DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
Chhatrapati Sambhajinagar.

NAAC- 'A+' Grade

CIRCULAR /SU/ *AEDP / Sci & Tech./ Comm.& Mang. / Humani. /06/2025*

It is hereby inform to all concerned that, on the recommendation of the Board of Dean's,; **the Academic Council at its meeting held on 21 July, 2025 has been accepted** ***the following Subject wise Syllabi under "Apprenticeship Embedded Degree Programme (AEDP)" run at colleges level.***

Sr.No.	Name of the Courses's	Faculty	College Name	Semester
1	B.Sc.Industrial Chemistry (AEDP)	Science & Technology	Maulana Azad College of Arts, Science & Commerce Chhatrapati Sambhajinagar	I & II
2	B.A. Psychology (AEDP)	Humanities		
3	B.Sc.Medical Laboratory Technology (AEDP)	Science & Technology	Deogiri College (Autonomous) Chhatrapati Sambhajinagar.	
4	B.Com in Banking, Financial Services and Insurance (AEDP)	Commerce & Management		

This is effective from the Academic Year 2025-26 and Onwards as per appended herewith.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus, ★
Chhatrapati Sambhajinagar ★
-431 004. ★
REF.No. SU/2025-26 1397-1400 ★
Date:- 30 /07 / 2025. ★
★★★★★

Deputy Registrar,
Syllabus Section

Copy forwarded for Information and necessary action:-

1] The Principal, Maulana Azad College of Arts, Science & Commerce Dr. Rafiq Zakaria Campus, Chhatrapati Sambhajinagar.

2] The, Principal, Deogiri College (Autonomous), railway station road Chhatrapati Sambhajinagar.

3] The Director, Board of Examination & Evaluation,

4] The Director, University Network & Information Centre, UNIC, with a **request to upload this Circular on University Website.**

Dr.Babasaheb Ambedkar Marathwada University **Chhatrapati Sambhajinagar.**

M.S.P. MANDAL'S

DEOGIRI COLLEGE,

CHHATRAPATI SAMBHAJINAGAR

(An Autonomous College affiliated to Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar)

(NAAC RE-ACCREDITED "A++" Grade with 3.59 CGPA (IV Cycle)

FACULTY OF SCIENCE & TECHNOLOGY

3 Years Apprenticeship Embedded Degree Programme (AEDP) in B.Sc. Medical Laboratory Technology (Hons)

As per National Education Policy-2020

Syllabus Structure

(Outcome Based Credit System)

(Effective from 2025-26)

M.S.P. Mandal's

Deogiri College (Autonomous), Chhatrapati Sambhajinagar

Department of Biotechnology

Course: B.Sc. Medical Laboratory Technology (AEDP Program)

Eligibility: 12th Science Pass

Duration: 03 Years

Intake Capacity: 30

Fees: 35,000/-Year

Introduction of the Parent Department:

The Department of Biotechnology at Deogiri College (Autonomous), Chhatrapati Sambhajinagar, stands as a pioneering academic unit dedicated to excellence in life sciences education and research. Established with the vision to nurture scientific temper and innovation, the department offers undergraduate and postgraduate programs designed to equip students with a strong foundation in molecular biology, genetic engineering, bioinformatics, and related interdisciplinary fields.

With a commitment to academic rigor and hands-on training, the department boasts 12 well-equipped laboratories, experienced faculty, and a learner-centric environment. It actively engages in industry collaborations, research projects, and skill development initiatives aligned with national education policies and emerging biotechnological trends.

The department continually evolves its curriculum to meet the demands of modern science, thereby preparing students for successful careers in research, healthcare, pharmaceuticals, agriculture, and environmental biotechnology.

MoU's with course related establishments:

Sr. No.	Name of the establishment
1	Pathology Lab., Government Medical College & Hospital, Chhatrapati Sambhajinagar
2	Dr. Hedgewar Rugnalaya Pathology Laboratory, Garkheda, Chhatrapati Sambhajinagar
3	Pathology Lab., Medicover Hospital, N-6, CIDCO, Chhatrapati Sambhajinagar
4	Pathology Lab., Ciigma Hospital, Darga Road, Chhatrapati Sambhajinagar
5	Mulay Diagnostic Services Pvt. Ltd, Usmanpura, Chhatrapati Sambhajinagar

Principal
Deogiri College,

M.S.P. Mandal's

Deogiri College (Autonomous),

Chhatrapati Sambhajinagar.

Dept. of Biotechnology

B.Sc. Medical Laboratory Technology (B.Sc. MLT)

(Non-Granted) fees structure) for Academic Year 2025-2026

Sr. No.	Particulars	Proposed Fees
1	Tuition Fee	21000
2	Entrance/Entry Fee	100
3	Laboratory Fee	11500
4	Library Fee	50
5	Gymkhana Fee	50
6	Extra Curriculum/Activity Fee	56
7	College Magazine Fee	50
8	Computer Training Fee	50
9	Registration Charges	25
10	Development Fund	110
11	Sports Fund	10
12	Ashwamedh Fund	04
13	Medical Aid Fund	15
14	Student Assistance/Welfare Fund	20
15	Student Insurance Fund	10
16	Youth Festival Charges	100
17	Student ID Charges	10
18	Semester Fee	75
19	University Various Head Fees	361
20	Lab Main./Development Fee	1304
21	Session Fees/Study Tour	00
22	Computer Fees	00
23	Library Deposit	100
	Total	**35000**

Principal
Deogiri College,
Chhatrapati Sambhajinagar

Structure of B. Sc. Three Year Apprenticeship Embedded Degree Programme (AEDP) with Multiple Entry and Exit Options

Class: B.Sc First Year **Subject (Major): Medical Laboratory Technology**

Semester: I

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) M1 (Mandatory)	DSC-1/MLT/T/101	Human Anatomy	2	-	2	-	4
	DSC-2/MLT/P/102	Practical based on DSC-1/MLT/T/101	-	4	-	2	
Major (Core) M2 (Mandatory)	DSC-3/MLT/T/103	Human Physiology	2	-	2	-	4
	DSC-4/MLT/P/104	Practical based on DSC-3/MLT/T/103	-	4	-	2	
Major (Core) M3 (Mandatory)	DSC-5/MLT/T/105	General Biochemistry	2	-	2	-	4
	DSC-6/MLT/P/106	Practical based on DSC-5/MLT/T/105	-	4	-	2	
Generic / Open Elective (GE/OE)	GE/OE-1/MLT/T/103	Introduction to Healthcare Systems	2	-	2	-	2
SEC (Skill Enhancement Course)	SEC-1/MLT/T/107	Basic Laboratory Techniques & Safety	1	-	1	-	2
	SEC-2/MLT/P/108	Practical based on SEC-1/MLT/T/107	-	2	-	1	
AEC	AEC-1/ENG/106	Developing Communication Skills in English-I	2	-	2	-	2
IKS (Choose any one from pool of courses)	IKS-1/MLT/107	Indian History of Diagnostic Sciences	2	-	2	-	2
CC (Choose any one from pool of courses)	CC-1/PHYE/108	Health & Wellness	-	4	-	2	2
	CC-1/YOG/108	Yoga Education	-	4	-	2	
	CC-1/NSS/108	NSS	-	4	-	2	
	CC-1/NCC/108	NCC	-	4	-	2	
	CC-1/CUL/108	Cultural Activity	-	4	-	2	
			13	**18**	**13**	**09**	**22**

Class: B.Sc First Year **Subject (Major): Medical Laboratory Technology**

Semester: II

Course Type	Course Code	Course Name	Teaching Scheme (Hrs/Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) **M1** (Mandatory)	DSC-7/MLT/T/201	General Pathology	2	-	2	-	4
	DSC-8/MLT/P/202	Practical based on DSC-7/MLT/T/201	-	4	-	2	
Major (Core) **M2** (Mandatory)	DSC-9/MLT/T/203	General Microbiology	2	-	2	-	4
	DSC-10/MLT/P/204	Practical based on DSC-9/MLT/T/203	-	4	-	2	
Major (Core) **M3** (Mandatory)	DSC-11/MLT/T/205	Clinical Biochemistry	2	-	2	-	4
	DSC-12/MLT/P/206	Practical based on DSC-11/MLT/T/205	-	4	-	2	
Generic / Open Elective **(GE/OE)** (Choose any ONE from pool of courses)	GE/OE-2/MLT/207	Fundamentals of Human Health and Disease	2	-	2	-	2
VSC (Vocational Skill Courses)	VSC-1/MLT/T/208	Phlebotomy & Specimen Handling Techniques	1	-	1	-	2
	VSC-2/MLT/P/209	Practical based on VSC-1/MLT/T/208	-	2	-	1	
AEC (Ability Enhancement Course)	AEC-2/ENG/206	Developing Communication Skills in English-II	2	-	2	-	2
VEC	VEC-1/POL/207	Constitution of India	2	-	2	-	2
CC (Choose any one from pool of courses other than Sem-I)	CC-2/PHYE/208	Sport and Fitness	-	4	-	2	2
	CC-2/YOG/208	Yoga Education	-	4	-	2	
	CC-2/NSS/208	NSS	-	4	-	2	
	CC-2/NCC/208	NCC	-	4	-	2	
	CC-2/CUL/208	Cultural Activity	-	4	-	2	
			13	**18**	**13**	**09**	**22**

Exit Option : Award of UG Certificate in 3 Majors with 44 credits and an additional 4 credits of core NSQF course/ Internship OR continue with Major and Minor

Structure of B. Sc. Three Year Apprenticeship Embedded Degree Programme (AEDP) with Multiple Entry and Exit Options

Class: B.Sc Second Year **Subject (Major): Medical Laboratory Technology**

Semester: III

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-13/MLT/T/301	Clinical Pathology	2	-	2	-	4
	DSC-14/MLT/P/302	Practical based on DSC-13/MLT/T/301	-	4	-	2	
	DSC-15/MLT/T/303	Hematology-I	2	-	2	-	4
	DSC-16/MLT/P/304	Practical based on DSC-15/MLT/T/303	-	4	-	2	
Minor	M-1/MLT/T/305	Immunology & Serology	2	-	2	-	4
	M-2/MLT/P/306	Practical based on M-1/MLT/T/305	-	4	-	2	
Generic / Open Elective (GE/OE)	GE/OE-3/MLT/T/307	Public Health & Hygiene	2	-	2	-	2
VSC (Vocational Skill Course)	VSC-3/MLT/T/308	Urine and Body Fluid Analysis Techniques	1	-	1	-	2
	VSC-4/MLT/P/309	Practical based on VSC-3/MLT/T/308	-	2	-	1	
AEC	AEC-3/ENG/306	Developing Communication Skills in English-III	2	-	2	-	2
Field Project (In a medical college/100 bedded hospital with well-equipped pathology laboratory for at least one month)	FP-1/MLT/307	Field Project-I	-	4	-	2	2
CC (Choose any one from pool of courses)	CC-3/PHYE/308	Health & Wellness	-	4	-	2	2
	CC-3/YOG/308	Yoga Education	-	4	-	2	
	CC-3/NSS/308	NSS	-	4	-	2	
	CC-3/NCC/308	NCC	-	4	-	2	
	CC-3/CUL/308	Cultural Activity	-	4	-	2	
			11	**22**	**11**	**11**	**22**

Class: B.Sc Second Year **Subject (Major): Medical Laboratory Technology**

Semester: IV

(Apprenticeship Module)

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-17/MLT/P/401	Apprenticeship-I	-	30	-	22	22
Total Hrs. of Semester-V apprenticeship =720 Hrs.							

Sem-V Apprenticeship Modules Credit Distribution (22 Credits)

Module No.	Topics Covered	Credits
1	Orientation to Pathology Laboratory: Safety protocols, standard operating procedures (SOPs), biomedical waste management, record-keeping practices	2
2	Hematology: Sample collection techniques, complete blood count (CBC), ESR, peripheral smear preparation, blood grouping, cross-matching	4
3	Clinical Biochemistry: Specimen collection, tests for glucose, lipids, liver and renal function tests, electrolytes, quality control	4
4	Clinical Pathology: Urinalysis, stool examination, CSF and body fluid analysis, basic interpretation of results	3
5	Histopathology and Cytology: Tissue processing, section cutting, H&E staining, basics of cytological examination	3
6	Microbiology Basics: Collection and transport of specimens, culture methods, Gram staining, antibiotic susceptibility testing	3
7	Professional Skills: Effective communication, basic laboratory informatics, ethical practices, patient data confidentiality	3
Exit Option : Award of UG Certificate in Majors & Minor with 88 credits and an additional 4 credits of core NSQF course/ Internship OR continue with Major and Minor		

Class: B.Sc Third Year **Subject (Major): Medical Laboratory Technology**

Semester: V

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-18/MLT/T/501	Blood Banking & Transfusion Technology	2	-	2	-	2+2+2+2 =08
	DSC-19/MLT/P/502	Practical based on DSC-18/MLT/T/501	-	4	-	2	
	DSC-20/MLT/T/503	Hematology-II	2	-	2	-	
	DSC-21/MLT/P/504	Practical based on DSC-20/MLT/T/503	-	4	-	2	
Discipline Specific Electives (DSE) (Select any one from pool of courses)	DSE-1/A2/MLT/T/505	Parasitology & Mycology	2	-	2	-	4
	DSE-2/A2/MLT/P/506	Practical based on DSE-1/A2/MLT/T/505	-	4	-	2	
	DSE-1/B2/MLT/T/505	Bacteriology & Virology	2	-	2	-	
	DSE-2/B2/MLT/P/506	Practical based on DSE-1/B2/MLT/T/505	-	4	-	2	
Minor	M-3/MLT/T/507	Clinical Biochemistry-II	2	-	2	-	4
	M-4/MLT/P/508	Practical based on M-3/MLT/T/507	-	4	-	2	
VSC (Vocational Skill Course)	VSC-3/MLT/T/509	Histopathology & Cytology	2	-	2	-	4
	VSC-4/MLT/P/510	Practical based on VSC-3/MLT/T/509	-	4	-	2	
FP (Field Project)	FP/MLT/P/511	Field Project	-	4	-	2	2
			10	**18**	**10**	**12**	**22**

Class: B.Sc. Third Year **Subject (Major): Medical Laboratory Technology**

Semester: VI

(Advanced Apprenticeship Module)

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-22/MLT/P/601	Apprenticeship-II	-	30	-	22	22
Total Hrs. of Semester-VI apprenticeship =720 Hrs.							
Exit option : Award of UG degree in Major with 132 credits							

Sem-VI Advanced Apprenticeship Modules Credit Distribution (22 Credits)

Module No.	Topics Covered	Credits
1	Advanced Hematology: Coagulation profile (PT, aPTT), bone marrow aspirations, advanced cell morphology	3
2	Advanced Biochemistry: Automation in clinical biochemistry, troubleshooting equipment, advanced test panels	4
3	Immunology and Serology: ELISA, immunofluorescence, rapid immunoassays, result interpretation	3
4	Advanced Microbiology: Mycology, parasitology, molecular diagnostics (PCR basics), biosafety protocols for infectious samples	4
5	Laboratory Management & Quality Assurance: Equipment calibration, quality control (internal and external), documentation and reporting	4
6	Professional Development: Advanced communication skills, teamwork in healthcare, ethics, data analysis and laboratory reporting	4

M.S.P. MANDAL'S

DEOGIRI COLLEGE,

CHHATRAPATI SAMBHAJINAGAR

(An Autonomous College affiliated to Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar)

(NAAC RE-ACCREDITED "A++" Grade with 3.59 CGPA (IV Cycle)

FACULTY OF SCIENCE & TECHNOLOGY

3 Years Apprenticeship Embedded Degree Programme (AEDP) in

B.Sc. Medical Laboratory Technology (Hons)

As per National Education Policy-2020

Course Structure & Curriculum

(Outcome Based Credit System)

(Effective from 2025-26)

PREAMBLE

The **Apprenticeship Embedded Degree Programme (AEDP)** in **Bachelor of Science (B.Sc.) Medical Laboratory Technology (MLT)** is an innovative initiative developed in alignment with the National Education Policy (NEP) 2020. This unique program blends academic learning with industry-relevant practical experience, aiming to create a workforce that is job-ready, skilled, and adaptable to the dynamic needs of the healthcare sector.

Recognizing the critical role of medical laboratory technologists in the accurate diagnosis and treatment of diseases, the AEDP-B.Sc. MLT program emphasizes a holistic approach to education. It integrates theoretical knowledge of medical laboratory sciences including biochemistry, microbiology, haematology, and immunology with real-world laboratory practices.

A distinctive feature of this program is the apprenticeship component, which is embedded within the curriculum and allows students to gain hands-on experience in clinical laboratories, hospitals, and diagnostic centers. Through structured, supervised apprenticeship training, students develop technical competencies, professional ethics, and workplace readiness.

This program also fosters a culture of lifelong learning and critical thinking, preparing graduates to meet evolving challenges in laboratory medicine and healthcare delivery. By combining academic rigor with experiential learning, the AEDP-B.Sc. MLT program ensures that graduates are well-prepared for meaningful careers and contribute effectively to the health and well-being of communities.

Program Outcomes (POs) of B.Sc. Medical Laboratory Technology	
PO1	**Demonstrate Foundational Knowledge:** Apply core principles of human anatomy, physiology, pathology, microbiology, biochemistry, and immunology in medical laboratory practices.
PO2	**Perform Laboratory Diagnostics:** Competently conduct diagnostic procedures and tests using modern laboratory equipment and techniques, ensuring accuracy and reliability of results.
PO3	**Integrate Theory with Practice:** Apply theoretical knowledge effectively in real-world laboratory settings through integrated apprenticeship training, bridging the gap between classroom learning and workplace demands.
PO4	**Adhere to Quality and Safety Standards:** Uphold stringent quality control, biosafety, and infection control measures in the laboratory environment.
PO5	**Demonstrate Professional Ethics:** Exhibit professionalism, ethical conduct, and empathy while working in clinical and diagnostic laboratories, respecting patient confidentiality and data privacy.
PO6	**Analyze and Interpret Data:** Analyze test results critically, recognize discrepancies, and communicate findings clearly to healthcare professionals.
PO7	**Employ Effective Communication Skills:** Demonstrate strong written and verbal communication skills for interacting with colleagues, healthcare providers, and patients.
PO8	**Utilize Digital Tools and Emerging Technologies:** Use laboratory information systems and embrace advancements in digital health and laboratory technologies.
PO9	**Engage in Lifelong Learning and Research:** Develop a spirit of inquiry, pursue continuous learning, and participate in research activities to stay abreast of evolving practices and technologies.
P10	**Work Collaboratively and Independently:** Collaborate effectively in interdisciplinary healthcare teams and demonstrate independence in managing laboratory responsibilities.

PSO No.	Program Specific Outcomes (PSOs) of B.Sc. Medical Laboratory Technology
PSO1	**Mastery of Laboratory Practices:** Graduates will be proficient in performing a wide range of laboratory tests, including hematology, clinical biochemistry, microbiology, immunology, histopathology, and molecular biology, using standard operating procedures and modern equipment.
PSO2	**Integration of Classroom and Workplace Learning:** Through embedded apprenticeship training, graduates will seamlessly integrate theoretical knowledge with hands on clinical and diagnostic laboratory experiences, making them workforce-ready.
PSO3	**Quality Assurance and Laboratory Management:** Graduates will demonstrate expertise in laboratory quality control, equipment maintenance, safety protocols, and management practices essential for reliable laboratory operations.
PSO4	**Application of Digital and Data Analysis Tools:** Graduates will utilize laboratory information systems and digital tools for record-keeping, data analysis, and reporting of laboratory results, fostering precision and efficiency.
PSO5	**Contribution to Healthcare and Community Health:** Graduates will actively contribute to disease diagnosis, monitoring, and health promotion by delivering reliable laboratory services, supporting patient care, and participating in community health initiatives.

Structure of B. Sc. Three Year Apprenticeship Embedded Degree Programme (AEDP) with Multiple Entry and Exit Options

Class: B.Sc First Year **Subject (Major): Medical Laboratory Technology**

Semester: I

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) M1 (Mandatory)	DSC-1/MLT/T/101	Human Anatomy	2	-	2	-	4
	DSC-2/MLT/P/102	Practical based on DSC-1/MLT/T/101	-	4	-	2	
Major (Core) M2 (Mandatory)	DSC-3/MLT/T/103	Human Physiology	2	-	2	-	4
	DSC-4/MLT/P/104	Practical based on DSC-3/MLT/T/103	-	4	-	2	
Major (Core) M3 (Mandatory)	DSC-5/MLT/T/105	General Biochemistry	2	-	2	-	4
	DSC-6/MLT/P/106	Practical based on DSC-5/MLT/T/105	-	4	-	2	
Generic / Open Elective (GE/OE)	GE/OE-1/MLT/T/103	Introduction to Healthcare Systems	2	-	2	-	2
SEC (Skill Enhancement Course)	SEC-1/MLT/T/107	Basic Laboratory Techniques & Safety	1	-	1	-	2
	SEC-2/MLT/P/108	Practical based on SEC-1/MLT/T/107	-	2	-	1	
AEC	AEC-1/ENG/106	Developing Communication Skills in English-I	2	-	2	-	2
IKS (Choose any one from pool of courses)	IKS-1/MLT/107	Indian History of Diagnostic Sciences	2	-	2	-	2
CC (Choose any one from pool of courses)	CC-1/PHYE/108	Health & Wellness	-	4	-	2	2
	CC-1/YOG/108	Yoga Education	-	4	-	2	
	CC-1/NSS/108	NSS	-	4	-	2	
	CC-1/NCC/108	NCC	-	4	-	2	
	CC-1/CUL/108	Cultural Activity	-	4	-	2	
			13	**18**	**13**	**09**	**22**

Class: B.Sc First Year **Subject (Major): Medical Laboratory Technology**

Semester: II

Course Type	Course Code	Course Name	Teaching Scheme (Hrs/Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) **M1** (Mandatory)	DSC-7/MLT/T/201	General Pathology	2	-	2	-	4
	DSC-8/MLT/P/202	Practical based on DSC-7/MLT/T/201	-	4	-	2	
Major (Core) **M2** (Mandatory)	DSC-9/MLT/T/203	General Microbiology	2	-	2	-	4
	DSC-10/MLT/P/204	Practical based on DSC-9/MLT/T/203	-	4	-	2	
Major (Core) **M3** (Mandatory)	DSC-11/MLT/T/205	Clinical Biochemistry	2	-	2	-	4
	DSC-12/MLT/P/206	Practical based on DSC-11/MLT/T/205	-	4	-	2	
Generic / Open Elective **(GE/OE)** (Choose any ONE from pool of courses)	GE/OE-2/MLT/207	Fundamentals of Human Health and Disease	2	-	2	-	2
VSC (Vocational Skill Courses)	VSC-1/MLT/T/208	Phlebotomy & Specimen Handling Techniques	1	-	1	-	2
	VSC-2/MLT/P/209	Practical based on VSC-1/MLT/T/208	-	2	-	1	
AEC (Ability Enhancement Course)	AEC-2/ENG/206	Developing Communication Skills in English-II	2	-	2	-	2
VEC	VEC-1/POL/207	Constitution of India	2	-	2	-	2
CC (Choose any one from pool of courses other than Sem-I)	CC-2/PHYE/208	Sport and Fitness	-	4	-	2	2
	CC-2/YOG/208	Yoga Education	-	4	-	2	
	CC-2/NSS/208	NSS	-	4	-	2	
	CC-2/NCC/208	NCC	-	4	-	2	
	CC-2/CUL/208	Cultural Activity	-	4	-	2	
			13	**18**	**13**	**09**	**22**

Exit Option : Award of UG Certificate in 3 Majors with 44 credits and an additional 4 credits of core NSQF course/ Internship OR continue with Major and Minor

Structure of B. Sc. Three Year Apprenticeship Embedded Degree Programme (AEDP) with Multiple Entry and Exit Options

Class: B.Sc Second Year **Subject (Major): Medical Laboratory Technology**

Semester: III

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-13/MLT/T/301	Clinical Pathology	2	-	2	-	4
	DSC-14/MLT/P/302	Practical based on DSC-13/MLT/T/301	-	4	-	2	
	DSC-15/MLT/T/303	Hematology-I	2	-	2	-	4
	DSC-16/MLT/P/304	Practical based on DSC-15/MLT/T/303	-	4	-	2	
Minor	M-1/MLT/T/305	Immunology & Serology	2	-	2	-	4
	M-2/MLT/P/306	Practical based on M-1/MLT/T/305	-	4	-	2	
Generic / Open Elective (GE/OE)	GE/OE-3/MLT/T/307	Public Health & Hygiene	2	-	2	-	2
VSC (Vocational Skill Course)	VSC-3/MLT/T/308	Urine and Body Fluid Analysis Techniques	1	-	1	-	2
	VSC-4/MLT/P/309	Practical based on VSC-3/MLT/T/308	-	2	-	1	
AEC	AEC-3/ENG/306	Developing Communication Skills in English-III	2	-	2	-	2
Field Project (In a medical college/100 bedded hospital with well-equipped pathology laboratory for at least one month)	FP-1/MLT/307	Field Project-I	-	4	-	2	2
CC (Choose any one from pool of courses)	CC-3/PHYE/308	Health & Wellness	-	4	-	2	2
	CC-3/YOG/308	Yoga Education	-	4	-	2	
	CC-3/NSS/308	NSS	-	4	-	2	
	CC-3/NCC/308	NCC	-	4	-	2	
	CC-3/CUL/308	Cultural Activity	-	4	-	2	
			11	**22**	**11**	**11**	**22**

Class: B.Sc Second Year **Subject (Major): Medical Laboratory Technology**

Semester: IV

(Apprenticeship Module)

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-17/MLT/P/401	Apprenticeship-I	-	30	-	22	22
Total Hrs. of Semester-V apprenticeship =720 Hrs.							

Sem-V Apprenticeship Modules Credit Distribution (22 Credits)

Module No.	Topics Covered	Credits
1	Orientation to Pathology Laboratory: Safety protocols, standard operating procedures (SOPs), biomedical waste management, record-keeping practices	2
2	Hematology: Sample collection techniques, complete blood count (CBC), ESR, peripheral smear preparation, blood grouping, cross-matching	4
3	Clinical Biochemistry: Specimen collection, tests for glucose, lipids, liver and renal function tests, electrolytes, quality control	4
4	Clinical Pathology: Urinalysis, stool examination, CSF and body fluid analysis, basic interpretation of results	3
5	Histopathology and Cytology: Tissue processing, section cutting, H&E staining, basics of cytological examination	3
6	Microbiology Basics: Collection and transport of specimens, culture methods, Gram staining, antibiotic susceptibility testing	3
7	Professional Skills: Effective communication, basic laboratory informatics, ethical practices, patient data confidentiality	3
Exit Option : Award of UG Certificate in Majors & Minor with 88 credits and an additional 4 credits of core NSQF course/ Internship OR continue with Major and Minor		

Class: B.Sc Third Year **Subject (Major): Medical Laboratory Technology**

Semester: V

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
	DSC-18/MLT/T/501	Blood Banking & Transfusion Technology	2	-	2	-	
Major (Core) Mandatory	DSC-19/MLT/P/502	Practical based on DSC-18/MLT/T/501	-	4	-	2	2+2+2+2 =08
	DSC-20/MLT/T/503	Hematology-II	2	-	2	-	
	DSC-21/MLT/P/504	Practical based on DSC-20/MLT/T/503	-	4	-	2	
Discipline Specific Electives (DSE) (Select any one from pool of courses)	DSE-1/A2/MLT/T/505	Parasitology & Mycology	2	-	2	-	4
	DSE-2/A2/MLT/P/506	Practical based on DSE-1/A2/MLT/T/505	-	4	-	2	
	DSE-1/B2/MLT/T/505	Bacteriology & Virology	2	-	2	-	
	DSE-2/B2/MLT/P/506	Practical based on DSE-1/B2/MLT/T/505	-	4	-	2	
Minor	M-3/MLT/T/507	Clinical Biochemistry-II	2	-	2	-	4
	M-4/MLT/P/508	Practical based on M-3/MLT/T/507	-	4	-	2	
VSC (Vocational Skill Course)	VSC-3/MLT/T/509	Histopathology & Cytology	2	-	2	-	4
	VSC-4/MLT/P/510	Practical based on VSC-3/MLT/T/509	-	4	-	2	
FP (Field Project)	FP/MLT/P/511	Field Project	-	4	-	2	2
			10	**18**	**10**	**12**	**22**

Class: B.Sc. Third Year **Subject (Major): Medical Laboratory Technology**

Semester: VI

(Advanced Apprenticeship Module)

Course Type	Course Code	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
			Theory	Pract	Theory	Pract	
Major (Core) Mandatory	DSC-22/MLT/P/601	Apprenticeship-II	-	30	-	22	22
Total Hrs. of Semester-VI apprenticeship =720 Hrs.							
Exit option : Award of UG degree in Major with 132 credits							

Sem-VI Advanced Apprenticeship Modules Credit Distribution (22 Credits)

Module No.	Topics Covered	Credits
1	Advanced Hematology: Coagulation profile (PT, aPTT), bone marrow aspirations, advanced cell morphology	3
2	Advanced Biochemistry: Automation in clinical biochemistry, troubleshooting equipment, advanced test panels	4
3	Immunology and Serology: ELISA, immunofluorescence, rapid immunoassays, result interpretation	3
4	Advanced Microbiology: Mycology, parasitology, molecular diagnostics (PCR basics), biosafety protocols for infectious samples	4
5	Laboratory Management & Quality Assurance: Equipment calibration, quality control (internal and external), documentation and reporting	4
6	Professional Development: Advanced communication skills, teamwork in healthcare, ethics, data analysis and laboratory reporting	4

Curriculum
B.Sc. Medical Laboratory Technology (MLT)
F.Y. Semester-I

Name of the Course: Human Anatomy	
Course Type: Major (DSC)	**Course Code: DSC-1/MLT/T/101**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Understand the fundamental structure of the human body and its systems.
- Identify and describe various anatomical structures and their physiological relevance.
- Gain hands-on familiarity with anatomical terms, body planes, and major organs to support laboratory diagnostics.

Course Outcomes (COs) :

After completion of the course, students will be able to -

- Define anatomical terms and explain the structural organization of the human body.
- Identify major organs and describe their anatomical location and relationships.
- Demonstrate knowledge of the skeletal, muscular, and cardiovascular systems with clinical relevance.
- Apply anatomical knowledge in interpreting laboratory results and assisting in medical diagnostics.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Human Anatomy: Definitions and terminology in anatomy, Body planes, directions, cavities, and regions, Levels of structural organization, Cell structure and function (basic overview), Tissues: types, structure, and function, Introduction to Integumentary System (skin layers and appendages).	10
II	Skeletal and Muscular Systems: Classification of bones and types of joints, Major bones of the human body: axial and appendicular skeleton, Bone structure and growth, Overview of muscle types: skeletal, smooth, and cardiac, Major muscle groups and their functions, Introduction to musculoskeletal disorders (osteoporosis, arthritis).	10

III	Cardiovascular and Lymphatic Systems: Structure of the heart and major blood vessels, Circulatory pathways (pulmonary and systemic), Blood vessels: arteries, veins, capillaries, Composition and functions of blood, Lymphatic system: organs (lymph nodes, spleen, thymus), vessels, and circulation, Clinical relevance: hypertension, atherosclerosis, anemia.	10

Text Books:

- Handbook of General Anatomy Chaurasia B. D and Krishna Garg

Reference Books:

- Tortora & Derrickson – Principles of Anatomy and Physiology
- Ross & Wilson – Anatomy and Physiology in Health and Illness
- Chaurasia's Human Anatomy – Volumes I–III (for reference)
- Open educational resources (e.g., Visible Body, TeachMeAnatomy)

Name of the Course: Practical based on DSC-1/MLT/T/101	
Course Type: Major (DSC)	**Course Code: DSC-2/MLT/P/102**
Contact Hours : 60 Hrs	**Credit: 02**
Hours/Week: 04	**Total Marks: 50**

Practical:

1.	Study of anatomical terms, body planes, directions, and body cavities
2.	Identification and description of human tissues using charts and permanent slides
3.	Study of axial and appendicular skeleton using bone specimens and models
4.	Identification of bones: skull, vertebrae, ribs, sternum, scapula, clavicle
5.	Identification of bones: humerus, radius, ulna, femur, tibia, fibula, hand, and foot
6.	Demonstration of major joints and movements using skeletal models
7.	Study of major muscles of the human body using charts and models
8.	Identification of structures of the human heart and major blood vessels
9.	Study of blood circulation and lymphatic system using charts and models
10.	Virtual or video-based dissection of thorax/limbs/heart for orientation and application

Text Books:

- Handbook of General Anatomy Chaurasia B. D and Krishna Garg

Reference Books:

- Tortora & Derrickson – Principles of Anatomy and Physiology
- Ross & Wilson – Anatomy and Physiology in Health and Illness
- Chaurasia's Human Anatomy – Volumes I–III (for reference)
- Open educational resources (e.g., Visible Body, TeachMeAnatomy)

Name of the Course: Human Physiology	
Course Type: Major (DSC)	**Course Code: DSC-3/MLT/T/103**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Introduce the basic concepts and mechanisms involved in normal human body function.
- Develop a foundational understanding of organ systems and their interrelationships.
- Enable students to relate physiological concepts to clinical laboratory investigations.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Describe the normal structure and function of human organ systems.
- Explain homeostatic mechanisms that maintain body functions.
- Relate physiological processes with diagnostic parameters.
- Apply physiological knowledge in interpreting lab data and aiding healthcare professionals.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Blood and Body Fluids: Composition and functions of blood Hematopoiesis and blood cell types, Blood groups and Rh factor, Hemostasis and blood coagulation mechanism, Plasma proteins, their types, and functions, Lymph and tissue fluid: composition and function.	10
II	Cardiovascular and Respiratory Systems: Anatomy and physiology of the heart, Cardiac cycle and heart sounds, Blood pressure: regulation and measurement, Structure and function of blood vessels, Respiratory system: structure of respiratory organs, Mechanism of respiration and gas exchange, Control of respiration.	10

III	Digestive and Excretory Systems: Structure and function of alimentary canal and associated glands, Digestion and absorption of carbohydrates, proteins, and fats, Functions of liver and pancreas, Structure and function of kidneys, Formation of urine and regulation of water-electrolyte balance, Micturition and disorders of the excretory system	**10**

Text Books:

- Guyton and Hall – Textbook of Medical Physiology

Reference Books:

- Tortora & Derrickson – Principles of Anatomy and Physiology
- Ross and Wilson – Anatomy and Physiology in Health and Illness
- Open source: NPTEL / WHO / Visible Body / TeachMePhysiology

Name of the Course: Practical based on DSC-3/MLT/T/103	
Course Type: Major (DSC)	**Course Code: DSC-4/MLT/P/104**
Contact Hours : 60 Hrs	**Credit: 02**
Hours/Week: 04	**Total Marks: 50**

Practical:

1.	Estimation of hemoglobin using Sahli's and/or cyanmethemoglobin method
2.	Determination of red blood cell (RBC) count using a hemocytometer
3.	Determination of total leukocyte count (TLC) and differential leukocyte count (DLC)
4.	Determination of bleeding time (BT) and clotting time (CT)
5.	Determination of blood group (ABO and Rh typing)
6.	Measurement of blood pressure using a sphygmomanometer
7.	Recording of pulse rate and respiratory rate under rest and mild exertion
8.	Demonstration of cardiac cycle and heart sounds using charts or digital simulations
9.	Demonstration of respiratory movements using spirometry (or simple water spirometer if available)
10.	Study of digestive enzymes: demonstration of starch hydrolysis by salivary amylase

Text Books:

- Guyton and Hall – Textbook of Medical Physiology

Reference Books:

- Tortora & Derrickson – Principles of Anatomy and Physiology
- Ross and Wilson – Anatomy and Physiology in Health and Illness
- Open source: NPTEL / WHO / Visible Body / TeachMePhysiology

Name of the Course : Basic Biochemistry	
Course Type: Major (DSC)	**Course Code: DSC-5/MLT/T/105**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Impart fundamental knowledge of biomolecules and their roles in biological systems.
- Explain the basic structure and function of enzymes and the concept of metabolism.
- Develop analytical thinking for understanding molecular interactions essential for physiological functions.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Understand and explain the structure, types, and biological roles of carbohydrates, proteins, lipids, and nucleic acids.
- Describe the structural and functional characteristics of enzymes and vitamins.
- Illustrate the basic biochemical pathways of metabolism without clinical emphasis.
- Apply fundamental biochemical knowledge to laboratory procedures and biochemical experimentation.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Biomolecules – Structure and Function: Introduction to Biochemistry: scope and significance Carbohydrates: classification, structure of monosaccharides, disaccharides, and polysaccharides, Proteins: classification, amino acids (structure and types), levels of protein structure, Lipids: classification (simple, compound, derived), structure of fatty acids, triglycerides, phospholipids, Nucleic Acids: structure of DNA and RNA, differences between DNA and RNA, biological significance	10

II	Enzymes and Vitamin: Enzymes: definition, classification, properties, and specificity, Mechanism of enzyme action (lock and key, induced fit models), Factors affecting enzyme activity: temperature, pH, substrate concentration, Enzyme inhibition: competitive and non-competitive, Vitamins: classification (water-soluble and fat-soluble), general functions, Deficiency symptoms of important vitamins (A, D, E, K, B-complex, C).	10
III	Basic Concepts in Metabolism: Concept of metabolism: catabolism vs. anabolism, High-energy compounds: structure and role of ATP, Introduction to carbohydrate metabolism: glycolysis and TCA cycle (overview), Introduction to protein and lipid metabolism (overview, no clinical details), Concept of bioenergetics and metabolic regulation (basic principles), Role of cofactors and coenzymes in metabolic reactions	10

Text Books:

- Vasudevan & Sreekumari – Textbook of Biochemistry for Medical Students

Reference Books:

- Satyanarayana, U. – Essentials of Biochemistry
- Debajyoti Das – Biochemistry
- Lehninger – Principles of Biochemistry

Name of the Course: Practical based on DSC-5/MLT/T/105	
Course Type: Major (DSC)	**Course Code: DSC-6/MLT/P/106**
Contact Hours : 60 Hrs	**Credit: 02**
Hours/Week: 04	**Total Marks: 50**

Practical:

1.	Qualitative analysis of carbohydrates (Molisch's, Benedict's, Barfoed's tests)
2.	Qualitative analysis of proteins (Biuret, Ninhydrin, Xanthoproteic tests)
3.	Qualitative analysis of lipids (Sudan III staining, grease spot test, saponification)
4.	Preparation and use of buffer solutions (acetate and phosphate buffers)
5.	Determination of pH using pH meter and indicators
6.	Colorimetry: Beer-Lambert's law and preparation of a standard curve
7.	Quantitative estimation of glucose using colorimetric methods (DNS or anthrone method)
8.	Effect of pH and temperature on enzyme activity (e.g., salivary amylase)
9.	Study of enzyme inhibition (competitive and non-competitive) using simulated experiments
10.	Isolation of starch or casein from plant/animal sources

Text Books:

- Vasudevan & Sreekumari – Textbook of Biochemistry for Medical Students

Reference Books:

- Satyanarayana, U. – Essentials of Biochemistry
- Debajyoti Das – Biochemistry
- Lehninger – Principles of Biochemistry

Name of the Course : Introduction to Healthcare Systems	
Course Type: GE/OE	**Course Code: GE/OE-1/MLT/T/107**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Introduce the structure, function, and types of healthcare systems.
- Familiarize students with the organization and delivery of healthcare services in India and globally.
- Promote understanding of public health, healthcare institutions, policies, and career pathways.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Describe the basic structure and classification of healthcare systems.
- Explain how healthcare is delivered through public and private sectors.
- Identify key components of the Indian healthcare system and compare with global models.
- Understand the roles of healthcare professionals and institutions in promoting public health.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Healthcare Systems: Definition, objectives, and significance of healthcare systems, Types of healthcare systems: public, private, mixed, Evolution of healthcare systems: historical perspectives, Primary, secondary, and tertiary care: definitions and examples, WHO healthcare system building blocks	10
II	Healthcare Delivery in India: Structure of Indian healthcare system: central, state, and local roles, Rural and urban health services, National Health Mission (NHM) and major government health schemes (PMJAY, Ayushman Bharat), Role of Indian systems of medicine (AYUSH), Role of NGOs, community health workers	10

	(ASHA, ANMs), and Panchayati Raj in health delivery.	
III	Global Healthcare Systems & Public Health Concepts: Comparison of Indian healthcare system with systems in developed countries (UK, USA), Introduction to health policies and regulations (NHP, HIPAA – brief overview), Social determinants of health, Role of public health in disease prevention and health promotion, Career opportunities in healthcare systems: government, private, NGOs & research.	**10**

Text Books:

- Park's Textbook of Preventive and Social Medicine

Reference Books:

- WHO – Building Blocks of Health Systems
- Ministry of Health & Family Welfare – Annual Health Reports
- Bajpai, Vikas – Basics of Health Care Systems
- Selected government websites and open resources (NHM, NITI Aayog, etc.)

Name of the Course: Basic Laboratory Techniques & Safety	
Course Type: (SEC)	**Course Code: SEC-1/MLT/T/108**
Contact Hours : 15 Hrs	**Credit: 01**
Hours/Week: 01	**Total Marks: 50**

Course Objectives:

- Introduce basic laboratory equipment, operations, and handling skills.
- Instill best practices for lab hygiene, chemical/biological safety, and waste disposal.
- Build competency in safe, accurate, and efficient laboratory work aligned with biosafety guidelines.

Course Outcomes (COs) :

After completion of the course, students will be able to -

- Demonstrate safe handling and maintenance of basic laboratory glassware and instruments.
- Follow standard operating procedures (SOPs) and biosafety protocols.
- Identify laboratory hazards and implement safety measures effectively.
- Manage laboratory waste and emergency situations responsibly.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Basic Laboratory Techniques: Introduction to laboratory layout, rules, and conduct, Identification and use of common laboratory glassware (beakers, pipettes, burettes, flasks, etc.), Preparation of solutions: normality, molarity, and dilution techniques, Calibration and use of balances, pH meter, centrifuge, water bath, and microscopes, Use and care of laboratory equipment: do's and don'ts, Accurate measurement and recording of observations.	07
II	Laboratory Safety and Biosafety Guidelines: Types of hazards: physical, chemical, biological, Laboratory safety signs, labels, and PPE (Personal Protective Equipment), Biosafety levels and practices (BSL I & II overview), Good laboratory practices (GLP) and aseptic techniques, Safe	08

	handling of samples, reagents, acids, and flammable substances, Laboratory waste management and disposal protocols (biohazard bins, sharp containers, etc.), Emergency procedures: fire extinguisher use, first aid, spill cleanup, and incident reporting.	

Text Books:

- Basic Clinical Laboratory Techniques by Barbara H. Estridge

Reference Books:

- Laboratory Safety Manual – Indian Council of Medical Research (ICMR)
- WHO – Laboratory Biosafety Manual (3rd edition)
- Manual of Basic Techniques for a Health Laboratory – WHO

II	Dashavidha Pariksha (Tenfold examination) and their clinical significance, Nadi Pariksha (pulse diagnosis) and its historical development, Diagnostics in Siddha: Ennvagai Thervu (Eightfold diagnosis), Diagnostic wisdom in Unani: Mizaj, Nabz, Bolan, and urine analysis.	**10**
III	Evolution, Transmission, and Relevance: Documentation and transmission of diagnostic knowledge: palm leaf manuscripts, oral traditions, Colonial influence and marginalization of traditional diagnostics, Comparative perspective: Indian diagnostic heritage vs. Western clinical laboratory evolution, Contributions of ancient India to pathology, toxicology (Agada Tantra), and surgery, Revival of Indian diagnostic science in post-independence India: role of AYUSH, CCRAS, and educational reforms.	**10**

Text Books:

- Ministry of AYUSH – Ayurveda and Indian Medical Heritage publications

Reference Books:

- Charaka Samhita – English/Hindi translations by P.V. Sharma
- Sushruta Samhita – Edited by Kaviraj Kunjalal Bhishagratna
- IKS Division, Ministry of Education – Online modules
- Valiathan, M.S. – The Legacy of Charaka and The Legacy of Sushruta

Name of the Course: Indian History of Diagnostic Sciences	
Course Type: IKS	**Course Code: IKS-1/MLT/T/110**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Explore the origin, growth, and evolution of diagnostic sciences in ancient India.
- Understand traditional diagnostic principles and tools from classical Indian medical literature.
- Trace the historical continuity of diagnostic practices and their influence on contemporary systems.

Course Outcomes (COs) :

After completion of the course, students will be able to -

- Describe the historical development of diagnostic systems in Ayurveda, Siddha, and Unani traditions.
- Explain traditional tools and methods used in early Indian diagnostic sciences.
- Relate the evolution of ancient Indian diagnostics to current clinical laboratory practices.
- Appreciate India's scientific heritage in health and diagnostic knowledge systems.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Foundations of Diagnostic Thought in Ancient India: Diagnostic thinking in the Vedic period: disease classification in Atharva Veda, Foundations of Ayurveda: diagnostic references in Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, Philosophical and theoretical basis: Tridosha Siddhanta, Panchamahabhuta, Sapta Dhatus, Role of Roga Pariksha (examination of disease) and Rogi Pariksha (examination of patient).	10
	Classical Indian Diagnostic Practices: Ashtavidha Pariksha (Eightfold Examination) in Ayurveda,	

Name of the Course : Practical based on SEC-1/MLT/T/108	
Course Type: (SEC)	**Course Code: SEC-2/MLT/P/109**
Contact Hours : 30 Hrs	**Credit: 01**
Hours/Week: 04	**Total Marks: 50**

Practical:

1.	Identification, use, and calibration of basic laboratory glassware and measuring instruments
2.	Preparation of standard solutions and serial dilutions (normal, molar, percentage solutions)
3.	Operation and safety handling of laboratory equipment: centrifuge, pH meter, microscope, and balance
4.	Demonstration and application of Personal Protective Equipment (PPE) and biosafety cabinet use
5.	Segregation of biomedical waste and practical training on disposal, spill management, and emergency response

Text Books:

- Basic Clinical Laboratory Techniques by Barbara H. Estridge

Reference Books:

- Laboratory Safety Manual – Indian Council of Medical Research (ICMR)
- WHO – Laboratory Biosafety Manual (3rd edition)
- Manual of Basic Techniques for a Health Laboratory – WHO

Name of the Course: Developing Communication Skills in English-I (Common for all Faculty)	
Course Type: (AEC)	**Course Code: AEC-1/ENG/106**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**
(Syllabus of above course is available on respective BOS or College Website)	

Co-Curricular Courses (CC-1)

(Choose any one subject as a CC-1 from following pool of subjects)

Course Type: CC	**Credit: 02**
Contact Hours : 60 Hrs	**Total Marks: 50**
Hours/Week: 04	

Course Code:	**Name of the Course**
CC-1/PHYE/108	Health & Wellness
CC-1/YOG/108	Yoga Education
CC-1/NSS/108	NSS
CC-1/NCC/108	NCC
CC-1/CUL/108	Cultural Activity

(Syllabus of above course is available on respective BOS or College Website)

Curriculum
B.Sc. Medical Laboratory Technology (MLT)
F.Y. Semester-II

Name of the Course : General Pathology	
Course Type: Major (DSC)	**Course Code: DSC-7/MLT/T/201**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Provide fundamental knowledge of mechanisms underlying disease processes.
- Explain the structural and functional changes occurring in cells and tissues during illness.
- Develop a strong foundation for understanding systemic pathology and laboratory diagnosis in next semesters.

Course Outcomes (COs) :
After completion of the course, students will be able to –

- Define key concepts in pathology and describe various causes of disease.
- Explain processes of cell injury, inflammation, repair, and adaptation.
- Understand the basic mechanisms of hemodynamic disturbances and neoplasia.
- Relate pathological changes at the cellular/tissue level with laboratory findings.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction and Cellular Adaptation: Definition, scope, and branches of pathology, Cellular responses to stress and injury: atrophy, hypertrophy, hyperplasia, metaplasia, Reversible and irreversible cell injury: causes and morphological changes, Cell death: necrosis (types), apoptosis (mechanism and significance), Intracellular accumulations: fat, protein, pigments (lipofuscin, melanin, hemosiderin).	10
II	Inflammation and Repair: Acute inflammation: definition, causes, cardinal signs, vascular and cellular events, Chronic inflammation: causes, characteristics, granulomatous inflammation, Chemical mediators of	10

	inflammation and their role, Wound healing: healing by first and second intention, Factors influencing wound healing, Tissue regeneration and fibrosis.	
III	Hemodynamic Disorders and Neoplasia: Edema: types, pathogenesis, and clinical relevance, Thrombosis: Virchow's triad, fate of thrombus, Embolism and infarction: causes and consequences, Shock: types and pathophysiology, Neoplasia: definitions, differences between benign and malignant tumors, Nomenclature, spread of tumors, and general effects of neoplasia.	**10**

Text Books:

- Harsh Mohan – Textbook of Pathology

Reference Books:

- Robbins & Cotran – Basic Pathology
- Ramadas Nayak – Exam Preparatory Manual for Undergraduates: Pathology
- Culling – Manual of Histological Techniques

Name of the Course: Practical based on DSC-7/MLT/T/201	
Course Type: (DSC)	**Course Code: DSC-8/MLT/P/202**
Contact Hours : 60 Hrs	**Credit: 02**
Hours/Week: 04	**Total Marks: 50**
Practical:	
1.	Study and identification of various types of laboratory glassware and equipment in pathology
2.	Collection, labeling, and preservation of pathological specimens (tissues, fluids)
3.	Preparation and staining of blood smears; identification of normal blood cells
4.	Introduction to fixatives and fixation techniques (formalin, alcohol-based)
5.	Demonstration of tissue processing and embedding methods
6.	Section cutting using microtome and preparation of histological slides (demo/practice)
7.	Hematoxylin and Eosin (H&E) staining procedure and slide mounting
8.	Identification of pathological changes in prepared slides: necrosis, inflammation
9.	Demonstration of cytological techniques (Pap smear, FNAC basics)
10.	Study of museum specimens or digital images showing edema, thrombus, tumors, etc.
Text Books: • Harsh Mohan – Textbook of Pathology	
Reference Books: • Robbins & Cotran – Basic Pathology • Ramadas Nayak – Exam Preparatory Manual for Undergraduates: Pathology • Culling – Manual of Histological Techniques	

Name of the Course: General Microbiology	
Course Type: Major (DSC)	**Course Code: DSC-9/MLT/T/203**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Introduce the basic concepts, history, and scope of microbiology.
- Explain the classification, structure, and functions of microorganisms.
- Familiarize students with microbial cultivation, growth, and control methods.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Describe the scope, development, and major contributors to the field of microbiology.
- Classify and differentiate microorganisms based on structure and characteristics.
- Explain microbial growth, reproduction, and nutritional requirements.
- Apply sterilization and disinfection methods in microbiological work.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Fundamentals of Microbiology: History and scope of microbiology, Contributions of Louis Pasteur, Robert Koch, and Antonie van Leeuwenhoek, Types of microorganisms: bacteria, fungi, algae, protozoa, viruses (basic properties), Prokaryotic vs. eukaryotic microorganisms, Applications of microbiology in environment, food, industry, and research.	10
II	Microbial Structure and Classification: Structure and function of bacterial cell: cell wall, capsule, flagella, pili, nucleoid, Morphology and classification of bacteria (coccus, bacillus, spirillum, etc.), Classification and general features of fungi, protozoa, algae, Introduction to	10

	viruses: structure, types (DNA/RNA), and replication (lytic and lysogenic cycle), Overview of microbial taxonomy and nomenclature.	
III	Microbial Nutrition, Growth, and Control: Nutritional types of microorganisms: autotrophs, heterotrophs, phototrophs, chemotrophs, Microbial growth: phases of bacterial growth curve, Factors affecting growth: temperature, pH, oxygen, water activity, Culture media: types and preparation (broth, agar, selective, differential), Methods of sterilization: heat, filtration, radiation, chemical agents, Disinfection: types, methods, and applications	**10**

Text Books:

- Ananthanarayan – Textbook of Microbiology (relevant introductory chapters)

Reference Books:

- Pelczar, Chan & Krieg – Microbiology: Concepts and Applications
- Prescott, Harley & Klein – Microbiology
- Cappuccino & Sherman – Microbiology: A Laboratory Manual

Name of the Course: Practical based on DSC-9/MLT/T/203	
Course Type: (DSC)	**Course Code: DSC-10/MLT/P/204**
Contact Hours : 60 Hrs	**Credit: 02**
Hours/Week: 04	**Total Marks: 50**
Practical:	
1.	Familiarization with microbiology laboratory rules, safety practices, and PPE
2.	Cleaning, sterilization, and preparation of glassware and culture media (agar & broth)
3.	Preparation and sterilization of nutrient agar and potato dextrose agar
4.	Inoculation techniques: streak plate, pour plate, and spread plate methods
5.	Microscopic observation of bacteria using simple staining
6.	Differential staining: Gram staining technique and interpretation
7.	Staining of fungal elements using lactophenol cotton blue
8.	Study of bacterial growth curve using turbidity measurements (OD600)
9.	Testing effectiveness of physical and chemical disinfectants
10.	Isolation of microorganisms from given sample and morphological (Colony) study

Text Books:

- Ananthanarayan – Textbook of Microbiology (relevant introductory chapters)

Reference Books:

- Pelczar, Chan & Krieg – Microbiology: Concepts and Applications
- Prescott, Harley & Klein – Microbiology
- Cappuccino & Sherman – Microbiology: A Laboratory Manual

Name of the Course: Clinical Biochemistry	
Course Type: Major (DSC)	**Course Code: DSC-11/MLT/T/205**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- Provide a conceptual understanding of biochemical alterations in health and disease.
- Introduce biochemical diagnostic markers and their interpretation in clinical practice.
- Familiarize students with laboratory analysis of blood, urine, and other body fluids in pathological conditions.
- Build capacity to correlate biochemical test results with specific diseases.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Explain the biochemical basis of common metabolic and organ-specific disorders.
- Describe the principles and interpretation of biochemical tests in clinical diagnostics.
- Identify critical biochemical markers used in the diagnosis of liver, kidney, and endocrine diseases.
- Apply knowledge to assist in laboratory analysis and patient sample interpretation.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Biochemical Investigations in Liver and Kidney Function: Liver Function Tests (LFT): bilirubin (direct/indirect), ALT, AST, ALP, GGT, serum proteins, prothrombin time, Interpretation of LFT in jaundice, hepatitis, cirrhosis, Kidney Function Tests (KFT): urea, creatinine, uric acid, electrolytes (Na^+, K^+, Cl^-), GFR, Urine analysis: proteinuria, hematuria, ketonuria, glycosuria (clinical interpretation only).	10
	Clinical Enzymology and Cardiac Markers: Clinical	

II	importance of enzymes: ALT, AST, ALP, LDH, CK, GGT, Isoenzymes and diagnostic relevance (LDH, CK-MB), Cardiac biomarkers: Troponins, Myoglobin, CK-MB, BNP, Interpretation of enzyme levels in myocardial infarction, liver, bone, and muscle diseases, Interfering factors in enzyme estimation (hemolysis, drugs, sample handling).	10
III	Endocrine and Metabolic Disorders: Biochemical assessment in diabetes mellitus: blood glucose, HbA1c, urine glucose, ketone bodies, Thyroid function tests (TFT): T3, T4, TSH – significance and interpretation, Lipid profile: total cholesterol, LDL, HDL, triglycerides; relevance in atherosclerosis, Interpretation of calcium, phosphate, and vitamin D in bone metabolism, Fluid and electrolyte imbalance: dehydration, acidosis, alkalosis basics.	10

Text Books:

- Thomas M. Devlin – Textbook of Biochemistry with Clinical Correlations

Reference Books:

- Vasudevan & Sreekumari – Textbook of Biochemistry for Medical Students (Clinical Sections)
- Ramakrishnan & Prasannan – Practical Clinical Biochemistry
- Bishop, Fody & Schoeff – Clinical Chemistry: Principles, Techniques, and Correlations.

Name of the Course : Fundamentals of Human Health and Disease	
Course Type: GE/OE	**Course Code: GE/OE-2/MLT/T/207**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- To introduce students to the basic concepts of human health, wellness, and disease.
- To describe the structure and function of major human organ systems in health and disease.
- To develop an awareness of common disorders, prevention strategies, and diagnostic methods.
- To foster appreciation for the role of diagnostics in public and personal health.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Describe the fundamental anatomy and physiology of major human organ systems.
- Explain the general mechanisms of disease development.
- Identify common lifestyle and infectious diseases and their prevention.
- Understand the importance of early diagnosis, screening, and health awareness.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Introduction to Health and Human Body Systems: Definition of health and disease, Overview of homeostasis and wellness, Introduction to human organ systems: structure and function (digestive, respiratory, circulatory, urinary, nervous), Health indicators and public health concepts.	10
	Disease Mechanisms and Common Disorders: Basic pathological processes: inflammation, infection, allergy, cancer, Communicable diseases: tuberculosis, malaria,	

II	HIV/AIDS, hepatitis, Non-communicable diseases: diabetes, hypertension, cardiovascular disease, cancer, Lifestyle and nutrition-related disorders.	**10**
III	Prevcntion, Diagnostics, and Health Promotion: Concepts of prevention: primary, secondary, and tertiary, Screening tests and common diagnostics: BP, blood glucose, BMI, urine tests, Vaccination and immunization programs in India, Role of laboratory diagnosis and health check-up camps, Health education and awareness: hygiene, mental health, fitness.	**10**

Text Books:

- Park's Textbook of Preventive and Social Medicine

Reference Books:

- Tortora G.J. – Principles of Anatomy and Physiology
- WHO Reports on Communicable and Non-Communicable Diseases
- Basic Health Guides from Ministry of Health & Family Welfare (India)

Name of the Course: Phlebotomy and Specimen Handling Techniques	
Course Type: (VSC)	**Course Code: VSC-1/MLT/T/208**
Contact Hours : 30 Hrs	**Credit: 01**
Hours/Week: 02	**Total Marks: 50**

Course Objectives:

- To provide students with essential skills in blood collection and specimen handling.
- To train students in safe, aseptic, and patient centered phlebotomy practices.
- To familiarize students with pre-analytical errors and quality assurance in sample management.
- To enable students to perform basic specimen transport, labeling, and documentation.

Course Outcomes (COs) :

After completion of the course, students will be able to –

- Describe the procedures, equipment, and safety measures used in phlebotomy.
- Perform venipuncture and capillary blood collection techniques confidently.
- Label, transport, and store biological specimens as per laboratory standards.
- Demonstrate professionalism and infection control while handling patients and specimens.

Module No.	Topics / actual contents of the syllabus	Contact Hours
I	Principles and Practices of Phlebotomy: Introduction to Phlebotomy, Definition and scope of phlebotomy in laboratory diagnostics, Role and responsibilities of a phlebotomist, Professionalism, ethics, and legal considerations, Patient rights, consent, and confidentiality. Blood Collection Techniques-Types of blood samples: venous, capillary, arterial (overview), Venipuncture method: site selection, steps, precautions, Capillary sampling: sites (fingertip, heel), lancet use, sample collection, Overview of equipment: needles,	07

	syringes, vacutainers, lancets, tourniquet, Order of draw: importance and tube sequence (EDTA, citrate, etc.). Special Cases and Troubleshooting- Difficult vein identification and strategies, Pediatric and geriatric phlebotomy considerations, Management of complications: hematoma, fainting, prolonged bleeding, Phlebotomy in ICU/emergency setups: safety and coordination with clinical staff.	
II	Pre-analytical Procedures, Specimen Handling, and Safety: Pre-analytical Considerations-Patient preparation: fasting, posture, timing, Phlebotomy requisition form: elements and accuracy, Labeling protocols: unique ID, barcoding, timing, color-coding, Preventing pre-analytical errors: hemolysis, underfilling, wrong labeling. Specimen Handling and Transport-Proper mixing of blood samples (e.g., anticoagulants), Storage conditions: room temperature, refrigeration, light protection, Transporting biological specimens: thermal control, time sensitivity, Biohazard labeling and leakage prevention. Infection Control and Waste Management- Use of PPE during phlebotomy Needle stick injury prevention and reporting protocol, Biomedical waste disposal: segregation and color coding, Disinfection of work surfaces and spills.	**08**

Text Books:

- WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy

Reference Books:

- Basic Clinical Laboratory Techniques – Barbara H. Estridge & Anna P. Reynolds
- Clinical Laboratory Science: The Basics and Routine Techniques – Jean Jorgenson Linné & Karen Munson Ringsrud
- Phlebotomy Essentials – Ruth E. McCall & Cathee M. Tankersley
- Clinical Procedures for Safer Patient Care – Glynda Rees Doyle & Jodie Anita McCutcheon

Name of the Course: Practical based on VSC-1/MLT/T/208	
Course Type: (VSC)	**Course Code: VSC-2/MLT/P/209**
Contact Hours : 30 Hrs	**Credit: 01**
Hours/Week: 04	**Total Marks: 50**

Practical:

1.	Demonstration of Phlebotomy Equipment and Safety Gear
2.	Simulation of Venipuncture and Capillary Blood Collection (using dummies/simulators)
3.	Sample Labeling and Requisition Form Filling
4.	Specimen Storage and Transport Techniques
5.	Biomedical Waste Segregation and Infection Control Practices

Text Books:

- WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy

Reference Books:

- Basic Clinical Laboratory Techniques – Barbara H. Estridge & Anna P. Reynolds
- Clinical Laboratory Science: The Basics and Routine Techniques – Jean Jorgenson Linné & Karen Munson Ringsrud
- Phlebotomy Essentials – Ruth E. McCall & Cathee M. Tankersley
- Clinical Procedures for Safer Patient Care – Glynda Rees Doyle & Jodie Anita McCutcheon

Ability Enhancement Course (AEC-2) (Choose any one subject as a AEC-2 from following pool of subjects)	
Course Type: (AEC)	**Credit: 02**
Contact Hours : 30 Hrs	**Total Marks: 50**
Hours/Week: 02	
Course Code:	**Name of the Course**
AEC-2/ENG/206	Developing Communication Skills in English-II
AEC-2/MAR/206	Rojgarabhimukh Marathi (रोजगाराभिमुख मराठी)
AEC-2/HIN/206	Hindi Cinema Aur Sahitya (हिंदी सिनेमा और साहित्य)
AEC-2/SAN/206	Sanskrut Sambhashangyan (संस्कृत संभाषणज्ञान)
(Syllabus of above courses is available on respective BOS or College Website)	

Name of the Course: Constitution of India	
Course Type: (VEC)	**Course Code: VEC-1/POL/207**
Contact Hours : 30 Hrs	**Credit: 02**
Hours/Week: 02	**Total Marks: 50**
(Syllabus of above course is available on respective BOS or College Website)	

Co-Curricular Courses (CC-2)

(Choose any one subject as a CC-2 from following pool of subjects)

Course Type: CC	**Credit: 02**
Contact Hours : 60 Hrs	**Total Marks: 50**
Hours/Week: 04	
Course Code:	**Name of the Course**
CC-2/PHYE/208	Sports & Fitness
CC-2/YOG/208	Yoga Education
CC-2/NSS/208	NSS
CC-2/NCC/208	NCC
CC-2/CUL/208	Cultural Activity
(Syllabus of above course is available on respective BOS or College Website)	