

Bachelor of Science (Honours) (Medical Laboratory Technology) (Semester -III)											
Course Code	Course Title	Course Type	Total Credits (L-T-P)	Credit Hours			Total Marks	Marks			Exam Time in Hrs
				L	T	P		L	P	CA	
BMLL-3481	Hematology- II	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3481	Hematology- II Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL- 3482	Pathology- I	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3482	Pathology-I Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL-3483	Clinical Biochemistry-I	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3483	Clinical Biochemistry-I Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL-3064	Introduction to Bacteriology and Virology	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3064	Introduction to Bacteriology and Virology Lab	DSC	0-0-1	-	-	2	50	-	35	15	3
BMLL-3065	Basics of Microbiology-I	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-3065	Basics of Microbiology-I Lab	DSC	0-0-1	-	-	2	50	-	35	15	3
VACG-3531	*Gender Sensitization	VAC	1-0-1	1	-	2	50	35	-	15	1
Total Credits			25	Total marks			800				

*Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.

DSC- Discipline Specific Course

VAC- Value Added Course

Bachelor of Science (Honours) (Medical Laboratory Technology) (Semester -IV)											
Course Code	Course Title	Course Type	Total Credits (L-T-P)	Credit Hours			Total Marks	Marks			Exam Time in Hrs
				L	T	P		L	P	CA	
BMLL-4481	Hematology-III	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-4481	Hematology-III Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL-4482	Pathology-II	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-4482	Pathology-II Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL-4483	Clinical Biochemistry-II	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-4483	Clinical Biochemistry-II Lab	DSC	0-0-2	-	-	4	50	-	35	15	3
BMLL-4064	Basics of Microbiology-II	DSC	3-0-0	3	-	-	100	70	-	30	3
BMLP-4064	Basics of Microbiology-II Lab	DSC	0-0-1	-	-	2	50	-	35	15	3
BMLL-4485	Immunology-I	MDC-I	3-0-0	3	-	-	100	70	-	30	3
BMLP-4485	Immunology-I Lab	MDC-I	0-0-1	-	-	2	50	-	35	15	3
VACE- 4221	*Environmental Studies (Compulsory)	VAC	1-0-1	1	-	2	50	25	10	15	3
Total Credits			25	Total marks			800				

*Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.

DSC- Discipline Specific Course

VAC- Value Added Course

MDC- Multi Disciplinary Course

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Hematology-II

Course Code: BMLL- 3481

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand the mechanism of gaseous transport in blood.

CO2: Gain knowledge about blood staining techniques.

CO3: Understand the blood group system and its transfusion.

CO4: Learn about significance of bone marrow studies.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Hematology-II

Course Code: BMLL- 3481

(THEORY)

Time: 3 Hours

Total Marks: 100

Credits: 3-0-0

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Gaseous Transportation in blood: Oxygen transport, Carbon dioxide transport, Carbon monoxide transport, oxygen dissociation curve.

Section B

Staining techniques in Hematology: Principles, mechanism and applications of staining technique.

Routine and special stains (E.g. Romanowsky's stain, Wright's stain, Sudan Black B, PAS- Periodic Acid Schiff's, Enzyme stain, Reticulocyte stain, Iron stains-Prussian Blue) to identify specific blood cells and cellular components.

Section C

Blood Transfusion: Donor selection, Blood cross matching, testing for infectious diseases, Principles of blood transfusion, including blood group compatibility, transfusion reactions and blood component therapy

Section D

Bone marrow studies: Understanding bone marrow techniques and their clinical significance.

Blood banking: Procedures for blood collection, storage and preparation for transfusion, Management of blood banks, regulatory aspects.

Books Recommended:

1. Godkar, PB and Godkar, DP (2008) Text Book of Medical Laboratory Technology, 2nd edition Bhalani Publishing House, Mumbai, India.
2. Martin R. Howard and Peter J Hamilton (2013) Text Book of Hematology, 4th edition, Churchill Livingstone.

Course Title: Practical in Hematology-II
Course Code: BMLP - 3486
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about the oxygen levels during various activities.

CO2: To study human blood group system.

CO3: To understand blood collection and storage techniques.

CO4: Distinguish between the normal and abnormal bone marrow slides.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Hematology-II

Course Code: BMLP - 3486

(PRACTICAL)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Theory: 35

CA: 15

1. To measure partial oxygen levels in blood during various activities.
2. To determine blood group compatibility.
3. To study various methods of blood collection and storage in blood banks.
4. To prepare blood smear using different stains.
5. To study permanent slides of bone marrow.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Pathology - I

Course Code: BMLL- 3482

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand the use of microscopy and staining techniques for disease diagnosis.

CO2: To gain the knowledge about diseases of Alimentary canal.

CO3: Learn about various diseases of Accessary digestive glands and its pathology.

CO4: Understand the diseases of circulatory system.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Pathology-I
Course Code: BMLL- 3482
(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Microscopy-Working principle, maintenance, and applications of various types of microscopes, Light microscopy and its types, Fluorescence microscopy, Electron microscopy.

Staining: Metachromasis and metachromatic dyes, hematoxylin stain, MGG, papanticolou stain, special stains like PAS, Mucicarmine, Alcain blue, Schmorl, and Acid phosphatase.

Section B

Alimentary and digestive system: - Disease of mouth and esophagus, gastritis, peptic ulceration, pathology of appendicitis, food poisoning, hernia, intestinal obstructions & malabsorption.

Section C

Accessory Digestive glands: Diseases of Salivary glands-mumps, Salivary gland tumours, Liver disease– Hepatitis, liver failure, cirrhosis, hepatocellular carcinoma, fatty liver disease.

Pancreatic disease- pancreatitis, Gall bladder diseases: Gall stones, jaundice.

Section D

Circulatory System: - Disease of Blood vessels- Atheroma, Atherosclerosis, Disorders of Blood Pressure – Hyper & Hypotension and cardiovascular diseases- coronary artery disease, Heart Failure, Arrhythmia.

Recommended Books:

1. Textbook of Pathology by Harsh Mohan (2015). Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, India.
2. Muir's Textbook of Pathology (2014) edited by C. Simon Herrington. CRC press USA.
3. Textbook of Pathology (2004) by V Krishna. Orient Longman Pvt. Ltd, India.

Course Title: Practical in Pathology-I
Course Code: BMLP - 3487
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: To understand the use of microscope and its care.

CO2: Learn mounting and staining techniques

CO3: Learn about bio-medical waste management, record keeping, and universal precautions to keep themselves safe.

CO4: To study the slide preparation of organs of digestive and circulatory system.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Pathology-I

Course Code: BMLP - 3487

(PRACTICAL)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Theory: 35

CA: 15

1. Study of various types of microscopes, Use & care of Microscope.
2. Mounting and staining techniques.
3. Maintenance of records and slides and Bio-Medical waste management.
4. To study stained slide preparation from organs of the digestive system.
5. To study stained slide preparation from organs of the circulatory system.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Clinical Biochemistry-I

Course Code: BMLL- 3483

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Collect specimen, process, and handle clinical laboratory, interpret results etc.

CO2: Know about body fluids and their importance.

CO3: Learn procedure of various assays viz. glucose in blood, serum, plasma, and urine etc.

CO4: Learn to calculate normal Range, Reference Values, principles, and assay procedures of proteins, urea, uric acid, creatinine, bilirubin, and lipids in blood, serum, plasma, and urine.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Clinical Biochemistry-I

Course Code: BMLL- 3483

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Introduction: Definition and scope of clinical biochemistry in diagnosis; Specimen collection, processing, and handling in clinical laboratory; Sources of biological variation; Use of clinical laboratory and interpretation of results; Quality control and quality assurance.

Section-B

Body Fluids and their Importance: Milk, Colostrum, Aqueous humor, Cerebrospinal fluid, Amniotic fluid, Assessment of fetal maturity.

Section-C

Assay Procedures 1: Normal range, reference values, principles, and assay procedures of glucose in blood, serum, plasma, and urine; type of diabetes and its complications; glucose tolerance test.

Section-D

Assay Procedures 2: Normal Range, Reference Values, principles, and assay procedures of proteins, urea, uric acid, creatinine, bilirubin, and lipids in blood, serum, plasma, and urine.

Books Recommended

1. Vasudevan D, Sreeekumari S and Vaidyanathan K (2016) Textbook of Biochemistry for Medical Students. 8th Edition. Jaypee Brothers Medical Publishers (P) Ltd.

2. Godkar PB and Godkar DP (2014) Textbook of Medical Laboratory Technology (Vol 1 and 2) by P.B. Godkar. Bhalani Publishing House.
3. Chaterjea MN and Shinde R (2012) Text book of Medical Biochemistry. 8th Edition.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Clinical Biochemistry-I

Course Code: BMLP - 3488

(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn how to collect and store blood.

CO2: Gain knowledge about preparation of serum and plasma.

CO3: Learn to detect Hb through various methods.

CO4: Understand detection of glucose in urine.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Clinical Biochemistry-I

Course Code: BMLP - 3488

(PRACTICAL)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Theory: 35

CA: 15

1. Collection and storage of blood
2. Preparation of serum
3. Preparation of plasma
4. Determination of Hb using a hemoglobinometer
5. Determination of Hb using alkaline hematin method
6. Determination of hematocrit
7. Estimation of blood glucose
8. Detection of glucose in urine by Benedict reagent
9. Detection of glucose in urine by Fehling's reagent

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Introduction to Bacteriology and Virology

Course Code: BMLL- 3064

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand various sterilization and cultivation methods

CO2: Study (Classification, morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis) of clinically important bacteria.

CO3: Understand basic concepts of virology.

CO4: Learn about symptoms, transmission, pathogenesis, detection and treatment of viral diseases: Influenza, Dengue, Hepatitis and AIDS.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Introduction to Bacteriology and Virology

Course Code: BMLL - 3064

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Brief history of microbiology with special reference to the contributions of Louis Pasteur, Robert Koch and others. Morphology and growth requirements of bacteria. Sterilization and disinfection procedures. Stains – Gram's Stain, ZN Stain and special stain. Cultivation methods, isolation and identification of bacteria. Antibiotic susceptibility testing.

Section-B

Study (Classification, morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis) of clinically important bacteria - *Staphylococcus*, *Streptococcus*, *Neisseria*, *Corynebacterium*, *Mycobacterium*, *Clostridium*, *E.coli*, *Klebsiella*, *Salmonella*, *Proteus*, *Pseudomonas*, *Vibrio* & *Spirochaetes* (*Treponema*, *Borrelia* and *Leptospira*), *Mycoplasma*, *Helicobacter pylori*

Section-C

Brief history of virology. Virus: general characteristics, Morphology: envelope, capsid and nucleic acid. Bacteriophages. Lytic and lysogenic cycle. Detection of virus: Complement fixation test, haemagglutination, serological & molecular based methods. Electron microscopic techniques for visualization of virus

Section-D

One step growth curve for virus. Culture of animal virus. Cytopathogenic effects of virus infection. Symptoms, transmission, pathogenesis, detection and treatment of viral diseases: Influenza, Dengue, Hepatitis and AIDS.

Recommended Books:

1. Pelczar, M.J. Chan, E.C.S. and Krieg, N.R. 1986, Microbiology, 5th Ed. McGraw Hill.
2. Woolverten C. J. and Sherwood L. 1990. Prescott's Microbiology. 10th Ed. WCB Publishers.
3. Cann, Allan J. 1997. Principles of Molecular Virology, Academic Press London.
4. E.K. Wagner and M.J. Hewlet. 2004. Basic virology (2ndEd) Blackwell publisher.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Bacteriology and Virology-I

Course Code: BMLP - 3069

(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Study the Composition and preparation of various culture media.

CO2: Gain knowledge about serial dilution methods.

CO3: To understand about various biochemical analyses.

CO4: Quantification of viruses through various methods

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)
Course Title: Practical in Bacteriology and Virology-I
Course Code: BMLP - 3069
(PRACTICAL)

Credits: 0-0-1

Total Marks: 50

Time: 3 Hours

Theory: 35

CA: 15

1. Composition and preparation of culture media: Mueller Hinton, Blood Agar Cultural characterization of bacteria
2. Culture methods: Streaking, Spreading, Pour plating
3. Isolation and enumeration of bacteria using serial dilution method
4. To perform staining: Simple staining, Negative staining, Gram staining
5. To perform various biochemical tests: IMViC test, Acid gas production, nitrate reduction test, gelatin
6. liquefaction, catalase production, oxidase production
7. Antibiotic susceptibility test by Kirby Bauer Method
8. Estimation of blood sugar and creatinine
9. Haemagglutination assay for quantification of virus
10. Quantification of virus in infected plant leaves by protein estimation
11. Detection of purified/semi purified virus preparation by UV spectrophotometer

Course Title: Basics of Microbiology-I
Course Code: BMLL- 3065
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand classification and identification of microorganisms.

CO2: Learn various staining techniques and preparation of culture media.

CO3: Learn about various types of cultures and their characteristics.

CO4: Study conditions essential for growth of microorganisms.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Basics of Microbiology-I

Course Code: BMLL - 3065

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Historical aspects and discovery of microorganisms in the living world (Haeckels kingdom Protista, Prokaryotes & Eukaryotes, Whittaker's five kingdom concept, Koch's postulates) groups of microorganisms, distribution in nature, spontaneous generation verses biogenesis, fermentation, germ theory of disease. Identification of microorganisms

Section B

Microscopy and staining, microbiological techniques pour plating, spreading, streaking serial dilution, methods of sterilization, media preparation, types of media (synthetic, natural, enrichment, selective)

Section C

Pure cultures & cultural characteristics: Mixed culture, selective methods, natural selection of microorganisms, maintenance & preservation of cultures, culture collection and cataloguing of pure cultures, colony characteristics & characteristics of broth cultures.

Section D

Nutritional requirements for growing microorganisms: Physical conditions required for growth: Temperature, gaseous, pH, miscellaneous, factors affecting growth.

Books Recommended:

1. Stanier, R.Y. Adelberg, A. and Ingraham, J. L.(1984), General Microbiology, IV edn. Mac Millan Press.
2. Pelczar, M.J.Chan, E.C.S. and Krieg, N.R . (1986), Microbiology, VEd. McGraw Hill.
3. Prescott. L.M. Harley J.P.and L.Kreig D.A.(1990). Microbiology, WCB Publishers. Rosenberg, E & CohenI. R. (1983). Microbial Biology. H.S. International Editions.

Course Title: Practical in Basics of Microbiology-I
Course Code: BMLP - 3069
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about various apparatuses used in microbiology

CO2: Study the various techniques of sterilization.

CO3: To prepare Agar slants and deeps.

CO4: Learn about various cultural techniques.

B. Sc. (Honours) Medical Laboratory Technology Semester–III (Session 2025-26)

Course Title: Practical in Basics of Microbiology-I

Course Code: BMLP - 3060

(PRACTICAL)

Credits: 0-0-1

Total Marks: 50

Time: 3 Hours

Theory: 35

CA: 15

1. To study different lab apparatuses used in microbiology.
2. To study compound microscope.
3. To study various techniques of sterilization.
4. To prepare media & its sterilization.
5. To prepare agar slants/deeps.
6. Serial dilution for enumeration of microorganisms.
7. To study various cultural techniques like pour plating, spreading & streaking.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Hematology-III

Course Code: BMLL- 4481

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about coagulation

CO2: Learn about various laboratory techniques and procedures theoretically

CO3: Theoretical analysis of blood

CO4: Handle samples and learn various techniques like serum separation, CBC, ESR.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)
Course Title: Hematology-III
Course Code: BMLL- 4481
(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Coagulation and mechanism of coagulation, Blood coagulation, Anticoagulants, Routine coagulation Tests, Automated coagulation system

Section B

Characteristics of good technician, Preparation of specimen collection material, lab request form, vein puncture and its complications

Section C

Specimen rejection criteria for blood specimen, Haemolysis of blood, Blood collection by skin puncture, Arterial puncture

Section D

Separation of serum, plasma, changes in blood on keeping, maintenance of specimen, identification & transport of the specimen, Complete blood count (CBC), ESR

Books Recommended:

1. Godkar, PB and Godkar, DP (2008) Text Book of Medical Laboratory Technology, 2nd edition Bhalani Publishing House, Mumbai, India.
2. Martin R. Howard & Peter J Hamilton(2013) Text Book of Hematology, 4th edition, Churchill Livingstone.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Hematology-III

Course Code: BMLP- 4486

(Practical)

Course Outcomes

After passing this course the student will be able to:

CO1: Perform basic hematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.

CO2: Adapt hematology laboratory techniques and procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner.

CO3: Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders and diseases.

CO4: Recognize laboratory results consistent with leukemia and other white blood cell disorders.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Hematology-III

Course Code: BMLP- 4486

(Practical)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Practical: 35

CA: 15

1. Determination of Blood group
2. Absolute Eosinophil count
3. Morphology of Red Blood Cells
4. Determination of Malarial Parasite
5. Determination of Bleeding Time
6. Determination of clotting time

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Pathology-II

Course Code: BMLL- 4482

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Know about diseases of respiratory system

CO2: Learn about various urinary tract disorders and diseases

CO3: Understand pathology behind sexually transmitted diseases

CO4: Gain knowledge about genital tract diseases.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Pathology-II

Course Code: BMLL- 4482

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Respiratory System: Upper Respiratory Tract Infections (URTIs), Diseases of Bronchi; Bronchitis and Asthma, Diseases of Lung; Pneumonia, Fungal infections of the lung, Lung abscess, Tuberculosis, and Lung Collapse.

Section B

Urinary System: Glomerulonephritis, Nephrotic syndrome, Acute Renal failure, Chronic Kidney disease, Renal calculi, Urinary obstruction, Urinary tract infections.

Section C

Sexually Transmitted Diseases: Common Sexually transmitted diseases (STDs); Chlamydia, Gonorrhoea, Syphilis, Genital herpes, Human papillomavirus (HPV), and HIV/AIDS.

Section D

Male and Female Genital Tract: - Prostatitis, erectile dysfunction, testicular disorders, pelvic inflammatory disease, disorder of cervix; cervical intraepithelial neoplasia (CIN), disease of ovaries, ectopic pregnancy, prostatitis, infertility.

Recommended Books:

1. Textbook of Pathology by Harsh Mohan (2015). Jaypee Brothers Medical Publishers (Pvt)

Ltd. New Delhi, India

2. Muir's Textbook of Pathology (2014) edited by C. Simon Herrington. CRC Press USA
3. Textbook of Pathology (2004) by V Krishna. Orient Longman Pvt. Ltd, India.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Pathology-II

Course Code: BMLP- 4487

(Practical)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about Pancreas and Liver through permanent slides

CO2: Study gall bladder through permanent slides

CO3: Study the stained slide preparation from organs of the Respiratory system

CO4: Understand stained slide preparation from organs of the Urinary system

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Pathology-II

Course Code: BMLP- 4487

(Practical)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Practical: 35

CA: 15

1. To study stained slides of the liver and pancreas
2. To study stained slides of the gall bladder
3. To study stained slide preparation from organs of the Respiratory system
4. To study stained slide preparation from organs of the Urinary system

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Clinical Biochemistry-II

Course Code: BMLL- 4483

(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Know about electrolyte and water balance

CO2: Learn about pH and buffers

CO3: Understand Acid-Base Balance and Disorders

CO4: Know about Detoxification and Biotransformation of Xenobiotics

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Clinical Biochemistry-II

Course Code: BMLL- 4483

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Electrolyte and Water Balance: Electrolyte concentration of body fluid compartments, Regulation of sodium and water balance: Anti-Diuretic Hormone (ADH), Reninangiotensin system; Donnan membrane equilibrium, Osmolality; Disturbances in Fluid and Electrolyte Balance; Clinical applications of Sodium, Potassium, and Chloride: Hyponatremia, Hyponatremia, Hypokalemia, Hyperkalemia, Hyperchloremia, Hypochloremia

Section-B

pH and buffers: Introduction to pH: definition of pH, the pH scale: acidic, neutral, and basic solutions; Mathematical expression of pH; Relationship between pH and hydrogen ion concentration; Importance of pH in various fields; Concept of buffers and buffer capacity; Buffers of body fluids; Henderson-Hasselbalch equation; Maintenance of body pH; Buffers of body fluids.

Section-C

Acid-Base Balance and Disorders: Acids and bases, Respiratory regulation of pH, Renal regulation of pH, Titra table acid, Disturbances in acid-base balance, Anion gap, Metabolic acidosis, Metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis.

Section-D

Detoxification and Biotransformation of Xenobiotics: Phase one reactions, Oxidative reactions, Reductive reactions, Hydrolysis, Phase two reactions, Conjugation, Phase three reactions.

Books Recommended:

1. Vasudevan D, Sreeekumari S and Vaidyanathan K (2016) Textbook of Biochemistry for Medical Students.8thEdition. Jaypee Brothers Medical Publishers (P) Ltd.
2. Godkar PB and Godkar DP (2014) Textbook of Medical Laboratory Technology (Vol 1 and 2) Bhalani Publishing House.
3. Chaterjea MN and Shinde R (2012) Textbook of Medical Biochemistry. 8th Edition Jaypee Brother Medical Publisher.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Clinical Biochemistry-II

Course Code: BMLP- 4488

(Practical)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about collection and storage of urine

CO2: Estimate proteins in plasma and calculation of A/G ratios

CO3: Estimate serum urea and creatinine

CO4: Estimate serum uric acid

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)
Course Title: Practical in Clinical Biochemistry-II
Course Code: BMLP- 4488
(Practical)

Credits: 0-0-2

Total Marks: 50

Time: 3 Hours

Practical: 35

CA: 15

1. Collection and storage of urine
2. Estimation of proteins in urine
3. Estimation of proteins in plasma and calculation of A/G ratios
4. Estimation of serum urea
5. Estimation of serum creatinine
6. Estimation of serum uric acid

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Basics of Microbiology-II

**Course Code: BMLL- 4046
(THEORY)**

Course Outcomes

After passing this course the student will be able to:

CO1: Know about bacteria, fungi, protozoa and viruses

CO2: Learn about Fundamentals of control of microorganisms by physical agents

CO3: Understand control of microorganisms by chemical agents

CO4: Know about Antibiotics and drug resistance

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Basics of Microbiology-II

Course Code: BMLL- 4064

(THEORY)

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

General account of Bacteria: Morphology and fine structure, Mode of cell division, growth curve of bacteria mathematical expression of growth, quantitative measurement of bacterial growth, Structure of fungi, protozoa, viruses.

Section B

Fundamentals of control of microorganisms, the rate of death of bacteria, conditions influencing antimicrobial action, Control of microbes by physical agents: temperature, desiccation, osmotic pressure, radiation, filtration

Section C

Control of microbes by chemical agents: characteristics of ideal chemical agents, major group of antimicrobial agents and mode of action, evaluation of antimicrobial agents.

Section D

Antibiotics: properties and mode of action. Drug resistance and its significance. Antibiotic Sensitivity test. Microbial flora of healthy human host

Books Recommended:

1. Stanier, R.Y. Adelberg ,E.A .and Ingraham, J.L. (1984), General Microbiology, IV edn. Mac Millan Press.
2. Pelczar, M.J. Chan, E.C.S and Krieg, N.R. (1986), Microbiology, VEd. McGraw Hill.
3. Prescott. L.M. Harley J.P. and L. Kreig D.A. (1990).Microbiology, WCB Publishers.
4. Rosenberg, E& CohenI. R. (1983). Microbial Biology. H.S. International Editions.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Basics of Microbiology-II

**Course Code: BMLP- 4069
(Practical)**

Course Outcomes

After passing this course the student will be able to:

CO1: Learn about staining techniques

CO2: Learn Silver staining

CO3: Count the no. of microorganisms by Haemocytometer

CO4: Measure size of bacteria using micrometer

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)
Course Title: Practical in Basics of Microbiology-II
Course Code: BMLP- 4069
(Practical)

Credits:0-0-1

Total Marks: 50

Time: 3 Hours

Practical: 35

CA: 15

1. To study the morphology cell structure of microorganisms through staining procedures.
 - a. Simple staining
 - b. Gram staining
 - c. Negative staining
2. To count the no. of microorganisms by Haemocytometer.
3. Measure size of bacteria using micrometer

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Immunology-I

**Course Code: BMLL- 4485
(THEORY)**

Course Outcomes

After passing this course the student will be able to:

CO1: Know about Types of immunity and immune response.

CO2: Gain knowledge about Primary and secondary lymphoid organs.

CO3: Understand antibodies and its types.

CO4: Know about Antigen-antibody interactions.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Immunology-I

**Course Code: BMLL- 4485
(THEORY)**

Credits: 3-0-0

Total Marks: 100

Time: 3 Hours

Theory: 70

CA: 30

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Types of immunity: Innate immunity-Physical barriers, cellular components, soluble molecules; Adaptive immunity-T-cell and B-cell mediated responses.

Features of immune response: Primary vs. secondary immune response.

Section-B

Primary lymphoid organs: Thymus-Structure, T-cell development; Bone Marrow- Structure, B-cell development.

Secondary lymphoid organs: Spleen-Structure and functions; Lymph nodes-Structure, functions, and lymphocyte trafficking; Lymphatic system - Role in immunity; Mucosa Associated Lymphoid Tissue (MALT) – Structure and functions.

Cells of Immune system: T-cells-Types, functions, and development; Bcells - Types, functions, and development; NK cells-Role in immunity; Macrophages- Phagocytosis and antigen presentation.

Section-C

Antibodies: Classes-IgG, IgM, IgA, IgE, IgD; Structure-Heavy and light chains, variable and constant regions.

Antigens and their characteristics: Antigenicity vs. immunogenicity; Types of antigens: complete and haptens.

Section-D

Affinity and avidity: Definitions and differences; Importance in antigen-antibody interactions.

Antigen-antibody interactions: Principles of binding; Techniques- Precipitation, agglutination, immunofluorescence.

Books Recommended:

1. Abbas, A.K., Litchman, A.H. (2006-2007). Basic Immunology: Functions and Disorders of the Immune System, 2nd Ed. (updated edition), Philadelphia, Pennsylvania: W.B. Saunders Company Publishers.
2. Benjamini, E., Coico, R. and Sunshine, G. (2009). Immunology: A Short Course, 6th Ed., New York, Wiley-Blackwell.
3. Roitt, I.M., Delves, P. Seamus M. and Burton D. (2006). Essential Immunology, 11th Ed., Wiley-Blackwell.
4. Roitt, I., Brostoff, J. and Male, D. (2001). Immunology, 7th Ed., Mosby
5. Kanfmann S.H.E., Sher, A., Ahmed, R. (2002). Immunology of Infections Diseases, ASM Press, Washington.
6. Goldsby, R. A., Kindt, T.J., Osborne, B.A. (2005). Kuby Immunology, 5th Ed., W.H. Freeman and Company, New York.

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)

Course Title: Practical in Immunology-II

Course Code: BMLP- 4069
(Practical)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn blood group testing

CO2: Separation of serum and plasma from blood

CO3: Examine Peripheral Blood Film (PBF)

CO4: Learn to store serum and plasma

B. Sc. (Honours) Medical Laboratory Technology Semester–IV (Session 2025-26)
Course Title: Practical in Immunology-II
Course Code: BMLP- 4480
(Practical)

Credits:0-0-1

Total Marks: 50

Time: 3 Hours

Practical: 35

CA: 15

1. Blood Group testing
2. Separation of serum from blood
3. Separation of plasma from blood
4. Peripheral Blood Film (PBF) examination
5. Storage of serum and plasma