

SYLLABUS FOR LAB ASSISTANT IN MCD

HAEMATOLOGY

1. E.S.R. Principles – normal and interpretation Various Method Demonstration.
2. Hemoglobin – formation fate and functions, Normal ranges, physiological and pathological variations
3. Various principals for methods in Hemoglobinometry; Standardization.
4. Interpretation of TLC & DLC. Leukocytosis, Physiological and Pathological, Arneht counts, Leukopenia, eosinophilia, lymphocytosis,
5. Anaemia, R.B.C., morphology, normal and abnormal – hypochromia, anisocytosis, polychromasia, Cabot Rings, Basophilic, Stippling, Reticulocyte.
6. The Hematocrit – macro and micro methods; Hematocrit ratio to Hb, Erythrocytic indices, Interpretation.
Demonstration of Micohematocrit
7. Origin, formation and fate of Blood cells, Theories of Blood cell formation. Bone Marrow sites.
8. Maturation of Blood cells – myeloid series.
9. Maturation of Blood cells – lymphocyte and monocytic series and megakaryocytic series.
10. Maturation of Erythrocytic series – Normoblastic and megaloblastic maturation.
11. Theory of Blood coagulation. Factors involved. Extrinsic and Intrinsic Pathway. Cascade Theory.
12. Various sample tests
 - a) Bleeding Time – Duke and Ivy method
 - b) Coagulation Time – Lee White Capillary and Slide Method
 - c) Prothrombin Time – 1 stage and 2 stage
 - d) Clot Retractione/
 - e) Platelet Count
 - f) Thrombin Time
 - g) Partial Thromboplastic Timeh
 - h) F.D.P.
- 13 Principle, interpretations and demonstrations
- 14 Reticulocyte count – various methods Interpretations and Demonstration
- 15 L.E. Principle – various methods. ANF Test. Demonstration
- 16 PMNS smear, Filarial preparation, eosinophil count principle, interpretation and source of error.
- 17 Hemoglobin – structure in detail, formations fate, abnormal Hemoglobin, methods of study – Sickle Test, Eb, electrophoresis test. Demonstration.
- 18 Iron Metabolism
- 19 Classification of anemia and microcytic (Iron Deficiency) anemia.
- 20 Macrocytic anaemia including Pernicious Anaemia – causes, Lab. Findings.
- 21 Hemolytic anaemia – Classification, Gen. Lab. findings.
 - a) Congenital anaemia. Spherocytic anaemia, Osmotic fragility
 - b) Acquired hemolytic anemia. Drug induced.
 - q Hemoglobinopathies, Sickle cell Hb.C. Thalassemia.
 - d) P N H and cold hemolytic anaemia.
 - e) Enzyme deficiencies including tests.
- 22 Aplastic anaemia, myelofibrosis
- 23 Polycythemia, Leukemia – acute and chronic
- 24 Purpura and Hemorrhagic disease, Hemophilia
- 25 Bone marrow aspiration. Staining and differential and reporting.

BLOOD BANK

1. ABO System, antigens sub-groups of A Bombay O. Antibodies of ABO systems. Nature of antibodies. Anti A.B. Anti H.
2. ABO testing slide and tube test. Reverse grouping. Discrepancies between cell and serum results, sources of error. Rouleaux formation and methods of checking this.
3. Rh system. Nomenclature, Due system and its significance, nature of Rh antibodies. Clinical significance phenotype and genotype.
4. Rh grouping test. Slide or Rapid Tube Test. False positive and false negative results.
5. Cross matching of Blood. Principles, Reasons for X match. Saline albumin, Coombs, Enzymes in testing.
6. Labelling of tubes, Methodology, legal implications, Incompatible Crossmatch. Auto antibodies, plasma expanders, multiple myeloma etc. affecting a X-match. Difficulties in X-matching, and methods of investigations.
7. Anticoagulants for blood preservation, ACD, CPD, CPD A-1. Heparin advantages and Disadvantages. Shelf life of blood Changes taking place in blood on storage, Na, K etc.
8. Reception of donors, indirect questioning of eliciting medical history. Types of donors, Rejection of donors in certain diseases and history of diseases. Physical examination of donor and test done on donor's blood for safe transfusion of blood. Technique and importance of sterile technique in drawing blood.
9. Various donor reactions and their remedies. Facts of blood donations, precautions and care to be taken during and after blood donation. Need of giving refreshments to the donor. Emergency kit.
10. Coombs Test – Direct and Indirect. Principle, explanation of procedure and sources of error. Control, interpretation and clinical application. Different types of Coombs's sera.
11. Transfusion reactions. Handling of Transfusion Reactions in Blood Bank.
12. Demonstration of Coombs Tests – Direct and Indirect
13. Hemolytic disease of the new born due to anti – D or ABO. Mechanism of the disease. Blood for exchange and tests done on cord blood.
14. Other blood group systems. Kell, Duffy, MNS and its importance. H.L.A. system, Enzymes in Blood Banking. Use of LISS.
15. Antibody Titrations, reasons and methodology.
16. Blood Component Therapy.

IMMUNOLOGY AND SEROLOGY

1. Definition of Immunity and the immune system of the body immuneresponses. Basic definitions
2. Basic aspects of the immune response
 - a) Humoral division
 - b) Cellular division
3. Antigens and heptens. Types of antigen. Types of immunization Heterophile antigens, Alloantigens.
4. Basic Structure, biological properties of immunoglobulins complement.
5. Methods of detection and measurement of antibody and antigen
 - a) Preceipitation
 - b) Ring test (original C Reactive Protein)
 - c) Gel – Immune diffusion. Single and double immuno-diffusion.
6. Redial Immunodiffusion, counter immuno-electrophoresis Agglutination test. Direct agglutination, Titration, Prozone reaction fibrile agglutinins.
7. Slide agglutination and tube agglutination Widal tests, complement fixation test – principle Immunoflourescence test.

- Principle and interpretation of various, immunological tests done by the Laboratory.
8. Pregnancy test, (including the historical background and Bioassays). A SO, CRP, RP, ANF and autoimmune disorder, Wider VDRL (Kahn, was erman's test TPI, TPI, RPCF, FLA, ABS).
 9. EIA and RIA – Principle; Viral Hepatitis and the markers.
 10. Syphilitic Serology – Kahn, VDRL, RPR.
 11. Indirect of passive agglutination
 - a) Using RBC as carriers (Coated RBC) Pregnancy tests HBs Ag.
 - b) Latex coated particles fixation, Bentonite, Rheumatoid factor; Pregnancy latest (Gravindex) pregtel ASL and CRPA.
 12. Complement fixation tests and Wassermann Reaction
 13. Immune Florescence tests
Fluorescent labeled antibody techniques.
F.T.A. for syphilis.
ANA or ANF tests for L.E.
 14. Auto Immunity auto immune disease LE cell ANA or ANF
 15. Hypogammaglobunemia
 16. Hypergammaglobunemia Cryoglobunemia
 17. Organ transplantation

CLINICAL CHEMISTRY/ BIOCHEMISTRY

1. Principles in brief of the various methodologies.
2. Principle, brief procedure, Reagent ingredients and functions sources of errors and precautions and standardization.
3. Brief Metabolism and Clinical Interpretation.
4. Care and precautions, in general, to be used in Biochemical testing.
5. Urea Methods: a/ Diacetyl Monoxime b/ Bertholets
6. Bilirubin:
 - a) Mallery Evlem
 - b) Jendrassik and grof
7. Neonatal jaundice and direct spectrophotometric method of Bilirubin estimation Advantages and Disadvantages.
8. Creatinine
9. Enzymes – general considerations, units of measurement, Factors effecting and types of assays.
10. Amylase caraways method
11. Protein free filtrates
12. Creatinine estimation – Jaffe's reaction
13. Calcium
14. CSF. Physical, chemical and cytological examination methods and procedures used and clinical interprets.
15. Basic concepts in Biochemistry, atomic and molecular symbols and formulae; various types of solutions, Molar, Normal definitions and calculations; various types of chemicals.
16. SGOT & SGPT – Reitman frankel method
17. Alk P'tase. BLB method
18. Acid P'tase BLB method
19. Serum proteins. Total protein by Biuret method and Albumin by BCG method
20. Review of Beer's Law and Spectrophotometry.
21. Principles of spectrophotometry and use of flame Photometer. Estimation of :
 - a) Na^+
 - b) K^+

- c) Cl
- d) HCO₃

22. Lipid metabolism and estimation
 - a) Cholesterol
 - b) HDL Cholesterol
 - c) Triglycerides
 - d) Total Lipids.
- 22 Fractional test meal and analysis of gastric contents. Augmented histammic test. Hallenders test.
- 23 Transudates and exudates; Phosphorus.
- 24 Quality Control
- 25 Acid, Base, PH, Indicators, Buffers.
- 26 Electrolytes, Acid, Base and Water balance
- 27 Primary and Secondary standards.
- 28 Revision of :
 - a. Carbohydrate
 - b. G.T.T. and metabolism, intermediary metabolism and Ketosis
 - c. Urea metabolism and Kidney function test.
 - d. Bilirubin metabolism and liver functions test.
 - e. Calcium and Phosphorus metabolism.
 - f. Proteins metabolism and electrophoresis
- 29 Brief understanding of :
 - a) T3 T4 TSH
 - b) CPK
 - c) VMA
 - d) Cortisols
 - e) Estrogen/Progesterone
 - f) Hormones
- 30 Introduction to automation in clinical chemistry, Basic concepts, types of analyzers.

URINE ANALYSIS

1. Physical and Chemical examination of urine by strip – appearance, colour , specific gravity ,pH ,Alb. Sugar.
2. Demonstration of technique; Chemical examination of urine by other methods. Albumin Sulfosalicylic acid method; Glucose – Benedict's method.
3. Urinary sediments – Methods of obtaining sediment; Organic and Inorganic sediments: normal and abnormal sediments.
4. Principles of Albumin tests with interpretation. 24 – hour semiquantitative test for albumin; Bence Jones protein methodology.
5. Principle of tests for glucose in urine – various methods.
6. Bile pigments and urobilinogen in urine; Principle and various methods; Demonstration of Harrison's Spot Test; Metabolism of bile pigments; Interpretation.
7. Watson's semiquantitative test and tests for Porphobilinogen; Demonstration of techniques.
8. Porphyrine in urine – various tests; clinical significance; Demonstration of techniques.
9. Ketone bodies in urine – principles and interpretation; Demonstration of techniques.
10. Occult Blood in urine; principles, various methods; sources of error; Demonstration of technique.
11. Semen analysis; reasons for it and interpretation.
12. Urine calculi; reasons for formation; clinical significance; Demonstration of technique and test.
13. Semi quantitative and 24 – hours tests for urinary calcium (Sulkowitch) and chloride (Fantu's);

- Demonstration of technique.
14. Tests for Melanin, Indian PKU, Homogentisic acid; Demonstration of technique.
15. Renal Function Tests – principle of concentration and dilution tests
P.S.P. Dye Test.
16. Addis Count – Various preservatives for 24 – hours samples of urine, volume of urine in 24 – hours; change in urine on standing.

BACTERIOLOGY

1. Structure and Biology bacteria; respiration; reproduction, nutrition and growth.
2. Methods of sterilization with equipment used:
a/ Physical
b/ Chemical
c/ Irradiation, etc.
3. Basic constituents of culture media; various types of culture media; Liquid and solid media; Semisolid media – differential, selective, enriched.
4. Methods of inoculation and streaking liquid; semisolid and plates aerobic and aerobic methods of culture.
5. Review Gram's and AFB staining methods and capsular and Albert's stain; demonstration in all of these to be taken regularly in the 1st month.
6. Gram +ve Staphylococcus. Catalase and coagulase tests.
7. Streptococci, Pneumococcus, bacitracin test, optochin and Bile solubility tests.
8. Neisseria
9. Enterobacteriaceae with classification, Code I, Code II, Metilites full code.
10. E Coli, Klebsiella and Enterbacter.
11. Edwardsiella, Alkalescens dispar, serratia and Hafnia with Gillies code.
12. Pseudomonas, Aeromonas, Mima, Alkaligenes.
13. Proteus, Providence.
14. Salmonella, Citrobacter, Arizina.
15. Shigella
16. Vibrios, Hanging drop
17. Non- intestinal gram negative bacteria; Hemophilus, Brucella; Pasterueulle, Bordetella; Bacterioides.
18. Gram positive bacteria – (Corynebacteria; Listeria; Chosticia); Bacillus species
19. Spirochetes and Spirillum
20. Mycobacteria
21. Virus Rickersia
22. Fungus
23. Normal flora of various areas in the body
24. Chemical disinfectants and methods of study of disinfectants.
25. Antibiotics and sensitivity.

PARASITOLOGY

1. Protozon classification and general morphology.
2. E.Coli, E. Histolytica and other Rhizopodia.
3. Flagellates ex. Trichomonas, Giardia intestinalis, etc.
4. Malaria Parasites, Life cycle – various stages.
5. Hemoglagellates, Trypanosomes Leishmania.
6. Nematode classification; Trichnella spiralis; Trichuris; Trichura.
7. Round Worms and Pin Worm.

8. Hook Worms and Strongyloides
9. Platyhelminths – classification and names with general outline.
10. Tenia Saginata; T. Solium; H.Nana
11. Echinococcus Granulosus; D. Latum.
12. Tissue Nematodes; Wuchcheria Bancrofti Brugia; loa loa.
13. Onchocera; Dracunculose medinosis.
14. Methods of Examination of Stool for Parasites and for Protozoa.

ELEMENTARY HISTOPATHOLOGY

1. Introduction to Histopathology sources and types of Histopathological specimens received, records, labeling and general rules when receiving aspecimen.
2. Fixation, properties of fixing fluids, Classification of fixatives, simplefixatives and compound fixatives.
3. Decalcification
4. Processing – Dehydration, Principle. Various clearing agents,advantages and disadvantages of each.
5. Processing Count, Clearing, Principle. Various clearing agents,advantages and disadvantages of each.
6. Impregnation with paraffin. Type of paraffin. Advantages and Disadvantages.
7. Embedding and Blocking.
8. Impregnation; embedding and blocking with various water soluble masses.
9. Various equipments and methods used in Histology for processing,Histokinette etc.
10. Microtomes and Knaves, Care
11. Hones, strops, homing and stopping, methodology and checking the results attaching blocks to carriers.
12. Cutting and sectioning knife angle. Errors in sectioning and their remedies.
13. Separating and identifying sections.
14. Decalcification of Stains, types of stains, mordents and differentiations.
15. Separating and identifying sections.
16. H & E staining methods and principles involved in staining.
17. Papanicolaou staining.
18. Skeletal system – various bones, joints Bone Marrow, face bones, skull,vertebrate, ribs, pelvis, Limbs.
19. Joints – movable and immovable.
20. Muscular System, Muscles, tendons, ligaments, diaphragm.
21. Circulatory System, Heart, great blood vessels, arterial and venous system, capillaries, foetal circulation.
22. Lymphatic system.
23. Respiratory system
24. Digestive System
25. Nervous System
26. Endocrine system