Government of Karnataka

PARA MEDICAL BOARD

Revised Syllabus
of
II & III Year Diploma in Medical Laboratory Courses
(Previously first/second year certificate course / I year DMLT/II DMLT)

2017
Second Year Diploma in Medical Laboratory Technology  
(DMLT II)  
SUBJECT: ANATOMY  
Section A   Q P Code : 5101

Goal: Is to prepare the students with basic knowledge of structures with a co-relation to functions. At the end of course of six months, the paramedical students should be able to:

1. Identify the structures in the human body in their normal position.
2. Demonstrate the knowledge about each system with functional co-relation.
3. Develop the skills to use the knowledge of structures in the human body in their respective fields of function, with utmost care to the needs of the patients and with regards to the betterment of the health of the patients.
4. Develop and demonstrate the basic skills in microscopy of any given tissue, with an understanding of handling different types of microscopes independently in the course of Laboratory technology.

Syllabus

Teaching Hours: 40 hrs

General Anatomy:

I. Introduction to Anatomy:  
   a. Definition of Anatomy  
   b. Anatomical position  
      - Supine, prone, lithotomy → positions  
      Axial  
   c. Different parts of human body:  
      Appendicular  
      → Head and neck, Thorax and abdomen, pelvis and perineum, upper and lower limbs.
   d. Anatomical planes and sections: Median, sagittal, coronal, transverse, longitudinal, horizontal, oblique.
   e. Anatomical terms:  
      Anterior, posterior, superior, inferior, medial, lateral, proximal, distal, superficial, deep, ventral, dorsal, cephalic, caudal, interior, exterior, invagination, evagination, ipsilateral, contralateral.
   f. Terms for describing muscles:  
      Origin, insertion, Belly, tendon, aponeurosis, raphe.
   g. Anatomical movements:
Flexion, extension, adduction, abduction, Medial rotation, lateral rotation, circumduction, pronation, supination, protraction, retraction, elevation, depression.

II. Basic tissues: Definitions of 3 Marks
Epithelium, connective tissue (including cartilage and bone), muscle, nerve.

III. Skeletal System: 10 Marks
Types and number of bones: Identification of each bone with its major features (ex: Femur with its upper end, lower end, shaft, trochanters, condyles, linea aspera etc)
Arthrology and Kinesiology in general:
Each joint to be understood under participating bones and movements.

IV. Systemic anatomy: 10 Marks
The student should be able to identify and understand the anatomical components of each system with functional co-relation. (Diagrams, models, specimens from the dissected cadavers and colour photographs, 2D and 3D animation techniques can be used to teach.)

a. Parts of digestive system and associated glands and structures like liver, gall bladder, pancreas.
b. Cardiovascular System

Surface anatomy of superficial veins.
c. Respiratory system, its parts and respiratory passages, Trachea, lungs and their location, parts and differences between right and left lung.
d. Urinary system- parts and urinary passages → Kidney, ureter, urinary bladder and urethra.
e. Nervous system → parts, meninges, C.S.F and lumbar puncture.
f. Reproductive system → parts of male and female reproductive systems → in particular, Testis, prostate and seminal vesicle and structure of spermatozoon, uterus, ovary, Fallopian tube, cervix, vagina.
g. Lymphatic system → parts and functional co-relation regarding Thymus, lymph nodes, spleen and Tonsils.
h. Endocrine system → Location, parts and functions of each endocrine gland.
Histology 10 Marks

1. Study of microscope including different types and using and handling of microscopes. The study of microscopes should include a thorough knowledge of both mechanical and optical parts. Usage of the microscope should include.

i. Taking care of microscope like cleaning and maintaining both mechanical & optical parts.

ii. Light adjustment with a thorough knowledge about the laws of physics applicable to optics – using low power, high power, and oil immersion objective lenses and also dark ground examination (advantages and disadvantages of each type of oil has to be learnt).

iii. A thorough knowledge about avoiding artefacts (dirts) in the microscope and the slides.

iv. Detailed study of magnification with knowledge about ocular and objective lenses, the focal length etc. A thorough description about practical problems during handling the microscope and histological techniques (Ex: Loose mirror, loose eye piece, dried oil, etc).

2. Basic procedure of staining with Haematoxylin and eosin → The preparation of dyes, the process of staining with rationale, starting from tissue procurement to staining completely (Tissue processing, fixation, dehydration, clearing, embedding, using the microtome, staining using Haematoxylin and Eosin) and getting the slide ready for examination by the experts. It is desirable to know about improper staining.

3 Marks

3. Biomedical waste management in Anatomy Laboratory- Do’s and Dont’s.

3 marks

Lab Technology: Practicals 50 Marks

The students should maintain practical records and submit the same to the HOD of Anatomy for scrutiny.

Gross Anatomy: Basic tissues to be demonstrated for identification 25 Marks

Limbs: i) Upper limb
ii) Lower limb
Identification of superficial and deep structures and surface anatomy of superficial vessels.

Thorax: Heart, Trachea and lungs, Mediastinum.

Abdomen: i) Location and identification of individual organs in GIT and its associated structures like liver and gall bladder, pancreas.

   ii) Urinary system → Identification of parts and functional co-relation.

   iii) Reproductive system → Identification of parts with functional co-relation.

Head and neck: i) Surface features in face and neck, oral cavity, Tongue, pharynx, nasal cavity → their location and importance.

   ii) CNS → Meninges and parts of CNS → Identification with functional co-relation.

**Histology:** i) Introduction to Histology

   ii) Microscope and its parts, types of microscopes.

   iii) Using microscope → hands on training.

   iv) Tissue processing, fixation, dehydration, clearing, embedding, using the microtome, staining using Haematoxylin and Eosin.

   v) Practical problems with the handling of microscope and the staining process like artifacts, shrinkage, precipitate, Folds, Pinched tissue, Nick in knife, Autolysis, under and over staining.

**REFERENCE BOOKS:**

2. Difore Atlas of normal Histology Ed. 6 Lea & Febiger - 1989
3. Anatomy & Physiology for Nurses

Reference Books:

SECOND YEAR DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

(DMLT II)

SUB: PHYSIOLOGY

Section B

Q P Code : 5102

GENERAL PHYSIOLOGY (Duration of Teaching - 3 Hrs)

Introduction:--

Physiology - Homeostasis

Cell:--

Structure of a Cell, An overview of Intracellular Organelles, Cell Junctions, Stem Cells, Cell Aging & Death

Transport across cell membranes:--

Mechanisms of Transport across Cell Membrane

Body Fluids:--

An overview of Compartments of Body Fluid.

BLOOD (Duration of Teaching - 7 Hrs)

Composition & Functions of Blood

Plasma:--

Composition and Functions of Plasma Proteins

Cellular Components of Blood:--

(RBC, WBC, PLATELETS) Morphology, Physiological Values, Functions, Overview of Haemopoeies, Life Span & Applied Aspects

Hemoglobin:--

Definition of Hemoglobin, Functions, Physiological Values, Fate of Hemoglobin, Applied Aspects

ESR, PCV, Blood Indices & Anemia, Polycythemia.

Blood Groups:--

Hemostasis:-
Clotting Factors, Types off Clotting mechanisms, Anticoagulants, Applied Aspects, Bleeding time, Clotting time, Prothrombin time

NERVE PHYSIOLOGY (Duration of Teaching – 3 Hrs) 03 Marks

Nerve:-
Structure, Types of Neuralgia Cells, Functions Of Nerves

Receptors:-
Definition, Types of Sensory Receptors.

Reflex:-
Arc, Action & Reflexes.

Autonomic Nervous System:-
Organization and Functions

Synapse & Neuromuscular Junction

MUSCULOSKELETAL SYSTEM (Duration of Teaching - 2 Hrs) 03 Marks
Types of Muscle, Muscle Spindle, Physiology of Muscle Contraction. Applied Aspects

GASTROINTESTINAL PHYSIOLOGY (Duration of Teaching – 4 hrs) 05 Marks

Structural Overview: of Gastrointestinal Tract
Movements of GIT
Salivary Glands- Its Secretions and Functions,
Hepatobiliary System - Secretions and Its Functions
Pancreatic - Secretions and Its Functions
Intestinal- Secretions and functions
Applied Aspects In GIT.
Defecation
THE CARDIOVASCULAR SYSTEM (Duration of Teaching - 3 Hrs)  05 Marks
Overview of structure of Heart, Conducting System Of Heart, Systemic And Pulmonary Circulation, Over View -Heart Rate, Stroke Volume, Cardiac Output, Heat Sounds, Pulse, BP &Definition of ECG and Recording of ECG.

RESPIRATORY SYSTEM (Duration of Teaching - 3 Hrs)  03 Marks
Applied aspects:-
Artificial respiration, hypoxia, Definition of Apnea, Dyspnea, and Tachypnea.

RENAL SYSTEM (Duration of Teaching - 3 Hrs)  05 Marks
Overview of Anatomy of kidneys, renal blood flow, structure of Nephrons.
Renal and non renal functions of kidney
General principles of formation of urine, GFR, estimation of GFR
Normal constituents of Urine.
Renal function tests (RFT).

ENDOCRINE SYSTEM (Duration of Teaching - 3 Hrs)  03 Marks
Over view of endocrine system; hypothalamic hormones, Functions and applied aspects, hormonal regulation by positive and negative feedback mechanism of Anterior & Posterior Pituitary Hormones, Thyroid Hormones, Parathyroid Hormones, Pancreatic Hormones, Adrenal Cortical Hormones.

REPRODUCTIVE SYSTEM (Duration of Teaching - 3 Hrs)  05 Marks
Over view:-
Male and Female Reproductive System Functions of Male and Female Gonads, Menstrual Cycle
Oogenesis and Spermatogenesis, Fertilization, Implantation and Parturition,
Male Reproductive Hormones It Functions & Cryptorchidism
Female Reproductive Hormones and Its Functions,
Pregnancy Tests and Contraceptive Methods in Male and Females, Lactation.
SKIN (Duration of Teaching - 2 Hrs) 03 Marks

Functions of skin
Vitamin D synthesis
Temperature regulation

CNS & SPECIAL SENSES (Duration of Teaching - 4 Hrs) 03 Marks
CSF Composition and Functions.

Vision: -
Structure and Functions of Eye Ball, Errors of Refraction and Correction.

Hearing:-
Structure and Function of Ear. Audiometry.

Taste: -
Taste Buds, Primary Taste sensation

Smell:
Olfactory pathway

Total theory teaching hours: 40 hrs

REFERENCE BOOKS:

Human Physiology and Biochemistry by Prof. A.J.Jain, Arya Publications
THEORY EXAMINATION – 100 MARKS

ANATOMY. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PHYSIOLOGY. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)
PRACTICALS (Duration of Teaching - 20 Hrs) 50 Marks

Microscope:-

Handling of microscope, parts of microscopes and maintenance
Collection of blood samples and anticoagulants and preparation
Study of drop of blood
Estimation of hemoglobin percentage
Determination of RBC, WBC, PLATELET, AEC count.
Differential leucocytes count
ESR, PCV (Demonstrate)
Blood grouping and RH typing
Recording of Pulse and BP.

Total practical teaching hours: 20 hrs
### Topics

<table>
<thead>
<tr>
<th>Basic of Laboratory Equipment and Basic Chemistry</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit I : General information of Laboratory</strong></td>
<td>50</td>
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<tr>
<td>- General knowledge about laboratory basic information and skills. Laboratory safety, Laboratory laws and regulations, Laboratory quality, Laboratory mathematics.</td>
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<tr>
<td><strong>Unit II : Specimen Collection</strong></td>
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<tr>
<td>- General approach to Patient identification, Phlebotomy and specimen collection, Storage, transport and disposal.</td>
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<tr>
<td><strong>Unit III : Introduction to Laboratory Apparatus</strong></td>
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<tr>
<td>- Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes, Burettes, Beakers, Petri dishes, depression plates.</td>
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<tr>
<td>- Flasks –different types- Volumetric, round bottomed, Erlenmeyer conical etc.</td>
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<td>- Funnels – different types, use.</td>
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<tr>
<td>- Bottles: Reagent bottles – graduated and common, Wash bottles – different types, Specimen bottles etc.</td>
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<tr>
<td>- Measuring cylinders,</td>
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<tr>
<td>- Porcelain dish, Tubes – Test tubes, centrifuge tubes, test tube draining rack</td>
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<tr>
<td>- Tripod stand, Wire gauze, Bunsen burner.</td>
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<tr>
<td>- Cuvettes, types, significance of cuvettes in colorimeter, cuvettes for visible and UV range, Cuvette holders</td>
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</tbody>
</table>
• Racks – Bottle, Test tube, Pipette,
• Desiccators, Stop watch, timers, scissors, Dispensers – reagent and sample.
• Any other apparatus which is important and may have been missed should also be covered

Unit IV: Maintenance of Lab Glassware and Apparatus
• Glass and plastic ware in Laboratory, use of glass: significance of boro-silicate glassware and cleaning of glassware, different cleaning solutions of glassware and cleaning of plasticware, different cleaning solutions.

Unit V: Instruments (Theory and demonstration & Diagrams to be drawn)
• Water bath: Use, care and maintenance,
• Oven & Incubators: Use, care and maintenance.
• Water Distillation plant and water deionizers. Use, care and maintenance,
• Refrigerators, cold box, deep freezers – Use, care and maintenance.
• Reflux condenser: Use, care and maintenance.
• Centrifuges.
  Definition, Principle, Svedberg unit, centrifugal force, centrifugal field, rpm. Different types of centrifuges, Use care and maintenance of a centrifuge.
• Laboratory balances. Manual balances: Single pan, double pan, direct read out electrical balances. Use care and maintenance. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids. Hygroscopic compounds etc.
• Colorimeter and spectrophotometer.
  Parts, diagram. Use, care and maintenance.
• pH meter and electrodes, Use, care and maintenance.
  Guidelines to be followed and precautions to be taken while using pH meter.

Unit VI: Solutions and Dilutions
- **Preparation of solution:** Normal solution, Buffer solution, Percent solution, Molar solution.
- **Diluting solutions:** e.g. Preparation of 0.1N NaCl from 1N NaCl from 2N HCl etc., preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques. Calculating the dilution of a solution, body fluid reagent etc., Saturated and supersaturated solutions.
- **Standard solutions:** Technique for preparation of standard solutions e.g. Glucose, urea, etc., Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl2, potassium carbonate, sodium hydroxide etc.,)
- **Conventional and SI Units:** Preparation of standards using conventional and SI units. Methods of measuring liquids, weighting solids.

**SECTION-B**

**Q P Code : 5104**

**Basic Clinical Biochemistry**

**Unit VII :**

- **Salts** – Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts.
- **Acid-base indicators:** (Theory and Practical) Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and
basic conditions, use if standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators, and their pH range, suitable pH indicators used in different titrations, universal indicators.

Unit VIII: Basic Biochemistry

- Carbohydrates:
  - Classification, Definition & properties of monosaccharides, disaccharides, and polysaccharides.

- Proteins:
  - Proteins – Definition, classification, properties.
  - Plasma proteins – Definition, classification and reference values.

- Lipids
  - Definition, classification and properties of lipids and lipoproteins.

- Nucleic acid chemistry
  - Definitions of DNA, RNA, purines and pyrimidines, nucleosides and nucleotides.

- Enzymes- Definition, classification and factors affecting enzyme activity. Isoenzymes – Definition, classification and significance.

- Vitamins and Minerals: in brief about reference values in blood.

Unit VI: Clinical Laboratory records.

Requisition forms, patient data registers, electronic records, Report forms, reference forms, equipment maintenance registers/log books, Reagent stock books, quality control records, Laboratory statistics
THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)
PRACTICALS II YEAR DMLT

40 Hours

PRACTICALS BIOCHEMISTRY

- Preparation of standard solutions.
- Preparation of Molar solutions
- Preparation of Normal solutions
- Preparation of Percent solutions
- Preparation of De ionized, distilled and double distilled water
- Reactions of carbohydrates Monosaccharide, Disaccharides and polysaccharide.
  - Glucose & Fructose, Lactose, Starch
- Reactions of Proteins
- Color reactions and precipitation reactions of albumin and casein.
- Analysis of normal and abnormal Urine
- Demonstration of Glucometer with strips.

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PRACTICAL EXAMINATION- 100 MARKS:

1. Spotters - 10 No - 20 marks
2. Preparation of normal, standard/molar percent solutions 10 marks
3. Reactions of carbohydrates Monosaccharide, Disaccharides and polysaccharide.
   Glucose & Fructose, Lactose, Starch 20 marks
4. Analysis of normal and abnormal Urine 20 marks
5. Color reactions and precipitation reactions of albumin and casein. 10 marks
6. Records - 10 marks
7. Viva voce - 10 marks

Total - 100 marks

REFERENCE BOOKS:

Text Books:
1. Text book of Biochemistry for Dental Students– Pattabhiraman
2. Text book of Biochemistry for Dental Students, Harbans lal
3. Text book of Chemistry prescribed for II P.U.C. (students may need the basic knowledge of chemistry)

Practical Books:
1. Practical manual of Biochemistry – Rajagopal
2. Practical manual of Biochemistry – Shivananda Nayak
3. Practical manual of Biochemistry - Pattabhiraman
### II DMLT

**Subject: PATHOLOGY**

**SECTION-A** | Q P Code : 5105

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>MARKS</th>
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<tbody>
<tr>
<td><strong>I. Urine analysis / Examination –</strong></td>
<td>50</td>
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<tr>
<td>1. Urine Formation</td>
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<td>2. Collection</td>
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<td>3. Composition</td>
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<td>4. Preservation</td>
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<td>5. Physical Exam</td>
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<td>6. Chemical Exam</td>
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<td>7. Microscopic Exam</td>
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<td>8. Dipstick Method</td>
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<td>9. Principal</td>
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<td>10. Types of Dipstick</td>
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<td>11. Interpretation</td>
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<td>12. Quality Control</td>
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<td><strong>II. Stool Examination -</strong></td>
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<td>• Composition</td>
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<td>• Collection</td>
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<td>• Physical Exam</td>
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<td>• Chemical</td>
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<td>• Microscope for ova Cyst</td>
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<td>• Occult blood</td>
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<td><strong>III. Hematology</strong></td>
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<tr>
<td>• Introduction to clinical hematology</td>
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<tr>
<td>• Instruments &amp; Equipment used in hematology Lab</td>
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<tr>
<td>• Anticoagulants – definition, anticoagulants used in different tests, Mechanism of action, Preparation, advantages, disadvantages. Use of Anticoagulants in different tests</td>
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<tr>
<td>• Collection of Blood sample - Different methods of collection of Blood sample vacutainers</td>
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<td>• Cut off time for conducting various tests and storage of different samples.</td>
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<td>• Preparation of various diluting fluids (RBC, WBC, Platelet, AEC, Reticulocyte) stains &amp; buffers used in hematology lab</td>
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<tr>
<td>• Stains: Romanowskey stains: Leishman &amp; Giemsa in</td>
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</table>
Detail. Use of other Romanowskey stains – Wrights, JSB, Field stain
- Development of Blood cells RBC, WBC, Platelets (Briefly)
- Morphology of normal & abnormal RBC & WBC’s
- Hemoglobin – Introduction Mention all methods Sahlis & Drabkins method in detail including merits & demerits.

- RBC Count – Equipment, Principle, Procedure, Importance
- WBC count – Equipment, Principle, Procedure, Importance
- Absolute eosinophil count – Equipment, Principle, Procedure, Importance
- Reticulocyte count – Equipment, Principle, Procedure, Importance
- Packed cell volume – (PCV) Introduction Equipment, Principle, Procedure, Importance, and Automation
- Preparation & Staining of peripheral Blood smear (Leishman stain), Preparation of Spreader and Ideal Smear
- Blood Indices – MCV, MCH, MCHC – Calculation & Importance
- Automation in hematology – in each & every test
- Quality Control in hematology( With respect to each test)
- Blood groups – Introduction, types.

SECTION-B Q P Code: 5106

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>MARKS</th>
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<tbody>
<tr>
<td>IV. Clinical Pathology</td>
<td>50</td>
</tr>
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</table>

- Sputum Examination
  - Definition
  - Collection
  - Physical Examination
  - Chemical Examination
  - Microscopy - Preparation & staining of smear
  - Preservation and Transport

- CSF Examination – stat specimen
  - Definition
  - Collection
  - Physical Examination
  - Chemical Examination
  - Microscopy - Preparation & staining of smear
- Examination of other body fluids
  - Definition
  - Collection
  - Physical Examination
  - Chemical Examination
  - Microscopy - Preparation & staining of smear
  - Cell count and Cell Type
  - Preservation and Transport

- Semen Analysis
  - Definition
  - Collection
  - Physical Examination
  - Chemical Examination
  - Microscopy - Sperm count, Preparation & staining of smear
  - & Sperm Morphology
  - Preservation and Transport

V. **Cytopathology**
   - Introduction
     b. Urine, body fluids, CSF bronchial washings, Synovial fluid and Pap smears.
     c. Advantages of Dry and Wet Smears
       - Fixatives: Different Types of Fixatives.
       - Stains used in cytopathology: Preparation of stains staining cytopathology smears
       - Stains PAP – Detail – Preparation & staining, Advantages, Drying Artifacts. Mention – Use of ZN, H&E, Shorr stain
       - Demonstration of Barr Bodies – (Buccal smear, Peripheral Smear).
       - Quality control in Cytology

VI. **Histopathology**
   - Introduction
   - Planning of Histopathology Lab: Infrastructure, Equipements, Man power and Master Register.
   - Collection of specimen, numbering & giving tissue bits
Fixatives used in histopathology, preparation, advantages & disadvantages

Stains & dyes – Introduction Composition of commonly used stains, mention types of stains.

Decalcification of Tissues like bones & teeth or other calcified tissues: Decalciﬁying Methods, Reagents Used and End point methods of Decalcification.

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**PAPER SETTING AS PER THE TOPICS**

**PART-A**

<table>
<thead>
<tr>
<th>SL NO</th>
<th>TOPICS</th>
<th>NO OF QUESTION</th>
<th>MARKS</th>
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<tr>
<td>1</td>
<td>SHORT NOTES (4x5)</td>
<td>URINE EXAMINATION</td>
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<td>HAEMATOLOGY</td>
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<td>SHORT ANSWERS (10x3)</td>
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<td>HAEMATOLOGY</td>
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<td>6x3=18</td>
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<td>STOOL EXAMINATION</td>
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**PART-B**

<table>
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<tr>
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<tr>
<td>1</td>
<td>SHORT NOTES (4x5)</td>
<td>CLINICAL PATHOLOGY</td>
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<tr>
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<td>HISTOPATHOLOGY</td>
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<td>CYTOPATHOLOGY</td>
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<td>CYTOPATHOLOGY</td>
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**THEORY EXAMINATION – 100 MARKS**

**Section A. : 50 Marks**

I. Short Notes:
   5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

**Section B. : 50 Marks**

I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)
Practical’s (SECOND Year DMLT, SUB: PATHOLOGY)  

(Approximately 240hrs)

1. Instruments & Glassware in Pathology Lab (Including slides & Coverslips)

2. Urine Examination:
   a. Physical Examination –
      - Volume
      - Colour
      - Ph – Reaction
      - Sp Gravity
      - Odour
   
   b. Chemical Examination
      i. Albumin – Heat coagulation test
         - SSA
         - Nitric acid (Hellers)
         - Dipstick method
      ii. Sugar -*Benedicts Test
          *Dipstick Method
      iii. Ketonebodies -
          *Rotheras Test
          *Dipstick Method
      iv. Blood -
          * Benedicts test
          * Dipstick Method
      v. Bile salts & Pigments : Heys test, Fouchets test, Dipstick Method
     vi. Microscopic Exam :- Crystals, Casts, Cells

• Study of Blood Tests:
• Study of Neubauer chamber
• Haemoglobin estimation – Sahils & Drabkins
• Red Blood Cell (RBC) Count
• Total White Blood (TWBC) Count
• Absolute Eosinophil (AEC) Count
• Platelet Count
• Reticulocyte count
• Packed Cell Volume (PCV)

• Erythrocyte Sedimentation Rate (ESR) - Westergrens, Wintrobe
• Blood indices
• Use of cell counter (Automated)
• To make charts
3. Preparation Blood Smears
   • Selection of slide - including preparation of new slides & old or used slides for making blood smears preparation of spreader slide
   • * Good & bad smear ideal smears
     Removal of mucks, Destaining & Restaining.
4. Staining of Peripheral Blood smear – Leishman stain
   * Care & maintenance of equipment used in Lab
5. Identification of Optimum decalcification-
6. Preparation of cytology smear & fixation of cytology smears-
7. Staining of cytopathology Smears

PRACTICAL EXAMINATION-100 MARKS

<table>
<thead>
<tr>
<th>I DMLT</th>
<th></th>
<th>[ 3 hrs duration ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Spotters</td>
<td>- 10 No. -</td>
<td>20 marks</td>
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<tr>
<td>2. Urine Exam</td>
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<tr>
<td>3. Hb exam Sahli’s / Drapkins/ Automation</td>
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<tr>
<td>4. Peripheral Blood seamier preparation &amp; stain</td>
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<td>5. RBC / WBC / AEC count</td>
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<td>6. Records</td>
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<tr>
<td>7. Viva voce</td>
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<td><strong>Total</strong></td>
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* Records  - Students should maintain this as work done

Take the signature of practical-incharge on a record- Demonstrator or Tutor and counter signed by Concerned H.O.D.

* Theory Valuation should be done by teacher teaching particular subjects with minimum of 3 years teaching experience.

REFERENCE BOOKS:
2. Practical Haematology - SIR JOHN V. DACE, S.M. LEWIS, ELBS
Subject: Microbiology

SECTION-A Q P Code : 5107

<table>
<thead>
<tr>
<th>TOPICS</th>
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<tr>
<td>1. Introduction to microbiology including history of microbiology</td>
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<tr>
<td>2. Microscopy &amp; different types of microscope</td>
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<tr>
<td>3. General bacteriology</td>
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<tr>
<td>a. Morphology &amp; Physiology of bacteria</td>
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<td>b. Classification of bacteria</td>
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<td>c. Common staining techniques in bacteriology</td>
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<td>d. Sterilization &amp; disinfection</td>
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<td>e. Culture media &amp; culture methods</td>
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<td>f. Basic concepts in identification of bacteria</td>
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SECTION- B Q P Code : 5108

<table>
<thead>
<tr>
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<tr>
<td>1) Washing &amp; packing of materials used in microbiology</td>
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<tr>
<td>2) Preparation of stains &amp; buffers</td>
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<tr>
<td>3) Immunity, Antigen, Antibodies</td>
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<td>4) Antigen &amp; antibody reactions</td>
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<td>5) Hypersensitivity</td>
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<td>6) Infection prevention and control</td>
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</table>
II DMLT MICROBIOLOGY PRACTICALS

- Microscopy – types of microscopes, focusing, care & handling of microscopes
- Usage of sterilization equipments
- Media preparation & pouring
- Washing & packing
- Preparation of smears & stains
- Simple stain, Gram stain
- Inoculation techniques

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks
I. Short Notes:
   5 marks X 4 questions = 20 marks (answer any 4 out of 5 questions)
II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks
I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)
II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICALS EXAMINATION – 100 MARKS

1. Spotters - 20
2. Media preparation - 20
3. Packing & sterilization techniques - 25
4. Gram stain - 20
5. Record - 10

Total 100

REFERENCE BOOKS:

1. Bacteriology by Ananthanarayanan
2. Bacteriology by Rajesh Bhatia
3. Parasitology by Chatterjee
4. Parasitology by Jayaram and Panicker
5. Hand book of laboratory technology by Scott
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<td>Paper 2</td>
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<td>Paper 3</td>
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<td>Paper 4</td>
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<td>Section B</td>
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<td>Microbiology Practical</td>
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<td>Unit I. Photometry</td>
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<td>Definition, laws of photometry, absorbance, transmittance, absorption maxima, instruments, parts of photometer, types of photometry–colorimetry, spectrophotometry, flame photometry, fluorimetry, choice of appropriate filter, measurements of solution, calculation of formula, applications.</td>
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<td>Unit II. Liver Functions &amp; their Assessment</td>
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<td>Tests for 1) Carbohydrate metabolism 2) Protein metabolism 3) Lipid metabolism 4) Measurements of serum enzyme levels, Bile pigment metabolism, Jaundice, its types and their biochemical findings.</td>
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<td>Unit III. Different methods of Glucose Estimation-</td>
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<td>Principle advantage and disadvantage of different methods</td>
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<td>Unit IV. Renal Function Tests-</td>
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<td>Various Tests, GFR &amp; Clearance Tests</td>
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<td>Unit V. Cardiac Profile -</td>
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<td>In brief Hypertension, Angina, Myocardial Infarction, Pattern of Cardiac Enzymes in heart diseases</td>
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<td>Different methods of Cholesterol Estimation- Principle, advantage and disadvantage of different methods. Lipid profile.</td>
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<td>Unit VI. Electrophoresis</td>
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<td>Principle, Types &amp; Applications.</td>
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<td>Unit VII. Automation of Laboratory Services, Organization and Management</td>
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<td>Automation in clinical chemistry: Principle &amp; Applications</td>
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<td>Instrumentation, types of analysers, benefits of automation.</td>
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<td>Unit VII. Electrolytes, Blood Gases and pH</td>
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<td>pH Regulation,</td>
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<td>Disturbance in acid Base Balance, Metabolic acidosis &amp; alkalosis, Respiratory acidosis &amp; alkalosis.</td>
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<td>Basic Principles and estimation of Blood Gases and pH,</td>
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<td>Basic principles and estimation of Electrolytes</td>
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<td>Unit VIII. Quality control: Internal &amp; External</td>
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<tr>
<td>Principles of quality Assurance and Standards for clinical chemistry</td>
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<td>Pre-analytical factors, analytical and post-analytical factors important in clinical chemistry</td>
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<tr>
<td>Accuracy, Precision, Specificity, Sensitivity.</td>
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<td>Limits of error allowable in laboratory, Percentage error.</td>
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<td>Reference values and Interpretations,</td>
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<tr>
<td>PRACTICALS III YEAR DMLT (50 Hours)</td>
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<tr>
<td>1. Blood urea estimation</td>
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<td>2. Serum creatinine estimation</td>
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<td>3. Serum uric acid estimation</td>
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<td>4. Serum total protein &amp; A:G ratio</td>
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<td>7. Serum glucose estimation</td>
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<td>8. Total cholesterol estimation</td>
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<td>9. HDL cholesterol (direct) estimation.</td>
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<td>10. LDL cholesterol (direct) estimation</td>
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<td>11. Triglyceride estimation</td>
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<td>12. Estimation Serum of Direct &amp; Total Bilirubin.</td>
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<td>13. Estimation of serum Phosphate</td>
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</table>
14. Serum amylase estimation
15. Serum GOT (AST) estimation
16. Serum GPT (ALT) estimation
17. Alkaline phosphatase estimation
18. Acid phosphatase estimation
19. Serum sodium estimation
20. Serum potassium estimation
21. Serum chloride estimation
22. Estimation of serum calcium
22. Estimation of CK-NAC & CK MB
23. Analysis of CSF
24. Lactate dehydrogenase
THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICAL EXAMINATION-100 MARKS

1. Spotters - 10 No - 20 marks
2. Estimation of blood urea/creatinine/uric acid - 10 marks
3. Estimation of cholesterol/ HDL/LDL/Triglyceride - 20 marks
   And calculation
4. Liver function tests- Any 2 - 10 marks
5. Electrolytes estimation/ chart - 10 marks
6. CSF analysis - 10 marks
7. Records - 10 marks
8. Viva voce - 10 marks

Total - 100 marks

REFERENCE BOOKS:

iii) Biochemistry:

Text Books:
1. Text book of Biochemistry for Dental Students– Pattabhiraman
2. Text book of Biochemistry for Dental Students, Harbans lal
3. Text book of Chemistry prescribed for II P.U.C. (students may need the basic knowledge of chemistry)

Practical Books:
1. Practical manual of Biochemistry – Rajagopal
2. Practical manual of Biochemistry – Shivananda Nayak
3. Practical manual of Biochemistry - Pattabhiraman
### TOPICS

<table>
<thead>
<tr>
<th>I. Hematology</th>
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<tr>
<td>• Differential Luecocyte count - DC</td>
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<td>• Bone marrow examination -</td>
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</tr>
<tr>
<td>a. Introduction ,</td>
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<tr>
<td>b. Different sites of bone marrow aspiration,</td>
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<tr>
<td>c. Different Types of Bone marrow needles.</td>
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<tr>
<td>d. Types of bone marrow —1. Aspiration 2. Bone Marrow Biopsy</td>
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<tr>
<td>e. Materials Required for bone marrow exam – Slides, Watch glass, Anticoagulant for collecting Bone marrow particles</td>
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<td>f. Preparation of Bone Marrow smear for Examination</td>
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<td>g. Staining of Bone marrow slides (Leishman, Giemsa, Perls stain)</td>
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<td>h. Importance of Bone marrow exam</td>
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<tr>
<td>• Osmotic fragility test: Definition, Preparation, Procedure and Importance</td>
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<tr>
<td>• Blood coagulation –</td>
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<tr>
<td>a. Introduction to normal haemostatic mechanism or coagulation mechanism</td>
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<tr>
<td>b. Investigation of bleeding disorders :</td>
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<td>a. Bleeding time – BT</td>
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<td>b. Clotting time – CT</td>
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<td>3. Clot retraction time – CRT</td>
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<td>4. Prothrombin time - PT</td>
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<td>5. Activated partial Thromboplastin time – APTT</td>
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<td>• BT, CT, CRT, PT, APTT – must know - normal values &amp; importance</td>
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<td>• Thrombin Time – TT (Optional)</td>
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<td>• Automation in Coagulation Tests.</td>
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<tr>
<td>• FDP &amp; fibrinogen estimation – Desirable to know</td>
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<tr>
<td>• Foetal Hb - Desirable to know</td>
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<tr>
<td>• Introduction &amp; importance of calibration &amp; validation of clinical laboratory instruments in pathology</td>
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<tr>
<td>• Introduction to laboratory information system(LIS) &amp; Hospital information system(HIS)</td>
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### TOPICS

#### Blood Bank
- Introduction – Blood bank & blood group, Organization of blood bank- Infrastructure : Building, Equipments, Human resources. Use of various Registers and their importance.
- Blood grouping ABO & Rh, other Systems of Blood grouping (Mention)
- Forward & Reverse grouping and their Importance
- Cross matching – major / minor and Imporrtance
- Methods – Saline, Albumin, Coombs cross – matching
- Coombs test – Principle, Procedure and Importance of direct indirect Coomb’s Test.
- Selection of Donor, Counselling
- Screening tests for donor
- Collection & Storage of Blood
- Infrastructure for Components : Space area, Equipments, manpower.
- Separation & uses of various Blood components (Packed cells, Fresh Frozen Plasma(FFP), Cryoppt
- Transfusion reaction – definition, importance and role of technician in transfusion reaction.
- Quality control, Quality assurance & SOP ( Standard Operating procedure.
- Disposal of unused and expired Blood and Blood components, with special importance of disinfection
- Inventory Management in Blood Bank

6. **Histopathology**
- Tissue processing – Completion of Fixation, Dehydration, Clearing, Impregnation in molten wax.
- Instruments used for tissue processing -
  - a. Manual method
  - b. Automated (Histokinette)

- Embedding & Section cutting -
  - b. Automated
- Errors in section cutting & their correction
- Different types of haematoxylins, Preparation of Harris Haematoxyllin and Eosin – routine H & E
- Staining technique including staining technique for rapid diagnosis – Frozen section
- Special stains – Introduction Names and their Importance
- Microwave tissue processing – Introduction, Principle, Procedure in brief and importance
- Quality check or Quality control in Histopathology

7. Mounting of museum specimens : Various Mounting solutions used in mounting, Different types of mounting jars used.
   Biological Hospital waste disposal & universal Precautions

**PAPER SETTING AS PER THE TOPICS**

**SECTION-A**

<table>
<thead>
<tr>
<th>SL NO</th>
<th>TOPICS</th>
<th>NO OF QUESTION</th>
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<td>OSMOTIC FRAGILITY</td>
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<td>OSMOTIC FRAGILITY</td>
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<td>IMPORTANCE OF CALIBRATION &amp; VALIDATION OF CLINICAL LABORATORY INSTRUMENTS</td>
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<tr>
<td></td>
<td>LABORATORY INFORMATION SYSTEM(LIS) &amp; HOSPITAL INFORMATION SYSTEM(HIS)</td>
<td>1</td>
<td>1x3=3</td>
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</table>

**GRAND TOTAL**

50
SECTION-B

<table>
<thead>
<tr>
<th>SL NO</th>
<th>TOPICS</th>
<th>NO OF QUESTION</th>
<th>MARKS</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>1</td>
<td>BLOOD BANK</td>
<td>2</td>
<td>2x5=10</td>
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<tr>
<td>2</td>
<td>HISTOPATHOLOGY INCLUDING SPECIAL STAINS</td>
<td>2</td>
<td>2x5=10</td>
<td>10</td>
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<tr>
<td>3</td>
<td>BIOLOGICAL HOSPITAL WASTE DISPOSAL &amp; UNIVERSAL PRECAUTIONS</td>
<td>1</td>
<td>1x5=5</td>
<td></td>
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<tr>
<td>4</td>
<td>BLOOD BANK</td>
<td>2</td>
<td>2x3=6</td>
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<tr>
<td>5</td>
<td>HISTOPATHOLOGY INCLUDING SPECIAL STAINS</td>
<td>3</td>
<td>3x3=9</td>
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<tr>
<td>6</td>
<td>MICROWAVE TISSUE PROCESSING</td>
<td>1</td>
<td>1x3=3</td>
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<tr>
<td>7</td>
<td>QUALITY CHECK &amp; QUALITY CONTROL IN HISTOPATHOLOGY</td>
<td>1</td>
<td>1x3=3</td>
<td></td>
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<tr>
<td>8</td>
<td>MOUNTING OF MUSEUM SPECIMENS</td>
<td>1</td>
<td>1x3=3</td>
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<tr>
<td>9</td>
<td>BIOLOGICAL HOSPITAL WASTE DISPOSAL &amp; UNIVERSAL PRECAUTIONS</td>
<td>1</td>
<td>1x3=3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GRAND TOTAL</td>
<td></td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

III year DMLT PATHOLOGY Practical’s (Approximately 240hrs)

1. Differential WBC count (DC)
2. Staining of Bone marrow smears
3. Preparation of red cell suspension
4. Osmotic fragility test
5. Sickling Test
6. Determination of ABO blood grouping & Rh typing - methods
   Slide method
   Tube method
   Micro titer plate method & gel method
7. Cross – matching – Major cross Match
   Minor cross match
8. Coomb’s test - Direct, Indirect
9. Tissue processing
10. Blocking - Observation & Demonstration
11. Section cutting
12. Staining by H & E stain
13. Frozen section Cutting & staining - Demonstration
   (Desirable to know)
14. Semen analysis
15. Sputum Examination
16. CSF Examination
17. Other body fluids pleural Peritoneal
18. Bleeding Time & Clotting Time
19. Clot retraction Time Observation
21. Prothrombin time(PT)
22. Activated partial thromboplastin Time(APTT)
23. Mounting of museum specimens

Proposed: Pathology 3 days in a week Includes Lecture, Lecturer Demonstration, Practical & Hospital Posting

THEORY EXAMINATION – 100 MARKS

Section A. : 50 Marks

I. Short Notes:
5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B. : 50 Marks

I. Short Notes:
5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)

II. Short Answers:
3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICAL EXAMINATION: 100 MARKS [3hrs duration]

Pattern:

1. Spotters - 10 No - 20 marks
2. Blood group - 10 marks
3. PAP smear staining - 20 marks
4. H & E staining - 20 marks
5. WBC – DC - 10 marks
6. Records - 10 marks
7. Viva voce - 10 marks

Total - 100 marks
* Take the signature of practical-incharge on a record- Demonstrator or Tutor and counter signed by Concerned H.O.D.

* Theory Valuation should be done by teacher teaching particular subjects with minimum of 3 years teaching experience.

* Practicals examination training can be taught by objective structured practical examination pattern(OSPE)

**REFERENCE BOOKS:**

2. Practical Haematology - SIR JOHN V. DACE, S.M. LEWIS, ELBS
7. Text book of laboratory medicine by V.H. Talib
### III DMLT

Subject: MICROBIOLOGY

**SECTION-A** Q P Code : 6105

<table>
<thead>
<tr>
<th>Topics</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Systematic Bacteriology</strong></td>
<td>15</td>
</tr>
<tr>
<td>Gram positive cocci – Staphylococci, Streptococci, Pneumococci</td>
<td></td>
</tr>
<tr>
<td>Gram negative cocci – Neisseria meningitides &amp; Gonococci</td>
<td></td>
</tr>
<tr>
<td>Gram positive bacilli – C. diphtheria Cl. tetani</td>
<td></td>
</tr>
<tr>
<td>Gram negative bacilli – Enterobacteriaceae, V. cholerae, Pseudomonas, Mycobacteria</td>
<td></td>
</tr>
<tr>
<td><strong>II. Isolation &amp; identification of micro organisms from various clinical samples</strong></td>
<td>25</td>
</tr>
<tr>
<td>a). Collection and transport of various samples</td>
<td></td>
</tr>
<tr>
<td>b). Preservation of samples</td>
<td></td>
</tr>
<tr>
<td>c). Processing of various samples</td>
<td></td>
</tr>
<tr>
<td><strong>III. Quality and Biomedical waste disposal Management System.</strong></td>
<td>10</td>
</tr>
<tr>
<td>1. Quality control measures</td>
<td></td>
</tr>
<tr>
<td>2. Universal precautions</td>
<td></td>
</tr>
<tr>
<td>3. Bio Medical Waste disposal and Management</td>
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</table>

**SECTION- B** Q P Code : 6106

<table>
<thead>
<tr>
<th>Topics</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV. Mycology – General features, lab Diagnosis of fungal infection</strong></td>
<td>10</td>
</tr>
<tr>
<td>(KOH mount, LPCB &amp; SDA); Candida, Cryptococci, Aspergillus</td>
<td></td>
</tr>
<tr>
<td><strong>V. Virology</strong> – General features, HIV, HBV HCV,</td>
<td>5</td>
</tr>
<tr>
<td><strong>VI. Parasitology</strong> – Protozoology – Entamoeba histolytica, Trichomonas, Giardia, Malaria,</td>
<td>5</td>
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<tr>
<td><strong>VII. Helminthology</strong> – Nematodes – Ascaris, Ankylostoma, Trichuris trichura, Enterobious, Vermicularis &amp; Cestodes – Taenia &amp; Echinococcus</td>
<td>5</td>
</tr>
<tr>
<td><strong>VIII. Serology</strong> – Widal, Typhidot., VDRL, ASLO, RA, CRP, Brucella Agg test, ELISA, Antibigram, Preparation of antibiotic discs, Antibiotic Resistance, Automation in Serology and Cultures</td>
<td>25</td>
</tr>
</tbody>
</table>
III YEAR DMLT MICROBIOLOGY PRACTICALS  50 hrs

Albert’s stain
Gram’s stain
Z-N stain
Negative stain
Leishman’s stain
JSB
Lactophenol cotton blue mount
Wet mounts & KOH mount

Serology, Widal, VDRL, RA, CRP, ASO, latex agglutination ELISA
Stool examination
Clinical sample with culture sensitivity

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THEORY EXAMINATION -100 MARKS

Section A : 50 Marks
I. Short Notes:
   1. 5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)
II. Short Answers:
   2. 3 marks X 10 questions = 30 marks (Answer All 10 Questions)

Section B : 50 Marks
I. Short Notes:
   5 marks X 4 questions = 20 marks (Answer any 4 out of 5 questions)
II. Short Answers:
   3 marks X 10 questions = 30 marks (Answer All 10 Questions)

PRACTICALS EXAM – 100 Marks
1. Spotters - 20
2. Serology - 20
3. Stool examination - 20
4. Z-N stain - 20
5. Clinical sample with culture sensitivity (Charts can be used) - 10
6. Record - 10

100 Marks

REFERENCE BOOKS:

1. Bacteriology by Ananthanarayanan
2. Bacteriology by Rajesh Bhatia
3. Parasitology by Chatterjee
4. Parasitology by Jayaram and Panicker
5. Hand book of laboratory technology by Scott
<table>
<thead>
<tr>
<th>Paper</th>
<th>SUBJECT</th>
<th>SECTION</th>
<th>Question paper Code</th>
<th>MAX. MARKS</th>
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<tbody>
<tr>
<td>Paper 1</td>
<td>Biochemistry</td>
<td>Section A</td>
<td>6101</td>
<td>50</td>
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<tr>
<td></td>
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<td>Section B</td>
<td>6102</td>
<td>50</td>
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<tr>
<td></td>
<td>Biochemistry Practical</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Paper 2</td>
<td>Pathology</td>
<td>Section A</td>
<td>6103</td>
<td>50</td>
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<tr>
<td></td>
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<td>Section B</td>
<td>6104</td>
<td>50</td>
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<tr>
<td></td>
<td>Pathology Practical</td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Paper 3</td>
<td>Microbiology</td>
<td>Section A</td>
<td>6105</td>
<td>50</td>
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<tr>
<td></td>
<td></td>
<td>Section B</td>
<td>6106</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Microbiology Practical</td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>
Students should know- In All 3 years * (not included in practical examination)

**Basic computers and Information Science-Practical**

Practical on fundamentals of computers -

1. Demonstration of basic hard ware of the computers and laptops
2. Learning to use MS office: MS word, MS PowerPoint, MS Excel.
3. To install different software.
4. Data entry efficiency

**DMLT- Communication and Soft Skills, Spoken English-Practical**

1. Précise writing and comprehension of simple passages from a prescribed text book. The passage should be atleast100 words and students should answer a few questions based on it.
2. To practice all forms of communication i.e. drafting reports, agendas, notes, précise writing, circulars, presentations, telephonic communication, along with practice on writing resumes and applications for employment.

**DMLT- Medical Terminology, Record keeping (including anatomical terms) and Orientation to Medical Laboratory Science Technology (MLT)-Practical**

1. General discussion/Sensitization on career opportunities and role of MLT in Hospital Care
2. Visit to Central Sterile Supply Department (CSSD)
3. Visit to incinerator complex
4. Visit to Immunization section

**DMLT- Introduction to Quality and Patient safety (including Basic emergency care and life support skills) Practical**

**DMLT- Environmental Science-Practical**

1. Any Activity related to public awareness about the environment:
   1.1. Preparation of Charts/Models
   1.2. Visit to any effluent treatment plant
2. Effects of environmental pollution on humans through poster presentation.
3. Any activity related to biomedical waste management in a hospital or clinical laboratory

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