



B. Sc. Medical Laboratory Technology Multidisciplinary Minor to be offered

Course Code	Course Name	Credits
U26MM201	Basics in Hematology	2
U26MM302	Fundamentals in Blood Banking	3
U26MM303	Fundamentals in Blood Banking Lab	1
U26MM404	Basics in Histopathology	3
U26MM405	Basics in Histopathology Lab	1
U26MM506	Disease and Health	3
U26MM507	Disease and Health Lab	1
U26MM608	Basics in Cytology	3
U26MM609	Basics in Cytology Lab	1
	Total	18



Theory Course

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U26MM201	Basics of Hematology	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U26MM201	Basics of Hematology	10	--	5	15	40%	35	40%	50

Course Description: Students will learn about the basic principles and concepts of Hematology and hematology section of hospital and pathology laboratories. Student will able to explain about Blood and hematopoietic system of the body.

Course Outcomes: after the end of this course students will able to

- CO1** Explain² the basics of Blood and hematopoietic system of the body.
- CO2** Identify² components of blood and their functions.
- CO3** Examine³ the influencing factors erythropoiesis and Leucopoiesis.
- CO4** Analyze⁴ complete Hemogram.

Course Contents

Module	Unit	Description	Hours
1.0		Introduction	
1	1.1	Introduction to 'Hematology.' and hematology section of a pathology laboratory.	6
	1.2	Blood and hematopoietic system of the body	
2.0		Blood and Hemoglobin	
2	2.1	Components of blood and their functions, various techniques of blood collection, use of various anticoagulants. Effects of storage of blood on cell morphology, waste disposal.	6
	2.2	Hemoglobin: synthesis, iron metabolism. Various types of hemoglobin. Determination of hemoglobin by various methods.	
3.0		Erythropoiesis and Leucopoiesis	



3	3.1	Factors influencing erythropoiesis, Red blood cells morphology. Total erythrocyte count by hemocytometry. Clinical significance.	6
	3.2	Factors influencing leucopoiesis, White blood cell morphology. Total leukocyte count by hemocytometry. Clinical significance.	
4.0			
Thrombopoiesis and Haematocrit			
4	4.1	Morphology of platelets. Determination of platelet count. Clinical significance.	6
	4.2	Determination by different methods: Haematocrit, Clinical significance. Study of blood smears for differential leukocyte count and cell morphology.	
5.0			
Erythrocytes and Leukocytes			
5	5.1	Study of abnormal erythrocytes and leukocytes in peripheral blood smear. Determination of Erythrocyte Sedimentation rate, Erythrocyte Indices.	6
	5.2	Principle, various methods, clinical significance. Study of complete Hemogram.	

Text Book

- 1 Praful Godkar, Darshan Godkar (2014). Textbook of Medical lab technology. Bhalani Publishing House. 3rd Edition, Vol 2.
- 2 Ochei and Kolatkar (2000). Medical Laboratory Science: Theory and Practice. McGraw Hill Education.

Reference Books

- 3 Dacie and Lewis practical hematology
- 4 Dr. Gayathri Prakash. Lab Manual on Blood Analysis and Medical Diagnostics. S Chand publication house, New Delhi.

● Evaluation Scheme

Internal Assessment (T1, T2 and FET):

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. Fifth module will be assessed for 5 marks separately it will be taken as seminar.



Theory Course

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U26MM302	Fundamentals in Blood Banking	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U26MM302	Fundamentals in Blood Banking	10	10	5	25	40%	50	40%	75

Course Description: This course will focus on and explore the ideas from viewpoint of knowing and understanding the basics of Fundamentals in Blood Banking, imparting knowledge about the fundamentals of blood and related components, sources and basic components of blood system classification and their uses.

Course Objectives:

1. To understand the basic principles of Fundamentals in Blood Banking
2. To study the different constituents of Blood Banking

Course Outcomes: after the end of this course students will able to

- CO1** Estimate¹The scope and historic background of Blood Banking
- CO2** Identify² Various source of blood.
- CO3** Describe³ Types of blood and their relation
- CO4** Analyze² Basic concepts of Blood Banking.



Course Contents

Module	Description	Hours
1	Various methods of blood collection, anticoagulants-mechanism and uses. Counting chamber hemocytometry. Enumeration of RBC including various counting chambers, diluting fluids for RBC count.	9
2	Hemoglobinometry. Principles and methods of quantitating Hb. Concentration of blood including knowledge of errors and quality control in various method. Abnormal hemoglobin and its investigation. Principles and methods of determining PVC calculation and interpretation of red cell indices. ESR: introduction, factors affecting ESR, principles and methods of determining ESR, increasing and decreasing conditions of ESR.	9
3	WBC: introduction, development of WBC, diluting fluids. Absolute eosinophil count, errors in sampling, mixing, diluting and counting. Cell counting, advantages and disadvantages, uses and mechanism of cell counting, quality control in cell counts. Preparation of peripheral smear and bone marrow smear. Thin smear, thick smear. Buffy coat smear, wet preparation. Romanowsky stain. Preparation advantages and disadvantages.	9
4	Blood Coagulation and disorders of hemostasis. Principles and methods of assessment of coagulation. BT, CT, Prothrombin time, partial thromboplastin time, thromboplastin regeneration time. Principle and methods of staining of Blood smears and bone marrow smears. Supravital stain. Reticulocyte count. Heinz bodies.	9



5	Description of morphology of normal and abnormal red cells. Blood differential WBC counting. Recognition of abnormal cell. Anaemia – definition etiology classification and laboratory diagnosis. Hemolytic anaemia, definition, causatives, laboratory investigations. Auto hemolysis, acid hemolysis.	9
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Reference Books

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
3. Godkar.B. Praful, (2016) Textbook of MLT, 3rd edition, Bhalani Publications
4. C F A Culling, (1974), Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques, 3rd edition, Butterworths Publishers

● Evaluation Scheme

Internal Assessment (T1, T2 and FET):

3. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
4. Fifth module will be assessed for 5 marks separately it will be taken as seminar.



Lab course Without POE

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U26MM303	Fundamentals in Blood						
	Banking Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass %	Marks	Min pass %	Total (Marks)
U26MM303	Fundamentals in Blood Banking					
	Lab	25	40			25

Course Outcomes: after the end of this course students will able to

- CO1** **Estimate**¹The scope and historic background of Blood Banking
- CO2** **Identify**² Various source of blood.
- CO3** **Describe**³ Types of blood and their relation

List of Practical

1. Blood Grouping
1. Blood Transfusion
2. Blood Donation
3. Blood Collection
4. Storage & Transport
5. Maintenance of Blood Bank Records
6. Compatibility Testing
7. Blood Components
- 8. Blood Transfusion Reactions**



Theory Course

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U26MM404	Basics in Histopathology	03	-	-	03	-	-

Evaluation Scheme

Course Code	Course Name	Evaluation Scheme (In Semester)					End Semester Exam (ESE)		
		T1	T2	FET	Total	Min pass	Marks	Min pass	Total (Marks)
U26MM404	Basics in Histopathology	10	10	5	25	40%	50	40%	75

Course Description: This course will focus on and explore the ideas from viewpoint of knowing and understanding the basics of Fundamentals in Histopathology, imparting knowledge about the fundamentals of pathology and related components, sources and basic components of histopathology system classification.

Course Objectives:

3. To understand the basic principles of Fundamentals in histopathology
4. To study the different constituents of histopathology

Course Outcomes: after the end of this course students will able to

- CO1** Estimate¹The scope and historic background of histopathology
- CO2** Identify² Various source of histopathology
- CO3** Describe³ Types of blood and their relation
- CO4** Analyze² Basic concepts of histopathology



Course Contents

Module	Description	Hours
1	Introduction of histopathology, cytology & histotechniques, laboratory organization, care & maintenance of equipment's used in histotechnology lab ,Safety measures in histotechnology lab	9
2	Reception, Recording, Labelling and transportation of tissue specimens, Basic concepts of fixation and various types of fixative used in histopathology and cytopathology.	9
3	Tissue and its types, Location and function, Grossing of tissues, whole mount, sections, smears, tissue processing and its steps, manual and automated method, components & principle of automatic tissue processor	9
4	Decalcification, decalcification methods, types of decalcifying fluid, Processing of bones and teeth, Embedding media, its type and properties	9
5	Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Section cutting, fault and remedies, Section adhesive. Cryostat, frozen sections of fresh, fixed and unfixed tissue, freeze drying, rapid frozen sections and staining for emergency diagnosis,	9

Reference Books

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
3. Godkar.B. Praful,(2016) Textbook of MLT, 3rd edition, Bhalani Publications
4. C F A Culling,(1974), Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques, 3rd edition, Butterworths Publishers

● Evaluation Scheme

Internal Assessment (T1, T2 and FET):

1. T1 should be based on first two modules and T2 should be based on next two modules, for 10 marks each.
2. Fifth module will be assessed for 5 marks separately it will be taken as seminar.



Lab course Without POE

Course code	Course name	Teaching Scheme (Hr/week)			Credits Assigned		
		Theory	Practical	Tutorial	Theory	Practical	Tutorial
U26MM405	Basics in Histopathology						
	Lab	-	02	-	-	01	-

Evaluation Scheme

Course Code	Course Name	In Semester Evaluation		End Semester Exam (OE/POE)		
		Term Work	Min pass %	Marks	Min pass %	Total (Marks)
U26MM405	Basics in Histopathology Lab					
		25	40			25

Course Outcomes: after the end of this course students will able to

- CO1** **Estimate**¹The scope and historic background of histopathology
- CO2** **Identify**² Various source of pathogens.
- CO3** **Describe**³ Types of pathogens and their relation with diseases

List of Practicals

1. Basic steps of tissue processing.
2. Preparation of fixatives and fixation.
3. Embedding technique
4. Microtomy basics.
5. Tissue Staining methods.
6. Tissue/sample Mounting technique.
7. Various methods of preparation of tissue sections.
8. Paraffin section, colloid embedding, frozen section.
9. Decalcification.