



GALGOTIAS UNIVERSITY

Syllabus of

B.Sc. Medical Laboratory Technology

Name of School: School of Medical and Allied Sciences

Department: Medical Laboratory Technology

Year: 2018-2019



(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

School of Medical and Allied Sciences

Course: B. Sc. (Medical Lab Technology)

Scheme: 2018 – 2022

Date of BoS: 20/07/2018

Curriculum

2018-19-Programme Structure

Course Code	Course	L	T	P	C
SEMESTER-I					
BMLT1001	General Anatomy-I	3	0	0	3
BMLT1002	General Physiology -I	3	0	0	3
BMLT1003	Basic Biochemistry	3	0	0	3
ENVS1001	Energy & Environmental Sciences	3	0	0	3
PENG1001	Communicative English-I	3	0	0	3
BMLT1051	General Anatomy Lab-I	0	0	2	1
BMLT1052	General Physiology Lab-I	0	0	2	1
BMLT1053	Biochemistry Lab-I	0	0	2	1
PENG1002	Communicative English Lab-I	0	0	2	1
	TOTAL				19

SEMESTER-II

BMLT2001	General Anatomy- II	3	0	0	3
BMLT2002	General Physiology-II	3	0	0	3
BMLT2003	Biochemical metabolism	3	0	0	3
BMLT2004	General Microbiology	3	0	0	3
PENG1003	Communicative English-II	3	0	0	3
BMLT2051	General Microbiology Lab	0	0	2	1
BMLT2052	Biochemical metabolism Lab	0	0	2	1
PENG1004	Communicative English Lab-II	0	0	2	1
	TOTAL				18

SEMESTER-III

BMLT3001	Systemic bacteriology	3	0	0	3
BMLT 3002	Pathology	3	0	0	3
BMLT3003	Analytical biochemistry	3	0	0	3
COMP1111	Computer Fundamentals	3	0	0	3
BMLT3004	Laboratory Quality Management-I	2	0	0	2
BMLT3005	Infection Control and Prevention-I	2	0	0	2
BMLT3051	Analytical biochemistry Lab	0	0	2	1
BMLT3052	Pathology Lab	0	0	2	1
BMLT3053	Systemic bacteriology Lab	0	0	2	1
COMP1112	Computer Fundamentals Lab	0	0	2	1
	TOTAL				18

SEMESTER-IV

BMLT4001	Hematology & hematological diseases	3	0	0	3
BMLT4002	Immunology and serology	3	0	0	3
BMLT4003	Clinical Biochemistry	3	0	0	3
BMLT4004	Laboratory Quality Management-II	2	0	0	2
BMLT4005	Infection Control and prevention-II	2	0	0	2
BMLT4051	Hematology & hematological diseases Lab	0	0	2	1
BMLT4052	Immunology and serology Lab	0	0	2	1
BMLT4053	Clinical Biochemistry Lab	0	0	2	1
					14

SEMESTER-V

BMLT5001	Virology & Mycology	3	0	0	3
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BMLT5002	Transfusion Medicine	3	0	0	3
LLL101	Universal human values and ethics	3	0	0	3
BMLT5003	Medical Laboratory Technician-I	6	0	0	6
BMLT5004	Phlebotomy-I	6	0	0	6
BMLT5051	Virology & Mycology Lab	0	0	2	1
BMLT5052	Transfusion Medicine Lab	0	0	2	1
BMLT5053	Medical Laboratory Technician Lab-I	0	0	6	3
BMLT5054	Phlebotomy Lab-I	0	0	6	3
					20

SEMESTER-VI

BMLT6001	Parasitology	3	0	0	3
BMLT6002	Clinical Laboratory Practice(CLP)	3	0	0	3
BMLT6003	Research Methodology & Biostatistics	3	0	0	3
BMLT6004	Medical Laboratory Technician-II	6	0	0	6
BMLT6005	Phlebotomy-II	6	0	0	6
BMLT6052	Medical Laboratory Technician Lab-II	0	0	6	3
BMLT6053	Phlebotomy Lab-II	0	0	6	3
BMLT6054	Microbiology (Project)	0	0	0	2
BMLT6055	Biochemistry (Project)	0	0	0	2
BMLT6056	Hematology (Project)	0	0	0	2
BMLT6057	Transfusion Medicine(Project)	0	0	0	2
					20

SEMESTER-VII

BMLT 7001	Professional Training	0	0	40	20
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	Total				20

SEMESTER-VIII

BMLT 8001	Professional Training	0	0	40	20
	Total				20
	Total				149

Detailed Syllabus

Name of The Course	General Anatomy- I			
Course Code	BMLT1001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To develop the knowledge about various anatomical planes, Movements and organ systems of human body
- 2 To gain the knowledge of Axial, Appendicular and lower limbs and cavities of the human body
- 3 To learn the morphology and types of various tissues in human body
- 4 To know the anatomy of digestive system in human body

Course Outcomes:

On completion of course student will be able to,

CO1	Demonstrate anatomical position planes, Types of movement & organ systems of body
CO2	Show Axial, Appendicular skeleton, Lower upper limbs & Cavities of Body
CO3	Differentiate types of tissues in human body
CO4	Describe and teach the anatomy of digestive system of human body
CO5	Describe and teach the urinary system of human body

Text Book (s)

1. Text book of Anatomy & Physiology by P.R Ashalatha
2. Text book of Anatomy & Physiology by Ross & Willson

Reference Book (s)

- 1.Text Book of Anatomy by B.D.Chaurasiya
- 2.Anatomy Review by Gray's

Unit-1 Introduction to Anatomy	7 hours
Anatomical Position, Anatomical Planes, Types of Movement & Organs systems of body	
Unit-2 Skeletal System	8 hours
Axial Skeleton: Skull & Vertebral column. Appendicular skeleton: Shoulder girdles, upper limbs, pelvic girdle & lower limbs. & Cavities of Body	
Unit-3 Organization of Human body - Tissue level	7 hours
Primary tissues, Epithelial tissue, Simple epithelium, Pseudostratified epithelium, Stratified epithelium, Basement membrane, Glands, Connective tissue, Special connective tissue & Supporting tissues.	
Unit-4 Digestive System	12 hours
Process of Digestion, Parts of digestive system, Pharynx, Salivary glands, Esophagus, Stomach, Small intestine, Large intestine, & Accessory organs of digestion (Liver, Gall bladder)	
Unit-5 Urinary System	6 hours
Parts of urinary system, Functions of urinary system Kidneys, Nephron, Ureters, Urinary bladder, Male & Female Urethra	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	General Physiology – I			
Course Code	BMLT1002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about the structure of cell organelles, tissues and organ system of the human body.
2. To gain the knowledge of performing ESR, PCV.
3. To learn the functions of muscles and neuromuscular junction.
4. To know the physiology of the digestive system in detail.
5. To understand the renal physiology

Course Outcomes:

On completion of course student will be able to,

CO1	Demonstrate cell & Cell organelles , Tissues, & Organ systems of Human body
CO2	Perform ESR, PCV, & Teach blood cell functions
CO3	Describe and teach types of muscles and Neuromuscular junction
CO4	Present the functions of Digestive system & Accessory organs of Digestive system
CO5	Illustrate the functions of Renal system & Mechanism of artificial kidney

Text Book (s)

1. Text book of Medical Physiology by Sembulingam & Prema Sembulingam
2. Text of Anatomy & Physiology by Ross & Willson

Reference Book (s)

1. Review on Medical Physiology by Guyton and Hall
2. Understanding Medical Physiology by RL Bijlani

Unit-1 Introduction to physiology	8 hours
Cell, Tissue, Organ, System, Structure of Cell, Cell membrane, Functions, of cell wall, Cytoplasm, EPR, Golgi apparatus, lysosomes, Peroxisomes, Nucleus, DNA, RNA, Cell Death, Cell adaptation & Cell degeneration	
Unit-2 Blood	13 hours
Blood, Serum/Plasma, RBC, ESR, PCV, Erythropoiesis, WBC, Platelets, Hemostasis, Coagulation of blood, Blood groups, Blood transfusion & Blood volume	
Unit-3 Muscle physiology	4 hours
Classification of Muscles, Structure of skeletal muscle , Properties of skeletal muscle & Neuromuscular junction	
Unit-4 Digestive System	7 hours
Gastric secretion, Liver, Biliary system. Function of SI & LI, Movements of GIT& Gastro intestinal Hormone	
Unit-5 Excretory System	8 hours
Nephron, Juxtaglomerular Apparatus, Renal circulation, Urine formation, Micturition, Renal function tests, Dialysis & Artificial kidney	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	Basic Biochemistry			
Course Code	BMLT1003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To gain the knowledge about various types of carbohydrates and their functions.
2. To gain the knowledge of Lipids, their structure and functions
3. To learn the structure of proteins and their functions
4. To know the structure and functions of DNA & RNA
5. To gain the knowledge of biochemistry of enzymes and it's diagnostic applications.

Course Outcomes:

On completion of course student will be able to,

CO1	Apply knowledge and describe Carbohydrates and its classification.
CO2	Apply knowledge and describe Lipids and its classification
CO3	Apply knowledge and describe Proteins & its classification
CO4	Apply knowledge and describe on DNA & RNA
CO5	Apply knowledge and describe on Enzymes and their applications in diagnostic purpose

Text Book (s)

1. Biochemistry by U.Satyanarayana
2. Biochemistry by D.Vasudevan

Reference Book (s)

- 1 Biochemistry by Voet and Voet
- 2 Varley, Clinical Chemistry
- 3 Illustrated Biochemistry by Harper

Unit-1 Introduction of Biochemistry & Carbohydrates	6 hours
Biomolecules & Cell, Carbohydrates Introduction, Functions, Classification, Monosaccharide's, Disaccharides & Polysaccharides	
Unit-2 Lipids	8 hours
Lipids introduction, Functions, Classification, Fatty acids, Essential Fatty acids, Triacylglycerol's, Phospholipids, Glycolipids, Lipoproteins, Steroids, Cholesterol, Soaps & Detergents.	
Unit-3 Proteins & amino acids	8 hours
Introduction of Proteins & amino acids, Functions, Classification , Elemental composition of proteins, Amino acids, Classification, Chemical Properties, Physical properties, Amino acids usefull as drugs, Structure of proteins	
Unit-4 Nucleic Acids & Nucleotides	8 hours
Introduction, History, Functions, Components, Nucleotides, Structure, Nucleotide Analogs, Structure of DNA, Double helix DNA, Conformations of DNA double helix, Other types of DNA Structure. Organization of DNA in cell. Structure of RNA, Types of RNA	
Unit-5 Enzymes	10 hours
Introduction, History, Nomenclature, Chemical Nature, Properties, Factors effecting enzyme activity, Active site, Enzyme inhibition, Enzyme Specificity, Coenzymes, Mechanism of Enzyme action, Units of Enzymes, Non protein Enzymes, Application of Enzymes, Diagnostic Importance, Enzyme pattern in Diseases	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	Energy and Environmental sciences			
Course Code	ENVS1001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about the environment and its components and Problems associated with natural resources.
2. To gain the knowledge Chemical Toxicity of the chemicals in the environment.
3. To learn the consequences of social problems.
4. To know the role of information technology to address environmental issues.
5. To understand the Applications of sustained Chemistry.

Course Outcomes:

On completion of course student will be able to,

CO1	Understand About environment and its components and Problems associated with natural resources and their sustainable use
CO2	Chemical Toxicity of the chemicals in the environment and Sources of pollution in air , water and soil and Solid waste management and natural Disaster management.
CO3	Understanding about social issues.
CO4	Understanding of role of information technology to address environmental issues.
CO5	Application of sustained Chemistry.

Text Book (s)

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2008, ISBN:978-81-224-2159-0.
2. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5
3. Environmental Studies, Suresh K. Dhameja, S.K. Kataria and Sons , 2008, ISBN: 81-88458-77-5

Reference Book (s)

Unit-1 Environment & Natural Resources	6 hours
Definition, scope, importance, need for public awareness, Environmental Management Systems its objectives, components, EIA, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, Mineral resources – Use and exploitation, environmental effects of extracting and using mineral resources, Food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, landslides, soil erosion, desertification & case studies.	
Unit-2 Chemical Toxicology	8 hours
Toxic chemicals in the environment, Impact of toxic chemicals on enzymes, biochemical effects of arsenic, cadmium, lead, chromium, mercury, biochemical effects of pesticides	
Unit-3 Environmental Pollution	9 hours
Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.	
Unit-4 Social Issues, Human Population and the Environment	8 hours
Urban problems related to energy & sustainable development, water conservation, problems related to rehabilitation – case studies, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness. Population growth, variation among nations, Population explosion, Environment and human health, Value Education, Women and Child Welfare, Role of Information Technology – Visit to local polluted site /Case Studies.	
Unit-5 Green Chemistry	9 hours
Introduction, Basic principles of green technology, concept of Atom economy, Tools of Green technology, zero waste technology.	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	General Anatomy Lab – I			
Course Code	BMLT1051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To identify and get the knowledge about different bones of the skull.
2. To identify and gain the knowledge of different bones of upper limb and lower limb bones and joints
3. To learn the structure of different bones of Vertebrae.
4. To identify the different bones of Pelvic girdle.
5. To understand the histology of Bone, Nerve, Stomach, Intestine & Kidney.

Course Outcomes :

On completion of course student will be able to,

CO1	Demonstrate different bones and joints of Human skeletal system
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Text Book (s)

1. Text book of Anatomy & Physiology by P.R Ashalatha
2. Text book of Anatomy & Physiology by Ross & Willson
3. William Davis, Understanding Human Anatomy and Physiology, McGraw Hill.

Reference Book (s)

1. .Chaurasia's, Practical of Human Anatomy.

List of Experiments	
1	Good Laboratory Practices in Anatomy Lab
2	Dmonstration of Skull bones
3	Demonstration of Upper limb bones
4	Demonstration of Lower limb bones
5	Demonstration of Vertebrae
6	Demonstration of Pelvic girdle
7	Demonstration of Upper limb joints
8	Demonstration of Lower limb joints
9	Histology of Bone
10	Histology of Nerve
11	Histology of Stomach
12	Histology of Intestine
13	Histology of Kidney

Continuous Assessment Pattern

Internal (CAT I & CAT II)	External (ETE)	Total Marks
30	70	100

Name of The Course	General Physiology Lab - I			
Course Code	BMLT1052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge of Haemoglobin estimation.
2. To gain the knowledge differential WBC count.
3. To gain the knowledge on performing Blood group.
4. To know the skills to perform various bleeding disorders.
5. To understand the knowledge of heart sounds and blood pressure.

Course Outcomes :

On completion of course student will be able to,

CO1	Perform basic parameters in physiology
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Text Book (s)

1. Text book of Medical Physiology by Sembulingam & Prema Sembulingam
2. Text of Anatomy & Physiology by Ross & Willson
3. A.K Jain, Practical Handbook of Human Physiology.

Reference Book (s)

- 1.Review on Medical Physiology by Guyton and Hall
- 2.Understanding Medical Physiology by RL Bijlani
- 3.Nageshwari, Practical Workbook of Human Physiology

List of Experiments	
1	Estimation of Haemoglobin
2	Perform total White Blood Cell Count.
3	Perform Red Blood Cell Count.
4	Determination of Blood Groups.

5	Perform Leishman's staining for Differential WBC count.
6	Determination of packed cell Volume.
7	Perform Erythrocyte sedimentation rate [ESR].
8	Calculation of blood indices.
9	Determination of Clotting Time,
10	Determination of Bleeding Time.
11	Determine Blood pressure
12	Perform Auscultation for Heart Sounds.
13	Determination of vital capacity.
14	Perform Electrocardiogram

Continuous Assessment Pattern

Internal (CAT I & CAT II)	External (ETE)	Total Marks
30	70	100

Name of The Course	Biochemistry Lab -I			
Course Code	BMLT1053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To attain the skills to perform Qualitative Analysis of abnormal constituents of Urine
2. To attain the skills to perform Qualitative analysis of unknown carbohydrates Monosaccharides
3. To attain the skills to perform identification of Disaccharides (Lactose Sucrose) and Polysaccharides (Starch)
4. To attain the skills to estimation of Serum protein and blood glucose

Course Outcomes :

On completion of course student will be able to,

CO1	Perform basic tests of Biochemistry laboratory
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Text Book (s)

1. Biochemistry by U.Satyanarayana
2. Biochemistry by D.Vasudevan

Reference Book (s)

1. Biochemistry by Voet and Voet
2. Varley, Clinical Chemistry
3. Illustrated Biochemistry by Harper

List of Experiments	
1	Good medical laboratory practices in Biochemistry lab
2	Qualitative Analysis of abnormal constituents of Urine (Glucose,proteins,ketonebodies,bilesalts,bilepigments,occultblood)
3	Qualitative analysis of unknown carbohydrates Monosaccharides (Glucose,Fructose,Galactose&Maltose)
4	Disaccharides (Lactose &Sucrose)
5	Polysaccharides (Starch)
6	Colorimetry
7	Estimation of Serum protein
8	Estimation of Blood glucose

Continuous Assessment Pattern

Internal (CAT I & CAT II)	External (ETE)	Total Marks
30	70	100

Name of The Course	Communicative English I			
Course Code	PENG1001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of the course is to:

1. To help the students understand and communicate in English as used in day to day activities.
2. To help the students enhance their competence in the English language.
3. To produce short and simple connected texts on familiar topics
4. To gain Basic understanding into pronunciation of English sounds

Course Outcomes:

On completion of course student will be able to,

CO1	Demonstrate the knowledge of the fundamental principles of communication
CO2	Write simple and meaningful sentences with proper punctuations
CO3	Apply the knowledge of functional and formal grammar
CO4	Compose different types of formal letters.
CO5	Develop effective non verbal skills
CO6	envelop conversational and presentation skills for group discussion

Text Books

1. Murphy Raymond, Essential English Grammar, Cambridge Uni. Press.
2. Intermediate English Grammar. Raymond Murphy ISBN NO 978-81-7596-676-5
3. Essential English Grammar. Raymond Murphy ISBN: 9788175960299
4. Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge, 1980.

Reference Books

1. Bhatnagar, R.P. & R. Bhargava, Law and language, New Delhi: Macmillan.
2. Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.
3. Madabhushi Sridhar, Legal Language, Asia Law House, Hyderabad.
4. Legal Language and Legal Writing – P.K. Mishra

Detailed Outlines of Course

SESSION WISE INSTRUCTION PLAN

Module	Topics
I	Fundamentals of Communication; Effective listening strategies , Time, Tense and aspects ; Subject-Verb Agreement; Basic sentence structure;
II	Formal and Functional Analysis of sentences, Prepositions; Constituents of Formal Letter writing, Formats; Types of Letter (Enquiry, Complaint, Adjustment, Place an Order)
III	Clauses, Active and Passive Voice; Homophones; Homonyms; Non-Verbal Communication; Para linguistics; Group Discussion , Extempore

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Communicative English lab -I			
Course Code	PENG1002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To acquire the knowledge of skills required for speaking and writing

Course Outcomes:

On completion of course student will be able to,

CO1	Acquire proper pronunciation skills
CO2	Write and read phonemic transcription.
CO3	Handle the software “Clear Pronunciation”

Text Book (s)

Reference(s)

1. Course Title: **Communication Skills** by Dr. T. Ravichandran, Department of Humanities and Social Sciences (NPTEL)
https://www.youtube.com/watch?v=cQruENyLNYI&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH
2. Course Title: **English Language for Competitive Examinations** By Prof. Aysha Iqbal (NPTEL)
<https://www.youtube.com/watch?v=6xFaxIwwq0s&list=PLqGm0yRYwTjSdCmTeXLJLJkHXmC6CbEw>
3. Course Title: **Better Spoken English** by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)
<https://www.youtube.com/watch?v=0AM35Nu5McY&list=PLbMVogVj5nJT3a24lj4KOkQCOElxcDQrs>

Weekly Schedule of Lab Activities:		
Week	Activity Name	Concept Note (Plan of Action)
1	Introduction	All the students will be introduced, the lab activities and assessment along with giving self-introduction.
2	Extempore	The teacher will prepare a list of topics. Each student will select any one of these randomly and speak on the same.
3	Movie Review	The students will be asked to prepare a review of a movie of their own choice. The students will be evaluated on the basis their logical thinking, content, language and confidence.
4	Phonetics (Sounds)	To enhance the pronunciation skills of the students the teachers a brief introduction to phonetics and sound system will be given to the students. Along with it the students will also practice various sounds (both consonant and vowels) in RP using the software “Clear Pronunciation”.
5	Phonetics (Transcription)	The students will learn to write and read phonemic transcription. Along with this the students will prepare a register and their transcription using software “Clear Pronunciation”.
6	Practice on Clear Pronunciation	The students will practice on the software “Clear Pronunciation” so as to revise what they learnt through the exercise of week 4 and 5.
7	Practice on Tense Buster	To hone their writing skills the students will practice on the software “Tense Buster”. The Students will learn about common mistakes and how to avoid them.
8	Role Play	It will be a group activity and the students will choose a scene from a drama given by the teacher and enact the same.
9 & 10	Group Discussion	The teacher will assign one topic to each group. The students will discuss on the same and will be evaluated based on their subject knowledge, promptness, rationality, confidence, etc.
11 & 12	Group Presentation by Students	The teacher will assign one topic to each group. The students will deliver a group presentation on the same topic and will be evaluated based on their PowerPoint, content, presentation skills, time management, etc.

Continuous Assessment Pattern

Internal (IA)	External(E TE)	Total Marks
50	50	100

Name of The Course	General Anatomy – II			
Course Code	BMLT2001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To develop the knowledge about anatomy of cardiovascular system , circulation of blood in human body.
- 2 To gain the knowledge of anatomy of Pharynx,Larynx, Trachea, Tracheobronchial tree, lungs & pleura.
- 3 To gain the knowledge of anatomy of Meninges, Brain, Cerebrum, Diencephalon, Thalamus, Hypothalamus, Cerebellum, Spinal cord,& Spinal nerves.
- 4 To know the anatomy of Male and Female reproductive system.
- 5 To gain the knowledge of anatomy of Skin, Hair, Sweat glands.

Course Outcomes

On completion of course student will be able to:

CO1	Demonstrate heart anatomy circulation of blood in human body
CO2	Describe and teach anatomy of respiratory organs
CO3	Demonstrate the anatomy of Nervous system
CO4	Describe and teach anatomy of reproductive system & Perform Pregnancy test
CO5	Demonstrate the anatomy of Special sense organs

Text Book (s)

1. Text book of Anatomy & Physiology by P.R Ashalatha
2. Text book of Anatomy & Physiology by Ross & Willson

Reference Book (s)

1. Text Book of Anatomy by Chaurasya
2. Anatomy Review by Gray's

Unit-1 Cardiovascular system	6 hours
Systemic circulation, Pulmonary circulation, Heart chambers, Blood supply of Brain, Heart , Aorta	
Unit-2 Respiratory system	8 hours
Nose, paranasal air sinuses, Pharynx larynx, Trachea, Tracheobronchial tree, lungs & pleura	
Unit-3 Nervous system	14 hours
Meninges, Brain, Cerebrum, Internal capsule, Basal Nuclei, Functional areas of cerebral cortex, Diencephalon, Thalamus, Hypothalamus, pons, Brainstem, Mid brain, Cerebellum, Spinal cord, Cranial nerves & Spinal nerves	
Unit-4 Reproductive system	8 hours
Female reproductive System: Ovaries, fallopian tubes & Uterus. Male reproductive system: Testes, vas deferens, Seminal vesicles, Prostate gland, Penis	
Unit-5 Special Senses	3 hours
Skin, Hair, Sweat Glands	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	General Physiology – II			
Course Code	BMLT2002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To learn about physiology of Cardiovascular system ,Heart sounds, Cardiac cycle, ECG, Cardiac output.
- 2 To gain the knowledge of Respiratory system, Tracheobronchial tree, lungs & pleura.
- 3 To gain the knowledge Nervous system , female and male Reproductive system.

Course Outcomes

On completion of course student will be able to:

CO1	Demonstrate heart function and circulation of blood in human body
CO2	Teach Functions of respiratory organs
CO3	Demonstrate the functions of Nervous system
CO4	Teach reproductive system & Perform Pregnancy test and explain Fertility control
CO5	Demonstrate the functions of Special sense organs

Text Book (s)

1. Text book of Medical Physiology by Sembulingam & Prema Sembulingam
2. Text of Anatomy & Physiology by Ross & Willson

Reference Book (s)

1. Review on Medical Physiology by Ganog's
2. Understanding Medical Physiology by RL Bijlani

Unit-1 Cardiovascular system	8 hours
Heart sounds, Cardiac cycle, ECG, Cardiac output, Heart rate, Arterial pulse, foetal circulation & Respiration, & Haemorrhage	
Unit-2 Respiratory system	5 hours
Pulmonary circulation, Exchange of respiratory gases, Transport of respiratory gases, Regulation of Respiration & Artificial respiration.	
Unit-3 Nervous system	11 hours
Neuron, Classification of nerve fibres, Neuroglia, Receptors, Synapse, Spinal cord, Brainstem, Thalamus, Internal capsule, Hypothalamus, Basal Ganglia, Cerebellum, EEG, CSF & Epilepsy	
Unit-4 Reproductive system	10 hours
Male reproductive system: Seminal vesicles, Prostate gland, Semen. Female Reproductive system: Ovary, Menstrual cycle, Ovulation, Menopause, Infertility, Pregnancy, Pregnancy tests & Fertility control	
Unit-5 Special Senses	6 hours
sensation of taste, smell, Auditory pathway, Visual pathway, Field of vision & Errors of refraction	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	Biochemical Metabolism			
Course Code	BMLT2003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To learn the biochemical Metabolism of various biomolecules and their integration .

Course Outcomes

On completion of course student will be able to:

CO1	Describe and outline carbohydrate metabolism
CO2	Describe and outline Lipid metabolism
CO3	Discuss on protein metabolism
CO4	Discuss on Nucleotide metabolism
CO5	Present outline on integrated biochemical metabolism

Text Book (s)

1. Biochemistry by U.Satyanarayana
2. Test Clinical Chemistry

Reference Book (s)

1. Kaplan, Clinical Chemistry
2. Varley, Clinical Chemistry

Unit-1 Carbohydrates Metabolism	8 hours
Introduction, Glycolysis, Citric acid Cycle, Gluconeogenesis, Glycogen metabolism, Glycogenolysis, HMP Shunt pathway.	
Unit-2 Lipids Metabolism	8 hours
Introduction , fatty acid oxidation, ketone bodies, Biosynthesis of fatty acids, Synthesis of triacylglycerol's, Metabolism of phospholipids, Glycolipids, Cholesterol, Lipoproteins, Fatty liver, Atherosclerosis.	
Unit-3 Proteins Metabolism	8 hours
Amino acid pool, Transamination, Deamination, Metabolism of ammonia, Ure cycle, Phenyl alanine & tyrosine	
Unit-4 Nucleic Acid Metabolism	8 hours
Biosynthesis of purine nucleotides, Degradation of purine nucleotides, Disorders of purine metabolism, Biosynthesis of Pyrimidine nucleotides, Degradation of Pyrimidine nucleotides & Disorders of pyrimidine metabolism	
Unit-5 Integration of Metabolism	8 hours
Introduction, Organ specialization & metabolic integration, Metabolism in starvation and dehydration	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	General Microbiology			
Course Code	BMLT2004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To learn the history & Basics of General Microbiology, Sterilization Methods, Bacterial growth.
- 2 To gain the knowledge of different types of culture media used for the growth of Bacteria & Bacterial genetics.

Course Outcomes

On completion of course student will be able to:

CO1	Practice different types of microbiology staining methods & Demonstrate the Microorganisms using Microscope
CO2	Illustrate & Practice the different types of sterilization
CO3	Demonstrate the Growth Curve of a Bacteria in culture
CO4	Practice different types of Streaking techniques & Preparation of media for microbial culture
CO5	Apply the knowledge acquired to explain briefly about Bacterial genome, Mutation & Its Repair

Text Book (s)

1. Aneja K.R. Experiments in Microbiology
2. Gunasekaran P, Lab Manual of Microbiology, New Age Publishers
3. Text book of Microbiology by Prescott
4. Text book of Microbiology by Ananthanarayan

Reference Book (s)

1. Practical Medical Microbiology by Mackie and MacCartney
2. Medical Microbiology by Paniker & Satish Gupte

3. Medical laboratory Technology vol.I ,II, III by Mukherjee

4. District Laboratory Practice in tropical countries Vol II Microbiology by Monia Cheesbrough

Unit-1 Introduction to Medical Microbiology & Microscopy	8 hours
Definition - History - Host-Microbe relationships. Microscopy- Introduction and history, Types of microscopes; Light microscope, Fluorescent, Phase contrast, Electron microscope. General characteristics & classification of Microbes, Prokaryotes & Eukaryotes, Morphological classification of bacteria, Bacterial anatomy (Bacterial cell structures)	
Unit-2 Sterilization	8 hours
Definition, Principles & Types of sterilization -Physical methods, Chemical methods	
Unit-3 Growth and Nutrition of Microbes	8 hours
General nutritional & other requirements of the bacteria, Classification of bacteria on the basis of their nutritional requirements, Physical conditions required for growth., Normal growth cycle of bacteria (growth curve) Types of microbial cultures: Synchronous, Static, continuous culture.	
Unit-4 Culture media & Streaking techniques	8 hours
Introduction, Classification, Composition, & types of culture media Example & Uses. Antibiotic sensitivity Test. Aerobic & anaerobic culture methods	
Unit-5 Microbial genetics	8 hours
Bacterial genomes and basic functions; Microbial Replication, transcription and translation; microbial gene organization and Operon; Plasmid; Transduction; Transposition; Transformation; Conjugation; DNA Mutation and DNA Repair.	

Continuous Assessment Pattern

Internal Assessment (IA)	Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
10	30	60	100

Name of The Course	General Microbiology Lab			
Course Code	BMLT2051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

- 1 To practice the practical knowledge in Handling of Compound microscope.
- 2 To learn the different methods of Sterilization.
- 3 To prepare different culture media.
- 4 To identify motile and non-motile organisms via hanging drop technique .

Course Outcomes

On completion of course student will be able to:

CO1	Practice General Microbiology procedures
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Text Book (s)

1. Text book of Microbiology by Ananthanarayan
2. Gunasekaran P, Lab Manual of Microbiology, New Age Publishers

Reference Book (s)

1. Practical Medical Microbiology by Mackie and MacCartney
2. Text book of Microbiology by Prescott

List of Experiments

1. Demonstration of safe code of practice for a Microbiology laboratory
2. Demonstration of working & handling of Compound microscope
3. Prepare cleaning agents & to study the technique for cleaning & sterilization of glassware.
4. Demonstration of method of sterilization by autoclave
5. Demonstration of method of sterilization by hot air oven.
6. Demonstration of streaking methods.
7. Demonstration of Hanging drop technique
8. Demonstration of Albert Stain
9. Demonstration of Gram Stain
10. Demonstration Indian ink stain

Continuous Assessment Pattern

Internal (CAT I & CAT II)	External (ETE)	Total Marks
30	70	100

Name of The Course	Biochemical Metabolism Lab			
Course Code	BMLT2052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

- 1 To learn the basic tests performed in biochemistry.
- 2 To gain the knowledge of estimating different Biochemical tests procedures and their interpretation.

Course Outcomes

On completion of course student will be able to:

CO1	Perform basic tests of Biochemistry
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Text Book (s)

1. Text book of Medical Biochemistry by Chaterjee Shinde
2. Manipal manual of Biochemistry by S.Naik

Reference Book (s)

- 1 Medical laboratory technology book by Ramkin soodh

List of Experiments

1	Good laboratory practices in analytical biochemistry laboratory
2	Determination of Glucose in serum & plasma
3	Determination of Blood urea
4	Determination of Serum Creatinine
5	Determination of Serum Cholesterol
6	Determination of serum Transaminases
7	Demonstration of principle & procedure of Gas chromatography
8	Determination of A:G ratio

Continuous Assessment Pattern

Internal (CAT I & CAT II)	External (ETE)	Total Marks
30	70	100

Name of The Course	Communicative English II			
Course Code	PENG1003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

The objective of the course is to:

- 1 To help the students understand and communicate in English as used in day to day activities.
- 2 To help the students enhance their competence in the English language

Course Outcomes

On the successful completion of the course, the student would be able to:

CO1	Develop conversational skills using reported speech
CO2	Apply the knowledge of idioms and phrases
CO3	Apply the knowledge of technical and business communication in professional fields.
CO4	Compose various technical documents
CO5	Develop presentation skills.
CO6	Apply the knowledge of body language in delivering presentation

TextBooks:

1. Murphy Raymond, Essential English Grammar, Cambridge Uni. Press.
2. Intermediate English Grammar. Raymond Murphy ISBN NO 978-81-7596-676-5
3. Essential English Grammar. Raymond Murphy ISBN: 9788175960299
4. Wallace, Michael J: Study Skills in English, Cambridge University Press, Cambridge, 1980.

Reference :

1. Bhatnagar, R.P. & R. Bhargava, Law and language, New Delhi: Macmillan.
2. Cross, Ian et al. Skills for lawyers, Jordan Publishing Company., 1997 Bristol.

3. Madabhushi Sridhar, Legal Language, Asia Law House, Hyderabad.
4. Legal Language and Legal Writing – P.K. Mishra

Session No	Module	Topics	Core Reading	Additional Reference
	I	Reported Speech; word formation, Idioms and phrases, One word substitution, Reading comprehension; Constituents of Effective Writing;		
	II	Dealing with New Words (Academic Vocabulary Building) Resume Writing; report writing, technical proposal , memorandum, agenda , notice		
	III	Presentation Techniques: body language , voice and pronunciation , proxemics, chronemics , effective PowerPoint preparation		

Continuous Assessment Pattern

Internal (CAT 1 & CAT 2)	Internal (ETE)	Total Marks
30	70	100

Name of The Course	Communicative Functional English lab -II			
Course Code	PENG1004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

The objective of the course is to:

1. Understand simple texts and a range of high frequency vocabulary in context
2. Describe aspects of personal and everyday life in both oral and written form
3. Produce short and simple connected texts on familiar topics
4. Basic understanding into pronunciation of English sounds

Course Outcomes

On the successful completion of the course, the student would be able to:

1. Develop the understanding into the communication and language as its medium
2. Develop the basic understanding of spoken English
3. Improve their reading fluency skills through extensive reading
4. Use and assess information from academic sources, distinguishing between main ideas and details
5. Compare and use a range official support through formal and informal writings

Reference:

- 1 Course Title: **Better Spoken English** by Prof. Shreesh Chaudhary, Department of Humanities and Social Sciences, IIT Madras. (NPTEL)
<https://www.youtube.com/watch?v=0AM35Nu5McY&list=PLbMVogVj5nJT3a24lj4KOkQCOElxcD>
- Ors
- 2 Course Title: **Understanding Creativity and Creative Writing** by Prof. Neelima Talwar(NPTEL)
<http://www.digimat.in/nptel/courses/video/109101017/L01.html>

The following activities will be conducted in lab classes:

1. Spin-a-yarn
2. Drafting Catchphrases
3. Picture Interpretation (Denotation and Connotation)
4. Active Listening
5. Reading between the lines
6. Brief Biography of Female Personalities
7. Rhythm and Intonation
8. Public Speaking
9. Mock Lecture
10. Dialogue Writing
11. Enacting scene(s) from critically appreciated movies.

Weekly Schedule of Lab Activities:

Week	Activity Name	Concept Note (Plan of Action)
1	Spin-a-yarn	This will be an ice breaking session. The students will be given the beginning lines of an imaginary story and will be asked to carry on the same by adding two-three sentences at a time one by one to reach a meaningful end of the story.
2	Drafting Catchphrases	Each student will be individually called and given a random topic regarding any advertisement. They will be asked to draft catchphrases for the same within a short time period (1-2 min.).
3	Picture Interpretation	Students will be asked to review a random picture with the help of denotative meanings and their connotative implications.
4	Active Listening	An audio clip (BBC News) will be played by the teacher in the class. Students will be given an incomplete written draft of the same. They will be asked to carefully listen to the audio clip and fill the blanks.
5	Reading between the lines	A Media Discourse (Public speech by a politician) will be presented to the students. Students will be asked to excavate the hidden messages and prepare a list of what the speech explores.
6	Brief Biography of Female Personalities	Students will be asked to write a brief biography of any female personality highlighting her achievements and notable moments of her life.
7	Word Accent, Rhythm and Intonation	With the help of the software Clear pronunciation, students will be able to overcome Mother Tongue Influence (MTI) by learning

		various Rhythm patterns and Intonation at sentence level.
8	Public Speaking	To enhance their confidence, students will be given a chance to prepare a topic of their choice and speak in front of the class.
10	Mock Lecture	Students will be asked to Prepare a Mock Lecture so as to make them through with the concepts and ready to face the professional world.
11	Dialogue Writing	The teacher will assign one scene to each group. Students then will be asked to use their imagination to write dialogues.
12	Enacting Scene(s) from Critically appreciated Movie (English)	It will be a group activity and the students will choose a scene from a movie given by the teacher and enact the same.

Continuous Assessment Pattern

Internal (CAT 1 & CAT 2)	External (ETE)	Total Marks
30	70	100

Name of The Course	Systemic Bacteriology			
Course Code	BMLT3001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To learn about the gram stain to differentiate bacteria.
2. To develop the brief knowledge of gram positive and negative infections.
3. To know about the diagnosis of mycobacterium.
4. To know about the diagnosis of spirochaetes and methods for collection of different sample.

Course Outcomes

On completion of this course, the students will be able to,

CO1	Explain and Diagnose Gram positive and Gram negative cocci infections
CO2	Apply knowledge in diagnosing Gram positive and gram negative bacilli infections
CO3	Describe and diagnose the mycobacterium infections.
CO4	Describe and diagnose the spirochaetes .
CO5	Perform sample collection from bacterial infections area and their diagnosis.

Text Book (s)

- 1 Aneja K.R. Experiments in Microbiology
- 2 Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
- 3 Text book of Microbiology by Prescott
- 4 Text book of Microbiology by Ananthanarayan

Reference Book (s)

- 1 Practical Medical Microbiology by Mackie and Mac Cartney
- 2 Text book of Microbiology by Ananthanarayan
- 3 Medical Microbiology by Paniker & Satish Gupte
- 4 Medical laboratory Technology vol.I ,II, III by Mukherjee
- 5 Practical Medical Microbiology by Mackie & MacCartney Volume 1 and 2

Unit-1 Cocci	5 hours
Staphylococci, Streptococci, Neisseria, Pneumococcus	
Unit-2 Bacilli	10 hours
Anthrax, Diphtheria, Clostridium species Enterobacteriaceae, Vibrios, Brucella	
Unit-3 Micobacterium	9 hours
Haemophilus , TB, Leprosy, AFB stain	
Unit-4 Spirochaetes	12 hours
Brucella, Leptospira. Borella, Treponema	
Unit-5 Miscellaneous	9 hours
Corynebacterium, pseudomonas, bordetella, Miscellaneous bacteria	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Pathology			
Course Code	BMLT3002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about various types of cell abnormalities and death.
2. To gain the basic knowledge of clinical pathology.
3. To learn examination of various body fluids in pathology lab.
4. To gain the knowledge of tissue processing, section cutting, staining of histopathological tissues.

Course Outcomes

On completion of this course, the students will be able to:

CO1	Apply basic knowledge on introduction to pathology, inflammation and normal cell death and cell repair.
CO2	Perform examination of semen, sputum and urine examination in Clinical pathology laboratory
CO3	Perform examination of body fluids, Transudate, Exudate and do cell count techniques.
CO4	Perform reception, receiving, sample fixation and grossing of histological specimens in histopathology laboratory
CO5	Perform procedure such as tissue processing and section cutting in histopathology laboratory

Text Book (s)

- 1 Hand book of Pathology by Harshmohan
- 2 Practical Hematology by Davies & Lewis

Reference Book (s)

- 1 Handbook of Histopathological Techniques by C F A Culling
- 2 Medical Lab technology by Lynch
- 3 An Introduction to Medical Lab Technology by F J Baker and Silverton

**4 Bancroft's Theory and Practice of Histopathological Techniques by John D Bancroft
Clinical Diagnosis in lab methods by Todd & Sanford**

Unit-1 Introduction of Pathology	5 hours
Introduction to Pathology, Normal Cell injury and cell death, Basic mechanisms involved in the process of inflammation and repair, Alternations in Vascular permeability and blood flow, migration of WBC's mediators of Inflammation	
Unit-2 Clinical Pathology	10 hours
Clinical Pathology: Introduction, Urine Physical, Chemical & Microscopic examination, Semen total count, Morphology & clinical abnormalities, Examination of feces for occult blood. physical examination of sputum	
Unit-3 Body fluids abnormalities	9 hours
Examination of body fluids: Transudate, Exudate & Cell counts methods	
Unit-4 Histopathology	12 hours
Histopathology: Introduction, Reception of specimens, & Various fixatives-Mode of action, indications, Preparation. Grossing techniques	
Unit-5 Tissue processing and embedding	9 hours
Steps of tissue processing and embedding, Section cutting, Decalcification. Mounting & Staining of Slides. Microtome Knives, Sharpening of Microtome Knives, Honing, Stropping, various types of microtome and their applications.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Analytical Biochemistry			
Course Code	BMLT3003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about various types of acid base balance in human body
2. To gain the knowledge how to calculate and prepare various solutions
3. To learn the working and application of photometry
4. To know the working and application of various types of chromatography techniques.
5. To gain the knowledge of different types of electrophoresis.

Course Outcomes

On completion of this course, the students will be able to:

CO1	Explain Acid base balance in the Human body
CO2	Prepare solutions of required concentration.
CO3	Operate /demonstrate use and maintenance of the instruments used in photometry
CO4	Demonstrate different types of chromatography
CO5	Demonstrate different types of Electrophoresis

Text Book (s)

- 1 Text book of Biochemistry by U. Satyanarayana & U. Chakrapani
- 2 Manipal Manual of Biochemistry by B. Shivanand Nayak
- 3 Wilson & Walker's Principles and techniques of Biochemistry and Molecular Biology by Andreas Hofmann

Reference Book (s)

- 1 Practical Clinical Biochemistry by Harold Varley
- 2 Medical Laboratory Technology by Mukherjee

Unit-1 Acid base balance	5 hours
Acid base balance -Concept of pH, Henderson Hasse balch equation, buffers & Buffering mechanism	
Unit-2 Concept of Stoichiometry	9 hours
Concept of Stoichiometry: Molarity, Molality, Normality, Gram Equivalent Weight, Preparation of solutions.	
Unit-3	8 hours
Colorimeter, Spectrophotometer, Nephelometry, Turbidometry, Flame Emission Spectroscopy	
Unit-4	10 hours
Chromatography: Introduction, Types of chromatography, Paper Chromatography, Thin layer chromatography: Column chromatography: Gas chromatography: Ion exchange chromatography:	
Unit-5	8 hours
Electrophoresis: Introduction, Principle, Types of electrophoresis PAGE & SDS-PAGE, applications	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Laboratory Quality Management-I			
Course Code	BMLT3004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	0	2

Course Objectives:

1. To develop the knowledge about various types of Quality control management in lab
2. To gain the knowledge of about the safety and emergency systems in clinical lab
3. To learn how to run sample in clinical lab with quality.
4. To know the functions of quantitation process in lab
5. To gain the knowledge of how to differentiate between qualitative and semi-quantitative procedures

Course Outcomes

On completion of course student will be able to,

CO1	Summarize the basic concept of laboratory quality management and its importance.
CO2	Design laboratory and organize safety and emergency systems in the lab
CO3	Practice the quality sample collection ,storage, transportation
CO4	Summarize quality control for quantitation process
CO5	Practice quality control for qualitative and semi-quantitative procedures

Text Book (s)

- 1 ICMR(2008) guidelines for good clinical laboratory practices.
- 2 Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition
- 3 Manipal Manual of Biochemistry by Shivanad nayak by Jaypee publications

Reference Book (s)

- 1 NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
- 2 WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 Introduction to Quality control	6 hours
Goals and objectives- Total quality management framework- Quality laboratory processes-Quality assurance, Quality assessment, Quality control, Quality planning and Quality improvement	
Unit-2 Facilities and safety	6 hours
Laboratory design- Physical aspects of premises and rooms –safety management programme- personal protective equipment- emergency management and first aid	
Unit-3 Process control-sample management	6 hours
Sample Collection and preservation-Sample processing- Sample storage-retention and disposal- Sample transport	
Unit-4 Process control-quality control for quantitation	6 hours
Control materials-establishing the value range for the control material-Control ranges-interpretating quality control data	
Unit-5 Process control -quality control for qualitative and semi quantitative procedures	6 hours
Preparation of internal `control`-Pooled Serum- Quality control charts, Levy- Jennings and Cusum charts	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Infection Control & Prevention-I			
Course Code	BMLT3005			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	0	2

Course Objectives:

1. To develop the knowledge about various types of guidelines for infection control
2. To gain the knowledge of spreading and control of infection in lab
3. To learn the different style of working in lab to minimise the exposure of infectious material
4. To know the importance of PPE for worker in healthcare sector
5. To gain the knowledge of sterilization and uses of disinfection by various method

Course Outcomes

On completion of course student will be able to,

CO1	Practice Standards of care in infection prevention and Guidelines for Infection Control in emergency Settings
CO2	Apply knowledge in Transmission and control of infection in health care settings
CO3	Apply knowledge in practice and use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker exposure to potentially infectious material in all healthcare settings
CO4	Select and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material
CO5	Apply knowledge in principles and practices for cleaning, disinfection, and sterilization

Text Book (s)

- 1 ICMR(2008) guidelines for good clinical laboratory practices.
- 2 Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Book (s)

- 1 NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
- 2 WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 Professional Responsibility for Infection Prevention	6 hours
Standards of care in infection prevention -Guidelines for Infection Control in emergency Settings	
Unit-2 Transmission and control of infection in health care sett	6 hours
Transmission of infections - Prevention: Breaking the “Chain of Transmission”	
Unit-3	6 hours
Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker exposure to potentially infectious material in all healthcare settings	
High risk practices and procedures (by exposure type) capable of causing healthcare acquired infection with bloodborne pathogens-Safe injection practices and procedures designed to prevent disease transmission from patient to patient and healthcare worker to patient-	
Evaluation/Surveillance of exposure incidents -Engineering controls -Work practice controls	
Unit-4	6 hours
Selection and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material	
Types of PPE and barriers and criteria for selection-Choosing PPE based on reasonably anticipate interaction-Choosing	
barriers / PPE based on intended need-Guidance on proper utilization of PPE / barriers	
Unit-5 Principles and practices for cleaning, disinfection, and Sterilization	6 hours
General Information-Potential for Contamination -Factors that have contributed to contamination - Points to reprocessing or handling where breaks in infection prevention practices can compromise the integrity of the equipment of devices- Sterilization Methods Advantages and Disadvantages	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Computer Fundamentals			
Course Code	COMP1111			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers
2. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

Course Outcomes

On completion of course student will be able to,

CO1	Appreciate the role of computer technology
CO2	Practice hand-on experience in using computers
CO3	Explain the basic knowledge about the computer technologies in india
CO4	Explain understand the Concept behind it
CO5	Apply knowledge in clinical settings

Text Book (s)

1. Mendham J, Denny R.C., Barnes J.D., Thomas M, Jeffery G.H., "Vogel's Textbook of Quantitative Chemical Analysis", Pearson Education Asia.
2. Connors K.A., "A Text book of Pharmaceutical Analysis", Wiley Inter-science.
3. Computer Technology. Joney & Bartlett learning, 2014

Reference Book (s)

1. Beckett, A.H., and Stenlake, J.B., Practical Pharmaceutical Chemistry, Vol. I&II. The Atherden Press of the University of London.
2. Alexeyev V. "Quantitative Analysis". CBS Publishers & Distributors.
3. Computers fundamentals, Lippincott Williams and Wilkins, 1991

Unit-1 Introduction	8 hours
<p>1. Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.</p> <p>2. Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).</p> <p>3. Processor and memory: The Central Processing Unit (CPU), main memory.</p>	
Unit-2 Introduction to Storage Device	6 hours
<p>4. Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.</p> <p>5. Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).</p>	
Unit-3 Introduction to MS-Word	6 hours
<p>6. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.</p> <p>7. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.</p>	
Unit-4 Introduction to power-point:	6 hours
<p>8. Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.</p> <p>9. Introduction of Operating System: introduction, operating system concepts, types of operating system.</p> <p>10. Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network</p>	
Unit-5 Internet and its Applications	6 hours
<p>11. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.</p> <p>12. Application of Computers in clinical settings.</p>	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	COMPUTER FANDAMENTALS LAB			
Course Code	COMP1112			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objective:

The objective of the course is to:

The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

Course Outcomes

At the end of the course, students will be able to:

CO1	The students will be able to appreciate the role of computer technology and some extent able to gain hand-on experience in using computers.
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Text Books

- 1 Computer Technology. Joney & Bartlett learning, 2014

Reference Books

- 1 Computers fundamentals, Lippincott Williams and Wilkins,1991

List of Experiments

- 1 Introduction to computer:
- 2 Introduction to . Input output devices
- 3 Introduction to Storage Devices:
- 4 Introduction to MS-Word
- 5 Introduction to power-point
- 6 Introduction to Internet and its Applications

Continuous Assessment Pattern

Internal Assessment (IA)	End Term Test (ETE)	Total Marks
30	70	100

Name of The Course	Analytical Biochemistry Lab			
Course Code	BMLT3051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge about preparation of different concentration of solution
2. To gain the knowledge of working and practical exposure on colorimeter and spectrophotometer
3. To learn the working of different types of chromatography

Course Outcomes

On completion of course student will be able to:

CO1	perform preparation of reagents in any concentration & Perform biomedical techniques
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Text Book (s)

- 1 Practical Clinical Biochemistry by Harold Varley
- 2 Text book of Medical Laboratory Technology by P. B. Godker
- 3 Medical Laboratory Technology by Mukherjee
- 4 Manipal Manual of Biochemistry by Shivanand Nayak B

Reference Book (s)

- 1 Text book of Medical Biochemistry by Chaterjee Shinde
- 2 Principal of Biochemistry by Lehninger
- 3 Biochemistry by Stryer

List of Experiments	
1	Good laboratory practices
2	Preparation of Molar solutions
3	Preparation of Normal Solutions
4	Preparation of Molal solutions
5	Demonstration of principle, working & maintenance of spectrophotometer
6	Demonstration of principle, working & maintenance of colorimeter
7	Demonstration of principle, working & maintenance of flame photometer
8	Demonstration of principle, procedure of paper chromatography
9	Demonstration of principle & procedure of column chromatography
10	Demonstration of principle & procedure of Electrophoresis

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Pathology Lab			
Course Code	BMLT3052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge about tests to examine body fluids
2. To perform semen count and its morphology
3. To learn and perform tissue processing and various stains used in histopathology.

Course Outcomes

On completion of this course students will be able to:

CO1	Perform examination of different clinical pathology samples like body fluids, urine, faeces, sputum.
CO2	Perform histopathological sample processing and staining.

Text Book (s)

- 1 Hand book of Pathology by Harshmohan
- 2 Practical Hematology by Davies & Lewis

Reference Book (s)

- 1 Handbook of Histopathological Techniques by C F A Culling
- 2 Medical Lab technology by Lynch
- 3 An Introduction to Medical Lab Technology by F J Baker and Silverton
- 4 Bancroft's Theory and Practice of Histopathological Techniques by John D Bancroft

List of Experiments	
1	Physical and microscopic examination of urine
2	Physical examination of Sputum.
3	Physical examination of Faeces
4	Test for Occult Blood
5	Demonstration of physical examination of semen
6	Demonstration of total count of Semen
7	Demonstration of semen morphology
8	Reception and labelling of histological specimens
9	Preparation of various fixatives, Zenker's fluid, Bouin's fluid , Corney's fluid , 10% Neutral formalin, Formal acetic acid
10	Preparation of ascending and descending grades of alcohol from absolute alcohol
11	Tissue processing by manual and automated processor method
12	Demonstration of microtome & types of microtome
13	Demonstration of Honing and stropping technique
14	Demonstration of section cutting, Preparation of slides.
15	Demonstration & practice of the Haematoxylin and Eosin staining technique and mounting

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Systemic Bacteriology Lab			
Course Code	BMLT3053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the skills to identify and perform sensitivity test on bacteria
2. To gain the knowledge to perform and identification of mycobacterium
3. To learn the various biochemical test to identify type of species.

Course Outcomes

On completion of this course students will be able to:

CO1	Perform identification of bacteria and sensitivity test for Bacterial species.
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Text Book (s)

- 1 Aneja K.R. Experiments in Microbiology
- 2 Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
- 3 Text book of Microbiology by Prescott
- 4 Text book of Microbiology by Ananthanarayana

Reference Book (s)

- 1 Practical Medical Microbiology by Mackie and MacCartney
- 2 Text book of Microbiology by Ananthanarayana
- 3 Medical Microbiology by Paniker & Satish Gupta

List of Experiments	
1	Demonstration of Gram stain
2	Demonstration of ZN staining
3	Demonstration of Capsule staining
4	Demonstration of Hanging drop technique
5	Demonstration of Biochemical tests
6	Demonstration of AST (Disc diffusion method)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Hematology & Hematological diseases			
Course Code	BMLT4001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about blood cell production and cell counts
2. To gain the knowledge of red blood cell disorder.
3. To gain the knowledge of white blood cell disorder.
4. To know the coagulation disorder
5. To gain the knowledge of various types of anticoagulants

Course Outcomes

On completion of this course, the students will be able to:

CO1	Apply basic knowledge in blood cell production and perform identification of blood cell and cell counts
CO2	Apply Basic knowledge on different types of anaemia's .
CO3	Illustrate white blood cell disorder and perform general procedure in hematology.
CO4	Describe/diagnose about coagulation disorder in human.
CO5	Explain about different types of anticoagulant used in hematology laboratory.

Text Book (s)

1. Text book of Medical Laboratory Technology by Paraful B. Godkar
2. Practical Haematology by JB Dacie
3. Medical laboratory Technology by KL Mukherjee Volume.

Reference Book (s)

- 1 Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henry
- 2 Atlas of haematology (5th edition) by G.A. McDonald
- 3 De Gruchy's clinical haematology in medical practice

Unit-1 Basic Hematology	5 hours
Introduction of hematology, hematopoiesis, RBC, ESR, PCV, Red cell Indices.	
Unit-2 Anemias	10 hours
Classification of anemia (Morphology, Etiology), clinical features of anemia, Classification: Microcytic hypochromic anemia, Macrocytic anemia, Normocytic normochromic anemia. LE- Cell Phenomenon, Reticulocyte count	
Unit-3 Leucopoiesis & disorders, WBC	9 hours
Quantitative disorders of Leukocytes Cause and significance, Infectious mononucleosis , Monocytic Disorders(AML & CML), Lymphocytic Disorders(ALL & CLL), Hodgkin's Lymphoma	
Unit-4 Thrombopoiesis and its disorders	12 hours
Introduction Causes of bleeding disorders, Vascular defect. Platelet defect, Factor deficiency, Inhibitors, Hyper fibrinolysis, Types of bleeding disorders, Inherited bleeding disorders, Acquired bleeding disorders, Thrombosis, Introduction, Causes of thrombosis	
Unit-5 Anticoagulants	9 hours
Anticoagulants used in hematology and mode of action, Steps in hematology investigation,	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Immunology & Bacterial serology			
Course Code	BMLT4002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about structure & types of Antigen and immunoglobulins
2. To gain the knowledge of Antigen-Antibody reaction
3. To gain the knowledge of the principle, procedure, interpret various serological tests
4. To know the complement activation pathways and immune response
5. To gain the knowledge of auto immune diseases, Vaccination schedule

Course Outcomes

On completion of this course, the students will be able to:

CO1	Explain the different types of immunity, immune cells, structure & types of Antigen and immunoglobulins
CO2	Differentiate general features ,mechanism, applications of different types of Antigen-Antibody reaction
CO3	Demonstrate the principle, procedure, interpret various serological tests
CO4	Generalize complement activation pathways and types of immune response
CO5	Explain autoimmunity, auto immune diseases, Vaccination schedule

Text Book (s)

- 1 Text book of Microbiology by Ananthanarayan
- 2 Text book of Microbiology: C P Baveja
- 3 Text book of immunology by: S K Gupta

Reference Book (s)

- 1 Practical Medical Microbiology by Mackie & McCartney Volume 1 and 2
- 2 Medical Microbiology by Paniker & Satish Gupte

- 3 Medical laboratory Technology Vol. I ,II, III by Mukherjee
- 4 Medical Laboratory manual for tropical countries Vol II Microbiology by Monica Cheesbrough

Unit-1 Basic Immunology	8 hours
Basic Immunology: History and introduction to immunology, Immunity; Innate & Acquired immunity- mechanisms mechanism of immunity; Definition, types of antigens and determinants of antigenicity ; Definition, types, structure and properties of immunoglobulin	
Unit-2 Antigen Antibody reaction	10 hours
Antigen Antibody reaction: Antigen-Antibody reactions-Definition, Classification, General features and mechanisms , Applications of Precipitation, Agglutination, Immunodiffusion Complement fixation test, Immuno- fluorescence, RIA , ELISA	
Unit-3 Serological Tests	6 hours
Serological Tests: Principle, procedure and interpretation of various serological tests: WIDAL, VDRL, ASO, CRP, Brucella tube agglutination, Rose-Waaler	
Unit-4 Complement	8 hours
Complement system: Definition, complement activation pathways Immune response: Introduction & Basic concepts of Humoral and Cellular immune response	
Unit-5 Auto Immunity and Vaccines	8 hours
Auto Immunity: Basic concepts of autoimmunity and brief knowledge about autoimmune diseases Vaccines: Definition, Types, Vaccination schedule	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Clinical Biochemistry			
Course Code	BMLT4003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To develop the knowledge about liver function test
2. To gain the knowledge of renal function test and urolithiasis.
3. To gain the knowledge of gastric function and cardiac function.
4. To know clinical diagnosis of Diabetes Mellitus
5. To gain the knowledge of quality control in biochemistry laboratory

Course Outcomes

On completion of course student will be able to,

CO1	Perform liver function test by semi auto analyzer and interpret the test results.
CO2	Perform and assess renal functioning and describe urolithiasis.
CO3	Perform and understand gastric function and cardiac function.
CO4	Diagnose and describe Diabetes Mellitus and explain metabolic defects
CO5	Perform and explain quality control in biochemistry laboratory and automation used

Text Book (s)

- 1 Raju Bindu, Review of Medical Biochemistry.
- 2 Geeta Damodaran K, Practical Biochemistry.
- 3 Manipal manual of Biochemistry by S.Nayak

Reference Book (s)

- 1 DS Sheriff, Textbook of Medical Biochemistry.
- 2 U. Satyanarayana: Textbook of Medical Biochemistry.

Unit-1 Liver function tests	9 hours
Liver function tests: Liver functions, Assessments - Based on its metabolic functions, Measurement of serum enzyme levels, Bile Pigment metabolism, jaundice, its types, & their biochemical findings.	
Unit-2 Urolithiasis & Renal Function Tests	8 hours
RFT- Clearance tests, Concentration tests, dilution tests. Renal calculi- Introduction, Etiology, Pathophysiology, Factors influencing, Types, Risk Factors, Control.	
Unit-3 Gastric Function tests and Cardiac Profile	9 hours
Gastric Function tests: Composition of Gastric Juice, free acidity & total Acidity, Gastric stimulants, Tubeless gastric analysis Cardiac Profile- Hypertension, MI, pattern of Cardiac Enzymes in Heart diseases	
Unit-4 Diabetes Mellitus.	8 hours
Diabetes Mellitus: Introduction, symptoms, types, Clinical Manifestations, Diabetic ketoacidosis, Control of Hyperglycemia. Lipoproteinemia, Atherosclerosis & control of Hypercholesterolemia. Alkaptonuria, Albinism, Maple syrup urine disease.	
Unit-5 Quality control & Automation	6 hours
Quality control & Automation in clinical biochemistry laboratory	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Laboratory Quality Management-II			
Course Code	BMLT4004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	0	2

Course Objectives:

1. To develop the knowledge about basic concept of laboratory quality management
2. To gain the knowledge of Inspect sources of variation in laboratory results and method of detection of errors
3. To gain the knowledge of the external quality control

Course Outcomes

On completion of course student will be able to;

CO1	Apply knowledge on External and Internal audit laboratory quality management process
CO2	Build in depth knowledge of how Internal quality control is maintained within the laboratory
CO3	Inspect sources of variation in laboratory results ,method of detection of errors and corrective and preventive actions.
CO4	Build in depth knowledge of how external quality control is maintained and process of EQAP
CO5	Illustrate the organization requirements for a quality management system

Text Book (s)

- 1 ICMR(2008) guidelines for good clinical laboratory practices.
- 2 Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition
- 3 Manipal Manual of Biochemistry by Shivanand nayak by Jaypee publications

Reference Book (s)

- 1 NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
- 2 WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 Assessment—audits	6 hours
External audit-Internal audit- Internal audit programme- Actions as result of audit	
Unit-2 Internal quality control	6 hours
Internal quality control -basic steps-Laboratory Testing Process- Pre analytical-Analytical-Post Analytical	
Unit-3 Laboratory errors	6 hours
Sources of variation in laboratory results -Methods of detection of errors - Types of error - Corrective measures to minimize the errors- CAPA - corrective action & preventive action	
Unit-4 External Quality control	6 hours
External quality control-Proficiency testing programme -Participation in E.Q.A.P.	
Unit-5 Quality management system	6 hours
Organizational requirements for a quality management system	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Infection Control & Prevention-II			
Course Code	BMLT4005			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	2	0	0	0

Course Objectives:

1. To develop the knowledge about prevention and control of infectious and Communicable diseases in health-care workers
2. To gain the knowledge of Multi-Drug Resistant Organism (MDRO'S) in infection prevention
3. To gain the knowledge of infection prevention as applied to nursing homes and long term care facilities

Course Outcomes

On completion of course student will be able to,

CO1	Acquire knowledge in Construction, renovation, repair and demolition in health care facilities
CO2	Practice prevention and control of infectious and Communicable diseases in health-care workers
CO3	Illustrate the characteristics, clinical syndromes, prevention of problems, transmission ,infection preventive measures of Multi-Drug Resistant Organism (MDRO'S) in infection prevention
CO4	Illustrate the Multi-Drug Resistant Organism (MDRO'S) in infection prevention
CO5	Explain infection prevention as applied to nursing homes and long term care facilities

Text Book (s)

- 1 ICMR(2008) guidelines for good clinical laboratory practices.
- 2 Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Book (s)

- 1 NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011

2 WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 Professional Responsibility for Infection Prevention	6 hours
Construction, renovation, repair and demolition in health care facilities	
Unit-2 Prevention and control of infectious and Communicable diseases in health-care workers	6 hours
Overview of occupational health strategies for infection prevention- Prevention and control of blood borne pathogen transmission - Evaluation of HCWs infected with HIV, HBV, or other blood borne pathogens	
Unit-3 Current topics in infection prevention-I	6 hours
Multi-Drug Resistant Organism (MDRO'S) to include: -Methicillin Resistant Staphylococcus Aureus (MRSA), - Vancomycin Resistant Enterococci (VRE), -Clostridium Difficile (C.DIFF), -Multi-Drug Resistant Tuberculosis (MDRTB) -Extended Spectrum Beta-Lactamase (ESBL),	
Unit-4 Current topics in infection prevention-II	6 hours
Multi-Drug Resistant Organism (MDRO'S) to include: -Carbapenem-resistant Enterobacteriaceae (CRE) -Severe Acute Respiratory Syndrome (SARS) -Creutzfeld Jacob Disease -Ebola Virus Disease (EVD) and Zika virus	
Unit-5 Infection prevention as applied to nursing homes and long term care facilities	6 hours
Infection prevention as applied to nursing homes and long term care facilities	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Haematology & Haematological diseases Lab			
Course Code	BMLT4051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge to identify anaemia's.
2. To gain the knowledge of perform various blood cells counting.
3. To gain the knowledge of diagnose different types of inflammatory and clotting disorders.

Course Outcomes

On completion of course student will be able to,

CO1	Perform and analyse hemogram by collecting blood sample , do blood cell counts and correlate the test
CO2	After the completion of course, students able to perform various blood cells counting.
CO3	After the completion of course, students able to perform and analyse different hematological blood test to daignose different types of inflammatory and clotting disorders.

Text Book (s)

- 1 Text book of Medical Laboratory Technology by Paraful B. Godkar
- 2 Practical Haematology by JB Dacie
- 3 Medical laboratory Technology by KL Mukherjee Volume-I

Reference Book (s)

- 1 Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henry
- 2 Atlas of haematology (5th edition) by G.A. McDonald
- 3 De Gruchy's clinical haematology in medical practice

List of Experiments	
1	Good laboratory practices in hematology laboratory
2	Handling and usage of Microscope
3	Preparation of different types of anticoagulants used in hematology
4	Demonstration of Collection of blood
5	Preparation of Blood smears
6	Demonstration of DLC
7	Demonstration of TRBC
8	Demonstration of TWBC
9	Demonstration of Platelet count
10	Demonstration of ESR
11	Demonstration of PCV
12	Demonstration of BT & CT
13	Calculation of Blood Cell Indices
14	Examination of Blood Smear for Abnormal Cells
15	Demonstration of Reticulocyte count

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Immunology & Bacterial serology Lab			
Course Code	BMLT4052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge about performing serological tests
2. To gain the knowledge of detect Ag or Ab by immune fluorescence /immune diffusion techniques.
3. To gain the knowledge of ELISA, SDS-PAGE techniques and its applications

Course Outcomes

On completion of course student will be able to,

CO1	Perform/ Demonstrate various serological tests in identification of different diseases
CO2	Demonstrate/detect Ag or Ab by immune fluorescence /immune diffusion techniques and ELISA, SDS-PAGE techniques.

Text Book (s)

1. Text book of Microbiology by Ananthanarayan
2. Text book of Microbiology: CP. Baveja
3. Text book of immunology by: SK: Gupta

Reference Book (s)

1. Practical Medical Microbiology by Mackie & McCartney Volume 1 and 2
2. Medical Microbiology by Paniker & Satish Gupte
3. Medical laboratory Technology Vol. I ,II, III by Mukherjee
4. Medical Laboratory manual for tropical countries Vol II Microbiology by Monica Cheesbrough

List of Experiments	
1	Collection of blood sample by vein puncture, separation and preservation of serum
2	WIDAL Test
3	VDRL (including Antigen Preparation
4	ASO (Anti streptolysin 'O')
5	C-Reactive Protein (Latex agglutination)
6	Rheumatoid factor (RF) Latex agglutination
7	Demonstration of antigen / antibody, determination by Immuno fluorescence (IF), Immuno diffusion, precipitation in Agarose gel (Ouchterlony)
8	Demonstration of ELISA
9	Demonstration of SDS - PAGE
10	Preparation of Vaccination schedule

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Clinical Biochemistry Lab			
Course Code	BMLT4053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge about perform liver and kidney fuction test
- 2 .To gain the knowledge of heart function test.
3. To gain the knowledge of biochemistry auto analyzers.

Course Outcomes

On completion of course student will be able to,

CO1	Perform and analyse blood sample for assessing the function of liver ,kidney and heart and correlate with clinical conditions in clinical biochemistry laboratory.
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Text Book (s)

- 1 Raju Bindu, Review of Medical Biochemistry
- 2 Geetha Damodaran K, Practical Biochemistry

Reference Book (s)

- 1 DS Sheriff, Textbook of Medical Biochemistry
- 2 U.Satyanarayana, Textbook of Medical Biochemistry

List of Experiments	
1	Serum Bilirubin total estimation
2	Serum amylase estimation
3	Serum GOT (AST) estimation

4	Serum GPT (ALT) estimation
5	Alkaline phosphatase estimation
6	Acid phosphatase estimation
7	Determination of OGTT
8	Serum Total Proteins estimation
9	Serum Creatinine estimation
10	Blood Urea Estimation
11	Serum Cholesterol estimation
12	Demonstration of Collection of Gastric Juice
13	Demonstration of working of Random Access Analyzer(RAA)

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Virology & Mycology			
Course Code	BMLT5001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To develop the knowledge on basic diagnosis of fungal infections
- 2 To gain the knowledge on diseases caused by fungi
- 3 To develop the basic knowledge on DNA and RNA viruses
- 4 To know clinical importance and laboratory diagnosis of viruses

Course Outcomes:

On completion of course student will be able to,

CO1	Related basic diagnostic tests to identify the fungus
CO2	outline diseases caused by fungus
CO3	Develop knowledge regarding the Structure & classification of viruses
CO4	Classify various types of RNA viruses
CO5	Classify various types of DNA viruses
CO6	Discuss the Importance of Advanced gene sequencing techniques

Text Book (s)

1. Arora, Medical Lab Technology
2. Mycology And Microbiology: A Textbook For Ug And Pg Courses C.Manoharachary
3. Text book of Medical mycology by Jagadish Chander, 4th Edition
4. Text Book of Virology by Vinod singh

Reference Book (s)

1. Practical Medical Microbiology by Mackie & Mac. Cartney Volume 1 and 2
2. Text book of Microbiology by C P Baveja

Unit-1 Mycology	8 hours
Introduction to medical mycology, basic concepts about superficial and deep mycoses taxonomy , classification & general characteristics of Various medically important fungi.	
Unit-2 Fungal infection	8 hours
Names of fungi & diseases caused by them; superficial mycoses, candida, dermatophytes, opportunistic fungi, subcutaneous mycoses	
Unit-3 Virology	7 hours
Introduction, classification of virus, collection, Transport, & Storage of sample for Viral diagnosis. Staining Techniques used in virology, Processing of sample for viral diagnosis (Egg Inoculation & Tissue culture)	
Unit-4 RNA Viruses	9 hours
RNA Viruses: Polio myelitis, Rhino virus, Influenza, Rabies, Arbo viruses, Measles Mumps, Rubella, HIV	
Unit-5 DNA Viruses	8 hours
DNA viruses: Small Pox, HSV, CMV, EBV, Varicella Zoster, Hepatitis, Adeno virus	
Unit – 6 PCR and Next generation DNA Sequencing techniques to identify viral genome:	8 hours
History of PCR, Principle of PCR, Stages of PCR, procedure of PCR, Concept of optimization of PCR, Applications of PCR, Advancements in PCR technology, DNA sequencing techniques, Methods of DNA Sequencing, Next generation DNA sequencing techniques	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Transfusion Medicine			
Course Code	BMLT5002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

- 1 To develop the basic knowledge in Transfusion medicine (or transfusiology) – the branch of medicine that deals with the transfusion of blood.
- 2 To learn the principles and best practices involved in blood collection
- 3 To learn blood components separation and storage.
- 4 To know safe blood transfusion and adverse reactions.

Course Outcomes:

On completion of course student will be able to,

CO1	Define mechanism of hemostats ,coagulation pathways and physiology of blood cells.
CO2	Demonstrate human blood group systems and practice blood grouping and other tests.
CO3	Organize patient donor selection or rejection and perform ,screening tests and compatibility testing.
CO4	Inspect adverse donor reactions and explain complications of mismatched transfusion.
CO5	Examine various fractions of blood.
CO6	Build skills in handling advanced techniques in blood banking

Text Book (s)

1. Practical haematology by JB Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Book (s)

1. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein
2. Medical Laboratory Technology by Mukherjee

Unit-1 Introduction of transfusion medicine	8 hours
History of transfusion medicine, RBC, WBC, Platelets-production, structure, functions & Life span. Hemoglobin structure function & degradation. Hemostasis, role of platelets, coagulation pathways, Fibrinolysis	
Unit-2 Concept of Stoichiometry	8 hours
Introduction to Human Blood Group systems, ABO systems, Rh System, Hemolytic Disease of New-born & Prevention. Blood grouping techniques, Cell grouping, Serum grouping,(Slide & Tube Method) Rh grouping by slide & tube method, Difficulties in ABO grouping & its importance.	
Unit-3 Blood bank	10 hours
Donor selection & rejection criteria, Health checks before donating, Types of anticoagulants, types of blood bags, component separation, Standard operating procedures for usage, donation & storage of blood, screening of donor, compatibility testing cross matching (Major & Minor). Coombs test Direct & Indirect	
Unit-4	7 hours
Instructions given to the donor after blood donation, Adverse donor reaction. Complication & hazards of blood transfusion reactions & mismatched blood transfusion. Artificial blood	
Unit-5	7 hours
Preparation of various fractions of blood, packed red cells, washed red cells, & frozen red cells, platelet rich plasma, platelet concentrate, frozen platelets, fresh plasma, fresh frozen plasma, cryoprecipitate.	
Unit – 6 Recent techniques used in blood bank	7 hours
"Recent techniques used in blood bank/ Quality control Automation-solid phase technology, Gel Technology, Affinity Column Technology. Haemopheresis: pertaining to Leucocytes, platelets and plasma. Quality control in blood bank. "	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Universal human values and ethics			
Course Code	LLL101			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life

Course Outcomes:

On completion of this course, the students will be able to

CO1	The students shall be able to understand the significance of value inputs in a classroom and start applying them in their life and profession
CO2	The students shall be able to identify values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual
CO3	The students shall be able to analyze the value of harmonious relationship based on trust and respect in their life and profession
CO4	The students shall be able to analyze the role of a human being in ensuring harmony in society and nature.
CO5	The students shall be able to evaluate ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
CO6	The students shall be able to evaluate soft skill development in education and attainment of happiness.

Text Book (s)

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Book (s)

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Unit-1 Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 8 hours

- | |
|---|
| <ol style="list-style-type: none"> 1. Understanding the need, basic guidelines, content and process for Value Education 2. Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels |
|---|

Unit-2 Understanding Harmony in the Human Being - Harmony in Myself 8 hours

- | |
|--|
| <ol style="list-style-type: none"> 1. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’ 2. Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha 3. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’ 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of physical needs, meaning of Prosperity in detail 6. Programs to ensure Sanyam and Swasthya |
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Unit-3 Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship 10 hours

- | |
|--|
| <ol style="list-style-type: none"> 1. Understanding harmony in the Family- the basic unit of human interaction 2. Understanding values in human-human relationship; meaning of <i>Nyaya</i> and program for its fulfilment to ensure <i>Ubhay-tripti</i>;

Trust (<i>Vishwas</i>) and Respect (<i>Samman</i>) as the foundational values of relationship |
|--|

3. Understanding the meaning of *Vishwas*; Difference between intention and competence
4. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
5. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

**Unit-4 Understanding Harmony in the Nature and Existence - Whole existence as Co-existence
7 hours**

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

Unit-5 Implications of the above Holistic Understanding of Harmony on Professional Ethics

7 hours

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in Professional Ethics:
 - a) Ability to utilize the professional competence for augmenting universal human order,
 - b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models
5. Case studies of typical holistic technologies, management models and production system
6. Strategy for transition from the present state to Universal Human Order:
 - a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - b) At the level of society: as mutually enriching institutions and organizations

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Medical Laboratory Technician-I			
Course Code	BMLT5003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	6	0	0	6

Course Objectives:

- 1 To develop the knowledge on training candidates for the job of a “Medical Laboratory Technician”, in the “Healthcare” Sector/Industry.
- 2 To gain the knowledge on basic clinical laboratory practice
- 3 To learn how to setup your own lab.
- 4 To know the maintain record and reporting format

Course Outcomes:

On completion of course student will be able to,

CO1	Recall Hospital/Diagnostic center organization,setup,facilities provided at health care systems in National/State/District level and to develop role and responsibilities of Medical laboratory technician.
CO2	Demonstrate safe disposal methods of biomedical waste ,how to maintain personnel hygiene and apply knowledge in basic testing of Biochemistry,hematology,clinical pathology laboratory.
CO3	Apply Basic knowledge in clinical biochemistry, bacteriology, serology laboratory and practice post analytical laboratory testing process
CO4	Determine Analytical laboratory testing process and apply knowledge in maintaining restful environment in health care setting.
CO5	Explain documentation types,uses,importance of records,guidelines to be followed and apply knowledge in Observing and reporting while dealing with patients.
CO6	Discuss Point of care testing(POCT) and It’s applications

Text Book (s)

1. Text book of Biochemistry by U. Satyanarayana

2. Text book of Medical Laboratory Technology by Godkar
3. Textbook of Parasitology by CP. Baveja
4. Essentials of Physiology by Sembulingam
5. Textbook of Pathology by Harshamohan
6. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone

Reference Book (s)

1. Textbook of Microbiology By Prescott
2. Textbook of Immunology by S.K gupta
3. Textbook of Hematology & Clinical pathology by Ram das naik
4. WHO : Good Clinical Laboratory Practice (GCLP),2009
5. Hand book of Health care quality & patient safety

Unit-1	Healthcare Systems, Role of the Medical Laboratory Technician & lab terminology	26 hours
<ul style="list-style-type: none"> • Healthcare Systems, Laboratory and Delivery: Basic Understanding of Healthcare Service Providers (primary, secondary & tertiary), Basic Understanding of Hospital Functions, Basic Understanding of Diagnostic Centres and medical laboratory facilities, Understanding of Laboratory at different level (National / State / District) • Role of the Medical Laboratory Technician: To develop broad understanding of the Role of MLT, To identify Laboratory maintenance needs to be taken care by MLT, To develop Understanding of Patient Comforts and Safety, To develop understanding of Laboratory Test Results, To exhibit Ethical Behaviour. • Introduction to Laboratory related Medical Terminology: Understand appropriate use of laboratory related medical terminology in daily activities with colleagues, patients and family. 		
Unit-2	Body fluids, Personal hygiene & Bio medical waste management	21 hours
<ul style="list-style-type: none"> • Introduction to Biochemistry, Haematology and Clinical Pathology & Examination of Semen, CSF and Knowledge about Other Body Fluids Like Pleural Fluid, Pericardial Fluid, Peritoneal Fluid, Synovial Fluid, Ascitic Fluid. • Personnel Hygiene: To develop understanding of the concept of Healthy Living, procedures of Hand Hygiene, to develop techniques of Grooming, To be equipped with Techniques of Use of PPE, To be vaccinated against common infectious diseases • Bio Medical Waste Management: To learn & gain understanding of importance of proper and safe disposal of bio-medical waste & treatment, categories of biomedical waste, colour coding, types of containers, transportation of waste, etc 		
Unit-3	Pre-analytical Laboratory Testing Process	26 hours
<p>To gain broad understanding of different types of samples to be taken in medical laboratory, sample Handling, different equipment useful for blood sample collection, correct method of blood sample collection, collection method of samples other than blood samples, correct procedure of sample transportation.</p> <ul style="list-style-type: none"> • Introduction to Clinical Biochemistry: Electrolytes, Therapeutic Drug Monitoring, Acid Base Balance. • Introduction to Bacteriology, Immunology and Serology • Sensitization to Blood Banking Understand Immuno- hematology 		

Unit-4 Professional Behaviour, Laboratory planning, & sample processing	23 hours
<ul style="list-style-type: none"> • Professional Behaviour in Healthcare Setting How to maintain restful environment, General and Specific etiquettes to be observed on duty, Understand need for compliance of organizational hierarchy and reporting, Understand the legal and ethical issues & importance of conservation of resources in laboratories • Analytical Laboratory Testing Process-I: To gain broad understanding about Laboratory planning, laboratory operations, care of laboratory glassware, equipment and instruments, Specimen Handling, understanding of setting up, calibrating, operating, cleaning, maintaining, troubleshooting and validation of laboratory equipment used in quantitative or qualitative analysis. 	
Unit-5 Observing & Reporting	24 hours
<ul style="list-style-type: none"> • Observing & Reporting: Understand the importance and method of Observing and reporting while dealing with patients during sample and report collection, method of Observing and reporting while assisting the pathologists and other members of the team, importance of verbally informing the person in authority • Documentation: Understand guidelines for documentation, Collecting documentation, Types of records in laboratory set up, uses and importance of records, Essential requirement of records, abbreviations and symbols, Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form 	
Unit – 6 Recent advancements in Point of test care Technology	8 hours
Introduction to Point-of-care testing (POCT or bedside testing), Applications of POCTs, Benefits of point of care tests.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Phlebotomy-I			
Course Code	BMLT5004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	6	0	0	6

Course Objectives:

- 1 To develop the knowledge on human anatomy and physiology .
- 2 To gain knowledge on the health care system.
- 3 To learn types of laboratory and its services
- 4 To know the personal safety during the work in the lab

Course Outcomes:

On completion of course student will be able to,

CO1	Teach human circulatory system and digestive system
CO2	Teach the human respiratory and nervous system.
CO3	Understanding the health care system and laboratory service.
CO4	Demonstrate the personal safety and first aid
CO5	Perform personal hygiene
CO6	Can able to formulate test environment by using automation

Text Book (s)

1. Ross and wilson, Anatomy and physiology in health and illness, 12th Edition, Elsevier publication
2. Prabhjot kaur, Textbook of Antomy and Physiology, 2nd Edition, lotus publication.

Reference Book (s)

1. PR. Ashalatha, G Deepa, Textbook of Antomy and Physiology for Nurses,4th edition, Jaypee brothers medical publications.
2. Medical Laboratory Technology by Mukherjee

Unit-1	Structure and Function of Human Body:-1.	15 hours
Anatomical terminology of human body. Endocrine system secretions and excretions different parts of body. Cardiovascular system and blood vessels. Digestive System in human body.		
Unit-2	Structure and Function of Human Body:-2	15 hours
Respiratory system, Urinary System, Nervous System, Integumentary system and Lymphatic system and body fluids		
Unit-3	Introduction to Healthcare Systems & Laboratory Service	15 hours
Basic Understanding of Healthcare Service. Providers (primary, secondary & tertiary). Basic Understanding of Hospital Functions. Basic Understanding of Diagnostic Centers and Medical Laboratory Facilities. Understanding of Laboratory facilities at different level (National / State / District)		
Unit-4	Safety & First Aid:	15 hours
To develop understanding and precautions to ensure Patient's Safety. To develop basic understanding and precautions to ensure sample preservation while transporting. Describe common emergency conditions and what to do in medical emergencies. Describe basics of first aid. To develop understanding and precautions to ensure self-safety.		
Unit-5	Personnel Hygiene	15 hours
To develop understanding of the concept of Healthy Living. To develop understanding & procedures of Hand Hygiene. To develop techniques of Grooming. To be equipped with Techniques of Use of PPE. To be vaccinated against common infectious Disease		
Unit – 6	Recent advancements in laboratory automation	8 hours
Advancements in blood collection and devices used and Robotic System for Blood Sampling- sampling robot for automated blood drawing and testing, future of blood testing robotic		

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Virology & Mycology Lab			
Course Code	BMLT5051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

1. To develop the knowledge on diagnosis of fungal infections and specimen collection.
2. To gain the knowledge on laboratory diagnosis of fungi
3. To learn the rapid diagnosis of virus and embryonated egg culture techniques

Course Outcomes:

On completion of course student will be able to,

CO1	Diagnose fungal infection by performing fungal tests and to demonstrate virus culture by embryonated egg technique.
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Text Book (s)

1. Practical Medical Microbiology by Mackie & Mac. Cartney Volume 1 and 2

Reference Book (s)

1. Medical laboratory Technology Vol. I ,II, III by Mukherjee

List of Experiments

1. Good laboratory practices in mycology laboratory
2. Prepare routine culture used in mycology laboratory
3. Perform Alcian blue stain
4. Perform collection of samples from Hair, Nail, & Skin
5. Perform collection samples from body fluids and Secretions
6. Good laboratory practices in virology laboratory
7. Demonstration of virus culture by embryonated egg techniques

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
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30		70	100
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Name of The Course	Transfusion Medicine Lab			
Course Code	BMLT5052			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	2	1

Course Objectives:

- 1 To develop the basic knowledge in Transfusion medicine (or transfusiology) - the branch of medicine that deals with the transfusion of blood.
- 2.To practice the principles and best practices involved in blood collection
- 3.To practice blood components separation and storage.
- 4.To know safe blood transfusion and adverse reactions

Course Outcomes:

On completion of course student will be able to,

CO1	Explain donor selection and investigations done on donor blood screening & cross matching.
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Text Book (s)

1. Practical haematology by JB Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical laboratory Technology by KL Mukherjee Volume-I

Reference Book (s)

1. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein
2. Medical Laboratory Technology by Mukherjee

List of Experiments

1. Prepare Acid Citrate Dextrose (ACD) and Citrate Phosphate Dextrose (CPD) Solutions
2. Screening of blood donor: physical examination including medical history of the donor
3. Collection and preservation of blood for transfusion purpose
4. Screening of blood for Malaria, Microfilaria, HBsAg, syphilis and HIV
5. Determine the ABO & Rh grouping
6. Perform Direct and Indirect Coomb's test
7. Perform cross matching (Major & Minor)
8. Demonstration of components separation

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Medical Laboratory Technician Lab-I			
Course Code	BMLT5053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	6	3

Course Objectives:

- 1 To develop the knowledge on performing clinical skills essential in providing basic diagnostic services such .
- 2 To gain knowledge on samples Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.
- 3 To learn Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment.
- 4 To know the maintain record and reporting format

Course Outcomes:

On completion of course student will be able to,

CO1	Explain blood sample for different parameter in hematology,clinical biochemistry& Microbiology laboratory in assessing and reporting it.
CO2	Demonstrate and practice laboratory set up, ethics and basic collection of sample.
CO3	Demonstrate working of various instruments used and laboratory process and to practice policies and procedures in Biomedical waste disposal in hospitals

Text Book (s)

1. Raju Bindu, Review of Medical Biochemistry
2. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone
3. Anatomy for Nurses By Asha Latha
4. Hand book of Health care quality & patient safety
5. Text book of Medical Laboratory Technology by Godkar
6. Damodaran K, Practical Biochemistry
7. Textbook of Parasitology by CP. Baveja

Reference Book (s)

1. Textbook of Microbiology By Prescott
2. Textbook of Pathology by Harshamohan
3. Textbook of Immunology by S.K Gupta

4. Textbook of Hematology & Clinical pathology by Ram das naik
5. U.Satyanarayana, Textbook of Medical Biochemistry

List of Experiments

1. Ethics of Laboratory
2. Laboratory safety and First aid
3. Demonstration of different systems of whole body (Models/Charts)
4. Demonstration of Blood collection
5. Separation of Serum/Plasma
6. Collection and preservation of Urine
7. Estimation of Hemoglobin by various methods
8. Demonstration of Reticulocyte count
9. Demonstration of Total Red blood cell count
10. Demonstration of Total White blood cell count
11. Demonstration of Bleeding Time
12. Demonstration of Clotting Time
13. Determination of ESR
14. Examination of Urine (Physical/Chemical/Microscopic)
15. Microscopic examination of stool
16. Collection and examination of sputum
17. Examination of Semen
18. Sample formats for test requisition
19. Demonstration of procedure for hand hygiene
20. Demonstration of handling and disposal of Biomedical waste
21. Demonstration of biohazard bags for waste disposal
22. Demonstration of Grams staining
23. Demonstration of cultivation of bacteria
24. Demonstration of different sterilization methods
25. Demonstration of ABO Grouping
26. Demonstration of Rh typing
27. Demonstration of Cross matching of blood
28. Demonstration of investigating transfusion reactions
29. Demonstration of working of Semiautoanalyzer
30. Sample formats for equipment maintenance

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Phlebotomy Lab-I			
Course Code	BMLT5054			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	6	3

Course Objectives:

- 1 To develop the knowledge on human anatomy and physiology .
- 2 To gain knowledge on patient safety and hospital function
- 3 To learn and performed first aid and personal hygiene
- 4 To know the personal safety during the work in the lab

Course Outcomes:

On completion of course student will be able to,

CO1	Teach anatomy and physiology of human body
CO2	Understand personnel hygiene
CO3	Understand first aid.

Text Book (s)

1. P.R Ashalatha Text book of anatomy and physiology for nurses, Jaypee brothers medical publication.
2. Text book of Medical Laboratory Technology by P. B. Godker

Reference Book (s)

1. Good laboratory practices
2. Demonstration of anatomical positions of human body.
3. Demonstration of Anatomy of heart
4. Demonstration of Kidney
5. Demonstration of digestive system.
6. Demonstration of Lungs
7. Demonstration of Laboratory setup.
8. Demonstration of first aid (CPR)
9. Demonstration of hand washing technique.
10. Demonstration of medical lab technician vaccination procedure.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Parasitology			
Course Code	BMLT6001			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To study and gain the knowledge of life cycle, clinical symptoms in each type of parasitic infection.
2. To study and gain the knowledge diagnosis treatment, control & prevention of various Medically important parasites

Course Outcomes

On completion of course student will be able to,

CO1	Teach & Discuss the mechanism of disease production by parasites
CO2	Diagnose the parasitic infections caused by Rhizopoda & Mastigophora
CO3	Diagnose the parasitic infections caused by Sporozoa & Ciliata
CO4	Diagnose the parasitic infections caused by Nematodes
CO5	Diagnose the parasitic infections caused by Cestodes
CO6	Discuss on diagnosis of parasite by Electrophoretic Techniques

Text Book (s)

1. Text book of Parasitology by C P. Baveja
2. Medical microbiology by Satish Gupta
3. Parasitology in relation to the clinical medicine by K D Chatterjee
4. Ananthanarayana and Panikar, Text book of Microbiology

Reference Book (s)

1. Parasitology in relation to the clinical medicine by K D Chatterjee
2. Anantha Narayan and Panikar, Textbook of Microbiology.

Unit-1 Introduction of Parasitology	5 hours
Introduction about Parasitology, taxonomy and classification, parasite, host, mechanism of disease production by parasites, Reaction of host to parasite.	
Unit-2 Classification of Protozoa	10 hours
Classification of Protozoa a) Rhizopoda (E. Histolytica) b) Mastigophora (Giardia Lamblia, Leishmania Donovanii, Trichomonas Homnis)	
Unit-3 Classification of Protozoa	9 hours
a) Sporozoa (Malarial Parasites, Toxoplasma Gondii) b) Ciliata (Balantidium Coli)	
Unit-4 Classification of Helimints	12 hours
Nematodes (Trichinella Spiralis, Trichuris trichura, Ascaris Lumbricoids, Ancylostoma duodenale, Strongyloides stercoralis, Enterobuds Vermicularis, Dracanculus Medinensis, Wuchereria Bancrofti)	

Unit-5 Classification of Helimints	9 hours
Cestodes (Diphyllobothrium Latum, Taenia saginata, Taenia solium, Cystercus cellulosae, Echinococcus granulosus, Trematodes (Schistosoma hematobium)	
Unit-6: Advanced techniques for diagnosis of parasite infections	8 Hours
Advanced techniques for diagnosis of parasite infections, Electrophoretic Techniques	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Clinical Laboratory Practice			
Course Code	BMLT6002			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To practice of good clinical laboratory practices followed in laboratory
2. To gain the knowledge of organization and infrastructure of clinical laboratory
3. To gain the knowledge of Ethical considerations to be followed, maintaining quality & safety in Laboratory
4. To practice Bio medical Waste Management rules, process of collection and disposal.

Course Outcomes

On completion of this course students will be able to:

CO1	Explain the different levels of laboratory services provided and to apply knowledge to follow safe practices and procedures in case of accidents and emergencies occur in the laboratory.
CO2	Practice how to setup the infrastructure of laboratory and SOP needed in maintaining laboratory personnel and equipment's.
CO3	Differentiate the appropriate method of biomedical waste management and apply knowledge in collection, transportation, redistribution and disposal and methods of disinfection.
CO4	Practice the four Biosafety Laboratory Levels, emergency response procedure and explain what types of risks are involved when working in a lab.
CO5	Practice laboratory ethics and how to maintain continuous quality improvement in the laboratory.
CO6	Solve the problems encountered during emergency care

Text Book (s)

1. ICMR(2008) guidelines for good clinical laboratory practices.
2. Hospital waste Management : Chapter 13 ,PARK'S Textbook of Preventive and Social Medicine,18th Edition

Reference Book (s)

1. NIH :DIADS guidelines for Good Clinical Laboratory Practice Standerds,2011
2. WHO : Good Clinical Laboratory Practice (GCLP),2009

Unit-1 Laboratory services	6 hours
Levels of laboratories-Primary level, Secondary level and Tertiary level, Reference laboratories, Research laboratories and Specific disease reference laboratories. Accidents and emergencies, First aid in the laboratory	
Unit-2 Infrastructure in the laboratories	8 hours
Laboratory space :Reception, specimen collection, quality water supply, work area, specimen/sample/slide storage, cold storage, record room, wash room, biomedical waste room, fire	

safety, etc. Personal in the laboratory –Qualifications as per NABL document Equipment Listing, cleaning, maintenance, SOP, verification of performance, Internal quality control	
Unit-3 Bio medical waste management	9 hours
Bio medical waste management and environment safety- Definition of Biomedical Waste - Waste minimization ;BMW – Segregation, collection, transportation, treatment and disposal (including color coding)- BMW Management & methods of disinfection - Modern technology for handling BMW	
Unit-4 Safety in Laboratories	8 hours
Safety in Laboratories – General safety measures, biosafety precautions, levels of biosafety laboratories:BSL1,BSL2,BSL3,BSL4,BSL5,	
Unit-5 Ethical Considerations & Quality Control	9 hours
Non- maleficence, beneficence, risk minimization ,ethical review ,transmission of ethical values, voluntariness, compliance. Quality Assurance –Internal and external Quality assessment	
Unit – 6 Recent advancements in emergency care	8 hours
Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR, Using an AED (Automated external defibrillator) & Managing an emergency including moving a patient.	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Research Methodology & Biostatistics			
Course Code	BMLT6003			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	3	0	0	3

Course Objectives:

1. To gain the basic knowledge of Research Methodology & Biostatistics
2. To know the basic principles of research and methods applied in applied to draw inferences from the research findings.
3. To make use of statistical methodology in designing, analysing, interpreting, and presenting biological experiments and observations.

Course Outcomes

On completion of this course students will be able to:

CO1	Illustrate the basic principles of research
CO2	Interpret the research findings.
CO3	Illustrate the basic of statistical methods
CO4	illustrate the basic of biostatistics and research tools
CO5	Apply research knowledge in presenting biological research
CO6	Adapt and understand recent advancements in epidemiology

Text Book (s)

1. The Analysis of Biological Data (2nd edition) by Whitlock & Schluter
2. Text Book of Biostatistics and Research methodology by Karthikeyan, R.M. Chaturvedi, R.M. Bhosale

Reference Book (s)

3. Textbook of Methods in Biostatistics by B.K. Mahajan 7th Edition
4. Textbook of Biostatistics by B. Annadural

Unit-1	8 hours
Introduction to research methods , Identifying research problem	
Unit-2	8 hours
Ethical issues in research, Research design	
Unit-3	7 hours
Basic Concepts of Biostatistics, Types of Data, Research tools and Data collection methods	
Unit-4	8 hours
Sampling methods, Probability rules & Probability distributions (Normal & Binomial)	
Unit-5 Ethical Considerations & Quality Control	9 hours
Developing a research proposal-Models	
Unit – 6 Recent advancements in epidemiology	8 hours
Basics of evidence based evidence, types of studies, causal inference in epidemiology, applied epidemiology	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Medical Laboratory Technician-II			
Course Code	BMLT6004			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	6	0	0	6

Course Objectives:

1. To train the students for the job of a “Medical Laboratory Technician” , in the “Healthcare” Sector/Industry
2. To develop knowledge and skill related to Medical Laboratory Technician

Course Outcomes

On completion of this course students will be able to:

CO1	Explain Patient’s Rights & Responsibilities and demonstrate chemicals/reagents useful in sample collection & analysis, broad understanding of maintaining record of inventory, test results in cytopathology and histopathology laboratory
CO2	Practice Good Clinical Laboratory Practices (GCLP) of WHO, laboratory safety, OSHA (Occupational Safety and Health Administration), U.S. Department of Labor, other current practices in laboratory used worldwide
CO3	Differentiate the Morphology, pathogenicity and laboratory diagnosis of human viruses and illustrate fine needle aspiration
CO4	Post-Analytical Laboratory Testing Process and patients environment.
CO5	Practice Soft Skills and effective Communications with Patients & Family
CO6	Discuss laboratory Information system, calibration of laboratory instruments & management of financial, biomedical waste in hospital.

Text Book (s)

- 1 Text book of Biochemistry by U. Satyanarayana
- 2 Text book of Medical Laboratory Technology by Godkar
- 3 Textbook of Parasitology by CP. Baveja
- 4 Essentials of Physiology by Sembulingam
- 5 Textbook of Pathology by Harshamohan
- 6 Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone

Reference Book (s)

1. Textbook of Microbiology By Presscott
2. Textbook of Hematology & Clinical pathology by Ram das naik
3. Textbook of Immunology by S.K gupta
4. WHO : Good Clinical Laboratory Practice (GCLP),2009
5. Hand book of Health care quality & patient safety

Unit-1	26 hours
<p>Patient's Rights & Responsibilities: Understand sensitivities involved in patient's right, Learn medical laboratory technician's role in maintaining patient's rights.</p> <ul style="list-style-type: none"> • Introduction to Histopathology: Brief introduction of histopathology, Elementary knowledge of specimen collection, tissue fixatives, Tissue processing, section cutting, Staining, Decalcification. • Introduction to Cytopathology: Elementary knowledge of specimen collection, transportation, precautions to be taken for gynaecological samples, specimen collection, transportation and preservation of nongynaecological Samples, fixation and fixative, fluid specimen, Papanicolaou stain, mounting of cell sample, special stains. • Analytical Laboratory Testing Process-II: To gain broad understanding of chemicals/reagents useful in sample analysis, broad understanding of maintaining record of inventory, test results, etc. Able to inspect the availability of medical supplies or diagnostic kits, laboratory safety. to research methods, Identifying research problem 	
Unit-2	21 hours
<p>Introduction to Advanced techniques and future trends in laboratory science-I: Updated on advanced techniques and future trends in field of biochemistry, haematology & blood banking, field of clinical pathology, histopathology & cytopathology.</p> <ul style="list-style-type: none"> • Sensitization on current best practices in laboratory: Elementary knowledge on Good Clinical Laboratory Practices (GCLP) of WHO, laboratory safety, OSHA (Occupational Safety and Health Administration), U.S. Department of Labor, other current practices in laboratory used worldwide. • Infection control and prevention: Understand practices to curb infection, hospital borne infections, prevention and treatment of needle, stick injury, management of blood and body, substance spills in the health care setting 	
Unit-3	26 hours
<p>Fine needle Aspiration: Understand the purpose of fine needle aspiration, procedure of fine needle aspiration, & section cutting</p> <ul style="list-style-type: none"> • Introduction to Parasitology, Mycology and Virology, Describe the Morphology, pathogenicity and laboratory diagnosis of human viruses. • Basic Computer Knowledge: To gain broad understanding about Application of computers in laboratory Practice, Introduction to Computers, Block diagram, Input and Output devices, Storage devices, operating systems, Operating systems (OS), Function of OS, MS-Office 	
Unit-4	23 hours
<ul style="list-style-type: none"> • Post-Analytical Laboratory Testing Process: Describe archiving protocol emphasizing on storage and retrieval of samples, specimens, data, and records. Archiving, Describe source of error/ interference/ quality of work and initiate corrective action as applicable, assessment of results to initiate followup, testing, Differentiation between clinically, Significant and insignificant findings, Able to establish and monitor quality assurance, programs or activities to ensure the accuracy of laboratory results • Patient's Environment: Describe things necessary to make the patient feel safe and comfortable while collection, impact of comfort on patients health, importance and methodology of cleanliness, and hygiene environment in collection space 	
Unit-5 Ethical Considerations & Quality Control	24 hours
<p>Soft Skills and Communications Theory Duration: Understand Art of Effective Communication, Able to handle effective Communication with, Patients & Family, Able to handle effective Communication with Peers/ colleagues using medical terminology in communication, reading and writing skills, sentence formation, grammar and composition, enhance vocabulary, Goal setting, team building, team work, time, management, thinking and reasoning & communicating with others, problem solving, Understand need for customer service and service excellence in Medical service, ethics in hospital set up, objection handling, Telephone and Email etiquettes, Basic computer working like feeding the data, saving the data and retrieving the data, analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently; rapidly changing situations, adapt accordingly, decision making ability, planning and organization of work</p>	
Unit – 6 Advancements in Laboratory Information system (LIS) 8 hours	

Laboratory Information system (LIS), Hospital Information system (HIS) and financial Management: Introduction, Functions of a laboratory management system, Standards for laboratory management system, Introduction and awareness of financial management in a clinical laboratory. Ethics in Medical laboratory Practice: Understanding the term _Ethics, Ethics in relation to the following: Pre-Examination procedures, Examination procedures, Reporting of results, Preserving medical records, Access to Medical laboratory Records. Procurement of equipment and Inventory Control: Audit in a Medical Laboratory, Introduction and Importance: Responsibility, Planning, Horizontal, Vertical and Test audit, Frequency of audit, Documentation.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Phlebotomy-II			
Course Code	BMLT6005			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	6	0	0	6

Course Objectives:

1. To gain the basic knowledge on role of “phlebotomy technician ” in the “Healthcare Sector/Industry”
2. To practice the Biomedical waste management
3. To develop knowledge and skill related to “phlebotomy technician”
4. To develop the knowledge role of phlebotomy technician in Pre-Analytical laboratory testing process

Course Outcomes

On completion of this course students will be able to:

CO1	Understanding role of the phlebotomy technician.
CO2	Perform blood collection in laboratory and blood bank.
CO3	Apply knowledge on biomedical waste.
CO4	Perform pre analytical procedure in laboratory
CO5	Understanding reporting and documentation.
CO6	Improve skills on collection of blood by using advanced techniques

Text Book (s)

1. Text book of Medical Laboratory Technology by Godkar
2. Medical Laboratory Technology by Mukherjee
3. Essentials of Physiology by Sembulingam
4. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone

Reference Book (s)

Unit-1 Role of the Phlebotomy Technician	26 hours
To develop broad understanding of the Role of PBT. To identify Laboratory maintenance needs to be taken care by PBT. To develop Understanding of Patient Comforts and Safety. To develop understanding of Laboratory Test Results. To exhibit Ethical Behaviour	
Unit-2 Blood Collection in lab and blood bank.	21 hours
Types, composition, action of anticoagulants. Anticoagulants used in blood bank and clinical laboratory. Blood collection procedure in laboratory, Blood collection in Blood bank. Blood collection method.	
Unit-3 Bio Medical Waste Management	26 hours
To gain understanding of importance of proper and safe disposal of bio-medical waste & treatment. To gain understanding of categories of biomedical waste. To learn about disposal of bio-medical waste colour coding, types of containers, transportation of waste, etc. To gain broad understanding of standards for bio-medical waste disposal To gain broad understanding of means of biomedical waste treatment.	
Unit-4 Pre-analytical Laboratory Testing Process	23 hours
To gain broad understanding of different types of samples to be taken in medical laboratory. To gain broad understanding about Sample Handling. To gain broad understanding of different equipment useful for blood sample collection. To gain broad understanding of correct method of interpretation of test request forms.	
Unit-5 Observing, Reporting & Documentation:	24 hours
Understand the importance and method of observing and reporting while dealing with patients during sample and report collection. Describe quality assurance process during report delivery. Understanding the importance of verbally informing the person in authority. Understand guidelines for documentation. understand uses and importance of records in laboratory	
Unit-6 Advancements in automation the field of phlebotomy	8 hours
Adaptations for fragile veins, Recognizing and adapting to damaged veins	

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
10	20	70	100

Name of The Course	Medical Laboratory Technician lab -II			
Course Code	BMLT6051			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	6	3

Course Objectives:

1. To demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood/urine/stool and tissue samples, etc.
2. To conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment
3. To provide technical information about test results; Prepare and document medical tests and clinical results; etc.

Course Outcomes

On completion of this course students will be able to:

CO1	Demonstrate working of various instruments used and laboratory process and formats in Medical Laboratory Technology Laboratory.
CO2	Demonstrate automation and quality control in Medical Laboratory Technology Lab.
CO3	Diagnose different diseases and report it.
CO4	Demonstrate and apply computers and its applications in laboratory field.

Text Book (s)

1. Text book of Medical Laboratory Technology by Godkar
2. Damodaran K, Practical Biochemistry
3. Textbook of Parasitology by CP. Baveja
4. Anatomy for Nurses By Asha Latha
5. Textbook of Pathology by Harshamohan
6. Introduction to Medical laboratory technology by J. Baker, R.E. Silverstone

Reference Book (s)

1. Textbook of Microbiology By Presscott
2. Textbook of Pathology by Harshamohan
3. Textbook of Hematology & Clinical pathology by Ram das naik
4. Textbook of Immunology by S.K Gupta
5. U.Satyanarayana, Textbook of Medical Biochemistry
6. Hand book of Health care quality & patient safety

List of Experiments

1. Demonstration of working of spectrophotometer
2. Demonstration of maintenance of equipment's and reagents
3. Sample formats for reporting test result
4. Demonstration of policies and procedures for infection control
5. Demonstration of mock diagnostic lab for learning & understanding patients right
6. Demonstration of mock environment to learn and understand conducive patient environment
7. Collection and handling of specimen for histopathology/cytopathology examination
8. Demonstration of working of Microtome
9. Demonstration of sharpening methods of microtome knife
10. Demonstration of tissue processing
11. Demonstration of PAP staining
12. Demonstration of PAS staining
13. Collection and handling of specimen for cytopathology examination
14. Demonstration of Mounting technique
15. Demonstration of maintaining record of inventory, test results etc
16. Demonstration of automation in clinical biochemistry laboratory
17. Demonstration of automation in hematology laboratory
18. Demonstration of automation in pathology laboratory
19. Demonstration of automation in microbiology laboratory
20. Demonstration of FNAC
21. Demonstration of laboratory diagnosis of HIV
22. Demonstration of laboratory diagnosis of HCV
23. Demonstration of maintenance of IQA
24. Demonstration of maintenance of EQA
25. Demonstration of advanced techniques in the field of Molecular biology
26. Demonstration of Computer and its applications
27. Demonstration of operating systems
28. Demonstration of MS –Word
29. Demonstration of MS-Excel

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

Name of The Course	Phlebotomy lab -II			
Course Code	BMLT6053			
Prerequisite				
Corequisite				
Antirequisite				
	L	T	P	C
	0	0	6	3

Course Objectives:

1. To gain the practical skill of “phlebotomy technician ” in collecting ,receiving and preparing patient for blood collection.
2. To practice the Biomedical waste management
3. To develop the knowledge role of phlebotomy technician in Pre-Analytical laboratory testing process

Course Outcomes

On completion of this course students will be able to:

CO1	Apply his knowledge and explain role of phlebotomy technician.
CO2	Perform collection, handling, transport of blood and urine samples
CO3	Perform collection, Handling ,patient care after blood collection in blood bank

Text Book (s)

1. Text book of Medical Laboratory Technology by Godkar
2. Medical Laboratory Technology by Mukherjee
3. Essentials of Physiology by Sembulingam

Reference Book (s)

List of experiments

1. Good laboratory practices
2. Demonstration of role of the phlebotomy technician.
3. Demonstration of Blood collection methods.
4. Demonstration of blood collection in blood bank.
5. Demonstration of types and action of anti-coagulents in Laboratory and blood bank
6. Demonstration of biomedical waste color coding.
7. Demonstration of collection and transport of urine sample.
8. Demonstration of patient care after blood collection
9. Demonstration of sample labelling in clinical laboratory and blood bank.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Test (MTE)	End Term Test (ETE)	Total Marks
30		70	100

BMLT7001	Professional Training	L	T	P	C
Version	Date of Approval:	0	0	40	20
Pre-requisites//Exposure					
Co-requisites					

Medical Lab Technology Internship Programme :

All the students shall undergo Internship for a period of one year under the supervision of Lab super indent/Lab incharge/Pathologist at Super specialty/Multi specialty- hospitals/Diagnostic & research Centers of repute, work in the areas of Clinical Biochemistry, Microbiology, Immunology & serology, Blood bank and Molecular Techniques, Pathology, Histopathology, Hematology and Sample collection, processing and rejection.

Duration: Internship is for 12 months (July – December; January – June) or 1 year. (6 days / week; 6 hours / day) A minimum of 720 hours /semester (If 120 days working days).

Course Objectives:

During this period the interns would gain knowledge and exposure in the following domains-

- Perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples, etc.; Conduct analysis of body fluids/ samples; Maintain, operate and clean laboratory equipment; Provide technical information about test results; Prepare and document medical tests and clinical results; etc.
- Explain quality assurance in Laboratory works
- Practice infection control measures
- Advanced knowledge of the scientific principles on which the tests and equipment function.
- Ensure readily availability of medical and diagnostic supplies
 - Demonstrate techniques to maintain the personal hygiene needs
 - Demonstrate actions in the event of medical and facility emergencies
- Exhibit professional behavior, personal qualities and characteristics of a Medical laboratory Technician
- Demonstrate good communication, communicate accurately and appropriately in the role of Medical laboratory Technician

Submission:

1. A log book must be maintained for day to day activities and signed by Lab superintendent or Lab incharge ,HoD of department on each semester end.
2. Project work completed with prior approval every semester end presented in End term external exam.

Examination:

At the end of each semester assessment made by external experts as per the university guidelines and evaluation made accordingly.

Evaluation Scheme:

Internal Assessment (IA)	CAT	End Term Exam (ETE)	Total Marks
		100	100

BMLT8001	Professional Training	L	T	P	C
Version	Date of Approval:	0	0	40	20
Pre-requisites//Exposure					
Co-requisites					

Medical Lab Technology Internship Programme :

All the students shall undergo Internship for a period of one year under the supervision of Lab super indent/Lab incharge/Pathologist at Super specialty/Multi specialty- hospitals/Diagnostic & research Centers of repute, work in the areas of Clinical Biochemistry, Microbiology, Immunology & serology, Blood bank and Molecular Techniques, Pathology, Histopathology, Hematology and Sample collection, processing and rejection.

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		100	100

