital Tract infections, Meningitis, Gastro intestinal infections, Enteric fever, Pulmonary and Extra-pulmonary Tuberculosis, Pyrexia of unknown origin Antibiotic susceptibility testing (AST) methods, Polymerase chain reaction, Automation in bacterial culture and AST, Bacteriological examination of water, milk, food and air, Sterility testing of I/v fluids, Nosocomial infections, Epidemiological markers, Preservation methods for microbes

Immunology and Bacterial Serology

History of immunology, Immunity, Antigens, Antibodies, Antigen antibody reactions, Complement fixation test, Immuno- fluorescence, ELISA, SDS-PAGE, Western blotting, Serological tests, Complement system, Immune response, Hypersensitivity, Automation in diagnostic serology, Vaccines, Vaccination schedule, EPI in India

Mycology and Virology

General characteristics and laboratory diagnosis of Medically important Viruses, Structure and Classification of viruses, Collection and processing of sample for viral diagnosis, Cultivation of viruses, Egg inoculation and tissue culture methods, Rapid diagnosis of HIV, HBV and HCV, General characteristics of various medically important fungi, Taxonomy, Superficial and deep Mycoses, Culture media used in mycology, Processing of clinical samples for fungal infections i.e. Skin, nail, hair, pus, sputum, CSF and other body fluids, Identification methods for yeasts and moulds, Dimorphism in fungi, Antifungal susceptibility tests, Routine myco-serological tests and skin tests

Medical Parasitology and Entomology

Medical Parasitology, General characteristics of protozoa, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of various parasites; Entamoeba, Giardia, Trichomonas, Plasmodium and Toxoplasma sp., Taenia solium and saginata, Echinococcus granulosus, Hymenolepis nana, Schistosoma, Fasciola, Trichuris trichura, Strongyloides stercoralis, Ancylostoma duodenale, Enterobius vermicularis, Ascaris lumbricoides, Wuchereria bancrofti, Dracunculus medinensis, Collection and Microscopic examination of stool samples, Diagnostic procedures of Stool and blood for parasites, intestinal protozoal infections, hydated cyst and cysticercosis, Concentration techniques i.e. Flotation and sedimentation techniques, Identification of Ova and cyst, Material preparation for unstained and stained preparation, Staining methods, thick and thin Smear preparation of blood for Malarial parasite and Microfilariae