



**DMLT**  
**(SECOND YEAR)**

**HAEMATOLOGY & BLOOD BANKING**

**1. STATISTICAL QUALITY CONTROL**

- Introducing
- Quality control
- Quality assessment/Quality assurance.

**2. BASIC STATISTICS**

- Use of standard deviation in laboratory
- Preparation of quality control chart.
- Interpretation of quality control chart.

**3. ABNORMAL MORPHOLOGY AND DISEASES ASSOCIATED WITH IT.**

- RBC morphology (Anisocytosis, Poikilocytosis, Cabot rings, etc)
- WBC morphology (Vacuoles, Dohle Bodies, Toxic Granulation, etc)

**4. BLOOD FILMS**

- Method of preparation
- Collection of specimen
- Special smear preparation
- Buffy coat smears

**5. ROMANOWSKY STAINS**

- Principle
- Types of stains
- Composition and Preparation
- Method of staining

**6. RED CELLS INDICES**

- MCV
- MCH
- MCHC, RDW, Red cell histogram.

**7. STORAGE OF BLOOD SAMPLES**

**8. COMPATIBILITY TESTS FOR TRANSFUSION**

- Request form
- Techniques for compatibility (Cross matching techniques by saline tube method)
- Coomb's cross matching ( Indirect coomb's test, Direct coomb's test)

**9. BLOOD TRANSFUSION REACTIONS**

- Quality Control management
- IQC, EQC programme.
- Abnormal HB and its types

**10. ANAEMIA**

- Introduction, Classification of anaemia (Based on etiology , Morphology)
- Signs/Symptoms.

**11. IRON DEFICIENCY ANAEMIA**

- Metabolism, Causes of Iron deficiency anaemia.
- Lab. Test in Iron deficiency anaemia.
- Peripheral smear, CBC with retic count , Bone marrow examination, Electrophoresis.



**12. EXAMINATION OF MEGALOBLATIC ANAEMIA**

- Introduction
- Causes of vit B<sub>12</sub> deficiency
- Investigation of megaloblastic anaemia (RBC morphology, Bone marrow examination, Biochemical tests)

**13. HAEMOLYTIC ANAEMIA**

- Introduction
- Classification ( Intravascular lysis and extra vascular lysis).

**14. EXAMINATION OF HAEMOLYTIC ANAEMIA**

- Introduction
- Laboratory tests (Complete Hemogram, Blood film, Bone marrow examination)

**15. DIAGNOSIS OF A PLASTIC ANAEMIA**

- Introduction
- Classification
- Laboratory tests (Complete Hemogram, RBC,PCV, Reticulocyte count, ESR, Bone marrow examination)

**16. THALASSEMIA**

- Introduction
- $\alpha$ -thalassemia,  $\beta$ -thalassemia
- Treatment

**17. LEUKEMIA**

- Introduction
- Symptoms

**18. HAEMOSTASIS, COAGULATION**

- Introduction
- Mechanism of Homeostasis
- Mechanism of Coagulation
- Coagulation factors
- Intrinsic & Extrinsic Pathways

**19. DETERMINATION OF PARTIAL THROMBOPLASTIN TIME**

- Principle, Clinical Significance, Procedure

**20. DETERMINATION OF THROMBIN TIME**

- Principle, Clinical Significance, Procedure

**21. FIBRINOGEN**

- Principle, Clinical Significance, Procedure

**22. BONE MARROW EXAMINATION**

- Introduction
- Types of Bone marrow
- Assesment of Patients
- Staining



## **PRACTICALS:**

- 1) To study and care of the lab & lab instrument.
- 2) To study Preparation of blood film.
- 3) To study staining of blood film by leishman stain.
- 4) To study Bleeding Time.
- 5) To study Clotting time.
- 6) To study Prothrombin Time.
- 7) To study ABO blood group by Tube method & Reverse method.
- 8) To study about blood cross matching test.
  - Major cross match
  - Minor cross match.
- 9) Quality Control management.
- 10) IQC, EQC programme.



## **CLINICAL PATHOLOGY**

**CREDIT HOURS : 2(1+1)**

### **1. EXAMINATION OF BODY FLUIDS**

- Introduction
- Types of Fluids(CSF, Pleural, Ascitic, Synovial fluid, BAL)

### **2. EXAMINATION OF CSF**

- Introduction of CSF
- Functions, Composition
- Physical Examination, Chemical Examination
- Microscopic Examination

### **3. EXAMINATION OF ASCITIC FLUID/PLEURAL FLUID**

- Introduction about Ascitic fluid/Pleural fluid
- Functions, Composition
- Physical Examination, Chemical Examination
- Microscopic Examination

### **4. SEMEN ANALYSIS**

- Introduction
- Morphology, collection
- Precautions, Storage, Transport
- Physical and Chemical Examination
- Motility

### **5. ROUTINE URINE EXAMINATION**

- Physical
- Chemical
- Microscopic

### **6. PERSERVATIVE USED IN URINE**



## **Practicals:**

- 1) To study Physical Examination of urine.
- 2) To study Chemical Examination of urine.
- 3) To study Microscopic Examination of urine.
- 4) Semen Analysis.
- 5) Fluids for cell count.
- 6) To study different specimen collection of urine.
- 7) To study stool examination.



## MICROBIOLOGY

CREDIT HOURS : 2(1+1)

### 1. Quality Control

- Quality assurance, Quality Control, Laboratory Organization management, Recording of Results.

### 2. Microscope

- Introduction, Principle, Uses, care and Maintenance,
- Types of Microscopes
- Compound Microscope, simple microscope, light microscope, dark field microscope, fluorescent microscope.

### 3. Virology

- Introduction, Classification, structure of viruses, Diseases caused by viruses.
- Isolation of virus in laboratory by tissue culture. Animal cell virus, Principle of different test used in virology.

### 4. Parasitology

- Introduction, classification, (Protozoan, Helminthes, Nematodes) Life cycles of protozoan (Morphology, Prevention) Life cycles of Helminthes (Morphology, Incubation period)
- Protozoan(Entamoeba, Giardia, Plasmodium)
- Helminthes(Ascaris, Ancylostoma)

### 5. Laboratory Diagnosis of Parasitic Infection

- Introduction, Specimen collection, prevention, Investigation test. (Entamoeba, Giardida, Trichomonas, Leishmania, Plamodium)

### 6. Laboratory Diagnosis of Helminthes

- Introduction, Specimen collection, prevention, Investigation test (Ascaris lumbricoids, Ancylostoma duodenale, Trichuris Trichura, wucheria Bancrofti, Tapeworm)

### 7. Serological Technique

- Introduction, Clinical significance, principle, definition.

Types: Precipitation, Flocculation, Agglutination, Neutralization, Haemagglutination.

### 8. Laboratory Procedure in Serology

- Collection and Preparation of specimen. Heat inactivation of serum, Laboratory Test
- TPHA (Treponema pallidum haemagglutination absorption)
- WIDAL Test (Slide method and tube method)



- CRP (C-reactive proteins)
- RA (Rheumatoid Arthritis)

9. **Serological Test for Infection**

- AIDS (Acquired Immuno deficiency Syndrome), HIV (Human Immuno Virus), Hepatitis, Malaria, Rubella, Leishmania. (Method, Principle, Interpretation)

10. **Immunology**

- Definition, Immune system of body, natural resistance, specific immunity, humoral and cell mediated specific immunity, humoral and cell mediated specific immunity diseases involving immune system.

11. **Immunology Test**

- Introduction, Antigen-Antibody reaction, measurement of antigen antibody reaction.
- Complement fixation test, agglutination test, (types, principle) precipitation (types, principle)

12. **Techniques in Microbiology**

- Immunoflorescence
- Radioimmuno assay (RIA)
- Enzyme linked immune sorbent assay (ELISA)
- CLIA (Chemiluminescence Enzyme Immunoassay)

13. **Staining Techniques**

- Introduction, Principles, Procedure, Interpretation.

## **Practicals:**

- 1) WIDAL test by slide method
- 2) WIDAL test by tube method
- 3) Rheumatoid Arthritis factor
- 4) C-Reactive Protein Test
- 5) ASO test (Anti Streptolysin test)
- 6) Carbogen R-PR test
- 7) ZN staining technique
- 8) Albert Stain
- 9) Gram Stain
- 10) Technique of Culture.
- 11) Preparation of Media
- 12) Biochemical test (IMVIC) LPCB stain for fungus Koh mounting .



## **BIOCHEMISTRY**

CREDIT HOURS : 2(1+1)

1. **DETERMINATION OF CSF AND URINARY PROTEINS**
  - Principle, Clinical Significance, Procedure, Normal Range
2. **DETERMINATION OF ENZYME ALP(Alkaline Phosphates)**
  - Introduction ,Principle, Clinical Significance, Procedure, Calculation, Preparation of standard graph
3. **DETERMINATION OF SERUM LACTATE DEHYDROGENASE(LDH)**
  - Introduction ,Principle, Clinical Significance
4. **CLINICAL SIGNIFICANCE OF AMYLASE, LIPASE**
  - Introduction, Principle, Clinical Significance, Normal Range
5. **KIDNEY FUNCTION TEST**
  - Introduction, Kidneys, Formation of urine, Hormonal regulation of kidney function.
  - Routine kidney function tests, Group-I, Group-II, Group-III, Group-IV
6. **DETERMINATION OF CREATININE CLEARANCE**
  - Introduction, Clinical Significance, Calculation, Collection of Specimen
7. **DETERMINATION OF UREA**
  - Introduction ,Principle, Clinical Significance, Procedure
8. **DETERMINATION OF SERUM BILIRUBIN GROUP I TESTS**
  - Principle, Clinical Significance, Procedure
  - Total Bilirubin, Direct Bilirubin, Indirect Bilirubin
  - Normal Range, Interpretation
9. **DETERMINATION OF HDL-CHOLESTEROL,LDL,VLDL**
  - Principle, Clinical Significance, Importance, Procedure, Calculation
10. **GROUP-IV CARDIAC PROFILE TESTS**
  - Serum Myoglobin
  - Serum  $\alpha$ -1-acid glycoprotein
  - Clinical Significance, Principle.
11. **DETERMINATION OF SERUM CPK**
  - Importance, Principle, Procedure
  - Determination of isoenzymes CK-MB(Clinical Significance, Principle)
12. **WATER AND MINERAL METABOLISM**
  - Importance, Body fluid distribution, Mineral metabolism
  - Importance of some trace minerals (Iron, Zinc, Manganese)
  - Diseases associated with (Na, K, Cl, Phosphorus) metabolism.





### **13. ACID-BASE BALANCE**

- Action of buffer systems, Disturbances in acid base balance,
- Determination of PH,PCO<sub>2</sub>,PO<sub>2</sub>,Bicarbonates
- Important components of blood gases analyzers
- Collection of Arterial blood gas samples

### **14. CLINICAL SIGNIFICANCE OF HORMONES**

- Thyroid ,Prolactin ,FSH,LH, Estrogen, ACTH, Testosterone, HCG , Insulin.

### **15. AUTOMATION IN BIOCHEMISTRY**

- Analyzers, mini vidas analyzer, Latest trends in automation,

### **Practicals:**

- 1) Determination of Creatinine.
- 2) Determination of Bilirubin(Total Bilirubin, Direct Bilirubin, Indirect Bilirubin,
- 3) Determination of Alkaline Phosphatase
- 4) Determination of SGOT.
- 5) Determination of SGPT.
- 6) Determination of Total protein.
- 7) Determination of Urea.
- 8) Determination of Cholesterol
- 9) Determination of Triglycerides
- 10) Determination of HDL.
- 11) Determination of albumin
- 12) Determination of uric acid
- 13) Determination of LDL and VLDL.



## **HISTOPATHOLOGY & CYTOLOGY**

Introduction – Tissue, Histology, Histopathology, Histotechnology, Histochemistry, immunohistochemistry.

Staining:- (routine & special)

1. Staining of the connective tissue
2. Staining of the reticulin
3. Staining of the elastic fibers
4. Staining of the carbohydrates
5. Staining of the amyloid
6. Staining of the tissue pigment
7. Gram staining of bacteria
8. Acid fast staining of bacteria
9. Weak acid fast staining
10. Staining of fat

Frozen section

Museum technique

### **(Cytopathology)**

Introduction – Cell, cytology, Cytopathology, cytotechnology

Sample collection and various types of cytological sample (Body fluids, FNAC)

Fixation of cytological smear and various types of fixative

Staining (routine and special)

1. PAP
2. Giemsa
3. Cresyl violet

Cell block technique

## **Practical Syllabus**

1. Contribution & Safety Rules for histopathology.
2. Equipments and instruments used in histopathology.
3. Preparation of 70 % (V/V) Alcohol from commercially available ethyl alcohol.
4. Gross Examination & fixation of the specimen.
5. Decalcification of calcified tissue.
6. Tissue processing by using an automatic tissue processor.
7. Section cutting of paraffin wax embedded tissue.
8. To fix the sections on the slides.
9. Staining of tissue section by using Hematoxyline and Eosin stain.
10. Staining of the cellular components in smears of exfoliated cells by papanicolaocoe method.
11. Cresyl violet staining in exfoliative gynecologic cytology.