

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

FIRST YEAR

ANATOMY

1) Introduction of Bones of the Human Body of :

- Upper Limb : clavicle, scapula, humerus, radius, ulna, carpus, metacarpus & phalanges
- Lower Limb : hipbone, femur, tibia, fibula, tarsus, metatarsus & phalanges
- Skull : name the bone of skull and sutures between them.
- Thorax : ribs and their articulations
- Vertebral Column : cervical, thoracic, lumbar, sacral and coccygeal vertebrae

2) Surface Markings of the Body :

- Nine regions of the abdomen
- Four quadrants of the Hip

3) Introduction of different Vital Organs :

A) Respiratory Organs :

- Nasopharynx
- Oropharynx
- Larynx
- Trachea
- Bronchi
- Lungs (and their lobular segments)
- Thoracic cavity
- Pleura and Pleural cavity

B) Circulatory Organs

- Anatomical position of the heart
- Pericardium of the heart
- Chambers of the heart
- Great vessels of the heart
- Valves of the heart

C) Digestive Organs :

- Tongue
- Teeth
- Oral cavity
- Pharynx
- Oesophagus
- Stomach
- Small intestine
- Large intestine
- Large intestine and its colons

PRACTICAL :

Labeled Diagrams of different organs and bones

Viva

PATHOLOGY

1. The Cell in health and disease
 - a. Introduction of pathology
 - b. Cellular structure and metabolism
 - c. Inflammation – Acute and Chronic
 - d. Derangement of Body Fluids and Electrolytes
 - Types of shocks
 - Ischaemia
 - Infection
 - e. Neoplasia – Etiology and Pathogenesis
2. Introduction of hematology
 - a. Formation of Blood
 - b. Erythropoiesis
 - c. Leucopoiesis
 - d. Thrombopoiesis
 - e. Collection of Blood
 - f. Anticoagulants
 - g. Red cell count – Haemocytometer, Methods and Calculation
 - h. WBC Count – Methods
 - i. Differential Leucocytes Count (DLC) –
 - Morphology of White Cells, Normal Values
 - Ranancosty Stains : Staining procedures
 - Counting Methods, Principle of staining
 - j. Hb estimation - Method
 - Colorimetric Method
 - Chemical Method
 - Gasmetric Method
 - S. G. Method
 - Clinical Importance

Practical :

- I.
 - Collection of Sample
 - Hb estimation
 - TLC and DLC
 - RBC Count
 - Peripheral blood film – staining and study of Malarial Parasite
- II. Laboratory management – Sample Collection, Labeling, Transport, Screening, Reporting and Dispatch of Reports.

BIOCHEMISTRY

1. Introduction of Biochemistry
2. Elementary knowledge of inorganic chemistry : - Atomic weight, molecular weight, equivalent weight, acid, bases.
3. Definition and preparation of solutions : - Percent solution, Molar solution, Normal solution and Buffer Solution etc.
4. Definition and preparation of Regent.
5. Unit of measurement
6. Elementary knowledge of organic chemistry
 - Organic compounds
 - Aliphatic and Aromatic
 - Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol etc
7. pH indicators : pH paper, universal and other indicators, pH measurement : different methods.

Practical

Introduction and usage of Glassware and Instruments

Glassware :

- Composition of Glass
- General glass wares

Instruments :

- Balance
- Hot plate and Magnetic stirrer
- Centrifuges
- Incubators
- Constant temperature bath
- Colorimeter : Principal, Function
- Photometer
- Flame Photometry

MICROBIOLOGY

I. Introduction and brief history of Microbiology

- Historical Aspect
- Relationship of Micro-organism to men
- Micro-organism in Disease and Health

II. Requirement and uses of common Laboratory Equipments

- Incubator, Hot Air Oven, Water Bath
- Anaerobic Jar, Centrifuge, Autoclave
- Microscope
- Glassware – Description of Glassware, its use, handling and care

III. Sterilization :

- Definition
- Classification and General Principle of Sterilization
- Autoclave – its structure, functioning, control and indicator

IV. Antiseptics & Disinfectants

- Definition
- Types
- Mode of Action
- Uses

V. Collection, Transportation and processing of clinical samples for Microbiological investigations**Practical :**

Demonstration of washing of instruments.

PHYSIOLOGY

1. Cell :

- Definition
- Structure and functions the cytoplasmic Organelles
- Reproduction : Miosis, Mitosis

2. The important physico-chemical laws applied to physiology

- Diffusion
- Osmosis
- Bonding
- Filtration
- Dialysis
- Surface Tension

- Adsorption
- Colloid
- 3. Fundamentals of different Organ Systems
 - Cardiovascular System
 - Respiratory System
 - Digestive System
 - Excretory System
 - Reproduction System
 - Endocrine System
 - Lymphatic System

PRACTICAL

Viva and diagrams of different Vital Organs.

PATHOLOGY

I. Hematology :

- ESR
- Methods
- Factors – Affecting ESR
- Normal Values
- Importance
- RBC – Indices
- Platelets

II. Body Fluids :

- a) Urine :
 - Method of Collection
 - Normal Constituents
 - Physical Examination
 - Chemical Examination
- b) Stool Examination :
 - Method of Collection
 - Normal Constituents and appearance
 - Abnormal Constituents (Ova, Cyst)
- c) C.S.F. Examination
 - Physical Examination
 - Chemical Examination
 - Microscopy
 - Cell Count
 - Staining
- d) Semen Analysis
 - Collection
 - Examination
 - Special Tests

PRACTICAL :

- a) Urine, Stool, Semen and C.S.F. – Collection, Handling, Examinations
- b) Absolute Eosinophil Count, PCV, RBC indices, ESR Estimation, Platelet Count

BIOCHEMISTRY

1. Aim and Scope of Biochemistry
2. Collection and Recording of Biochemical Specimen, separation of serum/plasma preservation and disposal of Biological material.
3. Chemical examination of urine : Qualitative, Sugar, Protein, Bile Salt, Bile Pigment, Ketones Bodies
4. chemical examination of Stool : Occult Blood.
5. Chemical examination of other Body Fluids : CSF, Pleural Fluid, Ascitic Fluid etc.
6. Laboratory management and Maintenance of Records.

PRACTICAL :

- Urine Examination Physical, Chemical, Microscopic, Biochemistry
- Stool Examination
- Body Fluids : Physical and chemical examination CSF, Pleural Fluid, and Ascitic fluid

MICROBIOLOGY

Bacteriology

- Definition
- Bacteria – General characteristics of Bacteria
- Classification and morphology of Bacteria
- Structure of Cell, Capsule, Flagella, and Spore
- Growth of Bacteria
- Nutrition of Bacteria

Virology :

- Definition
- General Introduction of Virus
- Physiochemical characteristic of Viruses
- Diseases caused by different Virus and mode of infection

Parasitology :

- Definition
- General characteristics of Parasite
- Classification of Parasite
- Mode of transmission

Fungus

- Definition
- Structure
- Classification

PRACTICAL:

Staining – Type of Staining, Principle, Procedure and Interpretation

SECOND YEAR

ANATOMY

A) Reproductive Organs :

- Male and Female Gonads : Testes, Epididymis, Ovary, Fallopian Tube, Uterus, Vagina etc.
- Introduction of male Genital Organs
- Introduction of female Genital Organs

B) Liver and Spleen :

- Introduction
- Anatomical position
- Gall bladder

C) Excretory Organs ;

- Cortex and medulla of Kidney
- Ureter
- Urinary Bladder
- Urethra (male and female)

D) Muscles :

- Introduction, Origin and Insertion, Function

PRACTICAL

Labeled Diagrams of different organs and bones

Viva

PATHOLOGY

a) Human blood group antigens and antibodies

b) ABO Blood group systems

- Sub. – group
- Source of antigens and types of antibodies

c) Rh Blood group System

- Types of Antigen
- Mode of Inheritance
- Types of Antibodies

d) Other Blood group Antigens

e) Blood Collection

- Selection and screening of donor
- Collection of blood
- Various anticoagulants
- Storage of Blood.
- Changes in Blood on Storage

PRACTICAL :

Blood grouping

Tube Method

Slide Method

BIOCHEMISTRY

1. Carbohydrates : -
 - Introduction
 - Importance
 - Classification
 - Properties
 - Estimation of Glucose
 - Clinical Significance
2. Protein : -
 - Introduction and Physiological importance
 - Amino acids
 - Essential amino acids
 - Classification
 - Denaturation of Proteins
 - Estimation of Total protein, Albumin, Globulin, A/G Ratio
3. Introduction, Properties and function of important hormones
4. Enzymes and Co-enzymes
 - Introduction and difference
 - Functions
 - Estimation of important enzymes
 - i) SGOT (AST)
 - ii) SGPT (ALT)
 - iii) Alkaline Phosphatase
 - iv) Acid Phosphatase
 - v) Amylase, lactate dehydrogenase.
 - vi) CPK, CPK-MB

PRACTICAL :

Method of estimation of glucose : Benedict's Reaction, Glucose oxidase Method
Method of estimation of Protein, Albumin.

MICROBIOLOGY

Staining of Bacteria :

1. Composition and preparation of Staining
2. Principle and Procedure of Bacteriological stain
 - Gram's Stain
 - Ziehl-Neelsen Stain
 - Albert Stain
 - Spore and Negative Stain

Cultivation of Micro-organism :

- Introduction and uses of culture
- Classification of culture media
- Composition of common of Laboratory culture media
- Special media and preparations
- Techniques of inoculation and isolation
- Antimicrobial sensitivity
- Anaerobic cultivation techniques

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

Different staining techniques used in Virology
Principle of different serological test used in Virology
Mode of Transmission of Viral agents
Prevention of Viral disease
Immunity in Viral infection

PRACTICAL

1. Staining : ZN Staining of M. T. B. and M. Lepra, Albert Staining
2. Culture
 - Type of Media
 - Preparation
 - Inoculation
 - Colony Characteristic
 - Staining and Antibiotic Sensitivity

PHYSIOLOGY

1. Blood
 - Definition
 - Composition
 - Function
2. Formation of different type of blood Cells
 - Erythrocytes
 - Leucocytes
 - Thrombocytes
3. Mechanism of Blood Cltting
4. Cerebrospinal Fluid
 - Formation
 - Composition
 - Function
5. Special Senses
 - Hearing
 - Taste
 - Smell
 - Touch
 - Sight

PRACTICAL :

Viva and diagrams of Corpuscles

PATHOLOGY

IMMUNOLOGY AND SEROLOGY

Hormones -

- Thyroid Hormones
- Growth Mhormone
- Isulin

Glycosylated Hemoglobin

COOMB'S Test

- Direct and Indirect Test
- Titration of Antibody

HISTOPATHOLOGY (Theory and Practical)

a) Fixation of tissues

- Classification of Fixatives

b) Tissue Processing

- Collection
- Steps of fixation

c) Section Cutting

- Microtome and Knives
- Techniques of Section Cutting
- Mounting of Sections
- Frozen Sections

d) Decalcification

- Fixation
- Declacification
- End Point

e) Staining Dyes and their properties, H & E Stain, Special Stains

PRACTICAL :

- COOMB'S Test
- Anti D Titre

BIOCHEMISTRY

1. Lipids : -

- Introduction and functions
- Classification
- Steroids
- Metabolism
- Estimation : Total lipids, HDL, LDL, VLDL, Total cholesterol, Trigycede
- Clinical significance

2. Principal of Assay procedures for biological material and estimation of kidney function tests.

- Urea
- Uric acid
- Creatinine

3. Electrolytes :

- Function
- Properties
- Estimation of Essential electrolytes : Sodium, potassium, calcium, chloride and phosphorus etc.
- Clinical Importance

4. Genetics

- DNA, RNA Structure
- Gene coding
- Transcription & Translation
- Genetic Disorders

PRACTICAL :

Method of estimation of urea

Method of estimation of Creatinine

Method of estimation of Cholesterol

MICROBIOLOGY

1) Immunology

- Definition
- Immunity : Definition and Classification
- Antigen
- Antibodies – Immunoglobulin
- Antigen and antibody reaction and clinical importance
- Structure and function of immune system
- Immune response
- Hypersensitivity

2) i. Principle & procedure of Serological Tests.

- Bidal, CRP, Brucella, Agglutination, ASO
- Cold agglutination, VDRL, TPHA
- i) Advanced techniques in Microbiology ELISA, RIA etc
- ii) Epidemiological Markers of Micro-organism serotyping
- iii) Preparation & Standardization of Antigen and Antisera
- iv) Preparation & Standardization of vaccine and immunization

3) i) General introduction, life cycle, mode of transmission, pathogenicity, and lab diagnosis of various Protozoa.

- ii) Entamoeba histolytica
- iii) Entamoeba coli
- iv) Giardia lamblia
- v) Trichomonas vaginalis
- vi) Leishmania donovani

4) i) Sprozoa

- Malaria Parasite
- Toxoplasma Gondii
- ii) Balantidium Coli

5) General introduction life cycle, mode of transmission, pathogenicity and lab diagnosis of various Helminths :

- i) Cestodes or Tapeworms :
 - Taenia solium
 - Taenia saginata
 - Hymenolepis nana

- *Echinococcus granulosus*
- ii) Trematodes of Flukes :
 - *Fasciola hepatica*
 - *Fasciola gigantica*
 - *Gestrodiscoides hominis*
- iii) Nematodes :
 - *Trichinella spiralis*
 - *Trichuris trichiura*
 - *Ancylostoma duodenale*
 - *Enterobius vermicularis*
 - *Ascaris lumbricoides*

PRACTICAL :

Demonstration :

Slide Agglutination

- VDRL
- VIDAL
- ASO
- CRP
- Stool Examination
- Physical
- Microscopic Demonstration of Ova, Cyst, Pus Cells
- Hanging Drop Examination