

Uttar Pradesh Paramedical Council, Lucknow

Effective from 2021-22

**Curriculum of Diploma in Lab
Technician Course**

COURSE OBJECTIVES

DMLT prepares Lab Technicians that are able to:

- ✓ Perform Pathological tests
- ✓ Perform tests related to Microbiology
- ✓ Study body reactions to certain medicines through Biochemistry
- ✓ Perform tests of Histopathology & Cytopathology
- ✓ Perform Blood Banking
- ✓ Dispose and handle Biomedical waste

Course of DMLT

YEAR I				
Paper	Name of Paper	Internal	External	Total
Theory Paper 1	Anatomy, Physiology and Pharmacology	20	80	100
Theory Paper 2	Pathology, Microbiology, Biochemistry, Hand Hygiene and Prevention of Cross Infection, Basic Life Support and Cardio-Pulmonary Resuscitation	20	80	100
Practical		20	80	100
YEAR II				
Theory Paper 1	Histopathology and Cytopathology	20	80	100
Theory Paper 2	Blood Banking and Biomedical waste Management	20	80	100
Practical		20	80	100

Diploma in Medical Laboratory Technology (DMLT)

YEAR I

Course Objectives

With new lifestyle, pollution, modernization comes various issues in the body in the form of different ailments. All these are usually treated after physical or biochemical analysis of body. Here is the importance of medical labs which are to be handled by trained professionals. One of these professionals is Medical Lab Technician. So in the corresponding diploma all the facets of lab; its processes and ethical reporting conduct are to be taught.

Paper I

Sr. No.	Paper	Unit	Tentative Course Outline	Hourly Distribution
1.	1. Anatomy and Physiology	1	Introduction to Study of Human Body – Science of anatomy and physiology, their importance and branches.	03
2.			Anatomic terms. Body planes, cavities and sections.	05
3.			Cells and tissues – Processes, types.	07
4.			Basic chemical organization of human body.	05
5.		2	Integumentary System – Terms, basics, layers and types.	05
6.			Muscular System– Terms, types, functions with corresponding positions, basic details. Muscle performance and energy use.	15
7.			Skeletal and Joint System – Terms, types of bones with their structure. Joint types with functions, types of movements.	15
8.		3	Gastrointestinal System – Terms, complete structure, various parts with their corresponding functions.	15
			Digestion – Parts involving absorption and waste elimination. Process of absorption.	
9.	4	Respiratory System – Terms, functions, organizations. Mechanism of breathing with alveoli function. Pulmonary gas exchange	10	

10.		5	Endocrine System – Terms, endocrine organs with their position, structure, function. Hormone regulation. Classification of hormones. Working and importance of each hormone	15	
11.		6	Blood – Terms, composition with functions of each component. Clotting system.	10	
12.			Cardiovascular System – Terms, location, structure. Heart as a pump. Blood vessels types, blood circulation. Arterial and venous tree.	20	
13.			Lymphatic System – Overview, lymphatic vessels, circulation of lymph. Functions of WBCs, spleen, tonsils and lymph nodes. Immunity function.	10	
14.			7	Nervous System – Organization, neurons and basic nerve signaling. Central Nervous System – Basics of brain and spinal cord Brain and Spinal Cord – Terms, regions, structure, functions. Spinal nerves with functions.	15
15.		General Senses – Various receptors and their corresponding senses.		10	
16.		8		Urinary System – Terms, organization with functions of kidneys. Urine formation process and voiding. Other physiology involved. Electrolyte balance and body fluid. Acid base balance.	10
17.			Sexual Reproduction – Importance for cycle of life. Male Reproduction System – Reproductive organs and their importance and functions. Male fertility.	05	
18.			Female Reproduction System – Reproductive organs their structure and functions. Menstrual cycle.	05	
19.		2. Pharmacology	1	Pharmacology – Introduction, importance, terms and jargons. Branches of pharmacology – Pharmacokinetics, pharmacodynamics(with scope)	05
20.				Pharmacokinetics – Introduction, routes of drug administration (enteral, parenteral and local administration routes), absorption (process and factors effecting), distribution (compartments, protein binding, apparent volume of distribution), metabolism (pathways of metabolism, metabolizing enzymes, factors effecting) and excretion	08
21.				Pharmacodynamics – Basic concepts, mechanism of	08

		<p>action (including factors modifying drug action), organ system effects.</p> <p>Principles of Drug Interactions – Importance of drug interactions, beneficial and adverse drug interactions.</p>	
22.	2	<p>Pharmacological Classification of Drugs –</p> <p>Classification of Nervous System – CNV (Central Nervous System) and ANV (Autonomic Nervous System)</p> <p>Drugs on CNV – CNV stimulants, neuroleptic drugs, sedatives and hypnotics, general and local anaesthetics, analgesic and antagonist, anti-inflammatory drugs, anti-rheumatic and anti-gout remedies, centrally acting muscle relaxants etc.</p> <p>Drugs on ANV – Cholinergic drugs, anticholinergic drugs, anticholinesterase drugs, adrenergic drugs and adrenergic receptor blockers. Neuron, ganglion neuromuscular blockers</p>	05
23.	3	<p>Drugs on Cardiovascular System – Cardiotonics, antiarrhythmic agents, anti-anginal agents, antihypertensive agents, peripheral vasodilators and drugs used in atherosclerosis</p>	08
24.	4	<p>Drugs on Blood – Coagulants and anticoagulants, antithrombotic & antiplatelet drugs, haematinics, haemostatic, blood substitutes and plasma expanders.</p>	10
25.	5	<p>Drugs on Respiratory System – Adrenergic agonists, corticosteroids, leukotriene receptor antagonists, leukotriene synthesis inhibitors, bronchodilators, cholinergic antagonists, opiates.</p>	10
26.	6	<p>Drugs on Renal Function – Diuretics and antidiuretics, urinary antiseptics, cholinergic and anti-cholinergic, acidifiers and alkalizers</p>	08
27.	7	<p>Drugs on Hormonal Disorders – Insulin & oral hypoglycemic, thyroid supplements and suppressants, steroids, anabolics, uterine stimulants and relaxants</p>	08
28.	8	<p>Drugs on Contraception and Pregnancy – Oral contraceptives, estrogen-progestrone preparations, corticotrophine&gonadotropines, adrenaline, prostoglandins, calcitonins, calcium salts.</p>	05
29.	9	<p>Drugs on Digestive System– Anti-emetics & emetics, purgatives, antacids, cholinergic & anti-cholinergics, fluid and electrolyte, anti-diarrheals, histamines and laxatives.</p>	05

30.		10	Drugs on Microbial Infections – Penicillin, streptomycin, tetracyclines and other antibiotics, anti-fungal agents, anti-viral drugs, anti-leprotic drugs.	05
Lab				
1.	Study of human skeletal with observation of specimen			
2.	Study of body systems through charts and models.			
3.	Microscopic study of blood films			
4.	Determination of RBCs			
5.	Determination of body vitals.			
References				
1.	Textbook of Anatomy and Physiology for Nurses and Health Sciences	Dr. InduKhurana and Arushi	CBS Publishers And Distributors Pvt. Ltd.	
2.	Introduction to Human Anatomy and Physiology	Solomon. E.A.	Saunders: St Louis	
3.	TB of Medicine	Krishna Das	Jaypee Brothers Medical Publishers	
4.	A Textbook of Pharmacology and Toxicology	A V Yadav	Nirali Publication	
5.	Pharmacology : A Prep Manual for Undergraduates	Tara V Shanbag	Elsevier	
6.	Handbook Medical Laboratory Technology	V.H. Talib	CBS	

Paper II

Sr.	Paper	Unit	Tentative Course Outline	Hourly Distribution
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No.				
1.	1. Pathology and Microbiology	1	Introduction to Pathology and its importance	02
2.			Basics of Microscope – Parts of microscope, use and importance	05
3.		2	Urine and Stool Examination – Physical and chemical properties	08
4.			Semen Examination – Sample collection, physical, morphological properties	05
5.		3	Measurement of body fluids – CSF, pleural fluid and ascitic fluid etc.	10
6.			Study of Blood – Composition, formation and importance. Collection of blood sample and its preservation. Anticoagulants – Types, uses, mode of action, merits and demerits	15
7.			Haematology – Use of autoanalyzer, stains in haematology, thick and thin smears, methods of staining. Preparation of anticoagulant vials and their use.	20
8.			Blood Group – Determination, ABO and Rhesus system with similar techniques.	05
9.		5	Measurement of haematological indices PCV, MCV, MCH, MCHC	10
10.			Haemoglobin - Importance, structure, estimation methods based on color, oxygen combining capacity and iron content	08
11.			Anaemia – Causes, types, classification.	08
12.			Haemocytometry –Measurement of cell count including red cells and leucocytes and platelet count.	05
13.			Morphology of Blood Cells – Identification	05
14.			ESR – Importance, process, factors influencing, estimation procedures	05
15.		6	Organ Test – Basics of liver and renal function test.	10
16.			Bone Marrow – Indications, contraindications and aspirations	05

17.		7	Introduction to Microbiology – Basics, importance, branches	03	
18.			Basics of Microscopy – Importance, properties and types	05	
19.			Bacteria – Structure, physiology, classification, growth and nutrition.	10	
20.		8	Safety Measures – Importance, universal precautions. Sterilization and Disinfection – Methods of sterilization and disinfection. Antiseptics and disinfections.	10	
21.		9	Bacterial Culture and Identification – Importance, types, methods	10	
22.		10	Staining – Meaning, importance, fixation. Staining Techniques – Simple, differential and special with subtechniques like gram staining, their procedure and uses.	10	
23.		11	Bacterial Morphology – Classification of bacteria based on shape (cocci and bacilli). Morphology and pathogenicity of gram positive cocci, gram negative cocci, gram positive bacilli, gram negative bacilli.	12	
24.		12	Bacterial Infection in Humans – Classification, sources of infection.	05	
25.		13	Other Microbes – Morphology, classification and infection of virus, fungi and parasite	08	
26.		14	Antigen and antibody reactions – Basics	05	
27.		15	Antimicrobial Sensitivity Testing–Antimicrobials and their mode of action, mechanisms of drug resistance, antimicrobial susceptibility testing	05	
28.		2. Biochemistry	1	Introduction to Biochemistry – Terminology, use in medicine, units of measurement	15
29.				Volumetric Apparatus – Pipettes, flasks and cylinders.	05
30.			2	Hazards related to lab	05
31.				Lab safety	05
32.	Lab design and management			10	
33.	Lab precautions			05	

34.		3	Molecular Weight – Introduction, concept and related calculations with examples	05
35.			Equivalent Weight – Introduction, concept and related calculations with examples	05
36.		4	Centrifugation – Introduction, principles with examples	05
37.		5	Calculations of Mole – Introduction, molar, buffer and normal solution. Calorimeter.	15
38.		6	Acid- Base – Meaning, concepts, difference. pH and buffer	08
39.		7	Anticoagulants – Meaning, importance, preparation, preservation	10
40.		8	Water purification and sterilization	05
41.		3. Hand Hygiene and Prevention of Cross Infection	1	Hand Hygiene – Meaning, concerns included, importance, steps and ways, compliance.
42.	2		Techniques – Details of all hand washing and rubbing techniques, care of skin. Promoting hand hygiene. Gloves – Importance, usage and disposal. Pitfalls in hand hygiene.	07
43.	3		Introduction – Terminology, meaning of cross infection with special reference to orthopedic infections. Portal of entry. Wound categories	02
44.	4		Breaking the Link of Cross Infection – Good health and hygiene, environmental sanitation, disinfection, sanitation, hand hygiene, trash and wash disposal, control of secretions and excretions, wound care, aseptic technique, catheter care, airflow control, proper food handling, isolation precautions, treatment of primary disease, recognize high risk patients, prompt treatment, rapid identification of organism	10
45.	5		Disinfection and Sterilization – Process, physical and chemical ways of sterilization, methods of disinfection, types of disinfectants	10
46.	6		Personal Protective Equipment (PPE) – Meaning, gloves (importance, when to wear, sterile and non-sterile gloves, glove material), cover garb (importance, when to wear, types), masks (importance, when to wear, types, characteristics). Choice of PPE as per requirement, proper use	02

47.	4. Basic Life Support and Cardio-Pulmonary Resuscitation	1	Basic Life Support – Introduction, meaning, concerns. Size-up (use of senses, initial impression), primary assessment of the unresponsive adult patient (Level of Consciousness (LOC), airway, head-tilt/chin-lift technique, simultaneous breathing and pulse check, respiratory arrest, cardiac arrest)	10
48.		2	CPR/AED for Adults – Compressions, ventilations (mouth-to-mouth, pocket mask, bag-valve-mask (BVM) resuscitator).	20
49.		3	Automated External Defibrillators - Using an AED, AED safety, high-performance CPR. CPR/AED differences between children and adults	20

References

1.	Clinical Pathology	Dr. J.S.Chauhan	SumitPrakashan
2.	Essentials of Practical Microbiology	ApurbaSankarSastry, SandhyaBhat K	Jaypee Brothers Medical Publishers
3.	Microbiology Theory for MLT	NamitaJaggi	Jaypee Brothers Medical Publishers
4.	Practical Microbiology	Dr. R. S. Gaud, Dr. G. D. Gupta	Nirali Publishers
5.	Text Book of Biochemistry	U. Satyanarayana&Chakrapani	Elsevier
6.	Textbook of Biochemistry for Dental/Nursing/Pharmacy Students	M N Chatterjea	Jaypee Brothers, Medical Publishers
7.	Cross Infections: Types, Causes and Prevention	Jin Dong, Xun Liang	Nova Biomedical Books
8.	Textbook of Emergency & Trauma Care	DevendraRichhariya	Jaypee Brothers, Medical Publishers
9.	Basic Life Support: Provider Manual	American Heart Association	American Heart Association

Lab

1.	Various drugs can be administered on specimen of frog or rats depending on the availability of resources. Atleast 10 drugs of different spectrum should be studied.
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2.	Practice on microscope
3.	Development of culture media
4.	Culture methods
5.	Stain methods
6.	Antibiotic susceptibility test
7.	Demonstration of sterilization and disinfection methods
8.	Hands-on practice of hand hygiene
9.	Practice of PPE
10.	Demonstration and hands on training of Monitoring of Vitals
11.	Hands on training of BLS
12.	Hands on training of CPR

Diploma in Medical Laboratory Technology (DMLT)

YEAR II

Course Objectives

With new lifestyle, pollution, modernization comes various issues in the body in the form of different ailments. All these are usually treated after physical or biochemical analysis of body. Here is the importance of medical labs which are to be handled by trained professionals. One of these professionals is Medical Lab Technician. So in the corresponding diploma all the facets of lab; its processes and ethical reporting conduct are to be taught.

Paper I

Sr. No.	Paper	Unit	Tentative Course Outline	Hourly Distribution
31.	Histopathology & Cytopathology	1	Introduction to Histology – Meaning of histology and its relevance. Instruments in Histopathology Reception of specimens for analysis in the lab.	3
32.			Fixation – Fixation of tissues. Classification of fixatives, Simple Fixatives and their properties. Formalin fixation	4

		Methods of examination of tissues and cells, Tissue processing, Collection of specimen, Labeling and fixation, Dehydration, Clearing, Impregnation, Embedding, Paraffin block making, Section Cutting Theory of frozen section preparation	
33.	2	Microtomes and microtome knives – Sharpening of knife, Microtome use – Honing, Stropping, Techniques of section cutting, Mounting of sections, Frozen section	3
34.	3	Mounting and staining: Dyes and their properties, Theory of staining, staining technique with haematoxylin and eosin. Theory of H & E staining PAS & PAP staining principal and uses. Stains for AFB [TB and leprosy]. Fe, Lipid, Mucicamine, Vencos for calcium, Special staining.	6
35.	4	Decalcification, Fixation, Decalcification, Detection of end point, Neutralization and processing.	
36.	5	Introduction to Cytology – Meaning of histology and its relevance. Sample collection and various types of cytological sample (Body fluids, FNAC)	3
37.	6	Fixation of cytological smear and various types of fixative	2
38.	7	Exfoliative Cytology and Fine needle aspiration cytology	2
39.		Preparation and fixation of smears	2
40.	8	Papanicolaous staining technique/MCC staining/HE staining/, Sex chromatin staining, Nuscum Techniques Reception of specimen. Preparation of fixation , Preservation , Presentation	5

References			
10	Techniques in Histopathology & Cytopathology	Sadhana Vishwakarma	Jaypee Brothers Medical Publishers Pvt. Limited
11	Medical Laboratory Technology	Kanai Mukherjee	TMH
Lab			
13	Embedding and preparation of block		
14	Section cutting and use and care of microtone		
15	H & E staining		
16	PAS staining		
17	AFB staining [TB and leprosy}		
18	Frozen section and care of cytosist		
19	PAP staining for fnac		
20	MGG staining for fnac		

Paper II

Sr. No.	Paper	Unit	Tentative Course Outline	Hourly Distribution
1.	Blood Banking	1	Instruments and Glassware used in Pathological Laboratories	2
2.			Preparation of Stains	
3.		2	Method of Collection of Blood Samples: Methods of Blood Sample Collection	3
			Anticoagulants used in tests and preservation Shelf life of Blood	
4.		3	Blood Cells and Platelets: Blood Count	2

		4	Anemia –Meaning Types and Classification of anemia; their characteristics and features RBC morphology & Normal and Abnormal hypochromia Vitamin B12 and folic acid Schilling test Serum iron and iron binding capacity Screening for sickle cell anemia	5
5.		5	Functions of Blood	1
6.	Basic Hematological Techniques: RBC count (Red blood cell count), HB estimation (hemoglobin estimation), WBC count		5	
7.	Determination of bleeding time (BT), clotting time (CT), and prothrombin time (PT)		5	
8.	Erythrocyte sedimentation rate, Reticulocyte count,		2	
9.		6	Preparation of Smear For Diagnosis of Blood Parasites:	3
10.	Laboratory investigations of blood parasites Test of L.E. cell.			
11.	Biomedical waste Management	7	Waste Management: Definition and identification, classification of wastes, characterization of wastes and its importance. Laboratories and blood banks, waste from other patient care areas, radioactive waste, expired pharmaceuticals, attenuated vaccines	3
12.		8	Need for importance of appropriate waste disposal. Waste minimization and segregation and labeling.	2
13.		9	Waste handling and disposal.	1
14.		10	Occupational hazards due to healthcare waste	2

References

1.	Hematology & Blood Banking	Nanda Maheshwari	Jaypee Brothers Medical Publishers Pvt. Limited
2.	Medical Laboratory Technology	Kanai Mukherjee	TMH

3.	Hospital Waste Management and it Monitoring	Sanskriti Sharma	Jaypee Brothers Publishers
Lab			
1.	Cleaning, Disinfection & Sterilization		
2.	Coomb's Test		
3.	Preparation of different components of blood		
4.	Blood grouping method		
5.	Rh antibody titre		