

# **Curriculum for B Sc MLT**

## **4th Semester**

**To be finalised by BOS-MLT on 18.3.09**

# Immunology and Mycology

## BMT – 204

### THEORY

1. History and introduction to immunology
2. Immunity
  - a. Innate and acquired immunity including Basic concepts about their mechanisms
3. Definition, types of antigens and Determinants of antigenicity
4. Definition, types, structure and properties of immunoglobulins
5. Antigen-Antibody reactions
  - a. Definition, Classification , general features and mechanisms and applications of various antigen antibody reactions
6. Principle, procedure and applications of Complement fixation test, Immuno-fluorescence, ELISA, CCIEP, and RIA, SDS-PAGE and western blotting in Medical Microbiology
7. Principle, procedure and interpretation of various serological tests *i.e.* Widal, VDRL, ASO, CRP, Brucella tube agglutination and Rose-Waaler
8. Raising of high titer antisera in laboratory animals and its standardization
9. Complement system: Definition and Basic concepts about its components and complement activation pathways
10. Immune response : Introduction & Basic concepts of Humoral and Cellular immune responses
11. Hypersensitivity: Definition and Types of hypersensitivity reactions
12. Basic concepts of autoimmunity and brief knowledge about autoimmune diseases
13. Vaccines: Definition, Types, Vaccination schedule and Brief knowledge about '**Extended programme of immunization**' (EPI) in India.
14. Introduction to medical mycology
15. Basic concepts about superficial and deep Mycoses
16. Taxonomy and classification and general characteristics of various medically important fungi

17. Normal fungal flora
18. Morphological, cultural characteristics of common fungal laboratory contaminants
19. Culture media used in mycology
20. Direct microscopy in Medical mycology laboratory
21. Processing of clinical samples for diagnosis of fungal infections i.e. Skin, nail, hair, pus, sputum, CSF and other body fluids
22. Techniques used for isolation and identification of medically important fungi
23. Identification of yeasts and moulds
24. Dimorphism in fungi
25. Use of laboratory animal for diagnosis of fungal infections
26. Antifungal susceptibility tests
27. Preservation of fungal cultures
28. Routine mycoserological tests and skin tests

## **Immunology and Mycology**

### **BMT – 214**

#### **PRACTICAL**

1. Collection of blood sample by veinpuncture, separation and preservation of serum
2. Raising haemolysin in Rabbit and performing its titration for Rosewaaler
3. Preparation of Phosphate buffers, Vernol buffer, ASO buffer, Richardsons buffer, Buffers of different pH and molarity, tris buffer, Standardization of cell concentration by spectrophotometer
4. Performance of Serological tests *i.e.*
  - a. Widal,
  - b. Brucella Tube Agglutination,
  - c. VDRL (including Antigen Preparation),
  - d. ASO (Antistreptolysin 'O')

- e. C-Reactive Protein (Latex agglutination)
  - f. Rheumatoid factor (RF) Latex agglutination
  - g. Rose Waaler test,
5. Demonstration of antigen / antibody determination by Immunofluorescence, Immunodiffusion, precipitation in agarose gel (Ouchterlony), CIEP, ELISA, SDS-PAGE and western blotting.
  6. To prepare culture media used routinely in mycology
  7. To perform all the staining techniques for identification of fungi as mentioned in theory syllabus.
  8. To identify given yeast culture (By performing various identification techniques studied in theory.
  9. To identify given mould culture (By performing various identification techniques studied in theory.
  10. To demonstrate dimorphism in fungi
  11. To process clinical samples for laboratory diagnosis of fungal infections i.e.
    - a) Skin
    - b) Nail
    - c) Hair
    - d) Body fluids and secretions
  12. To use mice for lab diagnosis of any fungal infection

# HISTOTECHNOLOGY-I

## BMT-208

### Theory

1. Introduction to histotechnology
2. Care and maintenance of laboratory equipment used in histotechnology
3. Safety measures in a histopathology laboratory
4. Basic concepts about routine methods of examination of tissues
5. Collection and transportation of specimens for histological examination
6. Basic concepts of fixation
7. Various types of fixatives used in a routine histopathology laboratory
  - i. Simple fixatives
  - ii. Compound fixatives
  - iii. Special fixatives for demonstration of various tissue elements
8. Decalcification
  - a. Criteria of a good decalcification agent
  - b. Technique of decalcification followed with selection of tissue, fixation, decalcification, neutralization of acid and thorough washing.
  - c. Various types of decalcifying fluids: Organic & Inorganic Acid, chelating agents, Use of Ion-exchange resins and Electrophoretic decalcification and treatment of hard tissues which are not calcified.
9. Processing of various tissues for histological examination
  - a. Embedding
    - i. Definition
    - ii. Various types of embedding media
    - iii. Procedure followed by Dehydration, Clearing, Infiltration and routine timing schedule for manual or automatic tissue processing.
    - iv. Components & principles of various types of automatic tissue processors
10. Section Cutting
  - a. Introduction regarding equipment used for sectioning
  - b. Microtome Knives, Sharpening of Microtome Knives, Honing, Stropping, various types of microtome and their applications
  - c. Freezing Microtome and various types of Cryostats.
  - d. Faults in paraffin section cutting with reason and remedy, spreading the sections and attachment or mounting of sections to glass slides.

## 11. Staining, Impregnation and Mountants

- a. Theory of Staining, Classifications of Dyes, Principles of Dye Chemistry,
- b. Stains and Dyes and their uses,
- c. Types of Stains, Chemical Staining Action, Mordants and Accentuators, Metachromasy.
- d. Use of Controls in Staining Procedures,
- e. Preparation of Stains, solvents, aniline water and buffers etc.,
- f. Commonly used mountants in histotechnology lab.
- g. General Staining Procedures for Paraffin Infiltrated and Embedded tissue.
- h. Nuclear Stains and Cytoplasmic stains
- i. Equipment and Procedure for manual Staining and Automatic Staining Technique.
- j. Mounting of Cover Slips, Labeling and Cataloguing the Slides.

## 12. Routine Staining Procedures

- a. Haematoxylin and Eosin Staining, various types of Haematoxylin
- b. Mallory's Phosphotungstic Acid Haematoxylin (PTAH)

# HISTOTECHNOLOGY-I

## BMT-218

### Practical

1. Demonstration of instruments used for dissection
2. Use of antiseptics, disinfectants and insecticides in a tissue processing laboratory
3. Reception and labeling of histological specimens
4. Preparation of various fixatives
  - a. Helly's fluid
  - b. Zenker's fluid
  - c. Bouin's fluid
  - d. Corney's fluid
  - e. 10% Neutral formalin
  - f. Formal saline
  - g. Formal acetic acid
  - h. Pereyn's fluid
5. To perform embedding and casting of block
6. To process a bone for decalcification
7. To prepare 70% alcohol from absolute alcohol
8. Processing of tissue by manual and automated processor method
9. To demonstrate various part and types of microtome
10. To learn sharpening of microtome knife (Honing and stropping technique)
11. To perform section cutting
12. To practice attachment of tissue sections to glass slides

13. To learn using tissue floatation bath drying of sections in incubator (-56<sup>0</sup>C)
14. To perform & practice the Haematoxylin and Eosin staining technique
15. To perform & practice the Mallory's Phosphotungstic Acid Haematoxylin (PTAH)
16. To learn mounting of stained smears

## **Applied Haematology – II**

### **BMT – 206**

#### **Theory**

1. Definition and classification of anaemias.
2. Laboratory diagnosis of iron deficiency anaemia
3. Laboratory diagnosis of megaloblastic anaemia
4. Laboratory diagnosis of haemolytic anaemia
5. Definition, classification and laboratory diagnosis of leukaemias
6. Definition and laboratory diagnosis of Leukamoid reactions
7. Cytochemical stainings, procedure and their significance in various haemopoietic disorders.
8. Chromosomal studies in haematology and their significance.
9. Mechanism of normal fibrinolysis and Laboratory diagnosis of hyperfibrinolysis.
10. Mechanism and laboratory diagnosis of disseminated intravascular coagulation (DIC).
11. Laboratory diagnosis of Haemophilia and von-willebrand disease.
12. Laboratory diagnosis of Idiopathic thrombocytopenic purpura (ITP)
13. Platelet function tests and their interpretation.

## **Applied Haematology – II**

### **BMT – 216**

#### **Practicals**

1. To estimate serum iron and total iron binding capacity.
2. To detect whether the given specimen is G6PD deficient or normal.
3. To estimate Hb-F in a given blood sample.

4. To estimate plasma and urine Haemoglobin in the given specimens.
5. To demonstrate the presence of Hb-S by sickling and solubility tests.
6. To test the given blood sample for its osmotic red cell fragility.
7. Cytochemical staining on the given smears such as PAS, SBB, MPO, LAP and Perl's reaction.
8. Estimation of Fibrinogen, Fibrin degradation products (FDPs) and Euglobulin clot lysis test (ELT)
9. Urea clot solubility test for factor XIII.
10. To perform various platelet function tests such as whole blood clot retraction test, prothrombin consumption index (PCI) Platelet adhesion, aggregation and PF3 availability test.

## **Clinical Biochemistry – 1**

### **BMT – 210**

#### **Theory**

1. Hazards & safety measures in clinical Biochemistry laboratory.
2. Quality control and quality assurance in a clinical biochemistry laboratory
3. Laboratory organization, management and maintenance of records
4. Normal range in blood, Serum, Plasma and Urine and reference values.
5. Principles of assay procedures for: -
  - a. Glucose
  - b. Proteins
  - c. Urea
  - d. Uric acid
  - e. Creatinine
  - f. Bilirubin
  - g. Lipids
6. Principles, procedures for estimation & assessment of the following including Error involved and their corrections
  - a. Sodium, Potassium and Chloride, Iodine.
  - b. Calcium, Phosphorous and Phosphates
7. Instruments for detection of Radioactivity.
8. Uses of Radioisotopes in clinical biochemistry.
9. Radioisotope techniques

## **Clinical Biochemistry – 1**

### **BMT – 220**

#### **Practical**

1. Estimation of Glucose in Urine and in Blood.
2. Estimation of Protein in Urine and Blood.
3. Estimation of Urea in blood.
4. Estimation of uric acid in blood.
5. Estimation of serum bilirubin
6. Estimation of Total Cholesterol in blood.
7. Estimation of HDL Cholesterol.
8. Estimation of LDL Cholesterol.
9. Estimation of TG
10. Estimation of Creatinine in Blood
11. Estimation of serum calcium
12. To measure electrolytes Sodium, Potassium & Chloride.

# Fundamentals of Computers-II

## BMT-202

### Theory

**Introduction of Operating System:** introduction, operating system concepts, types of operating system.

**Introduction to MS-DOS:** History of DOS, features of MS-DOS, MS-DOS Commands (internal and external).

**Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

**Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

**Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.

**Application of Computers in various fields:** Medical, Education, Railway, Defense, Industry, Management, Sports, Commerce, Internet.

***Introduction to installation of different software and introduction about different software related to MLT.***