



**Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore**  
**Shri Vaishnav Institute of Paramedical Sciences**  
**DMLT (Diploma in Medical Laboratory Technology)**  
**Syllabus DMLT IV SEMESTER**  
**Session 2023-2024**

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		L	T	P	CREDITS
			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
DMLT401	CC	Anatomy & Physiology IV	60	20	20	0	0	3	0	0	3

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs): The students will**

**CEO1:** Rationalize the fundamental knowledge of the human body system.

**CEO2:** Understanding detailed functioning about human system histology.

**CEO3:** Gain knowledge about clinical conditions of different body systems.

**Course Outcomes (COs): Student should be able to**

**CO1:** Understand the human system with emphasis on normal and pathophysiological conditions.

**CO2:** Acquainted with the different body systems and their prime functions.

**CO3:** Identification of the different clinical conditions with their signs and symptoms.

**CO4:** Learn some important clinical identification processes of diseases.

**Unit-I**

**Endocrine System**

- Introduction to Endocrine glands
- Hormone classification and mechanism of action
- Pituitary gland – structure, hormones, disorders
- Thyroid & Parathyroid – functions, regulation, hypo/hyper disorders
- Adrenal gland – cortex & medulla hormones, clinical significance

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**Unit-II**  
**Nervous System**

- Central nervous system (CNS): Brain (cerebrum, cerebellum, brainstem)
- Peripheral nervous system (PNS): Spinal nerves, cranial nerves
- Autonomic Nervous System (ANS): Sympathetic & Parasympathetic
- Neuron structure & impulse conduction
- Reflex arc & clinical reflexes

**Unit-III**  
**Musculoskeletal System**

- Classification of bones & joints
- Structure of muscle fiber
- Neuromuscular junction
- Physiology of muscle contraction
- Disorders: myasthenia gravis, muscle fatigue, osteoporosis (brief)

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#### Unit-IV

##### Reproductive System

##### Male Reproductive System

- Structure & functions
- Spermatogenesis
- Hormonal regulation

##### Female Reproductive System

- Structure & functions
- Ovarian & menstrual cycle
- Fertilization, implantation (brief clinical correlation)

#### Unit-V

##### Special Senses

- Anatomy & physiology of Eye
- Vision pathway
- Anatomy & physiology of Ear
- Hearing mechanism
- Taste & smell pathways

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**Course Educational Objectives (CEOs): The students will**

**CEO1:** identify various bones present in the human body.

**CEO2:** develop understanding about vitals of human cardiovascular system and factors affecting them.

**CEO3:** understand, analyze and interpret various histological tests for blood.

**Course Outcomes (COs): Student should be able to**

**CO1:** understand and identify the human bones with emphasis on general anatomy and general histology.

**CO2:** distinguish various human bones based on their respective

**CO3:** memorize and perform various clinical tests.

**CO4:** analyze and interpret the results of various blood tests.

**List of Practical's**

- Identification of Endocrine Glands (models/slides)
- Brain & Spinal Cord anatomy demonstration
- Cranial nerve identification exercises
- Reflex testing (knee jerk, plantar reflex, etc.)
- Demonstration of muscle fatigue experiment
- Identification of male & female reproductive organs (models)
- Demonstration of visual acuity tests
- Hearing tests – tuning fork tests (Rinne/Weber)

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**Reference books**

1. G.K. Pal (2021). *Textbook of Medical Physiology, 4th edition*. Elsevier.
2. Gyton A.C and Hall J.E. (2020). *Textbook of medical physiology*, Prism Books(Pvt) ltd. Bangalore.
3. C.C. Chatterjee . *Human Physiology* Vol.1 and Vol.2, CBS Publishers & Distributers.
4. Graaff et al, (2013). *Schaum's Outline of Human Anatomy and Physiology*. McGraw Hill Education. New York City.
5. C. Shier David et al, (2012), *Hole's Human Anatomy and Physiology*, McGraw Hill Education. New York.
6. Seema Tripathi, *Human Anatomical and Physiological Systems*, Viva Books Pvt. Ltd.

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### Course Educational Objectives (CEOs): The students will -

CEOs 1: Explain the clinical significance of the laboratory tests

CEOs 2: To train students in the principles and applications of clinical chemistry tests used in diagnosis, prognosis, and monitoring of diseases.

CEOs 3: To develop skills in handling, processing, and analyzing biological specimens while maintaining accuracy and safety.

CEOs 4: To impart knowledge of quality control and quality assurance in clinical biochemistry laboratories to ensure reliable results

### Course Outcomes (COs): Students should be able to:

COs 1: The principles and importance of quality control, types of automation used in clinical investigations.

COs 2: Demonstrate knowledge of record management, documentation, and report maintenance in a clinical laboratory

COs 3: Conduct and interpret various clinical examination for diagnostic purposes

### Unit I:

#### Introduction to Clinical Biochemistry Laboratory

- Scope and importance of a clinical biochemistry lab
- Role of a laboratory technician
- Basic laboratory layout and workflow
- Collection and recording of biological specimens
- Preservation and disposal of biological materials
- Principle and applications of rapid diagnostic tests

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**Unit II:**

**Organ function test:**

- Thyroid Function Tests
- Renal Function Tests: 24 hr collection, preservation Physical characteristics, clearance tests
- Liver function tests
- Gastric Function Tests
- Pancreatic Function Tests: Serum Amylase, Serum Trypsin, Serum Lipase
- Biochemical tests of CSF.

**Unit III:**

**Clinical enzymology**

- Acid phosphatase
- Alkaline phosphatase
- Lactate dehydrogenase
- Aspartate transaminase
- Alanine transaminase
- Creatine phosphokinase

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**Unit IV:**

**Principle for Assay Procedure for Biological Material-**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Total Protein</li> <li>• Total albumin</li> <li>• Glucose</li> <li>• Blood Urea</li> <li>• Uric acid</li> <li>• Serum Creatinine</li> <li>• Creatinine in urine</li> </ul> | <ul style="list-style-type: none"> <li>• Cholesterol</li> <li>• Serum Bilirubin</li> <li>• Sodium</li> <li>• Potassium</li> <li>• Chloride</li> <li>• Serum Calcium</li> <li>• Serum Inorganic phosphates</li> </ul> |
|---|--|

**Unit V:**

**Clinical Biochemistry Tests:**

- Clearance test for renal function.
- Qualitative analysis of Renal calculi.
- Qualitative test for: Urobilinogens Barbiturates T3, T4 and TSH Ketosteroids
- Chemical examination of Cerebrospinal fluid.

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DMLT402(P)	CC	Biochemistry-IV (Practical)	00	00	00	30	20	0	0	2	1

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### Course Educational Objectives (CEOs): The students will-

**CEOs 1:** Explain the clinical significance of the laboratory tests

**CEOs 2:** Perform routine clinical laboratory procedures within acceptable quality control parameters in Hematology, Chemistry, Immunohematology, under the general supervision of a Clinical Laboratory Scientist or Pathologist.

### Course Outcomes (COs): Student should be able to -

COs 1: Diagnostic implications of clinical enzymes: **acid and alkaline phosphatase, .SGOT, SGPT, LDH, CPK,**

COs 2 perform clinical blood and enzyme tests for diagnostic purposes

COs 3 Demonstrate working knowledge of **semi-automated and fully automated biochemical analyzers.**

### List of Practical's:

- Blood glucose analysis.
- Demonstration of Kidney function test.
- Demonstration of Gastric function test
- Demonstration of liver function test
- Demonstration of Lipid profile
- Demonstration of Enzyme analysis –acid and Alkaline phosphate ,SGOT/SGPT, Lactic dehydrogenase,CPK
- Estimation of Blood/Serum-Glucose ,G.T.T. Urea ,creatinine ,uric acid, Cholesterol, bilirubin ,Total protein, Glycosylated Hb
- Demonstration of semi-automated ,fully automated Biochemical analyzers

### REFERENCE BOOKS

1. Medical Biochemistry- Dr. M.N. Chatterjee III Edition, 1998 JAYPEE BROTHERS, Medica publishers (p) LTD, New Delhi.
2. Textbook of Medical Laboratory Technology by Prafull G B Godkar latest edition.
3. Practical Clinical Biochemistry- Harold Varley, Fifth edition, CBS Publication and Distributors, New Delhi.

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DMLT404	CC	Microbiology & Serology-IV	60	20	20	00	00	3	0	0	3

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**Course Educational Objectives (CEOs): The students will:**

**CEOs1** Equip students with the knowledge & practical skill to operate microscope

**CEOs 2** The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body.

**CEOs 3:** To study various Bacterial, Viral, Protozoan and Fungal diseases.

**Course Outcomes (COs): Students should be able to:**

**COs 1:** Students will be able to understand the microflora in human body in relation to pathogenesis and epidemiology

**COs 2:** Students will be able to correlate disease symptoms with causative agent, isolate and identify pathogens

**COs 3:** knowledge about various clinically important disease causing bacteria, virus, protozoa and fungi

**Unit-I**

**Lab. Diagnosis of fungal infections viz:**

- Candidiasis, Cryptococcosis, Mycetoma, Other deep mycotic infections,
- subcutaneous fungal infection sporotrichosis.
- Serological tests for fungal infections and skin tests.
- Advanced techniques in microbiology – ELISA, RIA,
- KOH mount

**Unit-II**

**Clinical Microbiology**

- Microbiological Analysis of Water and Milk,
- Microbial Safety Analysis of food and air.
- Assessment Methods for Toxin–Antitoxin Mechanisms and Microbial Virulence
- Host–pathogen interactions.
- Tuberculosis Detection Skin Test.

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### Unit III

#### Techniques for Laboratory Identification of Bacterial Agents

- Serology and Immune Response Testing (Widal, ASO, CRP, VDRL)
- Disinfectant Performance Assessment: Rideal-Walker, Chick-Martin & In-Use Tests
- Pathophysiology of Respiratory Tract Infections and Urinary Tract Infections.
- Bacterial Gastroenteritis and Enteric Fever

### Unit-IV

#### Parasitology –

- Diagnosis of morphology and life cycle of trematodes :- schistosomiasis Intestinal flukes, Blood flukes, Lung flukes.
- Serological & immunological technique used for the diagnosis of: - gel diffusion IFA, ELISA, indirect fluorescent antibody
- Protozoa, helminths — stool exam techniques,
- Blood parasites (malaria, filaria).

### Unit-V

#### Laboratory Diagnosis Of Viral Infections -

- Morphology And General Properties of Viruses
- Specimen Collection, Transportation
- Storage Of Specimen
- Immunological Techniques in Virology: HA, HAI, CFT, CFT, CIEP.

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**List of Practical's**

1. To study working principle of various microscope, care and maintenance
2. Determination of Milk Freshness by Methylene Blue Test Bacteria.
3. Laboratory Procedure for Detection of Typhoid Using Widal Test.
4. To study bacteria by gram staining method.
5. Technique of Isolating Individual Colonies on Nutrient Agar.
6. Sterilization techniques.
7. Gram staining

➤ **Practical's will be modified as per the feasibility.**

**REFERENCE BOOKS Microbiology**

- Praful B. Godkar & Darshan P. Godkar 4th Edition (2024), Bhalani Publishing House, 2-Volume Set, ISBN 9789381496800
- Anathanarayana & Panikar Medical Microbiology Ananth Narayan
- Stuart Hogg, (2005) Essential Microbiology, Wiley and Sons. New York.
- Baveja, C. P. (2024). *Textbook of Microbiology* (8th ed.). Arya Publishing Company.

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DMLT403	CC	Haematology & Blood Banking-IV	60	20	20	0	0	3	0	0	3

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**Course Educational Objectives (CEOs): The students will-**

**CEO1:** To understand basic ideas and techniques of Pathology.

**CEO2:** To understand the basic principles of pathological tests.

**Course Outcomes (COs): Student should be able to -**

**CO1:** develop competency in techniques of Haematology & Blood Banking.

**CO2:** acquire knowledge and understand the basic pathologies of biological fluids.

**Unit-I**

**Examination of Urine Routine:**

- Urine formation in the human body
- Physical examination of Urine
- Chemical examination of Urine
- Microscopic Examination of Urine

**Unit II**

**Clinical Haematology:**

- Peripheral Blood Smear Preparation
- Heinz bodies determination (G6PD Deficiency)
- Osmotic Fragility test
- Red blood cell & White blood cell count
- Differential count of WBC
- Absolute Eosinophil Count

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# Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore

## Shri Vaishnav Institute of Paramedical Sciences

DMLT (Diploma in Medical Laboratory Technology)

Syllabus DMLT IV SEMESTER

Session 2023-2024

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		L	T	P	CREDITS
			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
DMLT403	CC	Haematology & Blood Banking-IV	60	20	20	0	0	3	0	0	3

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

### Unit-III

#### Bone marrow:

- Bone marrow in detail.
- Haematopoiesis
- Bone marrow examination
- Bone marrow Aspiration & Biopsy
- Bone marrow abnormal & normal findings.

### Unit-IV

#### Blood Banking:

- Plasma transfusion therapy
- Blood transfusion Reactions
- Red cell suspension preparation
- Blood Bank equipments
- Types of Blood bags & Anticoagulants

### Unit-V

#### Blood Disorders:

- Anemia in detail (Microcytic, Normocytic, Macrocytic).
- Iron Deficiency Anemia
- Leukemia in detail
- Hemolytic Anemia

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**Session 2023-2024**

- Megaloblastic Anemia

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		L	T	P	CREDITS
			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
DMLT403(P)	CC	Haematology & Blood Banking-IV (Practical)	00	00	00	30	20	0	0	2	1

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

\***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs): The students will-**

**CEO1:** understand, analyze and interpret Haematology.

**Course Outcomes (COs): Student should be able to -**

**CO1:** memorize and perform haematology tests.

**CO2:** analyze and interpret the results of haematology & blood banking.

**List of Practical's:**

- Red blood cell count
- Absolute Eosinophil count
- Urine routine examination
- Blood bank equipments
- Peripheral Blood smear preparation
- 

**REFERENCE BOOKS Pathology —**

- Porter R. (1997) The greatest benefit to mankind: a medical history of humanity from antiquity to the present. HarperCollins, London.
- B. Rosai J (1997). Pathology: a historical opportunity. Americal Journal of Pathology. Muir's Textbook of Pathology.
- M.I. Filipe et.al. (202). Histochemistry in Pathology. Churchill Livingstone. London.
- Textbook or MLT by Prafull B Godkar latest edition.

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