GURUKUL EDUCATIONAL AND RESEARCH INSTITUTE

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

Subject and Syllabus

2022-23

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Syllabus

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

(1ST YEAR)

DURTATION:- 2 YEARS

449 ANATOMY & PHYSIOLOGY

Module 1:

Introduction to anatomy Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

Module 2:

Cardio Vascular System Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders

Module 3:

Respiratory System various parts of respiratory system and their functions, Physiology of Respiration

Module 4:

Digestive System names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption

Module 5:

Urinary System various parts of urinary system and its function-structure and function of kidney physiology of urine formation - pathophysiology of renal disease and edema

Module 6:

Reproductive System physiology and anatomy of Male & Female reproductive system-Prostate & Uterus & Ovaries etc

Module 7:

Musculoskeletal System Classification of bones & joints, structure of skeleton –structure of skeletal muscle – physiology of muscle contraction Module 8: Nervous System various parts of nervous system- Brain and its parts –functions of nervous system - Spinal Cord & Nerves

Module 8:

Ear, Nose, Throat and Eye Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision

Module 9:

Endocrine System Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus

Module 10:

Haemopoietic and Lymphatic System Name of the blood vessels & lymph gland locations

Module 11:

Surface Anatomy & Surface Markings of Human Body

Practical's

- Study of Human Skeleton parts with skeletal models..
- Study with charts and models of all organ systems mentioned above
- Microscopic slides examination of elementary human tissues, cells.

450 BIOCHEMISTRY

Module 1:

Carbohydrates Glucose and Glycogen Metabolism

Module 2:

Proteins: Classification of proteins and functions

Module 3:

Lipids: Classification of lipids and functions

Module 4:

Enzymes Definition – Nomenclature – Classification – Factors affecting enzyme activity – Active site – Coenzyme – Enzyme Inhibition – Units of enzyme – Isoeznzymes – Enzyme pattern in diseases.

Module 5:

Vitamins & Minerals: Fat soluble vitamins(A,D,E,K) – Water soluble vitamins – B-complex vitamins- principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur)- Trace elements – Calorific value of foods – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action(SDA) – Balanced diet – Marasmus – Kwasoirkar

Module 6 :

Acids and bases: Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality

BIOCHEMISTRY SYLLABUS FOR PRACTICALS

1 Benedict's test

2. Heat coagulation tests

458 FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY

Module 1:

Introduction to Clinical laboratory Basic laboratory principles - Code of conduct of medical laboratory personnel The use of the laboratory - Basic laboratory principles - Code of conduct of medical laboratory personnel -Organization of clinical laboratory and role of medical laboratory technician - Safety measures - Medical laboratory professional and professionalism in laboratory workers - clinic borne infection and personnel hygiene

Module 2

Common Laboratory Equipment's Incubator, Hot Air Oven, Water Bath - Anaerobic Jar, Centrifuge, Autoclave -Microscope - Fundamentals of Microscopy, Resolution & Magnification, Light Microscopy, Electron Microscopy- Glassware – Description of Glassware, its use, handling and care

Module 3:

Basic Steps for Drawing A Blood Specimen Requirement of Blood Collection - Blood collection - Phlebotomy - Sampling errors - Collection and preservation of biological fluids - Anticoagulants - Preservation of samples - Chemical preservatives - Process of analysing the specimens - The laboratory report.

Module 4:

Preparation of Reagents & Quality control Buffer and pH- Preparation of reagents : Normal , per cent and Molar solution - normal saline -Methods of measuring liquids- Clinical Laboratory records- Modern Laboratory set up - Quality control: Accuracy, Precision, and Reference values.

Module 5:

Manual Vs Automation in Clinical Laboratory Types of analyzers - Semi-auto analyzer - Batch analyzer - Random Access autoanalyzers. Steps in the automated systems - Responsibilities of a technician in the maintenance of the analyzers.

Module 6:

Characteristics of laboratory Substances The chemical composition, structure, and properties of substances. The chemical processes and transformations that they undergo including the use of chemicals and their interactions, danger signs, production techniques, and disposal methods

451 MICROBIOLOGY& IMMUNOLOGY

(Theory Outline)

Module I.

Introduction and brief history of Microbiology Historical Aspect -Branches of Microbiology-Prokaryotic Organisms - Prokaryote Vs Eukaryote-Cell Wall, Structures external to Cell Wall, Structures internal to Cell Wall, Spores.-Eukaryotic Organisms - Structure of eukaryotes, Characteristics of eukaryotes,

Module II.

Common Laboratory Equipments Incubator, Hot Air Oven, Water Bath - Anaerobic Jar, Centrifuge, Autoclave -Microscope - Fundamentals of Microscopy, Resolution & Magnification, Light Microscopy, Electron Microscopy- Glassware – Description of Glassware, its use, handling and care

Module III.

Sterilization Definition -Classification and General Principle of Sterilization

Module IV.

Antiseptics & Disinfectants Definition -Types - Mode of Action – Uses

Module V:

Growth and cultivation of Microorganisms. Nutritional requirement of microorganisms-Types of media-Microbial growth and growth curve-Collection, Transportation and processing of clinical samples for Microbiological investigations.

Module VI:

Bacteriology Definition - Bacteria – General characteristics of Bacteria -Classification and morphology of Bacteria - Staphylococcus, Streptococcus, Pneumococcus, Neisseira gonorrhoea, Neisseira meningitis, Cornybacterium diptheriae, Mycobaterium, Clostridium, E.coli, Klebsiella, Salmonella, Proteus, Pseudomonas, Vibrio & Spirochaetes with reference to their : - Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis.

Module VII

Virology : Definition - General Introduction of Virus - Physiochemical characteristic of Viruses - Isolation of Viruses in Laboratory by tissue culture -Cell and tissue culture technology - Embryonated Egg - Principles of animal cell culture and their use in Virology - Retro viruses - HIV, Hepatitis virus , Pox virus , Picrona virus - Polio - Orthomyxo virus - Influenza - Arbo virus - Chikungunya, Dengue - Herpes and Adeno virus with reference to their mode of infection, pathogenesis and diagnosis-Bacteriophages

Module VIII

Parasitology : Introduction of parasitology and classification - Protozoa - Rhizopoda - Mastigophora (Haemoflagellates, Intestinal and genital flagellates)- Sprozoa (Malarial parasite, Toxoplasma)- Helminthes -Nematodes (Ascaris, Hookworm, Whipworm, pinworm, strongyloides trichinella, Filaria,Dracunculus medinensis) - Cestodes (Taenia Saginata, T. Sclium, Echinococcus, D. atum, Hymenolepis nana)Trematodes

Module IX

Mycology Definition - Structure – Classification-Cutaneous & Sub cutaneous and Systemic Mycosis - Opportunistic fungal infections -Diagnosis of fungal infections.

Module X

Immunology: Introduction -Non specific resistance to infection -Specific immunity. Antigens. AntibodiesStructure and function.- Complement and antigen-antibody reaction. Hybridoma and Monoclonal antibodies. Applied immunology -Hypersensitivity. -Autoimmunity. -Transplantation and Tumour immunity.

452 MICROBIOLOGY & IMMUNOLOGY

(Practicum Outline)

1. Use and care of microscopes.

2. Measurement of microbes by micrometry.

3. Simple staining methods and gram stains

4. Special staining methods – capsule, spore, acid fast, Metachromatic etc,

5. Tests for motility in bacteria.

6. Preparation of media.

7. Using of autoclave hot air oven, other common laboratory equipment etc.

8. Disinfection practices in laboratory and wards.

9. Assay for disinfection.

10. Techniques of cultivation of bacteria.

11. Isolation of bacteria from clinical specimens.

12. Biochemical testing – Catalase, oxidase, citrate, urease, TSI,Carbohydrate fermentation,MR VP, Indole

13. Purification of microbial cultures.

14. Standard Plate Count.

15. Antibiotic sensitivity test

16. Isolation, Characterization and identification of pathogens from various clinical specimens.

17. Techniques in tissue culture.

a. Demonstration of Cytopathogenic effect (CPE)

b. Haemagglutionation test.

c. Haemagglutination inhibition test.

d. Viral Serology,PCR

2. Mycology:

a. Lactophenol blue staining.

b. KOH Preparation.

c. Morphology of fungi.

d. Yeasts.

e. Culture demonstration of contaminants- Aspergillus, Penicillium, Mucor, Rhizopus

f. Dermatophytes.

g. Dimorphic fungi.

3. Study of antibiotic sensitivity of common pathogens

4. Examination of stool for parasites.

5. Culture techniques for parasites

FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY

(practicum)

1. Handling common laboratory equipment's

2. Preparation of various reagents.

3. Responsibilities of a technician in the maintenance of the analyzers.

4. Use and care of microscopes.

5. Measurement of microbes by micrometry.

6. Simple staining methods and gram stains

7. Special staining methods – capsule, spore, acid fast, Metachromatic etc,

8. Tests for motility in bacteria.

9. Preparation of media.

10. Using of autoclave hot air oven, other common laboratory equipment etc.

11. Disinfection practices in laboratory and wards.

12. Assay for disinfection.

13. Techniques of cultivation of bacteria.

14. Isolation of bacteria from clinical specimens.

15. Biochemical testing – Catalase, oxidase, citrate, urease, TSI,Carbohydrate fermentation,MR VP, Indole

16. Purification of microbial cultures.

17. Standard Plate Count.

18. Antibiotic sensitivity test

19. Isolation, Characterization and identification of pathogens from various clinical specimens.

20. Techniques in tissue culture.

a. Demonstration of Cytopathogenic effect (CPE)

b. Haemagglutionation test.

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d. Viral Serology,PCR

21. Mycology:

e. Lactophenol blue staining.

f. KOH Preparation.

g. Morphology of fungi.

h. Yeasts.

i. Culture demonstration of contaminants- Aspergillus, Penicillium, Mucor, Rhizopus

j. Dermatophytes.

k. Dimorphic fungi.

22. Study of antibiotic sensitivity of common pathogens

23. Examination of stool for parasites.

24. Culture techniques for parasites

457 CLINICAL BIOCHEMISTRY, PATHOLOGY AND HISTOPATHOLOGY

Module 1:

Introduction to clinical biochemistry Definition of bio-chemistry, use of biochemical tests-the application of biochemistry in hospital setting.

Module 2:

Photometery Introduction and definition of photometry. Colorimetry - Lambert Beer's Law - Parts of photo colorimeter

Module 3:

Electrophoresis & Chromatography Introduction and General principle of Electrophoresis: Forces acting on the component in an electrophoresis system - Factors affecting the electrophoresis - Types of Electrophoresis - Applications - Separation of Serum Proteins by Agar Gel Electrophoresis. Chromatography Technique: General principle - Classification of chromatography - Principle of partition chromatography - Procedure - Other Chromatographic Techniques - Adsorption chromatography - Thin layer chromatography - Gas-liquid chromatography - Ion -exchange chromatography - Gel filtration chromatography - Affinity chromatography - HPLC (High performance liquid ChromCatography

Module 4:

Evaluation of organ function test Function of liver in health and disease: Jaundice, Hepatitis; liver function test. Assessment and clinical manifestation of renal, hepatic, pancreatic, gastric & intestinal function, enzyme of pancreatic origin and biliary tract, test of myocardial infarction.

Module 5:

Enzymes as clinical diagnostic tools. Endocrinal disturbance: protein hormones and hormones of hypothalamus, pituitary, thyroid and steroid hormones- In born errors in metabolism: Introduction, Metabolic disorders of carbohydrates- galactosemia, glycogen storage disease, deficiency of glucose6-phosphate dehydrogenase, Hypoglycemia, Diabetes mellitus. Metabolic disorder of lipid: Tay-Sachs disease, Nieman Pick disease. Metabolic disorder of amino acid: phenylketonuria, alkaptonuria, Maple syrup urine disease. Metabolic disorder of nucleotides: gout, Lesch-Nyhan Syndrome.

Module 6:

Antibiotics Classification. Primary mode of action of penicillin, streptomycin, chloramphenicol, tetracycline, actinomycin D, mitomycin C, polyenes, mechanism of antibiotics resistance, multiple drug resistance.

Module 7:

Introduction - Tissue Preparation - Receipt of specimens - Labeling of specimens with numbering – Fixation - Aims and functions of a fixative - Classification of fixatives - Simple fixatives - Compound fixatives - Micro anatomical fixatives - Cytological fixatives - Histochemical fixatives - Post-chromatization - Fixation of specimens - Fixation for individual tissues – Dehydration - Ethyl alcohol – Acetone - Isopropyl alcohol – Dioxane - Clearing (Dealcoholisation) - Cedar wood oil – Benzene – Xylene – Chloroform - Embedding Media - Paraffin wax – Paraplast - Paraplast plus – Gelatin - Water soluble waxes – Celloidin - Techniques of impregnation - Embedding or Blocking - Type of mould - Techniques of moulding - Decalcifying Agents - Selection of the tissues - Determination of end point - Neutralization of acid - Washing - Decalcifying agents - Use of ion exchange resins - Chelating agents - Electrophoretic

decalcification - Treatment of hard tissues - Section Cutting: Microtomes, Microtome knives, Sharpening of knives, Care of microtome knives - Techniques of section cutting - Mounting of Sections - Automatic Tissue Processor (Vacuum) - Application of Microwave Technology to Histology – Principle – Applications

Module 8:

Handling and Embedding of Tiny Tissue Biopsies Introduction - Labeling of Tissues - Fixation and Cutting of Small Biopsies - Renal biopsies - Intestinal biopsies - Skin biopsies - Muscle biopsies - Other tissues - Orientation of Tissue Blocks

Module 9:

Staining Techniques Routine staining techniques - Special Stains

Module 10:

Frozen Technique Introduction - Frozen Section – Overview - Use of Freezing Microtome – Fixation - Freezing Microtome - Fixing sections on slides - Staining of frozen sections (rapid staining) - Advantages and disadvantages - Frozen Sections Using Cryostat – Uses - The Cryostat - LEICA CM 1850 Cryostat - The components - Set up of instrument prior to operation - Operation of the Cryostat - Terminating work - Trouble shooting - Cleaning, disinfection, maintenance - Staining of Frozen Sections for Rapid Diagnosis

Module 11:

Cytotechnology Introduction - Specimen Collection - Specimen samples - Fine needle aspiration cytology (FNAC) – Preservation - Fresh specimen - Prefixation refers - Preparation of Smears - Viscid Secretions - Body fluids – Sputum - Precautions against infections – Fixation - Fixation method falls into one of 3 categories - Alcohol fixatives - Unstained smears which require to be mailed to a cytology laboratory – Staining - Papanicolaou method - Maygrunwald giemsa (MGG) stain - Mounting - Destaining Procedures - Automation Mass screening methods for early detection of cancer, Sputum examination

Module 12:

Examination of Urine Introduction – Formation of urine, Collection of Urine - Special type of collection of urine - Biohazard management - Components of routine urine analysis - Colour - Clarity - Odour - Volume - Chemical Examination - Sugar in Urine - Tests for Sugar In Urine - Benedict's Test - Fehling's test - Chemistrip method - Protein in Urine - Test for Protein in Urine - Heat and Acetic Acid Test - Sulphosalicylic Acid Test - Heller's Test. - Heat and Acetic Acid Test - Ketone Bodies in Urine - Test for Ketones in Urine - Rothera's Test - Gerhardt's test - Bile in Urine - Test for Bilirubin - Fouchet's Test - Test for Bile salts - Hay's Test - Blood in Urine - Test for Hematuria - Benzidine Test - Guaiacum Test -

Gregersen's Test. Microscopic Examination of Urine: Crystals Found In Urine - Crystals Found In Acid Urine - Uric Acid & Urates - Calcium oxalates in Crystals - Cystine Crystals - Leucine and tyrosine crystals - Drug crystals - Crystals Found In Alkaline Urine - Ammonium magnesium phosphates - Dicalcium phosphates - Calcium carbonate - Ammonium biurate - Casts In Urine - Cells in Urine:- Red Blood cells, Pus cells, Epithelial cells, Spermatozoa, Bacteria, Tumour cells Examination of stool- physical, chemical & microscopic examination

Module 13:

Body Fluids: Characteristics of Cerebrospinal Fluid. - Synovial fluid - Pleural fluid - Pericardial fluids - Peritoneal fluids-Semen analysis- physical, chemical & microscopic examination, sperm count,motility,

CLINICAL BIOCHEMISTRY (Practicum)

- Glucose Determination - Body Sources Of Glucose - the Clinical Significance Of Abnormal Blood Sugar Levels - The Glucose Oxidase Method Of Glucose Determination -The Colormetric Method--Ortho-Toluidine - The Glucose Tolerance Test (GTT) - Glycated Hemoglobin
- Enzymatic using urease - 'Neseler's Method - Berthelot Reaction - In the urease/glutamate dehydrogenase method - Kinetic Method - GLDH method - Colorimetric Method - Diacetyl Monoxime Method - Estimation of Serum Creatinine
- Biuret Method Bromocresol Green Method
- Modified Reitman & Frankel Method
- King & King Method
- Jaundice - Biochemical tests - Unconjugated Hyperbilirubinaemia (Retention Jaundice - Haemolytic (Pre-hepatic Jaundice) - Non haemolytic - Conjugated Hyperbilirubinaemia (Regurgitation Jaundice)
- Lipid profile - Total lipids – Phospholipids
- Sackett's Method
- Estimation of Serum HDL cholesterol
- Method of Fiske and Subbarow
- Caraway's Method of Estimation - Hyperuricaemia – Hypouricaemia
- Collection of specimen and its preservation - Preservatives used – Physical examination of urine - Colour - Appearance - Turbidity - Specific gravity - Volume - Polyuria - Oliguria - Anuria - PH - Chemical Examination - Proteins - Glucose / Reducing Substances - Ketone Bodies - Blood - Bilirubin - Urobilinogen -Tests - For Proteins - Heat test - TCA test - For Sugars - Benedict's Tests - For Blood/Haemoglobin - Benzidine test - For Ketone bodies: Rothera's nitroprusside test - Gerhardt's Test. For Bile Salts: Hay'sTest - For Bile Pigments - Fouchet'sTest

- Collection- Appearance-Analysis of Cerebrospinal fluid- Synovial Fluid- Pleural Fluid- Pericardial Fluid- Peritoneal Fluid- Seminal Fluids- Needle aspiration Cytology- Discharge from any site. Determine the presence of normal or abnormal components-Know what is implied by the

presence of abnormal constituents in body- Reporting of abnormal constituents. Relevant legislation, standards, policies, and procedures followed in the hospital.

- Assessment of the patient- Preparation of patient for the procedure-Education of the patient for the procedure- Procedure-Measures for the prevention of infection

453 HISTOPATHOLOGY (PRACTICUM)

- Fixatives
- Processing Of the Tissues Including Bone
- Embedding
- Section Cutting
- Staining & mounting
- Special stains
- Handling and embedding of tiny tissue biopsies
- Frozen section technique
- Techniques Equipments &Procedures
- Specimen Collection and Preparation
- Staining Procedure and Mounting
- Preparation of Fluids for Cytological Examination
- Paraffin section cutting.
- H & E staining
- Special staining
- PAS staining, principle & uses.
- Reticulin
- PTAM
- Van gerson
- Amyloid stain, pearl stain
- Melanin bleach & masson's Fontana AFB staining (TB and Leprosy)
- Pap staining
- MGG staining for enac
- Museum techniques
- Preparation of mounting medium & mounting of specimen-

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

(2ND YEAR)

454 PATHOLOGY

- Examination of Urine – Physical, chemical and microscopic
- Examination of Body fluids
- Semen Analysis
- Stool Examination

BLOOD BANK SERVICES & HEMATOLOGY

BLOOD BANK SERVICES

Module 1:

Blood Grouping Introduction- Human Blood Group system- ABO Subgroups- Red Cell Antigen- Natural Antibodies-Rh System- Rh Antigens & Rh Antibodies-Hemolytic Disease of Newborn & Prevention-Principal of Blood grouping, antigen-antibodyreaction-Agglutination, Haemagglutination, Condition required for antigen antibody reaction- Blood grouping techniques, Cell grouping, Serum grouping-Methods for ABO grouping. Slide & Tube Method, Cell grouping, Serum grouping, Rh grouping by slide & tube method-Difficulties in ABO grouping- Rouleaux formation, how it interfere with Blood grouping-Auto agglutinins - Antiserum used in ABO test procedures, Anti –A, Anti-B Anti- AB Antiserum-Inheritance of the Blood groups-Control, A&B Cells preparation, Auto control-Medical applications of Blood groups.

Module 2:

Blood Transfusion Principal & Practice of blood Transfusion-Blood Transfusion service at District level-Guide lines for the use of Blood, Appropriate use of Blood, Quality Assurance-Antilogous Blood Transfusion practices-Objectives of Quality Assurance in Blood Transfusion services, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing, safety, procurement of supplies.

Module 3:

Introduction -Blood donor requirements - Criteria for selection & rejection-Medical history & personal details -Self-exclusion-Health checks before donating blood-Screening for TTI. Blood Collection -Blood collection packs-Anticoagulants-Taking & giving sets in Blood transfusion-Techniques of collecting blood from a doctor- Instructions given to the donor after blood donation-Adverse donor reaction.

Module 4:

Testing Donor Blood Screening donor's blood for infectious agents - HIV, HCV, HBV, Trepanoma palladium, Plasmodium, HTLV-Bacterially contaminated Blood.

Module 5:

Blood Donor Records Blood donation record book-Recording results- Blood donor card- Documentation in blood bank- Types of documents. Blood bank temperature sheet. Blood bank stock sheet. Blood transfusion request form-Record Maintenance- Period of record archival- Process information by compiling, coding, categorising, calculating, tabulating, auditing or verification of data- The standard protocol for documenting the data in the patient's files and in the computer for future records- Evaluate the completeness of patient data- Monitor quality control data to rapidly identify analytical deficiencies- Document errors and note the remedial actions they have taken

Module 6:

Storage, preservation & Transport of blood Storage of Blood and its components - Whole Blood - Platelets - Leucocytes - Plasma - Fresh Frozen Plasma- Anticoagulant & Preservatives –- Whole Blood - Red Cells - Red CellsFrozen State - High glycerol solution. - Low glycerol solution. – Changes in blood after storage-labelling of blood units-Gas refrigerator-Lay out of a blood bank refrigerator Packing and Transportation.

Module 7:

Compatibility Testing Purpose - Single tube compatibility techniques using AHG reagent.- Emergency compatibility testing-Difficulties in cross matching- Labeling & Issuing cross- matched blood.

Module 8:

Blood Components Collection of blood components for fractional transfusion-Platelets packed Red Cell, Platelet rich Plasma, Platelets concentrate-Preparation of concentrated (packed) Red cellsTechniques of preparation.

Module 9:

Blood Transfusion Reactions Investigation of a Transfusion reaction-Hemolytic transfusion reaction-Actions to take when transfusion reaction occurs.

Module 10:

Introduction to Haematology What is a blood - Components of blood - Functions of blood - Components of Blood

Module 11:

Maintenance and Equipments of Haematology Lab Introduction to a microscope - Parts of a microscope - Centrifuge - Automated Cell Counter - Urine Analyser - Maintenance of equipments in the hematology lab - Coagulometer Responsibilities of a lab technologist

Module 12:

Principles of patient care Assessment of a patient and brief history collection. Collection of blood, sputum, urine and stool specimens, packing of equipments for CSSD, Develop specific goals and plans to prioritise, organise, and accomplish work

Module 13:

Collection of Blood Samples Specimen Collection - Methods - venipuncture - Patient Identification - Site selection - Tourniquet application - Cleansing the Venipuncture site - Sample Collection - Specimen Collected by skin puncture - Collection from indwelling catheters- Use basic non-automated tests to assess blood cells- See and analyse details at close range- Collect, receive and conduct a pre-analytical processing of clinical laboratory specimens.

Module 14:

Coagulation Studies Hemostasis - Definition, Basic concept and principle, Basic steps involved in Hemastosis. Coagulation –

- Basic Physiology, coagulation factors.
- Mechanism of blood coagulation. Extrinsic Pathway, Intrinsic Pathway. Regulators of blood coagulation. Role in Diseases, Bleeding disorders- . Platelet disorder - Thrombocytopenias - causes including aplastic anemia. D I C IT P , Hemophilia

Module 15:

Hematological Disorders Classification of Anemia : Morphological & etiological. Iron Deficiency Anemia : Distribution of body Iron, Iron Absorption, causes of iron deficiency, lab findings. Megaloblastic Anemia : Causes, Lab findings. Hemolytic Anemia : Definition, causes, classification & lab findings. Bone Marrow : Cell composition of normal adult Bone marrow, Aspiration, Indication, Preparation & Staining, Special Stain for Bone Marrow -Periodic Acid Schiff, Sudan Black, Myeloperoxidase. Leukemia : Classification, Blood Picture, Differentiation of Blast cells

Module 16:

Basic Haematological diagnosis

Preparation of Blood Smears - Specimen - Advantages of EDTA blood - Disadvantages of EDTA blood - Blood Smear Method - Cover slip method - Spreader slide method - Wedge method - Characteristics of a Proper Wedge Film - Types of Smear - Thick Smear - Thin Smear - Common causes of a poor blood smear - Biological (in diseased condition) causes of a poor smear - Precautions - Drying of Smears - Staining Of the Blood Films - Preparation of Stains - Leishman's stain - Wright's Stain - Field's stain - Romanowsky stains - Steps for staining - Manual staining methods - Rack method - Dip method. Automated staining methods: - Platen type - Carousel type. Criteria for a good stain: Problem encountered during staining – Troubleshooting

Total Cell Count – Rbc, Wbc, Platelets and Absolute Eosinophil Count, Estimation of Hemoglobin PCV & Erythrocyte Indices - M.C.V. - M.C.H - M.C.H.C - methods and process of estimation, Erythrocyte Sedimentation Rate [E.S.R.] - Westergren Method - Factors Influencing Sedimentation - Laboratory factors which influence ESR - Importance of ESR Reticulocyte Count , Differential Count , Bleeding time, clotting time, prothrombin time,

Module 17:

General principle of hospital practice Hospital structure and organization, Care of Patient, Basic Assessment Skills, First aid & Basic Life Support, Maintenance of Hygiene & Infection Control Practices, Principles of asepsis, Maintenance of Medications in the department, Specialized Investigations - Care of Patients, Medico - Legal Issues

455 BLOOD BANK SERVICES .

- Screening of donors.
- Preparation of anticoagulant fluids
- Grouping of blood.
- Cross matching of blood samples.
- Coomb's test, ELISA Test
- Screening of HbS .Ag. HIV and HCV and rapid kit methods
- Antiglobulin Test
- Dat
- Ict
- Saline Cross-Matching
- Albumin Cross Matching
- Enzyme Cross Matching

- Antiglobulin Test (Ahg)
- Bio safety Precautions and Guidelines
- Abo Blood Grouping Procedure
- Slide or Tile Method, Tube Method, Microplate Method, Micro-Typing System (Diamed/Bioview), Automated or Semi-Automatic Instrumentation

456 HEMATOLOGY (PRACTICUM)

- Collection of Blood Samples
- Obtaining peripheral Blood Smear
- Staining Of Blood Smear
- Obtaining Cell Counts – Rbc, Wbc, Platelets both manual and automated
- Absolute Eosinophils Count
- Estimation of Haemoglobin
- Packed Cell Volume, Erythrocyte Indices
- Reticulocyte Count
- Differential Count
- Bleeding Time
- Clotting Time
- Pt
- Aptt

PRACTICAL