



# Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore

## Shri Vaishnav Institute of Paramedical Sciences

BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

### Syllabus BMLT III 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%)				
BMLT301	CC	Basic Histology III (Anatomy & Physiology)	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

##### Digestive System II:

- Functions of Saliva, Gastric Juice, Pancreatic Juice, Succus Entericus.
- Process of digestion of Carbohydrates, Proteins and Fats.
- Functions of Liver. Formation of Bile. Compositions of Bile. Functions of Bile.

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#### Unit-II

##### Nervous system III:

- Functions of different parts of Brain.
- Reflex. Reflex arc. Types of reflexes. Stretch and Withdrawal reflex.
- Neurotransmitters and their basic functions.

#### Unit-III

##### Respiratory System II:

- Control of breathing. Respiratory gas exchange.
- Factors controlling O<sub>2</sub> and CO<sub>2</sub> transportation.
- Buffer system for maintenance of pH of the body.

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#### Unit-IV

##### Basic Embryology:

- Introduction
- Gametogenesis and fertilization
- Cell division- Mitosis and Meiosis.
- Placenta formation.
- Stages of maturation of embryo.

#### Unit-V

##### Musculoskeletal system II:

- Muscles of upper and lower limbs.
- Actions of muscles.
- Types of Cartilage. Difference between three types of cartilage.
- Basic pathophysiology of Osteomyelitis, Osteopenia, Osteoporosis and Rickets.

				Teaching and Evaluation Scheme			
		Theory		Practical			

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BMLT301(P)	CC	Basic Histology III (Anatomy & Physiology) (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 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:** identify various bones present in the human body.

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

**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

- Muscles identification according to their anatomy.
- Demonstration of pathophysiology of organs.
- Demonstration of different embryonic stages of foetus.
- Determination of different tissues by microscope.

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**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.

#### Suggested readings:

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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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT302	CC	Biochemistry III	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.

Course Educational Objectives (CEOs): The students will -

**CEO1:** Conferring basic knowledge about structure and functions of biomolecules.

**CEO2:** Understanding of how enzymes and metabolites in the living system work to synthesize different biomolecules and produce energy.

**CEO3:** Comprehensive knowledge about biochemical pathways involved in intermediary metabolism and regulation of carbohydrate, protein, lipid, and nucleic acid.

**CO1:** 1. An understanding of structural and functional fundamentals of carbohydrates, protein, lipid, and nucleic acid.

**CO2:** Understanding of the major metabolic processes in the living system.

**CO3:** Understanding the mechanism and the importance of enzymes. related disorders.

**Unit I:**

Enzymes – nomenclature and classification. Enzyme kinetics and enzyme inhibition; Regulatory enzymes

**Unit II:**

Vitamins and co-enzymes: Structure, regulation of biochemical reactions and function of water soluble vitamins; Fat soluble Vitamins A, D, E and K.

**Unit III:**

Glycolysis, citric acid cycle and energy generation; Pentose phosphate pathway and its regulation. Gluconeogenesis, glycogenesis and glycogenolysis, glyoxylate and Gamma aminobutyrate shunt pathways, Cori cycle, Entner-Doudoroff pathway, glucuronate pathway.

**Unit IV:**

Lipid Metabolism: biosynthetic pathway for triacylglycerols, phosphoglycerides, sphingomyelin and prostaglandins. Hydrolysis of triacylglycerols and oxidation of fatty acids. Metabolism of cholesterol and its regulation. Ketone bodies biosynthesis.

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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT302	CC	Biochemistry II	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 V:**

Protein metabolism: Synthesis and degradation of amino acids – transamination and deamination reactions. Urea cycle and metabolic disorders; metabolism and regulation of cholesterol; biosynthesis of ketone bodies

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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT302(P)	CC	Biochemistry III (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 test for macronutrients, blood and Urine.

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

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

**CO2:** analyze and interpret the results of various tests.

**List of Practical's:**

1. Different type of glassware's and their composition
2. Study of paper chromatography
3. Study of thin layer chromatography
4. Study of pH meter
5. To prepare phosphate buffer (200 ml p H 7.45 ) and determine its p H by using meter.
6. Estimation of sugar by DNS method.

**Suggested readings:**

1. U. Satyanarayana and Chakrapani. (2020). *Outlines of Biochemistry*. ELSEVIER
2. Victor W. Rodwell, David A. Bender. (2015). *Harper's Illustrated Biochemistry*. A Lange Medical book.
3. Drew Provan, Andrew Krentz. (2006). *Oxford Handbook of Clinical and Laboratory*. Oxford University Press.
4. Henry and John Bernard. (2011). *Clinical Diagnosis and Management by Laboratory Methods* Philadelphia.
5. B. Rose S. and Mileusnic, R. (1999). *The Chemistry of Life*. Penguin Press Science.
6. C. Lane, and Oxygen N. (2004). *The Molecule that Made the World*. Oxford University Press. USA.

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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT303	CC	MICROBIOLOGY III	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.

### Course Objectives

1. To explain the cell and its division mechanism.
2. To provide basic understanding of various cellular events.
3. To understand micro and macro molecular transportation.
4. To understand principles and mechanism of bioremediation
5. To understand human microflora.

### Course Outcomes

1. Students will be able to understand cell division process.
2. Students will be able to understand various types of cellular signaling processes.
3. Students will be able to understand molecular transportation across cell membrane/cell wall.
4. Students will learn about the core concepts of bioremediation and its advantages.
5. Students will be able to understand human-microbe interaction.

### Unit-I

#### Introduction to Cell Biology

Cell theory, pre-cellular evolution, animal and plant cells. Cell cycle: molecular events (Cell cycle checkpoints), control of cell number and cell size. Cell division - mitosis and meiosis.

### Unit-II

#### Transport

Transport across membranes – active transport, ABC transporters, Ion channels. Intra-cellular transport (vesicular and membrane transport). Vesicular Traffic in the Secretary and Endocytic Pathway, Transport from ER through the Golgi apparatus, Transport from the Trans Golgi network.

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BMLT303	CC	MICROBIOLOGY III	60	20	20	0	0	3	0	0	3

### Unit III

#### Cellular Signaling

General principles: Endocrine, Paracrine, Synaptic & Contact dependent. Cell signaling molecules – Hormones, Neurotransmitters, contact dependent signal molecules. Structures and working of the various types of receptors: Ion Channel coupled receptors, G protein Coupled receptors.

### Unit-IV

#### Bioremediation

Bioremediation of petroleum. Bioremediation of pesticide contaminated soil. Bioremediation of explosives.

Biological treatment of metallic pollutants and organic pollutants.

### Unit-V

#### Human Microbial flora

Normal Human – Microbial Interactions: Beneficial Microbial Interactions with Human, Normal microflora of - Skin, oral cavity, Gastrointestinal tract, respiratory tract, urino-genital tract

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BMLT303(P)	CC	MICROBIOLOGY III (Practical)	00	00	00	30	20	0	0	2	1

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**List of Practical's**

1. Mitosis and Meiosis.
2. Study of gene interaction
3. Study of chloroplast in plant cell
4. Antibiotic susceptibility test.
5. Study of air flora- gravity settling method.
6. Enumeration of microorganism from food samples.
7. Osmotic method of cell lysis.
8. Chemical method of cell lysis.
9. To understand the types, RCF and SOP of centrifuge.

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

**Suggested readings:**

- Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2014). **Prescott's microbiology**. McGraw-Hill.
- Pelczar Mj, Chan ECS and Kleig NR. (1993). **Microbiology**. Tata McGraw Hill. New York.
- LM Prescott. (2002). **Microbiology**. McGraw Hill. New York.
- Stuart Hoggy, (2005) **Essential Microbiology**, Wiley and Sons. New York.
- Copal E Hopier . 2011). **Manual of Clinical Laboratory methods**. Medical Laboratory.

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BMLT304	CC	Blood Banking	60	20	20	0	0	3	0	0	3

**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.

**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 blood banking.

**CO2:** acquire knowledge and understand the background of Transfusion medicine.

**CO3:** understand the detailed aspects of transfusion techniques.

**CO4:** understand the principles of transfusion transmitted diseases disorder.

**CO5:** acquire knowledge and understand therapeutic use of transfusion.

**Unit-I**

**Introduction to Transfusion Medicine:**

- History and discovery of Transfusion medicine. Modern concepts of Blood group systems.
- ABO and Rh Blood group systems and importance of determination of blood groups.

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### Unit II

#### Basic of Transfusion Medicine:

- Compatibility test in blood transfusion: Principles, Blood typing, Crossmatching, Antibody screening and identification.
- Indication and Contraindication of Blood transfusion.
- Laboratory investigation of transfusion reaction and mismatched transfusion.

### Unit-III

#### Advance techniques in Transfusion Medicine –

- Techniques of Blood component preparation.
- Techniques of Direct Antiglobuline Test (DAT).
- Techniques of Albumine, Immunoglobulines and Clotting factor separation.

### Unit-IV

#### Transfusion related diseases:

- Precautions during blood donation.
- Transfusion transmitted diseases.
- Blood Transfusion in operating room.

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**Syllabus BMLT III 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%)				
BMLT304	CC	Blood Banking	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

#### Transfusion Therapy:

- Transfusion therapy for Haemoglobinopathies.
- Plasma transfusion therapy.
- Coagulation therapy in Haemophilia.

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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%)				
BMLT304(P)	CC	Blood Banking (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 test for Blood banking.

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

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

**CO2:** analyze and interpret the results of various tests.

**List of Practical's:**

- Demonstration of Blood banking equipments.
- Blood donation procedures.
- Crossmatching.
- Separation of blood cells.
- Various serological tests for blood screening.

**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.

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