

SCHEME OF STUDIES

The Training Course of Laboratory Assistant shall comprise of two Parts, i.e. Part -I and Part-II, each of one Year duration.

1st Year

This part shall include basic sciences i.e. Anatomy, Physiology, Bio-Chemistry, Clinical Pathology. The duration of the Study of the Basic Sciences is as under:-

1. Laboratory Management & Ethics.
2. Anatomy
3. Physiology
4. Bio-Chemistry
5. Basic Clinical Pathology
6. Blood Banking.

2nd Year

The Part shall include Pathology parasitology, cytology, Microbiology and Blood Banking. The duration of study for these subjects shall be as below:-

1. Microbiology & Parasitology.
2. Blood Banking
3. Histopathology
4. Advanced Clinical Pathology
5. Cytology

1st YEAR**LABORATORY MANAGEMENT AND ETHICS**

- A. Role of the Laboratory in the Health Care Delivery System:**
- i) General
 - ii) Human Health & Diseases.
 - a) Types of Diseases
 - b) Process of Diagnosis
 - c) Laboratory at different levels.
 - d) Duties and responsibilities of Laboratory personnel.
- B. Laboratory Service in the Health care Delivery System in India.**
- i) Laboratory Service in India.
 - ii) The Health Administration System in India.
 - a) At the National Level.
 - b) At the State Level.
 - c) At the District Level.
 - d) At the Village Level.
 - e) Voluntary health Organizations in India.
- C. Laboratory Planning:**
- i) General Principals.
 - ii) Laboratory Goals.
 - iii) Operational Data.
 - a) Market Potential
 - b) Hospital / Laboratory relatives.
 - c) Competitions.
 - d) Laboratory Trends.
 - e) Planning at different levels.

f) Guiding Principles for planning Hospital laboratory Services:

- Factors
- Guiding Principles for Planning.
- Functional Criteria.
- Operational demand.
- Sections of a Hospital Laboratory.
- Common area.
- Design aspect.
- Space requirement.

g) Planning for a basic health Laboratory.

D. Laboratory Organisation (Laboratory Management Techniques):

- i) General Principles.
- ii) Components and functions of a laboratory.

2. ANATOMY THEORY

A. Introduction

- i) Different Parts of the human body, Common Anatomical Terms, Anatomical Positions and important planes.
- ii) Animal Cell.
- iii) Tissue of the body, classification and function.
- iv) Primary tissues of the body.

B. Skeletal System

- i) Joints & Movements
- ii) Muscle & Monce.

C. Gastro-Intestinal System

- i) Mouth and Pharynx.
- ii) Salivary Glands and Tonsils.
- iii) Oesophagus and Stomach
- iv) Location of different organs in the Abdomen in situ.

D. Genito-Urinary System

- i) Kidney
- ii) Ureters, Bladder and Urthra
- iii) Male Reproductive System.
- iv) Female Reproductive System

E. Respiratory System

- i) Thoracic Cavity, Pleura and Lungs.

F. Cardio-Vascular System

- i) Heart and Pericardium
- ii) Arterial System
- iii) Venous and Lymphatic System

G. Nervous System

- i) Meanings and cerebrospinal fluid.
- ii) Brain, Spinal Cord and the Nerves

H. Loco-Motor System

- i) Parts of Upper Limb :- Bones Land marks and important vessels, parts of lower limb.

3. PHYSIOLOGY THEORY

A. Blood

- i) Composition and General function of Blood.

- ii) Description of Blood Cells:- Normal Counts and function.
- iii) Anti-coagulants

B. Cardio-vascular System

- i) Functions of heart and blood vessels.
- ii) Circulation:- Systemic Circulation.
Pulmonary Circulation

C. Respiratory System:

- i) Name of the Structure involved in respiration and their function.
- ii) External and Internal Respiration. How respiration and expiration are brought about.
- iii) Transport of O_2 and CO_2 in the blood.
- iv) Definition of Respiratory Rate, Tidal Volume, Vital Capacity, Cyanosis, Hypoxia.

D. Excretory System

- i) Functions of Kidney.
- ii) Formation & Composition of Urine-normal and abnormal constituents.

E. Skin

- i) Functions of Skin

F. Digestive System

- i) Composition and functions of Saliva. Mastication and deglutition.
- ii) Functions of Stomach, Composition of Gastric,

Juice, Pancreatic Juice, Bile and Succus entericus.

G. Endocrine Glands

- i) Definition, name and the hormones secreted by them.
- ii) Major action of each hormone.

H. Reproductive System

- i) Male Genital System.
- ii) Female Genital System.
- iii) Names of Primary and Accessory Sex organs in male and female, Secondary Sexual characters in male and female.
- iv) Functions of Ovary, formation of Ova, actions of ovarian hormones.
- v) Functions of Testis-Spermatogenesis and actions of testosterone.

I. BLOOD GROUP, ABO and Rh, basis for classification, basis for determination, importance of Blood Groups.

J. Cerebrospinal Fluid, Formation, composition and functions.

ANATOMY PRACTICAL

1. Demonstration of Parts of Body (Bony) landmarks on the surface.
2. Identification of Cells and basic tissues.
3. Skeletal System, Identification of Bones and Joints.
4. Demonstration of Interior of Thorax with organs in Situ.

5.
 - a) Respiratory System and Pleurae.
 - b) Heart and Blood Vessels.
6. Demonstration and identification of various organs within abdomen.
 - a) Liver and Gall Bladder
 - b) Peritoneum Stomach and Intestine.
7. Male Genital System.
8. Female Genital System.
9. Central Nervous Systems, Spinal Cord and site of Lumber Puncture.

Examination will be:

- a) Identification of bones or parts of Skeletal System.
- b) Identification of basic tissues under the microscope.
- c) Identification of Certain organs and Viva.
- d) Surface marking of any of the important organs.
- e) Identification of sites of blood vessels or muscles for injections and site of lumbar puncture.

PHYSIOLOGY PRACTICALS

1. Microscope-Usage, Maintenance and minor repairs
 - i) Behaviour of RBC in Isotonic, Hypotonic and Hypertonic Sodium Chloride Solution.
2. Identification of Blood Cells focused under Microscope:-
 - i) RBC
 - ii) Various types of WBC
 - iii) Platelets
 - iv) Reticulocytes

3. To obtain samples of Plasma and Serum.
4. Preparations of Anti-Coagulants: double oxalate and Sodium citrate.
5. Haematocrit
6. Identification of ruled area in Neubauer's Chamber, RBC and WBC Pipettes and Wintrobe and Westergren Pipettes.
7. Demonstration of Normal Constituents of Urine and Abnormal Constituents e.g. Glucose and Protein.
8. Record writing.

4. CLINICAL BIO-CHEMISTRY

- A. Elementary knowledge of Inorganic Chemistry-Atomic Weight, Molecular weight, Equivalent weight - Acids, basis and Salts -indicators - molar solutions, Buffer Solution, Titration (Acid Base) Definition of Solutions. Methods of expressing concentration: Dilution.
- B. Elementary knowledge of Organic Chemistry - Organic Compounds. Aliphatic and Aromatic. Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol, Acids Colloids etc.
- C. Elementary knowledge of Analytical chemistry - Instrumentation, centrifuge Balances, Colorimeter, Spectrophotometer, Flamephotometer, Fluorimeter etc.

- D. Aims and Scope of Biochemistry.
- E. CARBOHYDRATES - Importance, Definition, classification, some properties.
- F. PROTEINS -Amino Acids, essential amino acids, peptides, denaturation of proteins, Physiologically important proteins, functions of plasma proteins.
- G. LIPIDS - Definition, classificaion, steroids, examples.
- H. NUCLEIC-ACIDS :- DNA and RNA, their importance.
- I. HAEMOGLOBIN.
- J. ENZYMES AND CO-ENZYMES-Elementary.
- K. GASTRIC JUICE collection, Acidity.
- L. CARBOHYDRATE-METABOLISM- elementary aspects, definition of Glycolysis, Glycogenolysis Hormonal regulation of Blood Sugar, Diabetes-Mellitus - Ketosis, Glycosuria, Renal Glycosuria, Penotosuria.
- M. METABOLISM OF LIPIDS-elementary aspects, Triglycerides, Cholestrol. Plasma Lipoproteins - Ketone bodies and Ketonuria.
- N. PROTEIN METABOLISM- Formation of Urea, Creatinine, Proteinuria. Edema, Transaminases.
- O. WATER AND MINERAL METABOLISM-Dehydration Calcium, Phosphorus, Sodium, Potassium, Chloride, Iron, Iodine, their physiological functions and disease

state.

- P. HARMONES-definition, functions of some important hormones.
- Q. Blood and cerebrospinal Fluid functions of Blood & CSF.
- R. Urine Normal and abnormal tests. Al, Sugar, K, bile,

BIOCHEMISTRY PRACTICAL:-

Practical Part must Learn Following

1. Basic Techniques:-

- i) Cleaning of Glassware.
- ii) Preparation of Chromic acid was solution.
- iii) Preparation of salturated solution.
- iv) Types and use of pipettes.
- v) Balance-types and uses.
- vi) Preparation of percent solution/volume/volume components (V/V/)
- vii) Preparation of percent solution weight by volume (W/V) solution.
- viii) Preparation of Molar Solution.
- ix) Preparation of Buffer Solution.
- x) Indicators pH, determination of unknown solutions.
- xi) Preparation of Normal Solutions.
- xii) Titration -(Acid Base) Preparation of Primary Standards.
- xiii) Titration preparation of Normal Solutions.
- xiv) Preparation of Protein filtrates.
- xv) Use and maintenance of centrifuge.
- xvi) Colorimeter-types, components, use and maintenance.
- xvii) Colorimetry.

- xviii) Colorimetry-Choice of filters.
- xix) Spectrophotometer-components, use and wavelength selection.
- xx) Flamephotometer components and use demonstration.
- xxi) List of spare parts of equipments maintenance.
- xxii) Distillation of water-setting up Glass Distillation Unit and Metal water Distillation Unit.

CLINICAL BIOCHEMISTRY PRACTICAL:-

1. **Diagnostic tests on urine:-**
 - i) Collection and preservation.
 - ii) Physical characteristics and specific gravity.
2. **u**
 - i) Qualitative tests for urea, Uric Acid, Creatinine, Calcium. Phosphorous, sodium, Potassium and chloride.
 - ii) PH.
 - iii) Urea clearance and Creatinine clearance.
3. **Abnormal Constituents of Urine.**
 - i) Qualitative test or -Sugar, Albimin, Ketone Bodies, Blood, Bile Salt and Bile Pigment.
4. **Da-----tests on Blood.**
 - i) Collection and preservation of Blood, Serum and Plasma b/w
 - ii) Estimation of Blood Sugar.
 - iii) Glucose Tolerance test.
5. **Non-Protein nitrogenous compound:**
 - i) Determination of Serum Urea, Uric Acid and creatinine.

6. Determination of Serum Protein:
 - i) Albumin, Globulin, Fibrinogen & AG ratio.
7. Serum-Electrolytes.
 - i) Determination of Na^+ , K^+ and Cl .
 - ii) Determination of inorganic Phosphorus.
 - iii) Determination of Calcium.
8. Serum Enzymes:
 - i) Determination of transaminases (GOT and GPT)
 - ii) Determination of Phosphatase (Alkaline phosphate and Acid Phosphate)
 - iii) Determination of amylase.
9. Serum Bilirubin:
 - i) Determination of total and direct bilirubin.
10. Serum Lipids:
 - i) Lipid Profile.
 - ii) Determination of Serum Cholesterol.
11. Liver Function Tests.
12. Diagnostic test on other body fluids.
 - i) Gastric juice:-
 - a) Tests of HCl. Blood and Starch.
 - b) Free and total acidity.
 - c) Gastric function tests.
 - ii) Cerebrospinal Fluid
 - a) Determination of Sugar
 - b) Determination of Proteins.
 - c) Determination of Proteins.
 - d) Pandy's Test.
13. Kidney or Renal function test.:
 - i) Importance of renal function tests.

ii) Tests:

- a) Concentration / Specific Gravity tests.
- b) Dilution test.
- c) Urea Clearance Test.
- d) Creatinine Clearance test.

14. Laboratory Maintenance and improvement

- i) Quality control
- ii) Automation and kits.
- iii) Laboratory Management.

5. **Basic Clinical Pathology:-**

- Pathology
- Haematology
- Collection of Blood
- Composition of Blood
- Types of Anti-Coagulant Tubes and their Uses
- RBC's and various process of counting RBC's manually/
clinically / automatically.
- Erythropoiesis
- Haemocytometer and its uses
- Types of WBC's and process of Counting, manually/
automatically.
- Colour indexes, its types and methods of calculation
- PBF(Peripheral Blood Film) its preparation, Staining.

- Various Types of Romansky Stains and Uses
- Leishman's Stains
- Buffer Solution
- PBF staining by Romansky Staining
- Platelet Count. Process of counting Manually and Automatically.
- Absolute Eosinophil Count & its estimation.
- ESR and various methods of estimation of ESR in detail.
- PCV and its procedure for conducting.
- Urine, Composition of Urine in detail, Urine Examination under Microscope.
- Various methods of sampling Urine for conducting various examinations like
 - ❖ Albumin, Sugar, Acetone, Bile pigmentation, Bile Salt, Urobilinogen, Occult Blood , KFT etc.
- Microscope, Parts and Functions in Laboratory.
- Haemoglobin in detail, Its estimation manually and clinically.
- Preparation of N/10 HCL role In estimation of Haemoglobin
- Centrifuge , and its uses.
- Haemometer Set.

6. Blood Banking:-

- Blood Banking
- Types of Blood Banking
- Process of Coagulation
- Rh- Factor.
- Erythroblastosis Foetalis
- MN- Group System

PRACTICAL PART MUST INCLUDE FOLLOWING

- Haemoglobin estimation.
- Preparation of N/10 HCL / Buffer Water
- ROMANOSKY Stains
- Preparation , Staining , Examining , Counting of WBS's in PBF
- Preparation of Acetic Acid Solution and Ammonia Solution
- Preparation of Benedict's reagents.
- Estimation of ESR / PCV its advantages / Disadvantages
- Urine Examination(Physically / Chemically/Microscopically)
- Estimation of TLC , RBC's, Platelet Count etc.

2nd Year D-MLT

1. a. MICROBIOLOGY AND PARASITOLOGY

MICROBIOLOGY AND PARASITOLOGY THEORY

A. Requirement and use of Common Laboratory Equipments

Incubator, Hot Air Oven. Autoclave, Water-Bath. Anaerobic jar, Vacuum Pump, Media Pouring chamber, Refrigerator, Centrifuge.

B. Microscope

Principle, Operation, Care and use of Microscope

C. Sterilization and Dis-infection

Classification and general principles of Sterilization. Physical, Chemical and Mechanical Methods. Disposal of contaminated Media, Syringes, Glassware, Apparatus.

D. Classification and Morphology of Bacteria:

Brief outline of:-

- i) Structure of Cell, Capsule, Flagella and spores.
- ii) Growth of Bacteria
- iii) Nutrition of Bacteria.

E. Staining of Bacteria:

- i) Simple, Grams, Ziehl-Neelsen, Albert, Spore stain,
- ii) Composition and preparation of Staining reagents.

F. Cultivation of Micro-Organisms-I: (In detail)

Classification of Media, Composition of Laboratory culture Media, and Special Media.

G. Cultivation of Micro-Organisms-II: (In detail)

H. Identification of Bacteria:

Cultural Characters, Bio-Chemical reactions and serotyping.

I. Normal flora of micro-organisms in the human body.

J. Gram Positive and Gram Negative, Staphylo-coccus, Pneumo-coccus, Neisseriae (in brief)

K. Gram Negative Bacilli:

Salmonella, Shigella, E. Coli, Klebsiella, protein, Pseudomona, Vibrio cholerae, Haemophilus. (In Brief)

L. Gram Positive Bacilli:

i) Aerobic

a) Corynebacterium diphtheriae. (In Brief)

b) Mycobacterium tuberculosis and Mycobacterium leprae.

ii) Anaerobic bacilli-Clostridia. (In Brief)

M. Antibiotic Sensitivity test - Principles and methods of determination of sensitivity.

Candida. Asperigillus. Dermatophytes. (In Brief)

N. HIV & AIDS:

Brief Account

O. Immunity, Antigens, Antibodies and antigen antibody reaction and their applications in diagnosis of diseases.

P. Principles, Procedures and Diagnostic significance of agglutination Precipitation, Neutralisation and complement fixation reactions.

Q. Collection and processing of Clinical materials like Sputum, Urine, Swabs, Stool, Blood, CSF and Aspirates.

1. b. PARASITOLOGY:**A. Brief Account of:-****Morphology, Life Cycle, Pathogenicity and Laboratory diagnosis of:-**

- E. histolytica, E. Coli, Giardia, Trichomonas, Plasmodia, Leishmania, Hook worm, round worm, whip worm, Tape worm, Echinococcus granulosus, granulosus, dracunculus, Wucheraria bancrofti.

MICROBIOLOGY PRACTICALS:

1. Personal safety and precautions.
2. Emergency treatment for Laboratory accidents.
3. Care and cleaning of Glasswares, syringes, apparatus, preparation of Pasteur pipettes and sealing of ampules.
4. Operation of Autoclave, incubator, Water bath, PH meter, Scitz filter, Ph comparator, Vacuum pump.
5. Operation of Anaerobic system.
6. Urine c/s & Colony count.
7. Pus C/S.
8. Sputum C/S and Blood C/S.
9. Sterilization, Packing, Loading of materials in Autoclave, Hot Air Oven, Inspissator.
10. Handling care of Microscope.
11. Preparation of various Media-Pouring and Storage.
12. Hanging Drop Method.
13. Collection of Clinical Materials - Blood Urine, Stool, Pus Swab, Throat Swab.
14. Receipt and Recording of Specimen in the Laboratory and dispatch of specimen to reference laboratory for tests.

15. Gram Stain, Z.N. Stain, Albert's Stain, Capsule Staining.
16. Inoculation of Clinical Material in Media.
17. Isolation of Organisms in pure culture.
18. Antibiotic Sensitivity test.
19. Disposal of contaminated materials.
20. Fungus Examination by wet mount of culture.
21. Animal house training collection of blood of sheep and horse.

PARASITOLOGY PRACTICALS:

1. Collection, Preservation and Transportation of fecal material for examination of Parasites.
2. Preparation of stained and unstained, fecal material for parasites.
3. Concentration Techniques of Stool.
4. Preservation of Parasites.
5. Identification of Ova and Cyst in Stool. occult Blood.
6. Parasites Blood films.
7. Serology:-
 - Widal
 - VDRL
 - Ra Test
 - CRP Test
 - ASO Test
 - Elisa for HIV-1 & 2
 - HBsAg (Australia Antigen)
 - Pregnancy Test.

8. DIAGNOSTIC SKIN TEST:

Mauntoux Test, Casoni's Test.

**LECTURE WILL BE WITH THE AID OF
CHARTS & OTEHR TEACHING AID MATERIALS**

2. Blood Banking:-

- * Definition of Blood Banking
- * Blood Grouping and procedures for testing.
- * Cross matching in Blood Bank.
- * AIDS , Various procedures for Testing.
- * Blood Donor / Receptor , Procedure of Blood Collection from a donor.
- * Precautions to be taken before Blood Collection.
- * Storage of Blood
- * Anticoagulants, Used is Blood banks.

A. Introduction of Haematology.

B. Collection of Blood

C. Anticoagulants

D. Red Cell Count:

- i) Haemocytometer
- ii) Methods
- iii) Calculation

E. White Cell Count. (Total Leucocyte Count):

- i) Morphology of White Cells.
- ii) Normal Values.
- iii) Romanowsky Stains.
- iv) Staining Procedures.

v) Counting Methods.

F. Absolute Eosinophil Count:

G. Erythrocyte Sedimentation Rate (ESR):

i) Westergren's Method.

ii) Wintrobe's Method.

iii) Factors effecting ESR.

iv) Importance and Limitations.

v) Normal Values.

H. Packed Cell Volume.

i) Macro and Micro Methods.

ii) Normal Values.

I. Haemoglobin Estimation and its clinical importance.

J. Red Cell indices

i) Calculations and importance.

K. Reticulocyte Count:

i) Methods

ii) Appearance

iii) Normal Values.

L. Sickle Cell Preparation.

M. Osmotic Fragility Test:

i) Scoring Test.

ii) Qualitative and Quantitative Test

iii) Normal Values.

iv) Factors allocating fragility.

v) Interpretation.

N. Peripheral Blood Film

O. Preparation of Bone Marrow Smears.

P. Coagulation Tests:

- i) Process of Coagulation.
- ii) Factors of Coagulation.
- iii) Tests of Coagulation:
 - a) Bleeding time.
 - b) Whole Blood Coagulation Time.
 - c) Clot Retraction Test.
 - d) Prothrombin Test.
 - e) Tourniquette.
 - f) Platelet Count.

Q. Urine-Analysis:

- i) Normal Constituent.
- ii) Physical Examination.
- iii) Chemical Examination.
- iv) Microscopic Examination.

R. CSF Examination.

- i) Normal and abnormal Cell count.

S. Semen Analysis:

- i) Physical Examination
- ii) Motility.
- iii) Morphology.

T. Coomb's Test

3. HISTO-PATHOLOGY

- * Sections of Pathology
- * Chemical used in Tissue Processing
- * Decalcification , Methods of Decalcification, &

Decalcification of Bones, Solutions used for Bone Decalcification

- * **Grossing / Embedding , Procedure of Embedding tissue in Paraffin Wax.**
- * **Microtomy , Procedure of Paraffin Wax Tissue Block.**
- * **Various Instruments used in Microtomy**
- * **Microtome Machine**
- * **Tissue Processing in Histopathology manually / Clinically / Automatically.**
- * **Automatic Tissue Processor and its uses in detail**
- * **Tissue Staining. Steps of Tissue Staining.**
- * **Haematoxylin Stain / Eosin Stain/ 1% Acid Alcohol / 1 % Ammonia Solution / ESS Albumin.**
- * **H & E Staining**
- * **Frozen Section its Preparation and staining.**
- * **Fixative and Fixation and their uses.**
- * **Tissue Grossing**
- * **Special Procedures of staining a tissue in Histopathology.**
- * **Tissue staining in IHC.**
- * **Honing / Strapping of Microtome Knife.**
- * **Mounting Materials**
- * **Procedure of Mounting Museum Specimen**
- * **Laboratory Safety, Precautions, Washing Techniques, etc for laboratory Equipment's.**
- * **Incubator and its uses.**
- * **Disposal of Pathology specimens.**

11. Autopsy Technique:

- i) **Assisting in Autopsy.**
- ii) **Preservation of organs & Processing of**

Tissues.

12. Waste disposal and safety in Laboratory.

LECTURER WILL BE WITH THE AID OF CHARTS & OTHER TEACHING AND MATERIALS

4. ADVANCED CLINICAL PATHOLOGY

- Anemia, Various types of Anemia.
- Bone Marrow , Preparation and Staining of Bone Marrow.
- Procedures for BT/CT/PTT/INR Test.
- Reticulocyte and Counting of reticulocyte
- Preparation of sickle Cell.
- Osmotic fragility test.
- Procedure & Precautions for collecting Bone Marrow
- Coombs Test
- CSF Test , Preparation, Collection , Staining procedures.
- Bacteriologically Testing of Urine.
- Bence Jones Testing
- Semen Testing , Counting , Staining (Physically/ Clinically/ Automatically)
- Foetal Haemoglobin
- Haemophilia and its detection
- Stool Collection and Testing(Physically /Chemically/ Microscopically/Bacteriologically)
- Analysers , Handling and maintenance
- Jaundice and investigations
- Diabetes Mellitus , Types , Investigations

5. Cytology

- * Description of cytology in detail
- * Fixatives used in cytology
- * Dry Fixation and Wet Fixation
- * Stains used in Cytology , Preparation of stains in cytology , Various Types of Stains in Cytology.
- * BLF Cytology
- * Sex Chromatin staining in Cytology.

Practical Part must include following:

1. Use of Microscope & Care.
2. Haemoglobin estimation.
3. ESR
4. RBC Count.
5. WBC Count
6. Platelet Count
7. Absolute Eosinophil Count.
8. Reticulocyte Count.
9. PCV.
10. Leishman Staining and PBF -Normal and abnormal cells.
11. Bleeding time.
12. Clotting time.
13. Bone Marrow Aspiration-Staining, Staining for Iron Stores.
14. Prothrombin Time-PTI
15. Tests for G6PD deficiency.
16. foetal Haemoglobin Estimation.
17. Serum / Urine Electrophoresis.
18. Coomb's Test.

URINE EXAMINATION:

1. Physical Examination - Colour, Reaction, Odour, Specific gravity Urinary Volume.

CHEMICAL EXAMINATIN:

1. Tests for protein, 24 hours urinary proteins.
2. Bence Jones Proteins.
3. Tests of Sugar, Ketone bodies.
4. Urine for bile salts, bile pigments and Urobilinogen.
5. Microscopic examination of urine.
6. Semen Analysis.

PRACTICALS MUST INCLUDE FOLLOWING:

1. Fixation Processing, Embedding, Section cutting and preparation of Slides.
2. Staining of Sides H & E Reticulin, PAS, Masson Trichrome.
3. Sharpening of knives for microtomes.
4. Preparation of adhesive to fix the section to the slide.

PRACTICALS MUST INCLUDE FOLLOWING:

1. Collection of sample for Cytological examination of various body fluids.
2. Preparation and fixation of cytology smears. Giemsa and papanicolaou staining technique.
3. Sex Chromatin technique.
4. FNAC.

2. BLOOD BANKING:

- A. Introduction and Historical aspects.
- B. Human Blood Group Antigens, their inheritance and antibodies.
- C. ABO Blood Group System.
 - i) Sub-Groups

- ii) Source of Antigens, types of antibodies.
- D. Rh. Blood Group System:
 - i) Nomenclature and types of Antigens.
 - ii) Mode of inheritance.
 - iii) Types of Antibodies.
- E. Other Blood Group System.
- F. Techniques of Grouping and Cross Matching.
- G. Blood Collection:
 - i) Selection and Screening of Donor.
 - ii) Collection of Blood.
 - iii) Various anticoagulants used.
 - iv) Storage of Blood.
- H. Blood Transfusion:
 - i) Procedures and Complications.
 - ii) Blood Transfusion Reaction, Types, Investigation and Presentation of Transfusion Reaction.
- I. Coomb's Test.
- J. Organization, operation & Administration and Blood transfusion techniques.

PRACTICALS MUST INCLUDE FOLLOWING:

- 1. ABO Grouping
 - i) Slide Technique.
 - ii) Tube Technique.

2. Cross Matching:
 - i) Methods of Major Cross Matching.
3. Rh. Typing:
 - i) Rapid Tube Test.
 - ii) Saline Anti-D
 - iii) One Stage Albumin Technique.
 - iv) Two Stage Albumin Technique.
 - v) Coomb's antihuman globulin technique.
4. Coomb's Test:
 - i) Direct Coomb's
 - ii) Indirect Coomb's.
5. Donor Screening and Selection:
 - i) Identification.
 - ii) Recording
 - iii) Haemoglobin estimation.
 - iv) Relevant Medical History of the Donor.
 - v) Grouping and Typing of Donor's blood.
6. Drawing of Blood.
 - i) Asepsis.
 - ii) Reassurance.
 - iii) Vein Puncture and Collection.
 - iv) Care of Donor.
7. Blood Storage:
 - i) Anticoagulants preparation.
 - ii) Recording the details and storage of Blood.
 - iii) Maintenance and cleaning of various equipments used in Blood Bank.