M.G.V's,Arts,Science and Commerce College, Malegaon Camp. Dist : Nashik 423103

Diploma in Medical Lab Technology
(One Year Diploma Course)

SEMESTER-I

Paper Code	Nomenclature	Duration of Exam	External	Internal	Max Marks	Type	Hours per Semester	Credits
DMLT - 101	Biochemistry-I	3 Hours	60	40	100	General	60	3
DMLT - 102	Microbiology-I	3 Hours	60	40	100	General	60	3
DMLT - 103	Pathology-I	3 Hours	60	40	100	General	60	3
DMLT - 104	Haematology-I	3 Hours	60	40	100	General	60	3
DMLT - 105	Practicals based on 101, 104	3 Hours	60	40	100	Skill	75	5
DMLT - 106	Practicals based on 103, 102	3 Hours	60	40	100	Skill	75	5
DMLT - 107	Compulsory Computer	3 Hours	100	-	100**	Skill	30	5
DMLT - 108	English	3 Hours	30	20	50	Skill	30	3
Total					**650**			

SEMESTER-II

Paper Code	Nomenclature	Duration of Exam	External	Internal	Max Marks	Type	Hours per Semester	Credits
DMLT - 201	Biochemistry-II	3 Hours	60	40	100	General	60	3
DMLT - 202	Microbiology-II	3 Hours	60	40	100	General	60	3
DMLT - 203	Pathology-II	3 Hours	60	40	100	General	60	3
DMLT - 204	Haematology-II	3 Hours	60	40	100	General	60	3
DMLT - 205	Practicals based on 101, 104, 201, 204	3 Hours	60	40	100	Skill	75	5
DMLT - 206	Practicals based on 102, 103, 203, 202	3 Hours	60	40	100	Skill	75	5
DMLT - 207	Compulsory Computer	3 Hours	100	-	100**	Skill	30	3
DMLT - 208	English	3 Hours	40	10	50	Skill	60	5
EVS		3 Hours	80	20	100**	Skill	30	3
Total					650			
Total (I + II)					1100			

1. Syllabus of English same is as that of B.Sc.-II.
2. Environmental Studies paper will be studied as a qualifying paper. Syllabus is same as that of B.Sc.-II
3. Theory exams will be held semester wise.
4. Practical exams will be annual.

PAPER-I
BIOCHEMISTRY-I

Subject Code : DMLT-101 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Introduction to Medical Lab Technology, Role of Medical Laboratory technologists-ethics, responsibility, safety measures and hazards in clinical biochemistry, first aid (accidents).

Units of measurements, S.I. Units, measurement of volume, various volumetric apparatus (cylinders, flasks, pipettes), calibration of volumetric apparatus.

Cleaning and caring of general laboratory glassware and equipment, preparation and storage of distilled water, preparation of reagents and standard solutions, storage of chemicals and reagents, use of analytical balance, dry and moist heat radiation, filtration, autoclaving and chemical disinfection for sterilization.

Section-B

Introduction, aim and scope of Biochemistry. Elementary knowledge of inorganic chemistry :- atomic weight, molecular weight, equivalent weight, acid, bases. Elementary knowledge of organic chemistry :

(a) Organic compounds
(b) Aliphatic and aromatic compounds
(c) Alcohols, Aldehydes, Ketones, Amines, Esters, Phenol etc.

Viscosity - principles and applications; sedimentation - principles and applications; Radio-isotopes and their use in Biochemistry, mole, molar, molal and normal solutions, pH measurement, buffer solutions, percent solutions, osmosis, dialysis, surface tension.

PAPER-II
MICROBIOLOGY-I

Subject Code : DMLT-102 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Basic principles and usage of Instruments:
General Instruments : Distillation plant, Centrifuge machine, Analytical Balance, Hotplate, Magnetic Stirrer, Water Bath, Automatic dispenser and diluters, Deionizer.

Microbiological Instruments : pH-meter, Autoclave, Incubator, Hot air oven, Laminar Air flow, Colony counter, Muffle furnace, Refrigerator, Inoculator, Mc Intosh and Flides anaerobic jar.

Microscopy and Micrometery:
Microscopy : Study of compound microscope-magnification, numerical aperture, resolution and components of microscope. Dark ground illumination, care of microscope and common difficulties. Study of phase contrast, interference, fluorescent, polarising and electron microscope. Calibration of ocular micrometer and measurement of microorganisms.

Section-B

Microbiology & Medicine : Introduction to Medical Microbiology, Discovery of microorganisms. Countribution of Robert Koch, Antonie Van Leeuwenhoek, Louis Pasteur, Bordet, Paul Ehrlich, Alexander Flemming, Elie Metchnikoff, Needham, Tyndall Janssen, Joseph Lister, Karl Landsteiner etc. Scope & relevance and safety measurers of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.

Sterilization and Disinfection : Definition, mode of action and uses of various physical methods of sterilization - heat, UV radiation, ionizing radiation, character affecting sterilization, autoclave control and sterilization indicators. Chemical disinfectants - phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compounds. Use and abuse of disinfectants. Disinfectants, antiseptics, chemotherapeutic agents, chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein and nucleic acid synthesis and cytoplasmic membrane. Future development of chemo-therapy.

PATHOLOGY –I PAPER-III
HISTOPATHOLOGY, ANATOMY & PHYSIOLOGY

Subject Code : DMLT-103 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Introduction to histopathology and laboratory organization, Introduction to anatomical terms and organization of human body. Tissues - Definitions, types, classification, location and functions.

Management and planning, receiving and recording of specimens, indexing, maintaining records, knowledge of maintenance and use of various equipments.

Study of :
Skeletal system, bones, joints and muscles.

Respiratory system.

Cardiovascular system.

Alimentary system mechanism and physiology of digestion and absorption.

Section-B

Study of :
Liver structure and function.

Urinary system.

Male genital system.

Female genital system.

Study of :
Nervous system.

Spleen, lymph node and R.E. system.

Endocrine glands and their functions.

PAPER-IV
HAEMATOLOGY-I

Time : 3 Hrs.

Subject Code : DMLT-104 **Total Marks : 100**

Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Introduction to haematology and laboratory organization, Lab safety and instrumentation, Transportation of different clinical materials to distant laboratories, Formation of blood, blood morphology, Chemistry and functions. Composition and functions of blood, Physiology of coagulation of blood.

Various anticoagulants, their uses, composition, amount, mode of action and their merits and demerits. Collection and preservation of blood for various haematological investigations. Changes in blood on storage, Morphology of normal and abnormal blood cells and their identifications; Methods of preparation of different types of vials.

Section-B

Normal and absolute values in haematology, Quality assurance in haematology. Haemoglobinometery, variouos methods of estimation of Hb, errors involved and standardization of instruments for Hb estimation. Physiological variations in haemoglobin.

Haemoglobin, its synthesis, functions and degradation, haemoglobin pigments and their measurement, abnormal haemoglobin and means of identification. Calculation of different red cell indices (Haemogram).

PAPER-I
BIOCHEMISTRY

Subject Code : DMLT-105

PRACTICAL

1. Organization of clinical laboratories
   (a) Organizational Structure
   (b) Functional Components
2. Study of laboratory ethics and responsibility of its workers.
3. Biohazards and Safety precautions.
4. First aid-knowledge of first aid procedures.
5. The calibration of volumetric apparatus
6. Study of cleaning and sterilization of glassware & equipments.
7. Preparation of normal, molar, molal and percent solutions.
8. Preparation of buffer solutions and determination of their pH.
9. The determination of pH using indicators.
10. The detection of changes in the confirmation of bovine serum albumin by viscosity measurements.
11. The effect of pH on the conformation of bovine serum albumin.
12. To study the phenomenon of osmosis.
13. To study the phenomenon of dialysis.

PAPER-IV
HAEMATOLOGY

Subject Code : DMLT-105

PRACTICALS

- Methods of collection of blood.
- Study of appliances for haematology practical
- Making blood smear, staining and use of microscope for identifying components of blood.
- Preparation of anticoagulant fluids.
- Preparation of reagents for coagulant studies.
- Study of various methods of estimation of Haemoglobin.
- Study of basic laboratory procedures in Haematology.
- Collection and processing of blood specimen -
  (a) Plasma
  (b) Serum
  (c) Preparation of blood films
- Cleaning of laboratory glassware in Haematology.

PAPER-II
MICROBIOLOGY

Subject Code : DMLT-106

PRACTICAL

1. Role of Microbiology Laboratory
2. Basic rules for specimen collection and handling, transportation of specimen and safety regulations.
3. Laboratory Procedures in Microbiology :
   - (a) Disinfection and sterilization
   - (b) Laboratory culture
4. Study of Principle and Working of :
   - (a) Microscopes (all types)
   - (b) Distillation apparatus
   - (c) Centrifuge
   - (d) Balance
   - (e) De-ionizer
   - (f) pH meter
   - (g) Autoclave
   - (h) Incubator
   - (i) Oven
   - (j) Colony Counter
   - (k) Muffle Furnace
   - (l) Refrigerator

PAPER-III
HISTOPATHOLOGY, ANATOMY & PHYSIOLOGY

Subject Code : DMLT-106

PRACTICALS

- Study of laboratory organization related to histology and cytology - basic terminologies and specimen handling.
- Use and care of equipments, laboratory supplies and management.
- Study of tissues.
- Study of all the systems with the help of model/charts.
- Study of bones.

(SEMESTER-II)

PAPER-I

BIOCHEMISTRY-II

Time : 3 Hrs. Subject Code : DMLT-201 **Time : 3 Hrs.**

Total Marks : 100

Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Water : Structure of water, solvents, properties of water, importance of water :

Carbohydrates : Structure, classification and their functions in biological system.

Lipids : General structure of fatty acids and classification of lipids.

Amino acids : Common structural features, physical and chemical properties, separation of amino acids and essential amino acids.

Proteins : Classification, structural organization and functions of proteins.

Section-B

Enzymes : Definition, classification of enzymes, concept of active sites, general mode of action of enzymes, mechanism of enzyme activity, Coenzymes.

A brief account of V**itamins**.

Nucleic acids : Structure, function and types of DNA and RNA, Nucleotides, Nucleosides, Nitrogen bases and role of Nucleic acids.

Porphyrins : A brief account of Porphyrins.

PAPER-II
MICROBIOLOGY-II

Subject Code : DMLT-202 **Time : 3 Hrs.**
Total Marks : 100
Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Cultural Media : Liquid and solid media, container for media distribution of media in tubes, bottles and petridishes. Common ingredients of cultural media, synthetic media, peptone water, nutrient agar and broth, chocolate and blood agar, malt extract and broth, milk agar etc. Special media for Neisseria, Corynebacterium, Mycobacterium & Enterobacteriaceae group.

Cultivation of bacteria : Instruments used, inoculation hood, laminar flow, culture procedure, incubation (aerobic and anaerobic). Isolation of pure culture and its preservation. Blood culture. Introduction and uses of culture, classification of cultures, antimicrobial sensitivity, anaerobic cultivation techniques.

Pure culture : Maintenance and preservation of pure cultures. Collection, transport processing and storage of clinical sample for microbiological analysis.

Section-B

Anatomy of bacterial cell, intercellular components and their functions, bacterial reproduction, morphological study of bacteria and its appendages - flagella, fimbriae, pili, capsule, spore and cysts.

Classification and identification of bacteria : Biological groups, morphological and biological classification, DNA composition as a basis of classification system of identification - morphology, staining reactions, cultural characters, biochemical reactions, antigenic characters and Medical importance.

Typical growth curve, various phases of growth physiology of bacteria-catabolism and anabolism. Nutrition of microbes and physical conditions required for growth. Effect of carbon, nitrogen, growth factors, vitamins, temperature, pH, osmotic pressure, oxygen and carbon dioxide on microbial growth.

PAPER-III
PATHOLOGY AND ALLIED SUBJECTS

Time : 3 Hrs.
Subject Code : DMLT-203 **Total Marks : 100**
Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Introduction to Histopathology :
General Principle, Reception, recording and labelling of histology specimens.
Fixation and various fixatives - Mode of action and indication preparation.
Processing of histological tissues for paraffin-embedding.
Embedding and embedding media, Vacuum embedding.

Equipment used in Histopathology :
(1) Tissue Processor
(2) Microtome - various types, their working principle and maintenance.
(3) Microtome knives and knife-sharpening.
(4) Automatic slide strainer
(5) Freezing microtome
(6) Cryostat
Section cutting, cutting faults and remedies.
Decalcification - Methods, advantages and disadvantages, various types - their mechanisms of action.

Section-B

Major techniques used in Histopathology ;
Routine staining procedures, mounting and mounting media.
Dye chemistry, theory and practice of staining.
Solvent mordents, accelerators and accentuators.
Use of controls in various staining procedures.

Preparation of Haematoxylin and Eosine
Methods of preparation, staining technique for rapid diagnosis
Histo-chemical staining
Cyto-chemical staining
Collection of Museum specimens
Preparation and storage, methods of mounting

PAPER-IV
HAEMATOLOGY-II

Time : 3 Hrs.

Subject Code : DMLT-204 **Total Marks : 100**

Minimum Pass Marks : 40%

Note : Attempt five questions in all, selecting two questions from each section. Question No. 1 is compulsory (short answer type). Nine questions are to be spread over the entire syllabus. All questions carry equal marks.

Section-A

Fundamentals of Haematology : History and discovery of blood group system, Principles used in blood grouping. ABO system and the methods used. Factors influencing the results of blood grouping. Rhesus blood group system (Rh-system), Rh-antigen, Source of antigens and types of antibodies.

Compatibility tests in blood transfusion (Direct & indirect), Cross-matching, Coomb's test - Principles involved and the methods used. Blood transfusion and it's hazards. Laboratory investigations of transfusion reactions and mismatched transfusion.

Section-B

Selection and screening of donor and collection of blood. Solution and apparatus used. Storage of blood, Preparation and storage of plasma; preparation of red cell suspension and how to serve a requisition. Detection of time when to discard blood in Blood bank.

Bone marrow aspiration methods, staining, preparation of bone marrow smears and preparation of histological sections. Preparation and staining procedures of blood smears - thin smears, thick smear, buffy coat smear and wet preparation.

PAPER-I
BIOCHEMISTRY (201)

Subject Code : DMLT-205

PRACTICALS

- To study the phenomenon of imbibition of water.
- To study the phenomenon of diffusion of water.
- To study the phenomenon of plasmolysis and deplasmolysis.
- To determine the osmotic pressure of cell sap by plasmolytic method.
- To study the qualitative analysis of carbohydrates.
- To study the qualitative analysis of proteins.
- To study the qualitative analysis of fats & oils.
- To study the structure of DNA and RNA from model/charts.
- To study the effects of temperature, pH and substrate concentration on enzyme activity.

PAPER-II
MICROBIOLOGY(202)

Subject Code : DMLT-205

PRACTICALS

1. Principle, construction and working of : Microscope, Laminar Air Flow
2. Study of bacterial cell morphology
3. Isolation of pure cultures and preservation.
4. Demonstration of staining procedures for Gram staining, endospore and capsules.
5. Classification and identification of bacteria with respect to Gram Staining.
6. Study of growth curve in Bacteria and yeast
7. Preparation of culture media and technique of aseptic transfers.
8. Study of composition and preparation of stains.

PAPER-III

PATHOLOGY AND ALLIED SUBJECTS(203;204)

Subject Code : DMLT-206

PRACTICALS

- Histological study of all the systems.
- Preparation of stains.
- Microtomy.