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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)
Syllabus BMLT IV 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%)				
BMLT401	**CC**	**Applied Histology**	**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 Micoscopes.

CEO2: understanding detailed procedure of staining.

Course Outcomes (COs): Student should be able to

CO1: understand the different staining protocols.

CO2: acquainted with the different microscope.

CO3: Identification of the different clinical conditions by staining process.

CO4: Learn some important clinical identification processes of diseases.

Unit-I

Microscopy:

- Dark ground microscope.
- Polarizing microscope.
- Phase contrast microscope

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)
Syllabus BMLT IV SEMESTER
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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%)				
BMLT401	CC	Applied Histology	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.

Unit-II

Advance Microscopy:

- Interference microscope
- UV microscope
- Micrometry.
- Electron Microscope

Unit-III

Basic Staining:

- Metachromasis and metachromatic dyes
- Haematoxylene its importance in histology.
- Leishman staining

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)
Syllabus BMLT IV SEMESTER
Session 2022-2023

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			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%)				
BMLT401	CC	Applied Histology	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.

Unit-IV
Special staining:

- Carbohydrates and amyloid –special stains procedures.
- Connective tissue, trichome staining and other special stains for the muscular fibres, elastic.reticulin and collagen fibres.

Unit-V
Advance Staining:

- Principle of metal impregnation techniques.
- Demonstration and identification of mineral pigments.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV SEMESTER

Session 2022-2023

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			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%)				
BMLT401(P)	CC	Applied Histology (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 tissues.

CEO2: develop understanding about different staining processes.

CEO3: understand, analyze and interpret various histological tests.

Course Outcomes (COs): Student should be able to

CO1: understand and identify the various tissues

CO2: distinguish various staining processes.

CO3: memorize and perform various clinical tests.

CO4: analyze and interpret the results of various staining tissues.

List of Practical's

- H-E staining.
- Leishman staining.
- Demonstration of different phase contrast microscope.
- Identification of different tissues by microscope.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)
Syllabus BMLT IV 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%)				
BMLT401(P)	CC	Applied Histology (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.

Suggested readings:

1. William J Krause. ***Krause's Essential Human Histology for Medical Students, 3rd edition***.
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. 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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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT402	CC	Biochemistry 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.

Course Educational Objectives (CEOs): The students will -

CEO1: Conferring basic knowledge about fundamentals of hemoglobin and immunoglobulins

CEO2: Understanding of plasma proteins in the living system..

CEO3: Comprehensive knowledge about importance Water and Electrolyte Balance

CO1: An understanding of structural and functional fundamentals of hemoglobin and immunoglobulins

CO2: Understanding of the major plasma proteins in the living system.

CO3: Understanding the mechanism and the importance Water and Electrolyte Balance.

Unit I:

Study of haemoglobin and immunoglobulins with functions.

Unit II:

Plasma Proteins and functions. Metabolism: General reactions of amino acids. Formation and fate of ammonia - Urea cycle.

Unit III:

Tissue chemistry: Chemistry of connective tissue, bone and teeth. Composition function and chemical mediators of nerve structure of muscle tissue.

Unit IV:

General Biochemistry of muscle contraction and relaxation.

Unit- V:

Water and Electrolyte Balance General outline of fluid compartments of the body with their water and electrolyte content and balance, Dehydration

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT402(P)	CC	Biochemistry 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 test for blood.

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. Determination of Total RBC count
2. Determination of PCV
3. General blood picture
4. 3. Study of antigen antibody agglutination
5. 4. Study of gel electrophoresis
6. 5. Study of ELISA

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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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT403	CC	MICROBIOLOGY & MOLECULAR BIOLOGY	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 concepts of DNA replication.
2. To provide understanding of transcription and its regulation.
3. To understand mechanism of translation.
4. To understand harmful microbiota and human interactions.
5. To understand epidemiology of infectious disease.

Course Outcomes

1. Students will be able to understand DNA replication mechanism.
2. Students will be able to understand the mechanism & regulation of transcription.
3. Students will be able to understand the mechanism of translation.
4. Students will learn about the disease-causing microbes and human interactions.
5. Students will be able to understand infectious diseases and epidemic concepts.

Unit-I

Introduction to Molecular Biology

DNA replication in Prokaryotes: replication origin. DNA polymerases features, replication factors and the mechanism of replication, leading strand and lagging strand synthesis. DNA damage and repair mechanisms

Unit-II

Transcription

Concept of Gene: Genome sizes, family of genes. Gene structure: Structural organization of prokaryotic genes, regulatory elements of genes. Transcription in Prokaryotes: RNA polymerase and their functions; Mechanism of Transcription

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT403	CC	MICROBIOLOGY & MOLECULAR BIOLOGY	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

Translation in Prokaryotes

Translation apparatus; ribosomal subunits, initiator-tRNAs, aminoacyl-tRNAs, initiating factors, elongation factors, termination factors; mechanism of chain initiation, elongation and termination.

Unit-IV

Harmful Microbial Interactions with Human

Entry of microorganisms into the host, Mechanism of bacterial pathogenicity, invasion, infection, colonization and growth, Host cell damage, Virulence, Virulence factors – exotoxins, enterotoxins, endotoxins, neurotoxins, Pathogenic properties of viruses

Unit-V

Infectious diseases & Epidemiology

Classification of infectious diseases, patterns of disease, spread of disease. Nosocomial infections. Definition, Principles of epidemiology, Measures for prevention of epidemics global health consideration, Emerging and re-emerging infectious diseases Biological warfare and biological weapons.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT403(P)	CC	MICROBIOLOGY & MOLECULAR BIOLOGY (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.

List of Practical's

1. Cell counting and viability.
2. Blood smear preparation.
3. To study bar body from buccal cavity.
4. Extract genome from plant tissue.
5. To determine melting temperature of DNA.

- **Practical's will be increased and 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.
- Concepts of Genetics, W.S. Klug, and M.R. Cummings 2004, Pearson Education
- Genome, T.A. Brown, John Willey & Sons Inc.
- Molecular Biology of the Cell. B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Publishing

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV SEMESTER

Session 2022-2023

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			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%)				
BMLT404	CC	HAEMATOLOGY I	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: 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 Haematology:

- Definition and history of Haematology.
- Blood collection procedure.
- Anticoagulants and their chemistry.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV SEMESTER

Session 2022-2023

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			End Sem University Exam (60%)	Two Term Exam (20%)	Teacher Assessment (20%)	End Sem University Exam (60%)	Teacher Assessment (40%)				
BMLT404	CC	HAEMATOLOGY I	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 following components: Quiz/Assignment/ Project/Participation in class, given that no component shall exceed more than 10 marks.

Unit II

Basic of Haematology:

- Red cell indices, Osmotic fragility of red cell.
- Red cell morphology study.
- Reticulocyte count.

Unit-III

Advance techniques in Haematology

- Bone marrow smear examination.
- Lupus erythematosus cell.
- Leucocyte cytochemistry.

Unit-IV

Coagulation analysis:

- Haemostatic mechanism and theories of blood coagulation
- Screening coagulation procedure.
- Quantitative assay of coagulation factors.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV 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%)				
BMLT404	**CC**	**HAEMATOLOGY I**	**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

Haematological diseases:

- Anemia.
- Haematological malignancies.
- Coagulation diseases.

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BACHELOR IN MEDICAL LABORATORY TECHNOLOGY (BMLT)

Syllabus BMLT IV SEMESTER

Session 2022-2023

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
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BMLT404(P)	**CC**	**HAEMATOLOGY I (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:

- Bone marrow smear examination.
- Red cell indices determination.
- Methods of LE cell determination.
- Study of Red cell Morphology.

Suggested readings:

- Porter R. (1997) T***he 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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