

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24
Semester V
Detailed Syllabus

| | |
|---|--|
| Course: Immunohematology and Blood Banking | |
| Immunohematology and Blood Banking Lab | |
| Course Code: BMLC501+BMLC591 | Semester: V |
| Maximum Marks: 100+100 | |
| Teaching Scheme | Examination Scheme |
| Lecture: 3 | End semester Exam: 70 |
| Tutorial: 0 | Attendance: 5 |
| Practical: 2 | Continuous Assessment: 25 |
| Credit: 5 | Practical/Seasonal internal continuous evaluation: 40 |
| | Practical/Seasonal external examination: 60 |
| | |
| SL No. | Course Objective |
| 1. | Gain foundational knowledge of blood banking, including the roles of antigens, antibodies (including naturally occurring antibodies), and the complement system. |
| 2. | Study the ABO and Rh blood group systems in detail along with other significant systems like Lewis, MNS, Cell, and Duffy. Understand methods of blood grouping including forward and reverse typing using slide, tube, and gel methods. |
| 3. | Understand criteria for donor selection, types of anticoagulants and preservatives, and procedures for blood collection and processing. |
| 4. | Learn about screening for transfusion-transmissible infections, Coombs' tests, crossmatching, compatibility testing, and antibody screening and identification, including grading of agglutination reactions. |
| 5. | Understand the preparation, storage, and transportation of various blood components and their specific indications for transfusion. Understand the quality control of reagents, equipment, and blood components, and recognize the roles of national bodies like NACO, Indian Red Cross Society, and DGHS in transfusion medicine. |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | Course Outcomes | Mapped module/Unit |
|-------------|--|---------------------------|
| CO 1 | Demonstrate the basic knowledge of Immunohematology and blood banking | U1 |
| CO 2 | Understand the different blood grouping system and donor selection criteria | U1,U2 |
| CO 3 | Explain the knowledge of transfusion transmissible disease and antigen antibody reaction | U1,U2,U3 |
| CO 4 | Organise the knowledge and skill of preparation of blood components. | U3,U4 |
| CO 5 | Outline the Apheresis procedure and role of different administrative bodies. | U4 |
| CO 6 | Examine and Evaluate to perform different activities related to transfusion medicines | U4,U5 |

Learning Outcome/Skills:

By the end of this course, students will be able to understand the fundamental principles of blood banking, including antigen-antibody interactions and major blood group systems such as ABO, Rh, and others like Lewis, Kell, MNS, and Duffy. They will gain practical knowledge of blood grouping techniques, donor selection, blood collection, processing, and component preparation. Students will also be equipped to perform compatibility testing, antibody screening, and transfusion-transmissible infection screening. They will understand the indications for different blood component transfusions, recognize various transfusion reactions including HDN, and learn advanced procedures such as apheresis and stem cell banking. Additionally, students will appreciate the importance of quality control and the regulatory roles of NACO, Indian Red Cross Society, and DGHS in ensuring safe transfusion practices.

| Unit | Total Hours | % of Questions | Bloom's Taxonomy | Remarks, if any |
|---------------|--------------------|-----------------------|-------------------------|------------------------|
| THEORY | | | | |
| U1 | 10 | 20 | 1,2 | NA |
| U2 | 10 | 20 | 1,2,3 | NA |
| U3 | 5 | 20 | 1,2 | NA |
| U4 | 10 | 20 | 1,2,3 | NA |
| U5 | 10 | 20 | 1,2 | NA |
| | 45 | 100 | | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|---------------------|---|---------------------|
| Course Code: | BMLC501 | |
| Course: | Immunohematology and Blood Banking | Credits: 3.0 |
| Contents | | |
| Chapter | Name of the Topic | Hours |
| Unit-I | Principles of Blood Banking; Antigen, Antibody, naturally occurring antibody, Complement, ABO & Rh blood group system, Methods of blood group determination, Forward and Reverse grouping, Slide & Tube method, Gel method. | 10 |
| Unit-II | Other blood group system such as Lewis, MNS, Kell Duffy etc. Anticoagulants and preservative used in blood bank, Donor selection criteria, Blood collection and processing | 10 |
| Unit-III | Transfusion transmissible infectious disease screen, Coomb'test, Cross matching, Compatibility testing, Antibody Screening & Identification, Grading of Reaction/Agglutination | 5 |
| Unit-IV | Blood components and its preparation, preservation, storage and transportation Indications for different blood component transfusion, Blood transfusion reaction and its type, HDN Introduction of stem cell banking and bone marrow transplantation. | 10 |
| Unit-V | Apheresis, indications of hemapheresis, plasmapheresis, plateletspheresis, plasmapheresis Quality control of reagents, equipment's, blood components used in transfusion medicine. Role of NACO, Indian Red Cross Society and DGHS. | 10 |
| | Total: | 45 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | |
|----------------------------|---|
| Course Code: BML591 | Course: Immunohaematology and Blood Banking Lab |
| Credit: 2 | Practical |
| 1 | Forward blood grouping (Tube and slide method) |
| 2 | Reverse blood grouping.. |
| 3 | Rh typing. |
| 4 | Rh negative or Du conformation. |
| 5 | Direct and indirect Coomb's test. |
| 6 | Major Cross matching. |
| 7 | Minor cross matching. |
| 8 | Blood donor selection. |
| 9 | Demonstration of blood collection procedure. 10- Blood group screening by finger pricking. 11- Demonstration of blood component separation. 12- Demonstration of storage of blood component |
| 10 | Blood group screening by finger pricking. |
| 11 | Demonstration of blood component separation. |
| 12 | Demonstration of storage of blood component |

List of Books

| Sr. No. | Name of Author | Title of the BOOK | Edition/Publication |
|----------------|--------------------------------|---|--|
| 1 | Godkar.B. Praful,(2016) | Textbook of MLT | 3rd edition, Bhalani Publications |
| 2 | Ochei J & Kolhatkar A(2000) | Medical Laboratory Science: Theory & Practice | 3rd edition, Mcgraw Hill Education |
| 3 | Mukherjee .L.K(2017) | Medical Laboratory Technology | Vol.1-3,3rd edition, Tata Mcgraw Hill |
| 4 | Sood Ramnik,(2015) | Text book of Medical Laboratory Technology | 2nd edition, Jaypee Publications |
| 5 | Wintrobe's | Clinical Hematology,(2014) | 13th edition, Lippincott Williams & Wilkins |
| 6 | R.N Makroo | Principle & practice of Transfusion Medicine | Kongposh Publications. |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | |
|--|--|
| Course: Clinical Pathology Clinical Pathology Lab | |
| Course Code: BMLC502+BMLC592 | Semester: V |
| Maximum Marks: 100+100 | |
| Teaching Scheme | Examination Scheme |
| Lecture: 3 | End semester Exam: 70 |
| Tutorial: 0 | Attendance: 5 |
| Practical: 2 | Continuous Assessment: 25 |
| Credit:5 | Practical/Seasonal internal continuous evaluation: 40 |
| | Practical/Seasonal external examination: 60 |
| Sl No. | Course Objective |
| 1 | To understand the correct methods for collection and preservation of urine samples, including 24-hour collections, and to perform physical, chemical, and microscopic examinations for diagnostic purposes. |
| 2 | To learn techniques for proper collection, preservation, and examination of stool samples, including the identification of parasites, occult blood, and other pathological contents using both direct and concentration methods. |
| 3 | To gain knowledge of the various methods of sputum collection for detecting infections such as tuberculosis, fungal diseases, and malignancy, along with microscopic examination and AFB staining. |
| 4 | To acquire skills in semen collection and comprehensive examination including liquefaction time, sperm count, motility, morphology, biochemical markers, and detection of antisperm antibodies. |
| 5 | To understand the proper collection, transportation, and examination of cerebrospinal fluid (CSF), as well as ascitic, pleural, pericardial, and synovial fluids, with emphasis on physical, cellular, microbial, and biochemical evaluation for diagnosis of conditions like meningitis, encephalitis, and effusions. |
| 6 | To explore the different methods used for pregnancy detection, particularly the urinary hCG assay, and understand their clinical applications and limitations. |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | Course Outcomes | Mapped module/Unit |
|-------------|---|---------------------------|
| CO 1 | Explain the principles and procedures for the collection, preservation, and physical, chemical, and microscopic examination of urine samples. | U1 |
| CO 2 | Perform and interpret stool examinations for parasitic infections, occult blood, and other pathological conditions using proper collection and diagnostic techniques. | U1,U2 |
| CO 3 | Demonstrate the collection and laboratory analysis of sputum for bacterial, fungal, tubercular, and malignant findings. | U1,U2,U3 |
| CO 4 | Conduct semen analysis including physical, chemical, and microscopic examination, sperm morphology, motility, and advanced diagnostic tests. | U1,U2,U3,U4 |
| CO 5 | Collect, transport, and analyze cerebrospinal fluid samples to diagnose meningitis, encephalitis, and other neurological conditions. | U4,U5 |
| CO 6 | Identify and interpret findings in serous fluids (ascitic, pleural, pericardial, and synovial) and perform pregnancy testing using various methods. | U5,U6 |

Learning Outcome/Skills:

By the end of this course, students will be able to properly collect, preserve, and examine various clinical specimens including urine, feces, sputum, semen, cerebrospinal fluid (CSF), and other body fluids such as ascitic, pleural, pericardial, and synovial fluids. They will gain practical skills in performing physical, chemical, and microscopic analyses to detect abnormalities, infections, and other pathological conditions. Students will understand diagnostic techniques for detecting ova, cysts, parasites, occult blood, and acid-fast bacilli, and will be proficient in semen analysis including sperm morphology, motility, and biochemical testing. Additionally, they will be able to interpret CSF findings for diagnosing neurological infections and perform various pregnancy detection methods using urine samples. This training prepares students for effective diagnostic work in clinical laboratories.

| Unit | Total Hours | % of Questions | Bloom's Taxonomy | Remarks, if any |
|---------------|--------------------|-----------------------|-------------------------|------------------------|
| THEORY | | | | |
| U1 | 10 | 25 | 1 | NA |
| U2 | 5 | 10 | 1, 2 | NA |
| U3 | 5 | 10 | 1, 2, 3 | NA |
| U4 | 10 | 25 | 1, 2, 3 | NA |
| U5 | 10 | 20 | 1, 2, 3 | NA |
| U6 | 5 | 10 | 1,2,3 | NA |
| | 45 | 100% | | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|---------------------|--|---------------------|
| Course Code: | BMLC502 | |
| Course: | Clinical Pathology | Credits: 3.0 |
| Contents | | |
| Chapter | Name of the Topic | Hours |
| Unit-I | Urine: Collection of urine and its preservation, 24 hour urine collection for protein. Physical examination of urine – examination of urine for colors, cloudiness, specific gravity, reaction and ph. Chemical examination of urine. Microscopical examination of urine Urine sediment preparation, types of sediments and its examination. | 10 |
| Unit-II | Faeces: Collection and preservation, examination of motion for color, mucus, consistency, ova, ameba, cysts, parasites, puscells, RBC and crystals. Detection of occult blood in stool, concentration techniques | 5 |
| Unit-III | Sputum Method of collection for various purposes including AFB fugal, malignant cells and others. Microscopic examination of sputum, sputum for AFB. | 5 |
| Unit-IV | Semen: method of collection examination of semen for time for liquefaction, volume, colour, reaction pH, motility of spam, sperm count and other findings staining and morphological study of spermatozoa, semen fructose determination, Antisperm antibodies | 10 |
| Unit-V | General introduction method of CSF collection, Transport of CSF, examination of CSF, colour, turbidity and fibrin clot (Cob web), total and differential leukocyte count. CSF examination by gram's staing and acid fast staining, biochemical tests, clinical significance of CSF analysis in various meningitis and 7ncephalitis and interpretations | 10 |
| Unit-VI | Methods of collection, transport and macroscopic and microscopic examination of ascetic fluid, pleural fluid, pericardial fluid and synovial fluid. Pregnancy tests: Different methods of testing and chronic gonadotropin assay with urine | 5 |
| | Total: | 45 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | | |
|-----------------------------|--|---------------------------------------|--|
| Course Code: BMLC592 | | Course: Clinical Pathology Lab | |
| Credit: 2 | | List of practical | |
| 1 | Leishman staining for malarial parasites | | |
| 2 | Saline wet mount for observing ova and eggs of parasites. | | |
| 3 | Iodine wet mount for observing ova and eggs of parasites. | | |
| 4 | Concentration of stool samples by floatation method | | |
| 5 | Zinc sulphate conc. Method for stool sample | | |
| 6 | Urine-collection, processing, physical, chemical and microscopic examination | | |
| 7 | Collection, preservation and examination of stool | | |
| 8 | Sputum collection and microscopy. examination of sputum for AFB. | | |
| 9 | Aldehyde Chopra test for Kala Azar | | |
| 10 | To perform HIV by ELISA | | |
| 11 | To perform Dengue IgG/IgM. | | |
| | | | |

List of Books

| Sl. No. | Name of Author | Title of the Book | Edition & Publisher |
|----------------|-----------------------------------|--|--|
| 1 | Harsh Mohan | Practical Pathology (5th Edition) | Jaypee Brothers Medical Publishers |
| 2 | Shirish M Kawthalkar | Essentials of Clinical Pathology (3rd Edition) | Jaypee Brothers Medical Publishers |
| 3 | Tapeshwar Yadav & Asheshwar Yadav | Essential Textbook of Clinical Pathology | Samiksha Publication Pvt. Ltd., Kathmandu, Nepal |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24
Course Name: Internship
Course code: BMLC581

INTERNSHIP DETAILS & GUIDELINES

COURSE OBJECTIVES (COs)

The internship aims to:

1. **Provide hands-on experience** in routine diagnostic laboratory procedures across different departments.
 2. **Develop technical skills** in handling laboratory equipment, reagents, and patient specimens safely and accurately.
 3. **Enhance understanding of quality control, biosafety, and standard operating procedures (SOPs).**
 4. **Build professional competencies** including communication, teamwork, and ethical laboratory practices.
 5. **Integrate theoretical knowledge with practical applications** in real clinical settings.
-

COURSE OUTCOMES (COs)

Upon successful completion of the internship, students will be able to:

1. **Perform basic and advanced diagnostic tests** in hematology, biochemistry, microbiology, and pathology with accuracy.
 2. **Operate and maintain laboratory instruments** following SOPs and safety standards.
 3. **Interpret test results** and correlate them with clinical conditions under supervision.
 4. **Apply biosafety guidelines and quality control measures** to ensure reliability of laboratory reports.
 5. **Demonstrate professionalism, ethics, and effective communication** within a healthcare laboratory environment.
-

1. Internship Overview

The Medical Laboratory Technology internship provides students with hands-on experience in diagnostic laboratory procedures under the supervision of qualified laboratory professionals. Students apply theoretical knowledge gained in the classroom to real laboratory environments, including hematology, microbiology, biochemistry, pathology, immunology, and clinical microscopy. This internship enhances technical accuracy, professional ethics, laboratory safety, and patient-centered practice.

2. Duration

- **Minimum Duration:** 3–6 months
 - Commencement during semester break between 4th and 5th semester (approximately 20 days, minimum 5 hours per day training, total 100 hours of exposure)

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

- From the beginning of 5th semester, 2 days during weekend, minimum 5 hours per day training, approximately 20 weeks, total 200 hours of exposure.

● **Mode:** On-site training in a hospital, diagnostic centre, or clinical lab.

During semester break between 4th and 5th semester (20 Days)

| Day of Week | Student Engagement | Hours/Day | Total Hours (20 Days) |
|-------------|----------------------|-----------|-----------------------|
| Day 1 | Internship (BMLC581) | 5 | 20 |
| Day 2 | Internship (BMLC581) | 5 | 20 |
| Day 3 | Internship (BMLC581) | 5 | 15 |
| Day 4 | Internship (BMLC581) | 5 | 15 |
| Day 5 | Internship (BMLC581) | 5 | 15 |
| Day 6 | Internship (BMLC581) | 5 | 15 |

From the beginning of 5th semester (20 Weeks)

| Day of Week | Student Engagement | Hours/Day | Total Hours (20 weeks) |
|------------------------|----------------------|-----------|------------------------|
| 1st day of the weekend | Internship (BMLC581) | 5 | 100 |
| 2nd day of the weekend | Internship (BMLC581) | 5 | 100 |

3. Internship Roles & Responsibilities

Students may be involved in the following activities:

Hematology

- Performing CBC, ESR, PCV, blood grouping, and coagulation tests
- Operating hematology analyzers
- Preparing peripheral blood smears and staining

Clinical Biochemistry

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

- Conducting biochemical tests (glucose, urea, creatinine, liver and kidney function tests)
- Handling autoanalyzers
- Measuring and interpreting biochemical parameters

Microbiology

- Sample collection and processing
- Gram staining, culture, streaking, and sensitivity tests
- Identifying microorganisms using biochemical methods

Clinical Pathology

- Urine, stool, and body fluid analysis
- Microscopy and sediment examination
- Preparation of slides and special stains

Immunology & Serology

- Performing ELISA, rapid card tests, Widal, CRP, RF, etc.

General Lab Work

- Accurate record keeping and report documentation
 - Assisting in sample reception and labelling
 - Following biomedical waste disposal guidelines
 - Maintaining sterility and handling lab equipment properly
-

4. Deliverables

At the end of the internship, every student must submit:

1. **Internship Logbook / Daily Diary**
 2. **Skill Competency Checklist** signed by the laboratory supervisor
 3. **Minimum number of tests performed/assisted** (as per department norms)
 4. **Case Studies (2–3)** based on actual lab procedures
 5. **Internship Completion Certificate**
 6. **Final Report and Presentation**
-

5. Professional Conduct & Safety Guidelines

- Maintain discipline, punctuality, and professional behaviour
 - Wear proper PPE (lab coat, gloves, mask, shoes) at all times
 - Follow biosafety levels and universal precautions
 - Adhere to confidentiality rules related to patient data
 - Prevent contamination by following aseptic techniques
 - Handle biological samples and chemicals safely
 - Dispose of biomedical waste as per rules
 - Avoid negligence and report incidents immediately
 - Always work under supervision and seek clarification when needed
-

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

6. Submission of Internship Report

Each student must submit a detailed **Internship Report** after completion. The report should include:

- Front Page: Student Name, Course, Internship Hospital/Lab, Duration, Mentor
- Internship Agreement Form
- Internship Certificate
- Introduction & Background of the Hospital/Laboratory
- Roles & Responsibilities as an Intern
- Weekly Work Allotment & Completion Report
- Challenges Faced & Solutions Implemented
- Learning Outcomes from the Internship
- Conclusion

7. Evaluation Criteria

| Component | Weightage |
|-----------------------------------|------------------|
| Logbook / Diary | 20% |
| Practical Skills & Test Handling | 30% |
| Final Internship Report | 20% |
| Viva / Presentation | 20% |
| Attendance & Professional Conduct | 10% |

The Viva Voce for internship evaluation in the Bachelor in Medical Laboratory Technology (B.SC MLT) program is an oral examination designed to assess the student's understanding, application, and reflection on their practical training experience in medical laboratory settings.

During the viva, interns present their experiences, learning outcomes, and professional contributions made during the internship period. The presentation should include a summary of their roles and responsibilities, key laboratory procedures handled, and technical or diagnostic projects undertaken.

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24
Semester VI

| | | |
|--|--|---|
| Course: Clinical Endocrinology and Toxicology | | |
| Clinical Endocrinology and Toxicology Lab | | |
| Course Code: BMLC601+BMLC691 | Semester: VI | |
| Maximum Marks: 100+100 | | |
| Teaching Scheme | | Examination Scheme |
| Lecture: 3 | | End semester Exam: 70 |
| Tutorial: 0 | | Attendance: 5 |
| Practical: 2 | | Continuous Assessment: 25 |
| Credit: 5 | | Practical/Seasonal internal continuous evaluation: 40 |
| | | Practical/Seasonal external examination: 60 |
| Sl. No. | Course Objective | |
| 1 | After the exposure of the current paper students would be able to detect hormones and toxic substances in blood samples and also will be able to outline the basis of endocrine disorders. | |
| | Course Outcomes | Mapped module/Unit |
| CO 1 | Build the basic knowledge of endocrine system | U1 |
| CO 2 | Distinguish the different types of thyroid hormones and their measurement. | U1,U2 |
| CO 3 | Interpret the knowledge of infertility profile. | U1,U2,U3 |
| CO 4 | Make use the knowledge of growth hormones and its abnormality. | U3,U4 |
| CO 5 | Explain the drug abuse and their measurement. | U5 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

Learning Outcome/Skills:

The candidate will be in a position to understand the fundamentals of the history of Pathology, general features, the concepts of tissue and its respective characteristics. The importance of protein molecule in eliminating the various deficiencies, the role of minerals and vitamins to maintain a good health and a detailed overview of cancer, its features, possibility of cure, the various stages and the malignant texture of this deadly disease. All these will be extremely necessary and helpful for the candidate invest the best in the career chosen and by them.

| Unit | Total Hours | % of Questions | Bloom's Taxonomy | Remarks, if any |
|---------------|--------------------|-----------------------|-------------------------|------------------------|
| THEORY | | | | |
| U1 | 5 | 10 | 1 | NA |
| U2 | 10 | 25 | 1, 2 | NA |
| U3 | 10 | 25 | 1, 2 | NA |
| U4 | 10 | 20 | 1, 2, 3 | NA |
| U5 | 10 | 20 | 1, 2, 3 | NA |
| | 45 | 100% | | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|---------------------|---|---------------------|
| Course Code: | BMLC601 | |
| Course: | Clinical Endocrinology and Toxicology | Credits: 3.0 |
| Chapter | Name of the Topic | Hours |
| Unit-I | Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion. | 5 |
| Unit-II | Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T3, T4, TSH, FT3, FT4, TBG, Disorder associated with thyroid dysfunction. | 10 |
| Unit-III | Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone, DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test | 10 |
| Unit-IV | Growth hormone, ACTH, Aldosterone, Cortisol clinical significance, reference range, hypo and hyper secretion | 10 |
| Unit-V | Introduction of Toxicology, Alcohol poisoning, Lead poisoning, Zinc poisoning, Mercury poisoning drugs abuse, screening procedure for drug screening, Immunoassay for drugs. | 10 |
| | Total: | 45 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|-----------------------------|--|--|
| Course Code: BMLC691 | | Course: Clinical Endocrinology & Toxicology Lab |
| Credit: 2 | | List of practical |
| 1 | To determine T3 conc. in serum sample. | |
| 2 | To determine T4 conc. in serum sample. | |
| 3 | To determine TSH conc. in serum sample. | |
| 4 | To determine LH conc. in serum sample | |
| 5 | To determine FSH conc. in serum sample. | |
| 6 | To determine Prolactin conc. in serum sample | |
| 7 | To determine TSH conc. in serum sample. | |
| 8 | To perform TRIPLE test. | |
| 9 | Demonstration of male and female infertility test. | |
| 10 | Beta HCG | |

List of Books

| Sr. No. | Name of Author | Title of the BOOK | Publication |
|----------------|-------------------------------------|--|-----------------------------------|
| 1 | Teitz,(2007 | Fundamentals of Clinical Chemistry | 6th edition,Elsevier Publications |
| 2 | Bishop(2013) | Clinical Chemistry | 7th edition, WileyPublications |
| 3 | Henry's | Clinical Diagnosis and Management by Laboratory Methods,(2011) | 22ndedition, Elsevier |
| 4. | D M Vasudevan, (2011) | Text book of Medical Biochemistry | 6th edition Jaypee Publishers |
| 5. | M N Chatterjea & Rana Shinde,(2012) | Text book of Medical Biochemistry | 8th edition,Jaypee Publications |
| 6. | Singh & Sahni,(2008) | Introductory Practical Biochemistry | 2nd edition, Alpha science |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|--|--|---|
| Course: Diagnostic Molecular Biology Diagnostic Molecular Biology Lab | | |
| Course Code: BMLC602+ BMLC692 | | Semester: VI |
| Maximum Marks: 100+100 | | |
| Teaching Scheme | | Examination Scheme |
| Lecture: 3 | | End semester Exam: 70 |
| Tutorial: 0 | | Attendance: 5 |
| Practical: 2 | | Continuous Assessment: 25 |
| Credit: 5 | | Practical/Seasonal internal continuous evaluation: 40 |
| | | Practical/Seasonal external examination: 60 |
| Sl. No. | Course Objective | |
| 1. | Students will be able to adopt the rendered to take up future molecular biology challenges and efficiently work in diagnostic molecular setup. | |
| | Course Outcomes | Mapped module/Unit |
| CO 1 | Explain the knowledge of chromosome. | U1 |
| CO 2 | Able to examine the transcription apparatus | U2 |
| CO 3 | Organize the Nucleic acid amplification testing . | U3 |
| CO 4 | Apply the knowledge of blotting technique. | U4 |
| CO 5 | Illustrate the knowledge about Radioisotopes and its application. | U5 |
| CO 6 | Able to conduct different test related to PCR. | U1, U2, U3, U5 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

Learning Outcome/Skills:

By the end of this course, students will gain a comprehensive understanding of the molecular biology of nucleic acids, including the structure, function, and replication of DNA and RNA. They will be able to explain transcription mechanisms, distinguish between different types of RNA, and understand the roles of polymerases. Students will also learn about nucleic acid amplification techniques such as PCR and its various forms, along with their diagnostic applications. The course equips students with knowledge of blotting techniques, chromosome structure and abnormalities, karyotyping, and FISH, particularly in the context of hematological disorders. Finally, students will understand the use of radioisotopes in blood analysis, radiation safety, and modern diagnostic tools like flow cytometry, stem cell banking, and prenatal diagnostics, preparing them for both clinical and research roles in molecular biology and diagnostics

| Unit | Total Hours | % of Questions | Bloom's Taxonomy | Remarks, if any |
|---------------|--------------------|-----------------------|-------------------------|------------------------|
| THEORY | | | | |
| U1 | 15 | 30 | 1, 2 | NA |
| U2 | 5 | 10 | 1, 2, | NA |
| U3 | 5 | 10 | 1, 2,3 | NA |
| U4 | 10 | 25 | 1, 2,3 | NA |
| U5 | 10 | 25 | 1, 2,3 | NA |
| | 45 | 100% | | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|---------------------|---|--------------------|
| Course Code: | BMLC602 | |
| Course: | Diagnostic Molecular Biology | Credits:3.0 |
| Chapter | Name of the Topic | Hours |
| Unit-I | Nucleic Acids, DNA, RNA, composition, structure, types, denaturation and renaturation of DNA, chemistry of DNA synthesis, general principles of replication, enzyme involved in DNA replication – DNA polymerases, DNA ligase, primase, telomerase and other accessory proteins. | 15 |
| Unit-II | Basic transcription apparatus, Initiation, elongation and termination of transcription, Eukaryotic Transcription of mRNA, tRNA and rRNA, types of RNA polymerases. | 5 |
| Unit-III | Nucleic acid amplification testing, PCR, Principle, Types, applications, Thermal cycler, RT PCR, reverse transcriptase PCR, Nested PCR | 5 |
| Unit-IV | Blotting techniques, southern blotting and Western blotting Introduction to chromosomes, its structure and disorder, Karyotyping, Chromosomal studies in hematological disorders (PBLC and Bone marrow), FISH | 10 |
| Unit-V | Radioisotopes and its application in measurement of blood volume, determination of red cell volume and plasma volume, red cell life span, platelet life span, radiation hazards and its prevention disposal of radioactive material Introduction and applications of Flow cytometry, Stem cell banking, Prenatal Diagnosis. | 10 |
| | Total: | 45 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| Course Code: BMLC692 | | Course: Diagnostic Molecular Biology Lab |
|-----------------------------|--|---|
| Credit: 2 | | List of practical |
| 1 | Isolation of DNA | |
| 2 | Separation of DNA by Agarose gel electrophoresis | |
| 3 | Demonstration of thermal cyclers and PCR. | |
| 4 | Demonstration of PCR HLA B-27 | |
| 5 | Demonstration of PCR HIV | |
| 6 | Demonstration of PCR MTB | |
| 7 | Demonstration of triple test | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

List of Books

| Sr. No. | Name of Author | Title of the BOOK | Publication |
|----------------|-----------------------|--|-----------------------------------|
| 1 | Teitz,(2007), | Fundamentals of Clinical Chemistry | 6th edition,Elsevier Publications |
| 2 | Henry's | Clinical Diagnosis and Management by Laboratory Methods (2011) | 22ndedition, Elsevier |
| 3 | Singh & Sahni (2008) | Introductory Practical Biochemistry | 2nd edition, Alpha science |
| 4 | Lehninger, (2013) | Principles of Biochemistry | 6th edition, W H Freeman. |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | |
|-----------------------------------|--|
| Course: Clinical Nutrition | |
| Course Code: BMLC603 | Semester: VI |
| Maximum Marks: 100 | |
| Teaching Scheme | Examination Scheme |
| Lecture: 3 | End semester Exam: 70 |
| Tutorial: 1 | Attendance: 5 |
| Practical: 0 | Continuous Assessment: 25 |
| Credit: 4 | Practical/Seasonal internal continuous evaluation: 0 |
| | Practical/Seasonal external examination: 0 |
| Sl. No. | Course Objective |
| 1. | Gain in-depth knowledge of the types, functions, and dietary sources of macronutrients and micronutrients. Understand the concept of a balanced diet and its significance in maintaining health and preventing disease. |
| 2. | Describe the biochemical pathways involved in digestion, absorption, and metabolism of carbohydrates, proteins, and fats. Identify the role of vitamins and minerals in metabolic functions and the effects of their deficiencies and toxicities. |
| 3 | Understand the role of diet in the prevention and management of various clinical conditions such as diabetes, cardiovascular diseases, renal disorders, gastrointestinal diseases, and obesity. |
| 4. | Analyze the impact of malnutrition on community health and explore national nutrition programs in India. Learn the theoretical foundation of dietary assessment and planning in clinical settings. Appreciate the importance of nutrition education and counselling in patient care. |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | Course Outcomes | Mapped module/Unit |
|-------------|--|---------------------------|
| CO 1 | Describe the fundamental concepts of nutrition, including types and functions of macro- and micronutrients, energy metabolism, and dietary guidelines. | U1, |
| CO 2 | Explain the biochemical processes of digestion, absorption, and metabolism of nutrients, and relate these to common clinical and nutritional disorders. | U1,U2 |
| CO 3 | Analyze the nutritional requirements and appropriate dietary modifications in various clinical conditions such as diabetes, cardiovascular disease, renal disorders, and gastrointestinal diseases. | U2,U3 |
| CO4 | Evaluate the nutritional needs at different stages of the life cycle (infancy, adolescence, pregnancy, aging), and identify potential nutritional challenges and preventive strategies | U3,U4 |
| CO5 | Discuss the impact of malnutrition and overnutrition on public health and describe the theoretical basis of national nutrition programs and clinical dietary planning. | U4,U5 |
| CO6 | Interpret basic dietary assessment methods and nutritional counseling strategies used in public health and clinical nutrition practice. | U4,U5 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

Learning Outcome/Skills:

Upon successful completion of this course, students will have a thorough understanding of the fundamental principles of human nutrition, including the roles, sources, and functions of macronutrients and micronutrients, as well as energy metabolism and dietary requirements. They will be able to explain the physiological and biochemical processes involved in the digestion, absorption, and metabolism of nutrients, and relate these concepts to various nutritional deficiencies and imbalances observed in clinical practice. Students will develop the ability to analyze and apply dietary modifications for managing common diseases such as diabetes, cardiovascular disorders, renal disease, and gastrointestinal conditions. They will also gain insight into the changing nutritional needs across the human life cycle—from infancy and adolescence to adulthood and old age—and be able to identify appropriate dietary strategies for each stage. Furthermore, students will understand the broader role of nutrition in public health, evaluate the theoretical basis of national nutrition programs, and appreciate the importance of nutrition education and counseling in improving patient outcomes and promoting community health.

| Unit | Total Hours | % of Questions | Bloom's Taxonomy | Remarks, if any |
|---------------|--------------------|-----------------------|-------------------------|------------------------|
| THEORY | | | | |
| U1 | 15 | 20 | 1,2 | N/A |
| U2 | 15 | 20 | 1,2 | N/A |
| U3 | 10 | 20 | 1,2,3 | N/A |
| U4 | 10 | 20 | 1,2,3 | N/A |
| U5 | 10 | 20 | 1,2,3 | N/A |
| | 60 | 100 | | |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|---------------------|---|------------------|
| Course Code: | BMLC603 | |
| Course: | Clinical Nutrition | Credits:4 |
| Chapter | Name of the Topic | Hours |
| Unit-I | <p>Introduction to Nutrition: Definition, scope, and importance in healthcare, Role of a nutritionist in clinical settings</p> <p>Macronutrients: Carbohydrates: types, functions, sources, dietary fiber, Proteins: essential amino acids, biological value, protein quality, Fats: types of fats, essential fatty acids, cholesterol, health implications</p> <p>Micronutrients: Vitamins: water-soluble (B-complex, C) and fat-soluble (A, D, E, K), Minerals: calcium, iron, iodine, zinc, sodium, potassium</p> <p>Energy Metabolism: BMR (Basal Metabolic Rate), physical activity level, total energy expenditure, Factors affecting energy requirements</p> <p>Balanced Diet: Food groups, food pyramids, My Plate model, RDA (Recommended Dietary Allowances) for different age groups</p> | 15 |
| Unit-II | <p>Digestive Physiology</p> <ul style="list-style-type: none"> • Overview of digestion and absorption of carbohydrates, proteins, and fats <p>Metabolism of Nutrients</p> <ul style="list-style-type: none"> • Carbohydrate metabolism: glycolysis, glycogenolysis, gluconeogenesis • Lipid metabolism: β-oxidation, cholesterol synthesis • Protein metabolism: transamination, deamination, urea cycle <p>Role of Vitamins and Minerals in Metabolism</p> <ul style="list-style-type: none"> • Coenzymes and cofactors • Deficiency disorders and their metabolic implications <p>Nutritional Deficiencies and Toxicities</p> <ul style="list-style-type: none"> • Vitamin A, D, C, B12, iron, calcium, and iodine-related disorders <p>Nutrient Interactions</p> <ul style="list-style-type: none"> • Nutrient-nutrient and nutrient-drug interactions | 15 |
| Unit-III | <p>Nutrition in Metabolic and Lifestyle Disorders</p> <ul style="list-style-type: none"> • Diabetes Mellitus: carbohydrate control, glycaemic index • Cardiovascular diseases: cholesterol, fat intake, DASH diet • Obesity: energy balance, weight management approaches <p>Renal and Hepatic Conditions</p> <ul style="list-style-type: none"> • Renal diets: low sodium, potassium, protein • Liver diseases: protein modification, fat restriction <p>Gastrointestinal Disorders</p> <ul style="list-style-type: none"> • Peptic ulcers, inflammatory bowel disease, constipation, diarrhoea – dietary implications <p>Special Diets in Clinical Practice</p> <ul style="list-style-type: none"> • Clear, full liquid, soft diets • High-protein, low-fat, high-fibre diets <p>Food-Drug Interactions</p> <ul style="list-style-type: none"> • Impact of medications on nutrient absorption and metabolism | 10 |

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. (Medical Lab Technology)
Effective from academic session 2023-24

| | | |
|----------------|---|-----------|
| Unit-IV | <p>Maternal Nutrition</p> <ul style="list-style-type: none"> • Nutritional needs during pregnancy and lactation • Common deficiencies (iron, folic acid, calcium) <p>Infant and Child Nutrition</p> <ul style="list-style-type: none"> • Breastfeeding, weaning practices, growth stages • Childhood malnutrition: causes and prevention <p>Adolescent Nutrition</p> <ul style="list-style-type: none"> • Nutrient requirements during growth spurts • Eating disorders: anorexia nervosa, bulimia <p>Adult and Elderly Nutrition</p> <ul style="list-style-type: none"> • Age-related changes, dietary adjustments • Common deficiencies in elderly population <p>Sports and Special Populations</p> <ul style="list-style-type: none"> • Basics of sports nutrition • Nutrition for women (menstruation, menopause) | 10 |
| Unit-V | <ol style="list-style-type: none"> 1. Malnutrition and Public Health Issues <ul style="list-style-type: none"> ○ PEM (Protein-Energy Malnutrition), obesity, anaemia ○ Determinants and consequences of malnutrition 2. National Nutrition Programs in India <ul style="list-style-type: none"> ○ Mid-Day Meal Scheme, ICDS, POSHAN Abhiyan, Anaemia Mukht Bharat 3. Dietary Assessment Methods (Theory) <ul style="list-style-type: none"> ○ 24-hour recall, food frequency questionnaire, diet history 4. Clinical Diet Planning (Conceptual) <ul style="list-style-type: none"> ○ Principles and steps in diet planning ○ Role of nutrition in hospital care and recovery 5. Nutrition Education and Counselling <ul style="list-style-type: none"> ○ Behaviour change models ○ Role of a clinical nutritionist in patient education | 10 |
| | Total: | 60 |

List of Books

| Sr. No. | Name of Author | Title of the BOOK | Publication |
|---------|---|---|-------------------------|
| 1 | Mahtab S. Bamji, N. Pralhad Rao, Vinodini Reddy | Textbook of Human Nutrition | Oxford & IBH |
| 2 | F.P. Antia and Philip Abraham | Clinical Nutrition and Dietetics | Oxford University Press |
| 3 | Ashok Kumar J | Nutrition and Biochemistry for BSc Nursing and Allied Health Sciences | Jaypee Brothers |
| 4 | Davidson, Passmore, Brock, and Truswell | Human Nutrition and Dietetics | |