

**Master of Science in Medical
Laboratory Techniques
(M.Sc. MLT)-
Haematology and
Blood Banking**

**SECOND
SEMESTER**

Era University, Lucknow
Department of Medical Laboratory Techniques
Course Outline: Master of Science in Medical Laboratory Techniques
M. Sc. MLT: Hematology and Blood Banking
Second Semester

Course Code	Course Title	Hours			Marks		Total Marks	Credits
				P	Internal	External		
MLT-HB 201	Applied Haematology-I	4	1	-	30	70	100	5
MLT-HB 202	Clinical Pathology	4	1	-	30	70	100	5
MLT-HB 203	Principles of Immunology	4	-	-	30	70	100	4
MLT-HB 204	Molecular Biology and Bioinformatics	4	-	-	30	70	100	4
MLP-HB 201	Applied Haematology-I (Practical)	-	-	5	30	70	100	3
MLP-HB 201	Clinical Pathology (Practical)	-	-	5	30	70	100	3
MLP-HB 202	Principles of Immunology (Practical)	-	-	2	30	70	100	1
MLP-HB 203	Molecular Biology and Bioinformatics (Practical)	-	-	2	30	70	100	1
Total		16	2	14	240	560	800	26
Total Hours in Semester		512						

Era University, Lucknow
 Department of Medical Laboratory Techniques
 Course Outline: Master of Science in Medical Laboratory Techniques
 Hematology and Blood Banking
 Effective From: 2024 -25

Name of the Program	Master of Science in Medical Laboratory Techniques			Year/ Semester:	1st year/ 2nd	
Course Name	Applied Hematology	Course Code:	MLT-HB-201	Type:	THEORY	
Credits	L: 4 T:1 P: 0			Total Sessions Hours:		
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70	
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill		
Course Objectives	This course will provide knowledge of Complete blood count and interpretation of histograms, Anemia-Definition, Various classifications of Anemia, Hereditary disorders of Haemoglobin structures and synthesis, Disorder of White Blood Cells, Haemostatic mechanism and its disorder, LE cells, its demonstration and significance					
Course Outcomes (CO): <i>After the successful course completion, learners will develop the following attributes:</i>						
Course Outcome (CO)	Students will know about the Iron -deficiency Anemia and their diagnosis by Complete blood count, Structural variants of hemoglobin and the diseases, morphologic abnormalities of neutrophils. Hemostatic mechanism and its types.					
CO1	Explain the Iron -deficiency Anemia and their diagnosis by Complete blood count.					
CO2	To learn about the Hereditary disorders of Haemoglobin					
CO3	To learn about the Disorder of White Blood Cells: .					
CO4	To learn about the Hemostatic mechanism and its disorders					
CO5	To learn about the LE cells, its demonstration and significance and SLE.					
Pedagogy	Classroom teaching, PPT, Videos, Seminar, Whiteboard, Assessments					
Internal Evaluation Mode	Continuous internal assessment and written exam					
Session Details	Topic			Hours	MappedCO	
Unit 1	Complete blood count and interpretation of histograms, Disorder of Red cell-Anemia-Definition, Various classifications of Anemia and adaptive mechanism in Anemia, clinical significance of anemia, Lab investigations and management of Anemia, Iron Deficiency Anemia, Metabolism of iron.			10	CO1	

Unit 2	Hereditary disorders of Haemoglobin structures and synthesis. Structural variants of haemoglobin, pathophysiology of structural haemoglobin variants, sickle cell Anemia with lab diagnosis, Thalassemia, definition, types of thalassemia including Alpha, Beta thalassemia, pathophysiology and lab diagnosis, Hemolytic Anemia-	15	CO2
Unit 3	Disorder of White Blood Cells: Neutrophilia, Leukemoid reaction, neutropenia, morphologic abnormalities of neutrophils, functional abnormalities of neutrophils, reactive eosinophilic and hyper eosinophilic syndrome, lymphocytosis, infectious mononucleosis, lymphocytopenia.	20	CO3
Unit 4	Hemostatic mechanism and its disorders, primary and secondary hemostasis, role of platelets in hemostasis, role of coagulation factors, coagulation inhibitory system, coagulation pathways-intrinsic and extrinsic, fibrinolytic system	20	CO4
Unit 5	LE cells, its demonstration and significance and SLE. Hemoparasites and their identification: Malaria, Trypanosomes, Leishmania and Filariasis-	10	CO5

CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO6
CO1	1	1	-	1	1	1	-	2	1	-	3	3	-	1
CO2	1	1	-	1	1	1	-	2	1	-	3	3	-	1
CO3	1	1	-	1	1	1	-	2	1	-	3	3	-	1
CO4	1	1	-	1	1	1	-	2	1	-	3	3	-	1
CO5	1	1	-	1	1	1	-	2	1	-	3	3	-	1
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Text- Books	<ol style="list-style-type: none"> Godkar.B.Praful,(2016)TextbookofMLT,3rd edition,BhalaniPublications Ochei J & Kolhatkar A(2000),Medical Laboratory Science: Theory &Practice, 3rdedition,McgrawHillEducation Mukherjee L.K(2017), Medical Laboratory edition, Tata McgrawHill SoodRamnik,(2015), Text book of Medical Laboratory Technology,2 edition Ja eePublications 													
Para Text	Unit 1: Complete blood count and interpretation of histograms. Unit 2: Hereditary disorders of Haemoglobin Unit 3: Disorder of White Blood Cells: Unit4: Hemostatic mechanism and its disorders Unit 5: LE cells													
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component	Marks	Pattern												
Mid Semester	12	MCQ: 4 Short Answer Type Questions: 02 Long Answer Type Question: 01												
Class Test	6	MCQ: 02 Short Answer Type Questions: 01 Long Answer Type Question: 01												
Online Test/ Objective Test	4	MCQ: 4												

Era University, Lucknow
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 Hematology and Blood Banking
 Effective From: 2024 -25

Name of the Program	Master of Science in Medical Laboratory Techniques			Year/ Semester:	1st year/2nd
Course Name	Clinical Pathology	Course Code:	MLT-HB-202	Type:	THEORY
Credits	L: 4 T:1 P: 0			Total Sessions Hours:	75
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill	
Course Objectives	This course will provide knowledge of Fetal and neonatal physiology and pediatric diseases, Cervical cancer, uterine and ovarian cancers, Polycythemia vera: history, epidemiology, clinical feature, blood and lab findings, WBC disorders, Collection, transport, preservation and processing of various clinical specimens,				
Course Outcomes (CO): <i>After the successful course completion, learners will develop the following attributes:</i>					
Course Outcome (CO)	Students will know about the Growth and functional development of the fetus, Cancer and the viral infections, Myelofibrosis and the examination of various clinical samples.				
CO1	Explain Fetal and neonatal physiology and pediatric diseases.				
CO2	To learn about the cancer and transmission of communicable diseases.				
CO3	To learn about the bone marrow study				
CO4	To learn about the WBC disorders				
CO5	To learn about the Collection, transport, preservation and processing of various clinical specimens,				
Pedagogy	Classroom teaching, PPT, Videos, Seminar, Whiteboard, Assessments				
Internal Evaluation Mode	Continuous internal assessment and written exam				
Session Details	Topic	Hours	MappedCO		
Unit 1	Fetal and neonatal physiology and pediatric diseases Growth and functional development of the fetus, adjustment of the infant to extrauterine life, special functional problems in the neonate, problems of prematurity	10	CO1		
Unit 2	Cervical cancer, uterine and ovarian cancers, gestational trophoblastic neoplasia, Sexually transmitted diseases — syphilis, gonorrhea, trichomoniasis, human papillomavirus infection.	15	CO2		
Unit 3	Polycythemia vera: history, epidemiology, clinical feature, blood and lab findings, bone marrow study, cytogenetic and pathogenesis, Myelofibrosis: History and pathogenesis, clinical features, lab finding and diagnosis Chronic lymphocytic leukemia: Etiology, clinical findings, lab findings.	20	CO3		

Unit 4	WBC disorders: Leukemoid reaction, myelodysplastic syndrome (MDS) — definition, clinical features, peripheral smear and bone marrow findings Leukemias definition, classification — FAB and WHO of acute leukemias, diagnostic criteria, cytochemical staining and immunophenotyping	20	CO4
Unit 5	Collection, transport, preservation and processing of various clinical specimens, Urine examination — physical, chemical and microscopic examination of urine, Body fluids: CSF — specimen collection, normal composition and clinical significance,	10	CO5

CO-PO and PSO Mapping

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO6
CO1	1	1	-	1	2	2	-	-	1	2	3	-	-	1
CO2	1	1	-	1	2	2	-	-	1	-	3	2	2	1
CO3	1	1	-	1	2	2	-	-	1	-	3	2	2	1
CO4	1	1	-	1	2	2	-	-	1	-	3	2	2	1
CO5	1	1	-	1	3	3	-	-	1	-	3	2	2	1

Strong contribution-3, Average contribution-2, Low contribution-1,

Suggested Readings:

Text- Books	<ol style="list-style-type: none"> 1. Medical Lab Technology by KL Mukherjee, 2. Practical Haematology. Dacie & Lewis, 11th edition 3. De Gruy's Clinical Hematology in Medical Practice 4. https://www.hematology.ondeducation 5. https://www.vet.cornell.edu/animal-healthdiagnostic-center/laboratories/clinical
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Recapitulation & Examination Pattern**Internal Continuous Assessment:**

Component	Marks	Pattern
Mid Semester	12	MCQ: 4 Short Answer Type Questions: 02 Long Answer Type Question: 01
Class Test	6	MCQ: 02 Short Answer Type Questions: 01 Long Answer Type Question: 01
Online Test/ Objective Test	4	MCQ: 4
Assignment/ Presentation	4	Hard copy/Softcopy
Attendance	4	
Total Marks	30	

Era University, Lucknow
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Name of the Program	Master of Science in Medical Laboratory Techniques			Year/ Semester:	1st year/ 2nd
CourseName	Principles of Immunology	Course Code:	MLT-HB-203	Type:	THEORY
Credits	L: 4 T:1 P:0			Total Sessions Hours:	60
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill	
Course Objectives	This course will provide knowledge of Immunology-Types of immunity and immune system, cells and organs of the immune system. Inflammation, MHC, Immune response, antigen, structure of Immunoglobulins, Types of T-Cells, T cell receptor and B-cells receptor, development of T and B-Cell.				
Course Outcomes (CO): After the successful course completion, learners will develop the following attributes:					
Course Outcome(CO)	Students will know about the composition, structural organization, and properties of proteins, amino acids, carbohydrates, and lipids.				
CO1	To learn about the immune system and inflammation.				
CO2	To learn about the structure, properties, types, and cells and organs of the immune system.				
CO3	To learn about the immune response, antigens their antigenicity, structure and function of Immunoglobulins,				
CO4	To learn about the classification, properties, and types of Antigens.				
CO5	To learn about the Hypersensitivity — types and mechanisms				
Pedagogy	Classroom teaching, PPT, Videos, Seminar, Whiteboard, Assessments				
Internal EvaluationMode	Continuous internal assessment and written exam				
Session Details	Topic	Hours	Mapped CO		
Unit 1	History & Overview of Immunology; Immunity; types of immunity- innate and acquired. Organs of the immune system, Primary and Secondary lymphoid organs. Cells of Immune system.	10	CO1		
Unit 2	Antigens and immunogenicity- antigen, immunogen, haptens, superantigen, tolerates, epitopes, paratopes. Antigenicity and immunogenicity	10	CO2		
Unit 3	Immunoglobulin- structure, types, distribution, biological and chemical properties - Theories of antibody production regulation and diversity. Monoclonal and polyclonal antibodies.	15	CO3		
Unit 4	Antigen recognition — TCR, BCR, MHC restriction, lymphocyte activation, clonal proliferation and differentiation. Physiology of Immune response — various phases of HI, CMI — cell-mediated cytotoxicity, DTH response	15	CO4		
Unit 5	Hypersensitivity — types and mechanisms, Autoimmunity, Tumour and Transplantation immunology, Immune regulation mechanisms brief	10	CO5		

		account on immune induction, Immunosuppression, immunotolerance, immunopotentiatiom Role of cytokines, lymphokines and chemokines.												
CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	1	1	-	1	-	1	2	-	1	2	3	3	3	1
CO2	1	1	-	1	-	1	2	-	1	2	3	3	3	1
CO3	1	1	-	1	-	1	3	-	1	2	3	3	3	1
CO4	1	1	-	1	-	2	3	-	1	2	3	3	3	1
CO5	1	1	-	1	-	2	2	-	1	2	3	3	3	1
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Text- Books	<ol style="list-style-type: none"> 1. Fundamentals of Biochemistry by Voet and Voet, John Wiley and sons NY. 2. Biochemistry b L. S er, W.H. Freeman and Co. 													
Para Text	Unit 1: Immunology Unit 2: Antigens Unit 3: Immunoglobulin- structure Unit4: Antigen recognition — TCR, BCR, Unit 5: Hypersensitivity													
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component	Marks	Pattern												
Mid Semester	12	MCQ: 4 Short Answer Type Questions: 02 Long Answer Type Question: 01												
Class Test	6	MCQ: 02 Short Answer Type Questions: 01 Long Answer Type Question: 01												
Online Test/ Objective Test	4	MCQ: 4												
Assignment/ Presentation	4	Hard copy/Softcopy												
Attendance	4													
Total Marks	30													

Era University, Lucknow
Department of Medical Laboratory Techniques
Course Outline: Master of Science in Medical Laboratory Techniques
Hematology and Blood Banking
Effective From: 2024 -25.

Name of the Program	Bachelors of Science in Medical Laboratory techniques			Year/ Semester:	1 st /2 nd
Course Name	Molecular Biology And Bioinformatics	Course Code:	MLT-HB-204	Type:	THEORY
Credits	L:4 T:0 P:0			Total Sessions Hours:	60
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill	
Course Objectives	This course will provide knowledge of Molecules structure, characteristics, techniques, the role of genetics in medicine and the Bioinformatics data processing by GenBank, EMBL, DDBJ, Uniprot and Protein Data Bank				
Course Outcomes (CO): <i>After the successful course completion, learners will develop following attributes:</i>					
Course Outcome (CO)	To learn about the Nucleic acids -structure and their types, transcription and translation, role of genetics in medicine.				
CO1	To learn about the Molecules structure, characteristics, techniques				
CO2	To learn about the Transcription and Translation				
CO3	To learn about the Recombinant DNA technology,				
CO4	To learn about the Genetics used in Medicine				
CO5	To learn about the tools and Techniques used in Bioinformatics databases.				
Pedagogy	Classroom teaching, PPT, Videos, Seminar, Whiteboard, Assessments				
Internal Evaluation Mode	Continuous internal assessment and written exam				
Session Details	Topic			Hours	Mappe dCO
Unit 1	Nucleic acids: Nucleotides, Nucleosides, Nitrogen bases DNA — structure, types, coiling and supercoiling, topoisomerases, replication, Satellite DNA. Organization of prokaryotic and eukaryotic genome, Chromosomes- structure, number, sex chromosomes, human karyotype, methods for chromosome analysis — chromosome banding, FISH, CGH, flow, cytometer , cell cycle, mitosis and meiosis.			10	CO1
Unit 2	Transcription and Translation: Factors involved, RNA processing, types of RNA, genetic code, regulation in eukaryotes and gene amplification Mutation: spontaneous, induced,			15	CO2

Unit 3	Recombinant DNA Technology: necessary elements — enzymes and their properties, DNA ligase, DNA ligase, DNA modifying enzymes, cloning vectors plasmids	15	CO3
Unit 4	Genetics in Medicine: Hemoglobin and hemoglobinopathies, phenylketonuria, alkaptonuria, homocystinuria, Lesch-Nyhan syndrome, genetics of cancer, Down's syndrome, Di- George syndrome, Klinefelter's Syndrome	15	CO4
Unit 5	Bioinformatics databases - Nucleotide sequence databases, Primary nucleotide sequence databases-EMBL, GeneBank, DDBJ; Secondary nucleotide sequence databases; Protein databases- UniProt, Protein Data Bank.	20	CO5

CO-PO and PSO Mapping

CO	PO 1	PO 2	PO 3	PO4	PO5	PO 6	PO 7	PO 8	PS O1	PS O2	PSO 3	PSO4	PSO 5	PS O6
CO1	1	1	2	-	-	1	2	1	3	3	3	3	3	3
CO2	1	1	2	-	-	1	2	1	3	3	3	3	3	3
CO3	1	2	2	-	-	1	2	1	3	3	3	3	3	3
CO4	1	2	2	-	-	1	2	1	3	3	3	3	3	3
CO5	2	2	3	-	-	1	2	1	3	3	3	3	3	3

Strong contribution-3, Average contribution-2, Low contribution-1,

Suggested Readings:

Text- Books	<ol style="list-style-type: none"> 1. Fowler, F,J. Survey Research Methods. New Delhi, Sage, 1993 2. Goode, W.J and Hatt, P.K. Methods in Social Science Research. New Delhi, McGraw Hill, 1986 3. Leddy, Pauli D Practical Research: Planning Design, London, Clive Bin le . 1980
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Para Text	Unit 1: Nucleic acids: Nucleotides, Nucleosides, Nitrogen bases Unit 2: Transcription and Translation Unit 3: Recombinant DNA Technology Unit4: Genetics in Medicine: Unit 5: Bioinformatics databases
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Recapitulation & Examination Pattern

Internal Continuous Assessment:

Component	Marks	Pattern
Mid Semester	12	MCQ: 4 Short Answer Type Questions: 02 Long Answer Type Question: 01
Class Test	6	MCQ: 02 Short Answer Type Questions: 01 Long Answer Type Question: 01
Online Test/ Objective Test	4	MCQ: 4
Assignment/ Presentation	4	Hard copy/Softcopy
Attendance	4	
Total Marks	30	

Era University, Lucknow
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 Course Outline: Master of Science in Medical Laboratory Techniques
 Hematology and Blood Banking
 Effective From: 2024 -25

Name of the Program	Bachelors of Science in Medical Laboratory techniques			Year/ Semester:	1st/ 2nd									
Course Name	Applied Hematology	Course Code:	MLP-HB-201	Type:	Practical									
Credits	L:0 T:0 P:3			Total Sessions Hours:	45									
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70									
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill										
Course Outcomes (CO): <i>After the successful course completion, learners will develop following attributes:</i>														
Course Outcome (CO)	Students will know about Staining and different blood test.													
CO1	To learn about the Staining of bone marrow, and to perform the sickling test. hemoglobin. osmotic test. schilling test etc													
Session Details	Topic				MappedCO									
Unit 1	Staining of bone marrow. To perform sickling test. To determine fetal haemoglobin. To perform osmotic test. To perform schilling test. To perform auto hemolysis sis test, To perform Iron profile. Haemoglobin electrophoresis.				CO1									
CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component		Marks												
Mid Semester		12												
Internal Continuous Assessments		18												
Total Marks		30												

Era University, Lucknow

Department of Medical Laboratory Techniques

Course Outline: Master of Science in Medical Laboratory Techniques

Hematology and Blood Banking

Effective From: 2024 -25

Name of the Program	Bachelors of Science in Medical Laboratory techniques			Year/ Semester:	1 st /2 nd									
Course Name	Clinical Pathology	Course Code:	MLP-HB-202	Type:	Practical									
Credits	L:0 T:0 P:2			Total Sessions Hours:										
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70									
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill										
Course Outcomes (CO): After the successful course completion, learners will develop following attributes:														
Course Outcome (CO)	To learn about the tools and Techniques used in Clinical pathology like Coomb's test, Urine analysis, Reticulocyte count, Semen analysis and body fluid analysis.													
CO1	To learn about the, Body fluid analysis, staining techniques, Pregnancy test, Urine examination and semen analysis													
Session Details	Topic				MappedCO									
Unit 1	1. Coomb's test direct and indirect 2. Urine: microscopic examination and automation in urine analysis 3. Reticulocyte count: preparation, staining examination and corrected retic count. 4. Semen analysis: microscopic examination and methylene blue staining for morphology 5. Pregnancy test. 6. Body fluid analysis (CSF, pleural and peritoneal/ascetic fluid - physical, chemical and microscopic examination. 7. Staining of bone marrow. 8. Demonstration of leukemic slides.				CO1									
CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component		Marks												
Mid Semester		12												
Internal Continuous Assessment		18												
Total Marks		30												

Era University, Lucknow
 Department of Medical Laboratory Techniques
 Course Outline: Master of Science in Medical Laboratory Techniques
 Hematology and Blood Banking
 Effective From: 2024 -25

Name of the Program	Bachelors of Science in Medical Laboratory techniques			Year/ Semester:	1st/1st									
Course Name	Principles of Immunology	Course Code:	MLP-HB-203	Type:	Practical									
Credits	L:0 T:0 P:2			Total Sessions Hours:										
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70									
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill										
Course Outcomes (CO): <i>After the successful course completion, learners will develop following attributes:</i>														
Course Outcome (CO)	To learn about the tools and Techniques used in Immunology to detect the ABO Blood group and to perform the RA test, Widal test and preparation of 5% red cell suspension.													
CO1	To learn about the, ABO Blood grouping and to perform the RA test.													
Session Details	Topic				MappedCO									
Unit 1	1. Preparation of 5% red cell suspension 2. To perform ABO blood group Forward 3. To perform ABO 4. To perform RA test 5. To perform widal test				CO1									
CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component		Marks												
Mid Semester		12												
Internal Continuous Assessment		18												
Total Marks		30												

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Effective From: 2024 -25

Name of the Program	Bachelors of Science in Medical Laboratory techniques			Year/ Semester:	1st/2nd									
Course Name	Molecular Biology and Bioinformatics	Course Code:	MLP-HB-204	Type:	Practical									
Credits	L:0 T:0 P:2			Total Sessions Hours:	30									
Evaluation Spread	Internal Continuous Assessment:	30		End Term Exam:	70									
Type of Course	<input type="radio"/> Compulsory	<input checked="" type="radio"/> Core	<input type="radio"/> Creative	<input type="radio"/> Life Skill										
Course Outcomes (CO): <i>After the successful course completion, learners will develop following attributes:</i>														
Course Outcome (CO)	To learn about the tools and Techniques used in molecular biology and Bioinformatics to separate the Nucleic Acids and their detection by agarose gel, western blotting, PCR.													
CO1	To learn about the, Agarpsse gel electrophoresis, PCR, and Western blotting.													
Session Details	Topic			Hours	Mapped CO									
Unit 1	1. Isolation of DNA 2. Separation of DNA by Agarose gel electrophoresis 3. To perform of PCR. 4. HIV test by Western Blotting 5. To perform of PCR mycobacterium pathogen 6. To perform PCR HIV 7. Separation of Nucleic acid			30	CO1									
CO-PO and PSO Mapping														
CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO 1	PSO 2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
<i>Strong contribution-3, Average contribution-2, Low contribution-1,</i>														
Suggested Readings:														
Recapitulation & Examination Pattern														
Internal Continuous Assessment:														
Component	Marks													
Mid Semester	12													
Internal continuous Assessment	18													
Total Marks	30													