Re-Accredited 'B++' 2.86 CGPA by NAAC
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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન B.Sc.Medical Laboratory Technology અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP - 2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર S.Y.B.Sc. Medical Laboratory Technology Sem.- 3 & 4 Major, Minor, MDC અને SEC નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ મેડિકલ ટેકનોલાજી વિષયની અભ્યાસ સમિતિની તા.૦૧/૦૫/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક : ૦૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિ શ્રીને આપેલ સત્તા અંતર્ગત ઈ.ચા.માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

મેડિકલ ટેકનોલાજી વિષયની અભ્યાસ સમિતિની તા.૦૧/૦૫/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૦૨

:: આથી ઠરાવવામાં આવે છે કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર B.Sc. Medical Laboratory Technology Sem.- 3 & 4 Major, Minor, MDC અને SECનો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./MLT Syllabus/પરિપત્ર/૯૯૩૪/૨૦૨૪
તા.૧૩–૦૫ –૨૦૨૪

કુલસચિવ

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન B.Sc.Medical Laboratory Technology અભ્યાસક્રમ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.

૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.

૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

Syllabus of

B. Sc. Medical Laboratory Technology

(SEMESTER 3 & 4)

(As per NEP- 2020)

Effective from 2024 - 2025

Faculty ની મંજૂર
થી B.C.મા મુકવા બાબત છે.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Medical Laboratory Technology Major

Course Structure of Semester III & IV

SEMESTER – III							
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-301	Basics of Immunology	02	02	25	25	01	50
MLT-MJ-302	Basics of Microbiology	02	02	25	25	01	50
MLT-MJ-303	General Biochemistry	04	04	50	50	02	100
MLTP-MJ-301	Practicals Based on Basics of Immunology	02	04	25	25	04	50
MLTP-MJ-302	Practicals Based on Basics of Microbiology	02	04	25	25	04	50
	Total	12	16	150	150		300
SEMESTER – IV							
MLT-MJ-401	Basics of Hematology	02	02	25	25	01	50
MLT-MJ-402	Bacterial Culture Technique	02	02	25	25	01	50
MLT-MJ-403	Instrumentation	04	04	50	50	02	100
MLTP-MJ-401	Practicals Based on Basics of Hematology	02	04	25	25	04	50
MLTP-MJ-402	Practicals Based on Bacterial Culture Technique	02	04	25	25	04	50
	Total	12	16	150	150		300

SEMESTER III

MLT-MJ-301: BASICS OF IMMUNOLOGY

Semester: III	
Course (subject) Code	MLT-MJ-301
Subject Title	Basics of Immunology
Course Type	Major
Credit	2
Course Level	200-299
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 • Basic aspects of immunity, antigens, antibodies. • The student will also obtain the basic knowledge of Immune System and the cells involved, which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained.

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Immunity and Immune System**	**15 Hr.**
1.1	Introduction, Definition, Classification of Immunity	
1.2	Innate immunity: Types and Mechanisms	
1.3	Acquired immunity: Types and Mechanisms	
1.4	Organs of the immune system	
1.5	Cells of the immune system	
Unit-2	**Antigen & Antibody**	**15 Hr.**
2.1	Antigen: Introduction, Definition, Types, Properties	
2.2	Antibody: Introduction, Definition, Structure, Function, Classes and Properties of Immunoglobulin's	
2.3	Antigen- Antibody Reactions: General features and Factors Affecting, Stages and Types	
2.4	Precipitation Reaction	
2.5	Agglutination Reaction	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Microbiology. 8th (2009)	Ananthanarayan R. and Paniker C.K.J.	University Press Publication
2	Textbook of Microbiology & Immunology/ 2nd	Subhash Chandra Parija	Elsevier
3	Essential Immunology/6th	I. M. Roitt	ELBS, London
4	Text book of Medical Microbiology/ 5th	R. Ananthnarayan C. K. Jayram Paniker	Orient Longman, Madras.
5	Immunology/ 1st	B. S. Nagoba, D. V. Vedpathak	BI publications Pvt Ltd, New Delhi
6	Immunology/ 1st	I Kannan	MJP Publishers

MLT-MJ-302: BASICS OF MICROBIOLOGY

Semester: III	
Course (subject) Code	MLT-MJ-302
Subject Title	Basics of Microbiology
Course Type	Major
Credit	2
Course Level	200-299
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 • Role of scientist in evolution of Microbiology • Types of Microorganism • Structure and characteristics of Microorganism • Various staining techniques used to study bacteria and its structure

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**History of Microbiology**	**15 Hr.**
1.1	Introduction	
1.2	Antony Van Leeuwenhoek and His Microscope	
1.3	Controversy of Spontaneous Generation	
1.4	Scientific Development of Microbiology: Contributions of Louis Pasteur, Joseph Lister, Robert Koch, Paul Ehrlich and Important Discoveries by Other Scientists	
1.5	Development of Pure Culture Technique	
Unit-2	**Introduction to Microorganism**	**15 Hr.**
2.1	Bacteria: Characteristic difference between Procaryotic and Eucaryotic cell, Morphological Classification, Cell Structure study, Difference between Gram positive and Gram negative, Observation of Bacteria by Staining Techniques: Simple, Differential and Special (Capsule, Metachromatic, Spore and Spirochaete)	
2.2	Virus: General Structure, Morphology and Classification	
2.3	Fungi: General Property and Classification	
2.4	Parasite: Terminology used, Classes of Host and Parasite, Sources of Infection and Portal of Entry	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Textbook of Microbiology/ 2nd	Prof. C. P. Baveja	Arya Publications
3	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	Modi H.A.	Ekta Prakashan
4	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD

MLT-MJ-303: GENERAL BIOCHEMISTRY

Semester: III	
Course (subject) Code	MLT-MJ-303
Subject Title	General Biochemistry
Course Type	Major
Credit	4
Course Level	200-299
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 • Essentials of Biochemistry • Role of Biomolecules • Understand the basic concepts of carbohydrates, lipids, proteins and nucleic acids to develop interest in the metabolic role of these biomolecules

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Carbohydrates**	**15 Hr.**
1.1	Classification and Biological role of carbohydrates	
1.2	Monosaccharides	
1.3	Disaccharides	
1.4	Polysaccharides	
Unit-2	**Lipids**	**15 Hr.**
2.1	Classification and Biological role of lipids	
2.2	Simple lipids: Triglyceride	
2.3	Compound lipids: Phospholipid, Glycolipid and Lipoprotein	
2.4	Derived lipids: Cholesterol and Fatty acid	
Unit-3	**Amino Acid and Proteins**	**15 Hr.**
3.1	Definition and Classification of Amino Acids	
3.2	Classification & Biological role of proteins	
3.3	Structural organization of proteins	
3.4	Denaturation of Protein	
Unit-4	**Nucleic acids**	**15 Hr.**
4.1	Nitrogen bases, Nucleoside, Nucleotide	
4.2	Structure of DNA (Watson-Crick model, variants)	
4.3	Structure of RNA	
4.4	Biological functions of nucleic acids	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3rd 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/ 2nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Fundamentals of Biochemistry	J. L Jain, Sunjay Jain, Nitin Jain	S Chand & company, New Delhi
4	Biochemistry	U. Satyanarayan	Books & Allied pvt Ltd, Kolkatta.

MLTP-MJ-301: PRACTICALS BASED ON BASICS OF IMMUNOLOGY

Semester: III	
Course (subject) Code	MLTP-MJ-301
Credit	02
Teaching Hour/ Week	4 Hours
Subject Title	Practicals Based on Basics of Immunology
Subject Outcome	At the end of the course, the students are imparted basic training of theoretical and practical in the field of Immunology and immunopathology. Mechanism underlying Antigen-antibody reaction or various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.

Course Content

1. Rapid Test for Syphilis.
2. To Perform ABO and Rh blood grouping (Slide test)
3. Test for Pregnancy by rapid agglutination / Strip method
4. Test for RA by agglutination method
5. Test for Typhoid by WIDAL slide test
6. Test for Typhoid by WIDAL tube test
7. Determination of ASO by rapid agglutination test.
8. Determination of CRP by rapid agglutination test.

Reference Books:

Sr. No.	**Title/Edition**	**Authors**	**Publisher**
1	Practical Manual for Medical Laboratory Technology-Volume-1/ 1st	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	Popular
2	A Hand book of Practical Immunology/1st	G.P. Talwar	Vikas Publishing House.
3	Medical Laboratory Technology/ 4th	Sood R.	Jaypee Brothers.
4	Textbook of Medical Laboratory Technology	P. B. Godkar, D.P. Godkar	Bhalani Pub.

MLTP-MJ-302: PRACTICALS BASED ON BASICS OF MICROBIOLOGY

Semester: III	
Course (subject) Code	MLTP-MJ-302
Credit	02
Teaching Hour/ Week	4 Hours
Subject Title	Practicals Based on Basics of Microbiology
Subject Outcome	At the end of the course, the students will able to, • Perform motility and various staining techniques for study of bacteria and its structure • Identify fungi from its morphological features.

Course Content

1. Observation of Bacteria by Wet mount and Hanging drop preparation
2. Morphological study of bacteria by Simple staining technique
3. Morphological study of bacteria by Negative staining technique
4. Differential Study of Bacteria by Gram staining technique
5. Differential Study of Bacteria by Acid-fast staining technique
6. Observation of Spirochaete by Fontana's method
7. Observation of capsule by Maneval's staining technique
8. Observation of metachromatic granules by Albert's staining technique
9. Observation of spore by special staining technique
10. Morphological study of fungi
11. Study of Parasites by Hay infusion
12. Study of general structure of viruses (Diagram/Chart/Model)

Reference Books:

Sr. No.	**Title/Edition**	**Authors**	**Publisher**
1	Practical Manual for Medical Laboratory Technology-Volume-1/ 1st	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	Popular
2	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
3	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	Modi H.A.	Ekta Prakashan
4	Medical Laboratory Technology Methods and Interpretations, Volume 1, 6th Edition	Ramnik Sood	Jaypee Brothers Medical Publishers (P) LTD

SEMESTER IV

MLT-MJ-401: BASICS OF HEMATOLOGY

Semester: IV	
Course (subject) Code	MLT-MJ-401
Subject Title	Basics of Hematology
Course Type	Major
Credit	2
Course Level	200-299
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 • Synthesis, morphology and functions of Blood and blood cells • Different estimation methods of haemoglobin • Routine haematological examination like CBC, DC, ESR, PCV

Course Content:

Unit No.	**Content**	**Teaching Hours**
Unit-1	**Introduction to Hematology**	**15 Hr.**
1.1	Blood: Components and Function	
1.2	Blood Collection Methods	
1.3	Anticoagulants	
1.4	Introduction to Hematopoiesis	
Unit-2	**Complete Blood Cell Count**	**15 Hr.**
2.1	Haemoglobin and its Estimation	
2.2	Red Blood Cell Count and its Morphology	
2.3	White Blood Cell Count and its Morphology	
2.4	Platelet Count	
2.5	Red Cell Indices and ESR	

Reference Books:

Sr. No.	**Title/Edition**	**Authors**	**Publisher**
1	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Practical Manual for Medical Laboratory Technology-Volume-2/ 1st	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	Popular
3	Medical Laboratory Science - Theory and Practice	J. Ochei & A. Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	Hand book of Medical Laboratory Technology	Bharucha, Meyerm Moody, Carman,	CMC Vellore
5	Practical Haematology/ 8th	A. Dacie & S. M. Lewis	ELSEVIER

MLT-MJ-402: BACTERIAL CULTURE TECHNIQUE

Semester: IV	
Course (subject) Code	MLT-MJ-402
Subject Title	Bacterial Culture Technique
Course Type	Major
Credit	2
Course Level	200-299
Teaching Hour/ Week	2 Hours
Teaching Time	15×2= 30 Hours
Subject Outcome	At the end the course, the students will get knowledge • Use and inoculation of culture media, aerobic and anaerobic culture technique, isolation pure cultures and preservation cultures • Isolation of bacteria from mixed culture. Study morphological, cultural, biochemical characteristics common bacterial pathogen

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Isolation of Bacteria**	**15 Hr.**
1.1	Introduction: Pure Culture and Natural Microbial Population (Mixed Culture)	
1.2	Types of Culture Media: Classification Based on (i) Physical state, (ii) Presence of Molecular Oxygen and Reducing Substances (iii) Nutritional Factors	
1.3	Separation of Bacteria by Culture Methods: Streak Plate Technique, Pour Plate Technique, Spread Plate Technique, Serial Dilution Culture Technique and Enrichment Culture Technique, Use of selective and Differential Media	
1.4	Other Methods: Single Cell Isolation, Use of Laboratory Animals and Isolation of Anaerobes	
1.5	Maintenance and Preservation of Cultures	
Unit-2	**Identification of Bacteria**	**15 Hr.**
2.1	Introduction: Bacterial Identification Methods: Conventional Method, Antigenic Structure, Typing Method, Pathogenicity Test and Antibiotic Sensitivity Test	
2.2	Morphological Identification by Microscopic Examination of Unstained and Stained Preparation	
2.3	Macroscopic Identification Technique: Colony Characteristics, Growth Characteristics and Biochemical Characteristics.	
2.4	Identification Characteristics of Common Gram-Positive Bacteria: *Staphylococcus aureus*, *Bacillus cereus* and *Streptococcus spp.*	
2.5	Identification Characteristics of Common Gram-Negative Bacteria: *Escherichia coli, Enterobacter aerogenes, Klebsiella pneumoniae, Proteus vulgaris, Pseudomonas aeruginosa* and *Salmonella spp.*	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Microbiology/ 2nd	Prof. C. P. Baveja	Arya Publications
2	Textbook Microbiology and Immunology/ 2nd	Subhash Chandra Parija	ELSEVIER, Elsevier India Private Limited, New Delhi
3	Elementary Microbiology, Fundamentals of Microbiolog/ Vol-1	Modi H.A.	Ekta Prakashan
4	Textbook Microbiology/ 8th	Ananthanarayan and Paniker's	University Press India Private Limited, Hyderabad
5	Microbiology/8th	Prescott M, Harley John P.	Mc Graw Hill
6	Basic medical microbiology/ 1st	Patrick R. Murray.	ELSEVIER, Philadelphia, PA

MLT-MJ-403: INSTRUMENTATION

Semester: IV	
Course (subject) Code	MLT-MJ-403
Subject Title	Instrumentation
Course Type	Major
Credit	4
Course Level	200-299
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 • Principle, types, components and uses of various photometric instruments • Principle and types of different chromatographic techniques • Principle and technique of electrophoretic techniques • Types and application of radioactive substances, gamma counter and scintillation counter

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Photometer**	**15 Hr.**
1.1	Introduction, Beers – Lamberts law	
1.2	Colorimeter : Principle, Components, Operation and uses	
1.3	Spectrophotometer: Types, Principle, Components, Operation and Applications	
1.4	Flame Photometer : Principle, Types, Components and Use	
Unit-2	**Electrophoresis**	**15 Hr.**
2.1	Principle	
2.2	Factors Affecting Electrophoresis	
2.3	Support Media: Agarose and Poly Acryl amide Gel	
2.4	Agarose gel Electrophoresis & PAGE	
Unit-3	**Chromatography**	**15 Hr.**
3.1	Introduction	
3.2	Types of Chromatography	
3.3	Paper Chromatography	
3.4	Thin Layer Chromatography	
Unit-4	**Radio Chemical Techniques**	**15 Hr.**
4.1	Radioactive substances and Types of radiation emission	
4.2	GM counter	
4.3	Scintillation counter	
4.4	Biochemical applications of radioisotopes	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Analytical Biochemistry: (Biochemical Technique)	P. Ashokan	Chinna Pub., Nelvisharani, Vellor
2	Textbook of Medical Laboratory Technology/3rd	P.B. Godkar	Bhalani Publishering
3	Medical Laboratory Science: Theory & Practice	K. Ochei J. & Kolhatkar A	Tata McGraw Hill Pub.
4	Practical Biochemistry: Principles & Technique/5th	Wilson K. & Walker J	Cambridge University Press

MLTP-MJ-401: PRACTICALS BASED ON BASICS OF HAEMATOLOGY

Semester: IV	
Course (subject) Code	MLTP-MJ-401
Credit	02
Teaching Hour/ Week	4 Hours
Subject Title	Practicals Based on Basics of Haematology
Subject Outcome	At the end of the course, the students will able to, • Do collection of blood • Implement knowledge of anticoagulant use • Perform haemoglobin estimation • Perform Routine haematological tests like CBC, DC, ESR, PCV

Course Content

1. Blood Collection
2. Haemoglobin estimation: Sahli's method and cyanmethemoglobin method
3. Total RBC count
4. Total WBC count
5. Platelet Count
6. Differential WBC Count
7. Determination of ESR
8. Determination of PCV

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Practical Manual for Medical Laboratory Technology-Volume-2/ 1st	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	Popular
2	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
3	Medical Laboratory Science - Theory and Practice	J. Ochei & A. Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
4	Practical Haematology/ 8th	A. Dacie & S. M. Lewis	ELSEVIER

MLTP-MJ-402: PRACTICALS BASED ON BACTERIAL CULTURE TECHNIQUE

Semester: IV	
Course (subject) Code	MLTP-MJ-402
Credit	02
Teaching Hour/ Week	4 Hours
Subject Title	Practicals Based on Bacterial Culture Technique
Subject Outcome	At the end of the course, the students will able to, • Cultivate and study of morphological and growth characteristics of microorganisms. • Perform differential and special staining techniques for identification of causative agents. • Perform various bacterial identification technique and their applications in the laboratory.

Course Content

1. Study of growth characteristics of bacteria by Broth, Slant & Stab culture technique
2. Isolation of bacteria by Spread plate method (Glass spreader and cotton Swabs) and Streak plate method
3. To determine Viable cell count by serial dilution technique
4. Study of Cultural and Growth Characteristics on Bacteriological Media: Nutrient Agar, Mac Conkey Agar, Eosin Methylene Agar, W.B. Agar, Blood Agar, Chocolate Agar, MSA
5. Study of some important biochemical reactions:
    a) Indole Test, Methyl red Test, V.P. Test, Citrate Utilization Test, H_2S Production (2% peptone), TSI slants, Sugars Fermentation Test
    b) Test for enzyme activity-Oxidase, Catalase, Coagulase, Urease
6. Identification of Common Gram-Positive Bacteria: *Staphylococcus aureus*, *Bacillus cereus* and *Streptococcus spp*.
7. Identification of Common Gram-Negative Bacteria: *Escherichia coli, Enterobacter aerogenes, Klebsiella pneumoniae, Proteus vulgaris, Pseudomonas aeruginosa* and *Salmonella spp.*
8. Isolation of Anaerobic organisms (Demonstration).

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Experimental Microbiology, Volume 1 & 2	Patel, R. J., and Patel, R. K	Aditya Pub
3	Principles of Microbiology	Atlas R M. Wm. C.	Brown Publishers
4	Practical Manual for Medical Laboratory Technology-Volume-1/ 1st	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	Popular

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Medical Laboratory Technology

Minor Elective Course Structure of Semester IV

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-ME-401	Blood Banking	02	02	25	25	01	50
MLTP-ME-401	Practicals Based on Blood Banking	02	04	25	25	04	50
	Total	04	06	50	50		100

MLT-ME-401: BLOOD BANKING

Semester: IV	
Course (subject) Code	MLT-ME-401
Subject Title	Blood Banking
Course Type	Minor
Credit	2
Course Level	200-299
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 • Operation of Blood bank • Various Blood group systems • Detailed knowledge about donors and processing of blood donated units

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Basic Principles of Immunohaematology**	**15 Hr.**
1.1	Historical overview of Transfusion Medicine	
1.2	Organization and Operation of Blood Bank	
1.3	ABO Blood group system	
1.4	RH blood group system	
1.5	Other blood group systems	
Unit-2	**Blood Collection and Processing**	**15 Hr.**
2.1	Types of Donors-Selection and rejection	
2.2	Collection of blood in blood bags	
2.3	Preservation and storage of Blood	
2.4	Red cell serology-Blood grouping, Cross matching and antiglobulin tests	
2.5	Blood component Preparation-Red cell concentrate, Fresh Frozen Plasma, Platelet Concentrate, Cryoprecipitate	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 2	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 2/ 2nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Clinical pathology, Haematology and Blood Banking, 4th Edition	Nanda Maheshwari	Jaypee Brothers; New Delhi
4	Makroo R. N. and Mitra J. *Compendium Transfusion Medicine.*	Dr R.N Makroo	KONGPOSH publication Pvt. Ltd., New Delhi
5.	Essentials of Blood Banking and Transfusion Medicine	Ganga S. Pilli	CBS Publishers, New Delhi

MLT-ME-401: PRACTICALS BASED ON BLOOD BANKING

Semester: IV	
Course (subject) Code	MLT-ME-401
Credit	2
Teaching Hour/ Week	4 hours
Subject Title	Practicals Based on Blood Banking
Subject Outcome	At the end of the course, the students will able to, • Perform all basic tests done in the blood bank • Will be eligible to serve in any blood bank as per Food and Drug Controller Administration (FDCA) norms

Course Content

1. ABO blood grouping: a) Forward grouping b) reverse grouping –Slide Method
2. ABO blood grouping: a) Forward grouping b) reverse grouping –Tube Method
3. Rh Typing: Saline, Albumin and AHG method
4. Direct Anti-Human globulin test
5. Determination of incomplete antibody by Indirect Anti-Human globulin test
6. Determination of Anti A titer by saline method
7. Determination of Anti B titer by saline method
8. Cross matching-Major and Minor
9. Blood component preparation (Demonstration)

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 2	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
2	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 2/ 2nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
3	Clinical pathology, Haematology and Blood Banking, 4th Edition	Nanda Maheshwari	Jaypee Brothers; New Delhi
4	Compendium of Transfusion Medicine.	Dr R.N Makroo	KONGPOSH publication Pvt. Ltd., New Delhi
5.	Essentials of Blood Banking and Transfusion Medicine	Ganga S. Pilli	CBS Publishers, New Delhi

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Multidisciplinary Course Structure of Semester III

Semester & Course Code	Course Title	Credit (Theory)	Teaching duration per Week (in Hr.)	External (Marks)	Exam Time Duration (in Hr.)	Internal (Marks)	Total (Marks)
III MLT-MDC-301	Introduction to Microbial World	4	4	50	2.5	50	100

MLT-MDC-301: INTRODUCTION TO MICROBIAL WORLD

Semester: III	
Course (subject) Code	MLT-MJ-301
Subject Title	Introduction to Microbial World
Course Type	Multidisciplinary
Credit	4 (Theory)
Course Level	200-299
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 • Microorganisms • Morphology and economic importance of Eukaryotes (mould, yeast, protozoa) • Morphology, cultivation and pathogenic significance of atypical bacteria (Rickettsia, Chlamydia, Mycoplasma, Actinomycetes) • General structural properties and types of viruses • General characteristics of bacteriophage

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Microbial world and its Identification**	**15 Hr.**
1.1	Origin of microorganisms	
1.2	Medical Microbiology and its development	
1.3	Phenotypic characteristics for microbial identification	
1.4	Genotypic characteristics for microbial identification	
Unit-2	**Eukaryotic Microbes: Morphology and Economic Importance**	**15 Hr.**
2.1	Common features of Eukaryotic cells	
2.2	Molds	
2.3	Yeast	
2.4	Protozoa	
Unit-3	**Atypical bacteria: Morphology, Cultivation and Pathogenic Significance**	**15 Hr.**
3.1	Rickettsia	
3.2	Chlamydia	
3.3	Mycoplasma	

3.4	Actinomycetes	
Unit-4	**Viruses and Bacteriophage**	**15 Hr.**
4.1	General structural properties of Viruses	
4.2	Types of viral infections	
4.3	General Characteristics of Bacteriophage	
4.4	Lytic cycle and Lysogeny	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1.	Elementary Microbiology, Fundamentals of Microbiology, Vol-1	Modi H.A.	Ekta Prakashan
2.	Prescott's Microbiology /8th	J. M. Willey, L. M. Sherwood, C. J. Woolverton,	McGrowHill, International Edition
3.	Nester's Microbiology, International Edition,	Nester Anderson, Roberts, Pearsall	McGrow HillPub.

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Skill Enhancement Course Structure of Semester III & IV

Semester & Course Code	Course Title	Credit (Theory)	Teaching duration per Week (in Hr.)	External (Marks)	Internal (Marks)	Exam Time Duration	Total (Marks)
III MLT-SEC-301	Laboratory Media Preparation - 1	02	02	25	25	1.5	50
IV MLT-SEC-401	Laboratory Media Preparation - 2	02	02	50	50	1.5	50

SEMESTER – 1II

MLT-SEC-301: LABORATORY MEDIA PREPARATION – 1

Semester: III	
Course (subject) Code	MLT-SEC-301
Subject Title	Laboratory Media Preparation - 1
Course Type	Skill Enhancement Course
Credit	2 (Theory)
Course Level	200-299
Teaching Hour/ Week	2 Hours
Teaching Time	30 hours
Subject Outcome	At the end of the course, the students will get knowledge of • Preparation and composition of Lab media • Use of various medias.

Course Content:

Unit No.	Content: Laboratory Media Preparation-I	Teaching Hours
Unit-1	**Nutritional requirements for cultivation of bacteria**	**15 Hr.**
1.1	Nutritional Classification.	
1.2	Culture Media and its types.	
1.3	Common Ingredients of Culture media	
1.4	Solidifying Agent and Basic Preparation of Culture Media	
Unit-2	**Broth Media: Principle, Composition, Preparation and Use**	**15 Hr.**
2.1	Nutrient broth and Nutrient Sugar broth	
2.2	1% & 2% Peptone	
2.3	Glucose Phosphate Broth	
2.4	Urea Broth	
2.5	MacConkey broth	

Reference Books:

Sr. No.	Title/Edition	Authors	Publisher
1	Experimental Microbiology Volume – 1 & 2	Rakesh J. Patel, Kiran R. Patel	Aditya Publication
2	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar& Darshan B. Godkar	Bhalani Publishing House Mumbai, India
3	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1/ 2nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
4	Medical Laboratory Science - Theory and Practice	J. Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
5	District Laboratory Practice in Tropical Countries, Part 1/ 2nd Edition	Monica Cheesbrough	Cambridge University Press

SEMESTER IV

MLT-SEC-401: LABORATORY MEDIA PREPARATION - 2

Semester: IV	
Course (subject) Code	MLT-SEC-401
Subject Title	Laboratory Media Preparation - 2
Course Type	Skill Enhancement Course.
Credit	2 (Theory)
Course Level	200-299.
Teaching Hour/ Week	2 hours
Teaching Time	30 hours
Subject Outcome	At the end of the course, the students will get knowledge of: • Different types of Laboratory media and its preparation. • Use of various media for laboratory purpose.

Course Content:

Unit No.	Content	Teaching Hours
Unit-1	**Bacteriological Media: Principle, Composition, Preparation and Use**	**15 Hr.**
1.1	Nutrient Agar and MacConkey Agar	
1.2	Eosin Methylene Blue Agar and Deoxycholate Citrate Agar	
1.3	Blood Agar and Chocolate Agar	
1.4	Salmonella- Shigella Agar and Wilson and Blair Medium	
1.5	Simmon Citrate Slant, Triple Sugar Ion Slant, Phenyl alanine Slant	
Unit-2	**Mycological Media: Principle, Composition, Preparation and Use**	**15 Hr.**
2.1	Potato Dextrose Agar	
2.2	Rose Bengal Agar	
2.3	Glucose Yeast Extract Agar	
2.4	Sabouraud's Agar	
2.5	Czapek Dox Agar	

Reference Books:

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1	Experimental Microbiology Volume – 1 & 2	Rakesh J. Patel, Kiran R. Patel	Aditya Publication
2	Textbook of Medical Laboratory Technology, 3rd Edition, Volume 1	Praful B. Godkar& Darshan B. Godkar	Bhalani Publishing House Mumbai, India
3	Medical Laboratory Technology - A Procedure Manual for Routine Diagnostic tests, Volume 1/ 2nd Edition	Kanai L. Mukherjee	Tata Mc Graw -Hill Education Private Limited, New Delhi
4	Medical Laboratory Science - Theory and Practice	K. Ochei & A Kolhatkar	Tata Mc Graw -Hill Publishing Limited Company, New Delhi
5	District Laboratory Practice in Tropical Countries, Part 1/ 2nd Edition	Monica Cheesbrough	Cambridge University Press