

## **BMLT I YEAR COURSE OUTCOME**

### **SUBJECT- BASIC PRINCIPLES OF BIOCHEMISTRY**

<b>S. NO.</b>	<b>TOPIC</b>	<b>COURSE OUTCOME</b>
1.	Introduction to medical laboratory technology and role of medical laboratory technologists	In this topic students able to Understand basic laboratory technology ,equipment , instrument and their role as a medical laboratory technician.
2.	Introduction to safety measures and first aid in laboratory	In this topic students able to understand the safety precaution and how to apply first Aid in laboratory.
3.	Cleaning and care of general laboratory glassware and equipment's.	In this topic students able to cleaning glassware with cleaning agent and also able to take care and maintenance of various types of glassware's and equipment's.
4.	Preparation and storage of distilled water	In this topic students able to understand to how to prepare and store the distilled water.
5.	Analytical balance	In this topic students able to understand to how to handle the balance and basic properties and also know the which reagent is balance in this analytical balance.
6.	Preparation of reagents and standard solution and storage of chemical	In this topic students able to how to prepare various types of reagent and their standard solution.
7.	Units of measurement and S.I	In this topic students able to understand the

	Units	units of all measurements.
8.	Measurement and calibration of Volumetric apparatus	In this topic students able to understand how to calibrate various types of volumetric apparatus like pipettes, flasks and cylinders.
9.	Radioisotopes and their uses in biochemistry	In this topic students able to understand the term of radioisotope and their various types.  Understand the uses of Radioisotopes in biochemistry.
10.	Mole , molar and normal solution	In this topic students able to understand to how to prepare various types of solution.
11.	PH and PH measurement	In this topic students able to understand the term of ph and able to measure ph.
12.	Buffer solution	In this topic students able to understand the preparation of buffer solution.
13.	Osmosis , Dialysis and Surface tension	In this topic students able to understand the term osmosis .  Understand the term dialysis and their method.  Understand about surface tension.
14.	Urine analysis	In this topic students able to understand qualitative methods of sugar , protein , bile pigments , bile salt , urobilinogen , ketone bodies and porphobilinogen.
15.	Occult blood	In this topic students able to understand about occult blood and their examination in faecal and urine.
16.	Collection and recording of biological specimens	In this topic students able to understand the collection,recording,separation of serum and plasma.

		Understand the preservation and disposal of biological samples materials.
17.	Basic statistics	In this topic students able to understand mean, standard deviation, coefficient variation, normal distribution and probability.
18.	Volumetric analysis	In this topic students able to understand the preparation of acid and bases.
19.	Chloride estimation	In this topic students able to understand the chloride estimation.

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S.NO.	TOPIC	COURS OUTCOME
1.	Introduction To Histopathology And Laboratory Organisation	<p>At the end of this topic student must should be able to</p> <p>Understand the term and basic of histology.</p> <p>Understand to how to organise laboratory.</p> <p>Understand the study of tissue.</p>
2.	Laboratory Equipment,Uses And Maintenance	<p>At the end of this topic student must should be able to</p> <p>Understand the different types of equipment's in laboratory.</p> <p>Understand the handling of equipment.</p> <p>Understand to how to maintain the equipment and how to care the equipment.</p>
3	Laboratory Hazards And Safety Precautions	<p>At the end of this topic student must should be able to</p> <p>Understand about laboratory hazards.</p> <p>Understand the safety precautions in laboratory.</p>
4	Compound Microscope	<p>At the end of this topic student must should be able to</p> <p>Understand the optical system of microscope.</p> <p>Understand to identify different cell constituents.</p> <p>Understand to how to maintain the microscope and how to care and handling of microscope.</p>

Fundamental Of Applied Histology.		
	Reception , Recording And Labelling Of Histology Specimens	<p>At the end of this topic student must should be able to</p> <ul style="list-style-type: none"> <li>-Understand to how to receive the sample at Reception counter.</li> <li>-Understand to how to maintain the patient's record register in laboratory.</li> </ul> <p>Understand to how to label the specimen after sample collection.</p> <p>Understand to label the proper manner of specimen before sending in concern department.</p>
	Fixation And Various Fixatives	<p>At the end of this topic student must should be able to</p> <p>Understand to various types of fixatives.</p> <p>Understand to why fixative is so important in histology.</p> <p>Understand the work of various type fixatives.</p>
	Proceesing Of Histological Tissue For Paraffin Embedding.	<p>At the end of this topic student must should be able to</p> <p>Understand to how to process the tissue for paraffin embedding.</p> <p>Understand the various step of tissue processing.</p>
	Embedding And Embedding Media	<p>At the end of this topic students must should be able to</p>

		<p>Understand the procedure of embedding. Understand the importance Of embedding in paraffin section.</p> <p>Understand the difference types of embedding media.</p> <p>Understand the importance of embedding media.</p>
	Decalcification And Various Types Of Dacalcifying Fluid.	<p>At the end of this topic students must should be able to</p> <p>Understand the process &amp; importance of decalcification.</p> <p>Understand the various types of decalcifying fluid &amp; composition of decalcifying fluid.</p>
	Microtome Various Types , There Working Principle And Maintenance.	<p>At the end of this topic students must should be able to</p> <p>Understand the function at microtome.</p> <p>Understand the functioning of microtome.</p> <p>Understand the various types of microtomes.</p> <p>Understand the working principle of microtomes.</p> <p>Understand to how to maintain the microtome.</p> <p>Understand the maintenance of microtomes.</p>
	Microtome Knives And Knife Sharpening	<p>At the end of this topic student should be able to</p> <p>Understand the various types of knife.</p> <p>Understand the use of knives in different microtomes.</p>

		Understand the procedure of knife sharpening
	Practical Section Cutting , Cutting Faults And Remedies.	<p>At the end of this topic student must should be able to</p> <p>Understand the practical procedure of section cutting.</p> <p>Understand the faults, which are done at the time of cutting &amp; careful for that faults.</p> <p>Understand the section cutting remedies.</p>
	Routine Staining Procedure, Mounting And Mounting Media	<p>At the end of this theory and practical student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the Routine staining Procedure.</li> <li>• Understand the different types of Routine staining.</li> <li>• Understand the mounting and mounting media</li> <li>• Understand the work of mounting media</li> </ul>
	<b>Dye chemistry ,theory and practice of staining</b>	<p>At the end of this topic student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the various types of Reagent and their chemistry Of Reagent.</li> <li>• Understand the brief knowledge of Reagent composition.</li> <li>• Understand to how to use the reagent in staining procedure.</li> </ul>
	<b>Solvents ,mordents , accelerators and accentuators –</b>	At the end of this topic students should be able to –

		<ul style="list-style-type: none"> <li>• Understand the solvents and mordents.</li> <li>• Understand the accelerators and their function.</li> <li>• Understand the accentuators and their function.</li> </ul>
	<b>Uses of controls in various staining procedures</b>	<p>At the end of this topic student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the uses of controls in various types of staining procedure.</li> <li>• Understand the criteria of controls.</li> </ul>
<b>CYTOLOGY</b>		
	<b>Introduction to Exfoliative cytology with special Emphasis on female genital tract</b>	<p>At the end of this topic student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the introduction of cytology and study of different types of cytology.</li> <li>• Understand the Exfoliative cytology on female genital tract.</li> </ul>
	<b>Collection processing and staining of the cytologic specimen</b>	<p>At the end of this topic student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the collection of processing.</li> <li>• Understand the staining process of the cytologic specimen</li> </ul>
	<b>FNAC (FINE NEEDLE ASPIRATION CYTOLOGY )-</b>	<p>At the end of this topic student should be able to –</p> <ul style="list-style-type: none"> <li>• Understand the procedure of FNAC.</li> <li>• Understand the importance of FNAC in cytology.</li> <li>• Understand to how to collect the sample for FNAC.</li> </ul>

BMLT COURSE OUTCOME

SUBJECT - HAEMATOLOGY

S.NO	TOPIC	OUTCOME
1	Introduction to haematology & laboratory organization	<p>At the end of this topic student must should be able to...</p> <ul style="list-style-type: none"> <li>i. Understand haematology lab and its disorders.</li> <li>ii. Understand glasswares and there uses .</li> <li>iii. Understand lab safety measures.</li> </ul>
2	Formation of blood	<p>At the end of this topic student must should be able to...</p> <ul style="list-style-type: none"> <li>i. Understand how to blood is formed.</li> <li>ii. Understand of blood cell.</li> <li>iii. Understand WBCs RBCs &amp; platelets.</li> </ul>
3	Composition and function of blood	<p>At the end of this topic student must should be able to...</p> <ul style="list-style-type: none"> <li>i. Understand function of blood .</li> <li>ii. Understand inorganic substance &amp; organic substance.</li> <li>iii. Understand identification of WBCs cells, RBCs cells and platelets.</li> </ul>
4	Various anticoagualants,their uses mode of action and their merits and demerits.	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to...</li> <li>i. Understand its introduction.</li> <li>ii. Understand type of anticoagualants .</li> <li>iii. Understand storage blood components.</li> </ul>

5	Collection & preservation of blood for various haematological investigation	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand collection of blood.</li> <li>ii. Understand preservation of blood.</li> <li>iii. Understand type of anticoagualants,uses,principal,composition &amp;working mechanisms.</li> </ul> </li> </ul>
6	Physiological various in hemoglobin, pcv, TLC, platelet count	<ul style="list-style-type: none"> <li>• At the End of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand Anemia, polycythemia.</li> <li>ii. Understand the thrombocytopenia.</li> <li>iii. Understand how to use Neubauer chamber .</li> </ul> </li> </ul>
7	Normal & absolute value in haematology	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its introduction.</li> <li>ii. Understand various haematolgical test like Hb, RBC,WBC.</li> <li>iii. Understand and identify Platelets pcv.</li> </ul> </li> </ul>
8	Quality insurance in haematology	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>I. Understand its introduction.</li> <li>II. Understand quality control.</li> <li>III. Understand various lab instruments and test procedure.</li> </ul> </li> </ul>
9	Hemoglobin various method of estimation of Hb, errors involved and standardization of instrument	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. To understand various Hb method like sahils, cyanmeth ,copper sulphate.</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>iii. Understand its principal and procedure.</li> <li>iv. Understand normal range Hb and errors in Hb procedure</li> </ul>
10	Hemocytometry, procedure for cell count- WBC count, RBC count and platelet count	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. To understand their procedure principal &amp; uses</li> <li>iii. Understand clinical significance .</li> <li>iv. Understand their normal range.</li> </ul> </li> </ul>
11	Romanowsky dyes preparation and staining procedure of the blood smear	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Undersatand its introduction.</li> <li>ii. To understand romanwsky stain procedure and principal</li> <li>iii. To understand how to the prepare a blood smear</li> </ul> </li> </ul>
12	Morphology of normal blood cell & their identification	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. To understand hemopoetic cells RBC,WBC, platelet.</li> <li>iii. To understand these cells morphology, lifespan</li> </ul> </li> </ul>
13	ESR various procedure for estimation and their significance	<ul style="list-style-type: none"> <li>• At the and of this topic student must should be able to... <ul style="list-style-type: none"> <li>Understand its introduction.</li> <li>To understand various method of ESR it procedure</li> <li>To understand clinical significance and their normal range.</li> </ul> </li> </ul>
14	PCB method their merit & demerit	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its</li> </ul> </li> </ul>

		<p>introduction</p> <p>ii. To understand various procedure principal of macro and micro method</p> <p>Understand their normal range and clinical significance</p>
15	Routine examination of urine	<ul style="list-style-type: none"> <li>• At the end of this topic student must should be able to... <ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. Understand chemical methods and microscopy</li> <li>iii. Understand physical methods.</li> </ul> </li> </ul>
16	examination of biological fluids	<p>At the and of this topic student must should be able to...</p> <ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. Understand chemical methods and microscopy</li> <li>iii. Understand physical methods.</li> </ul>
17	Examination of semen	<ul style="list-style-type: none"> <li>i. Understand its introduction</li> <li>ii. Understand chemical methods and microscopy</li> <li>iii. Understand physical methods.</li> </ul>
<b>S.N</b> <b>O</b>	<b>TOPIC</b>	<b>OUTCOME</b>
<b>1.1.1</b>	<b>GENERAL ANATOMY</b>	<ul style="list-style-type: none"> <li>➤ After the completion of the TOPIC the student shall be able to know Know the levels of organization in the living world.</li> <li>➤ Know the organization of the human body by cavities and anatomical</li> </ul>

		<p>terminology.</p> <ul style="list-style-type: none"><li>➤ Able to Understand the structure of matter and how it relates to cellular metabolism</li><li>➤ Can Understand the structure and function of a variety of cells contained in the human body.</li><li>➤ Can be able to Distinguish between groups of cells and tissues.</li><li>➤ Can Relate the components of the integumentary system to the levels of organization.</li><li>➤ Explain the structure and function of bones.</li><li>➤ Know the major divisions of the human skeleton.</li><li>➤ Learn a majority of the human bones by scientific name and location.</li><li>➤ Name, understand, and show by example the variety of joints in the human skeleton.</li><li>➤ Know the structure and function of muscles.</li><li>➤ Distinguish between the three types of muscle tissue.</li><li>➤ Learn the scientific names and locations of a select group of human muscles.<ul style="list-style-type: none"><li>➤ Demonstrate and name muscle and joint actions</li></ul></li><li>➤ After completion of the topic the student shall be able to</li><li>➤ Describe the structure and function of a neuron.</li><li>➤ Understand the steps involved in the transmitting</li></ul>
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		<p>of a nerve impulse.</p> <ul style="list-style-type: none"><li>➤ Explain several nerve pathways.</li><li>➤ Demonstrate several reflex actions on another person.</li><li>➤ Understand the structure and function of the brain and spinal cord.</li><li>➤ Identify the various types of sensory receptors.</li><li>➤ List and understand the operation of the human senses.</li><li>➤ Relate the importance of hormones to the functioning of the human body.</li><li>➤ Describe the endocrine glands and the hormones they produce</li><li>➤ Know the general structure and function of the alimentary canal.</li><li>➤ List the organs of the digestive tract by anatomical location.</li><li>➤ Understand the mechanisms of breathing and alveolar gas exchange.</li><li>➤ Identify blood cells by type and function.</li><li>➤ Know the structure and function of the heart.</li><li>➤ Measure pulse and blood pressure.</li><li>➤ Distinguish between veins and arteries.</li><li>➤ Understand the body's defense mechanisms.</li><li>➤ Know the organs of the</li></ul>
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		<p>urinary system.</p> <ul style="list-style-type: none"> <li>➤ Understand the process of waste removal in the human body.</li> <li>➤ Know the male reproductive organs by name and function</li> <li>➤ Know the female reproductive organs by name and function.</li> <li>➤ Understand the female menstrual cycle.</li> <li>➤ Understand the roles of various hormones in the reproductive cycle.</li> <li>➤ Describe the stages of pregnancy and the birth process.</li> </ul>
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**BMLT I YEAR COURSE OUTCOME**  
**SUBJECT – GENERAL MICROBIOLOGY**

<b>S. NO.</b>	<b>TOPIC</b>	<b>COURSE OUTCOME</b>
1.	Introduction and brief history of Microbiology	Students should be able to understand the microbiological methods, history and medically importance of microorganism.
2.	Safety measures in Microbiology	Students shall be aware ethics of microbiology labs & basic instruments & their uses.
3.	General characteristics and classification of bacteria and Fungi	Students shall be able to classify the Microorganism on the basis of their morphology & Diseases.

4.	Growth and Nutrition of Microbes	Students shall be able to know bacterial growth curve and nutritional requirement.  Also know use of nutrition in culture methods.
5.	Care and maintenance of laboratory equipment's	The objective of this topic shall be maintain the laboratory instruments & their working principle.  And understand care and handling of lab equipment.
6.	Care and handling of various Microscope- Binocular, DGI, Phase contrast, fluorescence and electron Microscope	Students shall be able to know role of microscopic parts & their function.  And also know their care and handling procedure.
7.	Principles and methods of sterilization	Students should be understand the types of sterilization methods and their principle. And also understand the use of sterilization in Microbiology laboratory.
8.	Uses and mode of action of antiseptics and Disinfectants	Students should be able to know the basic principle of antiseptic and disinfectant. And also be know the differences between antiseptic and disinfectants.
9.	Handling and cleaning of glassware apparatus	The students will aware the all the basic glassware handling procedure and types of reagent used in their cleaning.
10.	Preparation, uses and standardization of culture media	At the end of this topic students must should be able to define types of culture media and their preparation methods.  Students also know the quality standard procedure to avoid contamination of culture media.

11.	Principles of staining and reagents	<p>The students will be aware different types of staining principles and what reagents require to prepare a stain/dye.</p> <p>Also know the quantity of reagents to prepare dye.</p>
12.	Aerobic and anaerobic culture methods	<p>After the completion of this topic students should be understand the types of Bacteria and their growth requirement and also know the different types of culture method for isolation of bacteria.</p>
13.	General characters and nature of antigen and antibody	<p>Students shall be able to know basic characters of Ag-Ab reaction and their functions.</p> <p>And also understand the types of reactions.</p>
14.	Principles of antigen antibody reactions	<p>At the end of this topic students shall be able to know principal of Ag-Ab reaction and their interpretation of results.</p>
15.	Collections, transportation and processing of clinical samples for microbiology investigations	<p>In this topic students shall be know about how to handle viral, bacterial and fungal sample in laboratory and types of collection procedure.</p> <p>And also know the types of methods to investigation and types of media to use for sample transportation.</p>
16.	Principles and mode of action of antibodies and chemotherapeutic agents for Bacteria and Fungi	<p>At the end of this topic students understand the types of action of antibodies and their basic principle and also know their treatment.</p>
17.	Care and handling of laboratory animals	<p>In this topic students shall be aware the handling of laboratory animal and their use in investigation of diseases.</p>
18.	Laboratory organization,	<p>At the end of students should be able to know</p>

	recording of results and quality control in Microbiology	about lab organization, cleaning, record maintenance and also know quality control to assure the lab test.
<b>Virology</b>		
19.	Introduction to medical virology	Students shall be able to know about basic salient features of viruses and aware their types of infections to infect human being.
20.	Nomenclature and classification of viruses	At the end of this topic students will able to know general classification of viruses on the basis of diagram and morphology.
21.	General characteristics of viruses	At the end of this topic students shall be capable to analyze the salient features of viruses and their morphology.
22.	Collection and transport, processing and storage of sample for viral diagnosis	In this topic students shall be know about how to preserve viral sample in laboratory and collection procedure.  And also know the types of methods and types of media to use for sample transportation.
<b>Parasitology</b>		
23.	Introduction to medical and safety	At the end of this topic students shall be able to understand the medical knowledge and safety precautions in parasitology laboratory.  And also know the general parasitic terminology.
24.	General characters and classification of Protozoa	Students shall be able to understands the role of parasitic disease causing & their laboratory diagnosis as well as general morphology, culture characteristics and classification of

		parasites.
25.	Laboratory procedure collection, preservation and processing of samples for parasites (stool/blood/tissue/fluids/biopsy)	Students shall be able to understand sample handling, transportation & laboratory process of specimen for diagnosis of disease.  Students also aware the how to collect different types of specimen in sterilize condition in various bottles and tubes.
26.	Morphology, life cycles and Laboratory diagnosis of intestinal protozoa, Amoeba-Giardia	Students shall be understand the different types of parasite to cause intestinal infection in human being.  And their morphology, life cycle and laboratory diagnosis to diagnose the intestinal parasitic infections.
27.	Morphology and diagnosis of Trichomonas vaginalis, E. gingivalis	At the end of this topic students know the role of T. vaginalis infection in human being.  And also understand the morphology and laboratory procedure to diagnose the Disease.
28.	Morphology, life cycle and diagnosis of Haemoparasite (Malaria parasite)	Students shall be understand that what kind of different species of plasmodium to responsible for malarial infection and also know laboratory diagnosis procedure
29.	General characters and classification of Medical Helimenthology	At the end of this topic students know the basic salient features of helminths and their classification and also know the differences between clinical and non clinical related parasites.
30.	Morphology, life cycle and laboratory diagnosis of Nematodes (Ascaris, enterobious, Ancylostoma,	Students shall be understand the types of nematodes and their morphology, life cycle and identification of common intestinal parasitic

	Strongyloides)	infection.
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