SYLLABUS AND CURRICULUM OF DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY COURSE

DMLT

DMLT stands for Diploma in Medical Laboratory Technology. It is a diploma program that trains students in the skills and knowledge necessary to work as medical laboratory technicians, performing diagnostic tests in clinical laboratories. These tests help in the prevention, diagnosis, and treatment of diseases by analyzing bodily fluids, tissues, and other samples.

Course Overview

- **Full Form**: Diploma in Medical Laboratory Technology
- **Duration**: 2 Years + 6 Months (Internship)
- **Eligibility**:
    - 10+2 pass (Science stream – PCB or PCM usually preferred)
    - Minimum 45–50% marks
    - On the basis of 10th (Only Certificate Courses)

Career Opportunities after DMLT

- **Medical Lab Technician/Technologist**
- **Lab Assistant in hospitals, clinics, diagnostic centers**
- **Blood Bank Technician**
- **Microbiologist Assistant**
- **Research Lab Technician**

SEMESTER – I

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
DMLT101	HUMAN ANATOMY & PHYSIOLOGY	45 Min	1 Hrs.	50	50
DMLT102	FUNDAMENTAL OF MLT	45 Min	1 Hrs.	50	50
DMLT103	CLINICAL PATHOLOGY	45 Min	1 Hrs.	50	50
DMLT104	CLINICAL MICROBIOLOGY	45 Min	1 Hrs.	50	50

Anatomy & Physiology Syllabus

ANATOMY & PHYSIOLOGY is a core subject in Allied Health/Paramedical courses. It covers the structure (anatomy) and function (physiology) of the human body systems.

Theory Syllabus

1. Introduction to Human Body

- Definition and scope of anatomy and physiology
- Structural organization of the human body
- Anatomical terms, positions, and planes

2. Cell and Tissues

- Structure and function of cell organelles
- Cell division (mitosis and meiosis)
- Types of tissues: epithelial, connective, muscular, and nervous

3. Skeletal System

- Types of bones, structure, and functions
- Major bones of the body
- Joints: types and functions

4. Muscular System

- Types of muscles: skeletal, smooth, cardiac
- Structure and function
- Muscle contraction (basic mechanism)

5. Circulatory System

- Structure of heart and blood vessels

- Cardiac cycle and circulation of blood
- Blood: components and functions
- Blood groups and blood coagulation

6. Respiratory System

- Structure of respiratory organs
- Mechanism of breathing
- Exchange of gases
- Respiratory volumes

7. Digestive System

- Organs of the digestive system
- Functions of each part
- Digestion and absorption of nutrients

8. Excretory System

- Structure and function of kidneys, ureters, bladder, urethra
- Formation of urine
- Fluid and electrolyte balance

9. Nervous System

- Central and peripheral nervous system
- Brain and spinal cord
- Neuron structure and nerve impulse
- Autonomic nervous system

10. Endocrine System

- Major endocrine glands (pituitary, thyroid, adrenal, pancreas, etc.)
- Hormones and their functions

11. Reproductive System

- Male and female reproductive organs
- Menstrual cycle, fertilization, pregnancy basics

12. Integumentary System

- Structure and functions of skin
- Appendages of the skin (hair, nails, glands)

13. Lymphatic and Immune System

- Lymph nodes and lymphatic vessels
- Spleen, thymus
- Basics of immunity

Practical Syllabus

- Identification of bones and joints
- Models of major organs (heart, lungs, kidney, brain)
- Charts of different systems
- Microscopic study of tissues
- Blood pressure measurement
- Basic human body measurements (height, weight, pulse)

FUNDAMENTAL OF MLT

This subject introduces students to the basics of laboratory science and clinical procedures.

Theory Syllabus

1. Introduction to Medical Laboratory Science

- Definition, scope, and importance of MLT
- Ethics and responsibilities of an MLT professional
- Laboratory disciplines: Hematology, Biochemistry, Microbiology, Histopathology, Blood Bank, etc.

2. Laboratory Safety & First Aid

- Personal protective equipment (PPE)
- Biosafety levels
- Handling biohazard materials and waste disposal
- Needle stick injury – prevention and first aid
- Fire safety, chemical hazards, and emergency procedures

3. Laboratory Glassware and Equipment

- Classification of glassware (graduated, non-graduated, volumetric)
- Calibration and care of lab glassware
- Introduction to laboratory instruments:
    - Centrifuge
    - Autoclave
    - Incubator
    - Water bath
    - Hot air oven
    - Microscope – parts, use, and maintenance

4. Sterilization and Disinfection

- Definitions: Sterilization, disinfection, antiseptic
- Methods of sterilization:
    - Physical (heat, filtration, radiation)
    - Chemical methods

- Preparation of disinfectant solutions
- Aseptic techniques

5. Basic Laboratory Procedures

- Sample collection:
  - Blood (venipuncture, capillary)
  - Urine, stool, sputum
- Labeling, transport, and storage of specimens
- Anticoagulants – types and uses
- Specimen rejection criteria
- Cleaning and maintenance of laboratory

6. Units of Measurement and Preparation of Reagents

- SI units: Length, volume, weight, temperature
- Solutions:
  - Normal, molar, percent, buffer solutions
  - pH and its measurement
- Dilution techniques
- Common laboratory reagents – preparation and storage

7. Quality Control and Quality Assurance

- Internal and external quality control
- Accuracy, precision, sensitivity, specificity
- Calibration of equipment
- Documentation and record keeping
- Good Laboratory Practices (GLP)

8. Basic Hematology (Introductory)

- Composition and functions of blood
- Blood collection methods and precautions
- Anticoagulants used in hematology
- Introduction to hemoglobin estimation and cell counts

9. Introduction to Clinical Biochemistry (Introductory)

- Blood glucose, urea, creatinine – basic principles
- Sample handling and storage for biochemistry
- Use of colorimeter and autoanalyzer

10. Basic Microbiology (Introductory)

- Microorganisms: Bacteria, viruses, fungi, protozoa
- Microscopy – staining techniques (Gram stain)
- Aseptic culture techniques

11. Basic Histopathology (Introductory)

- Fixation and types of fixatives
- Tissue processing overview
- Embedding, microtomy, and staining basics

Practical Syllabus

- Identification and handling of basic laboratory equipment:
  - Microscope
  - Centrifuge
  - Incubator
  - Autoclave
  - Water bath
  - Hot air oven
- Glassware: Types, uses, and cleaning (Beakers, test tubes, pipettes, burettes, flasks)Laboratory Safety and Hygiene
- Sterilization and Disinfection Techniques
- Use and Care of Microscope
- Collection and Handling of Specimens
- Preparation of Reagents and Solutions
- Basic Laboratory Techniques
- Basic Staining Techniques
- Record Keeping and Reporting

CLINICAL PATHOLOGY

Clinical Pathology deals with the analysis of body fluids (blood, urine, stool, sputum, etc.) to diagnose diseases.

Theory Syllabus

1. Introduction to Clinical Pathology

- Definition and scope
- Importance of clinical pathology in diagnosis
- Role of a medical lab technician in clinical pathology

2. Collection and Preservation of Specimens

- Types of biological samples: Blood, urine, stool, sputum, CSF, body fluids
- General principles of sample collection
- Anticoagulants – types, uses, and preparation
- Specimen labeling, transport, and storage
- Precautions and rejection criteria

3. Examination of Blood

- Hemoglobin estimation: Sahli's method, Cyanmethemoglobin method
- Total Leukocyte Count (TLC)
- Differential Leukocyte Count (DLC)

- Red Blood Cell (RBC) count
- Platelet count
- Packed Cell Volume (PCV)/Hematocrit
- ESR (Erythrocyte Sedimentation Rate) – Westergren and Wintrobe methods
- Blood indices: MCV, MCH, MCHC
- Blood smear preparation and staining (Leishman stain)
- Reticulocyte and malarial parasite identification

4. Urine Analysis

Physical Examination

- Color, volume, appearance, specific gravity, pH, odor

Chemical Examination

- Protein (heat and acetic acid test, sulfosalicylic acid)
- Sugar (Benedict's test)
- Ketone bodies (Rothera's test)
- Bile salts and bile pigments
- Blood (benzidine test)
- Urobilinogen

Microscopic Examination

- RBCs, WBCs, epithelial cells, casts, crystals, bacteria, yeast, parasites

5. Stool Examination

- Collection and preservation
- Physical characteristics: Color, consistency, mucus, blood
- Chemical examination: Occult blood
- Microscopic examination:
    - Ova, cysts, trophozoites
    - Worm segments and eggs
    - Undigested food particles, pus cells

6. Sputum Examination

- Collection and preservation
- Gross examination
- Microscopic examination:
    - Staining for AFB (Ziehl-Neelsen stain)
    - Pus cells, epithelial cells, bacteria

7. Body Fluid Examination (Introductory)

- Cerebrospinal fluid (CSF): Collection, appearance, cell count, protein and sugar estimation
- Ascitic, pleural, synovial fluids – basic examination

8. Quality Control in Clinical Pathology

- Pre-analytical, analytical, and post-analytical errors
- Internal and external quality control measures
- Importance of reporting and documentation
- Maintenance of log books and records

Practical Syllabus

- Hemoglobin estimation (Sahli's/Cyanmethemoglobin)
- RBC, WBC, and Platelet counting (manual)
- DLC using Leishman stain
- ESR by Westergren and Wintrobe methods
- Urine analysis (Physical, Chemical, Microscopy)
- Stool examination (routine and ova/cyst identification)
- Sputum smear preparation for AFB
- Microscopic examination of CSF and other fluids

CLINICAL MICROBIOLOGY

Theory Syllabus

1. Introduction to Microbiology

- History and scope of microbiology
- Branches of microbiology
- Structure and classification of microorganisms:
  - Bacteria
  - Viruses
  - Fungi
  - Protozoa

2. Laboratory Organization and Safety

- Layout of a microbiology lab
- Biosafety levels (BSL-1 to BSL-4)
- Aseptic techniques
- Handling of infectious material
- Biomedical waste management
- Personal protective equipment (PPE)

3. Sterilization and Disinfection

- Definition and importance
- Methods of sterilization:
  - **Physical methods**: Dry heat (hot air oven), moist heat (autoclave), filtration, radiation
  - **Chemical methods**: Alcohol, formalin, glutaraldehyde
- Disinfection of surfaces and instruments

- Sterility testing

4. Culture Media and Culture Techniques

- Types of culture media:
  - **Basic media**: Nutrient agar, broth
  - **Enriched media**: Blood agar, chocolate agar
  - **Selective media**: MacConkey, Lowenstein-Jensen (LJ)
  - **Differential media**
  - **Transport media**
- Preparation and sterilization of media
- Culture techniques:
  - Streak plate
  - Pour plate
  - Spread plate
- Anaerobic culture techniques

5. Microscopy and Staining Techniques

- Parts and types of microscopes
- Gram staining
- Acid-fast staining (Ziehl-Neelsen)
- Simple staining
- Negative staining
- Special stains (e.g., spore stain)

6. Bacteriology

- Morphology and classification of bacteria
- Pathogenic bacteria and their diseases:
  - Gram-positive cocci: *Staphylococcus*, *Streptococcus*
  - Gram-negative cocci: *Neisseria*
  - Gram-positive bacilli: *Corynebacterium diphtheriae*, *Clostridium spp.*, *Bacillus spp.*
  - Gram-negative bacilli: *Escherichia coli*, *Salmonella*, *Shigella*, *Klebsiella*, *Pseudomonas*
  - Acid-fast bacilli: *Mycobacterium tuberculosis*
- Collection, transport, and processing of specimens
- Identification methods:
  - Morphology
  - Biochemical reactions
  - Serology

7. Virology (Introductory)

- Structure and classification of viruses
- Common viral infections: Hepatitis, HIV, influenza, herpes, rabies
- Laboratory diagnosis of viral infections:
  - Serological methods (ELISA)
  - Rapid tests
  - PCR (introductory)

8. Mycology (Introductory)

- Classification of fungi: Molds, yeasts, dimorphic fungi
- Fungal infections: Candidiasis, dermatophytosis, aspergillosis
- Lab diagnosis: KOH mount, culture, staining

9. Parasitology (Introductory)

- Classification of parasites
- Medically important protozoa and helminths:
  - Entamoeba histolytica, Giardia lamblia, Plasmodium spp.
  - Ascaris, Hookworm, Taenia, Wuchereria
- Stool examination techniques: Saline and iodine wet mount, concentration methods

10. Immunology and Serology (Basic)

- Antigen and antibody
- Types of immunity: Innate, acquired, active, passive
- Serological tests:
  - Widal test
  - VDRL
  - ELISA
  - CRP, ASO
  - Rapid antigen/antibody tests

11. Antimicrobial Sensitivity Testing (AST)

- Principles of antibiotic susceptibility testing
- Methods:
  - Kirby-Bauer disc diffusion method
  - MIC (introductory)
- Antibiotic resistance and MDR organisms

Practical Syllabus

- Operation of microscope
- Preparation and sterilization of media
- Inoculation techniques (streaking, spreading, pouring)
- Gram staining
- Acid-fast staining
- Motility testing (hanging drop)
- Culture interpretation and colony morphology
- Biochemical tests: Catalase, Coagulase, Indole, Urease, Citrate, TSI, Oxidase
- Stool examination (saline, iodine mount)
- Urine culture and sensitivity
- Widal and VDRL tests
- KOH mount for fungi

SEMESTER – II

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
DMLT201	MEDICAL LAB TECHNOLOGY & INSTRUMENTATION	45 Min	1 Hrs.	50	50
DMLT202	CLINICAL BIOCHEMISTRY	45 Min	1 Hrs.	50	50
DMLT203	BLOOD SAMPLE COLLECTION	45 Min	1 Hrs.	50	50
DMLT204	BLOOD BANKING	45 Min	1 Hrs.	50	50

MEDICAL LAB TECHNOLOGY & INSTRUMENTATION

This subject introduces laboratory instruments, their working principles, handling, and maintenance, which are critical for accurate diagnostic testing.

Theory syllabus

1. Introduction to Medical Laboratory Instruments

- Importance of instrumentation in laboratory diagnosis
- Classification of laboratory instruments
- Basic principles of laboratory devices

2. Weighing and Measuring Devices

- Types of balances: Analytical and digital balances
- Proper use and care of balances
- Measuring instruments: Measuring cylinders, pipettes, burettes, micropipettes

3. Colorimetry and Spectrophotometry

- Principle of colorimetry (Beer-Lambert law)
- Parts and working of a colorimeter
- Principle and components of spectrophotometer
- Applications in clinical biochemistry
- Maintenance and calibration

4. pH Meter

- Principle and working of pH meter
- Calibration and maintenance
- Measurement of pH in biological samples

5. Centrifuge

- Types: Bench-top, high-speed, refrigerated
- Principle of centrifugation
- Applications: Separation of serum, plasma, urine sediment
- Balancing, care, and safety precautions

6. Incubator and Hot Air Oven

- Principle and uses in microbiology and sample incubation
- Temperature regulation and maintenance
- Cleaning and safety precautions

7. Water Bath and Heating Devices

- Use in serology, biochemistry, microbiology
- Types: Simple water bath, serological water bath
- Thermostatic control, precautions

8. Autoclave and Sterilizers

- Principle of steam sterilization
- Operation of autoclave: Temperature, pressure, time
- Validation and safety precautions
- Hot air oven: Uses in dry sterilization

9. Microscopes

- Types: Light microscope, compound microscope, fluorescence microscope (introductory)
- Parts and functions
- Handling, cleaning, and maintenance

10. Electrolyte Analyzers and Semi-Auto Analyzers

- Principle and function
- Sample handling and result interpretation
- Common troubleshooting

11. Blood Cell Counters (Hematology Analyzers)

- Principle of automated cell counting
- Types: 3-part and 5-part analyzers
- Sample loading, maintenance, and result interpretation

12. Quality Control in Instrumentation

- Importance of calibration and QC in lab instruments
- Preventive maintenance
- Logbook maintenance and documentation

- Equipment validation

Practical Syllabus

➢ **Handling and Operation of Instruments**

- Weighing using analytical and digital balances
- Measurement using pipettes and burettes
- Use of micropipettes with calibration

➢ **Colorimeter and Spectrophotometer**

- Operating a colorimeter for blood glucose, protein estimation
- Use of spectrophotometer (demo/practice if available)

➢ **pH Meter**

- Calibration using buffer solutions
- Measurement of sample pH

➢ **Centrifuge**

- Balancing tubes
- Operation for serum/plasma separation

➢ **Autoclave and Hot Air Oven**

- Operation steps, safety checks
- Use of indicator tape and validation

➢ **Incubator and Water Bath**

- Setting and checking temperature
- Applications in culture incubation

➢ **Microscopy**

- Parts identification
- Cleaning and focusing slides under different magnifications

➢ **Semi-Auto Analyzer / Cell Counter (if available)**

- Sample preparation
- Loading and interpretation of results

➢ **Maintenance Logs**

- Daily/weekly maintenance checklist for lab instruments
- Sample instrument logbook entry

Theory syllabus

1. Introduction to Clinical Biochemistry

- Definition and scope
- Role of biochemistry in disease diagnosis
- Safety rules in a biochemistry laboratory
- Sample collection, preservation, and processing
- Pre-analytical, analytical, post-analytical phases

2. Carbohydrate Metabolism and Analysis

- Digestion and absorption of carbohydrates
- Blood glucose regulation (insulin, glucagon)
- Disorders: Diabetes mellitus, hypoglycemia
- Estimation of:
    - Fasting and postprandial blood glucose
    - Glycosylated hemoglobin (HbA1c)
    - Glucose tolerance test (GTT)

3. Protein and Amino Acid Metabolism

- Structure, types, and functions of proteins
- Protein digestion and absorption
- Disorders: Proteinuria, hypo/hyperproteinemia
- Estimation of:
    - Total protein
    - Albumin and A/G ratio
    - Urea and uric acid
    - Creatinine

4. Lipid Metabolism and Analysis

- Digestion and absorption of fats
- Lipoproteins: LDL, HDL, VLDL
- Lipid profile:
    - Total cholesterol
    - Triglycerides
    - HDL/LDL estimation
- Atherosclerosis and hyperlipidemia

5. Liver Function Tests (LFT)

- Bilirubin metabolism
- Estimation of:
    - Total and direct bilirubin
    - ALT (SGPT), AST (SGOT)
    - Alkaline phosphatase
    - Serum proteins (albumin, globulin)
- Clinical interpretation in hepatitis, cirrhosis

6. Kidney Function Tests (KFT)

- Role of kidneys in waste excretion
- Estimation of:
  - Blood urea
  - Serum creatinine
  - Uric acid
  - Electrolytes (Na^+, K^+, Cl^- – introductory)
- Clearance tests (introductory)

7. Acid-Base Balance and Electrolytes

- pH, buffer systems
- Acid-base disorders: Acidosis, alkalosis (introductory)
- Sodium, potassium, chloride – roles and estimation (basic)

8. Enzymes in Clinical Diagnosis

- Definition and classification
- Diagnostic enzymes:
  - AST, ALT
  - Amylase, lipase
  - ALP, ACP, LDH, CK
- Clinical interpretation in myocardial infarction, pancreatitis, liver disease

9. Endocrine Function Tests (Introductory)

- Hormones: Types and functions
- Thyroid function tests: T3, T4, TSH
- Blood glucose as part of endocrine test (insulin function)

10. Automation in Clinical Biochemistry

- Semi-auto and fully automated analyzers
- Use of photometry and spectrophotometry
- Quality control: Internal and external
- Calibration and maintenance of instruments

Practical Syllabus

➢ Sample Collection and Processing

- Blood and urine sample handling
- Serum and plasma separation
- Use of anticoagulants

➢ Estimation Techniques

- Blood glucose (Glucose oxidase/peroxidase method)
- Urea (diacetyl monoxime or enzymatic method)
- Creatinine (Jaffe's method)

- Total protein (Biuret method)
- Albumin (BCG method)
- Cholesterol (CHOD-PAP method)
- Triglycerides
- Liver function tests (ALT, AST, bilirubin)

➢ **Instrumentation**

- Use of colorimeter and semi-auto analyzer
- Use of centrifuge, pipette, and pH meter
- Calibration of instruments

➢ **Quality Control**

- Preparation of standard curves
- Use of controls and reagents
- Interpretation and recording of results

➢ **Urine Biochemistry (Qualitative)**

- Protein (heat and acetic acid, sulfosalicylic acid)
- Glucose (Benedict's test)
- Ketone bodies (Rothera's test)
- Bile salts and pigments

BLOOD SAMPLE COLLECTION

It includes theoretical knowledge and practical procedures essential for safe and effective phlebotomy.

Theory syllabus

1. Introduction to Blood Collection

- Purpose and importance of blood collection
- Types of blood samples:
  - **Venous blood** (most common)
  - **Capillary blood** (finger/heel prick)
  - **Arterial blood** (for blood gas analysis – advanced)

2. Methods of Blood Collection

- **Venipuncture** (common for laboratory tests)
- **Capillary puncture** (in infants, glucose testing, etc.)
- Arterial puncture (only in special settings)

3. Equipment for Blood Collection

- Tourniquet

- Sterile needles and syringes
- Vacutainer tubes (EDTA, Citrate, Heparin, Fluoride, Plain, Gel tubes)
- Butterfly needle (for difficult veins)
- Alcohol swab, sterile gauze, cotton, and bandages
- Needle disposal container (sharp bin)

4. Anticoagulants and Their Use

Anticoagulant	Tube Color	Use
EDTA	Lavender	CBC, hematology tests
Sodium Citrate	Light Blue	Coagulation tests (PT, APTT)
Fluoride Oxalate	Grey	Blood glucose
Heparin	Green	Biochemistry
No Additive	Red	Serum-based tests

5. Site Selection for Venipuncture

- Preferred vein: **Median cubital vein**
- Alternatives: Cephalic vein, basilic vein
- Avoid: Infected/injured sites, IV sites, scar tissue

6. Procedure for Venipuncture

1. Verify patient identity and fasting status
2. Assemble all required equipment
3. Apply tourniquet 3–4 inches above puncture site
4. Clean site with 70% alcohol in circular motion
5. Allow to dry, insert needle at 15–30° angle
6. Collect required amount of blood in appropriate tubes
7. Release tourniquet before removing needle
8. Apply gauze and ask patient to press
9. Label all tubes properly before leaving bedside
10. Dispose of sharps and gloves safely

7. Capillary Blood Collection

- Site: Finger (adults), heel (infants)
- Use of lancets, micropipettes, or capillary tubes
- Used for: Glucose, malaria, hemoglobin tests

8. Precautions During Blood Collection

- Never draw blood above an IV line

- Avoid excessive probing or blind puncture
- Never reuse needles or syringes
- Maintain aseptic technique
- Always label samples immediately

9. Complications and Errors

- Hematoma formation
- Fainting/syncope
- Hemolysis of sample
- Clotted sample due to delay in mixing
- Wrong tube or improper filling

10. Transport and Storage of Blood Samples

- Serum/plasma separation within 1–2 hours
- Maintain cold chain if required
- Avoid exposure to direct sunlight or heat
- Label with time and date of collection

Practical Syllabus

➢ **Hands-on Training**

- Demonstration of venipuncture (on manikins or simulation arms)
- Practice of capillary blood collection (finger prick)
- Sample collection in vacutainers and syringes

➢ **Tube Identification and Use**

- Color-coded tube identification
- Correct order of draw (to avoid cross-contamination of additives)

➢ **Labeling and Documentation**

- Writing patient name, date, time, and test name on sample
- Use of barcode systems (where applicable)

➢ **Safety and Hygiene Practices**

- Donning and doffing gloves
- Use of hand sanitizer and handwashing
- Disposal of used needles in sharp containers

BLOOD BANKING

This subject deals with the collection, testing, storage, and transfusion of blood and its components, ensuring safe blood transfusion practices.

Theory syllabus

1. Introduction to Blood Banking

- Definition and history of blood banking
- Structure and functions of a blood bank
- Role of blood bank in healthcare
- Blood bank organization and licensing norms (NACO, FDA)

2. Basic Hematology for Blood Banking

- Composition and functions of blood
- Structure and functions of RBCs, WBCs, platelets
- Plasma and serum: Difference and clinical use

3. Blood Groups and Typing

- ABO blood group system
- Rh blood group system
- Other blood group systems (Kell, Duffy – overview)
- Forward and reverse grouping
- Weak D (Du) testing
- Bombay blood group (introductory)

4. Collection of Blood from Donors

- Donor selection criteria (age, weight, hemoglobin, etc.)
- Blood donation process
- Blood collection bags and anticoagulants (CPDA, EDTA, ACD)
- Volume of collection and labeling
- Donor reactions and management

5. Compatibility Testing (Crossmatching)

- Major and minor crossmatch
- Direct and indirect antiglobulin tests (Coombs test)
- Causes of incompatibility
- Interpretation and troubleshooting

6. Component Separation and Storage

- Types of blood components:
  - Packed RBCs
  - Platelet concentrate
  - Fresh Frozen Plasma (FFP)
  - Cryoprecipitate
- Centrifugation techniques
- Storage conditions and shelf-life for each component

7. Transfusion Transmitted Infections (TTI)

- Mandatory screening tests:
  - HIV 1 & 2
  - Hepatitis B & C
  - Syphilis
  - Malaria (where applicable)
- ELISA, rapid tests, chemiluminescence (introductory)
- Interpretation and reporting of TTI results

8. Storage and Preservation of Blood

- Blood bank refrigerator (2–6°C)
- Deep freezers for FFP
- Platelet agitator/incubator
- Temperature monitoring and recording
- Cold chain maintenance

9. Adverse Reactions to Transfusion

- Hemolytic transfusion reactions
- Allergic and febrile reactions
- Anaphylactic reactions
- Post-transfusion infection
- Management and reporting of reactions

10. Quality Control and Documentation

- Quality assurance in blood bank operations
- Calibration and maintenance of blood bank equipment
- Standard operating procedures (SOPs)
- Record keeping: Donor records, blood issue register, stock register
- NABH/NACO/WHO guidelines (introductory)

Practical Syllabus

- **Blood Grouping**
  - Forward and reverse ABO grouping
  - Rh (D) typing and weak D testing
- **Crossmatching**
  - Major and minor crossmatch procedures
  - Coombs test (Direct & Indirect)
- **Donor Room Practices**
  - Demonstration of donor screening
  - Preparation of blood bag and labeling
  - Sample collection for testing
- **TTI Screening (Demonstration/Hands-on)**

- Rapid test and ELISA (if available)
- Sample processing and interpretation

➢ **Component Preparation (Demo or Practice)**

- Use of centrifuge for blood separation
- Labeling and storage of components

➢ **Equipment Use**

- Blood bank refrigerator, platelet incubator
- Use and maintenance of temperature logbooks

➢ **Record Keeping**

- Donor and recipient records
- Blood issue and transfusion reaction forms

SEMESTER – III

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
DMLT301	LABORATORY MANAGEMENT & ETHICS	45 Min	1 Hrs.	50	50
DMLT302	CYTOLOGY & IMMUNOLOGY	45 Min	1 Hrs.	50	50
DMLT303	CLINICAL HEMATOLOGY	45 Min	1 Hrs.	50	50
DMLT304	LAB SAFETY & FIRST AID	45 Min	1 Hrs.	50	50

LABORATORY MANAGEMENT & ETHICS

Theory syllabus

1. Introduction to Medical Laboratory Management

- Definition and objectives of laboratory management
- Types of laboratories (hospital-based, private, research, public health)
- Levels of healthcare and laboratory services
- Role and responsibilities of lab manager/supervisor

2. Laboratory Organization and Staffing

- Organizational structure of a clinical laboratory
- Job responsibilities of laboratory personnel:
  - Lab technicians
  - Pathologists
  - Assistants and clerical staff
- Staff scheduling and duty rotation
- Training and continuing education

3. Laboratory Planning and Layout

- Design and layout of a clinical lab
- Work zones: Sample receiving, testing area, reporting area
- Ventilation, lighting, and space optimization
- Safety considerations in design (fire exits, chemical storage)

4. Equipment Management

- Types of common lab instruments and their functions

- Installation, calibration, maintenance, and servicing
- Equipment logbook and usage records
- AMC (Annual Maintenance Contract) importance

5. Laboratory Supplies and Inventory Control

- Procurement of chemicals, glassware, reagents
- Inventory management and stock register
- Storage and labeling of chemicals and reagents
- FIFO (First In First Out) method

6. Quality Assurance and Quality Control

- Internal and external quality control (IQC & EQC)
- Precision, accuracy, sensitivity, specificity
- Control charts and standard deviation
- Proficiency testing and corrective actions

7. Laboratory Safety Practices

- Personal protective equipment (PPE)
- Handling and disposal of biohazardous waste
- Needle stick injury prevention
- First aid for chemical burns, spills
- Fire safety and electrical safety

8. Medical Ethics in Laboratory Practice

- Definition and importance of ethics
- Patient confidentiality and informed consent
- Code of conduct for lab personnel
- Truthful and accurate reporting
- Ethical handling of human samples

9. Legal Aspects and Accreditation

- Legal responsibilities of laboratories
- Regulatory bodies (NABL, NABH, MCI, DCI, etc.)
- Basic overview of laboratory accreditation (ISO 15189)
- Documentation and audits

10. Communication and Reporting Skills

- Importance of good communication in labs
- Interaction with patients and healthcare professionals
- Format of lab reports and interpretation guidelines
- Telephone etiquette and complaint handling

Practical Syllabus

- Report writing based on visit to a NABL-accredited lab

- Demonstration of lab safety practices
- Logbook entries for quality control
- SOP writing practice for common procedures

CYTOLOGY & IMMUNOLOGY

Theory syllabus

CYTOLOGY

1. Introduction to Cytology

- Definition, scope, and importance
- Diagnostic and research applications
- Types of cytology:
  - Exfoliative cytology
  - Aspiration cytology (FNAC)
  - Liquid-based cytology (introductory)

2. Cell Structure & Functions

- Prokaryotic vs. eukaryotic cells
- Cell organelles (nucleus, mitochondria, ER, Golgi, etc.)
- Cellular differentiation and regeneration
- Normal vs. abnormal cellular morphology

3. Specimen Collection for Cytology

- Types of specimens:
  - Sputum
  - Urine
  - Cervical smears (Pap smear)
  - Body fluids (pleural, ascitic)
  - FNAC aspirates
- Fixation methods and preservatives
- Transport media (e.g., 95% ethanol, cytorich red/blue)

4. Staining Techniques in Cytology

- Papanicolaou (Pap) stain
- Hematoxylin and Eosin (H&E) stain
- Giemsa stain
- May-Grünwald stain (where applicable)

5. Microscopy and Interpretation

- Use of microscope for cytological screening
- Normal and pathological changes in smears
- Basic reporting terminology (e.g., negative for malignancy, atypical cells, malignant cells)

- Bethesda System (basic intro for cervical cytology)

6. Cytological Diagnosis

- Common cytological findings in:
  - Cervical cancer
  - Lung diseases
  - Urinary tract infections
  - Breast lumps (via FNAC)
  - Serous effusions

IMMUNOLOGY

1. Introduction to Immunology

- Innate vs. acquired immunity
- Cells of the immune system (T cells, B cells, macrophages)
- Organs of the immune system (thymus, spleen, lymph nodes)
- Antigens and antibodies

2. Antigen-Antibody Reactions

- Types of reactions:
  - Precipitation
  - Agglutination
  - Complement fixation
  - Neutralization
- Diagnostic applications of each type

3. Immunological Techniques

- ELISA (Enzyme-Linked Immunosorbent Assay)
- Rapid tests (Pregnancy test, HIV, HBsAg)
- Rheumatoid factor (RA), CRP, ASO, Widal
- Latex agglutination tests
- Immunochromatography basics

4. Hypersensitivity and Autoimmunity

- Types I–IV hypersensitivity (overview)
- Common autoimmune disorders:
  - Systemic Lupus Erythematosus (SLE)
  - Rheumatoid arthritis
  - Type 1 diabetes

5. Immunoprophylaxis and Vaccines

- Types of vaccines: live, killed, subunit
- National Immunization Schedule
- Role of immunization in disease prevention

6. Immunodeficiency Diseases

- Overview of primary and secondary immunodeficiencies
- Brief mention of HIV/AIDS and its effect on the immune system

Practical Syllabus

Cytology Practicals

- Pap smear preparation and staining
- Microscopic examination of cervical and sputum smears
- FNAC slide handling and fixation
- Reporting of basic cytological features

Immunology Practicals

- ELISA technique demonstration
- Widal test (for typhoid diagnosis)
- RA factor and CRP test
- Rapid card tests for HIV, HBsAg, pregnancy
- Blood grouping using antisera (ABO, Rh typing)

CLINICAL HEMATOLOGY

Theory syllabus

1. Introduction to Hematology

- Definition and scope
- Composition and functions of blood
- Types of blood cells – RBCs, WBCs, Platelets
- Hematopoiesis (formation of blood cells)

2. Collection and Anticoagulants

- Venipuncture and capillary collection
- Anticoagulants:
  - EDTA
  - Heparin
  - Sodium citrate
- Precautions during blood collection
- Blood sample labeling and storage

3. Hemoglobin Estimation

- Principle and methods:
  - Sahli's method
  - Cyanmethemoglobin method
- Normal values (men, women, children)
- Clinical significance (anemia, polycythemia)

4. Red Blood Cell (RBC) Studies

- RBC count (manual and automated)
- Calculation and normal range
- Morphology of RBCs in health and disease
- Reticulocyte count
- Hematocrit (PCV)

5. White Blood Cell (WBC) Studies

- Total leukocyte count (TLC)
- Differential leukocyte count (DLC)
- Normal and abnormal WBC morphology
- Leukocytosis, leukopenia, leukemia (introductory)

6. Platelet Studies

- Platelet count (manual and automated)
- Normal values and clinical significance
- Thrombocytopenia and thrombocytosis

7. Red Cell Indices

- MCV, MCH, MCHC
- Interpretation and relevance in anemia classification
- ESR (Erythrocyte Sedimentation Rate) – Westergren and Wintrobe method

8. Peripheral Blood Smear (PBS)

- Preparation, staining (Leishman, Giemsa)
- Identification of normal and abnormal cells
- RBC morphological abnormalities:
    - Anisocytosis, poikilocytosis, target cells, spherocytes, etc.
- WBC morphology: Blasts, toxic granules, shift to left/right

9. Bone Marrow Examination (Introductory)

- Indications and procedure overview
- Smear preparation and staining
- Overview of normal vs. abnormal bone marrow findings

10. Hematological Disorders Overview

- Anemia – types and lab diagnosis
- Leukemia – types and blood picture
- Bleeding disorders – hemophilia, ITP
- Sickle cell disease and thalassemia (introductory)

11. Quality Control in Hematology

- Internal and external quality control
- Importance of accuracy and precision
- Daily QC logs and maintenance of instruments

Practical Syllabus

- **Hemoglobin Estimation**
  - Sahli's and cyanmethemoglobin method
- **Total RBC, WBC & Platelet Count**
  - Manual counting using Neubauer chamber
  - Calculation and normal range
- **Differential Leukocyte Count**
  - Preparation and staining of peripheral smear
  - Identification and calculation of % of each cell type
- **ESR**
  - Wintrobe and Westergren methods
- **Hematocrit (PCV)**
  - Microhematocrit method
  - Reading and interpretation
- **Red Cell Indices Calculation**
  - MCV, MCH, MCHC using formulas
- **Reticulocyte and Eosinophil Count**
- **Blood Smear Preparation**
  - Leishman staining
  - Identification of abnormal blood cells
- **Coagulation Tests (Introductory)**
  - Bleeding time (BT)
  - Clotting time (CT)
- **Sample Handling**
  - Anticoagulated vs. clotted samples
  - Specimen rejection criteria

LAB SAFETY & FIRST AID

Theory syllabus

1. Introduction to Laboratory Safety

- Importance of safety in a medical laboratory
- Types of hazards:
  - Biological
  - Chemical
  - Physical
  - Electrical
- Lab safety rules and regulations
- Personal protective equipment (PPE)

2. Personal Protective Equipment (PPE)

- Types and proper usage:
  - Lab coats/gowns
  - Gloves
  - Masks/respirators
  - Face shields, goggles, shoe covers
- Donning and doffing procedures
- Infection control precautions (Standard & Transmission-based

3. Biosafety Guidelines

- Biosafety levels (BSL 1–4) overview
- Safe handling of infectious materials
- Containment practices
- Working inside biosafety cabinets (BSC)
- Universal precautions

4. Chemical and Fire Safety

- Safe handling and storage of chemicals
- Labeling systems: GHS (Globally Harmonized System)
- Flammable, corrosive, and toxic substances
- Fire hazards in the lab
- Types of fire extinguishers and their use
- Fire triangle and classes of fire (A, B, C, D, K)

5. Biomedical Waste Management

- Waste segregation by color-coded bins
- Disposal of sharps, contaminated materials, chemicals
- BMW rules (India – BMWM Rules 2016)
- Transport, treatment, and final disposal methods

6. Electrical & Equipment Safety

- Grounding of equipment
- Handling of electrical tools and appliances
- Routine equipment checks and maintenance logs
- Avoiding electrocution and short circuits

7. Accidents and Incident Reporting

- Types of lab accidents: spills, cuts, burns, exposure
- Incident reporting format and documentation
- Root cause analysis
- Safety audit and checklist in laboratories

8. First Aid Principles

- Basic principles and priorities (ABC – Airway, Breathing, Circulation)
- First aid box contents and their uses
- Wound care and bleeding control
- Burns: classification and first aid
- First aid for fainting, choking, fractures
- Snakebite, electric shock, and chemical exposure response

9. CPR (Cardiopulmonary Resuscitation)

- Introduction to CPR
- Basic Life Support (BLS) steps
- Adult and child CPR (theoretical steps)

10. Emergency Preparedness and Disaster Management

- Evacuation procedures
- Earthquake/fire/emergency drills
- Role of laboratory staff during public health emergencies (e.g., pandemics)

Practical Syllabus

- **Demonstration of Lab Safety Measures**

  - Use of PPE
  - Eye wash and safety shower use
  - Spill clean-up procedure

- **Fire Safety Drill**

  - Operation of fire extinguisher (theory/demo)
  - Fire alarm and evacuation mock drill

- **Biomedical Waste Segregation**

  - Color-coded waste segregation and disposal
  - Handling of sharps

- **First Aid Demonstrations**

  - Bandaging techniques for minor cuts and wounds
  - Management of bleeding, burns, and fractures
  - First aid kit usage and stocking

- **CPR Simulation (if facilities allow)**

  - Chest compressions and rescue breathing (on manikin or demo)
  - Recovery position

SEMESTER – IV

PAPER CODE	SUBJECT NAME	THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PRACTICAL MARKS
DMLT401	HISTOPATHOLOGICAL TECHNIQUES	45 Min	1 Hrs.	50	50
DMLT402	COAGULATION & TRANSFUSION MEDICINE	45 Min	1 Hrs.	50	50
DMLT403	QUALITY CONTROL IN LABS	45 Min	1 Hrs.	50	50
DMLT404	HAND HYGIENE & PREVENTION OF CROSS INFECTION	45 Min	1 Hrs.	50	50

HISTOPATHOLOGICAL TECHNIQUES

Theory syllabus

1. Introduction to Histopathology

- Definition and importance of histopathology
- Role of histopathology in disease diagnosis
- Overview of histology vs. histopathology
- Responsibilities of a histopathology technician

2. Specimen Collection & Fixation

- Types of specimens (biopsies, surgical specimens, autopsies)
- Principles of fixation
- Types of fixatives:
  - Formalin (10% NBF)
  - Bouin's solution
  - Alcohol-based fixatives
- Properties of an ideal fixative
- Fixation artifacts and errors

3. Tissue Processing

- Dehydration: graded alcohol series
- Clearing: xylene, toluene
- Impregnation: paraffin wax
- Embedding: paraffin block preparation
- Automation in tissue processing
- Common tissue processing errors

4. Microtomy

- Types of microtomes:
  - Rotary
  - Sledge
  - Cryostat (frozen sections)
- Knife types and sharpening (honing, stropping)
- Section cutting techniques (3–5 µm standard)
- Troubleshooting during sectioning
- Floatation and mounting

5. Tissue Staining Techniques

- Routine stains:
  - Hematoxylin & Eosin (H&E)
- Special stains:
  - PAS (Periodic Acid Schiff)
  - Ziehl-Neelsen (AFB stain)
  - Masson's trichrome
  - Silver stain
- Principle and procedure of each
- Differentiation, bluing, and mounting

6. Mounting and Labeling

- Types of mounting media (DPX, Canada balsam)
- Coverslip application
- Labeling of slides and storage
- Slide drying and sealing techniques

7. Cytopathology (Introductory)

- Definition and types (exfoliative, aspiration cytology)
- Pap smear (brief introduction)
- FNAC and body fluid cytology basics

8. Histopathological Artifacts

- Common artifacts:
  - Shrinkage
  - Folding
  - Knife marks

- Bubbles
- Causes and prevention

9. Quality Control in Histopathology

- Internal QC procedures
- Standard Operating Procedures (SOPs)
- Slide and report accuracy
- Equipment maintenance and calibration

10. Safety Measures in Histopathology Lab

- Handling of chemicals and fixatives
- Disposal of hazardous waste (e.g., xylene)
- Use of PPE and fume hoods
- Fire and chemical safety precautions

Practical Syllabus

- **Collection and Fixation of Tissue**
- Demonstration of fixative preparation
- Fixing tissue specimens properly

➢ **Tissue Processing (manual and automated)**

- Dehydration, clearing, and embedding
- Paraffin block making

➢ **Microtomy**

- Section cutting using rotary microtome
- Knife sharpening (demo or practice)
- Use of warm water bath for ribbon spreading

➢ **Routine Staining**

- Hematoxylin & Eosin (H&E) staining procedure
- Differentiation and mounting techniques

➢ **Special Stains (if applicable)**

- PAS, Ziehl-Neelsen (demonstration level)
- Silver stain or trichrome (optional advanced)

➢ **Slide Mounting**

- Coverslip application
- Use of mounting media

➢ **Handling of Cytological Smears**

- Preparation and basic staining (optional introduction)

COAGULATION & TRANSFUSION MEDICINE

Theory syllabus

1. Introduction to Hemostasis

- Definition of hemostasis
- Primary and secondary hemostasis
- Role of blood vessels, platelets, and coagulation factors
- Sequence of clot formation

2. Coagulation Cascade

- Intrinsic and extrinsic pathways
- Common pathway
- Role of calcium and phospholipids
- Factors I to XIII (names, functions, deficiency effects)
- Natural anticoagulants (Protein C, Protein S, Antithrombin III)

3. Bleeding and Clotting Disorders

- Hemophilia A and B
- von Willebrand disease
- Thrombocytopenia and platelet function defects
- DIC (Disseminated Intravascular Coagulation)
- Hypercoagulable states (overview)

4. Coagulation Tests

- Screening tests:
  - Bleeding Time (BT)
  - Clotting Time (CT)
  - Prothrombin Time (PT)
  - Activated Partial Thromboplastin Time (APTT)
  - Thrombin Time (TT)
- Platelet function tests
- D-dimer test and FDP (Fibrin Degradation Products)
- Mixing studies and factor assays (introductory)

5. Introduction to Transfusion Medicine

- Historical perspective
- Importance in modern healthcare
- Role of blood banks

6. Blood Groups and Typing

- ABO and Rh blood group systems
- Inheritance patterns

- Forward and reverse typing
- Rh incompatibility and hemolytic disease of newborn (HDN)

7. Blood Collection and Processing

- Blood donation criteria and process
- Anticoagulants used in blood bags (CPDA-1, ACD)
- Component separation:
  - Packed RBCs
  - Platelet concentrates
  - Fresh frozen plasma (FFP)
  - Cryoprecipitate

8. Cross Matching and Compatibility Testing

- Major and minor crossmatch
- Direct and indirect antiglobulin (Coombs) test
- Antibody screening and identification

9. Transfusion Reactions

- Types:
  - Hemolytic (acute/delayed)
  - Febrile non-hemolytic
  - Allergic
  - Anaphylactic
  - TRALI (Transfusion Related Acute Lung Injury)
- Causes, signs, symptoms, and prevention
- Management and reporting of adverse reactions

10. Storage and Preservation of Blood

- Storage temperature and shelf-life of:
  - Whole blood
  - PRBCs, Platelets, Plasma
- Blood bag labeling and inventory control
- Cold chain maintenance

11. Legal and Ethical Issues

- Donor consent and screening
- Voluntary vs. paid donation ethics
- Documentation and traceability
- Blood Bank accreditation and quality systems (NACO, NABH)

Practical Syllabus

- **Coagulation Tests**

  - Bleeding Time (BT – Duke method)
  - Clotting Time (CT – Capillary tube method)

- PT/INR (with or without semi-auto analyzer)
- APTT (if facility available)
- Platelet count (manual or automated)

➢ **Blood Grouping and Rh Typing**

- Slide and tube method for ABO & Rh typing
- Forward and reverse grouping

➢ **Crossmatching Procedures**

- Saline method (major crossmatch demo)
- Gel method (optional advanced demo)
- Interpretation of compatibility results

➢ **Sample Handling**

- Blood bag labeling
- Sample identification and rejection criteria

➢ **Component Separation (Observation or demo)**

- Use of centrifuge
- Separated units (PRBC, FFP, platelets)

➢ **Transfusion Reaction Workup**

- Clerical checks
- Hemolysis check
- Reporting format (demo or practice documentation)

QUALITY CONTROL IN LABS

Theory syllabus

1. Introduction to Quality in Laboratory

- Definition of quality in clinical labs
- Importance of quality assurance (QA) and quality control (QC)
- Differences between QA and QC
- Goals of a quality laboratory system

2. Types of Laboratory Errors

- Pre-analytical errors:
  - Sample collection, labeling, transport
- Analytical errors:
  - Instrument failure, wrong reagent, technique errors
- Post-analytical errors:
  - Result interpretation, reporting mistakes

3. Quality Control Materials

- Types of control materials:
  - Internal and external controls
  - Lyophilized, liquid controls
- Use of commercial QC samples
- Control charts (Levey-Jennings chart)

4. Internal Quality Control (IQC)

- Daily monitoring of test performance
- Running control samples
- Accepting or rejecting test runs
- Standard deviation (SD), Coefficient of Variation (CV)
- Application in biochemistry and hematology

5. External Quality Assessment (EQA)

- Definition and purpose
- National and international EQAS programs (e.g., NABL, WHO)
- Proficiency testing
- Result analysis and corrective action

6. Calibration and Maintenance

- Instrument calibration (daily, monthly, annual)
- Calibration curves and standards
- Documentation of instrument logs
- Preventive maintenance schedules

7. Standard Operating Procedures (SOPs)

- Definition and need for SOPs
- Format of SOPs
- SOPs for sample collection, test procedures, equipment use
- Version control and review process

8. Laboratory Accreditation and Quality Standards

- NABL (National Accreditation Board for Testing and Calibration Laboratories)
- ISO 15189:2012 standards
- CLSI (Clinical and Laboratory Standards Institute) guidelines
- Benefits of accreditation

9. Documentation and Record Keeping

- Quality manual
- Log books (temperature, reagent use, maintenance)
- Report formats and validation
- Audit trails and traceability

10. Laboratory Safety and Ethics in QC

- Role of safety in quality systems
- Ethical reporting of QC failures
- Continuous quality improvement (CQI)
- Root cause analysis for quality failures

Practical Syllabus

- **Preparation and Use of Control Samples**

  - Running daily controls in hematology/biochemistry
  - Recording results and plotting control charts

- **Levey-Jennings Chart Practice**

  - Plotting values
  - Identifying trends, shifts, outliers
  - Westgard rules application

- **Calibration Procedures**

  - Calibrating a colorimeter or semi-auto analyzer
  - Checking calibration using standard solutions

- **SOP Practice**

  - Writing a sample SOP for glucose estimation
  - Following SOPs during testing

- **Documentation & Record-Keeping**

  - Maintaining quality control logs
  - Recording instrument maintenance reports
  - Filling up temperature chart forms

- **Quality Error Identification**

  - Case studies or demo: identifying pre-analytical, analytical, post-analytical errors
  - Reporting and corrective action exercises

HAND HYGIENE & PREVENTION OF CROSS INFECTION

Theory syllabus

1. Introduction to Hospital-Acquired Infections (HAIs)

- Definition of nosocomial infections
- Common pathogens (MRSA, VRE, C. difficile, etc.)
- Modes of transmission (direct, indirect, droplet, airborne)

- Impact on patient safety and healthcare system

2. Principles of Infection Control

- Chain of infection (Agent–Reservoir–Portal–Transmission–Entry–Host)
- Breaking the chain through hygiene practices
- Standard precautions and transmission-based precautions
- Universal precautions concept

3. Hand Hygiene

- Importance of hand hygiene in clinical settings
- When to wash hands – WHO's "Five Moments for Hand Hygiene":
    1. Before touching a patient
    2. Before clean/aseptic procedures
    3. After body fluid exposure
    4. After touching a patient
    5. After touching patient surroundings

4. Hand Hygiene Techniques

- Handwashing with soap and water
- Hand rubbing with alcohol-based hand rubs
- Steps of effective handwashing (20–30 seconds)
- Use of disposable towels and air dryers
- Indications for hand rub vs. handwash
- Nail hygiene, use of gloves

5. Personal Protective Equipment (PPE)

- Types of PPE: gloves, gowns, masks, face shields
- Donning and doffing procedures
- Proper disposal of PPE

6. Prevention of Cross Infection

- Cross-infection definition and sources
- Role of staff, instruments, surfaces in transmission
- Disinfection and sterilization protocols
- Isolation techniques and cohorting
- Cleaning of high-touch surfaces

7. Environmental and Equipment Hygiene

- Biomedical waste management (BMWM 2016 guidelines overview)
- Cleaning of patient care areas
- Disinfection of lab surfaces and equipment
- Safe handling of linen and spills

8. Role of Health Workers in Infection Prevention

- Ethical responsibility
- Monitoring compliance
- Reporting breaches in infection control

Practical Syllabus

- **Demonstration and Practice of:**

  - **Handwashing technique** (with soap & water)
  - **Hand rub technique** (with sanitizer)
  - WHO-recommended 7 steps of hand hygiene
  - Use of elbow tap or pedal-operated taps

- **Glove Usage and Removal**

  - Types of gloves (sterile, non-sterile)
  - Proper wearing and removal technique
  - Glove disposal in color-coded bins

- **Donning and Doffing PPE**

  - Gown, gloves, mask, goggles/shields – correct sequence
  - Hands-on PPE use training

- **Surface Disinfection Demo**

  - Cleaning a lab bench or patient table
  - Use of 1% hypochlorite solution and alcohol swabs

- **Cross Infection Case Studies**

  - Identification of infection source
  - Suggested preventive action
  - Group discussions or role play

- **Record Keeping and Hygiene Checklists**

  - Hand hygiene audit form
  - Daily cleaning checklist demo
  - PPE stock monitoring form

LIST OF HOLIDAYS

TOTAL DAY IN 1 YEAR	365/366
SUNDAY	52 DAYS
SUMMER VACATION	10 DAYS
WINTER VACATION	10 DAYS

GAZETTED HOLIDAYS	23 DAYS
OTHER HOLIDAYS	20 DAYS
TOTAL HOLIDAYS	115 DAYS
TOTAL WORKING DAYS	365-115=250

TOTAL HOURS

THEORY CLASS PER DAY	**3 HOURS**
PRACTICAL CLASS PER DAY	4 HOURS
TOTAL HOURS PER DAY	7 HOURS
TOTAL HOURS IN 1 YEAR	250*7=1750
TOTAL HOURS IN 6 MONTHS	875 HOURS

Chairman

Paramedical Education & Training Council