



THE J&K STATE PARA-MEDICAL COUNCIL

GOVERNMENT MEDICAL COLLEGE JAMMU.

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SYLLABUS

Diploma in Laboratory Assistant

ANATOMY

(Marks 10)

✓ Theory

✓ Introduction

- Different parts of the human body, common Anatomical terms, Anatomical Positions and important planes.
- Animal Cell
- Tissue of the body, classification and function
- Primary tissues of the body.

✓ Skeletal System

- Joints & Movements
- Muscle & Monce

✓ Gastro-intestinal System

- Mouth and Pharynx
- Salivary Glands and Tonsils
- Oesophagus and Stomach
- Location of different organs in the Abdomen in situ
- Liver and Gall Bladder
- Spleen and Pancreas.

✓ **Genito-Urinary System**

- Kidney
- Ureters, Bladder and Urethra
- Male Reproductive System
- Female Reproductive System

✓ **Respiratory System**

- Thoracic, Pleura and Lungs

✓ **Cardio Vascular System**

- Heart and Pericardium
- Arterial System
- Venous and Lymphatic System

✓ **Nervous System**

- Meninges and cerebrospinal fluid
- Brain, Spinal cord and the Nerves.

✓ **Loco-Motor System**

- **Parts of upper Limb** :- Bones Land marks and important vessels

PHYSIOLOGY

(Marks 10)

✓ Theory

✓ **Blood**

- Composition and General function of Blood
- **Description of Blood cells** :- Normal Counts and function.
- Anti-conagulants

✓ **Cardio-Vascular System**

- Function of heart and blood vessels.
- Circulation :- Systemic Circulation Pulmonary Circulation.

✓ **Respiratory System**

- Name of the Structure involved in respiration and their function.
- External and Internal respiration. How respiration and expiration are brought about.
- Transport of O² and CO² in the blood.
- Definition of respiratory Rate, Tidal Volume, Vital Capacity, Cyanosis, Hypoxia.

✓ **Excretory System**

- Functions of Kidney
- Formation & Composition of Urine Normal and abnormal constituents.

✓ **Skin**

- Functions of skin

✓ **Digestive System**

- Composition and functions of saliva, Mastication and deglutition.
- Functions of Stomach, Composition of Gastric Juice Pancreatic Juice, Bile and Succus entericus.

✓ **Endocrine Glands**

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

✓ **Reproductive System**

- Male Genital System
- Female Genital System
- Names of Primary and Accessory Sex organs in male and Female. Secondary Sexual characters in male and Female.
- Functions of ovary, formation of Ova, actions of ovarian hormones.
- Functions of Testis – Spermatogenesis and actions of testosterone.

✓ **Blood Group**

- ABO and Rh. Basis for classification, basis for determination, importance and Blood Groups.

✓ **Cerebrospinal Fluid**

- Formation, composition and functions.

➤ **Practical**

- Demonstration of parts of body(Bony) landmarks on the surface
- Identification of cells and basic tissues.
- Skeletal System, Identification of Bones and Joints

- Demonstration of Interior of Thorax with organs in Situ.
 - Respiratory System and Pleurae
 - Heart and Blood Vessels
- Demonstration and Identification of various organs within abdomen
 - Liver and Gall Bladder
 - Peritoneum stomach and Intestine.
- Male Genital System
- Female Genital System
- Central Nervous System, Spinal Cord and Site of Lumbar Puncture examination will be :-
- Identification of bones or parts of skeletal system
- Identification of basic tissues under the microscope
- Identification of certain organs and Viva
- Surface marking of any of the important organs.
- Identification of sites of blood vessels or muscles for injections and site of lumbar puncture.
- Microscopic – Usage, maintenance and Minor repairs
 - Behaviour of RBC in isotonic, Hypotonic and Hypertonic Sodium Chloride Solution
- Identification of Blood Cells Focused under Microscope :-
 - RBC
 - Various types of WBC
 - Platelets
 - Reticulocytes.
- To obtain samples of Plasma and Serum
- Preparations of Anti-Coagulants : double oxalate and Sodium Citrate
- Haematocrit
- Identification of ruled area in Neubauer's Chamber RBC and WBC Pipettes and Wintrobe and Westergren Pipettes
- Demonstration of Normal Constituents of Urine and Abnormal Constituents E.G Glucose and Protein
- Record Writing.

CLINICAL BIO-CHEMISTRY

(Marks 25)

➤ Theory

- Elementary knowledge of Inorganic Chemistry Atomic Weight Molecular weight, Equivalent weight –Acids, bases and Salts Indicators Molar Solutions, Buffer Solution, Titration (Acid Base) Definition of Solution. Methods of expressing concentration – Dilution.
- Elementary knowledge of organic Chemistry – organic Compounds. Aliphatic and Aromatic. Alcohols, Aldehydes, ketones, Amines, Esters, Phenol, Acids Colloids etc.

- Elementary of Analytical Chemistry I Instrumentation, centrifuge Balances, Colorimeter, Spectrophotometer, Flamephotometer, Fluorimeter etc.
- Aims and Scope Biochemistry.
- Carbohydrates :- Importance, Definition, Classification some properties.
- Proteins – Aminoacids, essential amino acids, peptides, denaturation of proteins, Physiologically important proteins, functions of plasma proteins.
- Lipid – Definition, Classification, Steroids, Examples.
- Nucleic Acids- DNA and RNA their importance.
- Haemoglobin
- Enzymes and Co-Enzymes Elementary.
- Gastric Juice collection Acidities.
- Carbohydrate – Metabolism – elementary aspects, definition of Glucolysis, Glycogenolysis Hormonal regulation of Blood Sugar Diabetes-Mellitus – Ketosis, Gcosuria, Renal Glycosuria, Pentosuria.
- Metabolism of Lipids – elementary aspects, Triglyeerides, Cholestrol, Plasma Lipoproteins-Ketone bodies and Ketonuria.
- Protein Metabolism – Formation of Urea, Creatinine Proteinuria Edema, Transaminases
- Water and Mineral Metabolism – Dehydration, Calcium Phosphorus, Sodium, Potassium, Chloride, Iron, Iodine their physiological functions and disease state.
- Harmones – definition, functions of some important hormones.
- Blood and cerebrospinal Fluid functions of Blood & CSF.
- Urine Normal and abnormal tests.

➤ Practical

- Basic Techniques :-
- Cleaning of Glassware
- Preparation of Chromic acid wash solution
- Preparation of saturated solution.
- Types and use of pipettes.
- Balance types and uses.
- Preparation of percent solution / volume / volume components (V/V)
- Preparation of percent solution weight by volume (W/V) solution.
- Preparation of Molar Solution.
- Preparation of Buffer Solution.
- Indicators pH, determination of unknown solutions.
- Preparation of Normal Solutions.
- Titration – (Acid Base) Preparation of Primary Standards.
- Titration preparation of Normal Solutions
- Preparation of Protein Filtrates.
- Use and maintenance of centrifuge.
- Colorimeter – types, components, use and maintenance.
- Colorimetry.
- Colorimetry – Choice of filters.
- Spectrophotometer components and use demonstration.

- List of spare parts of equipments maintenance.
- Distillation of water-setting up Glass Distillation Unit and Metal water Distillation Unit.
- Diagnostic tests on Urine :-
 - Collection and preservation.
 - Physical characteristics and specific gravity
- U
 - Qualitative tests for urea, Uric Acid, Creatinine, Calcium, Phosphorus, Sodium, Potassium and Chloride.
 - PH.
 - Urea clearance and Creatinine clearance.
- Abnormal Constituents of Urine.
 - Qualitative test for Sugar, Albumin, Ketone Bodies, Blood, Bile Salt and Bile Pigment.
- Da.....tests on Blood.
 - Collection and preservation of Blood, Serum and Plasma.
 - Estimation of Blood Sugar.
 - Glucose Tolerance test.
- Non-Protein nitrogenous compound :
 - Determination of Serum Urea, Uric Acid and Creatinine
- Determination of Serum Protein
 - Albumin, Globulin, Fibrinogen & AG ratio.
- Serum Electrolytes.
 - Determination of Na*, K* and Cl.
 - Determination of inorganic Phosphorus
 - Determination of Calcium.
- Serum Enzymes :
 - Determination of transaminases (GOT and GPT)
 - Determination of Phosphatase (Alkaline phosphate and acid Phosphate)
 - Determination of Amylase
- Serum Bilirubin :
 - Determination of total and direct bilirubin
- Serum Lipids :
 - Lipid Profile
 - Determination of Serum Cholesterol
- Liver Function Tests.
- Diagnostic test on other body fluids
- Gastric juice :-
 - Test of Hcl. Blood and Starch
 - Free and Total acidity
 - Gastric function tests.
- Cerebrospinal Fluid
 - Determination of sugar
 - Determination of Proteins
 - Determination of Proteins

- Pandey's test.
- Kidney or renal function test :
 - Importance of renal function tests
 - Tests
 - Concentration / Specific Gravity test
 - Dilution test
 - Urea Clearance Test
 - Creatinine Clearance test
- Laboratory Maintenance and empowerment
 - Quality Control
 - Automation and Kits
 - Laboratory Management.

✚ MICROBIOLOGY AND PARASITOLOGY (Marks 25)

✓ Theory

✚ Requirement and use of Common Laboratory Equipment.

- Incubator, Hot Air Oven, Autoclave, Water bath, Anaerobic jar Vacuum Pump, Media Pouring Chamber, refrigerator, Centrifuge

✚ Microscope.

- Principal, Operation, Care and Use of Microscope

✚ Sterilization and Disinfection.

- Classification and General principles of Sterilization. Physical Chemical and Mechanical Methods Disposal of contaminated media, Syringes, Glassware, Apparatus.

✚ Classification and Morphology of Bacteria.

- **Brief Outline of :-**
 - Structure of cell, capsule, Flagella and spores
 - Growth Bacteria
 - Nutrition of Bacteria.
- **Staining of Bacteria :**
 - Simple, Grams, Ziehl-Neelsen, Albert, Spore Stain
 - Composition and preparation of Staining reagents
- **Cultivation of Micro Organisms – I (In Detail)**
 - Classification of Media, Composition of Laboratory culture media and Special Media
- **Cultivation of Micro Organisation – II (In Detail)**
- **Identification of Bacteria :**
 - Cultural Characters, Bio Chemical reactions and serotyping.
 - Normal Flora of micro Organisms in the human Body.
 - Gram positive and Gram Negative co....Staphylo.....Pneumococcus Neisseria (in brief)

- **Gram negative Bacilli :**
 - Salmonella, Shigella, E.Coli, Klebsiella, Proteus, Pseudomonas Vibrio cholera Haemophilus (In brief)
- **Gram Positive Bacilli**
 - **Aerobic**
 - ✚ Corynebacterium diphtheria
 - ✚ Mycobacterium tuberculosis and Mycobacterium leprae.
 - **Anaerobic bacilli – Clostridia**
- **Antibiotic Sensitivity test** – Principles and methods of determination of sensitivity.
 - Candida, Aspergillus. Dermatophytes
- **HIV & AID**
 - Brief Account
- Immunity, Antigens, Antibodies and Antigen antibody reaction and their applications in diagnosis of diseases.
- Principles, Procedures and Diagnostic significance of agglutination Precipitation. Neutralization and complement fixation reactions.
- Collection and processing of Clinical materials like Sputum. Urine Swabs, Stool, Blood CSF and Aspirates.

✓ **Parasitology :**

Brief Account of :- Morphology, Life Cycle, Pathogenicity and Laboratory Diagnosis of :-

E. Hystolytica, E, Coli Giardia. Trichomonas. Plasmodia Leishmania, Hook worm Round worm, Whip worm. Tape worm, Echinococcus granulosus, granulosus, Dracunculus, Wucheraria Bancrofti.

➤ **Practical**

✓ **Microbiology Practicals :**

- Personal safety and precautions.
- Emergency treatment for Laboratory accidents
- Care and Cleaning of Glasswares, Syringes, apparatus, preparation of Pasteur pipettes and sealing of ampules.
- Operation of Autoclave, Incubator, Water bath, PH meter, Scitz filter. Ph comparator, Vacuum pump.
- Operation of Anaerobic system.
- Urine C/s & Colony count.
- Pus C/S.
- Sputum C/S and Blood C/S.
- Sterilization, Packing Loading of materials in Autoclave, Hot Air Oven Inspissator.
- Handling care of Microscope
- Preparation of various Media Pouring and Storage
- Hanging Drop Method
- Collection of Clinical Materials – Blood Urine Stool Pus Swab, Throat Swab

- Receipt and Recording of specimen in the Laboratory and dispatch of specimen to referenc laboratory for tests.
- Gram Stain Z.N Stain Albert's Stain, Capsule Staining
- Incolution of Clinical Material in Media
- Isolation of Organisms in pure culture.
- Antibiotic Sensitivity test
- Disposal of contaminated materials
- Fungus Examination by wetmount of culture.
- Animal house training collection of blood of sheep and horse.

✓ Parasitology Practicals :

- Collection, Preservation and Transporation of fear material for examination of Parasites.
- Preparation of stained and unstained feecal material for parasites.
- Concentration Techniques of Stool
- Preservation of Parasites
- Identification of Ova and Cyst in stool. Occult Blood
- Parasites Blood films.
- Serology :-
 - Widal
 - VDRL
 - Ra Test
 - CRP test
 - ASO test
- Elisa for IIIV – 1 & 2.
 - HBsAg (Australia Antigen)
 - Pregnancy Test.
- Diagnostic Skin Test
 - Mauntoux Test
 - Casoni's Test

✚ CLINICAL PATHOLOGY AND HAEMATOLOGY (Marks 30)

✓ Theory

- Introduction of Haematology
- Collection of Blood
- Antieoagulants
- Red Cell Count :
 - Haemocytometer
 - Methods
 - Caloculation.
- White Cell Count. (Total Leucocyte Count:
 - Morphology of White Cells.
 - Normal Values.
 - Romanowsky Stains

- Staining Procedures.
 - Counting Methods
- Absolute Eosi Nophil Count :
- Erythrocyte Sedimentation Rate (ESR)
 - Westergren's Method
 - Wintrobe's Method
 - Factors effecting ESR
 - Importance and Limitations
 - Normal Values.
- Packed Cell Volume.
 - Macro and Micro Methods
 - Normal Values.
- Haemoglobin Estimation and its clinical Importance
- Red Cell indices.
 - Calculations and importance.
- Retienloocyte Count :
 - Methods
 - Appearance
 - Normal Values.
- Sickle Cell Preparation.
- Osmotic Fragility Test
 - Scorning Test.
 - Qualitative and Quantitative Test
 - Normal Values.
 - Factors allocating fragility
 - Interpretation
- Peripheral Blood Film
- Preparation of Bone Marrow Smears
- Coagulation Tests.
 - Process of Coagulation
 - Factors of Coagulation
 - Tests of Coagulation
 - ✚ Bleeding time
 - ✚ Whole Blood Coagulation Time
 - ✚ Clot Retraction Test
 - ✚ Toorniquet Test
 - ✚ Platelet Count
- Urimanalysis
 - Normal Constituent.
 - Physical Examination
 - Chemical Examination
 - Microscopic Examination
- CSF Examination
 - Normal and abnormal Cell Count
- Semen Analysis
 - Physical Preterition
 - Motility
 - Morphology

- Coomb's Test.

✓ **Histotechnology :**

- Introduction
- Cell, Tissues and their functions
- Examination Methods of Tissues and Cells
- Fixation of Tissue :
- Classification of fixatives :
 - Simple fixatives and their properties.
 - Micro anatomical fixatives.
 - Cytological fixatives.
- Tissue Processing
 - Collection of specimen
 - Labeling and Fixation
 - Dehydration
 - Cleaning
 - Impregnation
- Section Cutting
 - Microtomes and their Knives
 - Techniques of Section cutting
 - Mounting of Sections
 - Frozen Section
- Staining
 - Dyes and their properties
 - Theory of Staining
 - Staining Techniques with haemotoxlin and cosin
 - Mounting of Sections
 - Common Special Stains
- Decalification
 - Fixation
 - Decalification
 - Detection of end point
 - Neutralization and processing
- Exfoliative Cytolgy
 - Types of specimen and preservation
 - Preparation and fixation of smears.
 - Papanicolaou Staining Techniques
 - Sex Chromatin Staining
- Museum Technique.
 - Reception of specimen
 - Preparation of fixation
 - Restoration of colour
 - Presevation
 - Presentation
- Autopsy Technique
 - Assisting in Autopssy

- Preservation of organs & Processing of Tissue.
- Waste disposal and safety in laboratory.

➤ Practical

✓ **Pathology Practicals :**

Clinical Pathology :

- Use of Microscope & Care
- Haemoglobin estimation
- ESR
- RBC Count
- WBC Count
- Platelet Count
- Absolute Eosinophil Count
- Reticulocyte Count
- PCV
- Leishman Staining and PBF – Normal and abnormal Cells
- Bleeding time
- Clotting time
- Bone Marrow Aspiration – Staining, Staining for Iron Stores
- Prothrombin Time – PTI
- Tests for G6PD deficiency
- Fowtal Haemoglobin Estimation
- Serum / Urine Electrophoresis
- Coombs Test.

Urine Examinations

- Physical Examination Colour Reaction Odour Specific gravity Urinary Volume

Chemical Examination

- Tests for protein, 24 hours Urinary proteins
- Bence Jones Proteins
- Tests for sugar, Ketone bodies
- Urine for bile salts, bile pigments and Urobilinogen
- Microscopic examination of urine
- Semen Analysis.

✓ **Hestotechnology Practicals**

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

Cytology Practicals

- Collection of samples for cytological examination of various body fluids
- Preparation and fixation of cytology smears. Giemsa and papanicolaon staining technique
- Sex Chromatin technique
- FNAC
 - Blood Bank
 - Theory
 - Introduction and Historical aspects
 - Human Blood Group Antigens, their inheritance and antibodies
 - ABO Blood Group System
 - Sub Groups
 - Source of Antigens, types of antibodies.
- Rh. Blood Group System.
 - Momenclature and types of Antigens
 - Mode of inheritance
 - Types of antibodies
- Other Blood Group System
- Techniques of Grouping and Cross Matching.
- Blood Collection
 - Selection and Screening of Donor.
 - Collection of Blood
 - Various anticoagulants used
 - Storage of Blood.
- Blood Transfusion.
 - Procedures and Complications
 - Blood Transfusion Reaction, Types, Investigation and Presentation of Transfusion Reaction.
 - Coomb's test.
 - Organisation, operation and Administration and Blood Bank.

➤ BLOOD TRANSFUSION TECHNIQUES

(Marks 10)

○ Practical

- ABO Grouping.
 - Slide Technique
 - Tube technique
- Cross Matching.
 - Methods of major Cross Matching
- Rh. Typing.
 - Rapid Tube Test
 - Saline Anti D
 - One Stage Albumin Technique
 - Two Stage Albumin technique
 - Coomb's antihuman Globulin technique
- Coomb's Test.
 - Direct Coombs
 - Indirect Coombs
- Donor Screening and Selection.
 - Identification
 - Recording
 - Haemoglobin estimation
 - Relevant Medical History of the Donor
 - Grouping and Typing of Donor's Blood
- Drawing of Blood.
 - Asepsis
 - Reassurance
 - Vein Puncture re and Collection
 - Care of Donor
- Blood Storage.
 - Anticoagulants preparation
 - Recording the details and storage of Blood
 - Maintenance and cleaning of various equipments used in Blood Bank.

➤ Laboratory Management and Ethics

(Marks 10)

- Role of the Laboratory in the Health Care Delivery System :
 - General
 - Human Health & Diseases.
 - ✚ Types of Diseases
 - ✚ Process of Diagnosis
 - ✚ Laboratory at different levels
 - ✚ Duties and responsibilities of Laboratory Personnel

- Laboratory Service in the Health Care Delivery System in India :
 - Laboratory Service in India
 - The Health Administration System in India
 - ✚ At the National Level\
 - ✚ At the State Level
 - ✚ At the District Level
 - ✚ At the Village Level
 - ✚ Voluntary Health Organisation in India

- Laboratory Planning :
 - General Principals
 - Laboratory Goals
 - Operational Data
 - ✚ Market Potential
 - ✚ Hospital / Laboratory relatives
 - ✚ Competitions
 - ✚ Laboratory Trends
 - ✚ Planning at different levels
 - ✚ Guiding Principles for planning Hospital laboratory Services :
 - Factors
 - Guiding Principles for Planning
 - Functional Criteria
 - Operational Demnad
 - Sections of a Hospital Laboratory
 - Common Area
 - Design Aspect
 - Space requirement.
 - ✚ Planning for a basic health Laboratory.

- Laboratory organization (Laboratory Management Techniques) :
 - General Principles
 - Components and Functions of a laboratory
 - Staffing the Laboratory
 - Job descriptions
 - Job specification
 - Work Schedule
 - Personnel re-arrangement and work load assessment.

- Care of Laboratory Glassware, Equipments and Instruments and Chemicals etc :
 - General Principles
 - Care and Cleaning of Glassware
 - Making simple glass wares in Laboratory
 - Care of equipments, Instruments and apparatus etc
 - Laboratory Chemicals their proper use and care
 - Labelling.

- Specimen Handlinging :
 - General Principles
 - Collection Techniques and containers for specimen
 - Types of specimens
 - Specimens entry
 - Specimens transfer and distribution and re-assignment
 - Specimens disposal
 - Specimens preservation.

- Laboratory Safety :
 - General Principles
 - Laboratory Hazards.
 - Safety Programmes
 - First Aid