



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, ઉધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

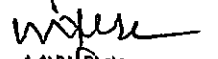
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—:પરિપત્ર:—

યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા હેઠળના તમામ શૈક્ષણિક વિભાગોના વડાશ્રીઓ અને યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૬-૨૭ થી અમલમાં આવનાર B.Sc. Medical Laboratory Technology Sem.-7 & 8 Honours (with OJT/without OJT) અને Honours with Research નો અભ્યાસક્રમ મેડિકલ ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૧/૦૪/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૦૨ થી મંજૂર કરવા વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૦૪/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૦૪ થી મંજૂર કરવા એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૮/૦૬/૨૦૨૬ ની સભાના ઠરાવ ક્રમાંક:૦૨ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક:ઓથો./પરિપત્ર/૧૩૬૧૮/૨૦૨૬
તા.૧૮/૦૬/૨૦૨૬


કુલસચિવશ્રી

પ્રતિ,

(૧) યુનિવર્સિટીના વિજ્ઞાન વિદ્યાશાખા હેઠળના તમામ શૈક્ષણિક વિભાગોના વડાશ્રીઓ.

(૨) યુનિવર્સિટી સંલગ્ન વિજ્ઞાન વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.

... આપશ્રીના વિભાગ/કોલેજના સંબંધિત શિક્ષકો/વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારું.

(૩) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.

(૪) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.

STRUCTURE OF PROGRAM – MEDICAL LABORATORY TECHNOLOGY – SEMESTER – 7
(HONOURS WITH OJT / RESEARCH)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	MLT-MJ-701	Blood disorder: Vedic Tradition and Modern Perspectives	Blood disorder: Vedic Tradition and Modern Perspectives	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-701	Practical Based on Blood disorder: Vedic Tradition and Modern Perspectives	Blood disorder: Vedic Tradition and Modern Perspectives	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-702	Histocytological Techniques	Histocytological Techniques	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-702	Practical Based on Histocytological Techniques	Histocytological Techniques	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-703	Recent Diagnostic Techniques	Recent Diagnostic Techniques	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-703	Practical Based on Recent Diagnostic Techniques	Recent Diagnostic Techniques	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
Research Project / OJT	MLT-RP/OJT-701	Research Project / On Job Training	Research Project / On Job Training	400-499	12		-	-	06		75		75		150	
MINOR ELECTIVE	ME	** Fundamentals of Cyber Security	Fundamentals of Cyber Security	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-

* - Research Methodology syllabus will be prepared by Adhoc Board of Research Methodology of VNSGU, Surat.

** - Fundamentals of Cyber Security syllabus will be prepared by Computer faculty of VNSGU, Surat.

STRUCTURE OF PROGRAM – MEDICAL LABORATORY TECHNOLOGY – SEMESTER – 7
(HONOURS WITHOUT OJT / RESEARCH)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	MLT-MJ-701	Blood disorder: Vedic Tradition and Modern Perspectives	Blood disorder: Vedic Tradition and Modern Perspectives	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-701	Practical Based on Blood disorder: Vedic Tradition and Modern Perspectives	Blood disorder: Vedic Tradition and Modern Perspectives	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-702	Histocytological Techniques	Histocytological Techniques	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-702	Practical Based on Histocytological Techniques	Histocytological Techniques	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-703	Recent Diagnostic Techniques	Recent Diagnostic Techniques	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-703	Practical Based on Recent Diagnostic Techniques	Recent Diagnostic Techniques	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-704	Laboratory Management and Automation	Laboratory Management and Automation	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-
		*Research Methodology	*Research Methodology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
MINOR ELECTIVE	ME	** Fundamentals of Cyber Security	Fundamentals of Cyber Security	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-

* - Research Methodology syllabus will be prepared by Adhoc Board of Research Methodology of VNSGU, Surat.

** - Fundamentals of Cyber Security syllabus will be prepared by Computer faculty of VNSGU, Surat.

STRUCTURE OF PROGRAM – MEDICAL LABORATORY TECHNOLOGY – SEMESTER – 8
(HONOURS WITH OJT / RESEARCH)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	MLT-MJ-801	Immunohaematology	Immunohaematology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-801	Practical Based on Immunohaematology	Practical Based on Immunohaematology	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-802	Organ Function Test	Organ Function Test	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-802	Practical Based on Organ Function Test	Practical Based on Organ Function Test	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-803	Diagnostic Mycology and Parasitology	Diagnostic Mycology and Parasitology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-803	Practical Based on Diagnostic Mycology and Parasitology	Practical Based on Diagnostic Mycology and Parasitology	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
Research Project / OJT	MLT-RP/OJT-801	Research Project / On Job Training	Research Project / On Job Training	400-499	12		-	-	06		75		75		150	
MINOR ELECTIVE	ME	* Entrepreneurship	Entrepreneurship	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-

*- Entrepreneurship syllabus will be prepared by Commerce including B.A. Board of studies of VNSGU, Surat.

STRUCTURE OF PROGRAM – MEDICAL LABORATORY TECHNOLOGY – SEMESTER – 8
(HONOURS WITHOUT OJT / RESEARCH)

Course Category	Course Code	Course Title	Marksheet Title in English	Level of Course	Teaching Hours/Week		Exam Duration		Credit		Internal Marks		External Marks		Total Marks	
					TH	PR	TH	PR	TH	PR	TH	PR	TH	PR	TH	PR
MAJOR	MLT-MJ-801	Immunohaematology	Immunohaematology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-801	Practical Based on Immunohaematology	Practical Based on Immunohaematology	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-802	Organ Function Test	Organ Function Test	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-802	Practical Based on Organ Function Test	Practical Based on Organ Function Test	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-803	Diagnostic Mycology and Parasitology	Diagnostic Mycology and Parasitology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
	MLTP-MJ-803	Practical Based on Diagnostic Mycology and Parasitology	Practical Based on Diagnostic Mycology and Parasitology	400-499	-	04	-	06.00 h	-	02	-	25	-	25	-	50
	MLT-MJ-804	Toxicology and Cancer & Tumour Marker	Toxicology and Cancer & Tumour Marker	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-
		*Research Methodology	*Research Methodology	400-499	02	-	01.00 h	-	02	-	25	-	25	-	50	-
MINOR ELECTIVE	ME	**Fundamentals of Cyber Security	Fundamentals of Cyber Security	400-499	04	-	02.00 h	-	04	-	50	-	50	-	100	-

* - Research Methodology syllabus will be prepared by Adhoc Board of Research Methodology of VNSGU, Surat.

* *- Entrepreneurship syllabus will be prepared by Commerce including B.A. Board of studies of VNSGU, Surat.

NOTE: The medium of instruction will be in **ENGLISH** only for students opting **MEDICAL LABORATORY TECHNOLOGY** as a **MAJOR, MINOR, MDC & SEC** subjects



Veer Narmad South Gujarat University, Surat

Syllabus of

B. Sc. Medical Laboratory Technology

Semester-VII & VIII

**As per NEP- 2020 [3 years (Degree) & 4 years
(Honours with OJT / with Research / without OJT)]**

Effective from 2026 - 2027

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Medical Laboratory Technology

**Major Course Structure of Semester VII & VIII- Honours with Research / with OJT /
without OJT**

SEMESTER – VII							
Course Code	Title of The Course	Course Credit	Hrs. Per Week	Internal Marks (CCE)	External Marks (SEE)	Duration of Exam (Hr.)	Total Marks
MLT-MJ-701	Blood disorder: Vedic Tradition and Modern Perspectives	02	02	25	25	01	50
MLTP-MJ-701	Practical Based on Blood disorder: Vedic Tradition and Modern Perspectives	02	04	25	25	06	50
MLT-MJ-702	Histocytological Techniques	02	02	25	25	01	50
MLTP-MJ-702	Practicals Based on Histocytological Techniques	02	04	25	25	06	50
MLT-MJ-703	Recent Diagnostic Techniques	02	02	25	25	01	50
MLTP-MJ-703	Practicals Based on Recent Diagnostic Techniques	02	04	25	25	06	50
Honours with Research / OJT							
Research/ OJT		06	12	75	75	12	150
Honours without OJT							
MLT-MJ-704	Laboratory Management and Automation	04	04	50	50	02	100
MLT-MJ-705	Research Methodology	02	02	25	25	01	50
SEMESTER – VIII							
MLT-MJ-801	Immunohaematology	02	02	25	25	01	50
MLTP-MJ-801	Practicals Based on Immunohaematology	02	04	25	25	06	50
MLT-MJ-802	Organ Function Test	02	02	25	25	01	50
MLTP-MJ-802	Practicals Based on Organ Function Test	02	04	25	25	06	50
MLT-MJ-803	Diagnostic Mycology and Parasitology	02	02	25	25	01	50
MLTP-MJ-803	Practicals Based on Diagnostic Mycology and Parasitology	02	04	25	25	06	50
Honours with Research / OJT							
Research/ OJT		06	12	75	75	12	150
Honours without OJT							
MLT-MJ-804	Toxicology and Cancer & Tumour Marker	04	04	50	50	02	100
MLT-MJ-805	Research Methodology	02	02	25	25	01	50

[Subject code for Theory-2603000507017001]

[Subject code for Practical-2603000507017002]

SEMESTER VII

MLT-MJ-701: BLOOD DISORDER: VEDIC TRADITION AND MODERN PERSPECTIVES

Program Name	B. Sc. Medical Laboratory Technology (Honors)																															
Semester	VII																															
NCrF Credit Level	6																															
Course Type	Major																															
Course Subtype	Employability																															
Subject Type	Discipline Specific																															
Course Code	MLT-MJ-701																															
Course level	400-499																															
Course Title	Blood disorder: Vedic Tradition and Modern Perspectives																															
Credit	Theory	2	Practical	2	Total 4																											
Course Type	Major																															
Effective From	Academic Year: 2026-2027																															
Course Outcome	<ul style="list-style-type: none"> • CO-1: The students will be able to correlate Ayurvedic diagnostic principles with Modern laboratory findings. Explain Pandu roga, Raktarbuda, Raktapitta with respect to Dosha, Dhatu and Mala involvement • CO-2: The students will be able to identify different types of anemia and leukemia, its symptoms, clinical features and laboratory diagnosis. • CO-3: The students will gain knowledge of coagulation mechanism and diagnosis of coagulation disorder. • CO-4: The students will get familiarized and trained to perform and interpret haematological tests for accurate diagnosis of blood disorder. • CO-5: The students will be able to integrate laboratory test results with patient symptoms for diagnosis of haematological diseases. • CO-6: The students can Recognize the importance of haematological tests in monitoring therapy 																															
Course Content	<table border="1"> <thead> <tr> <th>Unit No.</th> <th>Content</th> <th>Teaching Hours</th> </tr> </thead> <tbody> <tr> <td>Unit-1</td> <td>Raktaj Vyadhi: Vedic Tradition</td> <td>15</td> </tr> <tr> <td>1.1</td> <td>Pandu Roga: Causes, symptoms, Types</td> <td></td> </tr> <tr> <td>1.2</td> <td>Raktapitta: Causes, symptoms, Dosha association and Classification</td> <td></td> </tr> <tr> <td>1.3</td> <td>Raktarbuda: Causes, Symptoms, Ayurvedic management</td> <td></td> </tr> <tr> <td>1.4</td> <td>Diagnostic methods for identifying impure blood through Ayurveda and Modern science</td> <td></td> </tr> <tr> <td>Unit-2</td> <td>Blood Disorder: Modern Perspectives</td> <td>15</td> </tr> <tr> <td>2.1</td> <td>Anaemia: Classification and Clinical and laboratory features</td> <td></td> </tr> <tr> <td>2.2</td> <td>Haemaoglobinopathies: Sickle cell anemia and</td> <td></td> </tr> </tbody> </table>				Unit No.	Content	Teaching Hours	Unit-1	Raktaj Vyadhi: Vedic Tradition	15	1.1	Pandu Roga: Causes, symptoms, Types		1.2	Raktapitta: Causes, symptoms, Dosha association and Classification		1.3	Raktarbuda: Causes, Symptoms, Ayurvedic management		1.4	Diagnostic methods for identifying impure blood through Ayurveda and Modern science		Unit-2	Blood Disorder: Modern Perspectives	15	2.1	Anaemia: Classification and Clinical and laboratory features		2.2	Haemaoglobinopathies: Sickle cell anemia and		
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2.1	Anaemia: Classification and Clinical and laboratory features																															
2.2	Haemaoglobinopathies: Sickle cell anemia and																															

	Thalassemia
2.3	Leukemia: Classification, Clinical and laboratory features
2.4	Mechanism of coagulation and coagulation disorder: Haemophilia and Disseminated Intravascular Coagulation

MLTP-MJ-701: PRACTICALS BASED ON BLOOD DISORDER: VEDIC TRADITION AND MODERN PERSPECTIVES

Course Content:

1. Ayurvedic Herbs to Boost Haemoglobin
2. Reticulocyte count
3. Slide test for Sickle cell anemia
4. Tube test for Sickle cell anemia
5. NESTROF test for β -Thalassemia
6. Colorimetric determination of HbF
7. Test for G₆PD deficiency
8. Determination of red cell indices
9. Determination of Bleeding Time and Clotting time
10. Prothrombin Time test
11. Activated Partial Thromboplastin Time test
12. Hb electrophoresis (Demonstration)

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO-1	■	■								
CO-2	■						■		■	■
CO-3										
CO-4		■	■			■				
CO-5										
CO-6										

Reference Books

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Haematology	Dr. Tejinder Singh	Arya Publications
2	Textbook of Medical Laboratory Technology/ 3 rd , 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	Clinical Pathology, Hematology and Blood Banking for DMLT students/ 4 th	Nanda Maheshwari	Jaypee
5	https://sandhyamedicityindia.com/symptoms-of-leukemia/		
6	https://sandhyamedicityindia.com/causes-of-leukemia/		
7	https://www.easyayurveda.com/2016/12/06/pandu-roga-chikitsa/		
8	https://www.easyayurveda.com/2017/09/26/raktapitta-causes-symptoms/		

	<p>9 4 Ayurvedic Herbs to Boost Hemoglobin & Strengthen Blood Health https://jeenasikho.com/4-ayurvedic-herbs-to-boost-hemoglobin-and-strengthen-blood-health/</p> <p>10 Raktaj Vyadhi (Blood Disorder) and its Methods of Diagnosis- A Review; Sudhir T., Apneet W., Shri Ram S.; Internation Ayurvedic Medical Journal; page no.- 232-237.</p>
Teaching Methodology	<p>Theory: Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools</p> <p>Practical: Laboratory work, Direct Instruction with Demonstration, Journal Preparation, Experiments</p>
Evaluation Method	<p>Theory: Internal Assessment: 25 Marks: Internal test, Attendance, Class Assignments/ Seminar, Home Assignment External Assessment: 25 Marks: Semester end University examination</p> <p>Practical: Internal Assessment: 25 Marks: Attendance, Viva/ Internal practical examination, Lab Work External Assessment: 25 Marks: Semester end University examination</p>

[Subject code for Theory-2603000507027001]

[Subject code for Practical-2603000507027002]

MLT-MJ-702: HISTOCYTOLOGICAL TECHNIQUES

Program Name	B. Sc. Medical Laboratory Technology (Honors)					
Semester	VII					
NCrF Credit Level	6					
Course Type	Major					
Course Subtype	Employability					
Subject Type	Discipline Specific					
Course Code	MLT-MJ-702					
Course Level	400-499					
Course Title	Histocytological techniques					
Credit	Theory	2	Practical	2	Total	4
Effective From	Academic Year: 2026-2027					
Course Outcome	<p>At the end of course;</p> <ul style="list-style-type: none"> • CO-1: The students will get knowledge about various types of specimens, their fixation, fixatives, decalcifying agents and dehydrating agents. They will be able to carry out basic steps of tissue processing, operate basic microtome, stain and mount various sections. • CO-2: The students will get fundamental knowledge of general cytological changes in cell during malignancy and will be aware of various branches of cytology. They also get knowledge of methods of cytological specimens collection, preservation and processing steps. They will learn the technique of FNAC and museum technique. • CO-3: The students will be able to perform the basic steps of tissue processing like dehydration, clearing and infiltration. Embed the processed tissue in the embedding medium for microtomy. • CO-4: The students will be able to operate the basic microtome for cutting of tissue sections. • CO-5: The students will be able to stain the tissue sections by H&E staining process and the cytological smears by PAP staining process. • CO-6: The students will learn the process of honing and sharpening of Microtome knives and get familiar with the techniques of preservation, handling and mounting of specimens in museums. 					
Course Content	Unit No.	Content				Teaching Hours
	Unit-1	Histological Techniques				15 Hr.
	1.1	Types of specimens				
	1.2	Fixation and Decalcification				
	1.3	Steps of Tissue processing and Embedding : Manual and Automated				
	1.4	Types of Knife, Types of Microtome and Microtomy				

	<p>1.5 Staining Techniques : H & E staining , Mounting of sections.</p> <p>Unit-2 Cytological Techniques 15 Hr.</p> <p>2.1 Types of Exfoliation and General cytological changes in cell during malignancy</p> <p>2.2 Role and Branches of Diagnostic Cytology</p> <p>2.3 Collection, preservation, smear preparation and fixation Cytological specimens</p> <p>2.4 Interventional cytology</p> <p>2.5 Museum Techniques</p>																																																																													
<p>MLTP-MJ-702: PRACTICALS BASED ON HISTOCYTOLOGICAL TECHNIQUES</p> <p>Course Content:</p> <ol style="list-style-type: none"> 1. Manual steps of tissue processing. 2. Procedure of embedding from a processed tissue. 3. Section Cutting using a microtome. 4. Staining of tissue sections by H & E stain. 5. Staining of FNAC Smear by PAP stain. 6. Process of honing and sharpening of Microtome knives (Demonstration). 7. Handling, fixation, preservation and mounting of museum specimen (Demonstration). 																																																																														
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<p>Teaching Methodology</p>	<p>Theory: Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools</p> <p>Practical: Laboratory work, Direct Instruction with Demonstration, Journal Preparation, Experiments</p>
<p>Evaluation Method</p>	<p>Theory: Internal Assessment: 25 Marks: Internal test, Attendance, Class Assignments/ Seminar, Home Assignment External Assessment: 25 Marks: Semester end University examination</p> <p>Practical: Internal Assessment: 25 Marks: Attendance, Viva/ Internal practical examination, Lab Work External Assessment: 25 Marks: Semester end University examination</p>

[Subject code for Theory-2603000507037001]

[Subject code for Practical-2603000507037002]

MLT-MJ-703: RECENT DIAGNOSTIC TECHNIQUES

Program Name	B. Sc. Medical Laboratory Technology (Honours)					
Semester	VII					
NCrF Credit Level	6					
Course Type	Major					
Course Subtype	Employability					
Subject Type	Discipline Specific					
Course Code	MLT-MJ- 703					
Course Level	400-499					
Course Title	Recent Diagnostic Techniques					
Credit	Theory:	02	Practical:	02	Total:	04
Effective From	Academic Year: 2026-2027					
Course Outcome	<p>At the end of course,</p> <ul style="list-style-type: none">• CO-1: The students will understand the fundamental concepts of Molecular diagnostic techniques which can help for diseases diagnosis.• CO-2: The students will get an insight of various immunological assays used for detection of antigen / antibody of infectious diseases.• CO-3: The students will learn different protein based techniques employed in clinical and research laboratory.• CO-4: They will be able to develop skill to perform nucleic acid based techniques like DNA extraction, PCR, RFLP etc. which can be helpful in diagnostic and research purposes.• CO-5: The students will be able to perform basic chromatographic techniques for biomolecule separation and analysis.• CO-6: They will be able to analyse and interpret laboratory data related to molecular and protein based diagnostic methods					

Course Content	Unit No.	Content	Teaching Hours								
	Unit-1	Molecular Diagnostic Techniques	15 Hr.								
	1.1	Genomic DNA Extraction									
	1.2	PCR									
	1.3	RFLP									
	1.4	Northern Blotting & Southern Blotting									
	1.5	Fluorescence in situ hybridization (FISH) and DNA Microarray									
	Unit-2	Immunoassays and Protein Based Techniques	15 Hr.								
	2.1	ELISA									
	2.2	Immunofluorescence									
	2.3	Electrophoretic Techniques: PAGE, Iso Electric Focusing, 2D Gel electrophoresis, Gradient Gel Electrophoresis									
	2.4	Western Blotting									
	2.5	Chromatographic Techniques: Gel Filtration Chromatography, Ion Exchange Chromatography, GLC and HPLC									
MLTP-MJ-703: PRACTICALS BASED ON RECENT DIAGNOSTIC TECHNIQUES											
Course Content:											
<ol style="list-style-type: none"> 1. Extraction of Bacterial Genomic DNA. 2. Quantification of Bacterial Genomic DNA. 3. Ligation of DNA fragment. 4. RFLP technique. 5. Extraction of Plasmid DNA from Bacteria. 6. Thin layer chromatography for amino acids and sugars. 7. ELISA for detection of Ag and Ab. 8. Separation of Protein by SDS PAGE (Demonstration). 9. Gene Amplification by PCR (Demonstration). 											
Mapping between and PSOs		PSO 1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
	CO-1										
	CO-2										
	CO-3										
	CO-4										
	CO-5										
	CO-6										
Reference Books	Sr. No.	Title/Edition	Authors	Publisher							
	1	Analytical Biochemistry (Biochemical Technique)	P. Ashokan	Chinnaa Pub., Nelvisharani, Vellor.							
	2	Textbook of Medical Laboratory Technology, 3 rd	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India							

	3	Principles and Techniques of Biochemistry and Molecular Biology/ 6 th , 2005	Wilson and Walker	Cambridge University Press.
	4	Molecular Biology of Gene/7 th , 2017	Watson J. D. et al	Pearson India Edu. Services, Pvt. Ltd.
	5	Principles of Gene manipulations and Genomics, 7 th 2007	Primrose S. B. and Twyman R.M.	Blackwell Publishing , USA
	6	Genetic Engineering, 7 th impression, 2016	Rustogi S. and Pathak N.	Oxford University Press
	7	Biochemistry/ 4 th	Satyanarayana U. & Chakrapani U	Arunabha Sen and Allied (P) Ltd
	8	https://www.pw.live/full-form/exams/fish		
	9	Hariman, G. (2002). Microarray technologies-an overview. <i>Pharmacogenomics</i> , 3(3), 293-297.		
Teaching Methodology	<p>Theory: Lecture Based Learning, Discussion, Self- Study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools</p> <p>Practical: Laboratory work , Direct Instruction with Demonstration, Journal Preparation, Experiments</p>			
Evaluation Method	<p>Theory: Internal Assessment: 25 Marks: Internal test, Attendance, Class Assignments/Seminar, Home Assignment External Assessment: 25 Marks: Semester end University examination</p> <p>Practical: Internal Assessment: 25 Marks: Attendance, Viva/Internal practical examination, Lab Work External Assessment: 25 Marks: Semester end University examination</p>			

[Subject code-2603000507057001]

MLT-MJ-704: LABORATORY MANAGEMENT AND AUTOMATION
(Honours without OJT)

Program Name	B.Sc. Medical Laboratory Technology (Honors)					
Semester	VII					
NCrF Credit Level	6.0					
Course Type	Major					
Course Subtype	Employability					
Subject Type	Discipline Specific					
Course Code	MLT-MJ-704					
Course Level	400-499					
Course Title	Laboratory Management and Automation					
Credit	Theory	4	Practical	0	Total	4
Effective From	Academic Year: 2026 - 2027					
Course Outcome	<ul style="list-style-type: none"> • CO-1: The student will understand how to organize and manage a clinical laboratory, evaluate laboratory design and facilities, apply knowledge for material, personnel and fiscal management. • CO-2: The student will be able to employ proper intra- and extra-laboratory communication strategies to support teamwork, quality service, and coordination with other healthcare units and external partners. • CO-3: The student will be able to differentiate types of quality control and common error occur at different levels, apply statistical quality control techniques to prepare control charts and its interpretation • CO-4: The student will get knowledge of scope, objectives and framework of NABL accreditation as it applies to medical laboratories in India. • CO-5: The student will be able to identify and interpret qualification norms for personnel management systems required for NABL compliance. • CO-6: The student will get knowledge of basic principles of types of automation in clinical laboratory. 					
Course Content	Unit No.	Content				Teaching Hours
	Unit-1	Organization and Management of Clinical Laboratory				15
	1.1	Laboratory facilities and Organization: Functional, Spatial and Specific Consideration in Laboratory design				
	1.2	Purchasing				
	1.3	Personnel Management				
	1.4	Fiscal Management: Cost finding and Budgeting				
Unit-2	Total Quality Management				15	
2.1	Quality laboratory process					

	2.2	Quality Control: Internal and External QC									
	2.3	Formulating Quality control charts: Levy-Jenning Chart and Cusum chart									
	2.4	Westgard multi-rule charts									
	Unit-3	NABL Accreditation of Medical Laboratory									
	3.1	Introduction, Scope, Aims and Objectives									15
	3.2	Description and types of Laboratories									
	3.3	Qualification norms									
	3.4	Benefits and Process of Accreditation									
	Unit-4	Laboratory Automation									
	4.1	Introduction and Basic Concepts									15
	4.2	Automation in Haematology laboratory: Cell counter									
	4.3	Automation in Biochemistry laboratory: Continuous flow analyser, discrete analyser, centrifugal analyser and dry chemistry analyser									
	4.4	Automation in Microbiology laboratory: BACTEC and VITEK system									
Mapping between Cos and PSOs		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
	CO-1										
	CO-2										
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	CO-4										
	CO-5										
	CO-6										
Reference Books	Sr. No.	Title/Edition				Authors			Publisher		
	1	A Text book of MLT Fundamentals for MLT/ 1 st				Dr. Jigna Naik, Dr. Mayuri Dholaria			Popular		
	2	Tietz Fundamentals of Clinical Chemistry				Carl A. Burtis, Edward R. Ashwood			Harcourt (India) Private Limited		
	3	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1				Praful B. Godkar & Darshan B. Godkar			Bhalani Publishing House Mumbai, India		
	4	Medical Laboratory Science - Theory and Practice				J. Ochei & A. Kolhatkar			Tata Mc Graw -Hill Publishing Limited Company, New Delhi		
	5	Clinical Diagnosis and Management by Laboratory Methods/ 17 th				John Bernard Henry, Todd, Sanford, Davidsohn			All India Traveller Bookseller		
	Teaching Methodology	Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools									
Evaluation Method	Internal Assessment: 50 Marks: Internal test, Attendance, Class Assignments/ Seminar, Home Assignment External Assessment: 50 Marks: Semester end University examination										

MLT-MJ-705: RESEARCH METHODOLOGY (Honours without OJT): will be given same

[Subject code for Theory-2703000508017001]

[Subject code for Practical-2703000508017002]

SEMESTER VIII

MLT-MJ-801: IMMUNOHAEMATOLOGY

Program Name	B. Sc. Medical Laboratory Technology (Honors)					
Semester	VIII					
NCrF Credit Level	6					
Course Type	Major					
Course Subtype	Employability					
Subject Type	Discipline Specific					
Course Code	MLT-MJ-801					
Course Level	400-499					
Course Title	Immunohaematology					
Credit	Theory:	2	Practical:	2	Total:	4
Effective From	Academic Year: 2026-2027					
Course Outcome	<ul style="list-style-type: none"> • CO-1: The students will gain knowledge of blood group systems, performing blood collection and processing, interpreting immunohematology test results, applying quality control and safety principles, and understanding the clinical significance of transfusion practices and regulatory requirements • CO-2: The students will understand the process of separating blood into different components, such as packed red cells, platelets, and plasma. • CO-3: The students will learn how to store blood and shelf life criteria for each component. • CO-4: The students will be able to understand the logistical organization of a blood bank, including managing the inventory of components. Have clear knowledge about transfusion reactions and its investigations • CO-5: The students will be able to perform tube techniques for all serological tests in blood banking • CO-6: The students will gain knowledge of various component preparation by visiting any blood bank 					
Course Content	Unit No.	Content				Teaching Hours
	Unit-1	Basic Principles of Immunohaematology, Blood collection & Blood Group Systems				15 Hr.
	1.1	ABO Blood group system				
	1.2	RH Blood group system				
	1.3	Other blood group systems				
	1.4	Donor selection criteria				
	1.5	Whole blood collection, storage and mandatory transfusion transmitted infections testing in donor				
	Unit-2	Component preparation, Compatibility testing and Transfusion reaction				15 Hr.

	<p>2.1 Blood component Preparation- Red Cell Concentrate, Fresh Frozen Plasma, Platelet Concentrate, Cryoprecipitate</p> <p>2.2 Red cell serology-Blood grouping, Cross matching</p> <p>2.3 Antiglobulin tests-Direct and Indirect</p> <p>2.4 Mechanism and Investigation of HDN</p> <p>2.5 Transfusion reactions and investigation</p>																																																																														
	<p align="center">MLTP-MJ-801: PRACTICALS BASED ON IMMUNOHAEMATOLOGY</p> <p>Course content:</p> <ol style="list-style-type: none"> ABO and RH blood grouping by Slide Method ABO blood grouping by Tube Method: a) Forward grouping b) Reverse grouping RH Typing: Saline, Albumin and AHG method Direct Anti-Human globulin test Indirect Anti-Human globulin test Determination of Anti A/ Anti B titer Determination of Anti-D titer by IAT technique Cross matching-Major and Minor Blood component preparation (Demonstration) 																																																																														
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	6.	Essentials of Blood Banking and Transfusion Medicine	Ganga S. Pilli	CBS Publishers, New Delhi
	7.	Practical Manual for Medical Laboratory Technology- Volume 2/ 2 nd	Mayuri Dholaria, Jigna Naik, Urvashi Desai & Rinku Shukla	New Popular Prakashan
Teaching Methodology	<p>Theory: Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools</p> <p>Practical: Laboratory work, Direct Instruction with Demonstration, Journal Preparation, Experiments</p>			
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[Subject code for Theory-2703000508027001]

[Subject code for Practical-2703000508027002]

MLT-MJ-802: ORGAN FUNCTION TEST

Program Name	B. Sc. Medical Laboratory Technology (Honors)					
Semester	VIII					
NCrF Credit Level	6					
Course Type	Major					
Course Subtype	Employability					
Subject Type	Discipline Specific					
Course Code	MLT-MJ-802					
Course level	400-499					
Course Title	Organ Function Test					
Credit	Theory	2	Practical	2	Total	4
Course Type	Major					
Effective From	Academic Year: 2026-2027					
Course Outcome	<ul style="list-style-type: none"> • CO1: The students will gain knowledge of various functions of different organs and tests to be performed when function of organ is affected. • CO2: The students will gain knowledge of the tests used for the early diagnosis, treatment as well as prevention of potentially serious health conditions. • CO-3: The students will gain knowledge of how the functions of organs can help in detection of various diseases or organs damage conditions. • CO4: The students will be trained to perform tests for accurate diagnosis of functions of organs. • CO5: The students will be able to interpret tests performed to check proper functions of organ. • CO6: The students will get able to integrate laboratory test results with patient symptoms for diagnosis of various organ diseases and to recognize the importance of these tests in monitoring therapy. 					
Course Content	Unit No.	Content				Teaching Hours
	Unit-1	Renal and Cardiac Function Tests				15 Hr.
	1.1	Renal Function Test				
	1.1.1	Functions of Kidney & Classification of RFT				
	1.1.2	Tests based on Glomerular filtration				
	1.1.3	Tests based on Tubular function				
	1.1.4	Tests to measure Renal Plasma Flow				
	1.2	Cardiac Function Tests				
	1.2.1	Cardiac profile test				
	1.2.2	Cardiac injury panel test				
	1.2.3	Cardiac enzyme and cardiac marker				
	Unit-2	Liver and Thyroid Function Test				15 Hr.
	2.1	Liver Function Test				
	2.1.1	Functions of Liver & Classification of LFT				
	2.1.2	Tests based on abnormalities of metabolism: carbohydrate, lipid, drug, pigment				
	2.1.3	Tests based on detoxification function and Excretory function				
	2.1.4	Tests based on coagulation function				
	2.1.5	Tests based on change in plasma protein and amino acid				

	catabolism	
2.1.6	Serum enzymes in liver diseases	
2.2	Thyroid Function Tests	
2.2.1	Classification of Thyroid function test	
2.2.2	Tests for measurement of thyroid hormone	

MLTP-MJ-802: PRACTICALS BASED ON ORGAN FUNCTION TESTS

Course Content:

1. Estimation of Biochemical parameters to check function of kidney: Uric Acid, Urea & BUN, Creatinine, Total protein, Albumin, Glucose
2. Estimation of Electrolytes to check function of kidney: Sodium, Potassium, Chloride
3. Liver function tests to check abnormality in pigment metabolism: serum total bilirubin, Direct and Indirect bilirubin
4. Liver function tests to check abnormality in Protein metabolism: Total protein, Albumin, A:G ratio
5. Liver function tests to check abnormality in Lipid metabolism: Total cholesterol, HDL cholesterol. Total and HDL Cholesterol ratio
6. Tests to measure coagulation function of liver: Prothrombin time test.
7. Estimation of enzymes to check liver function: SGPT, SGOT, ALP & LDH
8. Cardiac function test: Total cholesterol, HDL Cholesterol, Triglyceride, LDL Cholesterol, VLDL, Glucose, Urea & BUN, CPK, SGOT & LDH

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO-1										
CO-2										
CO-3										
CO-4										
CO-5										
CO-6										

Reference Books

Sr. No.	Title/Edition	Authors	Publisher
1	Textbook of Medical Biochemistry, 8th edition	Chatterjaj M. N. and Shinde R.	Jaypee Brothers Publishers.
2	Textbook of Medical Laboratory Technology, Volume 1/ 3 rd	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
3	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
4	Fundamentals of Biochemistry	J. L Jain, Sunjay Jain, Nitin Jain	S Chand & company, New Delhi
5	Biochemistry	U Satyanarayan	Books & Allied pvt Ltd, Kolkatta.

Teaching Methodology	Theory: Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools Practical: Laboratory work, Direct Instruction with Demonstration, Journal Preparation, Experiments
Evaluation Method	Theory: Internal Assessment: 25 Marks: Internal test, Attendance, Class Assignments/ Seminar, Home Assignment External Assessment: 25 Marks: Semester end University examination Practical: Internal Assessment: 25 Marks: Attendance, Viva/ Internal practical examination, Lab Work External Assessment: 25 Marks: Semester end University examination

[Subject code for Theory-2703000508037001]

[Subject code for Practical-2703000508037002]

MLT-MJ-803: DIAGNOSTIC MYCOLOGY AND PARASITOLOGY

Program Name	B.Sc. Medical Laboratory Technology (Honors)				
Semester	VIII				
NCrF Credit Level	6				
Course Type	Major				
Course Subtype	Employability				
Subject Type	Discipline Specific				
Course Code	MLT-MJ-803				
Course Level	400-499				
Course Title	Diagnostic Mycology and Parasitology				
Credit	Theory	2	Practical	2	Total 4
Effective From	Academic Year: 2026-2027				
Course Outcome	<ul style="list-style-type: none"> • CO-1: The students will get knowledge of types of Mycosis and method of its diagnosis from various specimens. • CO-2: The students will gain theoretical knowledge of Morphological features, life cycle and laboratory diagnosis of different parasites. • CO- 3: The students will also know about use of mycological media and medically important fungi. • CO-4: The students will be able to perform diagnostic tests for identification of fungi from clinical specimen. • CO-5: The students will develop skills diagnosis of mycotic and parasitic infection • CO-6: The students will be able to perform concentration technique for identification of ova and cyst of stool parasites. 				
Course Content	Unit No.	Content	Teaching Hours		
	Unit-1	Diagnostic Mycology	15		
	1.1	Specimen collection, transportation and examination for laboratory diagnosis of mycotic infection			
	1.2	Superficial mycosis			
	1.3	Subcutaneous mycosis			
	1.4	Systemic Mycosis			
	1.5	Opportunistic Mycosis			
	Unit-2	Diagnostic Parasitology	15		
	2.1	Protozoology: Morphology, life cycle and lab diagnosis of: <ul style="list-style-type: none"> • <i>Trichomonas vaginalis</i> • <i>Entamoeba histolytica</i>, • <i>Giardia lamblia</i>, 			

	<ul style="list-style-type: none"> • <i>Leishmania donovani</i>, • <i>Plasmodium falciparum</i> & <i>Plasmodium vivax</i>
2.2	General characteristics of Cestodes Morphology, life cycle and lab diagnosis of: <ul style="list-style-type: none"> • <i>Taenia species</i>, • <i>Echinococcus granulosus</i>
2.3	General characteristics of Nematodes Morphology, life cycle and lab diagnosis of: <ul style="list-style-type: none"> • <i>Enterobius vermicularis</i> • <i>Trichuris trichiura</i> • <i>Ascaris lumbricoides</i> • <i>Wuchereria bancrofti</i>
2.4	General characteristics of Trematodes Morphology, life cycle and lab diagnosis of <i>Schistosoma</i> species

MLTP-MJ-803: PRACTICALS BASED ON DIAGNOSTIC MYCOLOGY AND PARASITOLOGY

Course Content:

- 1) Study of mycological media
- 2) Study of growth characteristic of fungi.
- 3) Examination of fungi from clinical specimen by Lactophenol cotton blue & KOH method
- 4) Detection of malarial parasites by immunochromatographic test
- 5) Detection of *Microfilaria* by immunochromatographic test
- 6) Examination of stool for parasitic infection: Saline preparation, Iodine preparation
- 7) Identification of ova and cyst of stool parasites using concentration methods.
- 8) Examination of blood for parasitic infection
- 9) Laboratory study of parasites present in stool, urine and blood from chart/permanent slide: Stool: *Giardia lamblia*, *Entamoeba histolytica*, *Enterobius vermicularis* & *Ascaris lumbricoides*,
 Urine: *Trichomonas vaginalis*, & *Schistosoma haematobium*
 Blood: *Plasmodium spp.*, *Microfilaria* & *Leishmania donovani*

Mapping between Cos and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO-1	■	■	■	■					■	
CO-2	■	■	■	■					■	
CO-3	■	■	■	■			■			
CO-4	■	■	■	■			■			
CO-5	■	■	■	■			■			
CO-6	■	■	■	■			■		■	

Reference Books	Sr. No.	Title/Edition	Authors	Publisher
	1	Medical Parasitology/5 th	D. R. Arora and Brij Bala Arora	CBS Publishers and Distributors Pvt. Ltd.
	2	Parasitology (Protozoology and Helminthology)/13 th	K. D. Chatterjee	CBS Publishers and Distributors Pvt. Ltd.
	3	Textbook of Medical Parasitology/8 th	Sougata Ghosh	Jaypee
	4	Short Textbook of Medical Microbiology including Parasitology/10 th	Satish Gupta	Jaypee
	5	Textbook of Microbiology/ 9 th	Ananthanarayana and Paniker	Universities Press
	6	Textbook of Medical Laboratory Technology, 3 rd Edition, Volume 1	Praful B. Godkar & Darshan B. Godkar	Bhalani Publishing House Mumbai, India
Teaching Methodology	<p>Theory: Lecture Based Learning, Discussion, Self-study, Seminar, Assignments, Technology Enhanced Teaching using Digital Tools</p> <p>Practical: Laboratory work, Direct Instruction with Demonstration, Journal Preparation, Experiments</p>			
Evaluation Method	<p>Theory: Internal Assessment: 25 Marks: Internal test, Attendance, Class Assignments/ Seminar, Home Assignment External Assessment: 25 Marks: Semester end University examination</p> <p>Practical: Internal Assessment: 25 Marks: Attendance, Viva/ Internal practical examination, Lab Work External Assessment: 25 Marks: Semester end University examination</p>			

[Subject code-2703000508057001]

MLT-MJ-804: TOXICOLOGY AND CANCER & TUMOUR MARKERS

(Honours without OJT)

Program Name	B. Sc. Medical Laboratory Technology (Honors)						
Semester	VIII						
NCrF Credit Level	6						
Course Type	Major						
Course Subtype	Employability						
Subject Type	Discipline Specific						
Course Code	MLT-MJ-804						
Course Level	400-499						
Course Title	Toxicology and Cancer & Tumour Markers						
Credit	Theory:	04	Practical:	0	Total:	04	
Effective From	Academic Year: 2026-2027						
Course Outcome	<p>At the end of course students will get knowledge</p> <ul style="list-style-type: none"> • CO-1: of free radicals, its sources and harmful effects. They will also gain idea about antioxidants. • CO-2: About the role of free radicals and antioxidants in cancer. • CO-3: About characteristics, properties and molecular basis of cancer cell and its etiology. • CO-4: Definition, types, characteristics and classification of Tumour Markers and detection of cancer through tumour markers. • CO-5: Toxicokinetic, Toxicodynamic, relationship of drugs with cells and plasma, their metabolism and excretion. • CO-6: They will gain knowledge about various methods to detect antiepileptic drugs. 						
Course Content	Unit No.	Content				Teaching Hours	
	Unit-1	Free Radical and Antioxidants				15 Hr.	
	1.1	Introduction and types of Free Radicals					
	1.2	Sources and Generation of Free Radicals					
	1.3	Harmful effects of Free Radicals					
	1.4	Antioxidants in Biological System and its dietary supplements					
	Unit-2	Cancer and its pathophysiology				15 Hr.	
	2.1	Definition, characteristics and pathophysiology of cancer					
	2.2	Properties of cancer cell and etiology of cancer					
	2.3	Molecular basis of cancer					
2.4	Characteristics of growing tumour cell						

	Unit-3 Tumour Marker and its detection 3.1 Definition, types, characteristics and classification of Tumour Markers 3.2 Biomarker still in research 3.3 Determination of Alpha-fetoprotein and Prostate Specific Antigen 3.4 Determination of Tumour Marker and CA 123 II Unit-4 Toxicology 4.1 Introduction, Toxicokinetic and Toxicodynamic 4.2 Metabolism and excretion of drugs 4.3 Relationship between plasma concentrations of drugs and their cellular effects 4.4 Methods for detection of common Antiepileptic drugs	15 Hr. 15 Hr.																																																																													
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MLT-MJ-805: RESEARCH METHODOLOGY: will be given same