COURSE STRUCTURE
DEPARTMENT OF MEDICAL LABORATORY TECHNOLOGY (BSc MLT)

Academic Year: (2025 -26)

Second Year						
S.No	**Subjects**	**Subject Code**	**Hrs/week**			**Credits**
			L	**T**	**P**	**C**
1.	Pathology – I	24HMLT21T	4	-	-	4
2.	Microbiology – I	24HMLT22T	4	-	-	4
3.	Biochemistry - I	24HMLT23T	4	-	-	4
4.	Basics of Pharmacology	24HMLT24T	4	-	-	4
5.	Clinical Hematology	24HMLT25T	3	-	-	3
6.	Pathology – I Lab	24HMLT21L	-	-	6	3
7.	Microbiology – I Lab	24HMLT22L	-	-	6	3
8.	Biochemistry – I Lab	24HMLT23L	-	-	6	3
9.	Clinical Hematology - Lab	24HMLT25L	-	-	6	3
	Total		19	-	24	**31**

Department of medical laboratory technology (B.Sc MLT) -Second year syllabus

Title of the Course : pathology-1
Category : Basic Medical Sciences
Year : II year
Course Code : 24HMLT21T
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
4	-	-	4	128

Course Objectives

1. Learn the basic concepts of disease and pathology.
2. Understand cell injury, inflammation, repair, degeneration, necrosis, and gangrene.
3. Know the causes and changes in common infections.
4. Understand blood disorders like anaemia, bleeding disorders, and leukaemia.
5. Learn the role of the immune system in disease.
6. Relate laboratory findings with disease conditions.

Course Outcomes

1. Explain the basic principles of pathology.
2. Describe changes in cells and tissues in disease.
3. Identify common infections and their pathology.
4. Explain common blood disorders and their lab findings.
5. Describe the role of immunity in health and disease.
6. Perform basic pathological and haematological tests.
7. Correlate lab results with disease conditions.
8. Follow ethical practices in specimen handling and reporting.

Unit 1 – Introduction to Histopathology -12 hours

- Basics of histopathology
- Structure & functions of normal cell
- Reception of specimens

- Fixatives – types, preparation, mode of action, indications

Unit 2– Tissue Processing & Grossing -13 hours

- Grossing techniques
- Steps of tissue processing & embedding
- Paraffin blocks, section cutting, and handling

Unit 3Haematology (Bone Marrow Techniques) -12 hours

- Bone marrow aspiration: technique, preparation, staining of films
- Bone marrow biopsy

Unit 4– Cytology: Principles & Fixation -13 hours

- Techniques of cytology sample collection
- Fixation and fixatives in cytology (routine, coating, special, fluid preservation)
- Processing of cytology samples in the laboratory

Unit 5 -Exfoliative Cytology 12 hours

- Female genital tract cytology: anatomy, physiology, ovarian hormones
- Pap smear techniques: vaginal, cervical, combined, triple, endocervical & endometrial smears
- Respiratory cytology: bronchial aspiration, washings, brushings
- Urinary cytology**:** urinary sediment, bladder washings, prostatic massage
- Body fluids cytology: effusions (ascitic, pleural, etc.), CSF in normal & disease states

Unit 6 – Interventional Cytology 12 hours

- Fine needle aspiration cytology (FNAC)
- Imprint cytology
- Crush smear cytology
- Biopsy sediment cytology

Unit 7 – Clinical Pathology 13 hours

- Urine examination: physical, chemical, microscopic
- Stool (faeces) examination – occult blood
- Body fluids examination – cell counts
- Semen analysis
- Sputum examination

Unit 8– Instrumentation in Pathology Lab 12 hours

- Microscope
- Balances
- Tissue weighing machines
- Tissue processor
- Microtomes & knives
- Knife sharpener
- Instruments for grossing
- Electric saw

TEXT BOOKS: handbook of pathology 2005 Harsh Mohan -publisher Anshan Ltd

Histological Techniques 1982 Bancroft publisher - Churchill living stone

REFERENCE BOOKS

1.Histopathology Techniques 1974 C.F.A. Culling publisher - Butter Worth

2. Lab Techniques WHO Manual Bio-Safety 2003 W.H.O-publisher W.H.O

3. Exfoliative Cytology Hand Book 1985 English M.c. Lure -publisher-Lippincott

4. Clinical Diagnosis in lab methods 1984 Todd & Sanford Book -publisher Saunders

Title of the Course : Microbiology – I
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT22T
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
4	-	-	4	128

Course Objectives

1. Learn the basics of microorganisms – structure, types, and functions.
2. Understand how microbes cause diseases and how they are diagnosed, treated, and prevented.
3. Know methods of sterilization, disinfection, and aseptic practices for infection control.
4. Perform simple microbiology lab work – specimen collection, culture, staining, and sensitivity tests.
5. Relate lab test results to clinical conditions for diagnosis.
6. Follow ethical practices, quality control, and confidentiality in lab work.
7. Apply microbiology knowledge in public health for control of hospital and community infections.

Course Outcomes

1. Recall the history of microbiology and contributions of important scientists.
2. Use different types of microscopes for studying microorganisms.
3. Describe bacterial structure, compare prokaryotic and eukaryotic cells, and perform common staining methods.
4. Explain bacterial growth, nutrition, metabolism, and growth curve.
5. Understand bacterial genetics and gene transfer and their role in resistance.
6. Apply sterilization and disinfection methods in laboratory practice.
7. Prepare and use different culture media and culture methods.
8. Identify bacteria using biochemical, molecular, and automated methods.
9. Use microbiology knowledge in diagnosis, prevention, and management of infections**.**

Unit 1: General Bacteriology – Foundations 12 hours

- Historical Aspects of Bacteriology
- Structure of bacterial cell
- Straining techniques
- Sterilization – physical and chemical methods, antiseptic and disinfectants

- Identification of bacteria (laboratory diagnosis)

Unit 2: culture media and methods 13 hours

- Culture Media- common ingredients of culture media, classification of media.
- Culture Methods- Methods of bacterial culture, aerobic culture, anaerobic culture, methods of anaerobiosis, methods of isolating pure cultures

Unit 3: Bacterial physiology 13 hours

- Growth and nutrition of bacteria
- Bacterial metabolism
- Bacterial genetics
- Antibiotics and drug resistance

Unit 4 : Infection And Immunity 12 hours

- Infection: Types, sources, modes of transmission
- Pathogen and virulence of bacteria
- Types of immunity

Unit 5 : Immunological Components and Reactions 12hours

- Antigens and antibodies (immunoglobulins)
- Antigen-antibody reactions: Precipitation, agglutination, immunofluorescence, immunoenzyme assays, radioimmunoassay
- Complement system and complement fixation

Unit 6: Immune System and Disorders 12 hours

- Immune system and immune response
- Autoimmunity – Basic concepts
- Immunodeficiency and transplantation immunology – Basic concepts

Unit 7: Systemic Bacteriology 12 hours

- Cocci: Staphylococci, Streptococci, Neisseria (Gram positive and Gram negative)
- Gram-positive bacilli: Anthrax (Bacillus anthracis), Diphtheria (Corynebacterium diphtheriae), Clostridia species
- Mycobacteria: Tuberculosis and Leprosy
- Gram-negative bacilli: Enterobacteriaceae, Vibrios, Brucella, Bordetella, Haemophilus, Pasteurella, Non-sporing anaerobic bacteria
- Spirochaetes: Leptospira, Borrelia, Treponema

- Bacterial infections and diagnosis:

Unit 8: bacterial infections and diagnosis 12 hours

- Wound and postoperative infections
- Urinary tract infections
- Respiratory tract infections
- Diarrhoeas and food poisoning
- Infections of the CNS
- Hospital acquired infections

TEXT BOOKS:

- Textbook of Microbiology: Anantha Narayan & Jayaram Panicker-universities press(india) pvt.ltd
- Text book of Microbiology, Baweja 2002- publisher Vikas

REFERENCE BOOKS:

- Text book of Microbiology, Satish Gupta, 2004 - publisher Jaypee
- Medical Lab Technology, Sood, 1999- publisher - Jaypee

Title of the Course **: Biochemistry– I**
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT23T
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
4	-	-	4	128

Course Objectives

1. Understand the use of basic laboratory apparatus and correct methods of measurement.
2. Learn the fundamental concepts of atoms, molecules, acids, bases, salts, and solution preparation.
3. Explain pH, buffer systems, and the role of acid–base balance in the human body.
4. Understand the principles of photometry, spectrophotometry, flame photometry, and atomic absorption spectrophotometry.
5. Describe the chemistry, reactions, and metabolism of carbohydrates, proteins, fats, and nucleic acids.
6. Learn the clinical significance of glucose tolerance test and disorders like diabetes.
7. Understand non-protein nitrogenous compounds (urea, creatinine, uric acid) and their role in renal function.
8. Correlate biochemical findings with clinical conditions for disease diagnosis.

Course Outcomes

1. Handle laboratory apparatus and perform accurate measurements.
2. Prepare standard solutions using concepts of molarity and normality.
3. Demonstrate understanding of acid–base reactions, pH, and buffer systems.
4. Apply photometry and spectrophotometry principles in biochemical estimations.
5. Use flame photometry and atomic absorption spectrophotometry for electrolyte and trace element analysis.
6. Identify carbohydrates, understand glucose metabolism, and interpret glucose tolerance test results.
7. Describe proteins, fats, nucleic acids, and explain their clinical relevance.
8. Perform and interpret tests for urea, creatinine, uric acid, and assess renal function.

9. Relate biochemical results to common clinical conditions for better diagnostic support.

Unit 1 – Laboratory Apparatus & Measurements 12 Hours

- Introduction to common biochemistry laboratory apparatus (pipettes, burettes, centrifuge, colorimeter, pH meter, etc.).
- Chemical balance – principle of weighing, sensitivity, precautions, and practice in laboratory use.
- Role of precision and accuracy in biochemical estimations.
- Importance of calibration of instruments for reliable results.

Unit 2 – Atomic & Molecular Concepts 13hours

- **Atomic structure:** composition of atom, protons, neutrons, electrons, shells, and orbitals.
- **Valency and bonding:** ionic, covalent, and hydrogen bonding relevance in biochemistry.
- **Molecular weight and atomic weight:** definition, calculation, and significance in laboratory work.
- **Normality and molarity:** preparation of solutions of known concentration, importance in assays.
- **Acids, bases, and salts:** definitions, dissociation, and role in buffer preparation.

Unit 3 – Acid–Base Reactions 13hours

- Concept of acids and bases according to different theories (Arrhenius, Brønsted-Lowry, Lewis).
- Hydrogen ion concentration (pH): definition, measurement, and biological importance.
- Buffer systems: phosphate buffer, bicarbonate buffer, protein buffer, their role in maintaining blood pH.
- Clinical relevance of acid–base balance in conditions like acidosis and alkalosis.

Unit 4 – Principles of Photometry & Spectrophotometry 12hours

- **Photometry:** principle of light absorption and transmission.
- Laws of absorption: Lambert's law and Beer's law.
- Key concepts: wavelength, calibration, transmittance, absorption, standard solutions, and blank reading.
- **Turbidimetry:** principle, applications in estimating substances in biological samples.
- Clinical application: use in quantitative biochemical tests like blood sugar, cholesterol.

Unit 5 – Advanced Analytical Techniques 12 hours

- **Flame photometry:** principle, instrumentation, and clinical use (estimation of sodium, potassium, calcium, lithium).
- **Atomic absorption spectrophotometry (AAS):** principle, instrumentation, and applications in trace element analysis (zinc, copper, magnesium, iron).
- Advantages and limitations of flame photometry vs AAS in clinical labs.

Unit 6– Carbohydrates 13hours

- **Chemistry of carbohydrates:** monosaccharides, disaccharides, polysaccharides, examples and functions.
- **Reactions of carbohydrates:** reducing property, Benedict's test, Molisch's test, Barfoed's test.
- **Glucose metabolism:** glycolysis, glycogenesis, glycogenolysis, gluconeogenesis (overview).
- **Glucose tolerance test (GTT):** procedure, interpretation of normal vs diabetic patterns, significance in clinical diagnosis of diabetes mellitus.

Unit 7 – Proteins, Fats & Nucleic Acids 12hours

- **Proteins:** amino acids, peptide bonds, structure of proteins (primary, secondary, tertiary, quaternary), functions of proteins, denaturation.
- **Fats (lipids):** classification, saturated and unsaturated fatty acids, triglycerides, phospholipids, cholesterol, clinical significance in health and disease (e.g., atherosclerosis).
- **Nucleic acids:** DNA and RNA – structure, composition, functions in heredity and protein synthesis.

Unit 8 – Non-protein Nitrogenous Compounds & Renal Function 13hours

- **Urea:** formation (urea cycle), normal levels, clinical significance in kidney function.
- **Creatinine:** origin, normal range, significance in renal function testing.
- **Uric acid:** metabolism, disorders (gout, renal stones).
- **Renal function tests (RFTs):**
  Clearance tests (creatinine clearance, urea clearance).
  Concentration and dilution tests.
- Clinical applications: diagnosis of acute and chronic kidney disease.

Text Books :

Text book of Bio-chemistry - Debajyothi Das publisher -academics publishers

Chemistry -Teitz publisher – elsevier

Reference Books

Essentials of Biochemistry by U. Satyanarayana publisher -elsevier

Varley's Clinical Chemistry-IV Edition-CBS publisher

Title of the Course : **Basics of Pharmacology**
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT24T
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
4	-	-	4	128

Course Objectives

1. Understand the basic principles of pharmacology including drug absorption, distribution, metabolism, and excretion.
2. Describe how drugs act on different body systems and their therapeutic uses.
3. Recognize common adverse drug reactions and the basics of drug safety.
4. Learn the general principles of drug administration and dosage forms.
5. Understand the role of commonly used drugs in infections, cardiovascular, respiratory, endocrine, and nervous system disorders.
6. Relate pharmacological knowledge to clinical and laboratory practices in diagnosis and patient care.

Course Outcomes

1. Define basic pharmacological terms and concepts.
2. Explain the general principles of pharmacokinetics and pharmacodynamics.
3. Identify routes of drug administration and their clinical importance.
4. Describe commonly used drugs acting on the autonomic, central, cardiovascular, respiratory, and endocrine systems.
5. Discuss the basic principles of chemotherapy including antibiotics, anti-TB, anti-malarial, and antiviral drugs.
6. Recognize and explain common adverse drug reactions and drug toxicity.
7. Correlate laboratory findings with drug effects for safe patient management.

Unit 1 – General Pharmacology 13hours

- Definitions and terminology in pharmacology.
- Routes of drug administration – oral, parenteral, topical, inhalation, etc.
- Basic principles of pharmacokinetics (absorption, distribution, metabolism, excretion).
- Pharmacodynamics – mechanism of drug action, dose-response relationship, agonists and antagonists.
- Adverse drug reactions (ADR): types, examples, clinical importance.
- General principles in the treatment of drug poisoning.

Unit 2– Drugs Acting on the Autonomic Nervous System (ANS) 13hours

- Cholinergic drugs: mechanism, uses, examples.
- Anti-cholinergic drugs**:** clinical applications and side effects.

- Adrenergic drugs: sympathomimetics, therapeutic role.
- Anti-adrenergic drugs**:** beta-blockers, alpha-blockers, clinical uses.

Unit 3 – Drugs Acting on the Peripheral Nervous System 13hours

- Skeletal muscle relaxants**:** types (depolarizing, non-depolarizing), therapeutic uses in anaesthesia.
- Local anesthetics**:** mechanism of action, examples (lidocaine, bupivacaine), clinical applications.

Unit 4 – Drugs Acting on the Central Nervous System (CNS) 12hours

- NSAIDs: Analgesics and Antipyretics
- Anesthetics: general and local, clinical importance.
- Anti-epileptic drugs: common drugs, mechanism, indications.
- Anti-parkinsonism drugs: dopaminergic therapy, anticholinergics.
- Antipsychotics: classification, mechanism, therapeutic uses, and adverse effects.

Unit 5 – Drugs Acting on the Respiratory System 12hours

- Cough medications: antitussives, expectorants, mucolytics.
- Asthma drugs: bronchodilators, corticosteroids, leukotriene inhibitors.
- Clinical importance of rational therapy in asthma and COPD.

Unit 6 – Drugs Acting on the Cardiovascular System (CVS) 12hours

- Antihypertensive drugs: classes (diuretics, beta-blockers, ACE inhibitors, calcium channel blockers).
- Anti-anginal drugs: nitrates, beta-blockers, calcium channel blockers; drugs in myocardial infarction.
- Drugs used in congestive heart failure (CHF): digitalis, diuretics, vasodilators.

Unit 7 – Drugs Affecting the Endocrine System 13hours

- Growth hormone therapy and inhibitors.
- Thyroid hormones: replacement therapy, anti-thyroid drugs.
- Insulin and oral hypoglycaemic agents: types, mechanisms, uses in diabetes.
- Corticosteroids: mechanism, therapeutic uses, adverse effects.

Unit 8 – Chemotherapy and Miscellaneous Drugs 12hours

- Antimicrobial drugs:
    - Penicillins (mechanism, spectrum, resistance).
    - Quinolones.
    - Anti-TB drugs.
    - Anti-leprosy drugs.
    - Anti-malarial drugs.
- Other important drugs:
    - Diuretics – types, clinical uses.
    - Antiemetics – mechanism and indications.

Text books : Text book of Pharmacology – Tripathi publisher -jaypee

. Illustrated Pharmacology – Lippincott publisher- wolters kluwer

Title of the Course : Clinical Hematology
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT25T
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
3	-	-	3	80

Course Objectives

1. Understand the structure and function of blood cells.
2. Learn red cell indices and their role in diagnosing anaemia.
3. Identify types of anaemia and their laboratory features.
4. Understand leukaemia's, blood disorders, and their lab diagnosis.
5. Learn coagulation pathways and bleeding/clotting disorders.
6. Understand cytogenetic methods and chromosome analysis.
7. Learn basics of flow cytometry and CD marker usage.
8. Develop practical skills in blood tests, smears, and bone marrow examination.

Course Outcomes

1. Recognize normal and abnormal blood cell morphology.
2. Calculate and interpret red cell indices.
3. Diagnose different types of anaemia using lab tests.
4. Classify and interpret leukaemia's and related disorders.
5. Perform and interpret basic coagulation tests.
6. Use cytogenetic techniques to analyse chromosomal abnormalities.
7. Apply flow cytometry for cell identification and diagnosis.
8. Perform practical haematology procedures accurately.

Unit 1 – Red Cell Indices **8 hours**

- Definition and significance of RBC indices
- Normal range and methods of calculation (MCV, MCH, MCHC, RDW)
- Applications in diagnosing anaemia

Unit 2 – Anaemia: Morphological Classification 10hours

- Morphological and etiological classification of anaemia
- Pathophysiology, signs, symptoms, and laboratory findings
- Iron deficiency anaemia and Megaloblastic anaemia

Unit 3 – Anaemia: Special Types 12hours

- Aplastic anaemia, Haemolytic anaemia
- Thalassemia, Sickle cell anaemia
- Hereditary spherocytosis, Paroxysmal nocturnal haemoglobinuria
- Recent advances in laboratory diagnosis of anaemia

Unit 4 – Leukaemia & Related Disorders – I 10hours

- Leukemoid reaction – definition and clinical implications
- Leukaemia: Classification and clinical implications
- Acute leukaemia's – ALL, AML (pathophysiology, clinical features, lab findings)

Unit 5 – Leukaemia & Related Disorders – II 10hours

Chronic leukaemia's – CLL, CML

- Polycythemia vera, Multiple Myeloma
- Recent advances in laboratory diagnosis of leukaemia

Unit 6– Haemostasis & Coagulation Disorders 10hours

- Coagulation pathways – intrinsic, extrinsic, and cell-based model
- Coagulation tests: PT/INR, APTT, TT, fibrinogen, platelet count, D-dimer, mixing study, factor assays
- Pathophysiology, clinical features, and lab diagnosis of bleeding/clotting disorders:
    - Haemophilia A & B
    - Von Willebrand disease
    - Bernard-Soulier syndrome
    - Glanzman's thrombasthenia
    - DIC, ITP
- Recent advances in laboratory diagnosis of coagulation disorders

Unit 7– Cytogenetics in Haematology 10hours

- Basics of cytogenetics
- Karyotyping methods
- Fluorescent In Situ Hybridization (FISH)
- Chromosomal analysis and interpretation in malignancies
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Unit 8 – Flow Cytometry & Practical Skills in Haematology 10hours

- Basics of flow cytometry
- Principles of CD markers in diagnosis

- Practical Skills:

- Preparation & staining of peripheral smear (Leishman's stain)
- Identification of normal & abnormal RBCs, WBCs, platelets
- Correlation of peripheral smear with CBC and clinical symptoms
- Reticulocyte count and clinical correlation
- Demonstration of bone marrow aspiration & smear preparation

Text books :

- Sood, R. (2009). Medical Laboratory Technology, Vol-1 : Methods of Interpretation (6th). India: Jaypee Brothers.
- Godkar, P. B., & Godkar, D. P. (2006). Textbook of medical laboratory technology. Bhalani publishing house.

Reference books:

Dacie, J. V. (2006). Dacie and Lewis practical haematology. Elsevier Health Sciences.

McKenzie, S. B., Williams, J. L., & Landis-Piwowar, K. (2004). Clinical laboratory haematology (Vol. 1). Pearson education.

Ramakrishnan, S., & Sulochana, K. N. (Eds.). (2012). Manual of Medical laboratory techniques. Jaypee Brothers Medical Publishers Pvt. Ltd.

Title of the Course : Pathology – I Lab
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT21L
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of periods
-	-	6	3	80

Course Objectives

1. Learn how to process and stain tissue sections in histopathology.
2. Prepare and stain cytology samples like vaginal, cervical, sputum smears, and FNAC.
3. Perform routine clinical pathology tests (urine, stool, semen, CSF, body fluids).
4. Learn haematology practicals (blood counts, bone marrow smears).
5. Mount and preserve specimens for museum use.
6. Handle laboratory instruments safely and maintain hygiene.

Course Outcomes

1. Prepare and examine tissue sections and cytology smears accurately.
2. Perform routine lab tests and interpret results.
3. Prepare and examine blood and bone marrow smears.
4. Mount specimens properly for teaching or museum purposes.
5. Use laboratory instruments correctly and safely.
6. Apply practical skills to support diagnosis in the lab.

LIST OF EXPERIMENTS

1. **HISTOPATHOLOGY:**

- Processing
- Embedding
- preparation of blocks
- Section cutting
- use and care of Microtome
- Microtome knives
- H & E staining.

2. CYTOLOGY

- Preparation of reagents
- Wet film preparation
- Fixation
- staining (H&E, 'Pap', MGG and Shorr) of vaginal smears
- cervical smears and sputum
- FNAC (Fine Needle Aspiration Cytology) - preparation of smears and staining.

3. CLINICAL PATHOLOGY:

- Complete Urine Analysis
- Cavity Fluids and miscellaneous samples
- Cerebrospinal Fluid in Health & Disease
- Semen analysis
- Stool examination for Occult blood

4. HAEMATOLOGY

- Complete Hemogram
- Bone marrow
- smears – staining and examination

5. MOUNTING OF MUSEUM SPECIMENS:

- Routine mounting of specimens
- Mounting in glass jars.
- special methods of mounting

Title of the Course : Microbiology – I Lab
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT22L
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Periods
-	-	6	3	80

Course Objectives

1. To learn basic laboratory techniques in microbiology.
2. To understand methods of handling and observing microorganisms safely.
3. To gain practical skills in staining, culture, and identification of microbes.
4. To apply laboratory practices for infection control and diagnosis.

Course Outcomes

1. Demonstrate safe laboratory practices and specimen handling.
2. Perform staining techniques (simple, differential, special stains).
3. Prepare and culture microorganisms using basic media.
4. Identify common bacteria and fungi under the microscope.
5. Apply microbiology knowledge in clinical and diagnostic contexts.

LIST OF EXPERIMENTS

1. Microscopes – Types and Operation.
2. Study of Morphology of Bacteria:
   a) Unstained – Hanging drop preparation
   b) Stains: Simple staining, Gram staining, Ziehl Neelsens's staining.
   c) Culture media: Types and uses.
   d) Inoculation methods.
   e) Anaerobic culture methods
   f) Antibiotic sensitivity methods.
   g) Biochemical reactions in identification of bacteria.
3. Isolation and identification of bacteria from various clinical specimens.
4. Agglutation Tests: Slide & Tube, Widal.
5. Latex agglutination: RF, ASO, CRP
6. Precipitation: VDRL test.
7. Bacteriological Examination: Water, Milk and Air

Title of the Course : Biochemistry– I Lab
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT23L
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Periods
-	-	6	3	80

Course Objectives

1. Learn to use lab apparatus, instruments, and chemical balance.
2. Practice preparation of normal, molar, percent solutions and dilutions.
3. Understand care and maintenance of laboratory glassware and equipment.
4. Learn basics of photometry, calibration, and use of cuvettes.
5. Perform tests for sugars in blood and urine.
6. Estimate non-protein nitrogenous compounds (urea, uric acid, creatinine, etc.).
7. Follow safe and accurate laboratory practices.

Course Outcomes

1. Properly handle lab instruments and chemical balance.
2. Prepare different types of solutions and perform dilutions correctly.
3. Maintain and care for laboratory glassware and apparatus.
4. Use photometry for biochemical tests and prepare calibration curves.
5. Identify and estimate sugars in blood and urine samples.
6. Estimate urea, uric acid, creatinine, and calculate creatinine clearance.
7. Record, interpret, and report biochemical test results accurately.
8. Work safely and carefully in a biochemistry lab.

List of experiments:

a) Introduction to apparatus, instruments and use of chemical balance.

b) Preparation of normal solutions, molar solutions, percent solutions and reagents, dilution techniques.

c) Maintenance of Laboratory, Glassware and Apparatus.

d) Practical aspects of Photometry, factors affecting wavelength: calibration and care of cuvettes. Reagent blank absorption curve, calibration curve, deviations of Beer's law.

e) Identification of sugars by qualitative tests; quantitative method for blood elucose estimation, qualitative screening test for urine glucose (Strip tests), qualitative test for reducing substances in urine.

f) Non protein nitrogenous compounds: determination of blood urea, ammonia, uric acid, creatinine. Creatinine clearance.

Title of the Course : Clinical hematology – I Lab
Category : Basic Medical Sciences
Year : II Year
Course Code : 24HMLT25L
Branch : MLT

Lecture Hours	Tutorial Hours	Practice Hours	Credits	No. of Periods
-	-	6	3	80

Course Objectives

1. Learn to prepare and stain blood and bone marrow smears.
2. Identify normal and abnormal blood cells and relate findings to clinical cases.
3. Understand and perform common coagulation and haemoglobin tests.
4. Gain basic knowledge of cytogenetics, flow cytometry, and advanced diagnostic methods.

Course Outcomes

After completing this course, students will be able to:

1. Prepare, stain, and interpret blood and bone marrow smears.
2. Recognize and report blood cell abnormalities.
3. Perform and interpret coagulation and haemoglobin tests.
4. Diagnose common haematological and bleeding disorders using lab results.
5. Apply cytogenetics and flow cytometry basics in disease diagnosis.

List of experiments:

1. Preparation and staining of peripheral smear using Leishman's stain.
2. Identification of normal and abnormal morphology of red blood cells, white blood cells, and platelets.
3. Peripheral smear study, its correlation with clinical symptoms and comparison
   of peripheral smear results with complete blood count (CBC).
4. Reticulocyte count and its correlation with clinical symptoms
5. Demonstration of bone marrow aspiration and smear preparation.
6. Staining of bone marrow smears (Pearls' Prussian blue stain) and its correlation with clinical symptoms
7. Preparation of iso-osmotic sucrose solution and performance of sucrose lysis test.
8. Identification of tests for haemoglobin variants and thalassemia. Explanation and interpretation of haemoglobin electrophoresis (e.g., sickle cell anaemia, thalassemia).
9. Sickling test. Performance and interpretation of the osmotic fragility test
10. Bleeding time, clotting time, Prothrombin time (PT), Activated partial thromboplastin time (aPTT). Thrombin time, Platelet count, Fibrinogen

count, and interpretation of first-line haemostasis tests. Blood collection procedures related to coagulation testing.

11. Performance and interpretation of: Clot retraction, Inhibitor assays. Platelet function tests.
12. Identify the tests to detect hereditary haemolytic anaemia. Prepare reagents for the osmotic fragility test. Perform the osmotic fragility test and interpret the results.

14.Integrate clinical symptoms and laboratory investigations to identify haematological disorders.