Estd.2003

St John Para Medical Institute

(Affiliated) To Para Medical Board of India, New Delhi)

:Campus: **K. S Saket P. G college Ayodhya faizabad**

SYLLABUS
DMLT

Provided by

PARA MEDICAL BOARD OF INDIA

NEW DELHI

INTRODUCTION

Medical Laboratory Technology

"The Science is devolving different branches of specialization and Medical Sciences are closely linked with each other scientific Medicine has been nurtured and grown to the present form in the laboratory. It is the knowledge gained in the technology that makes diagnosis of disease feasible, their treatment and subsequent follow us success.

Sometime it can harm the patient seriously; mainly the diagnosis depends upon the report of investigation done in the Laboratory by the Medical laboratory technology. Thus the Laboratory Technician plays a vital role in the Medicine field .It is difficult for the doctor alone.

In Fact it is necessary that every department in General Hospital Hospital Primary health centre at Taluk level, every Hospital belonging to state / Centre Govt. and all clinics & Nursing Homes & Practitioners should have the assistance of trained technician.

So A gap has been developed between the requirement and the availability of trained lab Technician due to the fast grow in Laboratory & X- Ray field.

To fulfil the gap and to make the Para medical Board of India has realized the problems and start training course in Medical laboratory technology & X-ray E.CG Technician.

DMLT-FIRST YEAR

COURSE CODE	SUBJECTS	(MAX. MARKS)	
		THEORY	PRACTICAL
D-2101	ANATOMY & PHYSIOLOGY	100	50
D-2102	MIROBIOLOGY & PARASITOLOGY	100	50
D-2103	HAEMATOLOGY & BLOOD BANKING.	100	50
D-2104	BASIC TECHNOLOGY & ETHICS	100	50
D-2105	HISTO-TECHNOLOGY	100	50
D-2106	BIOCHMISTRY	100	50

DMLT - SECOND YEAR

COURSE CODE	SUBJECTS	(MAX. MARKS)	
		THEORY	PRACTICAL
D-2201	BIOCHEMISTRY & CLINICAL PATHOLOGY.	100	50
D-2202	HISTOPATHOLOGY & CYTOLOGY	100	50
D-2203	MICRO,VIRO,MYCO & ADV SEROLOGY	100	50
D-2204	COAGULATION & TRANFUSION MEDICINE	100	50
D-2205	IMMUNOLOGY,HAEMATOLOGY & TRANFUSION MEDICINE	100	50

PAPER -1

ANATOMY & PHYSIOLOGY (2101)

Anatomy (Theory):-

1. Introduction:-

(a). Common Anatomical terms & Anatomical Positions .Different parts of the human body **(b)** Tissue with Function & Classification **(c)** Cell & Animal Cell**(2.) Skeletal system**: **(a)** Bones, joint, & Movement **(b)** Muscles**(3) Genito- Urinary System:(a)** Male & Female Reproductive Organic System **(b)** Urinary bladder, Kidney and Ureter **(C).** Uterus & Urethra

(4)Respiratory System(a) Lungs & Thoracic Cavity**(b)** Pleura **(c)** Surface marking of lungs

(5)Gastro- Intestinal System :-(a) Mouth **(b)**Pharynx & Salivary gland and Tonsils **(c)**Oesophagus &stomach**(d)** Spleen & Pancreas **(e)** Gall Bladder & Liver **(f)** Surface making of Abdomen **(g)** Structure of Digestive Tract

(6) Movement of the body(a) Upper Limb –Bones, Important Vessels **(b)** Lower Limb –Bones Important Vessels

(7) Nerves System(a) C.S.F & Spinal Card **(b)** Nerves & Brain**(c)** SympatheticAnd Sympathetic **(d)** Cranial and Spinal Nerves

(8) Cardio –Vascular System(a) Arterial System **(b)** Lymphatic and Venous System **(c)** Heart **(d)** Surface Making, Important Blood Vessels & Muscles**(e)** Pericardium

Physiology (Theory)

1. Digestive System(a) Mastication deglutition**(b)**Function and Composition Saliva **(c)** Function of Stomach **(d)** Function and Composition of gastric juice **(e)** Function of Pancreatic Juice **(f)** Function of Bile

(2) Respiratory System(a) Define-Respiratory Rate**(b)** Vital Capacity, Cyanosis **(c)**External & Internal Respiration **(d)** Transport of O2 and CO2 in the Blood **(e)** Function of Respiration its structure

(3) Blood(a) Function of Blood **(b)** Composition of Blood **(c)** Anti-Coagulants**(c)**Description of Blood Cells**(e)** Blood Group of A B C O and Rh Factor**(f)** Function of Lymph **(g)**anaemia and its Type

(4) Cardio- Vascular System(a) Define of Cardio output**(b)** Define the blood pressure, Electrocardiogram **(e)** Circulation (Systematic and Pulmonary) **(f)** Function of Heart **(g)** Function of Blood vessels **(h)** Cardio Cycle

(5) Excretory System(a) Kidney (Function)**(b)** Formation of Urine (Normal and abnormal)**(c)** Composition of Urine

(6) ENDOCRINE GLAND(a) Define- Name and hormones Secreted by than **(b)** Action of Hormones in our body

(7) Reproductive System(a) Male female Genital System**(b)** Function of Ovary**(c)** Formation of Ova and Their action of ovarian Hormones**(d)** Function of Testis- Their action of Testosterone**(e)**Mensuration Cycle and Fertilization **(f)**Progesterone and Oestrogen Hormones

(8) Skin(a) Define the Skin **(b)** Function of Skin

(9) Formation, Function &Composition of C.S.F

(10) Special Senses-Smell, Taste, Touch, Hearing

Paper - 2

MICROBIOLOGY & PARASITLOGY:-(2102)

MICROBIOLOGY (Theory)

Microbiology is the branch of science that deals with study of Virus, Bacteria and Fungi which cannot be seen through naked eye.

Morphology of Bacteria

1. Structure & Growth of Bacteria
2. 2..Classification of Bacteria
3. Nutrition of Bacteria

4. **Staining of Bacteria**
   - **(a)** Gram stain, Negative Stain, Ziehl – Neelsen, Albert, Spore Stain.
   - **(b)** Composition and preparation of staining Reagents and their composition.
5. **Gram Negative Cocci**
   - **(a)** MeningoCocci&GonoCocci
6. **Gram positive – Cocci**
   - **(a)**staphyloCocci**(b)**StreptoCocci**(c)**PneumoCocci
7. **Gram Bacilli**
   - **(a)** Salmonella
   - **(b)** E-coli
   - **(c)** Pseudomonas
   - **(d)**Shigella
   - **(e)** Klebsiellla
   - **(f)**Haemophilus
8. **Gram Positive Bacilli**
   - **(a)** Anaerobic Bacilli – Clostridia
   - **(b)** Areobic – Mycobacterium Tuberculosis and Myeobacteriumleprae. And Corynebacterium diphtheria.
9. **Bacterial Metabolsim :**
   - **(a)** Requirement of Bactria **,(b)**Aerobic **(c)**Anaerobic**(d)** Growth
10. **Morphology of Fungi :**
    - (a) Cultivation of Pathogenic Fungi (b) Gandida (C) Dermatophytes (d) Asperigillus
11. **Water :**
    - (a) Collection of water, Packing and dispatching of water sample.
12. **Bacteriological Examination of :**
    - (a) Examination of Pus, Abscess and wounds
    - (b) Milk (c) Air (d) water
13. **Cultivation of Micro- Organism :**

(a) Culture Medica (i) Composition (ii) Classification

14. Isolation and Inoculation according Techniques

Biochemical Test

- Test of Metabolism of Protein , amino acid , production of enzymes
- VP teat , MR test , Catalase test , Coagulates Test
- Gram stain, Negative Stain, Ziehl – Neelsen, Albert Stain.

Parasitology–(Theory)

"It is branch of medical science dealing with study of various human parasites."

1. Morphology, Life Cycle, Symptoms Clinical Diagnosis & Laboratory Diagnosis

(a) Hook Worm **(b)**Round worm **(c)**Tape worm **(d)**Ent. Amobea-Histolytica**(e)**Entameoba Coli**(f)**Plasmodia**(g)**Leishmania- donovani **(h)**Giardia- Lambila

Serology:(a)pregnancy Test**(b)**Widal Test**(c)**V.D.R.L Test **(d)**Elisa for HIV- I & II**(e)**RA & ASO Test

Paper 3

HAEMATOLOGY & BLOOD BANKING (2103)

HAEMATOLOGY:-

1. Introduction of Haematology
2. Collection of Blood
3. Red Cell Count (i) Method (ii) Calculation (ii) Haemocytometer
4. White cell count (T.L.C) (i) Method and Calculation
5. Differetal Leucocyte Count (D.L.C)(i)Normal Value and Morphology of White Cells (i) Counting Method (iii) Staining Procedures
6. **Packed Cell Volume** (i) Normal Values & Macro & Micro Method
7. **Estimation of Haemoglobin**
   Method-S.G, Chemical, Colonimetric&Gasometric etc. and Clinical Importance
8. **Anticoagulation, MCV,MCH & MCHC & its Importance**
9. **Morphology of Normal abnormal Red cells**
10. **Method, Appearance & Normal Calues Reticulocyte Count**
11. **Coagulation Tests** (i) Bleeding time, Prothombin Time WBC Coagulation time (ii) Clot Retration Test, Platelet Count
12. **Total Platelet Count (T.P.C) with Direct & Indirect Method**
13. **Urine Analysis** (a)Physical, Chemical, Microscopic& Normal
14. **Stool Examination** (i) Microscopically Examination of Stool (ii) Chemical Examination Stool (iii) Deference between Amoebic and bacillary Stool
15. **Seman Analysis** (i) Microscopical Examination of seman (ii)Normal & Abnormal Morphology of Spermatozoa. (iii) Motility & Total Sperm Count (iv) Macroscopical Examination of Seman (Amount of Seman, Colour, Rection, Viscocity)
16. **Anaemia and Leukemia** (a) Common Anatomical terms & Anatomical Position

Blood Banking

1. **Blood Collection** (i) Collection of Blood (ii) Storage of Blood (iii) Anticoagulation use for collection of Blood (iv) Screening of doner
2. **ABO & Rh Blood Group System –** (i) ABO Grouping by Slide Method & Tube Method (ii) Antigen and type of Antibodies (iii) Rh system with slide method (iv) Type of Antibodies (v) One/Two stage Albumin Technique for Rh Factor
3. **Cross Machine** (i) Open slide Method (ii) Albumin tube Technique
4. **Coomb,s Test** (i0 Direct (ii) Indirect
5. **Drawing of Blood for Donor**
6. **Blood Transfusion and its Reactions**
7. **Administration of Blood Bank**

Paper-04

Theory:- **BASIC TECHNOLOGY & ETHICS (2104)**

1. **Microscope-**Principal, Operation, care and use
2. **Sterilization:** General Principal of Sterilization, Classification, Physical, Mechanical Chemical Method, Sterilization Media, Syringes, Glassware and Apparatus

Rote of laboratory in the health

Duties and responsibility of lab technician (a) General Duties (b) Specific Duties

3. **First Aid and Safety Measures: (a)**Aims and type and Diagnosis of First Aid **(b)** safety Measures- Biological, Electrical ,Mechanical Chemical
4. **Cod of Professional Conducts**
5. **Immunity:** Types, Factor Effecting Immunity
6. **Collection preservation and Storage of different body fluids**
7. **Communication:** Public Relation, Patient relation and Physician, nursing staff relation, report and record
8. **Quality Control**
9. **Instrument (Internal):** Hot air Oven, Auto-Clave
10. **WHO and PHC**

Ethics: Importance, Principle, Consideration

PAPER-05

Histo-technology(2105)

Theory 1. **Introduction**

2 **Examination Method of Cell & Tissue**

3. **Tissue Processing** (i) Collection of Specimen (ii) Fixation (iii) Labelling and Clearing (iv) Dehydration
4. **Fixation of Tissue** (i) Simple Fixative and Cytological Fixative (ii) Micro Anatomical Fixative
5. **Staining** (a) Staining of Tissues section (b) Theory of staining (c) Mounting of section (d) Staining Technique
6. **Section Cutting** (i) Microtome and their Knives (ii) Mounting Section (iii) Techniques of section cutting
7. Reception of Specimen, Preparation & Fixation and Restoration of colour according Museum Technique
8. **Autopsy Techniques** (i) Processing of Tissues (ii) Preservation of Orange

PAPER-06

BIO-CHEMISRY (2106)

1. **Introduction of Biochemistry**
2. **Definition, Classification and Importance Metabolism in brief following**

   (a) Protein (b) Serum Album (c) Lipids
3. **Analysis and Collection of Gastric Juice**
4. **Estimation of-** (a) Total Protein (b) Serum Albumin (c) Globulin & A.G Ratio (d) Serum Creatinine (e) Blood Sugar (God-Pog-Ortho-toludine & Folinwu Method)
5. **Hormones –**

   (a) Definition of hormones (b) Function of Importance Hormones (c) T3, T4, T5 H
6. **Enzymes and Co- Enzymes**
7. **Serum Amylase**
8. **Serum Electrolytes:-** (a) Normal Blood Value Na+ (b) Normal Blood Value Cl – (c) Normal Blood Value K + (d) Normal Blood Value Mg+ (e) Importance of Na+, Cl-, K+
9. **Glocose Tolerance test** (G.T.T.)
10. **Liver Function test** (i) Types & Classification (ii) S. GOT. S.G.P.T (iii) Bilirubin Estimation (Direct & Indirect) (iv) Estimation of Acid phosphatise & Alkaline phosphatise (v) Jaundice Classification
11. **D.N.A & R.N.A Their Importance**
12. **Urine Analysis** (a) Normal & Abnormal & Constituents of Urine (b) Physical & Chemical test of urine (c) Proteins in Urine (d) Occult blood in Urine (e) Urinary Sediments

DMLT - SECOND YEAR

Paper-01
BIOCHEMISTRY & CLINICAL PATHOLOGY.(2201)

Course Description Student should leave knowledge of carbohydrate

1. Protien and lipids vitamin. Minral and hormones as well as the relevant diagnostic tests.

Theory:-

Carbohydrates digestive and absorption metabolism of glucose glycolysis gluconeonesis . glycogen Formation and breakdown stroge diseases maintinace of blood suger leave hormonal influence,mellitus,inter conversion of mono saccharides(12hrs)

2. Digestion of protiens, urea synthesis, transminnation, metabolism of the following amion acid Aromatic amino acid, sulphar containing amino-acid oxidation of fatty acid lipoproteins(9hrs)

3. digestion and absorption of lipids. Synthesis of fatty acid acid oxidation of fatty acid liporprotiens.

4. Hormones Role of biological important hormones. Insulin glucose, epinephrine,thyroid growth hormones steroid hormones.

5. Chemistry and biological role of Vitamins (7 hrs)

6. Minral metabolism iron,copper,calcium,mangnesium,phosphorus sodium,potassium,chloride,iodine (9 hrs)

7. ETC and oxidative phosphorylation (3 hrs)

URINE

1. Composition of urine
   Collection and preservation of urine
   Changes in composition of urine relation to varises disease principal of dry chemistry

PRACTICAL

Complete urine analysis

a. Physical
b. Chemical
   - Protein
   - Reducing substances
   - Ketone bodies
   - Blood pigments
   - Bile

c. Sediments
   Use if dip sticks in urine analysis

2. Cavity fluids and miscellaneous specimens extra vascular fluids, normal composition transudations and exudates
3. Cerebrospinal fluids and alteration in diseases
4. Semen analysis
5. Non- parasitological examination of stool including occult blood
6. Quality control-urine and extra vascular fluids

PRACTICALS:

1. Examination of CSF and reporting
2. Examination of cavity fluids and reporting
3. Semen analysis
4. Stool-Occult blood
5. Stool routine
6. Urine for Urobilinogen
7. Urine Bile salt, Bile pigment

Paper (02)

2-HISTOPATHOLOGY & CYTOLOGY (2202)

COURSE DESCRIPTION A the end of the course the student will be able to fix process. Embed tissue and make section for microscope student. He/She will also competent to make routine cytological preparation.

THEORY

Introduction to histo pathological techniques
Reception of specimens
Fixation formalin fixatation
Tissue processing and embedding
Section cutting
Mounting and staining
Theory of H & E staining
PAS & PAP staining principal and uses
Stains for AFB [TB and leprosy]
Theory of frozen section prep ration

CYTOLOGY

THEORY

Principal of exfoliate cytology
Fixation of smears
PAP staining and identification of cells in a normal veginal smear
Preparations of smear of fine needle aspiration cytology

PRACTICALS

Embedding and preparation of blocks
Section cutting and use and care of microtone
H & E staining
PAS staining
AFB staining [TB and leprosy}
Frozen section and care of ctyosist
PAP staining MGG staining for fnac

Paper 03

3-MICROBIOLOGY, VIROLOGY MYCOLOGY & AVDVANCE SEROLOGY (2203)

OBJECTIVE

To give the student sound Knowledge of pathogenic miorobec, laboratory diagnosis, basic under standing of virology mycology and advanced serologic techniques.

SYSTHMIC BACTERIOLOGY

Morpliology, isolation and identification of the pathogens cooer, bacilli, vibrio, spirochetes, actionnomycetes Laboratory diagnosis.

Principles of antimicrobial therapy and biotic susceptibility tests. Common pathogenic fungi of skin subcutaneous tissue Deep organ-laboratory diagnosis basic virology common viral diseases- transmission – common and dispatch inoculation egg inoculation techniques.

Preservation of micro organisms

Organization of a microbiology laboratory

PRACTICALS

1. Maintenance of stock cultures
2. Identification of pathogenic organisms

3. Methods of collection of clinical material for culture urine. Blood Sputum, C.S.F. throat swab, faeces, and body fluids.
4. Separation of sera, preservation and transport for serological tests.
5. Antibiotic susceptibility tests
6. Basic techniques of collection oaspecimens for direct examination of pathogenic fungi KOH. Lactopheoal blue method.
7. Cultivation of fungi
8. Basic technique of collection and transport of specimens for virology studies.
9. Diagnosis of viral infections isolation and serological tests.
10. Advanced serological technique cliza, immunoelectropiaresis.

Paper :-04

4 -COAGULATION & TRANSFUSSION MEDICINE (2204)

COURSE DESCRIPTION At the end of the course the student will be familiar with investigation of coagulation disorder and will also understand the principles of immunohematology He/She will be competent to handle routine blood bank.

Organization and procedures

COAGULATION DISORDER

Principles of blood coagulation and haempostasis

Disorder of coagulation and hemostasis.

Laboratory diagnosis of bleeding disorders.

Quality control in coagulation laboratory.

PRACTICALS

Whole blood coagulation time

Clot retraction and clotlysis

Bleeding time

Tourniquet tests

One stage prothrombin time

Partial thromboplastin time with correction

Factor assay

Platelet disorders

Disorders of platelets and laboratory diagnosis

PRACTICALS

Investigation of platelets disorders including sample methods to assess platelets adhesion, aggregation and factor release.

1. BIOCHEMISTRY & CLINICAL PATHOLOGY

   Course Description Student should leave Knowledge of carbohydrate. Protein and lipids vitamins. Mineral and hormones as well as the relevant diagnostic tests.

THEORY

1. Carbohydrate digestion and absorption metabolism of glucose glucolysis gluconeognesis. Glycogen formation and breakdown glucogen storage diseases, maintenance of blood sugar leaves hormonal influence, mellitus, inter conversion of mono saccharides (12hrs)
2. Digestion of proteins. Urea synthesis, transmination, metabolism of the following amino acid Aromatic amino acid, sulphur containing amino-acid in born error of metabolism (10hrs)
3. Digestion and absorption of lipids. Synthesis of fatty acid oxidation of fatty acid lipoproteins(9hrs)

4. Hormones- Role of biological Important hormones. Insulin glucose, epinephrine, thyroid growth hormones steroid hormones.
5. Chemistry and biological role of vitamins (7hrs)
6. Mineral metabolism iron, copper, calcium, magnesium, phosphorus sodium, potassium, chloride, iodine (9hrs)
7. ETC and oxidative phophorylation (3hrs)

PRACTICALS

1. Estimation of blood urea ceratinine uric acid calcium, phosphorus and chloride. (9hrs)
2. Sodium and potassium estimation by flame photometer (8hrs)
3. Blood glucose estimation by flame photometer (8hrs)
4. Theory of serum electrophoresis (6hrs)
5. Demonstration of paper chromatography (8hrs)

Paper 05

5-IMMUNOLOGY HAEMATOLOGY & TRANSFUSSION MEDICINE (2205)

THEORY

Principles of blood groups and antigen antibody reaction

Genetics in blood banking

ABOH blood group system

Rhesus blood group system

Other red cells antigens and antibodies

Transfusion of antibodies

Coonsbs tests

Identification of antibodies

Transfusion reactions and investigation of transfusion reaction

Haemolytic disease of new born

Blood donor selection and screening of blood donor

Diseases transmined by blood transfusion and their laboratory diagnosis

Blood components and use

Blood bank organization donor motivation and auditing blood bank

PRACTICALS

Blood collection and preservation using different anticoagulants and

Preservation solution.

Components prepratiuon

ABO grouping

Rh typing0

Antibody detection and titration

Coombs tests

Compatibility testing cross matches

Investigation if transfusion reactions

Investigation of hemolytic disease of new born

HbsAG and HUV antibody testing in blood bank