



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical LAB Technician (BMLT)



R.K.D.F. UNIVERSITY, BHOPAL

Study and Evaluation Scheme
Programmed: Bachelor Medical LAB Technician (BMLT)
Year I

S.No	Subject Code	Subject	Sessional						
			Internal Assessment		Theory		Practical		Total
			Max marks	Min marks	Max marks	Min marks	Max marks	Min marks	Max marks
1.	BML101	Human Anatomy	50	20	100	40	50	20	200
2.	BML102	Human Physiology	50	20	100	40	50	20	200
3.	BML103	Pathology	50	20	100	40	50	20	200
4.	BML104	Medical Biochemistry	50	20	100	40	50	20	200
5.	BML105	Bacteriology & Mycology	50	20	100	40	50	20	200
6.	BML106	Community Healthcare	50	20	100	40	-	-	150
7.	BML107	Basic of Computer	50	20	100	40	50	20	200
8.	BML108	Foundation English	50	20	100	40	-	-	150
9.	BML157	Hospital Postings	-	-	-	-	100	40	100
Total			400	160	800	320	400	160	1600



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Human Anatomy	BML-101

Course Outcome

Explain the basic knowledge of human anatomy and physiology. Defines anatomy, Defines physiology. Compares living and lifeless organisms, define the main structures composing human body, Tells chemical structure of human body, Explains structure and functions of cell. Relates structure and functions of tissue, explain structure of skeletal system.

Course Contents

Unit I

Introduction: Human body as a whole

Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Epithelium-definition, classification, describe with examples, function, Glands-classification, describe serous & mucous glands with examples, Basic tissues – classification with examples.

Unit II

Locomotion and Support

Cartilage – types with example & histology, Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc, fontanelles of fetal skull, Joints – Classification of joints with examples, synovial joint (in detail for radiology), Muscular system- Classification of muscular tissue & histology, Names of muscles of the body.

Unit III

Cardiovascular System

Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior vena cava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses, Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief.

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Unit IV

Gastro-intestinal System

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen.

Unit V

Respiratory System

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

Unit VI

Urinary System

Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.

Unit VII

Reproductive System

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary gland-gross.

Unit VIII

Endocrine Glands

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, Suprarenal gland (gross & histology).

Unit IX

Nervous System

Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.

1. Sensory Organs

Skin: Skin-histology, Appendages of skin, Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply, Ear: parts of ear- external, middle and inner ear and contents.

2. Embryology

Spermatogenesis & oogenesis, Ovulation, Fertilization, Fetal circulation, Placenta.

Reference Books:

1. William Davis, Understanding Human Anatomy and Physiology, McGrawHill
2. Chaurasia's, A Text Book of Anatomy
3. Ranganathan, T.S., A Text Book of Human Anatomy
4. Fattana, Human Anatomy, (Description and Applied), Saunders's & C P Prism Publishers, Bangalore.
5. Ester. M. Grishcimer, Physiology & Anatomy with Practical Considerations.
6. J.P. Lippincott, Philadelphia.

*** Latest editions of all the suggested books are recommended**



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Human Physiology	BML-102

Course Outcome:

The properties of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ. Tells structure of male reproductive organ.

Course Contents:

Unit I

Cell :- Definition, Structure and function of Cytoplasmic Organelles, Reproduction-Meiosis, Mitosis.

Unit II

The important physico-chemical laws applied to physiology

Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption, Colloid.

Unit III

Introduction- composition and function of blood

Red blood cells- Erythropoiesis, stages of differentiation function, counts physiological Variation. Haemoglobin -Structure, function, concentration physiological variation. Methods of Estimation of Hb, White blood cell- Production, function, life span, count, differential count. Platelets- Origin, normal count, morphology functions. Plasma Proteins- Production, concentration, types, albumin, globulin, fibrinogen, Prothrombin functions. Haemostasis & Blood coagulation. Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting disorders of clotting factors. Blood Bank, Blood groups-A, B, O system, Rh system, Blood grouping & typing, Cross-matching, Rh system-Rh factor, Rh in Cross-matching, Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor. Transfusion Anticoagulant – Classification, Examples and uses.

Anaemia's: Classification – morphological and etiological. Effects of anaemia on body. Blood indices – Colour index, MCH, MCV, MCHC, Erythrocyte Sedimentation Rate (ESR) and Packed cell volume, Normal Values, Definition, determination. Blood Volume – Normal value, determination of blood volume and regulation of blood volume body fluid- pH, normal value, regulation and variation.



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Bachelor Medical Lab Technician (BMLT) Year I

Unit IV

Fundamentals of different Organ Systems:

- i. CardiovascularSystem
- ii. RespiratorySystem
- iii. ExcretorySystem
- iv. ReproductiveSystem
- v. EndocrineSystem
- vi. LymphaticSystem

Reference Books:

- 1. Arthur, Text Book of Physiology, Prism Publishers
- 2. Chatterje C C, Human Physiology, Medical AlliedAgency
- 3. A.K Jain, HumanPhysiology



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Pathology	BML-103

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

Course Contents:

Unit I

Histopathology

Introduction to Histopathology, Receiving of Specimen in the LAB, Grossing Techniques, Mounting Techniques – various Mounts, Maintenance of records and filling of the slides. Use & care of Microscope, Various fixatives, Mode of action, Preparation and Indication. Section Cutting, Tissue processing for routine paraffin sections, Decalcification of Tissues. Staining of tissues - H& E Staining. Bio-Medical waste management.

Unit II

Clinical Pathology

Introduction to Clinical Pathology. Collection, Transport, Preservation, and Processing of various clinical Specimens of Urine Examination – Collection and Preservation of urine. Physical, Chemical, Microscopic Examination, Examination of body fluids. Examination of cerebro spinal fluid (CSF), Sputum Examination. Examination of feces.

Unit III

Haematology

Introduction to Haematology, Normal constituents of Blood, their structure and function. Collection of Blood samples, Various Anticoagulants used in Haematology. Various instruments and glassware used in Haematology, Preparation and use of LAB glassware. LAB safety guidelines, SI units and conventional units in Hospital LAB, Hb, PCV, ESR, Normal Haemostasis, Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin time.

Unit IV

Blood Bank

Introduction, Blood grouping and Rh Types, Cross matching



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Bachelor Medical Lab Technician (BMLT) Year I

Reference Books:

1. Rabbins&Cotran, Pathologic Basis &Diseases
2. Harsh Mohan, Pathologic Basis &Diseases
3. Todd & Sanford, Clinical Diagnosis by LABMethod
4. Dacie& Lewis, PracticalHematology
5. RamanikSood, LAB Technology Methods andInterpretation

*** Latest editions of all the suggested books arerecommended.**



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Medical Biochemistry	BML-104

Course Outcome:

The Biochemistry of circulatory and respiratory system, Lists of biochemical cycles in circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, to understand the biochemical reactions taking place in human body.

Course Content:

Unit I

Pre-analytical variables, Collection of blood, Collection of CSF & other fluids, Urine collection. Use of preservatives, Anticoagulants

Unit II

Introduction to LAB Apparatus

Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes, Burettes, Beakers, Petri dishes, depression plates. Flasks - different types) Volumetric, round bottomed, Erlenmeyer conical etc.). Funnels – different types (Conical, Buchner etc.) Bottles: Reagent bottles – graduated and common, Wash bottles – different types, Specimen bottles etc.

Measuring cylinders, Porcelain dish, Tubes – Test tubes, centrifuge tubes, test tube draining rack Tripod stand, Wire gauze, Bunsen burner. Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, Cuvette holders Racks – Bottle, Test tube, Pipette, Desiccators, Stop watch, rimers, scissors, Dispensers – reagent and sample.

Any other apparatus which is important and may have been missed should also be covered

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Unit III

Maintenance of Lab Glassware and Apparatus

Glass and plastic ware in LAB, use of glass: significance of boro-silicate glassware and cleaning of glassware, different cleaning solutions of glassware and cleaning of plastic ware, different cleaning solutions.

Unit IV

Instruments (Theory and demonstration)

Water bath: Use, care and maintenance, Oven & Incubators: Use, care and maintenance. Water Distillation plant and water deionizers. Use, care and maintenance, Refrigerators, cold box, deep freezers – use, care and maintenance. Reflux condenser: Use, care and maintenance. Centrifuges (Theory and demonstration) Diagrams to be drawn. Definition, Principle, Svedberg unit, centrifugal force, centrifugal field rpm, ref. Conversion of G to rpm and vice versa. Different types of centrifuges, Use care and maintenance of a centrifuge. LAB balances [Theory & Practical) Diagrams to be drawn. Manual balances: Single pan, double pan, trip balance, Direct read out electrical balances. Use care and maintenance. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids. Hygroscopic compounds etc. Colorimeter and spectrophotometer (Theory and Practical) Diagrams to be drawn. Principle, Parts diagram. Use, care and maintenance of pH meter and electrodes, Guidelines to be followed and precautions to be taken while using pHmeter.

Unit V

Conventional and SI Units

Preparation of normal solutions e.g., In Na_2CO_3 , O In Oxalic acid, 0.1N HCl, 0.1N H_2SO_4 , 0.66 N H_2SO_4 etc. Percent solutions. Preparation of different solutions – v/v, w/v (solids, liquids and acids). Conversion of a percent solution into a molar solution.

Unit VI

Dilutions

Diluting solutions: e.g. Preparation of 0.1N NaCl from 1N NaCl from 2N HCl etc., preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc., Saturated and supersaturated solutions.

Standard solutions: Technique for preparation of standard solutions e.g. Glucose, urea, etc.,

Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl₂, potassium carbonate, sodium hydroxide etc.,) Preparation of standards using conventional and SI units.

Acids, bases, salts and indicators: Acids and Bases – Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowry – Bronsted theory of acids and bases classification of acids and bases. Difference between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, Ionisation of water, buffer, pH value of a solution, preparation of buffer solutions using pHmeter.

Salts – Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts.

Acid-base indicators: (Theory and Practical) Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators, and their pH range, suitable pH indicators used in different titrations, universal indicators.

Quality control: Accuracy, Precision, Specificity, Sensitivity. Limits of error allowable in LAB, Percentage error, Normal values and Interpretations, pH Regulation, Disturbance in acid Base Balance, Metabolic acidosis & alkalosis, Respiratory acidosis & alkalosis, Respiratory alkalosis, Basic Principles and estimation of Blood Gases and pH, Basic principles and estimation of Electrolytes, Nutritional importance of lipids, carbohydrates, proteins and Vitamins.

Reference Books:

1. Varley, Clinical Chemistry
2. Teitz, Clinical Chemistry
3. Kaplan, Clinical Chemistry
4. Ramakrishna S, Prasanna KG, Rajna, Text Book of Medical Biochemistry, Orient Longman
5. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.
6. Das, Debajyoti, Biochemistry, Academic, Publishers, Calcutta.
7. Chatterjee, A Text book of Medical Biochemistry
8. U. Satyanarayan, Medical Biochemistry



Course	Subject	Subject Code
BMLT	Bacteriology & Mycology	BML-105

Course Outcome:

To gain complete knowledge about bacteria ,Explains structure, shapes and functions of Bacteria and fungi, Lists of their uses and types.Explains importance of them,Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system.

Course Contents:

Unit I

Bacteriology:

1. Morphology of Bacteria
 - a) Classification
 - b) Size & shape, Structure of Bacteria
2. Growth and Nutrition of Bacteria
3. Anti-Microbial Sensitivity Test
4. Sterilization and Disinfection

Unit II

Mycology:

1. Introduction of Mycology. Terms & Classification.
2. Lab Diagnosis of Fungal Infections
3.
 - c) Superficial Mycoses
 - d) Subcutaneous Mycoses
 - i) Mycetoma
 - ii) Rhinosporidium
 - iii) Sporotrichosis
 - e) Dermatophytes
 - f) Systemic Mycoses
 - i) Histoplasmosis
 - ii) Blastomycosis
 - iii) Coccidioidosis
 - iv) Paracoccidioidosis
 - g) Opportunistic Fungi
 - i) Aspergillosis
 - ii) Penicilliosis

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- iii) Zygomycosis
- iv) Pneumocystis
- v) Mycotoxins

Reference Books:

1. Anand Narayan and Panikar, Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology



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Course	Subject	Subject Code
BMLT	Community Healthcare	BML-106

Course Outcome:

The importance of community and healthcare system in human life, Explains structure and functions Healthcare system. Tells importance of excretory system. Recognizes the value and follow the guideline for effective community service, Explains structure of female reproductive The family, meaning and definitions, Functions of types of family, Changing family patterns. Influence of family on Individuals Health, family

Course Contents:

Unit I

Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.

National Health Policy.

National Health Programmers (Briefly Objectives and Scope).

Population of India and Family welfare programme in India.

Unit II

Family

The family, meaning and definitions, Functions of types of family, Changing family patterns. Influence of family on Individuals Health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their Importance to physiotherapy.

Unit III

Community

Rural community: Meaning and features – Health hazards to rural communities, health hazards to tribal community.

Urban community – Meaning and features – Health hazards of urbanities.

Unit IV

Culture and Health Disorders

Social Change: Meaning of social changes, Factors of social changes, Human adaptation and social changes, Social changes and stress, Social changes and deviance, Social changes and health programme, the role of social planning in the Improvement of health and rehabilitation.

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Unit V

Social Problems of disabled

Consequences of the following social problems in relation to sickness and disability
Population explosion.

Reference Books:

1. K. Perks, Sunder Lal, Adarsh Pandey, Textbook of Preventive Social Medicine
- **Latest editions of all the suggested books are recommended.**



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Basics of Computers	BML-107

Course Outcome:

Complete knowledge about Numbers or numerals, Characters, Organization of a computer, CPU, Motherboard, System Bus, Input Devices, Output Devices, Hardware, Computer Language, Machine Language, Assembly Language, High Level languages, Operating Systems and their Applications, different application of computers in biological sciences.

Course Contents:

Unit I

Objective, Introduction, Generations of computer, First generation, Second generation, third generation, Fourth generation, types of computers, Minicomputers, Mainframe computers, Supercomputers, Numbers or Numerals, Characters, Organization of a computer, CPU, Motherboard, System Bus, Input Devices, Output Devices.

Unit II

Hardware, Computer Language, Machine Language, Assembly Language, High Level languages, Operating Systems and their Applications, Disk Operating System, Unix Operating System, Windows Operating System,

Unit III

Software-Concept, software-Classification, What is Operating system?History of Operating system, Operating System Concepts, Disk Drives and directories.

Unit IV

General introduction to network, Meaning of network, Definition of network, LAN, WAN, VLAN, SONET, Types of network, Common types of network, Categories of networks, Topology in network:-BUS, STAR, RING, TREE, MESH.

Unit V

Accessing the internet, Getting an internet account, Getting connected to internet, World Wide Web, Web page, Net surfing, Beginnings of Email, Email settings, Web browser, web Servers, HTTP,



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	FOUNDATION ENGLISH	BML-108

Course Outcome:

Language Skills : Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, Speech Skills, Composition and Paragraph Writing

Course Contents:

Unit-I

Communication: Meaning & importance of communication, elements of human communication, barriers to effective communication, channels of communication, language as a tool of communication, 7C's of communication, tips for effective communication.

Unit –II

Comprehension

Unit-III

Composition and Paragraph Writing (Based on expansion of an idea).

Unit-IV

Basic Language Skills : Vocabulary – Synonyms, Antonyms, Word Formation, Prefixes and Suffixes, Words likely to be confused and Misused, Words similar in Meaning or Form, Distinction between Similar Expressions, SpeechSkills

Unit-V

Basic Language Skills: Grammar and usage – The Tense Forms, Propositions, Determiners and Countable/Uncountable Nouns, Verb, Articles, Adverbs.

• RecommendedBooks:

English Language and Indian Culture, Published by M.P. Hindi Grant Academy.

NOTE:

Eight questions to be set from unit-1 and four to be attempted.



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Human Anatomy (Practical)	BML-101

Course Contents:

1. Histology of types of epithelium, Histology of serous, mucous & mixed salivary gland.
2. Histology of the 3 types of cartilage, Demo of all bones showing parts, radiographs of normal bones & joints, Histology of compact bone (TS & LS), Demonstration of all muscles of the body, Histology of skeletal (TS & LS), smooth & cardiac muscle.
3. Demonstration of heart and vessels in the body, Histology of large artery, medium sized artery & vein, large vein, Microscopic appearance of large artery, medium sized artery & vein, large vein, pericardium, Histology of lymph node, spleen, tonsil & thymus, Normal chest radiograph showing heart shadows, Normal angiograms.
4. Demonstration of parts of respiratory system, Normal radiographs of chest, Histology of lung and trachea.
5. Demonstration of reflexes.
6. Demonstration of parts of urinary system, Histology of kidney, ureter, urinary bladder, Radiographs of abdomen-IVP, retrograde cystogram.
7. Demonstration of section of male and female pelvis with organs in situ, Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary, Radiographs of pelvis – hysterosalpingogram.
8. Demonstration of the glands, Histology of pituitary, thyroid, parathyroid, suprarenal glands.
9. Histology of peripheral nerve & optic nerve, Demonstration of all plexuses and nerves in the body, Demonstration of all part of brain, Histology of cerebrum, cerebellum and spinal cord.
10. Histology of thin and thick skin, Demonstration and histology of eyeball, Histology of cornea & retina.

Reference Books:

1. William Davis, Understanding Human Anatomy and Physiology, McGrawHill.
2. Chaurasia's, Practical of Human Anatomy.

*** Latest editions of all the suggested books are recommended.**

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Course	Subject	Subject Code
BMLT	Human Physiology (Practical)	BML-102

Course Contents:

1. Haemoglobinometry.
2. White Blood Cell Count.
3. Red Blood Count.
4. Determination of Blood Groups.
5. Leishman's staining and Differential WBC count.
6. Determination of packed cell Volume.
7. Erythrocyte sedimentation rate[ESR].
8. Calculation of blood indices.
9. Determination of Clotting Time, Bleeding Time.
10. Blood pressure Recording.
11. Auscultation for Heart Sounds.
12. Artificial Respiration.
13. Determination of vital capacity

Reference Books:

1. A.K Jain, Practical Handbook of Human Physiology.
2. Nageshwari, Practical Workbook of Human Physiology.
3. Gupta, Medical Physiology Made Easy.

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Course	Subject	Subject Code
BMLT	Pathology (Practical)	BML-103

Course Contents:

1. Urine Examination.

1. a) Physical
b) Chemical
c) Microscopic
2. Blood Grouping Rhtyping.
3. Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate {ESR}
4. Bleeding Time, Clotting Time.
5. Histopathology – Section cutting and H & E Staining.

Reference Books:

1. Robbins & Cotran, Pathologic Basis & Diseases.
2. Harsh Mohan, Pathologic Basis & Diseases.
3. Todd & Sanford, Clinical Diagnosis by Lab Method.
4. Dacie & Lewis, Practical Hematology.
5. Ramanik Sood, Lab Technology Methods and Interpretation.

*** Latest editions of all the suggested books are recommended.**

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Course	Subject	Subject Code
BMLT	Medical Biochemistry (Practical)	BML-104

Course Contents:

1. Analysis of Normal Urine.
2. Liver Function tests.
3. Lipid Profile.
4. Renal Function test.
5. Blood gas and Electrolytes.
6. Demonstration of Glucometer with strips.

Reference Books:

1. Varley, Clinical Chemistry.
2. Kaplan, Clinical Chemistry.
3. Das, Debajyoti, Biochemistry, Academic, Publishers, Calcutta.
4. Chatterjee, A Text book of Medical Biochemistry.
5. Satyanarayan, U., Medical Biochemistry.

*** Latest editions of all the suggested books are recommended.**



Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Bacteriology & Mycology (Practical)	BML-105

Course Contents:

Bacteriology:

1. Compound Microscope.
2. Demonstration and sterilization of equipments – Hot Air Oven, Autoclave, Bacterial filters.
3. Demonstration of commonly used culture media, Broth, and different agars.
4. Antibiotic sensitivity test.
5. Demonstration of common serological tests – Vidal, VRDL, ELISA Techniques.
6. Grams staining.
7. Acid fast staining.

Mycology:

1. Slide culture technique
2. KOH mount
3. Identification of fungal cultures
4. Colony characteristics and Microscopic examination of Candida, Cryptococcus, Trichophyton, Microsporum, Aspergillus niger, Aspergillus fumigatus, Rhizopus, Fusarium, Penicillium.

Reference Books:

1. Anand Narayan and Panikar, Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

*** Latest editions of all the suggested books are recommended.**



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Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Basics of Computers (Practical)	BML-106

Course Contents:

Unit I

Concept in Computer: Definition of Computer, History of Computer , Generations, Characteristic and Application of Computers, Classification of Computers, Computer Hardware, CPU, Various Types of I/O devices, Peripherals Devices, Storage Devices. Management Introductory concepts in operating system, textual Vs GUI Interface, Introduction to DOS

Unit II

Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, MailMerge.

Unit III

Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, referencing formula cells in other formulae , Naming cells, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document , Page set up, Print Preview, PrintingWorksheets.

Unit IV

Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents, MS- Access, Creating tables and database, Internet, Use of Internet (Mailing, Browsing, Surfing).

Text Books:

1. Sinha P. K., ComputerFundamentals.
2. Bruck Bill, The Essentials Office 2000Book.

Reference Books:

1. Leon A and Leon M., Introduction toComputers.
2. Norton's Peter, Introduction toComputers.

*** Latest editions of all the suggested books arerecommended.**



Bachelor Medical Lab Technician (BMLT) Year I

Course	Subject	Subject Code
BMLT	Hospital Postings	BML-157

Course Outcome:

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection to different labs, Process of performing various tests in different labs.

Course Contents:

Students shall be deputed to various practical training of handling patients, body fluids samples.

Labs of Pathology department wherein they shall undergo collection and processing of blood, urine, sputum stool and

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection to different labs.

Process of performing various tests in different labs.

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.



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Study and Evaluation Scheme Programme: Bachelor Medical LAB Technician (BMLT) Year II

S.No	Subject Code	Subject	Sessional						
			Internal Assessment		Theory		Practical		Total
			Max marks	Min marks	Max marks	Min marks	Max marks	Min marks	Max marks
1.	BML201	Immunology	50	20	100	40	50	20	200
2.	BML202	Bacteriology & Applied Bacteriology	50	20	100	40	50	20	200
3.	BML203	Cytology	50	20	100	40	50	20	200
4.	BML204	Immunology & Blood Transfusion	50	20	100	40	50	20	200
5.	BML205	Clinical Biochemistry-I	50	20	100	40	50	20	200
6.	BML206	Applied Medical Biochemistry	50	20	100	40	-	-	150
7.	BML256	Hospital Posting	-	-	-	-	100	40	100
Total			300	120	600	240	350	140	1250



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Immunology	BML-201

Course Outcome:

Complete knowledge about human immune system and there responses, detailed idea about the immunity of the body. Innate immunity, Acquired immunity (adaptiveimmunity), Active and passiveimmunity, Natural acquired active immunity, Artificial acquired active immunity

Course Contents:

Unit-I

Infection 2hrs

Unit-II

Immunity 4 Hrs.

- a) Innate immunity
- b) Acquired immunity (adaptiveimmunity)
- c) Active and passiveimmunity
 - i) Natural acquired active immunity
 - ii) Artificial acquired active immunity
 - iii) Natural acquired passive immunity - Breastfeeding
 - iv) Artificial acquired passiveimmunity

Unit-III

Immune System Brief Introduction

- a) Celldevelopment
- b) Lymphocytes
 - i) Bursa ofFabricus
 - ii) Stem celldifferentiation
 - iii) Gut-associated lymphoid tissue(GALT)

- Stem cell differentiation (general knowledge of their role)
- Cytotoxic T (TC) cells
- Delayed-type hypersensitivity T (TD) cells
- Helper T (TH) cells
- Suppressor T (TS) cells
- iv) Natural killer cells
- c) Dual nature of the immune system
- i) Humoral immunity
- ii) Cell-mediated immunity
- d) General properties of immune responses
- i) Recognition of self versus nonself

Humoral Immunity

General characteristics
Antigen types
Antigen sensitization
Plasma cells

Unit-IV

Antigen & Antibody

- i) Antigens
- ii) Epitopes (antigenic determinants)
- iii) Hypersensitivity

Unit-V

- iv) Antibodies consequences of antibody binding
- v) Titer

Unit-VI

Immune Response

- a) Properties of Antibodies (immunoglobulins)
- i) Light chains
- ii) Heavy chains
- iii) Constant and variable regions
- iv) Antigen binding sites

Unit-VII

Fab and Fc regions

B. Classes of immunoglobulins

- 1. IgG
- 2. IgM
- 3. IgA

- a. Jchain
 - b. Secretorypiece
- 4. IgE
- 5. IgD
- 6. Antibodytitre

C. Primary and secondaryresponses

- 1. Primaryresponse
- 2. Secondaryresponse

D. Kinds of antigen-antibody responses

E. How humeral responses eliminate foreignantigens

- 1. Basicmechanisms
 - a. Agglutination
 - b. Opsonization
 - c. Activation ofcomplement
- 2. Summary of humoralimmunity

Unit-VIII

Monoclonal Antibodies

- A. Production
 - 1. Hybridomaformation
 - 2. Cloning ofcells
- B. Uses
 - 1. Researchtools
 - 2. Diagnosticuses
 - 3. Therapy

Unit-IX

Cell-Mediated Immunity

- A. Generalcharacteristics
- B. The cell-mediated immune reactions
 - 1. Antigenprocessing
 - 2. Helper T (TH)cells
 - a. TH1 (inflammatory T) cells b. TH2 cells
 - 3. Suppressor T (TS)cells
 - 4. Cytotoxic (killer) T (TC)cells

Unit-X

Factors That Modify Immune Responses

- A. Compromised host
- B. Modifying factors
 - 1. Age
 - 2. Stress
 - 3. Diet
 - 4. Exercise
 - 5. Injuries
 - 6. Environmental factors
 - 7. Hypersensitivity reactions
 - 8. Autoimmune disorders
 - 9. Transplantation immunology

Reference Books:

- 1. Anand Narayan and Panikar Textbook of Microbiology
- 2. Baweja, Medical Microbiology
- 3. Arora, Medical Lab Technology



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Bacteriology & Applied bacteriology	BML-202

Course Outcome:

To gain complete knowledge about bacteria ,Explains structure, shapes and functions of Bacteria and fungi, Lists of their uses and types.Explains importance of them, students will have complete information about gram staining techniques.

Course Contents:

1. Antimicrobial Sensitivity.
2. Bacteriology of Water, Milk and Air
3. Systematic Bacteriology

Classification, Morphology, Genotypic & Phenotypic characteristics, Pathogenesis, Disease caused, Lab Diagnosis & Prophylaxis

A. Gram Positive Bacteria

- i. Staphylococcus
- ii. Streptococcus
- iii. Pneumococcus
- iv. Corynebacteria
- v. Clostridia
- vi. Bacillus
- vii. Listeria
- viii. Actinomyces
- ix. Nocardia

B. Gram Negative Bacteria

- i. Neisseria
- ii. Enterobacteriaceae
- iii. Escherichia
- iv. Klebsiella
- v. Enterobacter
- vi. Proteus
- vii. Salmonella
- viii. Shigella
- ix. Yersinia
- x. Pseudomonas
- xi. Haemophilus

- xii. Brucella
- xiii. Pasturella
- xiv. Legionella
- xv. Bordetella
- xvi. Burkholderia
- xvii. Gardnerella
- xviii. Vibrio
- xix. Campylobacter
- xx. Helicobacter
- xxi. Bacteroides
- xxii. Fusobacterium

C. Spirocheates

- i. Treponema
- ii. Borrelia
- iii. Leptospira

D. Mycobacteria

- i. M.tuberculosis
- ii. M.leprae
- iii. AtypicalMycobacteria

E. Mycoplasma

F. Chlamydiae

G. Rickettsiaceae

H. APPLIED MICROBIOLOGY RELATED TO DISEASES.

Molecular techniques in diagnostic microbiology- PCR, DNAhybridisation

Reference Books:

- 1. Anand Narayan and Panikar Textbook ofMicrobiology
- 2. Baweja, MedicalMicrobiology
- 3. Arora, Medical LabTechnology

*** Latest editions of all the suggested books arerecommend**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Cytology	BML-203

Course Outcome:

Be able to explain the evaluation of cell and the variety of cells occurring this progression, relate evaluation and progress of cells structures, compare cells according to their structural and functional characteristics and distinguish differences, categorize of cell types, Be able to list and define of chemical and biological components of cell contents, define inorganic and organic molecules containing of the cell, explain life activities in cells.

Course Contents:

1. Normal cell structure, functions, cytologic criteria of malignancy
2. Types of specimens, methods of collection & preparation of cell block
3. Different fixatives and methods of fixation
4. Staining:
 - (a) Papanicolaou's stain- principle, preparation and staining techniques
 - (b) May Grunwald Giemsa stain
 - (c) Shorr's stain
 - (d) Aceto-orcein stain

Female Genital tract

1. Anatomy, Histology, Physiology & normal cytology
 2. Techniques of collection of specimen for cervical cytology study
 3. Hormonal cytology and cytological indices
 4. Cervical cytology screening for malignant and nonmalignant Conditions, Radiation changes & followup
 5. Cytology of Endometrium – normal, nonmalignant and in malignant Conditions
 6. Cytology in Ovarian cancers
- Respiratory tract, gastrointestinal tract and Urinary tract
Anatomy, Histology and Physiology
Collection of sample, preparation of smears and staining
Cytology of normal, nonmalignant & malignant conditions C S F and Effusions
7. Cytology of CSF in inflammatory, nonmalignant & malignant Conditions
 8. Cytology of effusions in nonmalignant and malignant conditions Glands – Breast, Thyroid, Salivary glands and Lymph nodes

Automation in Cytology

1. FlowCytometry
2. ImageAnalysis
3. Principles, Equipments, procedures &Evaluation

Tissue culture and Immunohistochemistry

1. Equipments for Tissue culture studies
 - (a) Laminar air flow equipment
 - (b) Carbon dioxide incubator
 - (c) Inverted microscope
2. Derivation of culture from tissue
 - (a) Enzymatic digestion of tissue using collagenase, protease
 - (b) Plating in tissue culture media
- (c) Observation of cells in Invertoscope
- (d) Subculturing & derivation of cell lines
3. Characterization of cell lines
 - (a) Determination of biochemical markers in cells
 - (b) Chromosomal & DNA content of cells
 - © Immunological properties of cells
4. Preservation of immortalized cell lines
 - (a) Storage in Glycerol in Liquid Nitrogen
 - (b) Storage in Dimethyl sulfoxide in Liquid Nitrogen

Cytogenetics

1. Introduction to cytogenetics, terminology, classification and Nomenclature of human chromosomes
2. Methods of karyotypic analysis
 - (a) Culture of bone marrow cells, peripheral blood lymphocytes, Solid tumors & skin fibroblasts
 - (c) Direct preparation from tumor materials
3. Characterization of human chromosomes by various banding techniques
4. Sex chromatin identification

Immunocytochemistry

1. Basics concepts, monoclonal antibodies & preparation
2. Fluorescence reactions

Reference Books:

1. Orell, Fine Needle Cytology, 4th Ed

*** Latest editions of all the suggested books are recommended**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Immunohematology and Blood transfusion	BML-204

Course Outcome:

Apply advanced blood bank and blood transfusion knowledge to make appropriate and effective on-the-job professional decisions. Perform and interpret commonly utilized procedures in the blood bank LAB. Recognize normal and abnormal test results and correlate these data with appropriate pathologic conditions to accurately advise health care providers. Adapt immunohematology LAB techniques and procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner.

Course Contents:

1. ABO Blood group and Rh system
2. Subgroups of A and B, Other blood groups and Bombay group
3. HLA antigens and their significance
4. Principles of Blood transfusion:
 - (a) Blood donor selection
 - (b) Methods of bleeding donors
 - (c) Blood containers, anticoagulants and storage of blood
 - (d) Coomb's test and its significance
 - (e) Screening of blood for infective material
 - (f) Blood components, preparation & component therapy
 - (g) Autologous transfusion
 - (h) Transfusion reactions and workup
 - (i) Blood bank organization, standards, procedures, techniques and quality control

Reference Books:

1. Rudman, Blood Banking
2. Ramnik Sood, Textbook of Medical Lab Technology
3. Mehdi, Essential of Blood Banking: A Handbook of Students of Blood Banking.

* **Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Clinical Biochemistry –I	BML-205

Course Outcome:

Clinical Biochemistry has applications in **clinical** diagnosis, understanding pathology of diseases, treatment of diseases, designing of drugs and understanding their metabolism and manufacture of various biological products like amino acids, proteins, antibiotics, hormones, enzymes, nutrients, etc.

Course Contents:

1. Colorimetry- Principle & It's working.
2. Carbohydrates (Metabolism & disorder of carbohydrate metabolism) - Blood sugar & its types, DM, complications.
3. Lipids (metabolism & disorder) – digestion & absorption. Metabolism.
4. Proteins – digestion & absorption.
5. Vitamins.
6. Enzymes.
7. Biophysics – surface tension, osmolarity & viscosity.
8. Spectrophotometry.
9. Urine Chemistry.
10. Quality control in clinical biochemistry LAB.

Reference Books:

1. Raju Bindu, *Review of Medical Biochemistry*
2. Damodaran K, *Practical Biochemistry*
3. DS Sheriff, *Textbook of Medical Biochemistry*
4. U. Satyanarayan, *Textbook of Medical Biochemistry*

*** Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Advanced Medical Biochemistry	BML-206

Course Outcome:

Students will explain/describe the synthesis of proteins, lipids, nucleic acids, and carbohydrates and their role in metabolic pathways along with their regulation at the epigenetic, transcriptional, translational, and post-translational levels including RNA and protein folding, modification, and degradation. Regulation by non-coding RNAs will be tied to the developmental and physiological functioning of the organism.

Assessment: Class exams and final exams, research papers, lab reports with student-generated data.

Course Contents:

1. Radio isotope techniques: Principle, definition of units, measurement of radiation standards, crystal counting. Resources and applications
2. Immunoassay: Different methods, principle and applications.
3. Biostatistics: Population means, Correlation Coefficient, Standard deviation, Standard error.

Reference Books:

1. Varley, Clinical Chemistry
2. Teitz, Clinical Chemistry
3. Kaplan, Clinical Chemistry
4. Ramakrishna S, Prasanna KG, Rajna, Text Book of Medical Biochemistry, Orient Longman
5. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.
6. Das, Debajyoti, Biochemistry, Academic, Publishers, Calcutta.
7. Chatterjee, A Text book of Medical Biochemistry
8. Satyanarayan, U., Medical Biochemistry

*** Latest editions of all the suggested books are recommended**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Immunology (Practical)	BML-201

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

Course Contents:

Estimation of different immunoglobulins. Study of antigen and antibody reaction.
Electrophoresis

Reference Books:

1. Anand Narayan and Panikar Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

* Latest editions of all the suggested books are recommended.



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Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Bacteriology & Applied Bacteriology (Practical)	BML-202

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

Course Contents:

BACTERIOLOGY

1. Staining a. Grams staining ZN staining Alberts staining

Hanging drop preparation Culture methods

Introduction to biochemical reactions Identification of bacterial culture Colony characteristics Morphological characteristics Motility study Interpretation of biochemical reactions

2. Antibiotic sensitivity testing- Kirby Bauer method

1. Applied bacteriology- exercise
2. Immunology: Serological tests:

Specimen collection

Principle

Methods.

Procedure

Normal values/ significant titer

Interpretations

Limitations: of all the following tests

Widal

ASO

CRP

RPR/VDRL/TRUST

RA

HBsAg /anti HIV detection

ELISA



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Bachelor Medical Lab Technician (BMLT) Year II

Reference Books:

1. Anand Narayan and Panikar, Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

*** Latest editions of all the suggested books are recommended**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Cytology (Practical)	BML-203

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

1. Preparation of various cytology smears and fixation
2. Papanicolaou's and May Grunwald-Geimsa staining
3. Hormonal cytology study

Reference Books:

1. Orell, Fine Needle Cytology, 4th ed

* **Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Immunohematology and Blood Transfusion (Practical)	BML-204

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

Practicals

Blood grouping and Rh typing
Cross matching techniques
Screening of Donor's blood for infective agents
Transfusion reaction work up
Preparation of blood components

Reference Books:

1. Rudman, Blood Banking
2. Ramnik Sood, Textbook of Medical LAB Technology
3. Mehdi, Essential Of Blood Banking: A Handbook of Students of Blood Banking and Clinical Residence

* **Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Clinical Biochemistry–I Practical	BML-205

Course Outcome:

The Pathological aspects of circulatory and respiratory system, Lists organs of circulatory system. Explains structure and functions of heart, Lists of types of vessel. Explains importance of respiratory system. Tells structure and functions of lungs, explain properties of digestive and excretory systems, Lists organs of digestive system. Tells importance of excretory system. Recognizes organs of excretory system, recognize organs of reproductive system, Explains structure of female reproductive organ.

Course Contents:

1. Estimation of glucose, urea, creatinine. & uric acid.
2. Estimation of bilirubin, amylase, SGOT, SGPT.
3. Estimation of cholesterol, triglyceride & serum HDL.
4. Estimation of total protein, A:G ratio & globulin fraction.

Reference Books:

1. Chawla, Practical Clinical Biochemistry Methods and Interpretation.

*** Latest editions of all the suggested books are recommended.**

R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year II

Course	Subject	Subject Code
BMLT	Hospital Postings	BML-256

Course Outcome:

To provide an environment that enables students to benefit and learn nuances of **Hospital**Management from their collective **learning** experiences. To offer **opportunities** to develop the ability to think analytically and build capacity for independent **learning**.

Course Contents:

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection centres to different labs.

Process of performing various tests in different labs

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.



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Study and Evaluation Scheme
Programme: Bachelor Medical LAB Technician (BMLT) Year III

S.No	Subject Code	Subject	Sessional						
			Internal Assessment		Theory		Practical		Total
			Max marks	Min marks	Max marks	Min marks	Max marks	Min marks	Max marks
1.	BML301	Parasitology & Virology	50	20	100	40	50	20	200
2.	BML302	Histopathology	50	20	100	40	50	20	200
3.	BML303	Hematology	50	20	100	40	-	-	150
4.	BML304	Clinical Biochemistry- II	50	20	100	40	50	20	200
5.	BML305	Clinical Biochemistry- III	50	20	100	40	50	20	200
6.	BML355	Hospital Posting	-	-	-	-	100	40	100
Total			250	100	500	200	300	120	1050



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Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Parasitology & Virology	BML-301

Course Outcome:

Overall Aim of the Courses: To enable students to understand the pathogenesis, clinical presentations and complications of parasitic diseases. To provide students with adequate knowledge about endemic **parasites** and national parasitic problems as well as re-emerging parasitic infection.

Course Contents:

Unit I

Parasitology

1. Protozoology
 - a) Entamoebahistoltytica
 - b) Balantidiumcoli
 - c) Giardia
 - d) Toxoplasma
2. Helminthology
 - a) Cestodes - Taenia, Echinococcus, D.latum,H.nana
 - b) Trematodes - Schistosoma,Fasciola
 - c) Nematodes – Ascaris, hookworm, Strongyloides, Trichuris, Trichinella, Dracunculus, Filarialworms

Unit II

Virolog

General properties of virus, cultivation of viruses, Pox viruses, Herpes viruses, Adenoviruses, Picornaviruses, Orthomyxovirus, Paramyxoviruses, Arboviruses, Rhabdoviruses, Hepatitis viruses, Oncogenic viruses, HIV, Parvovirus, Viral haemorrhagic fevers, SARS, Rotavirus, Norwalk virus, Astrovirus, Corona virus

Reference Books:

1. Anand Narayan and Panikar, *Textbook of Microbiology*
2. Baweja, *Medical Microbiology*
3. Arora, *Medical Lab Technology*
4. Karykatee and Damle, *Textbook of Parasitology*

*** Latest editions of all the suggested books are recommended**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Histopathology	BML-302

Course Outcome:

To be able to identify and describe in detail the microscopic structure of the major organs, tissues and cells of the body. be able to explain the theoretical background to surgical cutup, tissue fixation, tissue processing, microtomy and staining using routine and specialised techniques.

Course Contents:

Unit-I

Instrumentation:

- Automated TissueProcessor
- Micro tomes, Knives, Knife sharpeners And Ultramicrotome
- Freezing microtome and Cryostat
- Automatic slideSteiner

Unit-II

Techniques:

- Routine paraffin sectioncutting
- Frozen section and Cryostat section studies Staining techniques: Special stains for Carbohydrates, Connective tissue, Nervous tissue, Bone tissue, Collagen fibres, Elastic Fibres, Lipids, Organisms, fungi, parasites, pigments and deposits intissues.

Unit-III

Mounting techniques: Various mounts and mounting techniques.

Electron Microscope, Scanning electron microscope, Dark ground and Fluorescent microscope, Museum technology.

Unit-IV

Microphotography and its applications.
Maintenance of records and filling of slides.ICDS Classification and coding.
Application of computers in Pathology.

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Reference Books:

1. Praful Godkar, *Textbook of Medical LAB Technology*
2. Dasie Lewis, *Medical LAB Technology*
3. Kanai Mukherjee, *Medical LAB Technology*
4. Bancroft, *Textbook of Medical LAB Techniques*

*** Latest editions of all the suggested books are recommended**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Haematology	BML-303

Course Outcome:

Distinguish normal and abnormal **hematological** LAB findings to predict the diagnosis of **hematological** disorders and diseases. Recognize LAB results consistent with leukemia and other white blood cell disorders.

Course Contents:

Unit-I

Haematopoiesis, Stem cells, formed elements of blood and their functions

Anticoagulants used in various hematological studies, Routine hematological tests and normal values:

- Determination of Hemoglobin and Hematocrit
- Enumeration of RBC, WBC & Platelets
- Absolute Eosinophil count
- Reticulocyte count
- Calculation of Red cell Indices
- Preparation and staining of blood film for morphological examination of red cells and differential count.

Unit-II

Special Hematological tests:

- Sickling tests
- Osmotic fragility test
- Determination HbF and HbA₂
- Hemoglobin Electrophoresis
- Investigation of G6PD deficiency
- Plasma haptoglobin and demonstration of hemosiderin in urine
- Tests for Autoimmune hemolytic anaemia
- Measurement of abnormal Hb pigments

Unit-III

Hemostasis and Coagulation

- Normal hemostasis, mechanism of blood coagulation and normal fibrinolytic system
- Collection of blood and anticoagulants used in coagulation studies

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- c) Investigation of hemostatic mechanism-BT, CT, whole blood coagulation time test, PT, PTT
- d) Assay of clotting factors.
- e) Tests for fibrinolytic activity- Euglobulin , clot lysis test and FDP
- f) Platelet function tests

Unit-IV

Investigation of Megaloblastic anaemia and Iron deficiency anaemia

- a) B12 and Folate assay and Schilling test
- b) Estimation of serum iron and iron binding capacity

Unit-V

Bone marrow biopsy study

- a) Needle aspiration and surgical biopsy technique
- b) Preparation of smears and staining
- c) Demonstration of LE cells
- d) Quality control

Reference Books:

1. Praful Godkar, *Textbook of Medical LAB Technology*
2. Dasie Lewis, *Medical LAB Technology*
3. Kanai Mukherjee, *Medical LAB Technology*
4. Mehendi, *LAB Procedure in Haematology*

*** Latest editions of all the suggested books are recommended.**



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Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Clinical Biochemistry –II	BML-304

Course Outcome:

Understand biochemistry at the atomic level, draw molecules and reaction mechanisms perfectly. Understand in detail about amino acid structures, types of amino acids, classifications, structure of proteins and types of proteins. Learn the molecular structures of 20 amino acids, differentiating essential and non-essential amino acids, biologically important modified amino acids and their functions.

Course Contents:

1. Liver function test.
2. Renal function test.
3. Gastric function test.
4. Cardiac profile test.
5. Hormones – introduction, classification, chemistry & function.
6. Water & Mineral metabolism.
7. Urolithiasis – formation & types of urinary stones & examination.
8. Serum electrophoresis.
9. Importance of blood urea, uric acid & creatinine.

Reference Books:

1. Raju Bindu, Review of Medical Biochemistry
2. Damodaran K, Practical Biochemistry
3. DS Sheriff, Textbook of Medical Biochemistry
4. Satyanarayan, U., Textbook of Medical Biochemistry

*** Latest editions of all the suggested books are recommended.**



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Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Clinical Biochemistry- III	BML-305

Course Outcome:

Recognize the structural levels of organization of proteins, 3D structure of proteins, its functions, denaturation (hemoglobin, myoglobin etc.) Learn how amino acids and proteins are metabolized, emphasizing the role of few intermediates of their metabolism, monitoring the deficiency and abundance disorders of amino acid metabolisms and the role of enzymes in the regulation of the pathways

Course Contents:

Liver Function tests. Role of the Liver in metabolism, formation of bilirubin and mode of excretion. Gastric Analysis: Composition of gastric juice, concepts of free and bound acids, gastric acid secretions stimulations.

Renal function, renal function test and renal clearance test.

Calculi: Theory of formation and analysis, Renal clearance concentration and application of Phenolsulfonphthalein.

Acid – Base balance and its disturbances.

Inorganic ions: Calcium metabolism, phosphate metabolism, sodium-potassium balance and trace element (Fe, CU).

Metabolism of proteins and amino acids.

Over view & replication, translation, transcription and genetic engineering. Metabolic disorders:

- a. Amino acids
- b. Proteins
- c. Inborn errors of metabolic disorders.
10. Clinical enzymologist.



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Bachelor Medical Lab Technician (BMLT) Year III

Reference Books:

1. Varley, ClinicalChemistry
2. Teitz, ClinicalChemistry
3. Kaplan, ClinicalChemistry
4. Ramakrishna S, Prasanna KG, Rajna, Text Book of Medical Biochemistry, Orient Longman
5. Vasudevan DM &Sreekumari S, Text Book of Biochemistry for MedicalStudents.
6. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
7. Chatterjee, A Text book of MedicalBiochemistry
8. Satyanarayan, U., MedicalBiochemistry

Latest editions of all the suggested books are recommended.



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Parasitology & Virology (Practical)	BML-301

Course Outcome:

To gain Practical experiments knowledge in lab

Course Contents:

Parasitology:

1. Stool examination
2. Salinemount
3. Iodinemount

Virology

1. Demonstration of embryonated egg inoculation
2. Virology exercise:
 - a) Spots test, ELISA (HBV, HCV, HIV), HI, Paul Bunnell test
 - b) Applied exercise – Rabies, Infantile Diarrhoea, Herpes, HBV, HIV, Influenza.

Reference Books:

1. Anand Narayan and Panikar Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology
4. Karyakartee and Damle, Textbook of Parasitology

*** Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Histopathology & Hematology (Practical)	BML-302

Course Outcome:

Perform Experiment related to Blood in the LAB.

Course Contents:

1. Paraffin sectioncutting
2. Staining by Hematoxylin& Eosin and other specialstains
3. Determination of Hemaglobin andHematocrit
4. Red blood cellcount
5. Total white blood cellcount
6. Plateletcount
7. Differential count of white bloodcells
8. Absolute Eosinophilcount
9. Reticulocyte count
10. Calculation of red cellindices
11. Determination ofESR
12. Determination of BT, CT, Whole blood clottingtime
13. Determination of PT and PTT
14. Blood smear preparation andstaining
15. Osmotic fragilitytest
16. Sicklingtest
17. LE cell preparation



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Bachelor Medical Lab Technician (BMLT) Year III

Reference Books:

1. Praful Godkar, Textbook of Medical LAB Technology
2. Dasie Lewis
3. Kanai Mukherjee, Medical LAB Technology, 3rd vol.
4. Bancroft, Textbook of Medical LAB Techniques
5. Mehdi, LAB Procedure in Haematology.

*** Latest editions of all the suggested books are recommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Clinical Biochemistry –IIPractical	BML-304

Course Outcome:

Perform Experiment related to Blood in the LAB.

Course Contents:

1. Estimation of acid & alkaline phosphates, & inorganicphosphorus.
2. Estimation of sodium, potassium,calcium.
3. Estimation of urinary proteins, & ureacalcium.
4. Electrophoresis of serum, CSFproteins.

Reference Books:

1. Chawla, Practical Clinical Biochemistry Methods andInterpretation.

*** Latest editions of all the suggested books arerecommended.**



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Clinical Biochemistry-III (Practical)	BML-305

Course Outcome:

Perform Experiment related to Blood in the LAB.

List OfPracticals:

1. Specimen Collections: Urine, Blood, Gastricjuice,
2. Accuracy, precision and quality control –Methods used to check the accuracy ofa result by histogram, F-test and Barrest.
3. Enzymes: amylase (salivary and Pancreatic), Alkaline Phosphates, AcidPhosphates, SGOT, SGPT, LDH and CPK- demonstration on auto analyzer.
4. Liver function tests: estimation of Bilirubin – total and conjugates,Urobilinogen,
5. Gastric analysis: Determination of free and total acid, gastricstimulation.
6. Lipid determination of serum lipids – cholesterol, triglycerides and lipoprotein Fractionation.
7. Inorganic ions – Determination of calcium in serum and urine, serumphosphates, chloride sodium andpotassium.
8. Analysis of calculi
9. Urine – screening for inborn errors ofmetabolism
10. RFT
11. Cardiacmarkers.
12. (Relevant charts on the above topics for interpretation anddiagnosis).

Reference Books:

1. Vasudevan DM &Sreekumari S, Text Book of Biochemistry for MedicalStudents.
2. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
3. Chatterjee, A Text book of MedicalBiochemistry
4. Satyanarayan, U., MedicalBiochemistry



R.K.D.F. UNIVERSITY, BHOPAL

Bachelor Medical Lab Technician (BMLT) Year III

Course	Subject	Subject Code
BMLT	Hospital Postings	BML-355

Course Outcome:

Demonstrate adequate knowledge and mastery of techniques relevant to hospital management and/or to demonstrate a clear understanding of concepts, information and techniques at the forefront of the hospital management discipline 2) Develop awareness of the responsibilities of senior hospital management, including understanding the role and functions of hospitals and their health care context and prepare to handle the management and development issues faced by a hospital manager, including structure and organization; planning and managing resources; and reviewing and evaluating services. 3) Recognize how operational problems and situations are handled in practice by undertaking and reporting at a hospital attachment 4) Formulate ideas and develop and participate in implementation of plans 5) Take a proactive and self-reflective role in working and to develop professional relationship

Course Contents:

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection centres to different labs.

Process of performing various tests in different labs

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.