



**Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore**  
**Shri Vaishnav Institute of Paramedical Sciences**  
**BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)**  
**Syllabus BMLT V SEMESTER**  
**Session 2022-2023**

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%)				
BMLT501	CC	Applied Histology II	60	20	20	0	0	3	0	0	3

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

**CEO1:** rationalize the fundamental knowledge of the Body systems.

**CEO2:** understanding detailed procedures.

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

**CO1:** understand the different organs & their functions.

**CO2:** acquainted with the different procedures.

**CO3:** Identification of the different clinical conditions.

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

**Unit-I**

**Techniques in Applied Histology:**

- Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Section cutting,.
- Electron microscope ,their working ,component and allied techniques for electron microscopy.
- Studies of various tissues in histology (Nervous, Epithelial, Connective tissue).

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### Unit-II

#### Applied Histology:

- Handling of fresh histological specimen, cryo/frozen section of fresh and fixed tissue, freeze drying.
- Ultra microtomy.
- Aspiration cytology principles, indications and utility of technician in FNAC clinics.
- Tissue requiring special treatment i.e eye ball, B.M. biopsy, under calcified bones.

### Unit-III

#### Tissue Histology:

- Different Epithelial and Connective Tissues
- Differences b/w Veins, Arteries & Capillaries.
- Tissue renewal and repairing.

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### Unit-IV

#### Tissue Processing

- Tissue processing in Histology laboratory.
- H&E Staining
- Decalcification
- Different types of Fixatives in Histology

### Unit-V

#### Various Histological diseases:

- Carcinoma
- Tumor
- Rheumatoid Arthritis
- Scleroderma
- Mixed Connective Tissue Disease (MCTD)
- Cryptogenic Hepatitis

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CEO2: Understanding detailed procedures.

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

CO1: Understand the different organs & their functions.

CO2: Acquainted with the different procedures.

CO3: Identification of the different clinical conditions.

CO4: Learn some important clinical identification processes of diseases.

### List of Practical's

- H-E staining.
- Embedding by L-mould.
- PAS staining.
- Interpretation of Histology slides
- Study of Squamous Buccal Mucosa,

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**Suggested readings:**

1. William J Krause. *Krause's Essential Human Histology for Medical Students, 3rd edition*.
2. Gytton 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. Sangeeta M et al, *Concise Text Book of Histology*, Thieme.
6. Praful B Godkar et al, *Text book of Medical Laboratory Technology*, Bhalani Medical Book House.

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

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

**CEOs 2:** Enabling them to understand the basics of life processes and function of the human body in health and disease with special reference to hepato, and renal functions

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

**COs 1:** Students acquire the basis behind the assessment of vital organ functioning through liver function, kidney function

**COs 2** perform clinical urine tests for diagnostic purposes

**COs 3** perform the hematology based analysis

**Unit-I: Overview of Clinical Biochemistry:**

Introduction & importance to clinical biochemistry;

Review of clinical aspects of carbohydrates; Lipids; Proteins and Amino Acids metabolism;

Enzymes; Integration of Metabolism

**Unit-II: Disorders of Carbohydrate metabolism:**

Introduction - Normal, fasting and post prandial level, maintenance of blood glucose concentration-hypo and hyperglycemia, renal threshold value. Diabetes Mellitus: types, clinical features, metabolic defects, complications, GTT, galactosemia, fructosuria, glycogen storage diseases

**Unit-III: Diseases in protein metabolism:**

Introduction - Clinical significance and variation of plasma and serum protein; Clinical features of phenylketonuria, albinism and tyrosinosis; Disorders in urea cycle.

**Clinical significance of non-protein nitrogen:** urea, uric acid and creatinine - Normal and abnormal levels; clinical importance of clearance determination

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**Unit IV: Disorders in lipid metabolism:**

Introduction, hyper triacylglyceridemia, hypo and hyperlipoproteinemia; Atherosclerosis - clinical features and complications; Lipid storage disease, fatty liver.

**Disorders in nucleic acid metabolism:** Gout-types, etiology and clinical features.

**Unit V: Liver function tests: -**

Serum enzymes in liver disease- Serum transaminases (SGOT and SGPT), and phosphatases.

**Renal function tests** - Introduction, clinical significance of GGT, LDH and creatine phosphokinase in kidney function.

**Urine analysis** - Physical examination of urine

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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): Students should be able to:**

**COs 1:** perform the Biochemical test

**COs 2** perform clinical urine tests for diagnostic purposes

**COs 3** perform the hematology based analysis

**Clinical Biochemistry Practical's:**

1. Blood glucose analysis.
2. Glucose tolerance test
3. Serum bilirubin estimation.
4. Determination of SGOT.
5. Determination SGPT.
6. Estimation of total protein
7. Urine analysis.

**RECOMMENDED READING**

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 B Godkar latest edition
3. Textbook of Biochemistry for Medical Students by Vasudevan DM.
4. Medical Laboratory Technology - a Procedure Manual for Routine Diagnostic Tests Vol. II (2010), Mukherjee, K.L., Tata Mc Graw – Hill Publishing Company Ltd. (New Delhi), ISBN: 9780070076648

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

**CEOs 1** The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body.

**CEOs 2:** 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**

**Introduction of medical microbiology:**

Introduction: Normal microflora of human body, nosocomial infections, carriers, septic shock, septicemia, pathogenicity, virulence factors, toxins, biosafety levels.

**Unit-II**

**Laboratory diagnosis of pathogenic gram-positive bacteria:**

Morphology, pathogenesis, symptoms, laboratory diagnosis, preventive measures of gram positive bacteria: *S. aureus*, *S. pyogenes*, *B. anthracis*, *C. perferingens*, *C. tetani*, *C. botulinum*, *C. diphtheriae* *M. tuberculosis*, *M. leprae*.

**Unit III**

**Laboratory diagnosis of pathogenic gram-negative bacteria**

Morphology, pathogenesis, symptoms, laboratory diagnosis, preventive measures caused by gram negative bacteria: *E. coli*, *N. gonorrhoea*, *N. meningitidis*, *P. aeruginosa*, *S. typhi*, *S. dysenteriae*, *Y. pestis*, *B. abortus*, *H. influenzae*, *V. cholerae*, *M. pneumoniae*,

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#### Unit IV

##### Viral diseases

General properties of virus-Laboratory diagnosis of viral infections: Hepatitis virus-Human Immunodeficiency virus-Polio Virus , Rabies Virus.

#### Unit-V

##### Fungal and Protozoan diseases

Fungal and Protozoan infections. Dermatophytosis (Trichophyton, Microsporun and Epidermophyton) systemic infection (Histoplasma, Coccidoides) and opportunistic fungal infections (Candidiasis, Aspergillois), Blood-borne infections (Leishmaniasis, Malaria)

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**List of Practical's**

**Medical Microbiology Practical's:**

1. Identification of pathogenic bacteria (any two) based on cultural, morphological and biochemical characteristics.
2. Growth curve of a bacterium.
3. To perform antibacterial testing by Kirby-Bauer method.
4. To prepare temporary mounts of Aspergillus and Candida by appropriate staining.
5. Staining methods: Gram's staining permanent slides showing acid fast staining, Capsule staining and spore staining.

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

**SUGGESTED READINGS**

1. Brooks GF, Carroll KC, Butel JS and Morse SA. (2007). Jawetz, Melnick and Adelberg's Medical Microbiology. 24th edition. McGraw Hill Publication.
2. Goering R, Dockrell H, Zuckerman M and Wakelin D. (2007). Mims' Medical Microbiology. 4th edition. Elsevier. .
3. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education
4. Copal E Hopier . 2011). *Manual of Clinical Laboratory methods*. Medical Laboratory.

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

**CEO1:** Acquire the ability to identify and find appropriate solutions to medical problems.

**CEO2:** Interpret morphological changes of the diseases in correlation to clinical manifestations and laboratory investigations of the diseases.

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

**CO1:** Develop competency in techniques of Haematology.

**CO2:** Acquire knowledge and understand the background of hematology.

**CO3:** Understand the principles of laboratory tests.

**CO4:** Acquire knowledge and understand diseases and diagnosis.

**Unit-I**

- Iron deficiency and overload
- Hemoglobinopathies
- Anemia of Chronic illness
- Porphyria

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## Unit II

### Basic of Hematology:

- Sickling disorders.
- RBC Enzyme membranes and metabolism
- G6PD deficiency (Heinz bodies).
- BT, CT
- PT, APTT.

## Unit-III

### Different type of anemia:

- Megaloblastic anemia
- Sideroblastic anemia
- Hemolytic anemia
- Aplastic anemia

## Unit-IV

### Platelet disorders:

- Hemophilias
- Von Willebrand's Disease
- Acquired disorders of coagulation
- Hypercoagulable states

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**Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore**  
**Vaishnav Institute of Paramedical Sciences**  
**BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)**  
**Syllabus BMLT V SEMESTER**  
**Session 2022-2023**

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%)				
BMLT504	CC	HAEMATOLOGY II	60	20	20	0	0	4	0	0	4

**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.

#### Unit-V

##### White cell diseases:

- Bone marrow failure.
- Leukemia in detail (ALL, AML, CLL, CML) with its lab diagnosis.
- Leukocytosis
- Leukocytopenia

#### Chairperson

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Paramedical and Allied Sciences  
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#### Chairperson

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#### Registrar

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BMLT504(P)	CC	HAEMATOLOGY II (Practical)	00	00	00	30	20	0	0	2	1

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

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

**CEO1:** Acquire the ability to identify and find appropriate solutions to medical problems.

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

**CO1:** Develop competency in techniques of Haematology.

**CO2:** Acquire knowledge and understand the background of hematology.

**CO3:** Acquire knowledge and understand diseases and diagnosis.

**List of Practical's:**

- Differential count of WBC
- Perls staining
- Heinz bodies determination.
- Modern diagnostic tool of hematology
- Knowledge on setting up a hematology laboratory

**Suggested readings:**

- 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 Patholog. Muir's Textbook of Pathology.
- M.I. Filipe et.al. (202). *Histochemistry in Pathology*. Churchill Livingstone. London.
- **Textbook of Medical laboratory technology** by prafull G B Godkar sixth edition.

**Chairperson**

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