BACHELOR OF MEDICAL LABORATORY TECHNOLOGY (BMLT)

Academic Year:- 2019 onwards

Duration:- Three Year Degree Course (Six Semester).

Eligibility for Admission:-

Candidates seeking to Admission in Bachelor of Medical Laboratory Technology (BMLT) Course should have:

- Passed +2 /Intermediate Science with PCB or PCM
- Passed ANM Course
- Passed DMLT Course.

Objective of the course:-

- To impart advanced skill based education in the field of pathology.
- To enable them to take up higher courses of learning / specialization in field of Pathology.

Structure of the Course:-

The course will have six semesters and each semester will consist of 6 papers. Each paper carries 100 marks. The outline of the course is given as follows:

K. B. WOMEN'S COLLEGE, HAZARIBAG

B. SC. MLT SYLLABUS

SEMESTER- I

Full Marks:100; Internal:20, External:8

Course Code / Subject Name	Unit	Topic	Cit
BMLT - 101 (General Human Anatomy & Physiology –I)	I	Basics of Human Anatomy-I	
	II	Basics of Physiology-I	
BMLT - 102 (Routine & Special Laboratory Techniques-I)	I	Human Healthcare and Safety Regulations	
	II	Introduction to Haematology and Routine tests	
	III	Specimen Collection	
	IV	Laboratory Preparation in Haematology	
	V	Sample processing and sterilization techniques.	
BMLT - 103 (Biomolecules)	I	Structure, Functions and Classification of Amino Acids and Proteins	
	II	Structure, Functions and Classification of Carbohydrates	
	III	Structure, Functions and Classification of Lipids	
	IV	Physical and Chemical Properties of Nucleic Acids	
BMLT - 104 (Fundamentals of Microbiology)	I	Introductory Microbiology-1	
	II	Morphology and Structure of Microorganisms	
	III	Recombinant DNA Technology	
	IV	Microbial Ecology and Biotic Interactions	
BMLT – 105 (Communication Skills)	I	Introduction, Business Correspondence:	
	II	Government Correspondence, Writing Skills:	
Practical			
BMLTP – 106		Practical of BMLT - 106	
Total Credits			

B. SC. MLT SYLLABUS

SEMESTER- II

Full Marks:100; Internal:20, External:80

Course Code / Subject Name	Unit	Topic	Credit
BMLT - 201 (General Human Anatomy & Physiology –II)	I	Basics of Human Anatomy-II	04
	II	Basics of Physiology-II	
BMLT – 202 (Routine & Special Laboratory Techniques-II)	I	Routine Haematological Tests	04
	II	Urine Examination	
	III	Stool Examination	
	IV	Sputum and Semen Examination	
	V	Basic Microbiology	
	VI	Introduction to serology	
	VII	Serological Tests	
	VIII	Staining Techniques	
BMLT – 203 (Basics of Computer Science)	I	Introduction to Computer	04
	II	Introduction to Microsoft Word	
	III	Microsoft Power Point	
	IV	Introduction to Internet	
	V	Hospital Information System	
BMLT - 204 Microbial Physiology -Metabolism	I	Microbial Nutrition, Cultivation, Isolation and Preservation	04
	II	Enzyme Regulation	
	III	Microbial Metabolism -I	
	IV	Microbial Metabolism -II	
Practical			
BMLTP – 205		Practical of BMLT - 205	04
BMLTP – 206		Practical of BMLT - 206	04
Total Credits			**24**

B. SC. MLT SYLLABUS

SEMESTER- III

Full Marks:100; Internal:20, External:80

Course Code / Subject Name	Unit	Topic	Credit
BMLT - 301 (Haematology and Blood Banking-I)	I	Special Haematological Tests	04
	II	Haemostasis & Bleeding Disorders	
	III	Immunohaematology & Blood Transfusion	
	IV	Routine Lab Procedures in Blood Bank	
BMLT - 302 (Microbiology and Serology)	I	Laboratory Diagnosis of Mycotic and Emerging Infections	04
	II	Diagnostic Microbiology	
	III	Serology	
	IV	Bacteriology	
BMLT - 303 (Clinical Pathology and Biochemistry)	I	Miscellaneous Body Fluids	04
	II	Biochemical Test Profile	
	III	Analytical Techniques	
	IV	Biochemical Processes	
	V	Carbohydrate Metabolism	
	VI	Lipid Metabolism	
	VII	Protein Metabolism	
	VIII	Nucleic Acids	
BMLT - 304 (Pathogenic Microbiology)	I	Infectious Diseases	04
	II	Microbes of Medical Importance	
	III	Mode of Microbial Infections	
	IV	Antimicrobial Drugs	
Practical			
BMLT P– 305		Practical of BMLT – 305	04
BMLT P– 306		Practical of BMLT - 306	04
Total Credits			24

B. SC. MLT SYLLABUS

SEMESTER- IV

Full Marks:100; Internal:20, External:80

Course Code / Subject Name	Unit	Topic	Credit
BMLT - 401 (Clinical Biochemistry and Microbiology-I)	I	Metabolic Disorders & Deficiency	04
	II	Clinical Endocrinology	
	III	Body Fluid Specimen Processing	
	IV	Blood Banking	
BMLT - 402 (Histolohy-Cytology –I)	I	Introduction to Histology	04
	II	Tissue Processing	
	III	Staining Procedures	
	IV	Instrumentation in Histocytotechnology	
BMLT - 403 (Parasitology and Blood Cell Disirders-I)	I	Medical Parasitology	04
	II	Common Intestinal worms	
	III	Malarial parasites, Filarial parasites	
	IV	Lab. diagnosis of Parasitic infections	
BMLT - 404 (Job Training & Project Report)	I	Student shall carry out Job Training & project work in consultation with industrial organizations.	04
Practical			
BMLTP – 405		Practical of BMLT – 405	04
BMLT P– 406		Practical of BMLT – 406	04
Total Credits			**24**

B. SC. MLT SYLLABUS

SEMESTER- V

Full Marks:100; Internal:20, External:8

Course Code / Subject Name	Unit	Topic	C
BMLT - 501 (Medical Genetics and Microbiology-II)	I	Genetics	
	II	CLIA techniques	
	III	Immunology and Virology	
	IV	Toxicology	
BMLT - 502 (Histology & Cytology-II)	I	Exfoliative Cytology-Specimen Preparation	
	II	Exfoliative Cytology- Staining Techniques	
	III	Exfoliative Cytology- Benign and Malignant Cells	
	IV	Advanced Instrumentation	
BMLT - 503 (Parasitology and Blood Cell Disorders-II)	I	Descriptive study of RBC abnormalities	
	II	Disorders related to RBC	
	III	Normal White Cell Count & Physiological variation	
	IV	Disorders related to WBC	
BMLT - 504 (Pathogenic Microbiology)	I	Pathogenic Microbes, Diagnosis, Prevention and Control	
	II	Prevention and Control of Viral Diseases	
	III	Human Mycotic Infections	
	IV	Mechanisms and Control of Parasitic Infections	
Practical			
BMLT P– 505		Practical of BMLT – 505	
BMLT P– 506		Practical of BMLT – 506	
Total Credits			

B. SC. MLT SYLLABUS

SEMESTER- VI

Full Marks:100; Internal:20, External:80

Course Code / Subject Name	Unit	Topic	Credit
BMLT - 601 (Clinical Laboratory Operations and Management)	I	Clinical Laboratory Operations and Management	04
BMLT - 602 (Professional Training)	I	Professional Training for three (3) months at reputed hospital, diagnostic centre, pathology laboratory, research institute, pharmaceutical industry, etc.	08
BMLT - 603 (Biomedical Imaging Devices & Concept)	I	X-ray	04
	II	Ultrasound	
	III	Computed Tomography	
	IV	Magnetic Resonance Imaging	
	V	Endoscopy	
Practical			
BMLTP – 604		Practical of BMLT – 604	04
BMLTP – 605		Practical of BMLT – 605	04
Total Credits			**24**

B. SC. MLT SYLLABUS

SEMESTER- I

Course Code	Unit	Topic
BMLT – 101 (General Human Anatomy & Physiology –I)	I	**Basics of Human Anatomy-I** Introduction to: Anatomy, epithelial tissue, muscular tissue, nervous tissue. Skeletal System, Structure of bones, types of bones, Bones of cranium, face vertebral column upper and lower limbs. Circulation System, Structure of heart, names and position of main blood vessels. Lymphatic System, Lymph vessels, lymph nodes and lymphoid organs, their structure & functions. Respiratory System, Parts of Respiratory System.(diagram ,Name, function) Brief introduction to vital organs in head, neck, thorax.
	II	**Basics of Physiology- I** Body fluids, Cardiovascular System. Circulation of blood. function of heart and blood vessels. Control of heart rate, blood volume.(Diagram of heart and Functions in details)- ECG. Respiratory system.: Function of lungs, Respiration disorders like anoxia. dyspnea. lung function tests. Digestive Systems, Digestion of food in mouth, stomach & small intestine. Absorption of food, function of liver. (formation of bilirubin & other functions in detail)

B. SC. MLT SYLLABUS

SEMESTER- I

Course Code	Unit	Topic	Credit
BMLT – 102 (Routine & Special Laboratory Techniques-I)	I	**Routine & Special Laboratory Techniques-I** **Human Healthcare and Safety Regulations** Basic causes of accidents, common types of laboratory accidents. First aid in laboratory Medical care in India, Medical Laboratories of developing countries, Importance of Biomedical Waste. NABL. **Organization of Laboratory** Functional components of clinical laboratories, , precautions to be taken WRT patients ,reports, analysis. Communication between physician, patients, and the medical laboratory professional. **Basic Laboratory Equipments** Identification, use, maintenance and care of common laboratory glasswares and equipments, handling of all glasswares, principle and care of centrifuge, colorimeter, oven, incubator, microscope, Neubauer's chamber, Autoclave.etc. Cleaning of laboratory glasswares.	04
	II	**Introduction to Haematology and Routine tests** Components of blood and their functions, Haematopoietic systems of the body. Haemoglobin. **Haematological Diseases** Anaemia and various types of anemias, Leukemia, parasitic infections of blood. Routine haematological tests, RBC indices.	
	III	**Specimen Collection** Specimen collection & sample processing for haematological studies, anticoagulants and different vials-their advantages and disadvantages.	
	IV	**Automation** Semiautoananalyzer	

B. SC. MLT SYLLABUS

SEMESTER- I

Course Code	Unit	Topic	Credit
BMLT – 103 Biomolecules	I	**Introduction of biochemistry, carbohydrates-** Introduction and definition, Classification- monosaccharides, disaccharides, oligosaccharides, polysaccharides. Isomerism and its classification. Deficiency & disorders-Glycosuria, Pentosuria, Diabetes mellitus, milk intolerance etc.	04
	II	**Lipid-** Definition, biological importance, Classification-simple lipid, compound lipid, derived lipid. Deficiency &disorders-Gaucher's disease, Tay- Sach's disease.	
	III	**Amino acids-** Introduction, physical properties of amino acids, Classification. **Protein**-Definition, biological importance, Classification- simple, conjugated & derived protein, Bonds relating to protein structure, structure of protein, denaturations of protein. Deficiency & disorders-Phenylketonuria (PKU), Alkaptonuria, Maple syrup urine disease, Malnutrition- Merasmus, scurvy.	
	IV	**Nucleic Acids:-** Structure & Properties of purine & pyrimidine bases, Nucleosides & Nucleotides, Biologically important nucleotides, Double helical model of DNA, Physical & Chemical Properties of nucleic acid. Deficiencies & disorders – Uric Acid, Gout.	

B. SC. MLT SYLLABUS

SEMESTER- I

Course Code	Unit	Topic	Credit
BMLT – 104 Fundamentals of Microbiology	I	**Introductory Microbiology** Introduction, scope and applications of Microbiology. Methods of Microbiology, isolation of pure cultures, theory and methods of sterilization. Microscopic examination of micro-organisms, bright field microscopy, dark field microscopy, phase contrast microscopy, electron microscopy. Staining of microbes, theory of Gram staining. Nature of Microbial World : Prokaryotes and eucaryotes.	04
	II	**Morphology and Structure of Microorganisms** Morphology & fine structure of bacteria, fungi, actinomycete and algae. Organization of cell wall, cell membrane, flagella and capsules in bacteria. Morphogenesis in bacteria, formation of spores and cysts. Animal Viruses : Morphology and viral disease. Bacteriophages: Morphology, multiplication, detection and enumeration.	
	III	**Recombinant DNA Technology** Recombinant DNA technology, genetic engineering and gene cloning in micro-organisms. Bacterial genetics, Normal microbial flora of human body, Hospital acquired infection.	
	IV	**Microbial Ecology and Biotic Interactions** Symbiotic & non-symbiotic Nitrogen fixation biofertilisers & biopesticides. Sewage (waste-water) treatment, chemical characteristics, microbiological characteristics, waste water treatment processes.	

B. SC. MLT SYLLABUS

SEMESTER- I

Course Code	Unit	Topic	Credit
BMLT – 105 Communication Skills	I	**Unit-I : Introduction, Business Correspondence:** Definition, Objectives, Stages of Communication, Essentials of Good/Effective Communication, Benefits of Good Communication, Gaps in Communication, Communication and information Technology. Structure of a Letter, Sales Letter, Order Letter, Compliant, Handling Telemarketing. **Unit-2 : Government Correspondence, Writing Skills:** Noting, Routine Letter, Official Letter Memorandum, Cicular, Telegrams, Newsletter. Report Writing, Scientific Paper Writing, Writing Small Paragraphs & Essays, Composition. **Unit-3 : Grammar:** Sentence Structure, Idiomatic Usage of Language, Tenses, Direct & Indirect Parts of Speech, Active & Passive Voice, Vocabulary. **Unit-1 : Selected Short Stories:** 2-3 Classic short stories, 2-3 great short stories by Indian writers. **Unit-5 : Preparation for Job:** Writing Applications for jobs, Preparing Curriculum Vitae, Preparing for Interviews, Preparing for Group Discussions.	04

B. SC. MLT SYLLABUS

SEMESTER- I, PRACTICAL

Course Code	Unit	Experiment	Credit
BMLT- 106	I	1. To study the compound microscope and parts. 2. Study of Epithelial, Muscle, Nerve and mammalian blood cells through permanent or temporary cells 3. Study of the skeletal system of human beings 4. To study human respiratory system - Slides 5. To study human circulatory system - Slides 6. To study human digestive system - Slides 7. To separate the plasma and serum from given blood sample	04
	II	1. To indentify and to study applications of the different laboratory instruments. (A)Hot air oven. (B) Centrifuge. (C)Autoclave (D)Burettes & pipettes (E)Colorimeter (F)Neubauer's Chamber 2. Determination of haemoglobin concentration by sahil's method 3. Determination of haemoglobin concentration by cyanmeth. method 4. Determination of total erythrocyte(RBC) count 5. Determination of leukocyte (WBC) count 6. Determination of pack cell volume (PCV) 7. Determination of erythrocyte sedimentation rate (ESR) 8. Determination and calculation of red blood indices MCV, MCH, MCHC 9. Study of differential leukocyte count (DLC) 10. Determination of absolute Eosinophil count 11. Determination of platelet count	
	III	1. Principles and working of laboratory instruments 2. Importance and methods of cleaning of glass apparatus 3. Calibration of apparatus and glasswares 4. Determination of blood sugar level of plasma (or serum) By glucose oxidase method 5. Determination of serum creatinine : Alkaline picrate method. 6. Determination of BUN (Blood Urea Nitrogen) 7. Determination of serum bilirubin 8. Estimation of lipids 9. Estimations of protein	

	IV	1. Bacteria - culture plates, Slide, Viruses - microscopic images, fungi – Slides, Helminthes, Gross specimens – Tape worm, Round worm, Microscopy of cysts ova/parasites, protozoans – Slides. 2. Staining-Gram's staining, acid fast staining, capsule staining, spore staining using prokaryotic and eukaryotic cells, hanging drop preparation. 3. Preparation of culture media, spread plates, pour plates, selective media, differential media. 4. Separation of pure cultures and study the effect of selective nutrients on prokaryotes. 5. Isolation of Soil Bacteria, & Soil Fungi. 6. Gel electrophoresis through photographs. 7. Sterilization Techniques	

B. SC. MLT SYLLABUS

SEMESTER- II

Part A: Skill Component

Course Code	Unit	Topic	Credit
BMLT201 General Human Anatomy, & Physiology -II	I	**Basics of Human Anatomy-II** Brief introduction of Vital organs in the abdomen. Structure and function of Gastrointestinal system. Urinary System.: Parts of Urinary System.(name, Function) **Unit I** Endocrine System: Various endocrine glands. Thyroid. Parathyroid. Adrenal glands pituitary pancreas. Thymus and sex glands.(detail function of each gland & clinical significance) Reproductive System. Male & female Reproductive organs.(name & function) Nervous System.: Parts of brain, spinal cord, peripheral nerves.(function)	04
	II	**Basics of Human Physiology-II** **Unit II** Excretory System, Structure & function of kidney and urinary bladder. Mechanism of urine formation. disorders of kidney – Kidney function test. Reproductive System, Physiology of reproductive organs. Nervous System: Neurone & its function,.	

B. SC. MLT SYLLABUS

SEMESTER- II

Course Code	Unit	Topic	Credit
BMLT 202 Routine & Special Laboratory Technology-II	I	**Routinue Haematological Tests** Determination of hemoglobin concentration ,determination of haematocrit , enumeration of formed elements ,calculations of red blood cell indices - MCV, MCH,and MCHC, study of blood smear , Reticulocyte count, Erytrocyte sendimantation rate (ESR) Eosinophil count , platelet count	04
	II	**Urine Examination** Urine analysis- Physical, chemical & microscopic examination Clinical significance, specimen collection, laboratory investigation.	
	III	**Semen Examination -** Semen analysis- Physical, chemical & microscopic examination **Sputum Examination** Collection, container, transport, preservation for sputum analysis. Physical, chemical and Microscopic examination and its significance.	
	IV	**Basic Microbiology** Classification, morphology and physiology of bacteria, growth requirement of bacteria, nutrients required. Gram positive & Gram negative Bacteria. Normal flora of human body.	
	V	**Introduction to serology** Structure and classes of Antigens and antibodies.	
	VIII	**Staining Techniques** Gram positive & Gram negative Bacteria. Sputum test for AFB	

Course Code	Unit	Topic	Credit
BMLT- 203 Basic Computer Science		**BASICS OF COMPUTER SCIENCE** COURSE OBJECTIVES : On completion of the course the students will be able to 3 1. Comprehend the parts of a computer and the different operating systems 2. Utilize the MS word for typing letters and text 3. Effectively use features in MS word to manipulate text and insert pictures and various fonts. 4. Prepare and use effectively a Power Point presentation. 5. Utilize the internet for web searches and e-mail 6. Appreciate the contribution of HIS to the healthcare industry 7. Describe the uses of the hospital information system **BASICS COMPUTER** 1. Introduction to the Computer : Parts of a Computer I/O devices – memories – RAM and ROM. Networking – LAN WAN, MAN (only basic ideas) 2. **Introduction to Microsoft word :** Typing text in MS work, manipulating text, formatting the text & using different font sizes. Bold italics. Using Bullets and numbering, insertion of pictures, & file insertion. Aligning of the text and Justify 3. **Microsoft PowerPoint :** Preparing new slides using MS-Power-Point. Inserting Slides, Slide transition and animation. Using templates, different text and font sizes. Inserting slides with sounds, inserting clip arts, Pictures, tables and graphs. Presentation using wizards.	04

4. **Introduction to the internet :** Definition about the World Wide Web & brief history. Using search engine and beginning Google search- Exploring the next using Internet Explorer and Navigator- Uploading and Download of files and images – E-mail ID creation – Sending message – Attaching files in E-mail.

5. **Introduction to the Hospital Information System :** Definition of Hospital Information system, Architecture of a HIS, aim and uses of HIS, Types of HIS Benefits of using a hospital information system.

BASICS OF COMPUTER (Practical)

1. **Introduction of Microsoft Word.**
Type a text document, save the document. Align the text with different formats using Microsoft Word. Inserting a table ensuring proper alignment of the table using MS word

2. **Microsoft Power-Point**
Preparing a slide show with transition, animation and sound effect using MS – PowerPoint. Customizing the slide show by inserting pictures and tables in the slides using MS- PowerPoint.

3. **Introduction to the Internet .**
Create an e-mail account. Use Internet to search for a subject of Internet.

Renewal.

B. SC. MLT SYLLABUS

SEMESTER- II

Course Code	Unit	Topic	Credit
BMLT -204 Microbial Physiology - Metabolism	I	**Microbial Nutrition, Cultivation, Isolation and Preservation** Microbial Nutrition: Requirements for Growth. Physical requirement (Temperature, pH, osmotic pressure), chemical requirements (C, N, S, P, O). Culture Media : Chemically defined media, complex media, anaerobic growth media, selective & differential media, and enrichment culture. Cultivation of Aerobes and Anaerobes. Microbial Growth : Growth in population, bacterial growth curve, mathematical nature and expression, measurement of growth in bacteria.	04
	II	**Enzyme Regulation** Enzymes and their Regulation: Chemical and physical properties of enzymes. Nomenclature of Enzymes. Mechanism of enzymes action. Inhibition of enzyme action. Regulation of enzymes.	
	III	**Microbial Metabolism –I** Microbial Metabolism : Respiration and fermentation. Glycolysis, Pentose Phosphate pathway, the Entner-Doudoroff pathway, Tricarboxylic acid cycle.	
	IV	**Microbial Metabolism –II** Microbial Utilization of Energy & Biosynthesis : Transport of nutrient by bacteria. Biochemical mechanisms of generation of ATP. Gluconeogenesis, Phospholipids. Replication of DNA molecules, Transcription & Translation (process of protein synthesis). Bacterial Genetics : Conjugation, Transformation, Transduction (generalized transduction, specialized transduction).	

B. SC. MLT SYLLABUS

Practical for Semester II

SL. No.	Experiment	Unit	Credit
	BMLTP 205		04
01	To measure the blood pressure of human being		
02	To measure the body weight and height and calculate BMI of a human (body mass index)		
03	Introduction to the word		
04	Introduction to the excel		
05	Introduction to the internet		
06	To prepare of the 1/10 N HCL		
07	Physical examination of urine		
08	Determination of specific gravity of urine by urinometer and refractormeter		
09	Chemical examination of urine.		
10	Microscopic examination of urine		
11	Physical and chemical examination of semen		
12	Microscopic examination of semen		
13	Physical examination of stool		
14	Chemical examination of stool		
15	Microscopic examination of stool		
16	Determination of reducing substances in stool		
17	Routine examination of sputum		
18	Preparation of sputum smear		
19	Gram's staining		
20	Study of motility of capsule		
21	Study of bacterial capsule		
22	Study of acid fast bacilli		
23	Study of malaria parasite		
24	Isolation of bacteria by streak plate techniques		
25	To perform qualitative widal test		

	BMLTP 206		
01	Assay of serum alkaline phosphates		
02	Determination of SGPT		
03	Determination of SGOT		
04	Determination of Y-GT		
05	Inhibition of alkaline phosphatase by EDTA		
06	Use of ultraviolet light for its germicidal effect.		
07	Turbidimetric / spectrophotometric monitoring of growth using liquid cultures.		

B. SC. MLT SYLLABUS

Semester III

Course Code	Unit	Topic	Credit
BMLT 301 Hematology and Blood Banking-I	I	**Special Heamatological tests & factors in Haemoglobin synthesis & automation** Screening of sickle cell anaemia, Estimation of foetal haemoglobin, Haemoglobin electrophoresis, Osmotic fragility test, Heinz body preparation, Laboratory diagnosis of protozone blood parasites, Lupus erythematosus (LE) cell preparation, Preparation of bone marrow smear for microscopic examination. **Interpretation of lab findings in Haematology** Anaemias, Leukaemias,	04
	II	**Haemostasis & Bleeding Disorders** Introduction to Haemostasis, & Mechanism of blood coagulation. **Laboratory Investigation & Bleeding Disorders** Laboratory preparation for coagulation tests , Routine coagulation tests, prothrombin time, activated partial thromboplastin time, thrombin time, Laboratory diagnosis of bleeding disorders .	
	III	**Immunohaematology & Blood Transfusion** Principles of immunohaematology, Human blood group systems, & Rh type. Clinical significance of blood transfusion. **Collection & Processing of blood for transfusion** Preparation for blood collection, Blood collection, Transportation of blood after collection , storage of blood, Preparation and use of blood components.	
	IV	**Routine Lab Procedures in Blood Bank** Specimen collection for blood bank, General laboratory reagents in blood bank. Reporting of haemagglutination reaction, Antihuman globulin (AHG) & cross matching **Transfusion reactions & Haemolytic Disease of a new born** Blood transfusion process, Transfusion reaction, Haemolytic disease of the newborn .	

B. SC. MLT SYLLABUS

Semester III

Course Code	Unit	Topic	Credit
BMLT 302 Microbiology and Serology	I	**Laboratory Diagnosis of Mycotic and Emerging Infections** **Introduction to Microbiology** Disease oriented microbiology,culture & sensitivity test,aerobic, anaerobic techniques **Laboratory Diagnosis of Mycotic infections** Introduction to Fungi specimen collection, Laboratory diagnosis of mycotic infections, Diagnostic mycology	04
	II	**Diagnostic Microbiology & Micro Techniques** Role of microbiology laboratory, specimen handling , laboratory records, safety Regulations, Quality control in microbiology, **Lab Diagnosis of parasitic infections** Collection and handling of faecal specimen, Laboratory techniques in parasitological investigation of stool, Lab identification of human parasites	
	III	**Serology : Introduction & Serological Lab Procedures** Principles of immunologic reactions, serodiagnosis. Collection and prepration of specimen,Serological test for syphilis (STS),Agglutination tests ,C-reactive protein test (CRP) ,Rheumatoid arthritis test (RA), ASO, Immunologic test for pregnancy RIA, ELISA **Parasitology** Introduction, Protozoa, Helminths, Medical Entomology	
	IV	**Bacteriology** Gram positive - streptococcus, staphylococcus, bacillus, mycobacterium, corynebacterium, Gram negative - E-coli, Klebsiella, Salmonella, shigella, Vibrio, Pseudomonas **Diagnostic & Systemic Bacteriology** Staphylococcus, Streptococcus, spirochaetes, mycoplasma, rickettsiae etc, idenifying characteristics of common pathogenic bacteria,Antimicrobial susceptibility test. Urease, catalase, geletine liquification, coagulase, oxidase, sugar fermentation, antibiotic sensitivity test.	

B. SC. MLT SYLLABUS

Semester III

Course Code	Unit	Topic	Credit
BMLT 303 Clinical Pathology and Biochemistry	I	**Miscellaneous Body Fluids** **Lab Examination of Miscellaneous Body Fluids** Cerebrospinal fluid ,Laboratory investigation ,Serous fluids, Synovial fluid. **Routine Biochemical Tests** Phosphatases, transaminases, lactic dehydrogenase , Creatine kinase , Electrolytes ,Blood gases and bicarbonate, Determination of serum / plasma bicarbonate	04
	II	**Normal & Abnormal Biochemical processes of the body (Basic physiology and biochemistry of the body)** Basic physiology and biochemistry of the body , **Biochemical Test Profile** Liver tests ,Renal tests, Endocrine function tests, Lipid profile, Transaminase, LDH, CPK, CPK-MB, SGPT/SGOT/ Amylase.GTT	
	III	**Normal & Abnormal Biochemical processes of the body** Biochemical changes in the body under pathological conditions. **Normal & Abnormal Biochemical processes of the body** Functions of various organs and their clinical assessment	
	V	**Carbohydrate Metabolism** Digestion & Absorption of Carbohydrates : Metabolic Pathways of Carbohydrates, Glycolysis and alcoholic fermentation, The Pentose Phosphate Pathway, Glucuronate and glyoxylate pathway, TCA cycle, Glycogenolysis & Glycogenesis, Gluconeogenesis.	
	VI	**Lipid Metabolism** Digestion & Transport of Lipids : -Oxidation of fatty acids including odd chain fatty acids. α -and ω- oxidation of fatty acids Degradation of triglycerides and phospholipids. Formation and utilization of ketone bodies. Biosynthesis of triglycerides. Brief account of cholesterol & Prostaglandins.	
	VII	**Protein Metabolism** Digestion of Proteins : General Reactions of Amino Acids : Deamination, transamination and decarboxylation. Urea cycle. Metabolic disorders in the urea cycle.	
	VIII	**Nucleic Acids** Nucleic Acids : Degradation of purines and pyrimidines. Catabolism of Heme & Formation of Bile pigments. Biosynthesis of heme. Conjugation of bilirubin and its clinical significance.	

B. SC. MLT SYLLABUS

Semester III

Course Code	Unit	Topic	Credit
BMLT 304 Pathogenic Microbiology	I	**Infectious Diseases** Brief introduction to terminology of Infections diseases, Frequency of disease, Recognition of Infectious disease, Infections, Virulence and mode of transmission,	04
	II	**Microbes of Medical Importance** Nomenclature and classification of microbes of medical importance. Origin of the Normal Flora, Germfree Life, Distribution and occurrence of Normal Flora of Skin, Eye, Respiratory Tract, Mouth, Intestinal Tract & Genitourinary Tract.	
	III	**Mode of Microbial Infections** Microbial adherence, Passive Penetration into body, Active Penetration into body, Events in Infection following penetration, Microbial virulence factors.	
	IV	**Antimicrobial Drugs** Development of chemotherapy, General characteristics of antimicrobial drugs, factors influencing the effectiveness of antimicrobial drugs, Antibacterial drugs viz. sulfonamides, Quinolones, Penicillins, Cephalosporins, Tetracyclines, Erythromycin, Chloramphenicol, Drug Resistance, Antifungal and Antiviral drugs.	

B. SC. MLT SYLLABUS

PRACTICAL SEMESTER III

Subject Code	Experiment	Credit
BMLTP-305	**(Hematology and Blood Banking-I)** 1. To study sickling test using 2% sodium metabisulphite 2. Determination of reticulocyte count. 3. Determination of prothrombin time, APTT. 4. Determination of glucose-6-phosphate dehydrogenase(G-6-PD) 5. Determination of serum sodium and potassium 6. Determination of serum chloride 7. Determination of bleeding time 8. Determination of blood clotting time 1.capillary method 2.tube method 9. Qualitative test for ABO grouping with antisera by slide method 10. Qualitative test for ABO grouping with antisera by tube method 11. Qualitative test for Determination of D (Rh) antigen on human red blood cells. 1.tube method 2.slide method 12. To perform cross matching test by saline-tube method 13. To perform direct coomb's test 14. To perform indirect coomb's test 15. Determination of the anti-D antibody titer	04
BMLTP-306	**(Clinical Pathology and Biochemistry)** 1. Estimation of blood sugar level of plasma (or serum) By glucose-oxidase method 2. To perform pregnancy test by dipstick method 3. Estimation of blood urea nitrogen. 4. Estimation of serum creatinine. 5. Determination of proteins 6. Determination of serum bilirubin. 7. Estimation of serum total cholesterol. 8. Determination of serum glutamate pyruvate transaminase(SGPT) and serum glutamate oxaloacette tranasaminase(SGOT) 9. Determination of serum alkaline phosphatase 10. To perform glucose tolerance test **Metabolism** 1. Estimation of Ca+ in serum 2. Estimation of total lipids in serum. 3. Estimation of Lipoproteins 4. Estimation of inorganic phosphate. **Pathogenic Microbiology** 1. Stainings – Gram's, Alberts, ZN. 2. Isolation and Maintenance of Pure Cultures. 3. Physiological characteristics of bacteria and identification. 4. Preparation of serum/plasma. 5. Sterilization – Introduction to autoclave, hot air oven, filter sterilization.	04

B. SC. MLT SYLLABUS

Semester IV

Course Code	Unit	Topic	Credit
BMLT 401 Clinical Biochemistry and Microbiology-I	I	**Metabolic Disorders & Deficiency** **Diagnostic Test profile** ANC, Arthritis, Cardiac, Hypertension, Anaemia.	04
	II	**Clinical Endocrinology** **Hormonal studies & Clinical Endocrinology** Thyroid, Pancreas, Adrenal & Sexual glands, hormones & it's diagnostic significance.	
	III	**Body Fluid Specimen Processing** **Specimen processing for biochemical analysis** Blood, Urine, Cerebrospinal fluid, Body fluids **Automation in Clinical Biochemistry Laboratory** Classification of automated systems , steps of automation in biochemical analysis, some commonly used automated analysers of biochemical laboratories	
	IV	**Blood Banking** Organization, operation, administration of blood bank and maintenance of records, government regulation (FDA)	
BMLT -402 Histology-Cytology -I	I	**Introduction to Histology** **Introduction to Histology & Cytotechnology** Basic terminology , Laboratory equipments for histology and cytology , Use and care of frequently used equipments , Preparation of reagent solutions	04
	II	**Tissue Processing** **Lab techniques in histology: Tissue Processing** Logging of specimen, preparation of tissues , processing of tissues , Handling and embedding of small tissue fragments.	
	III	**Staining Procedures** **Lab techniques in histology: Staining Procedures** Routine staining procedure in histotechnology , special stains and staining techniques , stains for particular substances	
	IV	**Instrumentation in Histocytotechnology** Autoanalyser, Tissue Processor, Microtome	
BMLT - 403 Parasitology and Blood Cell Disorders-I	I	Medical Parasitology	04
	II	Common Intestinal worms	
	III	Malarial parasites, Filarial parasites	
	IV	Lab. diagnosis of Parasitic infections	
BMLT 404 (Job Training & Project Report)	I	Student shall carry out Job Training & project work in consultation with industrial organizations. **This paper will be of 200 Marks.**	04

B. SC. MLT SYLLABUS

PRACTICAL SEMESTER IV

Subject Code	Experiment		Credit
BMLTP 405	1. Routine examination of peritoneal (ascitic) fluid 2. Routine examination of pleural fluid 3. Routine examination of synovial fluid 4. Routine examination of CSF 5. Chemical examination of CSF 6. To determine uric acid in serum 7. To determine uric acid concentration of urine. 8. To estimate serum calcium and phosphorus 9. To estimate the concentration of serum amylase & Lipase 10. To estimate the concentration of CPK total and LDH 11. To determine serum acid phosphatase 12. Determination of antistrptolysin O(ASO) 13. To perform C-reactive protein test (CRP) 14. Introduction to chromatography 15. Routine examination of feces. 16. Physical examination of stool. 17. Microscopic examination of stool specimen. 18. Detection of malarial parasite 19. Detection of trypanosomes(the casual agent of sleeping sickness) 20. Laboratory diagnosis of kala azar 21. Laboratory diagnosis of microfilaria(wuchereeia bancrofti) 22. Quantitative determination of serum (or plasma) IgG class antibodies by ELISA 23. Determination of IgM class antibodies by ELISA		04
BMLTP 406	1. Separation and identification of amino acids by (i) Paper chromatography (ii) Thin layer chromatography. 2. Estimation of lactic acid in blood.		04
	1. Antigen-antibody interactions – Agglutination – Precipitation – Blood grouping		

B. SC. MLT SYLLABUS

Semester - V

Course Code	Unit	Topic	Credit
BMLT 501 Medical Genetics and Microbiology-II	I	Introduction to Medical Genetics (Structures of DNA RNA). Genetic of common diseases.	04
	II	**Immunology and Virology** Immunity/Immune system, innate immunity, adaptive immunity, cells and oragans involved in immune system **Virology** General characteristics of Viruses, classification of viruses, Oncogenic Viruses, RNA/DNA Viruses,AIDS, Structure of viruses, lysogenic cycle, lytic cycle, smallpox, polio, HIV,Hepatitis B	
BMLT 502 Histology-Cytology -II	I	Prepration of specimens for cytological evaluation ,	04
	II	Cytological stains and staining techniques ,	
	III	Charecteristics of benign and malignan cells	
	IV	Descriptive study of RBC abnormalities	
BMLT 503 Parasitology and Blood Cell	I	**Disorders related to RBC** Disorders related to RBC	04
		Normal white cell count & physiological variation Normal white cell count & physiological variation	
		Disorders related to WBC Disorders related to WBC	
BMLT 504 Pathogenic Microbiology	I	**Pathogenic Microbes, Diagnosis, Prevention and Control** Introduction to important diseases caused by Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Bacillus, Ciostridium, enterobacteriaceae (Proteus, Shigella, Salmonella), Vibrio, Yersinia, Hemophilus, Mycobacterium, laboratory diagnosis, prevention and control of these diseases.	
	II	**Prevention and Control of Viral Diseases** Morphology, pathogenesis, laboratory diagnosis, prevention and control of viral diseases viz. Rabies, Polio, Small pox, Herpes, Measles, Influenza and AIDS.	04
	III	**Human Mycotic Infections** Introduction to Human mycotic infections, Dermatophytosis, Blastomycosis, Candidiasis and Aspergillosis.	
	IV	**Mechanisms and Control of Parasitic Infections** Life cycle, pathogenic, mechanisms and control of parasitic infections viz. amoebiasis, Kala-azar, toxoplasmosis, ascariasis, filarasis, hook worm infections.	

B. SC. MLT SYLLABUS

PRACTICAL SEMESTER V

Subject Code	Experiment	Credit
BMLT P505	1. To detect hepatitis-B surface antigen(HBsAg) 2. To detect HIV antibodies 3. To determine TSH, T3 & T4	04
	Tissue processing by using tissue processor 1. Sharpening of the microtome knife 2. Gross examination and fixation of the specimen 3. Processing of the tissue by manual method 4. Section cutting of paraffin wax embedded tissue 5. To fix the section on the slide 6. Staining of the tissue section by using hematoxylin and eosin staining method	
BMLTP 506	1. Preparation of staining of blood smear 2. Study of morphology of blood cells 3. Blood cells disorder in leukemia 4. Determination of osmotic fragility of red blood cells 5. Determination of foetal hemoglobin. 6. Preparation of lupus erythromatosus(LE) cell 7. Preparation of Heinz bodies 8. Microscopic examination of bone marrow smear 9. Laboratory tests for diagnosis of aplastic anemia 10. Investigations of megaloblastic anemia 11. Laboratory tests in iron deficiency anemia 12. Laboratory test for diagnosis of hemolytic disorders.	04
	1. Identification of both gram positive and gram negative microorganisms on the basis of : (i) Morphology. (ii) Bio-chemical characteristics. (iii) Serological reactions. 2. Demonstration of pathogens (Viruses, fungi, parasites) in permanent mounted slides. 3. Demonstration of cysts/ovas of protozoa/Helminths.	

B. SC. MLT SYLLABUS

Semester VI

Course Code	Unit	Topic	Credit
BMLT -601 Clinical Laboratory Operations and Management	I	Reagent preparation: The metric system, preparation of molar, normal, percent solutions Buffers, Acid, Base, pH (Definition and examples) Lab calculations and graphs. Clinical sample collection e.g. Blood, Urine, Stool examination, Saliva sample, Sputum sample, Semen analysis etc. Preparing and maintaining Lab records: Labeling of sample, ;.(making, entries storage, annexes), management of histopathology records. Reporting results : a. Basic format of a test report, b. Release of examination results c. Alteration in reports Quality Management system : Internal and External quality control Biomedical waste management in a clinical laboratory : Disposal of used samples, reagents and other biomedical waste Calibration and Validation of Clinical Laboratory instruments Ethics in Medical laboratory Practice : Pre-Examination procedures, Examination procedures, Reporting of results, Preserving medical records, Access to Medical laboratory Records Audit in a Medical Laboratory Documentation Quality control in hematology, cytology, histopathology, biochemistry, blood sugar.	04
BMLT 602 Professional Training	I	Professional Training for three (3) months at reputed hospital, diagnostic centre, pathology laboratory, research institute, pharmaceutical industry, etc. (Student shall submit the valid certificate of completion of training issued by the concern organization to the college for the award of B.Voc. degree) **(Professional Training completed / obtained by the student for 3 months will be included in this semester for 200 marks)**	08
BMLT 603 Biomedical imaging devices and concept	I	Imaging concept of living system, image quality and its control, introduction to different types of contrast media in imaging procedures, indications of contrast reactions and its management.	04
	II	X-ray: Introduction and methods of application.	
	III	Ultrasound: Introduction and different applications.	
	IV	Concept of C.T. Machines and their applications.	
	V	Concept of MRI, patient preparation and applications.	
	VI	Endoscopy: their principle and clinical applications.	

B. SC. MLT SYLLABUS

PRACTICAL SEMESTER VI

Subject Code	Experiment	Credit
BMLTP 604	1. Quality control – Experiments and viva on quality control. 2. Calibration and validation of Lab instrument/analyzers 3. Preparation of reports. 4. Biomedical waste disposal 5. Lab ethics and Audit in Medical lab.	4
BMLTP 605	Project report and viva on profession training.	4