विद्या विमुक्तिदायिनी

Bhaikaka University

Instilling Purpose in Healthcare

Charutar Arogya Mandal, Karamsad

A Curriculum

For

B.Sc. (Honours) in Medical Technology

(Medical Laboratory Technology)

CAM Institute of Allied Health Sciences &Technology

(A constituent Institute of Bhaikaka University)

(Academic Year 2024-25)

Vision

Our institute will be the most preferred destination for the aspirants who want to achieve the highest standard of excellence in the field of allied health sciences.

Mission

- To promote a collaborative working environment for the academicians and the students.
- To offer a curriculum emphasizing practical knowledge and clinical experience as to be implemented in authentic settings.
- To collaborate with clinicians and experts from basic biomedical sciences for education and research.

CURRICULUM

Faculty	--
Discipline	Medical Technology
Program	B.Sc. (Honours) Medical Technology
Specialization	Medical Laboratory Technology
Subject Code	---
Tenure	4 years (Including 1 year of Internship)
Last Revised	July 2024

NOTIFICATION

Subject: Regulations and Curriculum pertaining to B.Sc. (Honours) Medical Technology (Medical Laboratory Technology) Program

In exercise of the power conferred under section 22(3) of the Gujarat State Private Universities Act 2009, the Academic Council in its 9th meeting held on 22nd August 2024 Under the agenda item no. 24.02.10 is pleased to approve the curriculum of **B.Sc. (Honours) Medical Technology (Medical Laboratory Technology) Program)** at Bhaikaka University.

The curriculum shall come into force from the Academic Year 2024-2025.

By Order,
REGISTRAR

ACADEMIC REGULATIONS

1. TITLE OF THE PROGRAM:

This program shall be called as per the name given below under the discipline of Medical Technology at Bhaikaka University, Karamsad. It comes into effect from the Academic Year 2024-25. The relevant regulatory bodies reserve the right to make changes to the regulations at any period of time.

Name of the program shall be;
B. Sc. (Honours) Medical Technology (Medical Laboratory Technology)

2. ELIGIBILITY FOR THE ADMISSION:

The candidate who has passed 10+2 (Science) examination conducted by any recognized School Certification Board or Equivalent Examination; with principle subjects like Physics, Chemistry, Biology and/or Mathes and English. The student should complete minimum of 17 years at the time of securing admission.

2.1 DURATION OF THE PROGRAM:

The program of B.Sc. (Honours) in Medical Technology (Medical Laboratory Technology) comprises of 4 (four) academic years including 1 (one) year of internship at the respective area of Shree Krishna Hospital affiliated with Bhaikaka University.

2.2 MEDIUM OF INSTRUCTION:

English will be the medium of instruction for all the subjects and also for the examination of the program.

3. METHOD [S] OF INSTRUCTIONS:

- This program shall include teaching through lectures, practical, demonstration, group discussion, individual learning, kinesthetic or participative learning through traditional methods or by using ICT tools.
- Structured problem-based exercises shall be provided to simulate specific case examples
- Audio visual material and/or printed handouts shall be provided to supplement reading and classroom instruction.

4. CREDIT SYSTEM:

This program will have a curriculum in which every course will be assign certain credits reflecting its weight and contact periods per week as given below:

1 lecture (L)/week (15 Hours)* = 1 credit

1 Tutorial (T)/week (15 Hours)* = 1 credit

1 Practical (P)/week (30 Hours)* = 1 credit

* 1 credit of class room theory, tutorial and demonstration is equal to 15 hours of engagement in a year and 1 credit of practical class is equal to 30 hours of engagement in a year.

In addition to theory and laboratory practicals there may be other courses such as seminal. Clinical training/Hospital posting, projects etc., which will be assigned credits as per their contribution in the program without regards to contact periods.

5. ELIGIBILITY TO APPEAR IN ANNUAL EXAMINATION:

- The student must have attended at least 75% of the total classes conducted in each course of the year separately in theory, practical and clinical postings.
- The students must have secured 35% of the total marks in each course of the academic year separately in theory and practical.

6. ASSESSMENT:

- Assessments should be completed by the academic staff, based on the compilation of the student 's theoretical & clinical performance throughout the education Programme. To achieve this, all assessment forms and feedback should be included and evaluated.

6.1 INTERNAL ASSESSMENT

- Internal assessment shall be done based on continuous evaluation of the student. It includes mainly two internal examinations (one terminal examination & one preliminary examination). It may also include several unit tests and assignments submitted by the students throughout the year in each subject of the program. In order to award the internal marks in theory and practical, the average of the two internal examinations as well as unit tests, assignments, attendance and participation in curricular/extra-curricular activities shall be considered.

6.2 EXTERNAL ASSESSMENT

- External assessment shall include theory and practical examinations conducted as a part of the annual examinations of each subject (course) as per the schedule decided by the college and university.
- The scheme of question paper for theory and practical examinations will be as prescribed by the regulatory body.

7. ACADEMIC PROGRESSION:

- The student will not be allowed to appear for the annual examination of the third year if he/she has not cleared all the courses of the first and second year of the program.
- The student will not be allowed to enter in the internship (fourth year) of the program, if he/she has not cleared all the courses of final year of the program.
- These rules will be strictly applicable and no complaint/request will be entertained from the students who may be detained under these rules.

8. INTERNSHIP:

- There shall be one year of internship after the successful completion of third year of the program. Internship should be done at the hospital recognized by Bhaikaka University only.
- The student shall be awarded the degree only after successful completion of the internship.

9. AWARD OF GRADES:

- The student must secure minimum 35 % of marks in theory and practical examination separately to pass in the final University Examination.
- In case a student fails to secure minimum 35% marks in any theory or practical course, he/she shall reappear for the supplementary examinations or the annual examination of that course. However, his/her marks of the internal assessment shall be carried over and he/she shall be entitled for the grade obtained on passing.

9.1 ALLOCATION OF GRADE POINTS:

The student shall be awarded a final letter grade at the end of the academic year for each course as per the table shown below;

Table 1: Letter grades and Grade Points

Letter Grade	Grade Points	Marks
O (Outstanding)	10	≥90
A+ (Excellent)	9	80-89
A (Very Good)	8	70-79
B+ (Good)	7	60-69
B (Above Average)	6	50-59
C+ (Average)	5	40-49
P (Pass)	4	35-39
F (Fail)	3	<35
Ab (Absent)	0	--

9.2 DECLARATION OF CLASS:

The class shall be awarded on the basis of CGPA as follows;

Class	CGPA
First Class with Distinction	**≥ 7.50**
First Class	**6.00 to 7.49**
Second Class	**4.8 to 5.59**
Pass Class	**<4.8**

The class shall be awarded on the basis of following:

Class	Details
First Class with Distinction	A successful candidate obtaining 75% and more marks of the grand total aggregate in the first attempt shall be declared to have passed these subjects with Distinction
First Class	A successful candidate obtaining 60% and more and less than 75% of the marks of the grand total aggregate in the first attempt shall be declared to have passed these subjects with first class
Second Class	A successful candidate obtaining 50% and more and less than 60% of the marks of the grand total aggregate in the first attempt shall be declared to have passed these subjects with Second class
Pass Class	Those candidates who do not fall in any above criterions, but fulfil the requirement of passing of the whole course, will be shown as “PASS” in the grade card/mark sheet

10. PROGRAM OBJECTIVES:

Program objectives aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care

11. PROGRAM SPECIFIC OBJECTIVES:

1. Proficiently perform a full range of clinical laboratory tests
2. Develop and evaluate test systems and interpretative algorithms
3. Manage information to enable effective, timely, accurate, and cost-effective reporting of laboratory-generated information

12. PROGRAM OUTCOMES:

PO1: **Improvement and understanding of paramedical science:**
Students will make use of their subject-matter expertise to effectively render healthcare services.

PO2: Patient treatment methods and clinical services:
Students will use fundamental scientific concepts to choose pertinent investigations while offering patient care in an effective and economical manner. They ought to establish plans for sickness avoidance alongside healthcare improvement**.**

PO3: Intellectual proficiency:
The student will be competent to supervise diagnostics and clinical administration procedures and troubleshoot concerns.

PO4: Aptitudes for interaction:
In order to give stakeholders and the healthcare team pertinent information, students will be able to express themselves concisely and adaptably. They will be provided with purposeful counseling approaches to promoting lifestyle changes that will optimize health.

PO5: Research/ Exploration:
The ability for students to think critically on their own will be significant, as will be their ability to communicate verbally as well as in writing.

PO6: Ethics and accountability:
Students will comprehend the fundamental principles of clinical ethics and legislation so they may use them in their practice as healthcare practitioners.

Students should be able to:

- Describe and apply the fundamental ideas of clinical ethics to real-world scenarios and circumstances
- To provide patients with access to healthcare resources fairly, equally, and without bias, discrimination, or undue influence.
- Establish an understanding and effectively apply fundamental legal principles to their practice.
- Embrace professional responsibility for the beginning, maintaining, and closure of patient-provider conversations.

PO7: Leadership, mentor-ship and teamwork:
Where necessary, the student must assume a leadership position to assure optimal clinical outcomes and patient satisfaction. They must be able to effectively manage both themselves and other people, as well as respond to planned and unknown circumstances on their own and with confidence.

PO8: Responsibility and public accountability
The students will be exposed to community service that is guided by study and the practice of medicine. They will encourage creative solutions to effectively address community requirements. They will do their duties with a focus towards an emerging and enduring healthcare system.

PO9: Sustainability and the surroundings
Students will apply effective biological waste management and disposal strategies in order to preserve the environment, community wellness, and safety.

PO10: Continuous learning
The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology.

13. PROGRAM SPECIFIC OUTCOMES:

At the end of this specific program the student should be able to:

1. Perform routine clinical laboratory testing.
2. Make specimen-oriented decisions on predetermined criteria including working knowledge of critical values.
3. Communicate with other members of healthcare team, customers and patients in an effective manner.
4. Process information and ensure quality control as appropriate to routine laboratory procedures.
5. Train students in routine laboratory procedure.
6. Upgrade knowledge and skills in a changing healthcare scenario.
7. Analyze the logical interpretation of clinical lab investigations.
8. Extrapolate the data acquired
9. Work on all the automated machines commonly used in the clinical laboratory setting

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: First year

	Regular Subjects	Elective Subjects	Total
Subjects	07	01	**08**
Credit	40	02	**42**

CURRICULUM & CREDIT FRAME WORK

Regular Subjects

Course Code	Course Title	Hours/week			Marks		Total Marks	Credit
		L	T/D	P	Internal	External		
Core/Major Courses								
24BMT0101	Human Anatomy	3	1	-	30	70	**100**	**4**
24BMT0102	Human Physiology	3	1	--	30	70	**100**	**4**
24BMT0103	General Pathology	3	1	-	30	70	**100**	**4**
24BMT0104	General Microbiology	3	1	-	30	70	**100**	**4**
24BMT0105	General Biochemistry	3	1	-	30	70	**100**	**4**
24BMT0106	English	3	1	-	30	70*	**100**	**4**
24BMT0107	Health Care	2	--	-	20	40*	**60**	**2**
24BMT0108	Introduction to Medical Technology	1	-	-	60	--	**60**	**1**
24CES0101	Clinical Education (studentship)	--	13	-	100	--	100	13
	Total	**21**	**19**	**-**	**360**	**460**	**820**	**40**
	Total hours	**1280**			**---**	**---**	**---**	

Elective Subjects

Course Code	Course Title	Hours/week		Marks		Total Marks	Credit
		L	T/D	Internal	External		
24ELC0101	Yoga and Health	--	2	20	40*	**60**	**2**
24ELC0102	Basic emergency care and life support	--	2	20	40*	**60**	**2**

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

	Regular Subjects	Elective Subjects	Total
Subjects	07	01	**08**
Credit	40	02	**42**

CURRICULUM & CREDIT FRAME WORK

(Regular Subjects)

Course Code	Course Title	Hours / week			Marks		Total Marks	Credit
		L	T/D	P	Internal	External		
Core/Major Courses								
24BMT0201	Pathology- I	4	--	--	30	70	**100**	**4**
24BMT0202	Pathology Practical	--	1	2	20	40	**60**	**2**
24BMT0203	Microbiology-I	4	--	--	30	70	**100**	**4**
24BMT0204	Microbiology Practical	--	1	2	20	40	**60**	**2**
24BMT0205	Biochemistry-I	4	--	--	30	70	**100**	**4**
24BMT0206	Biochemistry Practical	--	1	2	20	40	**60**	**2**
24BSC0201	Basics of Research Methodology	2	**1**	**--**	20	40	**60**	**3**
24CES0201	Clinical Education (Studentship)	--	**19**	**--**	--	--	**100**	**19**
Total		**14**	**23**	**6**	**170**	**370**	**640**	**40**
	Total hours	**1280**						**40**

Elective Subjects

Course Code	Course Title	Hours / week		Marks		Total Marks	Credit
		L	T/D	Internal	External		
24ELC0201	Phlebotomy		2	20	40*	**60**	**2**
24ELC0202	Computer		2	20	40*	**60**	**2**

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

	Regular Subjects	Elective Subjects	Total
Subjects	09	01	**10**
Credit	40	02	**42**

CURRICULUM & CREDIT FRAME WORK

(Regular Subjects)

Course Code	Course Title	Hours/Week			Marks		Total Marks	Credit
		L	T/D	P	Internal	External		
Core/Major Courses								
24BMT0301	Pathology - II	4	--	-	30	70	**100**	**4**
24BMT0302	Pathology - III	4	--	--	30	70	**100**	**4**
24BMT0303	Pathology Practical	--	1	2	30	70	**100**	**2**
24BMT0304	Microbiology - II	4	--	-	30	70	**100**	**4**
24BMT0305	Microbiology - III	4	--	--	30	70	**100**	**4**
24BMT0306	Microbiology Practical	--	1	2	30	70	**100**	**2**
24BMT0307	Biochemistry - II	4	--	-	30	70	**100**	**4**
24BMT0308	Biochemistry - III	4	--	--	30	70	**100**	**4**
24BMT0309	Biochemistry Practical	--	1	2	30	70	**100**	**2**
24CES0301	Clinical Education (Studentship)	--	10	--	--	--	**100**	**10**
Total		**24**	**13**	**6**	**270**	**630**	**1000**	**40**
	Total hours	**1280**						**40**

Elective Subjects

Course Code	Course Title	Hours/week		Marks		Total Marks	Credit
		L	T/D	Internal	External		
24ELC0301	Leadership and Management Skills		2	20	40*	**60**	**2**
24ELC0302	AI in Health care		2	20	40*	**60**	**2**

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Internship

CURRICULUM & CREDIT FRAME WORK

Course Code	Course Title	Hours / week			Marks		Total Marks	Credit
		L	T/D	P	Internal	External		
Core/Major Courses								
24BMT0401	Clinical Internship	--	28	--	50	150	**200**	**28**
24BMT0402	Research Project	--	12	--	30	70	**100**	**12**
	Total hours	**1280**			--	--	**300**	**40**

ROTATION DURING INTERNSHIP

(1 credit = 15 hours of clinical postings)

Clinical area at hospital	Hours/ week	Credit
Biochemistry	4 hours/week	4 credits
Hematology	2 hours/week	2 credits
Clinical Pathology	2 hours/week	2 credits
Histopathology	2 hours/week	2 credits
Blood bank	2 hours/week	2 credits
Bacteriology	4 hours/week	4 credits
Parasitology	4 hours/week	4 credits
Mycology	2 hours/week	2 credits
Immunology	4 hours/week	4 credits
Molecular Laboratory	2 hours/week	2 credits
Total	**28 hours/ week**	**28 credits**
Research Project	12 hours/week	12 credits
TOTAL	**40 hours/week**	**40 credits**

Note:
1) Abbreviations: L-Lecture, T-Tutorial, D-Demonstration and P-Practical
2) Considering eight months per academic year as working months, total contact hours per year shall be 1280 (One thousand two hundred and eighty)
3) There shall be no annual Practical Examination in the first year of the program.
*The external examination will be taken at the institute level.
**The credit of the course "Introduction to Medical Technology" shall not be reflected in the annual marksheet. However, it will be reflected in the transcript.

Detailed Curriculum
Of
B.Sc.(Honours) Medical Technology
(Medical Laboratory Technology)

First Year

24BMT0108 (Introduction to Medical Technology)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology
Year of the Program: First year

Course Code	24BMT0108	Total Credit	1
Title of Subject	Introduction to Medical Technology	Total Hours	15

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives	1) To introduce the medical technology field and its applications. 2) To enhance understanding of basic medical concepts, techniques, and equipment. 3) To develop critical thinking and problem-solving skills related to medical technology. 4) To prepare students for advanced studies and practical applications in the respective field.

Course Content

Sessions	Description	Weightage
1	**Introduction to Medical Technology** History and Evolution of Medical Technology Overview of Medical Technology Applications Role of Medical Technologists in Healthcare	1 Hour 10%
2	**Medical Terminology** Common Medical Terms and Abbreviations Understanding routine laboratory procedures Communication in Medical Settings	2 hours 20%
3	**Basic Human Anatomy and Physiology** Introduction to Human Body Systems Major Organs and Their Functions Basic Physiological Processes	3 Hours 20%
4	**Biochemistry** Introduction Key Areas Importance Terms and Abbreviations	2 hours 10%

5	**Clinical Microbiology and Immunology** Introduction Key Areas Importance Terms and Abbreviations	2 hours 10 %
6	**Pathology** Introduction Key Areas Importance Terms and Abbreviations	2 hours 10%
7	**Communication Skills** Etiquettes in Communication Oral Communication Written Communication	1 hour 10%
8	**Professionalism and Values** Institutional/ organizational values Institutional Rules & Regulations Maintaining Discipline: During College Hours(Theory & Laboratory Postings) Behavior Etiquettes: During College Hours(Theory & Laboratory Postings)	2 hours 10%

Learning Activities:

- **Lecture and Presentation**
- **Group Discussion**
- **Class Participation**:
    - Engage in discussions and role-playing exercises, demonstrating an understanding of the material

Assessment:

- Quiz:
- Multiple-choice and short-answer questions

24BMT0101 (Human Anatomy)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: First year

Course Code	24BMT0101	Total Credit	4
Title of Subject	Human Anatomy	Total Hours/week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	To provide students with basic knowledge of anatomical terminology, basic histology, and understanding of the structural and functional organization of the normal human body.

Course Content

Unit	Description	Weightage
1	**Introduction-Human body as a whole** 5.3 Definition of anatomy and its divisions 1.2 Terms of location, positions and planes 1.3 Cell and its organelles 1.4 Epithelium-definition, classification, function, describe with examples 1.5 Glands- classification, describe serous & mucous glands with examples 1.6 Basic tissues – classification with examples **Demonstration &Tutorials:** **1.7** Histology & types of epitheliums 1.8 Histology of serous, mucous & mixed salivary gland	10%
2	**Locomotion and support** 2.1 Cartilage- Types with example 2.2 Bone- Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull 2.3 Joints- Classification of joints with examples, synovial joint 2.4 Muscular system: Classification of muscular tissue 2.5 Names of muscles of the body **Demonstration &Tutorials:** 2.6 Demonstration of all bones showing parts, radiographs of normal bones & joints 2.7 Demonstration of muscles of the body (as functional groups)	10%

3	**Cardiovascular system** 3.1 Heart-size, location, chambers, exterior & interior 3.2 Blood supply of heart 3.3 Systemic & pulmonary circulation 3.4 Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery 3.5 Inferior venacava, portal vein, portosystemic anastomosis 3.6 Great saphenous vein 3.7 Lymphatic system- cisterna chyli & thoracic duct 3.8 Names and brief of regional lymphatics, axillary and inguinal lymph nodes **Demonstration &Tutorials:** 3.9 Demonstration of heart and vessels in the body 3.10 Normal chest radiograph showing heart shadows	10%
4	**Gastro-intestinal system** 4.1 Parts of GIT, Oral cavity [lip, tongue (with histology)], tonsil, dentition, pharynx, salivary glands, Waldeyer's ring 4.2 Esophagus, stomach, small and large intestine, liver, gall bladder, pancreas 4.3 Radiographs of abdomen	10%
5	**Respiratory system** 5.1 Parts of upper and lower Respiratory System: nose, nasal cavity, larynx, trachea, lungs 5.2 Names of paranasal air sinuses **Demonstration &Tutorials:** 5.3 Demonstration of parts of respiratory system 5.4 Normal radiographs of chest	10%
6	**Urinary system** 6.1 Kidney, ureter, urinary bladder, male and female urethra **Demonstration &Tutorials:** 6.2 Demonstration of parts of urinary system 6.3 Radiographs of abdomen-IVP, retrograde cystogram	10%

7	**Reproductive system** 7.1 Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology) 7.2 Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology) 7.3 Mammary gland – gross **Demonstration &Tutorials:** 7.4 Demonstration of section of male and female pelvis with organs *in situ* 7.5 Radiographs of pelvis – hysterosalpingogram	10%
8	**Endocrine glands** 8.1 Pituitary gland 8.2 Thyroid gland, parathyroid gland, 8.3 Suprarenal gland- (gross) **Demonstration &Tutorials:** 8.4 Demonstration of the endocrine glands	10%
9	**Nervous system** 9.1 Neuron 9.2 Classification of Nervous System 9.3 Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (Gross Anatomy) 9.4 Meninges, Ventricles & cerebrospinal fluid 9.5 Blood supply of brain (in brief) 9.6 Cranial nerves (only names) **Demonstration &Tutorials:** 9.7 Demonstration of all parts of brain	10%
10	**Sensory organs** 10.1 Skin: histology and appendages of skin 10.2 Eye: Parts of eye & lacrimal apparatus 10.3 Extra-ocular muscles & nerve supply 10.4 Ear: parts of ear- external, middle & inner ear and contents **Demonstration &Tutorials:** 10.5 Demonstration and histology of eyeball	10%

REFERENCE BOOKS

1. William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill
2. Human Anatomy for Nursing & Allied Sciences – 1st edition, Dr. M.K.Anand, Dr. Meena Verma, The Arora Medical Publishers Pvt. Ltd.
3. Fattana, Human anatomy,(Description and applied), Saunder's & C P Prism Publishers, Bangalore – 1991
4. ESTER, M. Grishcimer, Physiology & Anatomy with Practical, Considerations, J.P. Lippin Cott. Philadelphia

Course Outcome: At the end of the course, Students will be able to:

CO1	Define and use basic anatomical terminology of location, positions and planes of human body
CO2	Identify and describe locations, relations, and functions of major organ system of human body
CO3	Correlate structural and functional organization of cells and basic tissue of human body
CO4	Execute this knowledge during their health care practice

24BMT0102 (Human Physiology)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: First year

Course Code	24BMT0102	Total Credit	4
Title of Subject	Human Physiology	Total Hours /week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objective	To provide a comprehensive understanding about functioning of the human body at the cellular, tissue, organ and system levels including mechanism of homeostasis, integration of various physiological processes with applications.

Course Content

1	**Blood and Muscle Physiology** 1.1 Blood 1.1.1 Composition & Function of Blood 1.1.2 Erythropoiesis 1.1.3 Blood group 1.1.4 Hemostasis 1**.2 Muscle** **1.2.1 Structure & classification** **1.2.2** Neuromuscular junction 1.2.3 Muscle contraction: Mechanism & action **Demonstration &Tutorials:** 5.3 Hb Estimation 1.4 RBC & WBC Count 1.5 Blood Group 1.6 Bleeding Time & Clotting Time	15%
2	**Digestive System and Excretory System** 2.1 Movement and Alimentary tract 2.2 Deglutition and Mechanism of Vomiting, Diarrhea 2.3 Digestive juices 2.4 Micturition 2.5 Function of Kidney 2.6 Regulation of acid-base balance	15%

3	**Cardiovascular and Respiratory System** 3.1 Heart rate and sound 3.2 Blood pressure 3.3 Mechanism of breathing 3.4 Transportation of Oxygen and Carbon dioxide 3.5 Pulmonary volume and capacity **Demonstration &Tutorials:** **3.6** Arterial Blood Pressure 3.7 Pulse, Heart rate, Breathing rate	20%
	3.8 Thermometry	
4	**Endocrinology and Reproductive System** 4.1 Contraceptives Measures and Menstrual cycle 4.2 Puberty 4.3 Pregnancy and Lactation 4.4 Hormones of Pituitary gland, **4.5** Hormones of Thyroid & Parathyroid Glands 4.6 Hormones of Adrenal Gland and Pancreas **Demonstration &Tutorials:** 4.7 Pregnancy Test	20%
5	**Embryology** 5.1 Spermatogenesis & oogenesis 5.2 Ovulation, fertilization 5.3 Placenta	15%
6	**Nervous System and Special Senses** 6.1 Neuron and Neuroglia 6.2 Properties of nerve fiber 6.3 Reflex mechanism and Receptors 6.4 Mechanism of vision and hearing 6.5 Taste and smell **Demonstration &Tutorials:** 6.6 1st, 2nd & 8th Cranial nerve **6.7** Examination of sensory system, motor system & reflex	15%

REFERENCE BOOKS

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers
2. Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton
3. Jain AK, Concise Physiology, Latest Ed.

Course Outcome: At the end of the course, Students will be able to:

CO1	State the basic terminology & functions of each organ system of the human body
CO2	Define, explain, and correlate basic physiological processes of each organ system of human body
CO3	Correlate and explain the integrated responses of the organ systems of the body to physiological and pathological stresses
CO4	Execute this knowledge during their health care practice

24BMT0103 (General Pathology)

Course Code	24BMT0103	Total Credit	4
Title of Subject	General Pathology	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	• To equip the students with the knowledge of basic steps of histopathology including sample receiving, fixation, tissue processing, section cutting, staining and bio-medical waste management • To understand basic concepts of haematology, clinical pathology, and blood banking including routine laboratory investigations like collection, transport and processing of various samples or specimen including blood and urine, blood grouping and Rh typing.

Course Content

Unit	Description	Weightage
1	**Histopathology** 5.3 Introduction to Histopathology 1.2 Receiving of specimen in the laboratory 1.3 Use & care of Microscope 1.4 Various Fixatives: Mode of action, Preparation and Indication 1.5 Tissue processing for routine paraffin sections 1.6 Section Cutting 1.7 Staining of tissues- H & E Staining 1.8 Bio-Medical waste management	25%
2	**Clinical Pathology** 2.1 Introduction to Clinical Pathology 2.2 Collection, Transport, Preservation, and Processing of various clinical specimens 2.3 Urine Examination- 2.3.1 Collection and Preservation of Urine 2.3.2 Physical, Chemical, Microscopic Examination	30%
3	**Hematology** 3.1 Introduction to Haematology 3.2 Normal constituents of Blood, their structure and function 3.3 Collection of Blood samples 3.4 Various Anticoagulants used in Haematology 3.5 Laboratory safety guidelines 3.6 SI units and conventional units in Clinical Pathology Laboratory 3.7 Hb Estimation , PCV, ESR	25%
4	**Blood Bank** 4.1 Introduction of blood banking 4.2 Blood grouping and Rh Types	20%
	Tutorial/ Demonstration 1) Blood Grouping Rh typing	

	2) Hb Estimation 3) Packed Cell Volume [PCV], 4) Erythrocyte Sedimentation rate [ESR] 5) Bleeding Time, Clotting Time 6) Histopathology- Section cutting and H & E Staining [For B.Sc. MLT only]	

REFERENCE BOOKS

- Bancroft : Theory and Practical of Histology techniques
- Textbook of Clinical Blood Banking Science by Zmijewski
- Manual for Clinical Pathology by Sabitry Sanyal
- Practical Pathology by Dr.P.Chakraborty & Gargi Chakraborty
- Haematology for students and practitioners by Ramnik Sood
- Histological techniques by Laxminarayan
- Practical Pathology by Dr. K.Uma Chaturvedi & Tejindersingh

Course Outcome: At the end of the course, Students will be able to:

CO1	Demonstrate basic steps of histopathology including sample receiving, fixation, tissue processing, section cutting, staining and bio-medical waste management
CO2	Explain basic concepts of haematology & routine clinical investigations of Haematology laboratory
CO3	Describe composition of blood and methods of estimating different components of blood
CO4	Perform samples collection, processing, transportation and urine examination
CO5	Explain blood banking and perform blood grouping and Rh typing

24BMT0104 (General Microbiology)

Course Code	24BMT0104	Total Credit	4
Title of Subject	General Microbiology	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- To provide basic knowledge of history & development of microbiology, application of various microscopes, morphology & physiology of bacteria.
- To explain relationships between the microorganisms, infection and immunity
- To introduce various methods as well as instruments for sterilization and disinfection
- To incorporate the concept of different culture media, methods and biochemical tests
- To provide knowledge about hospital acquired infection and biomedical waste management

Course Content

Unit	Description	Weightage
1	**Historical development & microbiology** 1.1 History and Pioneers in Microbiology: Contributions of Antony Van Leeuwenhoek, Louis Pasteur, Joseph Lister, Robert Koch (Koch's Postulates).Nobel prize awarded for research in Microbiology 1.2 Development in medical microbiology & immunology	10%
2	**Microscopy** 2.1 Microscopy: instruments ,Types of microscopic techniques 2.2 Details of Light Microscope (Principles, Techniques & Applications) 2.3 Principle & Application of following microscope: Dark Field Microscopy, Phase contrast Microscopy, Fluorescent Microscopy, Confocal Microscopy & Electron Microscopy	15%
3	**Morphology & Classification** 3.1 Nomenclature and classification of microbes (in brief) 3.2 Size & Shape 3.3 Morphology of bacteria: Structures of a bacterial cell and their functions 3.4 Physiology of Bacteria: Nutrition, Gaseous requirement, temperature requirement and other growth requirements	15%
4	**Immunology** 4.1 Immunity (in brief) 4.2 Infection: Sources of infection, Modes of transmission, Factors predisposing to microbial pathogenicity, Types of infectious diseases 4.3 Types of Vaccine & Immunization schedule	15%

5	**Sterilization and Disinfection** 5.1 Sterilization and Disinfection (in detail) 5.2 Principles and use of equipments of sterilization (Namely Hot Air Oven, Autoclave, Incinerator & Pasteurization) 5.3 Anti septic and disinfectants	15%
6	**General Microbiology** 6.1 Culture media in diagnostic bacteriology 6.2 Culture methods **6.3** Identification of bacteria-biochemical tests 6.4 Antimicrobial sensitivity test	15%
7	**Hospital infection** 7.1 Causative agents, transmission methods 7.2 Prevention and Control Hospital Infection 7.3 Blood Borne Infections 7.4 Principles and practice Biomedical Waste Management	15%
	Tutorial/ Demonstration 1) Compound Microscope 2) Grams stain 3) Acid Fast staining 4) Demonstration and sterilization of equipments- Hot Air oven, Autoclave, Bacterial filters 5) Demonstration of commonly used culture media, culture methods: Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, MacConkey medium, LJ media, Robertson Cooked meat media 6) Visit to hospital for demonstration of Biomedical waste management	

REFERENCE BOOKS

- Ananthanarayana & Panikar's Textbook of Microbiology
- Roberty Cruckshank – Medical Microbiology – The Practice of Medical Microbiology
- Essentials of Medical Microbiology by Apurba S. Sastry & Sandhya Bhat
- Silverton: Introduction to Medical Laboratory Technology

Course Outcome: At the end of the course, Students will be able to:

CO1	Explain history and development of microbiology
CO2	Use and handle various types of microscopes with proper technique and care
CO3	Identify and differentiate various types of bacteria
CO4	Describe the role of immunity against pathogens, types of infection and importance of Immunization
CO5	Select and operate various sterilization and disinfection techniques/instruments used in clinical laboratory
CO6	Select specific culture media, perform different culture methods and biochemical test for isolation and identification of specific microorganisms
CO7	Prevent and control hospital infections and manage biomedical wastes in health care settings
CO8	Perform Antibiotic Sensitivity Test and interpret the results

24BMT0105 (General Biochemistry)

Course Code	24BMT0105	Total Credit	4
Title of Subject	General Biochemistry	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	• To provide basic concepts of routine laboratory investigations and volumetric analysis required of clinical biochemistry laboratory • To sensitize about code of ethics for Medical Laboratory Technician at Health care organizations • To provide fundamental knowledge of different bio-molecules like carbohydrate, protein, lipid, enzymes, vitamins and nucleic acids

Course Content

Unit	Description	Weightage
1	**Introduction, Specimen collection and Handling** 5.3 Introduction to Bio-chemistry including code of ethics for Medical Lab technicians and Medical Lab Organization a) Duties to Patient b) Duties to colleagues and other professionals c) Duties to yourself d) Duties to society **e)** Duties to your profession 1.2 Reception, Registration and Bio-chemical parameters investigated 1.3 Sample Collection and Handling 1.3.1 Types of vials used in blood /specimen collection 1.3.2 Anticoagulants 1.3.3 Preservatives 1.3.4 Blood collection 1.3.5 Processing of samples 1.3.6 Preservation & Disposal of samples 1.4 Biological and chemical hazards: Safety and first aid 1.5 Introduction to laboratory apparatus: 1.5.1 Pipettes – different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes 1.5.2 Burettes, Beakers, Flasks, Funnels, Cuvettes	15%
2	**Units of measurements and Preparation of solutions** 2.1 Conventional and SI units 2.2 Preparation of solutions 2.2.1 Molecular weight, equivalent weight of elements and compounds, Normality, Molarity 2.2.2 Molar solutions, Normal solutions, Percent solutions	10%
3	**Carbohydrates** 3.1 Definition, biological importance, classification, 3.2 Qualitative tests of carbohydrates 3.3 Digestion & Absorption of carbohydrates	15%

4	**Lipids** 4.1 Definition, biological importance, classification, 4.2Acid value, Iodine value, saponification value 4.3 Digestion & Absorption of lipids	15%
5	**Amino acids and Proteins** 5.1 Definition, biological importance, classification 5.2 Qualitative tests of proteins 5.3 Digestion & Absorption of proteins	15%
6	**Vitamins** Classification of Vitamins, Sources, Daily requirements, Deficiency diseases (In Brief)	10%
7	**Enzymes** **7.1** Nature, Classification of Enzymes 7.2 Factors affecting enzyme activity 7.3 Enzyme Inhibition	10%
8	**Nucleic acids- Structure and functional aspects** **8.1** Purine bases, Pyrimidine bases, Nucleosides, Nucleotides 8.2 DNA: Types, Structure & functions 8.3 RNA: Types, Structure & functions	10%
	Tutorial/ Demonstration 1) Reception and registration 2) Collection of Capillary blood & Venous blood 3) Separation of Serum and plasma from blood 4) Laboratory glass ware: Identification, Handling, Care and Maintenance, Uses 5) Lab instruments: Centrifuges, Balances, Photo Electric colorimeter, Spectrophotometer 6) Preparation of Solutions: Percentage solutions, Normal solutions, Molar solutions 7) Qualitative identification tests of sugars 8) Qualitative identification tests of proteins and amino acids	

REFERENCE BOOKS

- Text book of Biochemistry by Satyanarayana
- TEITZ – Clinical chemistry
- Vasudevan (DM) Sreekumari (S) Text book of Biochemistry for Medical students
- Varley – Clinical chemistry
- Kaplan – Clinical chemistry

Course Outcome: At the end of the course, Students will be able to:

CO1	Execute codes of ethics for Medical Laboratory Technologists at respective health care settings
CO2	Collect, process, preserve and dispose various samples used in clinical biochemistry laboratory
CO3	State all the biochemical parameters with its clinical conditions and interpret the diagnostic tests.
CO4	Manage and handle safety, first aid and hazards of the clinical biochemistry laboratory.
CO5	Prepare and handle each reagent and samples used in clinical biochemistry laboratory.
CO6	Describe fundamental concepts of all the bio-molecules like carbohydrates, proteins, lipids, enzyme, vitamins and nucleic acids
CO7	Analyze and interpret qualitative tests of bio-molecules independently.

24BMT0106 (English)

Name of the Institute: CAM Institute of Allied Health Science & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: First year

Course Code	24BMT0106	Total Credit	4
Title of Subject	English	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External *	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	• Develop communication skills in English by training them in handling all the four language skills effectively. The learners will be able to listen, speak, read and write in English adequately so that they could participate in various activities and perform satisfactorily.

Course Content

Unit	Description	Weightage
1	**Reading** Short stories from the text: 1.1 The happy Prince 1.2 A Horseman in the sky 1.3 The Wolves of Cernogratz 1.4 The Mark of Vishnu 1.5 The Trust Property	25%
2	Grammar Part: 2.1 Prefixes / Suffixes 2.2 Phrasal Verbs 2.3 Registers 2.4 Writing paragraphs, developing points / ideas 2.5 Writing resume, Job applications, Leave Application. 2.6 Letters of invitations (inviting / accepting/ declining), 2.7 Letters of complaint to civil authorities 2.8 Connectives 2.9 Concords- Subject-Verb Agreement. 2.10 Homophones and Homonyms 2.11 Reading Comprehension	50%

3	**Ability Enhancement** 3.1 Use various notions and function of everyday usage: 3.1.1 Dialogue Writing 3.1.2 Notions and Function of Language 3.2 Give short formal and informal talks, speeches 3.2.1 Self-Introduction. 3.2.2 Welcome speech. 3.2.3 Vote of thanks. 3.2.4 Describing People / Object / Scene. 3.2.5 Asking questions (Wh'/Interrogative/Choice (Disjunctive)/ Question tags (tail question)) 3.2.6 Expansion of idea. 3.2.7 Discuss topic in Group Discussion.	25%
	There shall be no University Practical Examination. ***External exam will be taken at institute level**	

REFERENCE BOOKS

- Grant Taylor. English Conversation Practice. New Delhi: Tata McGraw Hill
- R.P.Bhatnagar and R.T.Bell (1999) **Communication in English**, Hyderabad: Orient Longma

Course Outcome: At the end of the course, Students will be able to:

CO1	Listen, speak, read, and write in English effectively, enabling to participate in various academic and professional activities proficiently.
CO2	Understand and apply key grammatical concepts enhancing vocabulary and language precision.
CO3	Be proficient in composing structured paragraphs, developing points/ideas, and crafting various types of formal and informal letters
CO4	Enhance their reading comprehension skills, enabling them to understand and interpret a variety of texts accurately and efficiently.
CO5	Practice and perform various everyday communication functions and participate in group discussion

24BMT0107 (Health Care)

Name of the Institute: CAM Institute of Allied Health Science & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: First year

Course Code	24BMT0107	Total Credit	2
Title of Subject	Health Care	Total Hours/Week	2

Examination Scheme

Continuous Assessment (20 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives

- To provide a foundational understanding of health and nursing, covering health definitions, determinants, national policies, and key health programs in India.
- To emphasize nursing principles, patient care techniques, bedside management, and first aid skills, equipping students with essential knowledge and practical abilities for effective healthcare delivery.

Course Content

Unit	Description	Weightage
1	**Introduction to Health** 1.1. Definition of Health 1.2. Determinants of Health 1.3. Health Indicators of India 1.4. Health Team	10%
2	**Health Policy and Programme** 2.1. Concept 2.2. National Health Policy 2.3. National Health programmes (Briefly Objectives and scope) 2.4. Population of India and Family welfare Programme in India	10%
3	**Introduction to law and ethics in health care** 3.1 Medical ethics – Definition – Goal – Scope 3.2 Introduction to Code of conduct 3.3 Basic principles of medical ethics – Confidentiality 3.4 Malpractice and negligence – Rational and irrational drug therapy 3.5 Autonomy and informed consent – Right of patients 3.6 Care of the terminally ill- Euthanasia 3.7 Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC – ownership of medical records – Confidentiality Privilege communication – Release of medical information- Unauthorized disclosure – retention of medical records – other various aspects.	20%

4	**Introduction to Nursing** 4.1 What is Nursing? Nursing principles 4.2 Inter-Personnel relationships 4.3 Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application 4.4 Nursing Position, Bed making, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, Aids and rest and sleep 4.5 Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher	20%
5	**Bed Side Management** 5.1 Giving and taking Bed pan, Urinal 5.2 Observation of stools, urine and sputum 5.3 Understand use and care of catheters, enema giving 5.4 Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion 5.5 Recording of body temperature, respiration and pulse 5.6 Simple aseptic technique: Sterilization and disinfection 5.7 Surgical Dressing: Observation of dressing procedures	20%
6	**First Aid** 6.1 Introduction to first aid: Definition and importance, Legal and Ethical consideration 6.2 Initial assessment and response 6.3 Common first aid procedures: Cardiopulmonary Resuscitation (CPR) Techniques for adults, children, and infants, Choking (Recognition and response), Bleeding and Wound care 6.3 Handling specific emergencies: Burns, Fractures & sprains, poisoning 6.4 Shock management: Recognizing shock and initial treatment	20%

REFERENCE BOOKS

1. Medical Ethics, by C.M. Francis, Jaypee Brothers
2. Current Problems in Medical Ethics, by George V. Lobo, St. Paul's Society, Allahabad.
3. Ethics for doctors, nurses & patients by H.P. Dunn, St. Pauls Bandar, Mumbai

Course Outcome: At the end of the course, Students will be able to:

CO1	Define health, identify its determinants, and assess health indicators specific to India, understanding the roles and functions within a healthcare team.
CO2	Analyze the national health policy and major health programs in India, including family welfare initiatives, and evaluate their objectives and scope.
CO3	Acquire and demonstrate fundamental nursing principles, including patient positioning, bandaging, and safe lifting and transporting techniques, ensuring effective and compassionate care.
CO4	To perform bed side management and aseptic techniques
CO5	To provide basic first aid techniques and respond to emergency situations with essential life-saving skills

Detailed Curriculum
Of
B.Sc.(Hons) Medical Technology
(Medical Laboratory Technology)

Second Year

24BMT0201 (Pathology-I)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0201	Total Credit	4
Title of Subject	Pathology I	Total Hours/Week	4

Examination Scheme				
Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	
	• To explain the basic principles of hematology, blood cells development, maturation and functions of blood • To learn blood collection procedures, anticoagulants, and hemostasis mechanisms. • To train in blood smear preparations, staining, and blood cell morphology interpretation. • To learn Immuno-hematology, principles, blood grouping systems, and cross matching techniques • To introduce histopathology, cytology techniques, and laboratory management concepts.

Course Content

Unit	Description	Weightage
1	**Haematology** **1.1** Hemopoiesis, Stem cells, formed elements and their functions **1.2** Anticoagulants used in various hematological studies **1.3** Routine hematological tests and normal values **1.4** Determination of Hemoglobin and Hematocrit **1.5** Enumeration of RBC, WBC & Platelets 1.**6** Absolute Eosinophil count **1.7** Reticulocyte count **1.8** Calculation of Red cell Indices **1.9** Preparation and staining of blood film for morphology of red cells and differential count. **1.10** Automated Hematology cell counter **1.11** Plasma haptoglobin and demonstration of hemosiderin in urine **1.12** Tests for Autoimmune hemolytic anemia.	30%

2	**Special Hematological tests:** **2.1** Sickling tests **2.2** Osmotic fragility test **2.3** Determination HbF and HbA2 **2.4** Hemoglobin Electrophoresis **2.5** Investigation of G6PD deficiency	20%
3	**Histopathology** **3.1 Instrumentation** **3.1.1** Automated Tissue Processor **3.1.2** Microtome, Microtome-knives, Knife sharpener **3.1.3** Freezing microtome and Cryostat **3.2 Techniques** **3.2.1** Routine paraffin section cutting **3.2.2** Frozen section and Cryostat section studies. **3.3 Mounting techniques:** Various mountants and mounting techniques	25%
4	**4.1 Cytology** **4.1.1** Normal cell structure, functions, cytological criteria of malignancy **4.1.2** Instruments in Cytology **4.1.3** Types of specimens, methods of collection & preparation of cell block **4.1.4** Different fixatives and methods of fixation **4.1.5 Staining :** a) Papanicolaou's stain- Principle, Preparation & Staining techniques b) May Grunwald Giemsa stain c) H & E stain **4.2 Female Genital tract** **4.2.1** Normal cytology **4.2.2** Techniques of collection of specimens for cervical cytology study **4.2.3** Hormonal cytology and cytological indices **4.3 Respiratory tract and Urinary tract** **4.3.1** Normal cytology **4.3.2** Collection of samples, preparation of smears and staining	25%
	Tutorial/ Demonstration 1) Blood Grouping Rh typing 2) Hb Estimation 3) Packed Cell Volume [PCV], 4) Erythrocyte Sedimentation rate [ESR] 5) Bleeding Time, Clotting Time 6) Histopathology- Section cutting and H & E Staining	

REFERENCE BOOKS

- Bancroft : Theory and Practical of Histology techniques
- Textbook of Clinical Blood Banking Science by Zmijewski
- Manual for Clinical Pathology by Sabitry Sanyal
- Practical Pathology by Dr.P.Chakraborty & Gargi Chakraborty
- Haematology for students and practitioners by Ramnik Sood
- Histological techniques by K.Laxminarayan
- Practical Pathology by Dr. K.Uma Chaturvedi & Tejindersingh
- Text book of Medical Laboratory Technology by P. B. Godker

Course Outcome: At the end of the course, Students will be able to:

CO1	Demonstrate comprehensive knowledge of hematology principles, including blood cell development, maturation, and the functions of blood constituents.
CO2	Perform proficiently in blood collection procedures, utilizing appropriate anticoagulants, and understanding mechanisms of hemostasis and coagulation profile tests.
CO3	Apply skills in preparing and analyzing blood smears, interpreting blood cell morphology in normal and disease states, and correlating findings with appropriate laboratory values.
CO4	Execute Immunohematology techniques effectively, including blood grouping and cross-matching procedures, to ensure accurate clinical transfusion practices.
CO5	Utilize fundamental techniques in histopathology and cytology, and integrate management concepts to optimize efficiency in medical laboratory technology settings.

24BMT0202 (Pathology practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0202	Total Credit	2
Title of Subject	Pathology Practical	Total Hours/Week	2

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives

- To develop skills as well as learn techniques to measure, count or analyze various blood cells and interpret the results.
- To develop the proficiency in basic hematological, immunohematological, histopathological and cytological techniques

Course Content

Sr. No	Description	Weightage
•	**Principle, Techniques, reference range result interpretation, clinical significance of all the below laboratory tests**	
1	Determination of Haemoglobin	08%
2	Determination of Hematocrit	08%
3	Red blood cell count	08%
4	Total white blood cell count	08%
5	Platelet count	08%
6	Differential count of white blood cells	08%
7	Absolute Eosinophil count	07%
8	Reticulocyte count	07%
9	Bleeding time & Clotting time	08%
10	Paraffin section cutting	06%

11	Staining by Hematoxylin & Eosin and Papanicolaou (PAP) stain	08%
12	ABO blood grouping & Rh typing	08%
13	Major and Minor Cross match	08%

REFERENCE BOOKS

- Bancroft : Theory and Practical of Histology techniques
- Textbook of Clinical Blood Banking Science by Zmijewski
- Manual for Clinical Pathology by Sabitry Sanyal
- Practical Pathology by Dr.P.Chakraborty & Gargi Chakraborty
- Haematology for students and practitioners by Ramnik Sood
- Histological techniques by K.Laxminarayan
- Practical Pathology by Dr. K.Uma Chaturvedi & Tejindersingh
- Text book of Medical Laboratory Technology by P. B. Godkar

Course Outcome: At the end of the course, Students will be able to:

CO1	Develop proficiency in routine hematological tests and interpretation of the laboratory test results.
CO2	Exhibit proficiency in histopathological and cytological techniques, including tissue sectioning and staining, for effective microscopic examination and diagnosis.
CO3	Perform immunohematological tests proficiently, including blood grouping and cross-matching, ensuring accurate transfusion practices.

24BMT0203 (Microbiology-I)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0203	Total Credit	4
Title of Subject	Microbiology- I	Total Hours/Week	4

Examination Scheme				
Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	
	• Develop a comprehensive understanding of antigens, immunoglobulins, the complement system, and antigen-antibody reactions • Acquire knowledge of bacterial genetic material, including extrachromosomal elements and the genetic mechanisms behind drug resistance. • Understand the morphology, classification, and laboratory diagnosis of fungi, focusing on diseases caused by opportunistic, superficial, subcutaneous, and systemic mycoses. • Gain an understanding of the morphology, life cycles, and diseases caused by key protozoan and helminthic parasites.

Course Content

Unit	Description	Weightage
1	**Immunology** 1.1. Antigens 1.2. Immunoglobulins a. Complement System b. Structure & Function of Immune system (Including Monoclonal Antibody) 1.3. Antigen and antibody reactions 1.4. General Features of antigen-antibody reaction a. Precipitation, Agglutination 1.5. Neutralization, Opsonization 1.6. Immunofluorescence, RIA, EIA 1.7. Western Blot 1.8. Immunochromatography	25%
2	**Bacterial genetics** 2.1 Structure & functions of genetic material 2.2 Extrachromosomal genetic elements 2.3 Genotypic & Phenotypic variation 2.4 Genetics mechanism of drug resistance in bacteria	30%

3	**Mycology** 3.1 The morphology and reproduction in fungi 3.2 Classification of fungi 3.3 Morphology, diseases caused and lab diagnosis of:- 3.4 Opportunistic fungi- Cryptococcus, Candidiasis, Aspergillus, Zygomycetes 3.5 Fungi causing superficial mycoses- Dermatophytes, Tinea Nigra 3.6 Subcutaneous mycoses- Mycetoma 3.7 Systemic Mycosis	25%
4	**Parasitology** **4.1 Protozoology-** *4.1.1 Entamoeba histolytica* *4.1.2 Giardia* *4.1.3 Toxoplasma* *4.1.4* Malaria *4.1.5 Leishmania* *4.1.6 Trichomonas* **4.2 Helminthology** 4.2.1 Cestodes - *Taenia, E. granulosus, D.latum, H.nana* 4.2.2 Trematodes – *Schistosoma Fasciola* 4.2.3 Nematodes – *Ascaris*, *Ancyclostoma duodenale, Strongyloides, Trichuris, Trichinella*, Filarial worms	20%

REFERENCE BOOKS

1. Text book of microbiology: Ananth Narayana & Panikar's
2. Text book of microbiology: Chakraborty
3. Microbiology: Prescott, Harly and Klein's
4. Parasitology: K.D. Chatterjee
5. Medical Lab. manual for Tropical countries: Monica Chessbrough
6. Practical Medical Microbiology: Mackey & Mac Cartney

Course Outcome: At the end of the course, Students will be able to:

CO1	Explain the structure and functions of antigens, immunoglobulins, and the complement system, including their roles in antigen-antibody reactions.
CO2	Describe the genetic mechanisms of bacterial drug resistance and the role of extrachromosomal elements in bacterial genetics.
CO3	Identify the morphology, classification, and laboratory diagnostic techniques for fungi, including diseases caused by opportunistic, superficial, subcutaneous, and systemic mycoses.
CO4	Describe the morphology, life cycles, and diseases caused by key protozoan and helminthic parasites, and demonstrate proficiency in their laboratory diagnosis.

24BMT0204 (Microbiology practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0204	Total Credit	2
Title of Subject	Microbiology Practical	Total Hours/Week	2

Examination Scheme				
Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives	• Understand and perform Gram staining and acid-fast staining techniques for bacterial identification. • Learn and apply various sterilization methods, including autoclaving, dry heat, filtration, and chemical sterilization, to ensure aseptic conditions in the laboratory. • Acquire the skills to prepare different types of culture media for the growth and identification of microorganisms. • Develop proficiency in inoculating, incubating, and isolating microorganisms using various culture techniques such as streak plate, pour plate, and broth cultures. • Learn stool examination techniques for detecting parasitic eggs and cysts with saline and iodine mounts, and apply concentration methods to improve detection.

Course Content

Unit	Description	Weightage
1	**General Microbiology:** • Staining: Gram's, Acid fast • Sterilization methods • Media preparation • Culture methods •	40%
2	**Parasitology**: Stool examination for parasitic eggs/cysts • Saline mount • Iodine mount • Concentration methods	30%
3	**Mycology:** • Slide culture technique • KOH mount • Identification of fungal cultures: Colony characteristics & Microscopic examination of Candida, *Aspergillus Species*	30%

REFERENCE BOOKS

1. Text book of microbiology: Ananthnarayana & Paniker's
2. Text book of microbiology: Chakraborty
3. Microbiology: Prescott, Harly and klein's
4. Parasitology: K.D. Chatterjee
5. Medical Lab. manual for Tropical countries: Monica Chessbrough
6. Practical Medical Microbiology: Mackey & Mac Cartney

Course Outcome: At the end of the course, Students will be able to:

CO1	Perform Gram staining and acid-fast staining techniques to accurately identify and differentiate bacterial species.
CO2	Apply various sterilization methods, including autoclave, dry heat, filtration, and chemical sterilization, to maintain aseptic conditions in the laboratory.
CO3	Prepare different types of culture media to support the growth and identification of various microorganisms.
CO4	Demonstrate proficiency in inoculating, incubating, and isolating microorganisms using techniques such as streak plate, pour plate, and broth cultures.
CO5	Execute stool examination techniques for detecting parasitic eggs and cysts using saline and iodine mounts, and utilize concentration methods to enhance detection accuracy.

24BMT0205 (Biochemistry-I)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0205	Total Credit	4
Title of Subject	Biochemistry I	Total Hours/Week	4

Examination Scheme				
Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	• To provide comprehensive theoretical understanding and practical proficiency in essential instrumentation techniques such as colorimetry, spectrophotometry, and pH meter operation. • To explore key metabolic pathways including carbohydrate and lipid metabolism, and develop a thorough grasp of protein digestion, metabolism, and nucleic acid processes such as replication and translation. • To examine the biochemical roles of minerals and vitamins, equipping students with foundational knowledge applicable to scientific research and clinical diagnostics.

Course Content

Unit	Description	Weightage
1	**Basic Instrumentation:** 1.1.Colorimetry: Photoelectric methods, instrumentation, principles and laws involved, Operation, maintenance, applications. 1.2.Spectrophotometry: Principle, types and applications 1.3.Weighing balance: Different types of balances used, care and maintenance 1.4.pH meter- Principle, Use, care and maintenance and electrodes 1.5.Basic laboratory operations like –Separation of solids from liquids, 1.6.Centrifugation: Principle, Different types of Centrifuges, care and maintenance, applications 1.7.Filtration using funnel	13%
2	**Carbohydrates** 2.1. Digestion & Absorption of Carbohydrates 2.2. Carbohydrate Metabolism (Major metabolic pathways and its importance and regulation) : a) Glycolysis b) TCA cycle c) Gluconeogenesis	13%

	d) Glycogen Metabolism e) HMP Shunt Pathway f) Galactose Metabolism g) Fructose Metabolism h) Amino sugars Metabolism	
3	**Lipids** 3.1 Digestion & Absorption of Lipids 3.2 Fatty acid oxidation 3.3 Fatty acid synthesis 3.4 Metabolism of Phospholipid 3.5 Cholesterol metabolism	12%
4	**Proteins** 4.1 Digestion & Absorption of Proteins 4.2 Protein metabolism : Transamination, Deamination, Decarboxylation of amino acid 4.3 Formation of ammonia, Detoxification of ammonia 4.4 Urea cycle & disorders (Hepatic Coma) 4.5 Special products formed from amino acids- in brief (**Glycine**-Heme, Purines, Glutathione, **Serine**-Choline, **Glutamic acid**-GABA, **Tyrosine**- Melanin, Epinephrine, non-epinephrine, Dopamine, **Tryptophan**- Serotonin and **Histidine**- Histamines	13%
5	**Nucleic acids** 5.1 Replication 5.2 Transcription 5.3 Translation	12%
6	**Vitamins & Minerals** 6.1 Minerals: Calcium, Iron, Phosphorus, Iodine, Sodium & Potassium 6.2 Vitamins: Water soluble and Fat-soluble vitamins	13%
7	**Biophysics** 7.1 Viscosity, Surface tension, Colloids, Osmotic pressure	12%
8	**Water & Electrolyte Balance** 8.1 Water Balance & Electrolyte 8.2 Blood Buffers 8.3 Acid Base balance & disorders	12%

REFERENCE BOOKS

- Text book of Biochemistry by Satyanarayana
- TEITZ – Clinical chemistry
- Vasudevan (DM) Sreekumari (S) Text book of Biochemistry for Medical students
- Varley – Clinical chemistry
- Kaplan – Clinical chemistry

Course Outcome: At the end of the course, Students will be able to:

CO1	Gain theoretical understanding and practical proficiency in colorimetry, spectrophotometry, and pH meter operation for biochemical analysis.
CO2	Acquire a deep understanding of critical pathways involved in carbohydrate and lipid metabolism, along with comprehensive knowledge of protein digestion, metabolism, and nucleic acid processes such as replication and translation.
CO3	Analyze the roles of minerals and vitamins in biochemical processes, applying this knowledge to scientific research and clinical diagnostics.

24BMT0206 (Biochemistry practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BMT0206	Total Credit	2
Title of Subject	Biochemistry Practical	Total Hours/Week	2

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives

- Identify and perform qualitative tests for carbohydrates and proteins.
- Perform quantitative estimation of blood glucose and blood urea
- Perform biochemical analysis of biological fluids like urine, CSF, bile
- Perform hydrolysis of starch to understand their breakdown process

Course Content

Sr. No	Description	Weightage
1	Qualitative analysis and identification of carbohydrates (Glucose, Fructose, Lactose, Maltose, Starch, Dextrin, Sucrose)	15%
2	Qualitative analysis and identification of Proteins A) Color reactions of proteins B) Precipitation reactions of proteins	15%
3	Quantitative estimation of Blood Sugar-Glucose by GOD-POD method	10%
4	Quantitative estimation of Blood Urea by DAMO method	10%
5	Biochemical analysis of CSF	10%
6	Biochemical analysis of Bile	10%
7	Biochemical analysis of Normal Urine (Physiological Urine)	10%
8	Biochemical analysis of Abnormal Urine(Pathological Urine)	15%
9	Acid hydrolysis and Enzyme hydrolysis of Starch	05%

REFERENCE BOOKS

1. Clinical guide to lab test : M.M. Tietz
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Practical Clinical Biochemistry by Harold Varley
5. Principal of Biochemistry by M. A. Siddiqi
6. Principal of Biochemistry by Lehninger

Course Outcome: At the end of the course, Students will be able to:

CO1	Successfully identify and differentiate carbohydrates and proteins using qualitative chemical tests.
CO2	Accurately quantify blood glucose and blood urea levels by using established enzymatic methods
CO3	Perform comprehensive biochemical analyses of CSF, bile, and urine samples, distinguishing between normal and abnormal biochemical profiles.
CO4	Demonstrate the processes of acid and enzyme hydrolysis of starch and their practical applications in biochemical analysis

24BSC0201 (Basics of Research Methodology)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Second year

Course Code	24BSC0201	Total Credit	2
Title of Subject	Basics of Research Methodology	Total Hours/Week	2

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
10	05	05	40	60

Course Objectives

- Understand the fundamental concepts and significance of research in Medical Technology.
- Learn about different types of research designs and methodologies.
- Gain knowledge on various data collection techniques and tools.
- Understand basic statistical concepts and data analysis techniques.
- Learn about ethical issues and guidelines in research.
- Develop skills in writing research proposals, reports, and scientific papers.
- Apply research methodology concepts in designing and conducting a small-scale research project.

Course Content

Unit	Description	Weightage
1	**Introduction to Research :** 1.1 Definition and purpose of research 1.2 Types of research: Basic, Applied, Clinical, and Translational 1.3 Importance of research in medical technology 1.4 The research process: Steps from idea to publication	15%
2	**Research Design**: 2.1 Types of research designs: Descriptive, Analytical, Experimental, Quasi-experimental 2.2 Qualitative vs Quantitative research 2.3 Cross-sectional and Longitudinal studies	20%
3	**Data Collection (in brief)** 3.1 Primary vs Secondary data 3.2 Data collection methods: Surveys, Interviews, Observations, Questionnaires 3.3 Tools for data collection: Designing surveys and questionnaires	15%
4	**Data Analysis (in brief)** 4.1 Introduction to statistical concepts: Mean, Median, Mode, Standard Deviation 4.2 Data analysis techniques: Descriptive and Inferential statistics 4.3 Interpreting and presenting data: Tables, Graphs, Charts	20%

5	**Ethical Considerations in Research** 5.1 Importance of ethics in research 5.2 Informed consent and confidentiality 5.3 Plagiarism and Research misconduct	15%
6	**Research Writing** 6.1 Structure of a research proposal: Title, Abstract, Introduction, Methodology, Results, Discussion, Conclusion, References 6.2 Referencing styles: APA, MLA, Chicago, Vancouver 6.3 Presenting research findings: Oral and Poster presentations 6.4 Writing research reports and scientific papers	15%

REFERENCE BOOKS

- "Research Methodology: A Step-by-Step Guide for Beginners" by Ranjit Kumar
- "The Practice of Research in Health Care" by Hugh McLaughlin
- "Biostatistics: A Foundation for Analysis in the Health Sciences" by Wayne W. Daniel
- Articles from relevant medical and scientific journals

Course Outcome: At the end of the course, Students will be able to:

CO1	Apply the basic principles of research methodology in the field of Medical Technology
CO2	Design a small research project in the respective field
CO3	Effectively communicate the research findings

Detailed Curriculum
Of
B.Sc.(Honours) Medical Technology
(Medical Laboratory Technology)

Third Year

24BMT0301 (Pathology II)
Hematology & Blood banking

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0301	Total Credit	4
Title of Subject	Pathology II (Hematology & Blood banking)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- To develop a comprehensive understanding of the pathophysiology, clinical manifestations, laboratory diagnostic techniques, and therapeutic management strategies of various anemia and leukemia.
- To understand the mechanisms of normal hemostasis, the coagulation cascade, and fibrinolysis, and gain proficiency in performing and interpreting essential coagulation assays crucial for clinical practice.
- To study the principles of blood group systems (ABO and Rh), transfusion practices, including donor selection and compatibility testing methods, and the management of transfusion reactions and hemolytic disease of the newborn.
- To study quality control principles in hematology and immuno-hematology tests, strategies for ongoing laboratory improvement, and challenges and future directions for maintaining high standards.

Course Content

Unit	Description	Weightage
1	**Hematology** **Anemias :** 1.1 Definition & Classification of anemia 1.2 Pathophysiology, Clinical manifestation, laboratory diagnosis, management & treatment of : a) Iron Deficiency Anemia b) Megaloblastic Anemia c) Hemolytic Anemia	20%
2	**Leukemias :** 2.1 Definition & Classification of leukemia 2.2 Pathophysiology, Clinical manifestation, laboratory diagnosis, management & treatment of : a) Acute Leukemias: Acute Lymphocytic Leukemia & Acute Myeloid Leukemia b) Chronic Leukemias: Chronic Lymphocytic Leukemia & Chronic Myeloid Leukemia	20%

3	**3.1 Hemostasis & Coagulation:** a) Normal hemostasis b) Mechanism of blood coagulation c) Normal fibrinolytic system **3.2 Assay of clotting factors:** a) Collection of blood and selection of anticoagulant for coagulation study b) Bleeding Time, Clotting time, whole blood coagulation time c) Thrombin Time & Prothrombin Time (PT) d) Partial Thromboplastin Time (PTT & APTT) e) Plasma Fibrinogen f) Fibrin Degradation Product (FDP) g) D-Dimer Demonstration of LE cells	20%
4	**Immuno-hematology (Blood Banking)** **4.1** ABO Blood group and Rh system 4.2 Subgroups of A and B , Other blood groups and Bombay group **4.3** Cross matching 4.4 Principles of Blood transfusion a) Blood donor selection b) Methods of bleeding donors c) Blood containers, anticoagulants and storage of blood d) Coomb's test and its significance e) Screening of blood for infective material f) Blood components, preparation & component therapy g) Autologous Blood transfusion h) Transfusion reactions i) Hemolytic Disease of Newborn 4.5 Blood Bank organization, Standards, Procedures, Techniques	20%
5	Quality control in hematology & immunohematology: • Introduction to quality control • principles and process of quality control in specific hematology& immunohematology tests, • Quality improvement strategies, • Challenges & future directions in quality control	20%

REFERENCE BOOKS

1. Clinical hematology: Wintrobe's
2. De-Gruchy's Clinical hematology in medical practice: Franki
3. Textbook of Medical Laboratory Technology by Praful B. Godkar
4. Practical hematology: Dacie & Lewis
5. Blood banking and transfusion medicine: Makroo
6. Hematology for students and practitioners: Dr. Ramnik Sood
7. Clinical Diagnosis and management by laboratory methods: John Bernard Henry (20th Edi.)

Course Outcome: At the end of the course, Students will be able to:

CO1	Demonstrate a thorough understanding of the pathophysiology, clinical manifestations, diagnostic techniques, and treatment strategies for various types of anemia and leukemia.
CO2	Gain proficiency in performing and interpreting essential coagulation assays, demonstrating competence in applying knowledge of normal hemostasis, the coagulation cascade, and fibrinolysis to clinical scenarios.
CO3	Explain the principles of ABO and Rh blood group systems, transfusion practices, including donor selection, compatibility testing, and the management of transfusion reactions and hemolytic disease of the newborn.
CO4	Apply quality control principles effectively in hematology and immuno-hematology tests, implement strategies for continuous laboratory improvement, and analyze challenges and future directions for maintaining high standards in diagnostic testing.

24BMT0302 (Pathology III)
Clinical Pathology, Histopathology & Cytology

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0302	Total Credit	4
Title of Subject	Pathology III (Clinical Pathology, Histopathology & Cytology)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	To equip students with comprehensive knowledge and practical skills in clinical pathology, covering body fluid and bone marrow examinations, histopathological and cytological techniques, record maintenance, automation, quality control, and basics of cytogenetics, enabling precise diagnostic evaluations in clinical and laboratory settings.

Course Content

Unit	Description	Weightage
1	**Clinical Pathology** 1.1 Complete examination of all body fluids: Urine, Peritoneal fluids, Pericardial fluids, Synovial fluid, Cerebro-Spinal Fluid (CSF), Ascitic fluid, Seminal fluid, Vaginal fluid 1.2 Complete examination of Stool 1.3 Bone marrow Examination: a) Needle aspiration and surgical biopsy technique b) Preparation and staining of smears for bone marrow examination	25%
2	**Histopathology** **2.1** Staining techniques: Special stains for Carbohydrates, Connective tissue, Nervous tissue, Bone tissue, Collage fibers, Elastic Fibers, Lipids, Organisms, Fungi, Parasites, Pigments and deposits in tissues **2.2** Immunohistochemistry (IHC) 2.3 Maintenance of records and filing of slides in histopathology 2.4 Application of computers in Pathology and histopathology **2.5** Automation in Histopathology 2.6 Quality Control in histopathology	25%
3	**Cytology** **3.1 Female Genital tract** a) Cervical cytology screening for malignant and non-malignant conditions b) Radiation changes & follow up.	25%

	3.2 CSF and Effusions a) Cytology of CSF in inflammatory, nonmalignant & malignant conditions b) Cytology of effusions in nonmalignant and malignant conditions **3.3 Glands – Breast, Thyroid and Lymph nodes:** Fine needle aspiration cytology of glands and other soft tissue mass	
4	**Cytogenetics** **4.1** Introduction to cytogenetics, terminology, classification and nomenclature of human chromosomes **4.2** Sex chromatin identification	25%

REFERENCE BOOKS

1. Clinical hematology: Wintrobe's
2. De-Gruchy's Clinical hematology in medical practice: Franki
3. Textbook of Medical Laboratory Technology by Praful B. Godkar
4. Practical hematology: Dacie & Lewis
5. Blood banking and transfusion medicine: Makroo
6. Hematology for students and practitioners: Dr. Ramnik Sood
7. Clinical Diagnosis and management by laboratory methods: John Bernard Henry (20th Edi.)

Course Outcome: At the end of the course, Students will be able to:

CO1	Demonstrate expertise in performing comprehensive examinations of body fluids, bone marrow, and various histopathological and cytological techniques, ensuring accurate and reliable diagnostic results.
CO2	Effectively apply advanced diagnostic methods, including special staining techniques and immunohistochemistry, to identify various pathological conditions.
CO3	Be proficient in maintaining accurate records, utilizing automation in pathology, and implementing quality control measures to enhance the reliability of laboratory results.
CO4	Understand and apply basic cytogenetic principles, including chromosome classification and sex chromatin identification, contributing to genetic diagnostics and research.
CO5	Adeptly use computer applications in pathology and histopathology, enhancing their operational efficiency and accuracy in diagnostic evaluations.

24BMT0303 (Pathology Practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0303	Total Credit	4
Title of Subject	Pathology Practical	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives	Equip students with hands-on expertise in essential diagnostic techniques across hematology, blood banking, clinical pathology, histopathology, and cytology to ensure precise and accurate diagnostic procedures and high standards of patient care and laboratory practice.

Course Content

Unit	Description	Weightage
1	**HEMATOLOGY** a) RBC count b) WBC count c) Platelet Count d) P.C.V e) Blood Indices f) ESR g) Differential WBC count h) Peripheral Smear Examination i) Sickling Tests j) Hb. Electrophoresis	25%
2	**BLOOD BANKING** a) Cross Match Test b) Coomb's Test: • Control & Cell preparation • Direct Coomb's Test • Indirect Coomb's Test c) Du Test d) Anti D Titer e) Screening of Donor's blood for infective agents like HIV, Hepatitis B, Syphilis, Malaria f) Transfusion reaction works up g) Preparation/Separation of blood component	25%

3	**CLINICAL PATHOLOGY** Routine & Microscopic examination of: a) Urine b) CSF c) Pleural Fluid d) Ascitic Fluid e) Synovial Fluid f) Stool	25%
4	**HISTOPATHOLOGY & CYTOLOGY** a) Hematoxylin & Eosin stain b) PAS & Other special stain c) Papanicolaou's stain d) May Grunwald Giemsa staining e) Tissue Processing f) Block Making	25%

REFERENCE BOOKS

1. Clinical hematology: Wintrobe's
2. De-Gruchy's Clinical hematology in medical practice: Franki
3. Textbook of Medical Laboratory Technology by Praful B. Godkar
4. Practical hematology: Dacie & Lewis
5. Blood banking and transfusion medicine: Makroo
6. Hematology for students and practitioners: Dr. Ramnik Sood
7. Clinical Diagnosis and management by laboratory methods: John Bernard Henry (20th Edi.)

Course Outcome: At the end of the course, Students will be able to:

CO1	Perform and interpret routine hematological tests accurately
CO2	Conduct all the routine tests performed at blood bank, manage transfusion reactions, and prepare/separate blood components effectively
CO3	Perform routine and microscopic examinations of all the body fluids received in the clinical pathology laboratory with precision
CO4	Apply staining techniques, perform tissue processing, and create accurate histopathological and cytological specimens, ensuring thorough diagnostic analysis.

24BMT0304 (Microbiology II)
(Immunology & Systemic Bacteriology)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0304	Total Credit	4
Title of Subject	Microbiology- II (IMMUNOLOGY & SYSTEMIC BACTERIOLOGY)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- To introduce immunology, describe immune system and immune responses
- To explain the classification and mechanisms of autoimmune disorders and immunodeficiency diseases
- To explain various hypersensitivity reactions, Graft reaction and Tumor immunology
- To learn morphology, identification and pathogenesis of gram positive, gram negative, spirochetes and mycobacterium

Course Content

Unit	Description	Weightage
1	**IMMUNOLOGY** **Immune System** 1.1 Major Histocompatibility Complex 1.2 Immune Response: **(a)** Humoral Immune response, Primary & secondary immune response, Fate of antigen in tissue, Production of antibodies **(b)** Cellular Immune Response: Scope of CMI, Indication of CMI & Cytokines 1.3 Immunological tolerance	15%
2	**Hypersensitivity Reactions, Auto-immunity & Immunodeficiency disease** 2.1 Hypersensitivity: Classification and Immunological basis 2.2 Auto-immunity: Mechanisms and classification of auto immune disorders 2.3 Immunodeficiency Diseases: Immunological basis of Primary and secondary immunodeficiency Diseases	15%
3	**Basic of Tumor & Transplantation Immunology** 3.1 Classification of transplants, 3.2 Allograft reaction, Graft-vs-host reaction 3.3 Tumor immunology: Tumor antigens, immunological surveillance	15%

4	**SYSTEMIC BACTERIOLOGY** **Gram Positive Bacteria** (Classification, Morphology, Culture characteristics, Pathogenesis, Disease caused, Laboratory Diagnosis & Prophylaxis) 4.1 Staphylococcus 4.2 Streptococcus 4.3 Pneumococcus 4.4 Corynebacteria 4.5 Clostridia	15%
5	**Gram Negative Bacteria** (Classification, Morphology, Culture characteristics, Pathogenesis, Disease caused, Laboratory Diagnosis & Prophylaxis) 5.1 Enterobacteriaceae (E.coli, Klebsiella, Proteus, Salmonella, Shigella) 5.2 Neisseria 5.3 Vibrio 5.4 Pseudomonas 5.5 Brucella 5.6 Haemophilus	15%
6	**Spirochaetes** 6.1 Treponema 6.2 Leptospira	10%
7	**Mycobacteria** 7.1 M. Tuberculosis 7.2 M. leprae 7.3 Atypical Mycobacteria	15%

REFERENCE BOOKS

1. Text book of microbiology: Ananth Narayana & Panikar's
2. Text book of microbiology: Chakraborty
3. Microbiology: Prescott, Harly and Klein's
4. Parasitology: K.D. Chatterjee
5. Medical Lab. manual for Tropical countries: Monica Chessbrough
6. Practical Medical Microbiology: Mackey & Mac Cartney
7. Textbook of Medical Laboratory Technology by Praful B. Godkar

Course Outcome: At the end of the course, Students will be able to:

CO1	Explain the immune system and its responses, including major histocompatibility complex and immune responses.
CO2	Explain the classification and mechanisms of autoimmune disorders and immunodeficiency diseases
CO3	Describe hypersensitivity reactions, graft-versus-host reactions, and tumor immunology
CO4	Identify and describe the morphology, culture characteristics, and pathogenesis of gram-positive and gram-negative bacteria.
CO5	Explain and diagnose the pathogenesis of spirochetes and mycobacteria.

24BMT0305 (Microbiology III)
(Virology & Applied Microbiology)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0305	Total Credit	4
Title of Subject	Microbiology- III (VIROLOGY AND APPLIED MICROBIOLOGY)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- Understand the general properties, morphology, cultivation, and pathogenesis of viruses, virioids, and prions.
- Study the laboratory diagnosis of viral infections, respiratory infections, urinary tract infections, sexually transmitted infections, septicemia, and food poisoning.
- Understand hospital-acquired infections, hospital waste management practices, and automation in microbiology laboratories.
- Introduce the concepts of bioterrorism and the bacteriology of water, milk, and air.

Course Content

Unit	Description	Weightage
1	**Virology** **1.1** General properties of virus **1.2** Lytic Cycle and Lysogeny, One step Growth curve **1.3** Cultivation of viruses **1.4** Cytopathic effect **1.5** Classification of Virus, Vrioids & Prions	25%
2	**Morphology, Cultivation, Pathogenesis, Clinical Feature, Lab. Diagnosis & Prophylaxis of Following Viruses:** a) Herpes virus b) Adenovirus c) Polio virus d) Influenza virus e) Mumps, Measles & Rubella f) Rabies Virus g) Dengue virus h) Hepatitis viruses i) Oncogenic viruses j) Human Immunodeficiency Virus (HIV) k) ARBO virus l) Rotavirus	25%

3	**APPLIED MICROBI0LOGY** **Clinical Microbiology applied to Tropical Medicine and Recent advances:** 3.1 Etiology and Laboratory diagnosis of : a) Respiratory infections b) Urinary tract infections c) Pyrexia of unknown origin d) Meningitis e) Septicemia f) Diarrheal diseases g) food poisoning h) STI 3.2 Prevention and Control of Hospital acquired infections **3.3** Immunoprophylaxis: Newer vaccines 3.4 Principal and Practice of Hospital waste disposal 3.5 Automation in Microbiology 3.6 Bacteriology of Water, Milk and Air. 3.7 Bio-terrorism	25%
4	**Emerging and Re-emerging Infectious disease** 4.1 Re – Emerging and Resurging disease 4.2 Factors responsible for emergence and re-emergence of infectious disease.	25%

REFERENCE BOOKS

1. Text book of microbiology: Ananth Narayana & Panikar's
2. Text book of microbiology: Chakraborty
3. Microbiology: Prescott, Harly and Klein's
4. Parasitology: K.D. Chatterjee
5. Medical Lab. manual for Tropical countries: Monica Chessbrough
6. Practical Medical Microbiology: Mackey & Mac Cartney
7. Textbook of Medical Laboratory Technology by Praful B. Godkar

Course Outcome: At the end of the course, Students will be able to:

CO1	Explain the properties, morphology, cultivation, and pathogenesis of viruses, virioids, and prions.
CO2	Demonstrate the ability to diagnose viral infections, respiratory infections, urinary tract infections, sexually transmitted infections, septicemia, and food poisoning through laboratory techniques.
CO3	Apply practices for managing hospital-acquired infections, hospital waste, and automation in microbiology laboratories.
CO4	Be familiar with the concepts of bio-terrorism and the bacteriology of water, milk, and air, enabling them to address public health concerns related to these areas.

24BMT0306 (Microbiology Practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0306	Total Credit	4
Title of Subject	Microbiology Practical	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- Perform and interpret bacteriological techniques, including staining methods, culture, biochemical reactions, and antibiotic sensitivity testing, to accurately identify and assess the antibiotic susceptibility of gram-negative and gram-positive bacteria.
- Develop proficiency in conducting and interpreting serological tests, including specimen collection, principles, methods, procedures, normal values, and interpretation, while understanding the limitations of tests such as Widal, ASO, CRP, RPR/VDRL/TRUST, RA, ELISA for HBsAg/p24 Ag, anti-HIV antibody detection, and rapid tests for Malaria, Typhoid, AIDS, and Hepatitis.

Course Content

Unit	Description	Weightage
1	**BACTERIOLOGY** **1.1** Staining: a) Gram's staining b) ZN staining c) Alberts staining **1.2** Hanging drop preparation (Motility of Bacteria) **1.3** Culture methods of Bacteria **1.4** Biochemical reactions of Gram Negative and Gram-positive Bacteria	30%
2	**2.1** Identification of bacterial culture a) Colony characteristics b) Morphological characteristics c) Motility study **d)** Interpretation of Biochemical reactions **2.2** Antibiotic sensitivity testing- Kirby Bauer method	40%

3	**Applied Bacteriology :** Immunology (Serological Tests) Specimen collection, Principle, Methods, Normal values, Significant titer, interpretation and Limitation of the following tests: a) Widal (Slide and Tube) b) ASO c) CRP d) RPR/VDRL/TRUST e) RA f) ELISA for detection of HBsAg /p 24 Ag. & anti-HIV antibody detection g) Rapid test for detection of Malaria, Typhoid, AIDS and Hepatitis	30%

REFERENCE BOOKS

1. Medical Lab. manual for Tropical countries: Monica Chessbrough
2. Practical Medical Microbiology: Mackey & Mac Cartney
3. Textbook of Medical Laboratory Technology by Praful B. Godkar

Course Outcome: At the end of the course, Students will be able to:

CO1	Analyze and interpret bacteriological techniques, including staining methods, culture, biochemical reactions
CO2	Accurately identify and assess the antibiotic susceptibility of gram-negative and gram-positive bacteria.
CO3	Independently perform and interpret serological tests of applied bacteriology

24BMT0307 (Biochemistry II)
(General Biochemistry)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0307	Total Credit	4
Title of Subject	Biochemistry II (General Biochemistry)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- Acquire comprehensive knowledge of cellular structure, organelles, and membrane transport systems, alongside mastering analytical techniques such as chromatography, flame photometry, electrophoresis, and immunoassays for clinical applications
- Describe the mechanism of xenobiotic and antioxidants with their clinical utility.
- Understand metabolic pathways, hormone functions, nutritional principles, the calculation and implications of Basal Metabolic Rate (BMR), and the fundamentals of genetics and inheritance patterns to diagnose and manage related disorders effectively.

Course Content

Unit	Description	Weightage
1	**Cell Biology** **1.1** Nucleus **1.2** Golgi Apparatus **1.3** Mitochondria **1.4** Structure of plasma membrane **1.5** Transport mechanism: Active transport, passive diffusion, facilitated transport, Transport system: uniport, symport, antiport, cotransport, proton pump, transport of macromolecules	15%
2	**Instrumentation** **2.1** Chromatography 2.2 Electrophoresis 2.3 Flame photometry 2.4 Fluorimetry **2.5** Autoanalyzer, electrolyte analyzer, Gas analyzer **2.6** RIA, Radioactive Isotopes 2.7 ELISA 2.8 Chemi luminance	20%
3	**Nucleotides** **3.1** Metabolism of Purine & Gout **3.2** Metabolism of Pyrimidines	10%

4	**Hormones** **4.1** Classification of Hormones **4.2** Hypothalamic Hormones **4.3** Anterior Pituitary Hormones **4.4** Posterior Pituitary Hormones **4.5** Thyroid stimulating Hormones **4.6** Hormones of adrenal Cortex **4.7** Hormones of Gonads **4.8** Gastrointestinal Hormone	20%
5	**Nutrition** **5.1** Basal Metabolic Rate (BMR) **5.2** Measurement of BMR **5.3** Factors affecting BMR **5.4** Significance of BMR **5.5** Balance Diet **5.6** Glycemic index **5.7** Nutrition Disorders **5.8** Protein Energy malnutrition **5.9** Kwashiorkor & Marasmus	15%
6	**Genetics** **6.1** Brief history of development of genetics- Basic principles of heredity in humans, Pattern of inheritance **6.2** Genetic disease in human	10%
7	**Xenobiotics and Antioxidants** **7.1** Detoxification **7.2** Phase reaction	10%

REFERENCE BOOKS

1. Textbook of Biochemistry : D.M. Vasudevan, Sree Kumari S
2. Textbook of Biochemistry : U. Satyanarayana
3. Medical clinical biochemistry : M. N. Chatterjee
4. Clinical guide to lab test : M.M. Tietz
5. Text book of Medical Laboratory Technology by P. B. Godkar
6. Medical Laboratory Technology by Mukherjee
7. Practical Clinical Biochemistry by Harold Varley
8. Principal of Biochemistry by M. A. Siddiqi
9. Instrumental Analysis by Chatwal Anand
10. Text book of Medical Biochemistry by Chaterjee, Shinde
11. Principal of Biochemistry by Leininger

Course Outcome: At the end of the course, Students will be able to:

CO1	Demonstrate the structure of cell, cell organelles and plasma membrane.
CO2	Describe various transport systems with its clinical utility.
CO3	Describe different types, working principle and application of chromatography, Flame photometer, auto analyzer, electrophoresis, photometry, and immunochemical techniques
CO4	Explain metabolic pathways of purines and pyrimidine with their disorders
CO5	Define and classify hormones with their mechanism of actions, biosynthesis, transportation, regulation mechanisms and clinical utility.
CO6	Define and explain balance diet and the principles of nutrition with its disorders.
CO7	Calculate Basal Metabolic Rate (BMR) and explain factors affecting BMR with its clinical applications.

24BMT0308 (Biochemistry III)
(Clinical Biochemistry)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0308	Total Credit	4
Title of Subject	Biochemistry II I (Clinical Biochemistry)	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- Understand metabolic pathways of carbohydrates, proteins and lipids with their metabolic disorders and clinical utility.
- Describe the diagnostic and therapeutic importance of enzymes and isoenzymes.
- Describe functions and different tests used to assess the function of organs like liver, kidney, thyroid, heart, and pancreas.
- Understand the molecular basis of isolation and electrophoretic separation of nucleic acids, gene amplification techniques, DNA recombinant technology, and blot techniques.
- Explain the biochemical aspects of tumor markers in treatment and detection of cancer.
- Gain knowledge and skills to implement and manage quality control programs in clinical laboratories, covering key concepts, tools, and error management.

Course Content

Unit	Description	Weightage
1	**Carbohydrates** **1.1** Blood sugar regulation (Hormonal) **1.2** Abnormalities - Diabetes mellitus **1.3** Glucose Tolerance Test **1.4** Glycated-Hemoglobin	15%
2	**Lipids** **2.1** Lipoprotein metabolism in health and disease -Chylomicrons, VLDL, IDL, LDL and HDL **2.2** Lipid profile and Atherosclerosis **2.3** Fatty liver	20%
3	**Proteins** **3.1** In born errors of amino acid metabolism a) Homocystinuria b) Alkaptonuria c) Phenylketonuria **d)** Albinism **3.2** Plasma proteins and associated disorders. **3.3** Immunoglobulins **3.4** Tissue Proteins, Collagen, Elastin	10%

4	**Clinical Enzymology** **4.1** Diagnostic & Therapeutic Use of enzymes **4.2** Isoenzymes	20%
5	**Function Test** **5.1** Liver function test **5.2** Renal function tests **5.3** Thyroid function tests **5.4** Cardiac function test **5.5** Pancreatic function test	15%
6	**Molecular Biology** **6.1** Nucleic acid isolation: DNA isolation, RNA isolation **6.2** Electrophoretic separation of Nucleic acid **6.3** Amplification techniques: Gene amplification (PCR, Reverse-transcriptase PCR, Real time PCR) **6.4** DNA recombinant Technology **6.5** Blot techniques 6.6 RFLP, VNTR, Gene Library	10%
7	**Biochemical aspect of Cancer** **7.1** Carcinogens, oncogenes & onco- suppressor genes **7.2** Tumor markers **7.3** Anticancer drug	10%
8	**Quality Control** 8.1 Definition: Precision, Accuracy, Specificity, Sensitivity, Standard and Control 8.2 Quality Control Program 8.3 Levy – Jenning Chart 8.4 Internal Quality Control 8.5 External Quality Control 8.6 Basic Components of Quality Control Program a) Pre analytical Errors b) Analytical Errors c) Post analytical Error	

REFERENCE BOOKS

1. Textbook of Biochemistry: D.M. Vasudevan, Sree Kumari S
2. Textbook of Biochemistry: U. Satyanarayana
3. Medical clinical biochemistry: M. N. Chatterjee
4. Clinical guide to lab test: M.M. Tietz
5. Text book of Medical Laboratory Technology by P. B. Godkar
6. Medical Laboratory Technology by Mukherjee
7. Practical Clinical Biochemistry by Harold Varley
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9. Instrumental Analysis by Chatwal Anand
10. Text book of Medical Biochemistry by Chaterjee, Shinde
11. Principal of Biochemistry by Leininger

Course Outcome: At the end of the course, Students will be able to:

CO1	Explain the metabolic pathways of carbohydrates, proteins, and lipids, recognize associated metabolic disorders, and appreciate their clinical utility.
CO2	Describe the diagnostic and therapeutic importance of enzymes and isoenzymes.
CO3	Describe various tests used to assess the function of organs such as the liver, kidney, thyroid, heart, and pancreas.
CO4	Demonstrate the molecular basis of nucleic acid isolation, electrophoretic separation, gene amplification techniques, DNA recombinant technology, and blot techniques.
CO5	Explain the biochemical aspects of tumor markers and their role in the treatment and detection of cancer.
CO6	Gain knowledge and skills to implement and manage quality control programs in clinical laboratories, including key concepts, tools, and error management.

24BMT0309 (Biochemistry Practical)

Name of the Institute: CAM Institute of Allied Health Sciences & Technology
Name of the Program: B. Sc. (Hons) in Medical Technology (Medical Laboratory Technology)
Year of the Program: Third year

Course Code	24BMT0309	Total Credit	4
Title of Subject	Biochemistry Practical	Total Hours/Week	4

Examination Scheme

Continuous Assessment (30 marks)			External	TOTAL
Internal examinations	Projects / Assignments	Attendance	Annual examination	
20	05	05	70	100

Course Objectives

- Teach methods for glucose estimation, including the GOD-POD method and glucose tolerance tests.
- Learn functional tests including liver function tests (bilirubin, total protein, albumin, A/G ratio, and liver enzymes), renal function tests (serum creatinine, urea, uric acid), and lipid profile analysis (cholesterol, HDL, triglycerides).
- Provide training in the use of colorimetry, spectrophotometry, paper chromatography, and gel electrophoresis for biochemical analysis.

Course Content

Unit	Description	Weightage
1	1.1 Estimation of Glucose by GOD-POD method 1.2 Comparison of various methods for the estimation of glucose 1.3 Glucose Tolerance Test	30%
2	**FUNCTION TESTS** **2.1 Liver function Tests**: a) Estimation of Bilirubin b) Estimation of total protein, Albumin , and A/G Ratio **c)** Estimation of Liver enzymes: SGOT, SGPT, Alkaline phosphatase (ALP) **2.2 Renal Function Tests:** a) Estimation of Serum Creatinine b) Estimation of Urea **c)** Estimation of Uric acid **2.3 Lipid Profile:** a) Estimation of Total cholesterol b) Estimation of HDL c) Estimation of Triglyceride	40%

3	**INSTRUMENTATION** 3.1 Colorimeter & Spectrophotometer 3.2 Paper Chromatography 3.3 Gel Electrophoresis	30%

REFERENCE BOOKS

1. Clinical guide to lab test: M.M. Tietz
2. Text book of Medical Laboratory Technology by P. B. Godkar
3. Medical Laboratory Technology by Mukherjee
4. Practical Clinical Biochemistry by Harold Varley
5. Principal of Biochemistry by M. A. Siddiqi
6. Instrumental Analysis by Chatwal Anand
7. Text book of Medical Biochemistry by Chaterjee, Shinde
8. Principal of Biochemistry by Leininger

Course Outcome: At the end of the course, Students will be able to:

CO1	Accurately perform glucose estimation using the GOD-POD method and conduct glucose tolerance tests.
CO2	Demonstrate the ability to conduct and interpret functional tests, including liver function tests (bilirubin, total protein, albumin, A/G ratio, liver enzymes), renal function tests (serum creatinine, urea, uric acid), and lipid profile analysis (cholesterol, HDL, triglycerides).
CO3	Acquire proficiency in using colorimetry, spectrophotometry, paper chromatography, and gel electrophoresis for biochemical analysis.