



KHYBER MEDICAL UNIVERSITY

CARDIAC PERFUSION TECHNOLOGY CURRICULUM

YEAR TWO STUDY GUIDE

(SEMESTER 3)

16 Weeks Activity Planner

2022-23

**CENTRAL CURRICULUM & ASSESSMENT COMMITTEE FOR
NURSING, REHABILITATION SCIENCES & ALLIED HEALTH SCIENCES**

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Introduction



KMU VISION

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

KMU MISSION

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

CENTRAL CURRICULUM COMMITTEE

Opened new door, for the beginning of new era under the supervision of Prof Dr. Zia ul Haq, VC Khyber Medical University and Dr. Brekhna Jamil Director IH-PE&R the Central Curriculum & Assessment Committee has been formulated. This is first step taken to change the dynamics of Allied Health Sciences and Nursing Education in Pakistan. Committee by using a craft man approach has developed study guide which will provide pathways for other to follow and KMU will pre-serve the leadership in providing quality education across Pakis9tan and will be a reference point of quality in future. Committe has developed curricula to promote inter-professional learning, enhancing and improving the quality of life for people by discovering, teaching and applying knowledge related to Nursing, rehabilitation Sciences & Allied Health sciences.

High-quality education is relevant to patient needs and the changing patterns of skills that are demanded by modern health care and aligning assessment and providing quality training to students will definitely will be the outcome. Which will strengthen and enhance quality of Health System across Pakistan.

The Central Curriculum & Assessment Committee is as follows:

Dr. Brekhna Jamil	Chairperson	Director Institute of Health Professions Education & Research, KMU
Prof. Dr. Zia Ul Islam	Member	Professor ENT
Dr. Syed Hafeez Ahmad	Member	Addl. Controller of Examination Khyber Medical University
Dr. Danish Ali Khan	Member	Deputy Dean Medical Profession- al Education Department Alliance Healthcare (PVT) LTD
Sardar Ali	Member	Assistant Professor Institute of Nursing Khyber Medical University
Muhammad Asif Zeb	Member	Lecturer Institute of ParaMedical Sciences Khyber Medical University
Nazish A Qadir	Member	Lecturer Institute of Physical Medicine & Rehabilitation Khyber Medical University
Syed Amin Ullah	Member	Assistant Director Academics Khyber Medical University



INTRODUCTION

Allied Health Sciences deal with all kind of diagnostic techniques used in the medical sector and are very crucial for the treatment of the patients. With diagnosis depending on technology, the role of allied health professional has become vital for delivering successful diagnostic and therapeutic. The allied health professionals include Medical laboratory technologists, Dental, Radiology, Anesthesia, Cardiology, Cardiac perfusion, Surgical, renal dialysis and Emergency technologists. Their role is to use scientific principles and evidence-based practice for the diagnosis, evaluation and treatment of various disorder; prevention of diseases, and to promote health of the community. In addition, it also deal with the application of administration and management skills.

OBJECTIVES

By the end of this program, students should be able to:

1. **To prepare a cadre of health technologists and workers who can effectively assist senior health professionals in the delivery of quality health services.**
2. **To prepare paramedical workers for all levels of the health care delivery system from the primary to the tertiary level.**
3. **To introduce and impart standard technical education with new modern techniques, within the fields of medical technologies, by replacing the conventional methods of pre-service training (certificate level).**
4. **To provide paramedical workers a status and recognition in the health care delivery system through improving their capacity along with increasing awareness of their responsibilities, authority and job description.**
5. **To equip paramedical staff with modern skills and latest technical knowledge and bring them at par with other national and international level.**



THIRD SEMESTER SUBJECTS CARDIAC PERFUSION TECHNOLOGY

S.No	Subjects	Duration
1	CAR-601 CARDIOPULMONARY ANATOMY 3(2+1)	16 weeks
2	PMS-612 GENERAL PATHOLOGY-I 3(2-1)	16 weeks
3	PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)	16 weeks
4	PMS-614 PHARMACOLOGY-I 3(2-1)	16 weeks
5	PMS-615 COMMUNICATION SKILLS 2(2-0)	16 weeks
6	MLT-601 HAEMATOLOGY-I 3(2-1)	16 weeks



3rd Semester

CAR-601 CARDIOPULMONARY ANATOMY 3(2+1)

Course Description

Students are been able to identify the principle structures of Thoracic wall, organs in the thoracic cavity. They can discuss the different concepts, terms and stages of the development of Cardiovascular and respiratory system and explain the anatomy of heart and blood vessels.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Identify the principle structures of thoracic wall**
2. **Discuss the different concept and terms of development of cardiovascular and respiratory system.**
3. **Explain the anatomy of the Thoracic cavity**
4. **Discuss the anatomy of heart and lungs**
5. **Describe the arterial and venous system of the heart**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate the bony orientation of chest wall.**
2. **Identify different chambers, surfaces and borders , major coronary artery and veins of the human heart.**
3. **Identify trachea, lobes and fissure of each lungs and Radiological Presentation and pathological finding on chest X-ray .**

Affective Domain

By the end of this subject, students should be able to:

1. **Demonstrate punctuality.**
2. **Follow the specified norms of the IL, SGD teaching & learning.**
3. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
4. **Make ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -CAR-601 CARDIOPULMONARY ANATOMY 3(2+1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: THORACIC WALL										
1	Week-1	Introduction	Define Thoracic Wall And basic Anatomy of thorax	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Sternum and its parts, Ribs and its types, Costal Cartilage	Discuss structure of the thoracic wall	C2						
3		Joints	Describe Joints of the Ribs	C2						
4		Practical	Identify various joints of thoracic wall independently		P4		Demo	2	OPSE	
5			Adopt how to care and handle human Skeleton/Chest models			A	Role Play		Formative Assessment	
6	Week-2	Movements	Discuss Movements of the Ribs and Costal Cartilages	C2			Interactive Lecture/SGD	2	MCQ's	5
7		Spaces and Muscles	Explain Intercostal Spaces and Intercostal Muscles	C2						
8		Nerves, arteries and veins	Describe intercostal nerves,arteries and veins	C2						
9		Practical	Identify various bones of thoracic wall independently		P4		Demo	2	OPSE	
10			Adopt how to care and handle human Skeleton/Chest models			A	Role Play		Formative Assessment	
11	Week-3	Suprapleural Membrane and Endothoracic Fascia	Discuss Suprapleural Membrane and Endothoracic Fascia	C2			Interactive Lecture/SGD	2	MCQ's	5
12		Diaphragm	Explain Diaphragm its parts, openings, nerves supply and its action	C2						
13		Muscles	Explain the muscles of thorax	C2						
14		Vessels & Lymphatics	Summarize large veins, arteries, nerves, lymph nodes of the thorax	C4			Demo	2	OPSE	
15		Practical	Identify suprapleural membrane, Various Structures passing through the inlet and Outlet of the thorax Independently		P4					
16	Adopt how to care and handle human Skeleton/Chest models				A	Role Play	Formative Assessment			
TOPIC: SURFACE ANATOMY										

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
17	Week-4	Introduction	Define Anterior and Posterior chest wall	C1			Interactive Lecture/SGD	2	MCQ's	5
18		Anterior Chest Wall	Describe Anterior Chest Wall	C2						
19		Ribs, Diaphragm, Nipple	Discuss Surface Anatomy of the Ribs, Diaphragm and Nipple	C2						
20		Axillary Folds and Posterior Chest Wall	Discribe Axillary Folds And Posterior Chest Wall	C1						
21		Lines of Orientation	Discuss lines of Orientation	C2						
22		Practical	Identify normal apex beat and lines of Orientation in Thorax anatomically.		P4		Demo	2	OPSE	5
23	Adopt how to care and handle human Skeleton/Chest models				A	Role Play	Formative Assessment			
TOPIC: THE THORACIC CAVITY										
24	Week-5	Introduction	Define Thoracic Cavity (Chest Cavity)	C1			Interactive Lecture/SGD	2	MCQ's	5
25		Mediastinum	Discuss Mediastinum and its Division	C2						
26		contents	Explain contents of the Mediastinum and Relations of the contents of the Mediastinum	C2						
27		Pleurae	Define Pleurae	C1						
28		Parts of the Pleurae	Explain parts of the Pleurae	C2						
29		Practical	Identify Mediastinum and its Division along with Sructures independently		P4		Demo	2	OPSE	5
30	Adopt how to care and handle human Thorax (Chest) models				A	Role Play	Formative Assessment			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
31	Week-6	Nerves	Describe nerves Supply of the Pleurae	C2			Interactive Lecture/SGD	2	MCQ's	5
32		Trachea, larynx	Define Trachea and larynx	C1						
33		Supply of the Trachea and Larynx	Describe nerves Supply, Blood supply and lymph drainage of the Trachea and larynx	C2						
34		surface anatomy of trachea	Explain surface anatomy of the Trachea	C2						
35		The Bronchi	Explain bifurcation of the trachea	C2						
36		Practical	Identify Trachea and larynx and its Division along with Sructures independently		P4		Demo	2	OPSE	5
37	Adopt how to care and handle human models				A	Role Play	Formative Assessment			
TOPIC: LUNGS ANATOMY										
38	Week-7	Introduction	Define lungs	C1			Interactive Lecture/SGD	2	MCQ's	5
39		Lobes and Fissures	Discuss Lobes and Fissures	C2						
40		Bronchopulmonary Segments	Explain Bronchopulmonary Segments	C2						
41		Practical	Identify trachea, lobes and fissure of each lungs		P4		Demo	2	OPSE	5
42			Adopt how to care and handle human lungs models.			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
43	Week-8	Vessels & Lymphatics	Describe Blood Supply, Nerves Supply and Lymphatic Drainage of the lungs	C2			Interactive Lecture/SGD	2	MCQ's	5
44			Describe Blood Supply of the lungs	C2						
45			Describe Nerves Supply of the lungs	C2						
46			Describe Lymphatic Drainage of the lungs	C2						
47		surface anatomy of Lungs	Explain Surface anatomy of Lungs	C2						
48	Practical		Radiological Presentation and pathological finding on chest X-ray		P4		Demo	2	OPSE	5
49			Comply SOPs for Observation of Chest X-ray			A	Role Play		Formative Assessment	
TOPIC: PERICARDIUM AND HEART ANATOMY										
50	Week-9	Introduction	Define pericardium and heart	C1			Interactive Lecture/SGD	2	MCQ's	5
51		Fibroserous sac	Discuss the Fibrous Pericardium	C2						
52			Discuss the Serous Pericardium	C2						
53			Discuss the Pericardial Sinuses	C2						
54		Practical		Identify heart surfaces, Chambers and heart Valves Independently		P4		Demo	2	
55	Adopt how to care and handle human Heart model					A	Role Play	Formative Assessment		

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
56	Week-10	Heart	Describe surfaces and Borders of the Heart	C2			Interactive Lecture/SGD	2	MCQ's	5
57		Heart Chambers	Explain Chambers of the Heart	C2						
58		Heart Structure	Discuss Structure of the Heart	C2						
59		Practical	Identify cardiac valve areas on the Thoracic wall Independently		P4		Demo	2	OPSE	
60			Adopt how to care and handle human Heart model			A	Role Play		Formative Assessment	
TOPIC: ARTERIAL SUPPLY OF THE HEART										
61	Week-11	Arterial Supply (Coronary arteries)	Describe Arterial Supply of the Heart long with its Branches	C2			Interactive Lecture/SGD	2	MCQ's	5
62		Variations in the Coronary Arteries and Coronary Artery Anastomoses	Explain Variation in the Coronary arteries and Coronary Artery Anastomoses	C2						
63		summary of arterial supply of the heart	Summarize the Overall Arterial Supply to the Heart in Most Individuals	C2						
64		Arterial supply of the heart	Discuss Arterial Supply to the Conducting System	C2						
65		Practical	Identify major coronary arteries and their branches		P4		Demo	2	OPSE	
66			Adopt how to care and handle human Heart model			A	Role Play		Formative Assessment	
TOPIC: VENOUS DRAINAGE AND SURFACE ANATOMY OF THE HEART										

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
67	Week-12	Introduction	Define Venous Drainage and nerve supply of the Heart	C1			Interactive Lecture/SGD	2	MCQ's	5
68		Venous Drainage	Discuss Venous Drainage of the heart	C2						
69		Nerve Supply	Describe Nerve supply of the heart	C2						
70		Relations of heart to other Structure within the Thorax	Explain Relations of heart to other Structure within the Thorax	C2						
71		surface anatomy of the Heart Valves	Describe Surface Anatomy of the Heart Valves	C2						
72		Practical	Identify main cardiac veins			P4	Demo	2	OPSE	5
73	Adopt how to care and handle human Heart model				A	Role Play	Formative Assessment			
TOPIC: STRUCTURE OF BLOOD VESSELS										
74	Week-13	Introduction	Define Artery, vein and Capillary	C1			Interactive Lecture/SGD	2	MCQ's	5
75		Types of blood vessels	Classify different types of Blood vessels	C2						
76		Structure, Layers of arteries and Veins	Discuss structure and layers of arteries and veins	C2						
77		Arteries	Describe Two main types of arteries	C2						
78		Types of Capillary	Describe primary Types of capillaries and their location	C2						
79		Practical	identify various layers of blood vessels			P4	Demo	2	OPSE	5
80	Adopt how to care and handle human Heart model				A	Role Play	Formative Assessment			
TOPIC: EMBRYOLOGY OF THE CARDIOVASCULAR SYSTEM										

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
81	Week-14	Introduction to Embryology of CVS System	Define cardiovascular system's embryological development	C2			Interactive Lecture/SGD	2	MCQ's	5
82		Primitive Heart Tube	Discuss Primitive Heart Tube	C2						
83		composition of the Primitive Heart Tube	Describe Composition of the Primitive Heart Tube	C2						
84		Septation of the Heart	Discuss septation of the heart during cardiovascular system's embryological development	C2						
85		Practical	Examination of Embryology of the cardiovascular System on models/charts.		P4		Demo	2	OPSE	5
86			Identification of various stages of cardiovascular system development effectively		P4					
87			Locate, Arrange and disseminate the Embryology of the cardiovascular System using manikins			A	Role Play	Formative Assessment		
TOPIC: DEVELOPMENT OF THE RESPIRATORY SYSTEM										
88	Week-15	Initial Development	Discuss Initial Development of the Respiratory System	C2			Interactive Lecture/SGD	2	MCQ's	5
89		Stages Respiratory System Development	Discuss Various Stages of Respiratory System Development	C2						
90		Terminal Sac Stage	Explain Terminal Sac Stage in Respiratory System Development	C2						
91		Practical	Examination of the development of respiratory System on models/charts		P4		Demo	2	OPSE	5
92			Identification of various stages of Respiratory system development effectively		P4					
93			Locate, Arrange and disseminate the Development of the Respiratory System using manikins			A	Role Play	Formative Assessment		

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: MISCELLANEOUS ZONES OF INTEREST											
94	Week-16	Fetal Circulation	Discuss fetal circulatory system	C2			Interactive Lecture/SGD	2	MCQ's	5	
95		New born circulation	Describe circulatory changes at Birth	C2							
96		New born Respiratory System	Describe Respirator changes at Birth	C2							
97		Practical		Examination of the Cardiovascular and Respiratory changes at birth on models/charts, Identification of various stages effectively		P4		Demo	2		OPSE
98				Locate, Arrange and disseminate the Cardiovascular and Respiratory changes at birth using manikins			A	Role Play			Formative Assessment

PMS-612 GENERAL PATHOLOGY-I 3(2-1)

Course Description

Students are being able to understand the basic concepts of pathology and their mechanisms. They should be able to understand cell injury and adaptation, inflammation, repair, healing, and regeneration. They should be able to understand hemodynamic disorders, shock, tumor development and types. Students are also introduced with practical and demonstrative work to acquire skills in the field of pathology

Cognitive Domain

By the end of this subject, students should be able to:

1. Understand basic concepts of pathology and their mechanisms
2. Understand cell injury and adaptation, inflammation, repair, healing, and regeneration.
3. Understand hemodynamic disorders and their mechanisms
4. Understand shock and compensatory mechanism of shock
5. Understand oncology, tumor development, types and mechanisms

Skills Domain

By the end of this subject, students should be able to:

1. Demonstrate basics concepts of pathology on charts and models
2. Demonstrates cell injury, cellular adaptation, inflammation repair, healing and regeneration, hemodynamic disorders, shock, oncology on video demonstrations.
3. Acquire skills in estimating clotting time, bleeding time, PT and APTT.
4. Identify different slides related to pathology on microscope.

Affective Domain

By the end of this subject, students should be able to:

1. Follow the specified norms of the IL, SGD teaching & learning.
2. Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.
3. Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.
4. Comply SOPs to discuss pathology on charts and videos demonstrations
5. Adopt how to care and handle charts and models related to pathology
6. Comply to SOPs for slides representation related to pathology and how to care instruments and equipment's used in slides representation
7. Comply to SOPs estimating clotting time, bleeding time, PT and APTT and how to care instruments and equipment used in it.

TOS -PMS-612 GENERAL PATHOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: CELLULAR ADAPTATION										
1	Week-1	Introduction	Define Pathology and cellular adaptation	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Terminology	Discuss different terminology related to pathology	C2						
3		Types	Enlist the different types of cellular adaptation	C1						
4		Causes	Illustrate the causes of different cellular adaptation	C2						
5		Practical	Identify the defferent causes of cellular adaptation on chart and video demonstration			P4	Demo	2	OPSE	5
6			Adopt how to care and handle charts of causes cellular adaptation			A	Role Play			
7	Week-2	Pathophysiology	Discuss the pathophysiology of different cellular adaptation	C2			Interactive Lecture/SGD	2	MCQ's	5
8		Physiological and Pathological example	Describe the cellular adaptation with different ex-ample	C2						
9		Practical	Identify the defferent types of cellular adaptation on chart and video demonstration			P4	Demo	2	OPSE	5
10			Adopt how to care and handle charts of cellular adaptation			A	Role Play			
TOPIC: CELLULAR INJURY										
11	Week-3	Introduction	Define Cellular injury	C1			Interactive Lecture/SGD	2	MCQ's	5
12		Types	Discuss different types of cellular injury	C2						
13		Causes	Enlist the causes of cellular injury	C1						
14		Morphology	Describe the morphology of cellular injury	C2						
15		Pathophysiology	Discuss the pathophysiology of cellular injury	C2						
16		Practical	Examination the cellular injury mechanism on charts and video demonstration identification of different mechanism of cellular injury			P4	Demo	2	OPSE	5
17			Comply to SOPs to identify and to show different processes of cellular injury			A	Role Play			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: NECROSIS										
18	Week-4	Introduction	Define necrosis	C1			Interactive Lecture/SGD	2	MCQ's	5
19		Causes	Enlist the causes of necrosis	C2						
20		Types	Describe the different types of necrosis	C2						
21		Morphology	Discuss the morphology of necrosis	C2						
22		Example	Describe the different types of necrosis with exam-ple	C2						
23		Clinical features	Describe clinical features of necrosis	C2						
24		Practical	Differentiate types of necrosis on charts and vedio demon-stration		P4		Demo	2	OPSE	5
25	Comply SOPs to observe pattern of necrosis and adopt how to care and handle charts of necrosis				A	Role Play	Formative Asses-ment			
TOPIC: APOPTOSIS										
26	Week-5	Introduction	Define Apoptosis	C1			Interactive Lecture/SGD	2	MCQ's	5
27		Example	Enlist different example of apoptosis	C1						
28		Morphology	Discuss the morphology of apoptosis	C2						
29		Pathophysiology	Describe the pathogenesis of apoptosis	C2						
30		Practical	Demonstrate the mechanism of apoptosis thourgh video demonstration and charts		P4		Demo	2	OPSE	5
31			Recognize the mechanism of apoptosis and adopt how to care and handle charts of apoptosis			A	Role Play		Formative Asses-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACUTE INFLAMMATION										
32	Week-6	Introduction	Define Acute inflammation	C1			Interactive Lecture/SGD	2	MCQ's	5
33		history back-ground and sign symptom	Discuss the history background of inflammation and cardinal sign of inflammation	C2						
34		Characteristics	Explain the characteristics of acute inflammation	C2						
35		Pathophysiology	illustrate vacsular and cellular changes in acute inflammation.	C2						
36		Practical	Demonstrate the vascular and cellular changes on charts and video		P4		Demo	2	OPSE	
37	Comply SOPs to examine the sign of inflammation in affective way				A	Role Play		Formative Assessment		
TOPIC: PHAGOCYTOSIS AND CHEMICAL MEDIATORS										
38	Week-7	Introduction	Define Phagocytosis and chemical mediators	C1			Interactive Lecture/SGD	2	MCQ's	5
39		Types	Describe different types of chemical mediators	C2						
40		Function	Describe the function of different chemical mediators	C2						
41		Pathophysiology	Describe the pathogenesis of phagocytosis	C2						
42		Practical	Demonstrate the phagocytosis processes through video charts		P4		Demo	2	OPSE	
43	Comply SOPs to draw a chart of different types of phagocytosis and chemical mediators independent-ly				A	Role Play		Formative Assessment		

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: CHRONIC INFLAMMATION											
44	Week-8	Introduction	Define Chronic inflammation and granulomatous inflammation	C1			Interactive Lecture/SGD	2	MCQ's	5	
45		Causes	Discuss the causes of chronic and granulomatous inflammation	C2							
46		Morphology	Discuss the morphology of chronic inflammation	C2							
47		Pathophysiology	Describe the pathogenesis of chronic inflammation	C2							
48		Practical		Identify the difference between granulomatous inflammation and chronic through charts		P4		Demo	2	OPSE	5
49				Comply SOPs to ensure the safe utilization of charts			A	Role Play		Formative Assessment	
TOPIC: REPAIR AND REGENERATION PROCESSES											
44	Week-9	Introduction	Define repair and regeneration processes	C1			Interactive Lecture/SGD	2	MCQ's	5	
45		Steps of repair processes	Discuss the repair processes of wound healing	C2							
46		Complication	Enlist the different complication of wound healing	C1							
47		Risk factors	Describe the factors which effects wound healing	C2							
48		Practical		Identification of repair mechanism through video demonstration		P4		Demo	2	OPSE	5
49				Recognize how to take care of wound in affective way			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: EDEMA											
50	Week-10	Introduction	Define Edema	C1			Interactive Lecture/SGD	2	MCQ's	5	
51		Types	Classify different types of edema	C2							
52		Pathophysiology	Discuss pathophysiology of edema	C2							
53		Clinical features	Describe clinical features of edema	C2							
54		hyperemia and cogestion	Describe the hyperemia and congestion	C2							
55		Practical	Identification of edema mechanism through charts/video demonstration			P4		Demo	2	OPSE	5
56	Comply to SOPs to ensure the safe utilization of charts indepently					A	Role Play	Formative Assessment			
TOPIC: HEMORRAGE AND THROMBOSIS											
57	Week-11	Introduction	Define Hemorrhage and thrombosis	C1			Interactive Lecture/SGD	2	MCQ's	5	
58		Etiology	Enlist the causes of hemorrhage and thrombosis	C2							
59		Types	Discuss the types of thrombosis	C2							
60		Pathogenesis	Illustrate the pathogenesis of thrombosis	C2							
61		Practical	Estimation of Prothrombin Time			P4		Demo	2	OPSE	5
62			Estimation of Clotting Time			P4					
63	Estimation of Bleeding Time				P4						
64	Estimation of Activated Partial Thromboplastin Time				P4						
65	Adopt how to care and handle instruments and equipments used in the above tests						A	Role Play	Formative Assessment		

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: EMBOLISM AND INFARCTION										
66	Week-12	Introduction	Define embolism and infarction	C1			Interactive Lecture/SGD	2	MCQ's	5
67		clinical features	Enlist the clinical feature of embolism and infarc-tion	C1						
68		types	Discuss the types of infarction and embolism	C2						
69		Pathogenesis	Discuss the pathophysiology of embolism and in-farction	C2						
70		Practical	Identification of embolism and infarction mecha-nism through video/charts		P4		Demo	2	OPSE	
71			Comply to SOPs to ensure the safe utilization of chars independly			A	Role Play		Formative Assess-ment	
TOPIC: SHOCK										
72	Week-13	Introduction	Define shock	C1			Interactive Lecture/SGD	2	MCQ's	5
73		Causes	Enlist the causes of shock	C1						
74		Types	Explaine the types of shock	C2						
75		Clinical features	Enlist the clinical feature of shock	C1						
76		Pathogenesis	Disuss the pathogenesis of shock	C2						
77		Practical	Identification of different types of shock and mech-anism through charts/video demonstration		P4		Demo	2	OPSE	
78			Comply to SOPs to differentiate types of shock			A	Role Play		Formative Assess-ment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HYPEREMIA, CONGSTION AND NEOPLASIA										
79	Week-14	Definition	Define Neoplasia, hyperemia and congestion	C1			Interactive Lecture/SGD	2	MCQ's	5
80		Components	Explain the components of neoplasia	C2						
81		Etiology	Enlist the etiological factors of hyperemia and con-gestion	C1						
82		Types	Discuss the types of hyperemia and congestion	C2						
83		Practical	Identification of hypermia, congestion and neo-plasia through slides			P4	Demo	2	OPSE	5
84	Comply to SOPs the safe utilization of lab equip-ments				A	Role Play	Formative Assessment			
TOPIC: BENIGN TUMOR										
85	Week-15	introduction	Define Benign tumor	C1			Interactive Lecture/SGD	2	MCQ's	5
86		Nomenclature	Explain the nomenclature of benign tumor	C2						
87		Characteristics	Discuss the characteristics of benign tumor	C2						
88		Mechanism	illustrate the mechanism of benign tumor	C2						
89		Practical	Identification of benign tumor via slides			P4	Demo	2	OPSE	5
90	Comply to SOPs the safe utilization of lab equip-ments				A	Role Play	Formative Assessment			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: MALIGNANT TUMOR AND METASTASIS										
91	Week-16	Definition	Define Malignant tumor and metastasis	C1			Interactive Lecture/SGD	2	MCQ's	5
92		Nomenclature	Explain the nomenclature of malignant tumor	C2						
93		Characteristics	Discuss the characteristics of malignant tumor	C2						
94		Pathway	Discuss the metastasis through different pathways	C2						
95		Mechanism	Illustrate the mechanism of malignant tumor	C2						
96		Practical	Identification of malignant tumor mechanism through chart and video demonstration			P4		Demo	2	OPSE
97	Comply to SOPs for recognizing pattern of malignant tumor and adopt how to care and handle charts of malignant tumor					A	Role Play		Formative Assessment	

PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)

Course Description

The purpose of this course is to equip the students by imparting knowledge and understanding of the bacteria and fungi, to foster the development of professional skills through this curriculum by understanding the transmission, pathogenesis and diagnosis of bacteria and fungi and see how this knowledge comes into play in real-world scenarios and in clinical settings. For this curriculum is designed in such a way to get insight of basics and explanations of different bacterial and fungal infection.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Discuss the history and scope of Medical Microbiology**
2. **Describe the structure and function of prokaryotic cell**
3. **Discuss the basic concepts in bacteriology and mycology**
4. **Identify different bacteria's with their importance in medical science**
5. **Discuss the nature of pathogenic bacteria and fungi**
6. **Describe the transmission, pathogenesis, clinical finding and laboratory diagnosis of bacteria and fungi.**

Skills Domain

By the end of this subject, students should be able to:

1. **Demonstrate ability to Identify and label different instruments in microbiology lab**
2. **Demonstrate the lab safety practices**
3. **Perform sterilization and different specimen culturing**
4. **Demonstrate gram staining and acid fast staining**
5. **Study of Microscope and use the microscope to look slides effectively.**
6. **Perform biochemical testing, MHA preparation and AST.**

Affective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -PMS-613 MEDICAL MICROBIOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION AND HISTORICAL REVIEW OF MICROBIOLOGY										
1	Week-1	History	Explain the history of microbiology	C2			Interactive Lecture/SGD	2	MCQ's	5
2		Scope	Discuss scope of medical microbiology	C2						
3		Definition	Define Prokaryotic Cell	C1						
4		Prokaryotic cell	Explain structure of Prokaryotic Cell	C2						
5		Practical	Explain laboratory safety practices and use of PPE		P2		Demo	2	OPSE	5
6	Comply SOPs of laboratory safety practices and adopt how to care and handle laboratory equipment's.				A	Role Play	Formative Assessment			
7	Week-2	Gram positive and Gram negative	Discuss Gram positive and gram negative cell	C2			Interactive Lecture/SGD	2	MCQ's	5
8		Size, shape and types of bacteria	Describe size, shape and types of prokaryotic cell	C2						
9		Differentiation	Differentiate the difference prokaryotic and eukaryotic cell	C4						
10		Practical	Demonstrate microscopes; slides; test tubes; petri dishes; growth mediums, inoculation loops; pipettes and tips; incubators; autoclaves		P1		Demo	2	OPSE	5
11			Comply SOPs of laboratory safety practices and adopt how to care and handle laboratory equipment's.			A	Role Play			
TOPIC: NORMAL FLORA AND MEDICAL IMPORTANT BACTERIA										
12	Week-3	Normal flora	Describe normal microbial flora of human flo-ra	C2			Interactive Lecture/SGD	2	MCQ's	5
13		Bacterial Classification	Classify medically Important Bacteria	C2						
14		Bacterial Diseases	Enlist the diseases caused by medically important bacteria's	C2						
15		Practical	Perform sterilization of different equipment's and culture media use in Microbiology lab		P4		Demo	2	OPSE	5
16			Adopt the care, use and SOPs of sterilization			A	Role Play			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HOST DEFENCES AND BACTERIAL PATHOGENESIS										
17	Week-4	Definition	Define Pathogenesis	C1			Interactive Lecture/SGD	2	MCQ's	5
18		Pathogenesis	Explain the mechanism of bacterial pathogen-esis	C2						
19		Definition	Define Immunity	C1						
20		Immunity	Discuss Innate immunity and adaptive im-munity	C2						
21		Host defense failure	Illustrate host defense failure	C3						
22		Practical	Explain appropriate specimen for different bacterial infec-tion		P2		Demo	2	OPSE	5
23	select the specimen for bacterial infection				A	Role Play	Formative Assessment			
TOPIC:LABORATORY DIAGNOSIS										
24	Week-5	Bacteriologic approach for diagnosis	Explain the bacteriologic approach for bacterial diagnosis	C2			Interactive Lecture/SGD	2	MCQ's	5
25		Bacterial Specimen	Enlist the specimen for infection caused by different bacteria's	C1						
26		Immunologic approach for diagnosis	Explain the immunologic approach for bacterial diagnosis	C2						
27		Practical	Perform appropriate preservative for preservation and transportation		P2		Demo	2	OPSE	5
28			Adopt to preserve and transport the specimens			A	Role Play			
TOPIC: GRAM POSITIVE COCCI										
29	Week-6	Definition	Define Staphylococci and streptococci	C1			Interactive Lecture/SGD	2	MCQ's	5
30		Staphylococci and Streptococci	Explain medically important species of staphy-lococci and streptococci with important prop-erties	C2						
31		Practical	Perfrom culture media preparation		P1		Demo	2	OPSE	5
32			Adopt the how to prepare culture media and inoculate the specimeny			A	Role Play			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
33	Week-7	Clinical Findings	Analyze the clinical findings of different species of staphylococci and streptococci	C4			Interactive Lecture/SGD	2	MCQ's	5
34		Laboratory tests and Medicines	Enlist the lab tests for staphylococci and streptococci	C1						
35		Practical	Perform inoculation and isolation of bacterial culture		P2		Demo	2	OPSE	
36			Adopt the how to prepare culture media and inoculate the specimen			A	Role Play		Formative Assessment	
TOPIC: GRAM NEGATIVE COCCI										
37	Week-8	Gram Negative Cocci	Illustrate medically important species of Neisseria with important properties	C2			Team Base Learning	2	MCQ's	5
38		Clinical Findings	Analyze the clinical findings N. meningitidis and N. gonorrhoea	C4						
39		Laboratory tests and Medicines	Enlist the lab tests for staphylococci	C1						
40		Practical	Show different bacterial morphologies on culture media		P2		Demo	2	OPSE	
41			Comply to bacterial identification affectively			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: GRAM POSITIVE RODS											
42	Week-9	Classification	Classify medically important gram positive rods with the list of diseases caused by them	C3			Interactive Lecture/SGD	2	MCQ's	5	
43		Bacillus and Clostridium	Illustrate medically important species of Bacillus, Clostridium and Corynebacterium with important properties	C3							
44		Clinical Findings	Analyze the clinical findings of Bacillus, Clostridium and Corynebacterium species	C4							
45		Laboratory tests and Medicines	Enlist the lab tests recommended for Gram positive rods	C1							
46		Practical		Perform Gram staining		P3		Demo	2		OPSE
47			Comply to SOPs of gram staining affectively			A	Role Play		Formative Assessment		
TOPIC: GRAM NEGATIVE RODS											
48	Week-10	Classification	Classify medically important gram negative rods with the list of diseases caused by them	C3			Interactive Lecture/SGD	2	MCQ's	5	
49		Gram Negative bacterias	Illustrate medically important species of gram negative rods with important properties	C3							
50		Practical		Identify microscopy of gram stain smear		P2x		Demo	2		OPSE
51				Comply to SOPs of practical affectively.			A	Role Play			Formative Assessment
52	Week-11	Clinical Findings	Analyze clinical findings of different gram negative rods	C4			Interactive Lecture/SGD	2	MCQ's	5	
53		Laboratory tests and Medication	Enlist the lab tests for gram negative rods	C1							
54		Practical		Explain biochemical tests for different bacteria's cultured on culture media		P4		Demo	2		OPSE
55				Comply to SOPs of practical affectively			A	Role Play			Formative Assessment

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACID FAST BACTERIA										
56	Week-12	Definition	Define acid fast bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
57		Classification	Classify acid fast bacteria with prominent diseases caused by them	C2						
58		Mycobacterium tuberculosis	Explain important properties of Mycobacterium tuberculosis	C2						
59		Clinical Findings of M. tuberculosis	Analyze clinical findings of Mycobacterium tuberculosis	C4						
60		Lab tests and antibiotics	Enlist the lab tests for Mycobacterium tuberculosis	C1						
61		Practical	State acid fast staining for Mycobacterium Tuberculosis		P2		Demo	2	OPSE	5
62	Comply to SOPs of practical affectively				A	Role Play	Formative Assessment			
TOPIC: SHOCK										

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
63	Week-13	Definition	Define obligate intracellular bacteria	C1			Interactive Lecture/SGD	2	MCQ's	5
64		Intracellular bacteria	Recognize obligate intracellular bacteria with their important properties	C1						
65		Chlamydia and Rickettsia	Analyze the clinical findings of Chlamydia and Rickettsia	C4						
66		Diagnosis and treatment	Enlist the diagnostic approaches for obligate intracellular bacteria	C1						
67		Definition	Define Spirochetes and wall less bacteria	C1						
68		Spirochetes	Enlist medically important spirochetes	C1						
69		Clinical findings of spirochetes	Analyze the clinical findings of Spirochetes	C4						
70		Mycoplasma	Explain the disease caused by mycoplasma	C2						
71		Diagnosis	Enlist the lab tests for spirochetes and Myco-plasma	C1						
72		Practical	Explain the preparation of Muller Hinton agar		P2					
73	Comply to MHA preparation affectively				A	Role Play	Formative Assessment			
TOPIC: INTRODUCTION TO MYCOLOGY										
74	Week-14	Definition	Define mycology	C1			Interactive Lecture/SGD	2	MCQ's	5
75		Classification	Classification of fungi	C3						
76		Fungal structure	Describe structure and growth of fungi	C2						
77		Pathogenesis	Discuss the pathogenesis of fungal infection	C2						
78		Diagnostic procedure	Explain different diagnostic procedure used for the diagnosis of fungal infection	C2						
79		Practical	Perform antibiotic susceptibility testing on MHA for bacterial isolates		P2					
80	Comply to AST affectively				A	Role Play	Formative Assessment			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: CUTANEOUS, SUBCUTANEOUS AND OPPORTUNISTIC MYCOSIS											
81	Week-15	Definition	Define Cutaneous and subcutaneous mycosis	C1			Interactive Lecture/SGD	2	MCQ's	5	
82		Cutaneous and Subcutaneous fungi	Enlist the fungi that cause Cutaneous and sub Cutaneous mycosis	C3							
83		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4							
84		Diagnostic tests and Treatment	Enlist the diagnostic tests for Cutaneous and subcutaneous mycosis	C3							
85		Definition	Define opportunistic mycosis	C1							
86		Opportunistic Mycosis	Enlist the fungi that causes opportunistic my-cosis	C3							
87		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4							
88		Diagnostic tests and Treatment	Enlist the diagnostic tests for opportunistic mycosis	C1							
89	Practical		Perform KOH preparation for fungal infection specimens		P2		Demo	2	OPSE	5	
90			Comply to practical affectively			A	Role Play		Formative Assessment		
TOPIC: SYSTEMIC MYCOSIS											
91	Week-16	Definition	Define Systemic Mycosis	C1			Interactive Lecture/SGD	2	MCQ's	5	
92		Systemic Mycosis	Enlist the fungi that causes systemic mycosis	C3							
93		Clinical Manifestation	Analyze the clinical manifestation of these fungi	C4							
94		Diagnostic tests and Treatment	Enlist the diagnostic tests systemic mycosis	C1							
95		Practical		Explain the interpretation of microbiological culture reports		P4		Demo	2	OPSE	5
96				Adopt how to interpret the microbiological reports			A	Role Play		Formative Assessment	

PMS-614 PHARMACOLOGY-I 3(2-1)

Course Description

Pharmacology module is designed to supplement the students with pharmacological knowledge. This flexible and self-paced course can benefit medical professionals who need to take an introductory pharmacology course for training or continuing education purposes.

This pharmacology course will introduce the principles of pharmacokinetic and pharmacodynamics to explore the mechanism of action of pharmaceutical drugs on a molecular level.

Cognitive Domain

By the end of this subject, students should be able to:

1. Describe the fundamental principles of drug action, including: basic pharmacokinetics, basic pharmacodynamics and receptor binding.
2. Differentiate the common side effects associated with major therapeutic drug classes and how they may impact patient care.
3. Construct an evaluation of a recently approved FDA medication.
4. Differentiate the various responsibilities of healthcare providers in the prescribing and administration of medications.

Skills Domain

By the end of this subject, students should be able to:

1. Demonstrate knowledge of major drug classes, including therapeutic uses, mechanism of action and various routes of drug administration.
2. Compute basic and advanced dosage calculation.
3. Design a therapeutic treatment plan for a patient with a commonly treated disease state or disorder.

Affective Domain

By the end of this subject, students should be able to:

1. Follow the specified norms of the IL, SGD teaching & learning.
2. Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.
3. Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.

TOS -PMS-614 PHARMACOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: INTRODUCTION TO PHARMACOLOGY AND ITS BASIC PRINCIPLES											
1	Week-1	Definition and examples to explain Pharmacology	Define pharmacology	C1			Interactive Lecture/SGD	2	MCQ's	5	
2		Definition, Absorption, Dis-tribution, Metabolism and Elimination of drugs, Routes of drugs administration	Describe Pharmacokinetics and its principles	C2							
3		Practical	Perform routes of drugs administration			P4		Demo	2	OPSE	5
4			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.				A	Role Play	2	Formative Assessment	
5	Week-2	Definition and overview of Pharmacodynamics, signal transduction, Dose response relationship, Intrinsic activity.	Explain Pharmacodynamics and its principles	C2			Interactive Lecture/SGD	2	MCQ's	5	
6		Practical	Identification various types of drugs preparations			P4		Demo	2	OPSE	5
7			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.				A	Role Play	2	Formative Assessment	
TOPIC: CHOLINERGIC AGONISTS AND ANTAGONISTS											
8	Week-3	Cholinergic and anti-cholinergic drugs	Define Cholinergic drugs	C1			Interactive Lecture/SGD	2	MCQ's	5	
9			Explain cholinergic ag-onists and antagonists	C2							
10		Practical	Affects/Actions of drugs on the given systems/organs			P4		Demo	2	OPSE	5
11			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.				A	Role Play	2	Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
12	Week-4	Introduction, Mechanism of action, adverse actions of: Ace-tylcholine, Pilocarpine, Edrophonium, Neostigmine, Echothiophate	Illustrate the properties of cholinergic agonists	C2			Interactive Lecture/SGD	2	MCQ's	5
13		Introduction, Mechanism of action, adverse actions of: At-ropine, Nicotine, Neuromuscular-Blocking Agents	Describe the properties of cholinergic antagonists	C2						
14		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	
15			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
TOPIC: ADRENERGIC AGONISTS AND ANTAGONISTS										
16	Week-5	Adrenergic Agonists and antagonists	Define Adrenergic drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
17			Explain adrenergic agonists and antagonists	C2						
18		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	
19			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
20	Week-6	Introduction, Mechanism of action, adverse actions of: Al-butanol, Dopamine, Epinephrine, Isoproterenol, Amphetamine, Ephedrine	Illustrate the properties of adrenergic agonists	C1			Interactive Lecture/SGD	2	MCQ's	5
21		Introduction, Mechanism of action, adverse actions of: Phenoxybenzamine, Prazosin, Atenolol, Carvedilol, Metoprolol, Propranolol, Reserpine, Reserpine	Describe the properties of adrenergic antagonists	C2						
22		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	
23			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: NSAIDS AND OPIOID ANALGESICS											
24	Week-7	Salicylates, p-Aminophenol Derivatives, Indoles (indomethacin) and Related Compounds, Fenamates, Arylpropionic Acid Derivatives, Acetic Acid Derivatives, COX-2 Inhibitors	Define NSAIDS	C1			Interactive Lecture/SGD	2	MCQ's	5	
25			Explain Pharmacokinetics and Pharmacodynamics of NSAIDS	C2							
26			Discuss adverse actions of NSAIDS	C2							
27	Week-7	Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	5	
28			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment		
29	Week-8	Morphine, Codeine and Other Phenanthrene Derivatives, Meperidine and Related Phenylpiperidine Derivatives	Explain pharmacokinetics and pharmacodynamics of opioid analgesics	C2			Team Base Learning	2	MCQ's	5	
30			Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
31				Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
TOPIC: GASTROINTESTINAL DRUGS											
32	Week-9	Gastrointestinal	List gastrointestinal drugs	C1			Interactive Lecture/SGD	2	MCQ's	5	
33		Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of PPIs	C2							
34			Explain Pharmacokinetics and Pharmacodynamics H2 Blockers	C2							
35		Practical	Affects/Actions of drugs on the given systems/organs		P3		Demo	2	OPSE	5	
36			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment		

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
37	Week-10	Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics Antacids	C3			Interactive Lecture/SGD	2	MCQ's	5
38		Adverse actions	Describe Adverse actions of Antacids	C3						
39		Practical	Adverse effects of this group of drugs on given body organs/ systems		P2x		Demo	2	OPSE	
40			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
TOPIC: ANTI-HISTAMINE										
41	Week-11	Classification	Classify Anti-Histamine drugs	C2			Interactive Lecture/SGD	2	MCQ's	5
42		Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of Anti-Histamine drugs	C2						
43		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	
44			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
45	Week-12	Adverse actions	Describe Adverse actions of Anti-Histamine drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
46		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	5
47			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
TOPIC: ANESTHETICS										
48	Week-13	Classification	Classify general anesthetics	C1			Interactive Lecture/SGD	2	MCQ's	5
49			Classify local anesthetics	C1						
50		Practical	Affects/Actions of drugs on the given systems/organs		P4		Demo	2	OPSE	
51			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
52	Week-14	Pharmacokinetics and Pharmacodynamics	Explain Pharmacokinetics and Pharmacodynamics of general anesthetics	C2			Interactive Lecture/SGD	2	MCQ's	5
53			Explain Pharmacokinetics and Pharmacodynamics of local anesthetics	C2						
54		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	
55			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
TOPIC: THYROID AND ANTITHYROID DRUGS										
56	Week-15	Drugs used in the treatment of hypothyroidism, adverse effects of treatment with thyroid hormone, drugs used in the treatment of hyperthyroidism	List the Anti-Thyroid drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
57			Explain Pharmacokinetics and Pharmacodynamics of Thyroid and Antithy-roid Drugs	C2						
58		Practical	Affects/Actions of drugs on the given systems/organs		P2		Demo	2	OPSE	
59			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	
60	Week-16	Adverse actions	Describe Adverse actions of Thyroid and Antithyroid Drugs	C1			Interactive Lecture/SGD	2	MCQ's	5
61		Practical	Adverse effects of this group of drugs on given body organs/ systems		P4		Demo	2	OPSE	
62			Comply SOPs of laboratory practices and adopt how to care and handle laboratory equipment's.			A	Role Play		Formative Assessment	

PMS-615 COMMUNICATION SKILLS 2(2-0)

Course Description

In this course, we delve into the multifaceted world of communication, equipping you with essential skills to excel in both academic and professional spheres. This course will explore the diverse landscape of communication, covering topics such as academic writing, various communication types, the nuances of effective communication, formal communication protocols, and mastering the art of interviews. This course will enhance the academic writing or an aspiring professional seeking to enhance student's interview. Through practical exercises, real-world examples, and interactive discussions, ensuring students gain a well-rounded understanding of communication strategies.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe the components and processes involved in various communication models.**
2. **Explain the advantages and challenges associated with different types of communication.**
3. **Apply principles of academic writing, including proper referencing, structure, and citation.**
4. **Demonstrate an understanding of formal communication protocols in professional settings**
5. **Formulate action plans to continually enhance communication skills beyond the course.**

Affective Domain

By the end of this subject, students should be able to:

1. **Follow the specified norms of the IL, SGD teaching & learning.**
2. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
3. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**

TOS -PMS-615 COMMUNICATION SKILLS 2(2-0)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO COMMUNICATION										
1	Week-1	Introduction to Communication	Define Communication	C1			Interactive Lecture/SGD	2	MCQ's	5
2		The process of communication	Explain with Examples of good, Effective communication in business	C2						
3	Week-2	Effective communication	Discuss the processs of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
4		Models of communication	Discuss the Linear models of communication	C2						
5	Week-3	Models of communication	Describe the Transactional model of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
6			Explain the Interactive models of communication	C2						
7		Communication in business	Discuss the Importance and benfits of effective communication in business	C2						
TOPIC: COMPONENTS OF COMMUNICATION										
8	Week-4	Discuss Sender, reciever, message, channel, Nonverbal, Visual Communication, Feedback, Noise, Decoding, Encoding	Explain components of communication	C2			Interactive Lecture/SGD	2	MCQ's	5
9		Physiological Barriers, language barriers, cultural, physical barriers	Describe communication barriers.	C2						
10	Week-5	Facial expressions, eye contact, posture, hand movements, and touch.	Explain Non-verbal communication	C2			Interactive Lecture/SGD	2	MCQ's	5
11		Active listening, Consistency, clarity, simpplicity, feedback, authenticity, coherency, empathy in communication	Discuss the principles of communication	C2						
12		Clarity, coherency, completeness, Conciseness, concretness, courtesy, correctness	Diss the Seven C in communication.	C2						

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ACADEMIC WRITING										
13	Week-6	Communication for academic purpose	Explain the Key aspects of communicating for academic purpose	C1			Interactive Lecture/SGD	2	MCQ's	5
14		Introduction to academic writing	Discuss the Key elements in academic writing	C2						
15	Week-7	Introduction to academic writing	Discuss the principles in academic writing	C2			Interactive Lecture/SGD	2	MCQ's	5
16		Summarizing	Explain the Introduction to summary.	C2						
17			Explain the steps of writing summary.	C2						
18	Week-8	Paraphrasing and argumentation skills	Discuss the steps of doing paraphrasing	C2			Interactive Lecture/SGD	2	MCQ's	5
19		Textual cohesion	Explain of textual cohesion	C2						
TOPIC: FORMAL COMMUNICATION										
20	Week-9	Formal communication	Discuss The characteristics of formal communication	C1			Interactive Lecture/SGD	2	MCQ's	5
21		Informal communication networks	Differentiate the Formal vs Informal communication	C2						
22	Week-10	Computer mediated communication	Discuss the Benefits Computer-mediated communication	C3			Interactive Lecture/SGD	2	MCQ's	5

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: FORMAL WRITING										
23	Week-11	Business writing	Discuss the Types of business writing	C2			Interactive Lecture/SGD	2	MCQ's	5
24			Discuss the principles of business writing	C2						
25		Memos	Discuss the memos.	C2						
26			Discuss the steps of writing memos.	C2						
27			Discuss the structure and sample of memo.	C2						
28	Week-12	Letters	Explain the letter.	C2			Interactive Lecture/SGD	2	MCQ's	5
29			Explain the types of letters.	C2						
30			Explain the sample and informal letters.	C2						
31			Explain letter, types of letters, sample, informal letters	C2						
32		Reports	Discuss how to write report.	C2						
33	Explain the steps and structure of report		C2							
TOPIC: PRESENTATION SKILLS										
34	Week-13	Proposals	Explain types and examples of proposal	C2			Interactive Lecture/SGD	2	MCQ's	5
35		Circulars	Discuss the Key features and purposes of circulars	C2						

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
36	Week-14	Public speaking and presentation skills	Explain the similarities between public speaking and presentations.	C2			Interactive Lecture/SGD	2	MCQ's	5
37			Explain the differences between public speaking and presentations.	C2						
38		Effective public presentation skills	Discuss the Important tips for public presentation	C2						
TOPIC: AUDIENCE ANALYSIS										
39	Week-15	Audience analysis	Discuss How to analyze audience	C2			Interactive Lecture/SGD	2	MCQ's	5
40		Effective argumentation skills	Illustrate the Techniques to enhance argumentation skills.	C2						
41	Week-16	Interview skills	Explain the tips for a good interview.	C2			Interactive Lecture/SGD	2	MCQ's	5

MLT-601 HAEMATOLOGY-I 3(2-1)

This course will introduce the students to basic concepts in hematology, structures, and functions of bone marrow, blood cells, and hemoglobin. Students will be able to understand how erythropoiesis, granulopoiesis, and megakaryopoiesis take place and how it is regulated. This course will cover quantitative disorders of neutrophils, lymphocytes, eosinophils, basophils, and monocytes. It also covers hemostasis and qualitative and quantitative disorders of platelets. It will help in developing the practical skill of students by determining hemoglobin level, clotting time, bleeding time, and complete blood count with peripheral blood smear examination.

Cognitive Domain

By the end of this subject, students should be able to:

1. **Describe hematology, blood composition, bone marrow, and hematopoiesis**
2. **Discuss hemoglobin, anemia, physiological and pathological red blood cell hemolysis**
3. **Explain quantitative disorders of leukocytes and hematological neoplasms etiology and diagnosis**
4. **Describe hemostasis, coagulation pathways, quantitative and qualitative disorders of platelets**
5. **Demonstrate complete blood count and how peripheral blood smear is prepared and examined.**

Skills Domain

By the end of this subject, students should be able to:

1. **Perform the procedure of venous blood sample collection.**
2. **Demonstrate hemoglobin level in a venous blood sample**
3. **Perform qualitative carbohydrate detection in an unknown sample independently**
4. **Perform qualitative Protein/Amino Acid detection in an unknown sample independently**
5. **Perform qualitative Lipids/Cholesterol Detection in an unknown sample independently**
6. **Perform donning & doffing technique of gloves independently**

Affective Domain

By the end of this subject, students should be able to:

1. **Demonstrate Punctuality.**
2. **Follow the specified norms of the IL, SGD teaching & learning effectively,**
3. **Demonstrate the humbleness and use the socially acceptable language during academic and social interactions with human models, colleagues and teachers.**
4. **Demonstrate ethically competent decisions when confronted with an ethical, social or moral problem related to professional or personal life.**
5. **Comply with SOPs of practical & procedure effectively.**

TOS -MLT-601 HAEMATOLOGY-I 3(2-1)

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: INTRODUCTION TO HEMATOLOGY										
1	Week-1	Definition	Define blood	C1			Interactive Lecture/SGD	2	MCQ's	5
2		Blood composition	Describe the cellular and plasma compartments of blood	C2						
3		Blood functions	Discuss blood functions	C2						
4		Practical		Perform the procedure of venouse blood sample collection independently		P4		Demo	OPSE	
5				Comply to SOPs of venouse blood sampling collection			A	Role Play	Formative Assessment	
TOPIC: BONE MARROW										
6	Week-2	Introduction	Define Bone marrow	C2			Interactive Lecture/SGD	2	MCQ's	5
7		Structure	Describe bone marrow structure	C2						
8		Function	Explain bone marrow fuctions	C2						
9		Practical		Observe a bone marrow trephine biopsy slide under microscope independently		P4		Demo	OPSE	
10				Comply to SOPs of bone marrow trephine biopsy slide examination			A	Role Play	Formative Assessment	
TOPIC: HEMATOPOIESIS										
11	Week-3	Introduction	Describe hematopoiesis	C2			Interactive Lecture/SGD	2	MCQ's	5
12		Prenatal & postnatal Hematopoiesis	Discuss blood formation intrauterine & extrauterine life	C2						
13		Sites of Hematopoiesis	Explain sites of hematopoiesis	C2						
14		Regulation of Hematopoiesis	Discuss growth factors that regulate hematopoiesis	C2						
15		Practical		Observe erythropoieis developmental stages under microscope independently		P4		Demo	OPSE	
16				Comply to SOPs of bone marrow aspirate smear examination			A	Role Play	Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: ERYTHROPOIESIS										
17	Week-4	Definition	Define erythropoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
18		Developmental stages	Explain developmental stages of erythropoiesis	C2						
19		Regulation of erythropoiesis	Discuss the growth factors that regulate rate of hematopoiesis	C2						
20		Practical	Perform the procedure of total red blood cell count by Neubauer chamber independently			P4	Demo	2	OPSE	
21			Comply to SOPs red blood cell count by manual method			A	Role Play		Formative Assessment	
TOPIC: HEMOGLOBIN										
22	Week-5	Introduction	Define Hemoglobin	C1			Interactive Lecture/SGD	2	MCQ's	5
23		Structure	Describe hemoglobin structure	C2						
24		Hemoglobin synthesis	Discuss hemoglobin synthesis	C2						
25		Hemoglobin functions	Explain hemoglobin function	C2						
26		Practical	Perform the procedure of hemoglobin estimation by Sahli's method independently			P4	Demo	2	OPSE	
27	Comply to SOPs hemoglobin estimation by Sahli's method				A	Role Play	Formative Assessment			
TOPIC: ANEMIA										
28	Week-6	Definition	Define anemia	C1			Interactive Lecture/SGD	2	MCQ's	5
29		Classification	Classify anemia on the basis of etiology and red blood cell morphology	C2						
30		Clinical symptoms	Describe clinical presentation of different types of anemia	C2						
31		Lab diagnosis	Discuss baseline laboratory diagnosis for anemia	C2						
32		Practical	Examine peripheral blood film under microscope of anemia patient independently			P4	Demo	2	OPSE	
33	Comply to SOPs for observation of peripheral blood smear of a patient having anemia				A	Role Play	Formative Assessment			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: RED BLOOD CELLS HEMOLYSIS										
34	Week-7	Introduction	Define Hemolysis	C1			Interactive Lecture/SGD	2	MCQ's	5
35		Physiological & pathological Hemolysis	Describe physiological and pathological hemolysis	C2						
36		Hemolytic anemia classification	Classify hemolytic anemia	C2						
37		Clinical symptoms	Describe clinical presentation of different types of hemolytic anemia	C2						
38		Lab diagnosis	Discuss laboratory diagnosis of hemolytic anemia	C2						
39	Practical	Examine peripheral blood film under microscope of hemolytic anemia patient independently			P4	Demo	2	OPSE	5	
40		Comply to SOPs for observation of peripheral blood smear of a patient having hemolytic anemia			A	Role Play		Formative Assessment		
TOPIC: GRANULOPOIESIS / MYELOPOIESIS										
41	Week-8	Definition	Define granulopoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
42		Developmental stages	Describe developmental stages of granulopoiesis	C2						
43		Regulation of granulopoiesis	Discuss regulation of granulopoiesis	C2						
44		Practical	Perform the procedure of differential leukocytes count independently			P4	Demo	2	OPSE	5
45			Comply to SOPs for differential leukocyte count of normal healthy individual			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: WBC DISORDERS											
46	Week-9	Introduction	Define disorders of leukocytes	C1			Interactive Lecture/SGD	2	MCQ's	5	
47		WBCs disorder types	Classify leukocytes disorders	C2							
48		Leukocytosis	Describe leukocytosis	C2							
49		Leukopenia	Describe leukopenia	C2							
50		Practical		Perform the procedure of total leukocytes count independently		P4		Demo	2	OPSE	5
51	Comply to SOPs for procedure of total leukocyte count					A	Role Play	Formative Assessment			
TOPIC: NEUTROPHILIA, NEUTROPENIA, MONOCYTOSIS AND MONOCYTOPENIA											
52	Week-10	Introduction to neutrophilia and neutrophenia	Define neutrophilia and neutropenia	C1			Interactive Lecture/SGD	2	MCQ's	5	
53		Causes of neutrophilia and neutrophenia	Discuss causes of neutrophilia and neutropenia	C2							
54		Introduction to monocytosis and monocytopenia	Define monocytosis and monocytopenia	C1							
55		Causes monocytosis and monocytopenia	Discuss causes of monocytosis and monocytopenia	C2							
56		Practical		Perform the procedure of absolute neutrophil and monocyte count independently		P4		Demo	2	OPSE	5
57				Comply to SOPs for the procedure of absolute neutrophil and monocyte count			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: LYMPHOCYTOSIS AND LYMPHOPENIA											
58	Week-11	Introduction of lymphocytosis	Define lymphocytosis	C1			Interactive Lecture/SGD	2	MCQ's	5	
59		Causes of Lymphocytosis	Discuss causes of lymphocytosis	C2							
60		Introduction of Lymphopenia	Define lymphopenia	C1							
61		Causes of Lymphopenia	Discuss causes of lymphocytosis	C2							
62		Practical		Perform the procedure of absolute lymphocytes count independently		P4		Demo	2	OPSE	5
63				Comply to SOPs for the procedure of absolute lymphocyte count			A	Role Play		Formative Assessment	
TOPIC: BASOPHILIA, BASOPENIA, EOSINOPHILIA AND EOSINOPENIA											
64	Week-12	Introduction to basophilia and eosinophilia	Define basophilia and eosinophilia	C1			Interactive Lecture/SGD	2	MCQ's	5	
65		Causes of Basophilia and eosiniphilia	Discuss basophilia and eosinophilia	C2							
66		Introduction of basopenia and eosinopenia	Define basopenia and eosinopenia	C1							
67		Causes of basopenia and eosinopenia	Discuss causes of basopenia eosinopenia	C2							
68		Practical		Perform the procedure of absolute basophil and eosinophil counts independently		P4		Demo	2	OPSE	5
69				Comply to SOPs for the procedure of absolute basophil and eosinophil counts			A	Role Play		Formative Assessment	

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items
				C	P	A				
TOPIC: HEMATOLOGICAL NEOPLASM										
70	Week-13	Introduction	Define hematological neoplasm	C1			Interactive Lecture/SGD	2	MCQ's	5
71		Classification	Classify hemtological neoplasm	C2						
72		Etiology of Leukemia	Discuss cuases of hematological neoplasm	C2						
73		Clinical Features	Describe clinical features of different hematological neoplasm	C2						
74		Laboratory diagnosis	Discuss laboratory diagnosis of different types hematological neoplasms	C2						
75		Practical	Examine few common leukemia slides under microscope independently			P4	Demo	2	OPSE	5
76	Comply to SOPs for the procedure of smear examination under microscope				A	Role Play	Formative Assessment			
TOPIC: MEGAKARYOPOIESIS										
77	Week-14	Introduction	Define megakaryopoiesis	C1			Interactive Lecture/SGD	2	MCQ's	5
78		Developmental stages	Describe deveopmental stages of megakaryopoiesis	C2						
79		Regulation of Megakaropoiesis	Discuss regulation of megakaryopoiesis	C2						
80		Thrombocytosis	Explain thrombocytosis and its causes	C2						
81		Thrombocytopenia	Explain thrombocytopenia and its causes	C2						
82		Practical	Perform the procedure of platelets count by maneul method independently			P4	Demo	2	OPSE	5
83	Comply to SOPs for the procedure of platlelts count				A	Role Play	Formative Assessment			

S.No	Weeks	Content	Learning Outcomes	Domain			MIT's	Hours	Assesment	No of Items	
				C	P	A					
TOPIC: HEMOSTASIS											
84	Week-15	Introduction	Define hemostasis	C1			Interactive Lecture/SGD	2	MCQ's	5	
85		Types of Hemostasis	Classify hemostasis	C2							
86		Platelets structure and functions	Describe structure and functions of platelets	C2							
87		Coagulation factors	Discuss coagulation factors	C2							
88		Coagulation Cascade (Pathways)	Illustrate coagulation pathways	C2							
89		Practical		Perform the procedure of bleeding time and clotting time independently		P4		Demo	2	OPSE	5
90			Comply to SOPs for the procedure of bleeding time and clotting time			A	Role Play		Formative Assessment		
TOPIC: COMPLETE BLOOD COUNT AND PERIPHERAL BLOOD FILM EXAMINATION											
91	Week-16	Introduction	Define complete blood count and blood cell morphology	C1			Interactive Lecture/SGD	2	MCQ's	5	
92		Componants of complete blood count	Describe componants of complete blood count	C2							
93		Blood cells morphology	Discuss erythrocyte, leukocyte and platelet morphology	C2							
94		Interpretation of complete blood count	Describe interpretation of each componant of complete blood count	C2							
95		Practical		Perform the procedure of peripheral blood film preperation and microscopic examination independently		P4		Demo	2	OPSE	5
96				Comply to SOPs for the procedure of peripheral blood smear preperation and examination			A	Role Play		Formative Assessment	

Recommended Text Books

CAR-601 CARDIOPULMONARY ANATOMY 3(2+1)

- Clinical Anatomy by Snell, in 2000 by Churchill living stone
- Gray's anatomy 2nd edition by Williams warwic Dyson
- Lasts Anatomy 11th edition by R.M.H McMinn

PMS-612 GENERAL PATHOLOGY-I

- Kumar, Abbas and Aster; 9 th edition. Robbins Basic Pathology.
- Review of general pathology by Muhammad Firdous 9th edition
- Short textbook of pathology 3rd edition by Inam Danish

PMS-613 MEDICAL MICROBIOLOGY-I

- Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4 th ed. McGraw-Hill, 2003.
- Clinical Microbiology Made Ridiculously Simple. Gladwin, M. & Trattler, B., 3rd ed. MedMaster, 2004.
- Medical Microbiology and Infection at a Glance. Gillespie, S., H., Bamford, K., B., 4th ed. WileyBlackwell, 2012.
- Medical Microbiology, Kayser, F., H., & Bienz, K., A., Thieme, 2005.
- Review of Medical Microbiology and Immunology. Levinson, W., 10th ed. McGraw Hill Professional, 2008.
- Jawetz, Melnick, & Adelberg's Medical Microbiology. Brooks, G., Carroll, K., C., Butel, J., & Morse, S., 26th ed. McGraw-Hill Medical, 2012.

PMS-614 PHARMACOLOGY-I

- Lippincott s pharmacology (text book) by Mycek 6th Edition published by Lippincott Raven 2012.
- I Katzung textbook of pharmacology (Reference Book) by Bertram Katzung 12th Edition, Published by Appleton.

PMS-615 COMMUNICATION SKILLS

- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- Intermediate by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

MLT-601 HAEMATOLOGY-I

- Essential of Hematology, A.V Hoff Brand, 6th edition 2006
- Essential of hematology by JP
- Clinical Hematology, G.C Degrunchi, 5th edition 2002
- Practical Hematology, Dacie J.V. 10th edition 2012





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