

Curriculum of

**POSTGRAGUATE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY
(PG-DMLT)**

JUNE-2024

These regulations shall be called as “The Revised Regulations for the postgraduate diploma in medical laboratory technology programme under the Faculty of Medical Sciences”. They shall come into effect from the Academic Year 2024-25.

RDMLT-1:

A Candidate for admission to the Postgraduate Diploma in Medical Laboratory Technology (PG-DMLT) must have passed the B.Sc. Degree Examination of the any UGC recognized University with Medical Laboratory Technology (or Medical Technology in Clinical Laboratory Technology)/Microbiology/ Bio-Chemistry/Zoology/Botany/Chemistry/Bio-Technology/Environment Science/Genetics/Bioinformatics/B. Sc. (Home Science) (Food and Nutrition)/B.Sc. (Home Science), B.Sc. Nursing, B.Sc. (Food Technology) or B. Sc (Industrial Microbiology) (Vocational) as principal subject or an examination of any other university recognized as equivalent.

RDMLT-2: The course of study for the Postgraduate Diploma in Medical Laboratory Technology shall be a full time course and its duration shall be of one academic year.

RDMLT-3: A candidate who has passed an equivalent examining body and is seeking admission to the Institute recognised by this University shall not be admitted without producing on eligibility certificate from the Sardar Patel University.

RDMLT-4: To become eligible to appear in the final examination conducted by Sardar Patel University - a) a candidate has to keep one year at the Institute recognised for teaching the course of studies in Medical Laboratory Technology by the university. b) A candidate has to keep the minimum attendance of 75% in Theory and Practical's separately. c) A candidate has to obtained at least 40% marks in each subject in the internal tests conducted by the Institute.

RDMLT-5: A candidate desirous of appearing at the Examination for the Postgraduate Diploma in Medical Laboratory Technology must forward his application in the prescribed form accompanied by a Certificate of attendance to the Registrar through the Head of the institute on or before the date prescribed for the purpose under the ordinance/s.

RDMLT-6: For the purpose of deciding final result at this examination, the ratio between the internal assessment and final University examination shall be 20:80 for both theory & practical. The internal assessment is done based on continuous evaluation including two internal test, seminar, quiz and attendance.

RDMLT-7: The final examination for the Postgraduate Diploma in Medical Laboratory Technology shall be held at the end of the academic year in the month of May. Re-examination for failed students will be carried on Oct/Nov month. One internal and one external examiner should jointly conduct practical/ oral examination for each student.

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RDMLT-8: The Postgraduate Diploma Medical Laboratory Technology shall not be conferred upon a candidate unless he/she has passed in all the subject of the theory examination and the practicals in accordance with the provisions of relevant regulations.

RDMLT-9: STANDARD OF PASSING

(A) To pass the Diploma in Medical Laboratory Technology Examination, a candidate must obtain at least 45% marks in each paper/practical/oral at the University Examination as also in the total of the internal assessment and the University Examination.

(B) AWARD OF CLASS:

1. The successful candidates who obtain at least 50% or more but less than 60% marks in the total of internal assessment & the University examination will be place in Second Class.
2. The successful candidates who obtain at least 60% or more but less than 70% marks in the total of Internal assessment & the University examination will be place in First Class.
3. The successful candidates who obtain at least 70% or more marks in the total of internal assessment & the University examination will be declared to have passed the examination in First Class with Distinction.
4. University rank Certificate or University Gold medal will be declared and awarded based on only External Theory and Practicals Marks.

RDMLT-10: Credit assignment

Theory and Laboratory Courses

Theory courses consist of lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory/Clinical lab/Community/demonstration. Credits (C) for a course are determined by multiplying the number of hours of instruction per week by a factor of one (1) for lecture and tutorial hours and a factor of half (1/2) for practical (laboratory/clinical/community) hours. Thus, a theoretical course with three lectures and one tutorial each week during the first and second carries four credits. Similarly, a practical with four laboratory hours per week throughout the semester is worth two credits.

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PROGRAMME STRUCTURE

Post-graduate Diploma in Medical Laboratory Technology

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| Programme Outcome (PO) | <ol style="list-style-type: none">1. Perform routine clinical laboratory procedures within acceptable quality control parameters in haematology, immunohematology, biochemistry, cytology, histology and microbiology.2. They will be able to function efficiently, confidently and safely in clinical laboratory settings including hospital environments and able to follow ethical practice associated with medical lab technology.3. Apply problem solving techniques in identification and correction of procedural errors, instrument malfunctions and verifying the accuracy of laboratory results.4. Interpret laboratory test data for clinical significance.5. Demonstrate knowledge and understanding of protocols and management principles and apply these to one's own work, as a member and leader in a team |
| Programme Specific Outcome (PSO) – | <ol style="list-style-type: none">1. Knowledge: Medical Laboratory Technology is a one year Post Graduate Diploma course in which the technicians are given the basic knowledge of diagnostic technique and prognosis of various clinical conditions. These technicians serve to offer the assistance to doctors in diagnosis of various clinical conditions.2. Skill: Demonstrate practical skill in narrow range of medical laboratory technology applications.3. Research attitude: Students will be able to apply practical skills as a laboratory technologist and have updated knowledge of research trends in health care. |

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The subject of examination for the Diploma Medical Laboratory Technology will be as under.
DMLT-Examination System and Marks distribution: Theory and Practical

PG-DMLT

| Course Code | Name of Course | Duration of Examination (hours) | Theory /Practical | Component of Marks | | Total |
|-----------------|--|---------------------------------|-------------------|--------------------|------------|------------|
| | | | | External | Internal | |
| PM01DM LT101 | Clinical Biochemistry | 3 hours | Theory | 80 | 20 | 100 |
| PM01DM LT102 | Medical Microbiology & Immunology | 3 hours | Theory | 80 | 20 | 100 |
| PM01DM LT103 | Clinical Pathology & Histopathology | 3 hours | Theory | 80 | 20 | 100 |
| PM01DM LT104 | Haematology, Blood Banking & Laboratory Management | 3 hours | Theory | 80 | 20 | 100 |
| PM01DM LT105 | Practicals of Biochemistry | 3 hours | Practical | 240 | 60 | 300 |
| | Practicals of Microbiology | 3 hours | Practical | | | |
| | Practicals of Pathology | 3 hours | Practical | | | |
| TOTAL | | | | 560 | 140 | 700 |

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|--------------------------|---|-------------------------|------------------|
| Course Code | PM01DMLT101 | | |
| Title of Subject | Clinical Biochemistry | Total Hours/Week | 04 |
| Course Objectives | <ol style="list-style-type: none"> 1. Discuss the fundamental biochemistry knowledge related to health 2. This subject gives information about various clinically important enzymes, biomolecules 3. Diagnosis of clinical disorders by estimating biomarkers 4. Determine various substances including substrates, enzymes, hormones, etc. and their use in diagnosis and monitoring of disease are applied 5. Student able to understand working of instruments used in clinical biochemistry | | |
| Course Content | | | |
| Unit | Description | | Weightage |
| 1 | <p>Preparation of solutions : Percent solution, Molar solution, Normal Solution and Buffer Solution, pH indicators, pH measurement</p> <p>Carbohydrate: Function, Classification, Optical activity of sugars, Epimers, Mutarotation, chemistry and properties and biomedical importance of monosaccharides, disaccharides and polysaccharides</p> <p>Regulation of water: Distribution and regulatory mechanism of water balance</p> | | 12% |
| 2 | <p>Amino Acids: Structure, Structural and Nutritional Classification, Physical and chemical properties, Color reactions of amino acids and proteins.</p> <p>Protein: Structural organization of protein (Primary, Secondary and Tertiary structure), Classification, Colour reaction of proteins, Classification and clinical significance of proteins, Precipitation method of proteins, methods for quantitative measurement of protein,</p> | | 12% |
| 3 | <p>Enzyme: Characteristics, IUB system of enzyme classification, Co-enzyme, Specificity of Enzyme, Mode of action of Enzyme, Kinetics Parameter, Factors affecting Enzyme activity, Enzyme Inhibition (Reversible, Irreversible, Suicide, Feedback, Allosteric), Enzyme profile in diseases (Diagnostic use of Enzyme), Isoenzyme and its clinical importance, Enzymes as Therapeutic Agents</p> <p>Minerals and Vitamins: Biochemical importance Calcium, Phosphorous, Iron, Medical importance of A, D, E, K, B₁₂, Folic acid & Vitamin C.</p> | | 13% |
| 4 | <p>Lipid: Classification of lipids and Fatty Acid, Essentials fatty acid, Triacylglycerol and its Chemical properties, structure and biomedical importance of phospholipids and Cholesterol, chemistry and functions of prostaglandins</p> <p>Nucleic acid: Purine Bases, Pyrimidine Bases, Formation of nucleosides, Nucleotide, Basic structure of DNA and RNA, Types of RNA</p> | | 13% |

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| | Free radicals : Generation of ROS, Role of GSH and various antioxidative enzyme (SOD, CAT, GPx) system in protecting cell | |
| 5 | Major Pathway of carbohydrate metabolism and its disorder: Glycolysis, TCA, HMP shunt, gluconeogenesis, Hormonal regulation of blood sugar, Diabetes mellitus: Classification, Laboratory Investigations in diabetes, Clinical aspect of diabetic complication, Glycated Haemoglobin, GTT, Lactose Intolerance, glycogen storage disorder Nucleic acid metabolic disorder: Gout, Xanthinuria | 12% |
| 6 | Protein metabolism and its disorder: Transamination, Deamination, Urea cycle and its regulation, Disorders of Urea Cycle, Phenyl ketonuria, Alkaptonuria, Cystinuria, Albinism, Maple syrup urine disease, Dopamine and Parkinson's disease Metabolism of Lipoproteins and its disorder: Chylomicron, VLDL, LDL, HDL, Atherosclerosis, Ketosis, Fatty liver, Method for measurement of Lipid Profile | 12% |
| 7 | Organ Function Test: Liver function test, Renal function test, Thyroid function test, Pancreatic Function Tests, Cardiac Profile test, Gastric Function Tests, Oncogenic Markers or Tumour Markers and its diagnostic method Haemoglobin: Types of Hb and its clinical significance, Synthesis and breakdown of Heme, Bilirubin, Types of Jaundice and its lab. diagnosis, Abnormal Hb and haemoglobinopathies (Thalassaemias, Sickle Cell Disease) TUMOR & CANCER MARKERS: Carcinogens, Various clinically important Tumour Markers | 13% |
| 8 | Biomedical Instrumentation: types of photometry–colorimetry, spectrophotometry, Serum Electrophoresis, Chromatography, immune-chromatographic assays, Auto analyzers and Chemiluminiscent analyzers, Electrolyte analyser, ELISA, Protein Blot Advanced Molecular Techniques in diagnosis: Isolation of DNA and RNA, PCR and RT-PCR, Real time PCR, basics of DNA Sequencing method. | 13% |
| Reference Book | | |
| <ul style="list-style-type: none"> • Text book of Medical Biochemistry by Chaterjee & Shinde, PublisherJPB • Practical Clinical Biochemistry by Harold Varley, Publisher CBS • Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company • Vasudevan & Shreekumar : Biochemistry for Medical students • Harper's Biochemistry • Satyanarayan, U. Chakrapani, Biochemistry, 3rd edition, Books & Allied Pvt Ltd Kolkatta. | | |

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|--------------------------|--|-------------------------|------------------|
| Course Code | PM01DMLT102 | | |
| Title of Subject | Medical Microbiology and Immunology | Total Hours/Week | 04 |
| Course Objectives | <ol style="list-style-type: none"> 1. Students will gain knowledge about the different types of microorganisms and their significance. 2. Students will be able to correlate disease symptoms with causative agent, isolate and identify pathogens. 3. They will gain knowledge of mechanism of action of antimicrobial drugs and prophylaxis. 4. The students will learn how to analyse various clinical patients' samples, for estimation of different components which are the cause of the immune disease or are the diagnostic/prognostic markers. 5. This subject gives information about various clinically important cells of immune system, lymphoid organs, antigen (Ag), antibody (ab), Ag-Ab reactions, transplant immunology etc. & automation techniques. | | |
| Course Content | | | |
| Unit | Description | | Weightage |
| 1 | <p>Morphology of bacteria – size, shape and arrangement of bacterial cell – cell wall, cytoplasmic membrane, flagella, fimbriae and pili, cytoplasmic matrix, nucleoid, cytoplasmic inclusions</p> <p>Isolation and Culture of Bacteria: Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media Pure culture techniques – dilution plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator. Preservation of microbial cultures - sub culturing, lyophilisation, sand cultures, storage at low temperature</p> | | 12% |
| 2 | <p>MICROSCOPY: Definition, Importance of microscopy, principle, operation and applications of light microscope, phase contrast microscopy, Dark field microscope, fluorescence microscopy</p> <p>Sterilization and Disinfection: Introduction to Sterilization & Disinfection; Definition of Sterilization, Disinfection; Physical & Chemical methods to destroy or reduce microbes; Physical methods- Sunlight, Drying, Heat, Filtration, Radiation; Chemical methods- Use of Alcohols, Aldehydes, Dyes, Halogens, phenols, Gases, Surface-Active agents, Metallic salts.</p> | | 12% |
| 3 | <p>Staining of Bacteria: Definition of Bacterial Staining; Principle & purpose of staining; Types of microbiological stain: Basic stains, Acidic stains, Neutral stains; Types of staining methods: Simple staining method, Differential staining method, Spore staining method, Capsule staining method; Principle & procedure of Gram stain & ZiehlNeelsen stain</p> | | 13% |

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| | <p>Biochemical Identification of Bacteria: Brief introduction to biochemical test to identify bacteria; Principle, procedure, result interpretation and application of Catalase, Oxidase, Coagulase, Indole, Citrate, Urease, Triple sugar iron</p> <p>Antibiotic Sensitivity Test: Introduction & use of antibiotic sensitivity test; Role of antibiotic sensitivity test</p> | |
| 4 | <p>Normal flora of human body. General attributes and virulence factors of bacteria causing infections – invasiveness and toxigenicity. Pathogens, pathogenesis, clinical manifestations, lab diagnosis, epidemiology, chemotherapy and prevention of diseases caused by– <i>Staphylococcus</i>, <i>Streptococcus</i>, <i>C. diphtheriae</i>, <i>Cl. tetani</i>, <i>Cl. botulinam</i>, <i>B.pertussis</i>, <i>M. tuberculosis</i>, <i>N. gonorrhoeae</i>, <i>S. typhi</i>, <i>V. cholera</i>, <i>S. dysenteriae</i>, <i>T. pallidum</i>. <i>Y. pestis</i>, <i>Leptospira interrogans</i>.</p> | 13% |
| 5 | <p>Introduction to parasitology, Host–parasite relationship, mechanism of pathogenesis, transmission and life cycle of the Protozoan – <i>Entamoeba</i>, <i>Toxoplasma</i>, <i>Cryptosporidium</i>, <i>Leishmania</i>, <i>Giardia</i>, <i>Trypanosoma</i>, <i>Trichomonas</i>, <i>Balantidium</i> and <i>Plasmodium</i>. <i>Helminthes</i></p> | 13% |
| 6 | <p>General Properties of Virus: Morphology, Replication & cultivation of viruses, Virus host interaction, The genetics of viruses, The pathogenicity of viruses, Diseases caused by different Virus and mode of infection: <i>Herpes viruses</i>, <i>Rubella virus</i>, <i>Influenza viruses</i>, <i>Polio</i>, <i>Hepatitis viruses</i>, <i>Rabies virus</i>, <i>Human immunodeficiency viruses</i>, <i>Adenoviruses</i> and <i>Corona viruses</i>. <i>Dengue</i>, Oncogenic viruses</p> <p>Method of diagnosis of virus infected diseases.</p> | 12% |
| 7 | <p>Concept of Innate and Adaptive immunity, Cells of immune system- Identification and function of B and T lymphocytes, Characteristics of antigen (Foreignness, Molecular size, Heterogeneity and solubility) Haptens. Antibodies - basic structure and types and functions, Complement system, Hypersensitivity</p> <p>Autoimmunity – Basic concept, Immuno-prophylaxis & Immunization schedule, Vaccines-classification & uses, Vaccination Schedule in India</p> <p>Immunodeficiency: Immunological basis of Primary and secondary Immunodeficiency Diseases</p> | 12% |
| 8 | <p>Diagnostic Immunology - Methods based on precipitation; ODD, CIE, IEP, immuno fixation and immunoblotting, RIA, RE, Immunonephlometry.</p> <p>Methods based on Agglutination - agglutination of whole cells, agglutination of inert particles coated with Ag/Ab.</p> <p>Haemagglutination – Direct, indirect, passive; CFT, labeled assays – ELISA, RIA, FISH, IFT-in vivo reactions- skin tests, immune complex demonstration.</p> | 13% |

Reference Book

- Text book of Microbiology (7th Edition)- by Ananthanereyan & Paniker, Publisher Universities press.
- Paniker's Text book of Parasitology (8th Edition)- C. K. Jayaram Paniker. The Health Sciences Publisher

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- Prescott M, Harley John P., Microbiology, 8th edition, Lansing, Donald A. Klein, McGraw Hill.
- Kuby's Immunology (7th Ed) - by J. Owen, J. Punt, S. Strandford. Macmillan Higher Education, England.
- Mackie and McCartney Medical Microbiology. A Guide to Laboratory Diagnosis and control of Infection.13th ed.,
- Mukharjee K.L. (1999),*Medical Laboratory Technology*,Vol II, 2nd ed .,Tata MacGraw Hill.
- Talwar G. P., A Hand book of Practical Immunology,1st Edn. Vikas Publishing House.
- Chakraborty P. Text book of Medical Parasitology, 2nd ed., JP

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| Course Code | PM01DMLT103 | | |
| Title of Subject | Clinical Pathology, Histopathology & Cytology | Total Hours/Week | 04 |
| Course Objectives | <ul style="list-style-type: none"> • Subject enables the students to carry out routine clinical laboratory investigation (on samples i.e urine, stool, sputum, semen, CSF & Other body fluids etc.). • Student can learn handling and processing sample for histopathology • Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained. • To learn the necessary techniques for the evaluation and reporting of Cytopathology specimens. • Student can identify microscopic changes of organs and tissues and explain the reasons or causes for the same. | | |
| Course Content | | | |
| Unit | Description | Weightage | |
| 1 | ANATOMY & PHYSIOLOGY OF BODY FLUIDS: Composition and Functions of Cerebrospinal Fluid (CSF), Composition and Functions of Synovial Fluid Composition and Functions of Pleural, Pericardial, and Peritoneal Fluids. COLLECTION, TRANSPORT & EXAMINATION OF SPECIMEN: Collection, preservation and storage of various specimens: Urogenital specimen, sputum, throat and mouth specimen, blood, and Pus. Antimicrobial sensitivity test. | 12% | |
| 2 | URINE ANALYSIS: Anatomy and Physiology of Urine formation. Composition of Urine. Role of Urine Examination in Disease Detection. Techniques of Urine Collection and Preservation. Routine Examination: chemical & microscopic examination of urine sediments. Urine Culture and Sensitivity Tests. Correlation of urinary findings in various diseases. Pregnancy Test. Quality Control and Assurance in Urine Examination. STOOL ANALYSIS: Techniques of Stool Collection and Preservation. Routine Examination: Physical, chemical & | 13% | |

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| | microscopic. Interpretation of Stool Examination Result and its significance in various diseases. Quality Control and Assurance in Stool Examination | |
| 3 | EXAMINATION OF BODY FLUID: Overview of Body Fluids, Significance of Body Fluid Analysis in Disease Diagnosis. Techniques of Body Fluid Collection and Processing: Lumbar Puncture and CSF Collection. Arthrocentesis and Synovial Fluid Collection Thoracentesis, Pericardiocentesis, and Paracentesis. Physical, chemical and microscopic examination of CSF. Transudate & Exudate. Examination of pleural, peritoneal, pericardial and synovial fluid. Normal vs. Abnormal Findings in Body Fluids Correlation of Results with Clinical Conditions. Reporting and Documentation of Body Fluid Analysis Results. Quality Control and Assurance in Body Fluid Analysis | 12% |
| 4 | SPUTUM ANALYSIS: Chemical composition of sputum. Role of Sputum Analysis in Detecting Respiratory Infections and Diseases. Routine examination of sputum. Interpretation of Sputum Examination Results. Quality Control and Assurance in Sputum Examination. SEMEN ANALYSIS: Introduction to semen. Physiology of seminal fluid. Techniques of Semen Collection and Preservation. Routine examination of semen. Semen Analysis Interpretation and Clinical Correlation. Interpretative semen analysis. Quality Control and Assurance in Semen Analysis. Semen Culture and Sensitivity Tests. | 13% |
| 5 | INTRODUCTION TO HISTOPATHOLOGY AND CYTOLOGY: Definition and Importance of Histopathology and Cytology. Handling biopsy specimens. Instruments used in histological and cytological studies. Overview of Laboratory Techniques in Histopathology and Cytology. | 12% |
| 6 | HISTOPATHOLOGICAL TECHNIQUES: Specimen Collection, Gross examination, fixation and common fixatives. Various methods for preparation of tissue sections. Tissue processing: Manually and using automatic tissue processor. Frozen section apparatus: a theoretical knowledge of its application, construction and use. Application of Histokinette | 13% |
| 7 | SECTIONING & STAINING: Microtomy: Sectioning of Tissues. Staining Techniques: Haematoxylin and Eosin (H&E), Special Stains. Immunohistochemistry and Molecular Pathology Techniques. | 12% |
| 8 | CYTOLOGICAL TECHNIQUES: Sample Collection Methods: Fine Needle Aspiration (FNA), Brushings, Washings. Preparation of Cytology Smears: Monolayer and Conventional Smears Staining Techniques: Papanicolaou (Pap) Stain, Romanowsky Stains. Cytopathological Evaluation: Normal and Abnormal Findings. Museum techniques and mounting. QC in Histopathology and Cytology. Legal and Regulatory Aspects of Laboratory Practice. | 13% |

Reference Book

- Textbook of Medical Laboratory Technology P.B Gotkar Mumbai, Bhalani Publishing House
- Text book of Medical Laboratory Technology by Paraful B. Godkar, Publisher Bhalani

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- K.Laxminarayan : Histological techniques
- Dr. Mukherjee, Medical Laboratory Technology, Volume I, II & II
- Ochei J. & Kolhatkar A. 2000, *Medical Laboratory Science: Theory & Practice*, Tata McGraw Hill Pub.
- Mohan H. (2005). Textbook of Pathology, 5th ed., Jaypee Brothers Medical publishers (P) LTD.
- Sood R. (1994) Medical Laboratory Technology, 4th ed., Jaypee Brothers

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| Course Code | | PM01DMLT104 | |
| Title of Subject | | Haematology, Blood Banking & Laboratory Management | Total Hours/Week 04 |
| Course Objectives | <ul style="list-style-type: none"> • Students to carry out routine clinical laboratory investigation in haematology or related to blood. • The candidates are taught the skill of blood collection from donors and aspects of proper collection of blood, documentation, preventive measures against communicable diseases etc. • They should be able to perform different investigations, preservation and interpretation of blood for transfusion. • Student can understand operation, safety, records, report and maintain quality control in laboratory. | | |
| Course Content | | | |
| Unit | Description | | Weightage |
| 1 | <p>INTRODUCTION TO HAEMATOLOGY: Definition and Scope of Haematology. Organization and Function of Blood Components. Haematopoiesis: Process of Blood Cell Formation.</p> <p>COMPOSITION OF BLOOD: Structure and function of Red Blood Cells (RBCs): White Blood Cells (WBCs), Platelets, Haemoglobin.</p> <p>LABORATORY TECHNIQUES IN HAEMATOLOGY: Collection of blood by various methods. Complete blood count (CBC), complete hemogram. Methods for determination of haemoglobin and blood cell counts. Haematocrit (PCV), Erythrocyte sedimentation rate (ESR), Platelet count, reticulocyte count and absolute eosinophil count, Differential WBC count. Automated Cell Counters: Working Principles and Interpretation Calculation of Absolute Cell Counts.</p> | | 12% |
| 2 | <p>PERIPHERAL SMEAR EXAMINATION: Blood Smear Preparation: Wedge and Spreader Methods. Staining Techniques: Wright-Giemsa, Leishman, and Romanowsky Stains. Artifacts in Peripheral Smears and Troubleshooting. Normal Blood Cell Morphology: RBCs, WBCs, and Platelets. Identification of Abnormal Blood Cells: Poikilocytosis, Anisocytosis. Leukocyte Abnormalities: Neutrophilia, Lymphocytosis, Eosinophilia, Monocytosis, Qualitative and Quantitative Platelet Disorders. Infectious Diseases: Malaria, Filariasis, and Other Blood Parasites.</p> | | 12% |

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| | BONE MARROW EXAMINATION: Bone Marrow Aspiration and Biopsy Techniques. Complications and Post-procedure Care. Interpretation and Reporting. | |
| 3 | HEMATOLOGICAL DISEASES: Types, Classification, Causes and Laboratory Diagnosis Criteria of Anaemia, Leukaemia, And Haemorrhagic Disorders: Haemophilia, Thrombocytopenia. THALASSEMIA COAGULATION AND ROUTINE COAGULATION TESTS: Haemostasis, Mechanism of coagulation. Routine coagulation tests. Bleeding disorders. Determination of bleeding time, clotting time, thrombin, prothrombin time, partial thromboplastin time (PTT) and activated partial thromboplastin time (APTT). Automated coagulation systems. SPECIAL HAEMATOLOGICAL TESTS: Detection of malarial parasite. Determination of osmotic fragility of RBC, G6PD, TIBC, GSH. Tests for Haemoglobinopathies: Screening test - Sickling test, NESTROF. Confirmative test -Electrophoresis, HPLC. | 13% |
| 4 | INTRODUCTION TO BLOOD BANKING: Significance of Blood Banking in Healthcare. Historical Perspective and Evolution of Blood Transfusions. Role of Blood Banks in Public Health and Emergency Situations. BLOOD COLLECTION: Blood Collection Techniques: Use of anticoagulant bulb. Storage and transportation of blood. Blood Donor Selection and Recruitment. Whole Blood and Component Collection. Blood Processing: Centrifugation, Separation, and Storage of Red Cells, Plasma, Platelets, and Cryoprecipitate. Special Blood Products and Therapies: Platelet Apheresis and Granulocyte Transfusions | 13% |
| 5 | BLOOD GROUPING: ABO and Rh blood Group systems. Other blood grouping systems. Serological techniques for detection of ABO & Rh antigens. Methods of blood group determination, Forward and Reverse grouping, Slide & Tube method, Gel method. Crossmatching Techniques: Major and Minor CROSSMATCH: Compatibility Testing and Pretransfusion Testing Protocols. Quality control in blood banking. | 13% |
| 6 | TRANSFUSION REACTION: Transfusion transmissible infectious disease screen, Coomb'test, Antibody Screening & Identification, Grading of Reaction/Agglutination. Types of Transfusion Reactions: Hemolytic, Febrile, Allergic, and Others. Recognition and Management of Transfusion Reactions. Complications and Prevention Strategies in Blood Transfusions. RHEUMATOLOGICAL DISEASES: Various rheumatological diseases. Etiology, pathogenesis and lab investigations of rheumatological diseases. | 12% |
| 7 | BLOOD-BORN PATHOGENES: HIV, Hepatitis, and Other Infectious Agents. Universal Precautions and Safety Measures in Blood Banking. Quality Control in Blood Banking: Monitoring and Assurance BLOOD DONOR SCREENING: Serological and Nucleic Acid Testing (NAT). Donor Deferral Criteria: High-Risk Behaviours and Medical Conditions. | 12% |

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| | ETHICS IN BLOOD BANK: Blood Banking Regulations and Accreditation Standards. Informed Consent and Ethical Issues in Blood Transfusions. Documentation and Record-Keeping in Blood Banking. | |
| 8 | <p>Laboratory Management : Laboratory Infrastructure, Control of Documents & Records (Flow of Documentation, Document Control, Records, Quality Records, Technical Records, etc), Biosafety Level and Biosafety cabinets, Signage system in laboratory.</p> <p>Biomedical Waste Rules , Types of Waste & Category, Color Coding, Waste cycle, Method of discarding Microbiological Waste,</p> <p>QUALITY CONTROL Accuracy, Precision, and Reference values, Quality control charts, Levy- Jennings and Cusum charts, West guard Rules, Legal and Regulatory Aspects of Haematology Laboratory Practice, Cycle of Accreditation - ISO 9001:2015, NABL, NABH</p> | 13% |
| <p>Reference Book</p> <ul style="list-style-type: none"> • Textbook of medical laboratory technology by Praful B Godkar, Publisher Bhalan • Textbook of Clinical laboratory methods and diagnosis by Gradwohls, Publisher Mosby • Text book of Medical Laboratory Technology (6th edition) by Ramnik Sood, Jaypee Publication • Dacie, Practical Haematology • Dr. Mukherjee, Medical Laboratory Technology, Volume I , II & II • Wintrobe's Clinical Haematology, 14th edition, Lippincott Williams & Wilkins • Kawthalkar S M, Essential of Clinical Pathology, 2nd ed., Jaypee Brothers • Denise Harmening ,Modern Blood banking and Transfusion Practices, 6th Edition 2012. | | |

SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
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Syllabus with effect from the Academic Year 2024-2025

| Course Code | PM01DMLT105 | | |
|---|-------------|------------------|----|
| Title of Subject | Practicals | Total Hours/Week | 12 |
| Practical- I (Practicals of Biochemistry) | | | |
| <ol style="list-style-type: none"> 1. Preparation of Normal solutions, Molar solutions, percent solution, dilution techniques. 2. Verification of Beer's by colorimeter 3. Qualitative identification of tests of sugars 4. Determination of Glucose in Blood/Serum 5. Estimation of Total serum protein and Albumin/Globulin ratio 6. Urine analysis – normal & abnormal constituents of urine 7. Estimation of Inorganic phosphorus 8. Estimation of Urea 9. Estimation of Creatinine 10. Estimation of Uric Acid 11. To study the Lipid Profile-Cholesterol, Triglycerides 12. Determination of bilirubin 13. Estimation of SGPT/ SGOT 14. To learn the Agarose Gel electrophoresis techniques 15. Estimation of Bilirubin 16. Separation of amino acid by TLC 17. Estimation of Serum Amylase activity 18. Estimation of LDH Enzyme 19. Estimation of phenylalanine for Phenyl ketonuria 20. Demonstration of semi/Autoanalyzer | | | |
| Practical- II (Practicals of Microbiology) | | | |
| <ol style="list-style-type: none"> 1. Demonstration and sterilization of equipment – Hot Air oven, Autoclave, Bacterial filters. 2. To study the preparation of commonly used culture media: Nutrient broth, Nutrient agar, Blood agar 3. Isolation of bacteria in pure culture by various striking method 4. Preparation of broth and slant. 5. Care and operation of Microscopes 6. Bacterial staining : Gram's stain, Spore stain, Leishman stain, Geimsa stain, Acid Fast staining 7. Sputum smear preparation and staining by Zieel Nelsen (AFB). 8. Direct Examination of specimens by KOH, Gram, Kinyoun's, Giemsa, Lactophenol Cotton 9. Biochemical Reactions for identification of bacteria (Coagulase test, Catalase test, IMViC, Urease, Oxidase) 10. Tests for motility: hanging drop preparation 11. Antibiotic susceptibility test by disc method 12. Examination of blood for protozoa and helminths by wet mount, thin and thick stained smears. 13. Examination of faeces for parasitic ova and cysts etc. by direct and concentration methods (Salt flotation and Formol-Ether methods). 14. Identification of fungal cultures Colony characteristics and Microscopic examination of Candida, Cryptococcus, Trichophyton, 15. To perform ASO test | | | |

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Immunology and Serology

16. To perform radial immune-diffusion test
17. To perform TORCH profile
18. Performance of serological tests viz. Widal, VDRL/RPR
19. Latex agglutination tests: RA, CRP
20. Rapid tests (Immunochromatography or Flow through type) HIV

Practical- III (Practicals of Pathology)

1. Test for Urine Exam,
2. Test for Stool examination

Hematology and Blood Banking

3. To demonstrate the method of collection of blood by vacutainer and use of anticoagulant
4. Preparation of blood smears and staining of blood smears and identification of blood cells
5. Hb estimation
6. Determination of Blood Groups (ABO and RH system)
7. CM Tests
8. Du Tests
9. Comb's Tests,
10. Differential leucocytes count (DLC).
11. Determination of RBC count
12. Sickling test.
13. Determination of ESR by wintrobes & Westergeren's method.
14. Determination of PCV by Wintrobes
15. Erythrocyte Indices- MCV, MCH, MCHC.
16. Platelet count
17. Reticulocyte count
18. Bleeding time & Clotting time
19. Determination of prothrombin time (PT) & APTT

Histopathology

20. To perform tissue processing by manual method.
21. To perform section cutting by microtone of paraffin embedded tissue.
22. To fix the smear on glass slide.
23. To perform hematoxylin and eosinstaining.
24. To perform PAS staining.
25. To perform AFB staining (TB and leprosy)
