

Re-Accredited 'B++' 2.86 CGPA by NAAC

VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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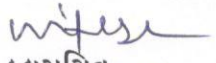
સંદર્ભ: યુનિવર્સિટી કાર્યાલયના તા.૧૮-૦૮-૨૦૨૩, ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૨૧૫૪૯/૨૦૨૩

--: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવેલ NEP-2020 અંતર્ગત વિજ્ઞાન વિદ્યાશાખાનાં સ્ટ્રક્ચર મુજબનો B.Sc. Medical Laboratory Technology Sem-1 & 2 નો Major, Minor, Multi-disciplinary અને SEC નાં અભ્યાસક્રમમાં પ્રેક્ટીકલનાં પેપરમાં સુધારા સાથે મેડીકલ ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા. ૦૧/૦૫/૨૦૨૪ની સભાનાં ઠરાવ ક્રમાંક: ૩ થી રિવાઈઝ કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૧/૩/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંક:૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય ઈ.યા.કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક : એસ./MLT/પરિપત્ર/૧૦૨૨૭/૨૦૨૪
તા.૧૪-૦૫-૨૦૨૪


કુલસચિવ

પ્રતિ,

- ૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારું.
- ૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
- ૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.



Veer Narmad South Gujarat University, Surat

Syllabus of

B. Sc. Medical Laboratory Technology

(As per NEP- 2020)

Effective from 2023 - 2024

B. Sc. Medical Laboratory Technology

Title of the Program: B. Sc. Medical Laboratory Technology

Eligibility: 12th Science

Duration: 3 years (Degree) /4 years (Honours/ Honours with Research)

Medium of Instruction: English

Program Outcome:

Bachelor of Science (B.Sc.) in Medical Laboratory Technology program is designed to prepare students for a career in laboratory. This course provides in-depth understanding and on hand training of principles, concept and techniques of Clinical laboratory tests for disease diagnosis. Some of the major areas that will be covered in this program are: Microbiology, Immunology, Biochemistry and Enzymology, Histology and Cytology, Hematology and Blood Banking, Pathology and Parasitology, Laboratory Management and Quality Control, Biostatistics, Toxicology, Cancer and Tumor marker etc.

At the end of the program, students will be able to...

Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations.

Perform routine clinical laboratory procedures within acceptable quality control parameters in different areas of clinical laboratories like; Haematology, Clinical Pathology, Biochemistry, Blood Bank and Microbiology.

Demonstrate technical skills, social behavior and professional awareness for functioning effectively as a laboratory technologist or laboratory technician.

Function in an ethical and professional manner without bias against any ethnicity, race, religion, caste or gender.

Program Specific Outcome:

B. Sc. Medical Laboratory Technology is concerned with the pre-diagnosis, diagnosis, post diagnosis and prevention of disease through the use of clinical laboratory tests. Doctors rely on laboratory investigation for diagnosing and treating diseases. The programme covers the basics of pre-clinical subjects such as Biochemistry, Pathology, Histology and Cytology, Microbiology, Immunology, Parasitology, Haematology, Blood banking, Laboratory Management and Instrumentation and Recent advances in diagnostic techniques. Medical laboratory technologist performs these tests by analysing different specimens like, blood, body fluids, tissues, urine, stool, sputum, semen etc.

At the end of programme, the student shall be able to:

Perform all the diagnostic techniques.
 Use discretely the essential laboratory services.
 Manage all types of clinical diagnostic methods.
 Handle and operate the modern equipments and instruments in laboratory test.
 Develop leadership qualities to function effectively as a leader in the laboratory environment.
 Render services to the laboratory set up and to communicate effectively with the doctors, patients and the hospital management.
 Development of skill and competency in data processing, reporting and maintenance of records & Laboratory investigations.
 Apply safety precautions, quality assurance, biomedical waste management, automation in the laboratory.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Medical Laboratory Technology Major

Course Structure of Semester I & II

SEMESTER – I							
Course Code	Title of The Course	Course Credit	Hrs. Per Week	Internal Exam Marks	External Exam Marks	Duration of External Exam (Hr.)	Total Marks
MLT-MJ-101	Fundamentals of Medical Laboratory Technology	03	03	35	35	02	70
MLT-MJ-102	Human Anatomy	03	03	35	35	02	70
MLTP-MJ-101	Practicals Based on Fundamentals of Medical Laboratory Technology	01	02	15	15	02	30
MLTP-MJ-102	Practicals Based on Human Anatomy	01	02	15	15	02	30
	Total	08	10	100	100		200
SEMESTER – II							
MLT-MJ-201	Laboratory Specimens	03	03	35	35	02	70
MLT-MJ-202	Laboratory Instruments and Equipments	03	03	35	35	02	70
MLTP-MJ-201	Practicals Based on Laboratory Specimens	01	02	15	15	02	30
MLTP-MJ-202	Practicals Based on Laboratory Instruments and Equipments	01	02	15	15	02	30
	Total	08	10	100	100		200

SEMESTER I

MLT-MJ-101: FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY

Semester: I	
Course (subject) Code	MLT-MJ-101
Subject Title	Fundamentals of Medical Laboratory Technology
Course Type	Major
Credit	3
Course Level	100-199
Teaching Hour/ Week	3 Hours
Teaching Time	15×3= 45 Hours
Subject Outcome	At the end of the course, the students will get knowledge of Basics of clinical laboratory, Standard clinical laboratory set up and its types Basics of clinical laboratory organization Laboratory Ethics and Code of safe laboratory practice Different types of glassware, its use, calibration and cleaning Laboratory hazards and safety

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Introduction to Clinical Laboratory	15 Hr.
1.1	Introduction: Health disease-health Cycle	
1.2	Functional Components and Role of Individual Components of Clinical Laboratory	
1.3	A Standardized Clinical Laboratory Set Up	
1.4	Various Types of Laboratories and Commonly Requested Laboratory Tests in India and other Developing Countries	
1.5	Introduction to Laboratory wares: Glassware, Plastic wares and Accessories	
Unit-2	Laboratory Organization and Ethics	15 Hr.
2.1	Organization of Clinical Laboratory	
2.2	Responsibilities of Medical Laboratory Technologist	
2.3	Factors reducing and increasing productivity of a Laboratory	
2.4	Professional Ethics and Code of Conduct for Medical Laboratory Professional	
2.5	Medico-Legal Aspects of Clinical Practice	
Unit-3	Laboratory Accidents and Safety	15 Hr.
3.1	Laboratory Hazards- Physical, Chemical and Biological, Accidents and Safety Measures in Clinical Laboratory	
3.2	Code of Safe Laboratory Practice	
3.3	First Aid in Laboratory	
3.4	Biosafety Level and Biosafety Programme	
3.5	Universal work precautions for Laboratory Personnel	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	J. Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	District Laboratory Practice in Tropical Countries, Part 1, 2 nd Edition	Monica Cheesbrough	Cambridge University Press
5	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6 th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD
6	Manual of Basic Techniques for a Health Laboratory	WHO	World Health Organization (2003)

MLT-MJ-102: HUMAN ANATOMY

Semester: I	
Course (subject) Code	MLT-MJ-102
Subject Title	Human Anatomy
Course Type	Major
Credit	3
Course Level	100-199
Teaching Hour/ Week	3 Hours
Teaching Time	15×3= 45 Hours
Subject Outcome	At the end of the course, the students will get knowledge of How our body is built and how it works. The structure, composition and function of included organs and organ systems in normal human body and more emphasis given to those relevant for medical laboratory technology students How the organ systems function and interrelate. Basic technical terminology and language associated with anatomy.

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Cells & Tissues	15 Hr.
1.1	Cell - structure & function Plasma Membrane Cell Organelles Cell Cycle Transport of Substance across cell membrane	
1.2	Tissues 1.2.1 Epithelial Tissue 1.2.2 Connective Tissue 1.2.3 Muscular Tissue 1.2.4 Nervous Tissue	
Unit-2	Digestive System and Genitourinary System	15 Hr.
2.1	Digestive System 2.1.1 Components and function 2.1.2 Basic anatomy and Function of Alimentary Organs: Salivary Gland, Stomach, Small Intestine, Large Intestine 2.1.3 Basic anatomy of Accessary organs: Pancreas, Liver and Biliary Tract	
2.2	Genitourinary System 2.2.1 Components and function of Urinary System and Reproductive System 2.2.2 Basic anatomy of Kidney and associated organs 2.2.3 Basic anatomy of Male reproductive organs, Female reproductive organs	
Unit-3	Respiratory and Central Nervous System	15 Hr.
3.1	Respiratory System 3.1.1 Components and function of Respiratory System 3.1.2 Basic anatomy of Upper Respiratory Tract organs: Nose, Larynx, Pharynx, Trachea 3.1.3 Basic anatomy of Lower Respiratory Tract organs: Bronchi, Bronchioles and Alveoli and Lungs	
3.2	Central Nervous System	

3.2.1 Components and function of Central Nervous System
3.2.2 Basic anatomy of Brain: Cerebrum, Thalamus, Hypothalamus, Mid Brain, Pons, Medula oblongata and Cerebellum
3.2.3 Basic anatomy of Spinal Cord

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Anatomy & Physiology in health & illness, 11 th edition, (2014)	Ross & Wilson	Elsevier Publications
2	Principles of Anatomy and Physiology, 14 th edition,	Gerard J. Tortora and Bryan H. Derrickson	Wiley Publications
3	Basics in Human Anatomy for B.Sc. Paramedical Courses 1 st edition (2008)	Priya Ranganath, Leelavathy N	Jaypee Publishers
4	Textbook of Physiology for MLT, 1 st edition (2016)	A. K. Jain	Avichal Publishing Company
5	Human Anatomy, 7 th edition (2016)	Chaurasia B D	CBS Publishers

**MLTP-MJ-101: PRACTICALS BASED ON FUNDAMENTALS OF MEDICAL
LABORATORY TECHNOLOGY**

Semester: I	
Course (subject) Code	MLTP-MJ-101
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals Based on Fundamentals of Medical Laboratory Technology
Subject Outcome	At the end of the course, the students will able to, <ul style="list-style-type: none"> • Identify and know the use of different glassware • Know cleaning procedure as well as calibration of glassware • Do first aid for types of laboratory accidents

Course Content

1. Study of Laboratory Glassware
2. Cleaning of New Laboratory Glassware
3. Cleaning of Old Laboratory Glassware
4. Calibration of 1 ml, 5 ml pipette
5. Study of Laboratory Hazards
6. Prevention of Laboratory Hazards
7. First Aid measures in Clinical Laboratory

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6 th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD
4	Anatomy & Physiology in health & illness, 11 th edition, (2014)	Ross & Wilson	Elsevier Publications
5	Principles of Anatomy and Physiology, 14 th edition,	Gerard J. Tortora and Bryan H. Derrickson	Wiley Publications

MLTP-MJ-102: PRACTICALS BASED ON HUMAN ANATOMY

Semester: I	
Course (subject) Code	MLTP-MJ-102
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals Based On Human Anatomy
Subject Outcome	At the end of the course, the students will able to, <ul style="list-style-type: none">• Recognize the anatomical structures of Cell, Tissues, Organs and System of Human body

Course Content

1. Cell Structure Study from models/charts/ Diagram
2. Study of Epithelial Tissue from models/charts/ Diagram
3. Study of Nervous Tissue from models/charts/ Diagram
4. Study of Connective Tissue from models/charts/ Diagram
5. Study of Muscular Tissue from models/charts/ Diagram
6. Demonstration of respiratory system from models/charts/ Diagram / Diagram
7. Demonstration of digestive system from models/charts/ Diagram
8. Demonstration of urinary system from models/charts/ Diagram
9. Demonstration of nervous system from models/charts/ Diagram
10. Demonstration of reproductive system from models/charts/ Diagram

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6 th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD
4	Anatomy & Physiology in health & illness, 11 th edition, (2014)	Ross & Wilson	Elsevier Publications
5	Principles of Anatomy and Physiology, 14 th edition,	Gerard J. Tortora and Bryan H. Derrickson	Wiley Publications

SEMESTER II

MLT-MJ-201: LABORATORY SPECIMENS

Semester: II	
Course (subject) Code	MLT-MJ-201
Subject Title	Laboratory Specimens
Course Type	Major
Credit	3
Course Level	100-199
Teaching Hour/ Week	3 Hours
Teaching Time	15×3= 45 Hours
Subject Outcome	<p>The students are imparted basic training of theoretical and practical in the field of clinical pathology. The training in this subject enables the students</p> <p>To carry out routine clinical laboratory investigation (blood, urine, stool etc.)</p> <p>Made to learn collection of clinical samples and their processing</p> <p>Pathological sample analysis reporting and recording of data</p>

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Blood	15 Hr.
1.1	Preparation of material and patient for blood collection	
1.2	Vacutainer system	
1.3	Responsibilities of a Phlebotomist	
1.4	Blood collection procedure: Venipuncture and Capillary puncture and Specimen rejection criteria	
1.5	Processing, Storage and Transportation of blood	
Unit-2	Urine and Stool Specimen	15 Hr.
2.1	Urine 2.1.1 Container for collection 2.1.2 Collection method and types: Collection for a) Screening b) Quantitative analysis c) Bacteriological examination d) Special collection Techniques 2.1.3 Preservation, Storage and Transportation of Urine	
2.2	Stool 2.2.1 Container for collection 2.2.2 Collection method 2.2.3 Preservation and Transportation	
2.3	Miscellaneous Specimen (Collection, Preservation and Transportation) 2.3.1 Sputum 2.3.2 Throat and Mouth specimen 2.3.3 Urogenital specimen 2.3.4 Pus, Eye and Ear specimen	
Unit-3	Biomedical Waste Management	15 Hr.
3.1	Introduction and Classification	
3.2	Segregation of BMW	
3.3	Treatment of BMW	
3.4	Disposal of BMW	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd ed., (2014)	Godkar P. B.	Bhalani Publishing House.
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Clinical Diagnosis and Management by Laboratory Methods/17 th	John Bernard Henry	W. B. Saunders Company
4	Medical Microbiology and Parasitology/4 th	B. S. Nagoba Asha Pichare	ELSEVIER

MLT-MJ-202: LABORATORY INSTRUMENTS AND EQUIPMENTS

Semester: II	
Course (subject) Code	MLT-MJ-202
Subject Title	Laboratory Instruments and Equipments
Course Type	Major
Credit	3
Course Level	100-199
Teaching Hour/ Week	3 Hours
Teaching Time	15×3= 45 Hours
Subject Outcome	At the end of the course, the students will get knowledge of Working Principle, components, operation and use of various sterilizing equipments like Autoclave, Hot air oven Incinerator and various types of filters Working Principle, components, operation and use of various equipment like centrifuge, weighing balance, distillation unit and incubator.

Course Content:

Unit No.	Content	Teaching Hours	
Unit-1	Microscope	15 Hr.	
1.1	Introduction and Properties of light		
1.2	Basic terminologies: Refraction and refractive Index, magnification, Numerical aperture, Resolution and Resolving power		
1.3	Components, working principle and operation of Bright field microscope		
1.4	Care and maintenance of microscope		
Unit-2	pH meter and Colorimeter	15 Hr.	
2.1	pH meter 2.1.1 Principle and use 2.1.2 Component 2.1.3 Care and maintenance		
2.2	Colorimeter 2.2.1 Principle and use 2.2.2 Component 2.2.3 Care and maintenance		
Unit-3	Other Laboratory Instruments		15 Hr.
3.1	Equipments of Sterilization: Autoclave and Hot Air Oven		
3.2	Weighing balance		
3.3	Centrifuge		
3.4	Incubator		

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	H.A. Modi	Akta Prakashan, Nadiad
2	Prescott's Microbiology, 10 th edition	Willey. J.M, Sherwood L.M and Woolverton C.J., (2017)	McGraw- Hill Education
3	Medical Laboratory Science- Theory and Practice	A.Kolhatkar , J Ochei.	Tata McGraw- Bhalani Pub.
4	Textbook of Medical Laboratory Technology/ 3 rd	P. B. Godkar, D.P. Godkar.	Bhalani Publishing House Mumbai, India
5	Elements of Microbiology, 2 nd edition	D. Darji	Nirav Prakashan, Ahmedabad

MLTP-MJ-201: PRACTICALS

Semester: II	
Course (subject) Code	MLTP-MJ-201
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals
Subject Outcome	At the end of the course, the students will able to <ul style="list-style-type: none">• Handling of various laboratory specimen• Separate serum and plasma from blood• Collection and transportation of various laboratory specimens• Manage BMW

Course Content

1. Collection of Blood by Venipuncture
2. Collection of Blood by Capillary puncture
3. Preparation of Plasma
4. Preparation of Serum
5. Collection of laboratory specimens: Urine, Stool, Sputum, Throat and Mouth specimen, Urogenital specimen, Pus, Eye and Ear specimen
6. Storage and Transportation of laboratory specimens: Urine, Stool, Sputum, Throat and Mouth specimen, Urogenital specimen, Pus, Eye and Ear specimen
7. Segregation of BMW
8. Treatment and Disposal of BMW

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, Volume 1/ 3 rd	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1/ 2 nd	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Technology Methods and Interpretations, Volume 1/ 6 th	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD
4	Elementary Microbiology, fundamentals of Microbiology, Volume-1	H. A. Modi	Akta Prakashan
5	Experimental Microbiology, Volume 1&2	Rakesh Patel	Aditya Pub

MLTP-MJ-202: PRACTICALS

Semester: II	
Course (subject) Code	MLTP-MJ-202
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals
Subject Outcome	At the end of the course, the students will able to <ul style="list-style-type: none">• Operate various basic instruments and equipments of laboratory• Use microscope to observe bacteria

Course Content

1. Different Methods for Measurement of pH
2. Operation of pH meter
3. Adjustment of pH by pH meter.
4. Operation of colorimeter
5. Operation of centrifuge
6. Operation of weighing balance
7. Sterilization by Hot air oven
8. Sterilization by autoclave

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, Volume 1/ 3 rd	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1/ 2 nd	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
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5	Experimental Microbiology, Volume 1&2	Rakesh Patel	Aditya Pub

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Medical Laboratory Technology

Minor Elective Course Structure of Semester I & II

SEMESTER – I							
Course Code	Title of The Course	Course Credit	Hrs. Per Week	Internal Exam Marks	External Exam Marks	Total Marks	Duration of External Exam (Hr.)
MLT-ME-101	Instruments and Equipments of Medical Laboratory	02	02	25	25	50	01
MLTP-ME-101	Practicals Based on Instruments and Equipments of Medical Laboratory	02	04	25	25	50	04
SEMESTER – II							
MLT-ME-201	Laboratory Specimens and Biomedical Waste Management	02	02	25	25	50	01
MLTP-ME-201	Practicals Based on Laboratory Specimens and Biomedical Waste Management	02	04	25	25	50	04

SEMESTER I

MLT-ME-101: INSTRUMENTS AND EQUIPMENTS OF MEDICAL LABORATORY

Semester: I	
Course (subject) Code	MLT- ME -101
Subject Title	Instruments and Equipments of Medical Laboratory
Course Type	Minor
Credit	2
Course Level	100-199
Teaching Hour/ Week	2 Hours
Teaching Time	15×2= 30 Hours
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">• Component and use of basic laboratory instruments• Working Principle, components, operation and use of various sterilizing equipments like Autoclave, Hot air oven• Different types of equipments, its use, calibration and cleaning

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Laboratory Instruments: Principle, Component, Use, Care and maintenance	15 Hr.
1.1	pH meter	
1.2	Colorimeter	
1.3	Centrifuge	
1.4	Instruments of Sterilization: Autoclave and Hot Air Oven	
Unit-2	Laboratory Equipments	15 Hr.
2.1	Introduction to Laboratory wares: Glassware, Plastic wares and Accessories	
2.2	Calibration of Glassware	
2.3	Cleaning of Glassware	
2.4	Care and Maintenance of Glassware	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	J. Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	H.A. Modi	Akta Prakashan, Nadiad
5	Prescott's Microbiology, 10 th edition	Willey. J.M, Sherwood L.M	McGraw- Hill Education

		and Woolverton C.J., (2017)	
6	Manual of Basic Techniques for a Health Laboratory	WHO	World Health Organization (2003)

MLTP-ME-101: PRACTICALS BASED ON INSTRUMENTS AND EQUIPMENTS OF MEDICAL LABORATORY

Semester: I	
Course (subject) Code	MLTP-ME-101
Subject Title	Practicals Based on Instruments and Equipments of Medical Laboratory
Teaching Time	30×2=60 Hours
Subject Outcome	At the end of the course, the students will able to <ul style="list-style-type: none"> • Identify and know the use of different glassware • Know cleaning procedure as well as calibration of glassware • Operate various basic instruments and equipments of laboratory

Course Content

1. Study of Laboratory Glassware
2. Cleaning of Laboratory Glassware
3. Calibration of 1 ml, 5 ml pipette
4. Operation of pH meter
5. Measurement and adjustment of pH by pH meter.
6. Operation of colorimeter
7. Operation of Centrifuge
8. Sterilization by Hot air oven and autoclave

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
5	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	H.A. Modi	Akta Prakashan, Nadiad

SEMESTER II

MLT-ME-201: LABORATORY SPECIMENS AND BIOMEDICAL WASTE MANAGEMENT

Semester: II	
Course (subject) Code	MLT-ME-201
Subject Title	Laboratory Specimens and Biomedical Waste Management
Course Type	Minor
Credit	2
Course Level	100-199
Teaching Hour/ Week	2 Hours
Teaching Time	15×2= 30 Hours
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">• Collection, Transportation and Processing of Blood and Urine• How biomedical waste is managed and disposed

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Blood and Urine Specimen	15 Hr.
1.1	Preparation of material and patient for blood collection	
1.2	Vacutainer system	
1.3	Responsibilities of a Phlebotomist	
1.4	Collection, Processing, Storage and Transportation of blood	
1.5	Urine: Container for collection, Collection method and types: Collection for a) Screening b) Quantitative analysis c) Bacteriological examination d) Special collection Techniques, Preservation, Storage and Transportation	
Unit-2	Biomedical Waste Management	15 Hr.
2.1	Introduction and Classification	
2.2	Segregation of BMW	
2.3	Treatment of BMW	
2.4	Disposal of BMW	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd ed., (2014)	Godkar P. B.	Bhalani Publishing House.
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Clinical Diagnosis and Management by Laboratory Methods/17 th	John Bernard Henry	W. B. Saunders Company
4	Medical Microbiology and Parasitology/4 th	B. S. Nagoba Asha Pichare	ELSEVIER

**MLTP-ME-201: PRACTICALS BASED ON INSTRUMENTS AND EQUIPMENTS
OF MEDICAL LABORATORY**

Semester: II	
Course (subject) Code	MLTP-ME-201
Subject Title	Practicals Based on Instruments and Equipments of Medical Laboratory
Teaching Time	30×2=60 Hours
Subject Outcome	At the end of the course, the students will able to <ul style="list-style-type: none"> • Collect and Handle blood and urine specimen • Separate serum and plasma from blood • Use microscope to observe living organisms and to study morphology of bacteria • Check the effect of various physical and chemical agents as well as Disinfectant on bacterial growth

Course Content

1. Study of Anticoagulants and Preparation of Anticoagulated Bulb
2. Study of Vacutainers
3. Venipuncture Technique
4. Capillary Puncture Technique
5. Separation of Plasma
6. Separation of Serum
7. Urine Specimen Collection
8. Biomedical Waste Disposal

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd ed., (2014)	Godkar P. B.	Bhalani Publishing House.
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Clinical Diagnosis and Management by Laboratory Methods/17 th	John Bernard Henry	W. B. Saunders Company
4	Medical Microbiology and Parasitology/4 th	B. S. Nagoba Asha Pichare	ELSEVIER

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Multidisciplinary Course Structure of Semester I & II

Semester & Course Code	Course Title	Credit (Theory)	Teaching duration per Week (in Hr.)	External (Marks)	Exam Time Duration	Internal (Marks)	Total (Marks)
I MLT-MDC-101	Organization of Clinical Laboratory	4	4	50	02	50	100
II MLT-MDC-201	Nutrition and Health	4	4	50	02	50	100

MLT-MDC-101: ORGANIZATION OF CLINICAL LABORATORY

SEMESTER – 1	
Course Code	MLT-MDC-101
Subject Title	Organization of Clinical Laboratory
Course Type	Multidisciplinary Course
Credit	4 (Theory)
Course Level	100-199
Teaching Hour/ Week	4 Hours
Teaching Time	15×4= 60 Hours
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none"> • Basics of Clinical laboratory, its types and Organization • Laboratory hazards and safety • NABL accreditation requirement • Laboratory accidents and its safety measures as well as First Aid

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Human Health and Clinical Diagnosis in Developing Countries	15 Hr.
1.1	Medical Care in India	
1.2	Status of Medical Laboratories in Developing Countries	
1.3	Commonly Requested Laboratory Tests	
1.4	Role of Medical Laboratory Technologist, Ethics and Code of Conduct	
Unit-2	Laboratory Organization	15 Hr.
2.1	Organization of Laboratory	
2.2	Functional Components and Role of Individual Components of Laboratory	
2.3	Various types of Laboratories	
2.4	A Standard Clinical Laboratory Set up	
Unit-3	Accreditation of Medical Laboratory: NABL	15 Hr.
2.1	Introduction and scope	
2.2	Aims and objectives	
2.3	Description and types of laboratory	

2.4	Qualification norms	15 Hr.
Unit-2	Laboratory Accidents and Safety	
2.1	Laboratory Hazards- Physical, Chemical and Biological, Accidents and Safety Measures in Clinical Laboratory	
2.2	First Aid in Laboratory	
2.3	Biosafety Level and Biosafety Programme	
2.4	Biomedical Waste Management	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	J. Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	District Laboratory Practice in Tropical Countries, Part 1, 2 nd Edition	Monica Cheesbrough	Cambridge University Press
5	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6 th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD
6.	https://www.nabl-india.org >2019/02		

SEMESTER – 2

MLT-MDC-201: NUTRITION AND HEALTH

SEMESTER – 2	
Course Code	MLT-MDC-201
Subject Title	Nutrition and Health
Course Type	Multidisciplinary Course
Credit	4 (Theory)
Course Level	100-199
Teaching Hour/ Week	4 Hours
Teaching Time	15×4= 60 Hours
Subject Outcome	<p>At the end of the course, the students will get knowledge of</p> <ul style="list-style-type: none"> • Organs and Systems of Human Body and its functions • Importance of nutrition in Health and Wellness • Energy requirements for people according to categories • BMR, BMI and its calculation • Nutritional Disorders

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Nutrition	15 Hr.
1.1	Introduction	
1.2	Nutrients: <ul style="list-style-type: none"> • Macronutrients and Micronutrients • Organic and Inorganic Nutrients Energy Yielding and Non-Energy Yielding Nutrients	
1.3	Nutritional Importance of Nutrients: Carbohydrate, Lipid, Protein, Minerals and Vitamin	
Unit-2	Energy	15 Hr.
2.1	Nutrition and Energy supply	
2.2	Utilization of Energy in Man	
2.3	Energy Requirements for Different Categories of People	
2.4	Measurement of Energy count of food	
2.5	Body Mass Index and Basal Metabolic Rate	
Unit-3	Health	15 Hr.
3.1	Introduction and Factor affecting Physical and Mental Health	
3.2	Role of Nutrition in Maintaining Health	
3.3	Factors Affecting Food and Nutrition	
3.4	Recommended Dietary Allowance and Balanced Diet	
Unit-4	Nutritional Disorders	15 Hr.
4.1	Protein-Energy Malnutrition	
4.2	Kwashiorkor	
4.3	Marasmus	
4.4	Nutritional Anaemia	
4.5	Obesity	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Anatomy & Physiology in health & illness, 11 th edition, (2014)	Ross & Wilson	Elsevier Publications
2	Textbook of Physiology for MLT, 1 st edition (2016)	A. K. Jain	Avichal Publishing Company
3	Biochemistry/ 4 th	Satyanarayana U. & Chakrapani U	Arunabha Sen and Allied (P) Ltd
4	Textbook of Medical Biochemistry/ 8 th	Chatterjea M. N. and Shinde R.	JaypeeBrothers Publishers
5	Textbook of Applied Biochemistry and Nutrition & Dietetics for Nursing Students	Harbans Lal	CBC Publishers and Distributors Pvt. Ltd

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Skill Enhancement Course Structure of Semester I & II

Semester & Course Code	Course Title	Credit	Teaching duration per Week (in Hr.)	External (Marks)	Exam Time Duration	Internal (Marks)	Total (Marks)
I MLT-SEC-101	Solution Preparation and Laboratory Calculations	01	01	13	01	13	26
MLTP-SEC-101	Practicals Based on Solution Preparation and Laboratory Calculations	01	02	12	02	12	24
		Total	03	25	03	25	50
II MLT-SEC-201	Clinical Specimen and Record Keeping	01	01	13	01	13	26
II MLTP-SEC-201	Practicals Based on Clinical Specimen and Record Keeping	01	02	12	02	12	24
		Total	03	25	03	25	50
OR							
II MLT-SEC-202	Phlebotomy	01	01	13	01	13	26
II MLTP-SEC-202	Practical Based on Phlebotomy	01	02	12	02	12	24
		Total	03	25	03	25	50

SEMESTER - 1

MLT-SEC-101: SOLUTION PREPARATION AND LABORATORY CALCULATIONS

SEMESTER – I	
Course Code	MLT-SEC-101
Subject Title	Solution Preparation and Laboratory Calculations
Course Type	Skill Enhancement Course
Credit	1
Course Level	100-199
Teaching Hour/ Week	1 hr.
Teaching Time	15 hr.
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">Different types of solution and its preparationDilution of solution and finding concentration of unknown solution

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Laboratory Solution Preparation	15 Hr.
1.1	Introduction: Solute, Solvent, Solution and its types and Basic Requirements for Solution Preparation	
1.2	Expression of Solution Concentration	
1.3	Preparation of Solution: Normal Solution, Molar Solution, Percent Solution, Primary and Secondary Standard Solution	
1.4	Buffer and Indicator: Preparation and Use	
1.5	Units of Measurements	
1.6	Finding concentration of solution after mixing two different concentrated solution	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	Textbook on Bio-Chemistry for DMLT & Paramedical Courses	Dr. I Clement	Emmess Medical Publishers

**MLTP-SEC-101: PRACTICALS BASED ON SOLUTION PREPARATION AND
LABORATORY CALCULATIONS**

Semester: I	
Course (subject) Code	MLTP-SEC-101
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals Based on Solution Preparation and Laboratory Calculations
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none"> • Different types of solution and its preparation • Dilution of solution and finding concentration of unknown solution

Course Content

1. Preparation of Normal and Molar Solution (HCL, H₂SO₄, NaOH)
2. Preparation of Percent Solution
3. Preparation of Primary and Secondary Standard Solution
4. Preparation of Phosphate Buffer
5. Working Solution Preparation from Stock Solution (Single dilutions)
6. Serial Dilution Technique

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	Textbook on Bio-Chemistry for DMLT & Paramedical Courses	Dr. I Clement	Emmess Medical Publishers

SEMESTER - 2

MLT-SEC-201: CLINICAL SPECIMEN AND RECORD KEEPING

SEMESTER – II	
Course Code	MLT-SEC-201
Subject Title	Clinical Specimen and Record Keeping
Course Type	Skill Enhancement Course
Credit	1
Course Level	100-199
Teaching Hour/ Week	1 hr.
Teaching Time	15 hr.
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">• Collection, processing transport, storage and discarding of major clinical samples• Reporting and recording of data of Clinical sample

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Collection and Processing of Major Laboratory Specimens	15 Hr.
1.1	Blood	
1.2	Urine	
1.3	General Consideration for Transport and Storage of Specimen	
1.4	Discarding of Specimen After Use	
1.5	Record Keeping: Clinical Laboratory Records and Record of Laboratory Personnel	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Medical Laboratory Technology - (Volume 1)/3 rd	Kanai L Mukherjee Anuradha Chakravarthy	Mcgraw Hill Education (India) Private Limited
2	Text Book of Medical Laboratory Technology (Volume-1)/3 rd	P. B. Godkar D. P. Godkar	Bhalani Publishing House
3	District Laboratory Practice in Tropical Countries (Volume 1)/2 nd	Monica Cheesbrough	Cambridge University Press.

**MLTP-SEC-201: PRACTICALS BASED ON CLINICAL SPECIMEN AND RECORD
KEEPING**

Semester: II	
Course (subject) Code	MLTP-SEC-201
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals Based on Clinical Specimen and Record Keeping
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none"> • Collection, processing transport, storage and discarding of major clinical samples • Reporting and recording of data of Clinical sample

Course Content

1. Collection of Capillary Blood
2. Collection of Venous Blood
3. Blood sample processing
4. Collection of Urine
5. Sample copies of Laboratory Forms
6. Sample copies of Laboratory Records

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Medical Laboratory Technology - (Volume 1)/3 rd	Kanai L Mukherjee Anuradha Chakravarthy	Mcgraw Hill Education (India) Private Limited
2	Text Book of Medical Laboratory Technology (Volume-1)/3 rd	P. B. Godkar D. P. Godkar	Bhalani Publishing House
3	District Laboratory Practice in Tropical Countries (Volume 1)/2 nd	Monica Cheesbrough	Cambridge University Press.

MLT-SEC-202: PHLEBOTOMY

SEMESTER – II	
Course Code	MLT-SEC-202
Subject Title	Phlebotomy
Course Type	Skill Enhancement Course
Credit	1
Course Level	100-199
Teaching Hour/ Week	1 hr.
Teaching Time	15 hr.
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">• Anticoagulants and its use• Types of Vacutainers• Collection procedure of Blood• Processing of Blood

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	Phlebotomy: Training the Technician	15 Hr.
1.1	Assessment of Competence of Laboratory Work	
1.2	Preparation of Blood collection materials and Preparation of Patient	
1.3	Responsibilities of A Phlebotomist	
1.4	Specimen Types and Anticoagulant	
1.5	Vacutainers	
1.6	Phlebotomy	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi

MLTP-SEC-202: PRACTICALS BASED ON PHLEBOTOMY

Semester: II	
Course (subject) Code	MLTP-SEC-202
Credit	01
Teaching Hour/ Week	2 Hours
Subject Title	Practicals Based on Phlebotomy
Subject Outcome	At the end of the course, the students will get knowledge of <ul style="list-style-type: none">• Anticoagulants and its use• Types of Vacutainers• Collection procedure of Blood• Processing of Blood

Course Content

1. Study of Anticoagulants
2. Phlebotomy: Venipuncture, Skin Puncture and Arterial Puncture
3. Separation of Plasma
4. Separation of Serum
5. Study of Specimen Stability
6. Preanalytical Errors

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1, 2 nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Medical Laboratory Science - Theory and Practice	Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi