



KHYBER MEDICAL UNIVERSITY

BS CARDIOLOGY AND CARDIAC PERFUSION TECHNOLOGY CURRICULUM

STUDY GUIDE SEMESTER 6

16 Weeks Activity Planner

2024-25

CENTRAL CURRICULUM & ASSESSMENT COMMITTEE FOR NURSING,

REHABILITATION SCIENCES & ALLIED HEALTH SCIENCES

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Team for TOS Development

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4.	Mr. Khushal khan	Subject Expert Diagnostic Equipment in Cardiology, KMU-IPMS Peshawar
5.	Mr. Siyar Ahmad	Subject Expert; Critical Care, KMU-IHS Mardan
5.	Mr. Syed Arshad Ullah	Subject Expert; Pulmonary Diseases, CMT (BKMC) Mardan
6.	Mr. Adeel Ahmad Khalil	Subject Expert; Echocardiography-II, CMT (BKMC) Mardan
7.	Mr. Babar Ali	Subject Expert; Perfusion Technology-II and Pharmacology related to Perfusion, KMU-IPMS Peshawar
8.	Miss. Wadiha Waheed	Subject Expert; Perfusion Technology-II and Pharmacology related to Perfusion, KMU-IHS Islamabad
9.	Mr. Mustajab Ghani	Subject Expert; Clinical medicine –II KMU-HIS Swat.
10.	Mr. Inam Ullah	External subject expert (PhD Scholar Cardiology, Nanjing Medical university China)
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2.	Mr. Babar Ali	Demonstrator, Cardiac Perfusion, KMU-IPMS

Vision & Mission

Khyber Medical University (KMU) Vision:

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

Khyber Medical University (KMU) Mission:

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

Institute of Paramedical Sciences Peshawar (IPMS-PESH) Mission:

To produce allied health professionals who excel in their skills, research, compassionate care, and community involvement, thereby enhancing the healthcare system

Program Introduction

The BS Cardiology and Cardiac Perfusion program at Khyber Medical University is a comprehensive four-year undergraduate degree designed to equip students with the knowledge, skills, and competencies required to become competent Cardiology and Perfusion technologists. Cardiology and Cardiac Perfusion is a vital healthcare profession that focuses on the diagnosis, treatment, and management of cardiovascular diseases. Cardiac technologists work closely with patients, healthcare providers, and other medical professionals to provide accurate diagnoses and improve patient outcomes.

This Program is structured to provide students with a strong foundation in the sciences and specialized training in Cardiology and Cardiac Perfusion technology. Students will learn about the principles to introduce and impart standard technical education with new modern techniques, within the fields of cardiovascular technologies, by replacing the conventional methods of pre-service training (certificate level).

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.

To equip allied health professionals with modern skills and latest technical knowledge and bring them as per with other national and international level.

Objectives

By the end of the BS Cardiology and Cardiac Perfusion Degree, the students will be able to:

Cognitive Domain:

1. Explain the principles of cardiovascular Anatomy, physiology, pathophysiology and pharmacology with emphasis on cardiac function, coronary circulation and electrical activity of the heart.
2. Interpret pertinent clinical data to select appropriate diagnostic procedures noninvasive including ECG, ETT, Echocardiography, Stress testing and invasive procedures for pediatric and adult patients in cardiac catheterization laboratory.
3. Identify potential expanded roles for cardiac professionals by examining the history and professional behaviors within cardiology and cardiac technology.
4. Discuss the current professional and clinical roles of cardiac technologist, electrophysiology technologist, and echocardiography technologist, cardiac Perfusionist, ECMO specialist in healthcare settings.
5. Apply advanced knowledge of cardiology and related technologies to address current and future needs in clinical practice, patient care, education, research and administration.

Psychomotor Domain:

1. Demonstrate proficiency in using the latest techniques and technologies in cardiac diagnostics and therapies, including interventional cardiology, electrophysiology, and echocardiography.
2. Perform clinical assessments and deliver high-quality diagnostics, including invasive procedures (e.g. Cardiac catheterization) and non-invasive procedures (e.g., echocardiograms, EKGs), in a clinical environment.
3. Effectively communicate with patients, healthcare providers, and other medical professionals using appropriate medical terminology, ensuring clear and accurate exchange of information.
4. Work collaboratively with inter-professional healthcare teams to provide comprehensive, patient-centered care in the management of cardiovascular diseases.
5. Develop the skills necessary to work efficiently in a fast-paced healthcare environment, particularly in acute settings like cardiac catheterization labs and

cardiac surgery units.

Affective Domain:

1. Exhibit professional behavior and adhere to ethical principles in all aspects of cardiology and cardiac technology, ensuring patient safety and confidentiality.
2. Incorporate evidence-based practices into patient care by identifying, accessing, and critically evaluating appropriate literature and medical research on cardiovascular diseases.
3. Demonstrate leadership and teamwork skills in the cardiology profession, including leading clinical teams, advocating for patients, and contributing to community health initiatives.
4. Engage in continuous learning and professional development, staying current with the latest advancements in cardiology, including interventions in electrophysiology, interventional cardiology and cardiac perfusion technologies.
5. Provide compassionate, patient-centered care, ensuring that each patient's dignity, autonomy, and preferences are respected throughout diagnosis, treatment, and recovery.

Sixth Semester Subjects for BS Cardiology and Cardiac Perfusion Technology

S. No	Subjects	Duration
1	CAR-616 CRITICAL CARE	16 weeks
2	CAR-610 CLINICAL MEDICINE-II	16 weeks
3	CAR-613 PULMONARY DISEASES	16 weeks
4	CAR-612 ECHOCARDIOGRAPHY-II	16 weeks
5	CAR-611 DIAGNOSTIC EQUIPMENTS IN CARDIOLOGY	16 weeks
6	CAR-618 CARDIAC SURGERY	16 weeks
7.	CP-606 PHARMACOLOGY RELATED TO PERFUSION	16 weeks
8.	CP-607 PERFUSION TECHNOLOGY-II	16 weeks

CAR-616 Critical Care 3(2+1)

Course Description

This comprehensive course is designed to equip students with the knowledge, skills, and competencies needed to provide high-quality care to critically ill cardiovascular patients. It focuses on the assessment, diagnosis, and management of complex cardiovascular conditions, including acute coronary syndromes, heart failure, arrhythmias, and cardiac arrest. The course integrates theoretical knowledge with practical applications, allowing students to interpret clinical investigations and develop comprehensive treatment plans.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Understanding the basic terminologies and investigations used in cardiovascular critical care.
2. Outlining various critical cardiovascular scenarios.
3. Identifying signs and symptoms indicative of cardiovascular emergencies.
4. Understanding the pathophysiology associated with different cardiovascular emergencies in critically ill patients.
5. Developing a strategic framework for addressing various cardiovascular emergencies.
6. Familiarity with the American Heart Association (AHA) guidelines for Advanced Cardiovascular Life Support (ACLS).

Psychomotor Domain

By the end of this course, students should be able to

1. Able to perform cardiopulmonary resuscitation (CPR), which includes executing chest compressions, providing ventilation, and utilizing automated external defibrillators (AEDs) effectively.
2. Skilled in the preparation and administration of emergency medications (such as epinephrine, amiodarone, heparin and atropine) during cardiovascular emergencies.
3. Proficient in managing hemodynamic instability such as hypotension, hypertension, myocardial infarction and shock.
4. Capable of interpreting results from various diagnostic modalities utilized in the assessment of cardiovascular emergencies.
5. Proficient in implementing targeted interventions to address a wide range of cardiovascular emergencies, ensuring prompt and effective care in critical situations.

Affective Domain

By the end of this course, students should be able to

1. Engage in effective and respectful communication, even in high-pressure situations.
2. Uphold the dignity and rights of patients during resuscitation and critical care procedures.
3. Ensure open and effective communication throughout the course of resuscitation efforts.
4. Showing accountability and responsibility for one's role in patient care.
5. Facilitate discussions regarding prognosis and treatment options with sensitivity and respect.
6. Adhere to established guidelines for clinical practice and investigation.

TABLE OF SPECIFICATION

TOS-CRITICAL CARE 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/Hour s	Assessment	No of Items
				C	P	A				
TOPIC: SHOCK										
1	Week-1	Definition	Introduction to the Shock	C1			Interactive Lecture/SGD	2	MCQs	05
2		Classification of Shock	Classified shock types and their causes	C2						
3		Clinical features	Explain the clinical features of the following types of shock. Hypovolemic, Obstructive, Distributive and Endocrine shock	C2						
4		Practical performance	Demonstrate Assessment Shock Index.		P4		Demo	2	OSPE/OSCE	2
5		SOPs Compliance	Comply SOPs for correct assessment with affective communication with patients.			A4				
TOPIC: CARDIOGENIC SHOCK										
6	Week-2	Etiology	Introduction to Cardiogenic shock and its etiology.	C1			Interactive Lecture/SGD	2	MCQs	03
7		Pathophysiology	Describe the pathophysiology of Cardiogenic shock	C2						
8		Management	Discuss IABP, inotropic and vasopressor agents	C3						
9		Practical performance	Demonstrate and interpretation of central venous pressure (CVP) monitoring, pulmonary artery catheters, and arterial lines in cardiogenic shock.		P4		Demo	2	OSPE/OSCE	1
10		SOPs Compliance	Comply SOPs for correct interpretation of CVP, PA Catheter and arterial line in cardiogenic shock.			A4				
TOPIC: RESUSCITATION IN INTENSIVE CARE										
11	Week-3	Introduction	Describe the chain of survival	C1			Interactive Lecture/SGD	2	MCQs	08
12		In Hospital Resuscitation	Discuss Adult ALS Algorithm	C2						
13		Asystole and pulseless electrical activity	Explain the Etiology of Asystole and pulseless electrical activity	C2						
14		Management	Discuss the Medical management/Drugs used in Resuscitation.	C3						

15		Practical performance	Demonstrate and Perform American heart association guidelines for CPR		P4		Demo	2	OSPE/OSCE	2
16		SOPs Compliance	Respectful and professional attitude by consistently adhering to each step of CPR as outlined in the AHA guidelines.			A4				
TOPIC: CARDIOVASCULAR MONITORING IN CRITICAL CARE										
17	Week-4	Introduction	Introduction to cardiovascular monitoring in critical care	C1			Interactive Lecture/SGD	2	MCQs	05
18		Explanation	Explain Systemic arterial blood pressure, Central venous pressure (CVP), Pulmonary artery pressure,	C2						
19		Classification	Discuss Classification of different hemodynamics profile.	C3						
20		Practical performance	Perform interpretation of Central venous pressure and hemodynamics parameters		P4		Demo	2	OSPE/OSCE	2
21		SOPs Compliance	Adopt how to handle patient documented investigations			A4				
TOPIC: CARDIOVASCULAR INVESTIGATION OF THE CRITICALLY ILL PATIENTS										
22	Week-5	Introduction	Introduction to CVS investigations (ECG, Echocardiography, Markers of Cardiac Infarction and Function)	C1			Interactive Lecture/SGD	2	MCQs	05
23		Hemodynamic	Explain the Hemodynamic instability in Critical care	C2						
24		Right heart catheterization indication	Explain the Indications for right heart catheterization in the critically ill patients	C3						
26		Practical performance	Perform the Interpretation of ABGs		P4		Demo	2	OSPE/OSCE	3
27		SOPs Compliance	Adopt how to interpret ABGs correctly.			A4				
TOPIC: PHARMACOLOGICAL CARDIOVASCULAR SUPPORT										
28	Week-6	Introduction	Introduction to CVS physiology (Preload, Afterload, Heart Rate, Baroreceptors and chemoreceptors)	C1			Interactive Lecture/SGD	2	MCQs	04
29		Therapeutic pharmacological intervention	Discuss the Positive inotropic agents (Adrenaline, Dopamine, Dobutamine, Isoproterenol and Digitalis glycosides)	C2						
30		Vasodilators	Describe Centrally acting vasodilator agents (Clonidine, Alpha methyl dopa) and Hydralazine.	C3						

31		Practical Performance	Perform identification of drugs assisting the proper administration of drugs, monitoring patients for pharmacological cardiovascular support		P4					
32		SOPs Compliance	Comply SOPs for drug administration and monitoring			A4				
TOPIC: ARRHYTHMIAS										
33	Week-7	Introduction	Introduction to atrial and ventricular arrhythmias	C1			Interactive Lecture/SGD	2	MCQs	05
34		Risk Factors	Discuss the Modifiable risk factors for arrhythmia (Central venous cannula, Arterial oxygen and carbon dioxide tensions, Magnesium and potassium)	C2						
35		Management	Explain the management of arrhythmia via Amiodarone, Beta receptor antagonists.	C3						
36		Practical performance	Perform identification of various types of Arrhythmias on the basis of ECG		P4		Demo	2	OSPE/OSCE	3
37		SOPs Compliance	Adopt how to handle ECG paper and correct interpretation			A4				
TOPIC: MECHANICAL HEART FAILURE THERAPY										
38	Week-8	Introduction	Introduction to Mechanical assist device (IABP, VAD) and Commonest indications for mechanical cardiac support	C1			Interactive Lecture/SGD	2	MCQs	03
39		Implantation of Mechanical assist device	Explain Short-term/long-term implantation of Mechanical assist device.	C2						
40		Methods of implantation	Discuss the Methods of implantation (Surgical connections and percutaneous devices)	C3						
41		Practical Demonstration	Practical demonstration of IABP and VAD setup and procedure through video		P3		Demo			
42		SOPs Compliance	Comply to the SOPs of protocols for ensuring the safe and effective use, management, and monitoring of the IABP and VAD			A4				
TOPIC: CARE OF THE HIGH-RISK PATIENT UNDERGOING SURGERY										
43	Week-9	Identification of high-risk patients	Introduction to the Risk criteria for mortality following major surgery	C1			Interactive Lecture/SGD	2	MCQs	02
44		Cardiovascular interventions	Explain the Generic flowchart for optimization	C2						
45		Prevention of myocardial ischemia	Discuss the strategies/Guidelines in the Prevention of myocardial ischemia in High-risk patients Undergoing Surgery	C3						

46		Practical Performance	Perform interpretation of monitoring devices (pulse oximetry, BP monitors and use of defibrillators) and resuscitation protocol.		P4		Demo	2	OSPE/OSCE	2
47		SOPs Compliance	Adopt how to handle Pulse oximeter and defibrillator.			A4				
TOPIC: COMMON COMPLICATIONS OF CARDIOVASCULAR CRITICAL ILLNESS										
48	Week-10	Introduction	Introduction to the Sites of common complications of cardiovascular critical illness	C1			Interactive Lecture/SGD	2	MCQs	05
49		Cardiovascular dysfunction	Discuss the pathophysiology and management of pericardial effusion and cardiac tamponade in critical ill patients.	C2						
50		Renal dysfunction	Explain the RIFLE classification of acute kidney injury and Contrast-induced nephropathy	C1						
51		Practical Performance	Demonstrate placement and interpretation of arterial line and Central venous pressure (CVP) readings and Identify arrhythmias e.g. atrial fibrillation, ventricular tachycardia, ischemic changes, and heart block patterns.		P4		Demo	2	OSPE/OSCE	2
52		SOPs Compliance	Comply SOPs for CVP line placement and its interpretation.			A4				
TOPIC: ACUTE CORONARY SYNDROMES AND MYOCARDIAL INFARCTION										
53	Week-11	Classification of ACS and MI	Classification of acute coronary syndromes (ACS) and myocardial infarction (MI) on the basis of electrocardiogram (ECG) findings and cardiac enzymes	C1			Interactive Lecture/SGD	2	MCQs	03
54		Pathophysiology	Discuss the pathophysiology of ACS and MI	C2						
55		Risk stratification	Explain the Risk scores for STEMI/NSTEMI.	C1						
56		Management of ACS and MI	Discuss the pharmacological and revascularization strategies of ACS and MI in critical care environment	C3						
57		Practical performance	Demonstrate the differential diagnosis and clinical presentation of Myocardial infarction.		P4		Demo	2	OSPE/OSCE	2
58		SOPs Compliance	Comply SOPs for Differential diagnosis of MI			A4				
TOPIC: AORTIC DISSECTION										
59	Week-12	Introduction	Introduction to the pathophysiology of Aortic dissection and its histological features	C1			Interactive Lecture/SGD	2	MCQs	
60		Classification of aortic dissection.	Explain the DeBakey and Stanford Classification of Aortic dissection and its physical sign.	C2						
61		investigations	Discuss the findings of aortic dissection on the following modalities. (Chest X ray, Echocardiography, CT, MR, and Aortography)	C1						

62		Management	Discuss the surgical and medical management of type A and B dissection	C3						
63		Practical Performance	Identify imaging features of aortic dissection on TTE and CT/MRI scans		P4		Demo	2	2	
64		SOPs Compliance	Comply with SOPs when identifying and analyzing imaging features of aortic dissection, ensuring patient safety.			A4				
TOPIC: HYPERTENSIVE CRISES										
67	Week-13	Introduction	Define hypertensive crises (According to the Joint National Committee) and its clinical presentation.	C1			Interactive Lecture/SGD	2	MCQs	04
68		Etiology of hypertensive crises	Explain the different causes of hypertensive crises	C1						
69		Pathophysiology	Discuss the pathophysiological events which is related with hypertensive crises	C2						
70		Types of hypertensive crises	Explain the hypertensive urgency and hypertensive emergency	C2						
71		Practical Performance	Identify imaging features of aortic dissection on TTE and CT/MRI scans		P4		Demo			
72		SOPs Compliance	Comply with SOPs when identifying and analyzing imaging features of aortic dissection, ensuring patient safety.			A4				
TOPIC: MANAGEMENT OF HYPERTENSIVE CRISES										
73	Week-14	Management	Introduction to the strategic map/plan for hypertensive crises.	C1			Interactive Lecture/SGD	2	MCQs	04
74		Antihypertensive agents	Discuss the management of hypertensive urgency.	C3						
75		Management of Hypertensive emergency	Explain the Agents used in hypertensive emergencies according to the causative condition.	C3						
76		Complications of hypertensive emergency	Discuss Organ dysfunction associated with hypertensive emergency.	C2						
77		Practical Performance	Demonstrating manual and automatic methods hypertensive urgency vs. emergency and appropriate management.		P4		Demo	2		2
78		SOPs Compliance	Comply SOPs for hypertensive crises.			A4				

TOPIC: ENDOCRINE PROBLEMS AND CARDIOVASCULAR CRITICAL CARE										
79	Week-15	Diabetes mellitus	Introduction to hyperglycemic state in diabetic patients and stress hyperglycemia in non-diabetic patient.	C1			Interactive Lecture/SGD	2	MCQs	04
80		Thyroid dysfunction	Discuss how Hypothyroidism and thyroid storm associated with Cardiovascular diseases.	C2						
81		Adrenal failure	Explain the effect of adrenal insufficiency on Cardiovascular system.	C2						
82		Practical Performance	Demonstrate the correct use of a glucometer and interpret results and interpret ECG changes related to endocrine issues (e.g., prolonged QT in hypothyroidism, tachycardia in hyperthyroidism)		P4		Demo	2		3
83		SOPs Compliance	Comply with SOPs by demonstrating professionalism, empathy, patient-centered care, commitment to learning, ethical conduct, and teamwork through accurate use of the glucometer.			A4				
TOPIC: EMERGENCY MANAGEMENT OF CARDIAC TRAUMA										
84	Week-16	Introduction	Introduction to emergency care of cardiac trauma.	C1			Interactive Lecture/SGD	2	MCQs	02
85		Blunt cardiac injury	Explain the Blunt cardiac injury and its diagnosis on the following modalities. ECG, Echocardiography and cardiac enzymes profile.	C2						
86		Management	Discuss the algorithm of management of blunt cardiac injury.	C3						
87		Blunt Aortic injury	Explain the Blunt aortic injury and its diagnosis on the following modalities. Chest X ray, CT scan and Trans esophageal Echocardiography (TOE)	C3						
88		Practical Performance	Perform basic life support tailored for cardiac trauma patients. Identify key findings such as pericardial effusion, tamponade, or myocardial rupture.		P4		Demo	2		2
89		SOPs Compliance	Comply SOPs for pericardial effusion, tamponade, or myocardial rupture.			A4				

Recommended Books:

1. Cardiovascular Critical Care by Mark J.D. Griffiths, Jeremy J. Cordingley and Susanna. 010 Blackwell Publishing Ltd.
2. Critical care by Andrea G 4th edition
3. Critical care Current diagnosis and treatment by Frederic S 3rd edition

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
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1	Shock	5	1	Static
2	Cardiogenic shock	3	1	Static and Interactive
3	Resuscitation in Intensive Care	8	1	Static
4	Cardiovascular monitoring of critical ill patient	5	1	Static
5	Cardiovascular Investigation of the Critically Ill patient	5	1	Interactive
6	Pharmacological Cardiovascular Support	4	1	Static
7	Arrhythmias	5	1	Interactive
8	Mechanical Heart Failure Therapy	3	1	Static
9	Care of the High-Risk Patient Undergoing Surgery	2	1	Interactive
10	Common Complications of Cardiovascular Critical Illness	5	-	-
11	Acute Coronary Syndromes and Myocardial Infarction	3	1	Static
12	Aortic Dissection	3	1	Static
13	Hypertensive crises	4	1	Static
14	Management of Hypertensive Crises	4	1	Static
15	Endocrine Problems and Cardiovascular Critical Care	4	-	-
16	Emergency Management of Cardiac Trauma	2	1	Interactive
Total	16	70	14	14

CAR-610 Clinical Medicine-II 3(2+1)

Course Description

This course will provide basic and an in depth concepts of the common diseases affecting, **GIT** (oral thrush, abdominal pain, GERD, peptic ulcer disease, inflammatory bowel diseases (Crohn's and ulcerative colitis), irritable bowel syndrome, and acute appendicitis), **Liver, Biliary Tract, and Pancreas**: jaundice, hepatitis (A, B, C), liver cirrhosis, hepatic encephalopathy, gallstones, acute cholecystitis, and pancreatitis. **Joints and Bones**: rheumatoid arthritis, osteoarthritis, infective arthritis, gout, osteoporosis, and systemic lupus erythematosus. **Nervous System Disorders**: meningitis, encephalitis, epilepsy, strokes (ischemic and haemorrhagic), and brain tumours. It integrates the causes, risk factors, pathophysiology, clinical manifestations, investigative approaches, and management strategies for these diseases.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe causes, risk factors, pathophysiology, clinical manifestations, investigative approaches, and management strategies **GIT, Liver, Biliary Tract, and Pancreas, Nervous System, Joints and Bones** diseases.
2. Discuss Pathophysiology of the specified Diseases in each System.
3. Explain Diagnostic approach and management strategies for specified Diseases in each System.
4. Interpret various tests and imaging findings to diagnose diseases.
5. Evaluate imaging studies (e.g., X-Ray, CT, MRI) to differentiate.

Psychomotor Domain

By the end of this course, students should be able to

1. Perform a thorough abdominal examination, musculoskeletal examination, neurological examination, including inspection, palpation, percussion, and auscultation.
2. Interpret basic diagnostic tools like ultrasound, X-rays, Blood tests (CBC, LFTs, uric acid, ESR).
3. Educate on **dietary modifications** for liver cirrhosis and gallstone prevention.
4. Demonstrate the **Glasgow Coma Scale** (GCS) to assess consciousness.
5. Educate patients and families on stroke prevention and long-term management strategies.

Affective Domain

By the end of this course, students should be able to

1. Comply with SOPs of practical & procedure effectively.
2. Acknowledge and validate the patient's pain and distress during consultations.
3. Demonstrate patience while taking a detailed history of symptoms.
4. Build trust by explaining the diagnostic process clearly.
5. Display understanding toward patients with anxiety about invasive procedures
6. Demonstrate **ethical responsibility** by ensuring patient confidentiality and dignity in all interaction.

TABLE OF SPECIFICATION

CAR-610 Clinical Medicine-II 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/Hours	Assessment	No of Items
				C	P	A				
TOPIC: ORAL THRUSH AND CANDIDIASIS										
1	Week-1	Definition	Define oral thrush and candidiasis, and explain their Causes and risk factors	C1			Interactive Lecture/SGD	2	MCQs	03
2		Pathophysiology, Clinical features	Describe the Pathophysiology oral thrush and candidiasis and Identify the clinical features and symptoms of oral thrush and candidiasis.	C2						
3		Diagnosis, treatment and prevention	Describe diagnostic approaches (clinical examination and Lab tests).	C2						
			Discuss the pharmacological and non-pharmacological treatments Summarize preventive strategies, including hygiene and management of risk factors.	C3						
4		Practical performance	Demonstrate the identification of Candida albicans with the help of charts, models & videos		P4		Demo	2	OSPE/OSCE	
5	SOPs compliance	Adopt how to take care of charts and models			A4	Role Play				
TOPIC: ABDOMINAL PAIN										
6	Week-2	Definition	Definition of Abdominal Pain	C1			Interactive Lecture/SGD	2	MCQs	05
7		Causes and risk factors	Describe common causes and risk factors	C2						
8		Pathophysiology, Clinical features	Explain the Pathophysiology Abdominal Pain and Identify the clinical features and symptoms of Abdominal Pain.	C3						
9		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and Summarize preventive strategies							
10		Practical performance	Demonstrate abdominal Examination and interpretation of investigation		P4		Demo	2	OSPE/OSCE	
11	SOPs compliance	Adopt standard operating procedures (SOPs) for performing abdominal examination and interpreting lab tests, ensuring correct procedural adherence			A4	Role Play				
TOPIC: GERD (GASTRO-ESOPHAGEAL REFLUX DISEASE)										

12	Week-3	Definition	Definition of GERD	C1			Interactive Lecture/SGD	2	MCQs	05
13		Causes and risk factors	Describe common causes and risk factors	C2						
14		Pathophysiology, Clinical features	Explain the Pathophysiology GERD and Identify the clinical features and symptoms of GERD.	C3						
15		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and Summarize preventive strategies							
16		Practical performance	Demonstrate the interpretation of basic findings from a pH monitoring test or endoscopy report		P4		Demo	2	OSPE/OSCE	2
17	SOPs compliance	Demonstrate proper handling, organization, and care of diagnostic charts, endoscopy models, or pH monitoring equipment			A4	Role Play				
TOPIC: PEPTIC ULCER DISEASE (PUD) AND INFLAMMATORY BOWEL DISEASE (IBD: CROHN'S DISEASE & ULCERATIVE COLITIS)										
18	Week-4	Definition	Introduction to Peptic Ulcer Disease and Inflammatory Bowel Disease	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
19		Causes and risk factors	Describe common causes and risk factors PUD and IBD	C2						
20		Pathophysiology, Clinical features	Explain the Pathophysiology PUD and IBD and Identify the clinical features and symptoms of PUD and IBD	C3						
21		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and Summarize preventive strategies							
22		Practical performance	Demonstrate abdominal examination to assess for signs of PUD and IBD and interpret diagnostic investigations		P4		Demo	2	OSPE/OSCE	2
23	Practical performance	Adopt standard operating procedures (SOPs) for performing abdominal examination and interpreting lab tests			A4	Role Play				
TOPIC: DIARRHEA AND CONSTIPATION IN IRRITABLE BOWEL SYNDROME (IBS)										
24	Week-5	Introduction	Introduction to diarrhea and constipation and their role in Irritable Bowel Syndrome (IBS).	C1			Interactive Lecture/SGD	2	MCQs/SEQs	03
25		Causes and risk factors	Describe common causes and risk factors for diarrhea and constipation and their role in Irritable Bowel Syndrome (IBS).	C2						

26		Pathophysiology, Clinical features	Explain the Pathophysiology diarrhea and constipation and their role in Irritable Bowel Syndrome (IBS) and Identify the clinical features and symptoms of diarrhea and constipation and their role in Irritable Bowel Syndrome (IBS).	C3						
27		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss pharmacological and non-pharmacological treatments and summarize preventive strategies	C3						
28		Practical performance	Demonstrate the preparation and administration of Oral Rehydration Solution (ORS) for managing diarrhea in IBS.			P4		Demo	2	OSPE/OSCE
29	SOPs compliance	Comply with Standard Operating Procedures (SOPs) for the preparation and correct usage of ORS.				A4	Role Play			
TOPIC: APPENDICITIS										
30	Week-6	Introduction	Introduction to appendicitis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
31		Causes and risk factors	Describe common causes and risk factors for appendicitis	C2						
32		Pathophysiology, Clinical features	Explain the Pathophysiology appendicitis and identify the clinical features and symptoms of appendicitis	C3						
33		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests). Discuss the pharmacological and non-pharmacological treatments And summarize preventive strategies	C4						
34		Practical performance	Demonstrate physical examination techniques for appendicitis, including psoas sign, rebound tenderness, obturator sign and Rovsing's sign.			P4	Demo	2	OSPE/OSCE	2
35		SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examinations and interpreting findings related to appendicitis.				A4	Role Play		
TOPIC: JAUNDICE, HEPATOMEGALY, HEPATITIS A, B, C										
36	Week-7	Introduction	Introduction to Jaundice, Hepatomegaly, Hepatitis A, B, C	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
37		Causes and risk factors	Describe common causes and risk factors for Jaundice, Hepatomegaly, Hepatitis A, B, C	C2						
38		Pathophysiology, Clinical features	Explain the Pathophysiology Jaundice, Hepatomegaly, Hepatitis A, B, C and Identify the clinical features and symptoms of Jaundice, Hepatomegaly, Hepatitis A, B, C	C3						

39		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and summarize preventive strategies for Jaundice, Hepatomegaly, Hepatitis A, B, C	C3						
		Practical performance	Demonstrate physical examination techniques for hepatomegaly, including liver palpation and percussion.		P4		Demo	2	OSPE/OSCE	1
39		SOPs compliance	Comply Standard Operating Procedures (SOPs) for examination			A4	Role Play			

TOPIC: LIVER CIRRHOSIS AND HEPATIC ENCEPHALOPATHY

40	Week-8	Introduction	Introduction to Jaundice, Hepatomegaly, Hepatitis A, B, C	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
41		Causes and risk factors	Describe common causes and risk factors for Jaundice, Hepatomegaly, Hepatitis A, B, C	C2						
42		Pathophysiology, Clinical features	Explain the Pathophysiology Jaundice, Hepatomegaly, Hepatitis A, B, C and Identify the clinical features and symptoms of Jaundice, Hepatomegaly, Hepatitis A, B, C	C3						
43		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests). Discuss the pharmacological and non-pharmacological treatments And summarize preventive strategies for Jaundice, Hepatomegaly, Hepatitis A, B, C	C3						
44		Practical performance	Demonstrate how to assess for signs of hepatic encephalopathy in patients, such as altered mental status and asterixis, with the help of charts, models, and clinical examples.		P4		Demo	2	OSPE/OSCE	3
45		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			

TOPIC: GALLSTONE & ACUTE CHOLECYSTITIS AND PANCREATITIS

46	Week-9	Definition	Introduction to Gallstone & Acute Cholecystitis and Pancreatitis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
47		Causes and risk factors	Describe common causes and risk factors for Gallstone & Acute Cholecystitis and Pancreatitis	C2						
48		Pathophysiology, Clinical features	Explain the Pathophysiology Gallstone & Acute Cholecystitis and Pancreatitis and Identify the clinical features and symptoms of Gallstone & Acute Cholecystitis and Pancreatitis	C3						

49		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests). Discuss the pharmacological and non-pharmacological treatments And summarize preventive strategies for Gallstone & Acute Cholecystitis and Pancreatitis	C3						
50		Practical performance	Demonstrate the clinical management of a patient with Pancreatitis, including assessment of serum amylase/lipase levels and imaging interpretation.		P4		Demo	2	OSPE/OSCE	2
51		SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examinations and interpreting findings related to Acute Cholecystitis and Pancreatitis			A4	Role Play			
TOPIC: RHEUMATOID ARTHRITIS, OSTEOARTHRITIS, AND INFECTIVE ARTHRITIS										
52	Week-10	Introduction	Introduction to arthritis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
53		Classification	Explain classification of arthritis (Rheumatoid Arthritis, Osteoarthritis, and Infective Arthritis)	C2						
54		Causes and risk factors	Describe common causes and risk factors Rheumatoid Arthritis, Osteoarthritis, and Infective Arthritis	C3						
55		Pathophysiology, Clinical features	Explain the Pathophysiology Rheumatoid Arthritis, Osteoarthritis, and Infective Arthritis and Identify the clinical features and symptoms of Rheumatoid Arthritis, Osteoarthritis, and Infective Arthritis	C3						
56		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological Treatments and Summarize preventive strategies for Rheumatoid Arthritis, Osteoarthritis, and Infective Arthritis	C3						
57		Practical performance	Demonstrate clinical examination techniques for arthritis, focusing on joint assessment, and diagnostic test interpretation.		P4		Demo	2	OSPE/OSCE	2
58	SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examination and interpreting findings related to arthritis			A4	Role Play				
TOPIC: GOUT AND OSTEOPOROSIS										
59	Week-11	Definition	Introduction to Gout and osteoporosis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
60		Causes and risk factors	Describe common causes and risk factors for Gout and osteoporosis	C2						

61		Pathophysiology, Clinical features	Explain the Pathophysiology Gout and osteoporosis and identify the clinical features and symptoms of Gout and osteoporosis	C1						
62		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C2						
			Discuss the pharmacological and non-pharmacological treatments and summarize preventive strategies for Gout and osteoporosis	C3						
63		Practical performance	Demonstrate clinical examination techniques for Gout (joint examination, uric acid levels) and Osteoporosis fracture risk assessment)			P4		Demo	2	OSPE/OSCE
64	SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examination and interpreting uric acid levels and risk assessment				A4	Role Play			
TOPIC: SYSTEMIC LUPUS ERYTHEMATOUS										
65	Week-12	Definition	Introduction to Systemic Lupus erythematosus	C1			Interactive Lecture/SGD	2	MCQs/SEQs	03
66		Causes and risk factors	Describe common causes and risk factors for Systemic Lupus erythematosus	C2						
67		Pathophysiology, Clinical features	Explain the Pathophysiology Systemic Lupus erythematosus and identify the clinical features and symptoms of Systemic Lupus erythematosus	C3						
68		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and summarize preventive strategies for Systemic Lupus erythematosus	C3						
69		Practical performance	Demonstrate interpretation of the Blood tests and Immunological Tests for SLE.			P4		Demo	2	OSPE/OSCE
70	SOPs compliance	Comply SOPs for Interpretation of Blood tests and Immunological tests for SLE.				A4	Role Play			
TOPIC: MENINGITIS AND ENCEPHALITIS										
71	Week-13	Definition	Introduction to Meningitis and Encephalitis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
72		Causes and risk factors	Describe common causes and risk factors for Meningitis and Encephalitis	C1						
73		Pathophysiology, Clinical features	Explain the Pathophysiology Meningitis and Encephalitis and Identify the clinical features and symptoms of Meningitis and Encephalitis	C2						
74		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						

75			Discuss the pharmacological and non-pharmacological treatments And summarize preventive strategies for Meningitis and Encephalitis	C4						
76		Practical performance	Demonstrate the clinical examination of a patient with Meningitis and Encephalitis, including neurological assessments, signs of Kerning's/Brzezinski, and CSF analysis.		P4		Demo	2	OSPE/OSCE	2
77		SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examinations and interpreting findings related to Meningitis and Encephalitis			A4	Role Play			
TOPIC: EPILEPSY										
78	Week-14	Introduction	Introduction to Epilepsy	C1			Interactive Lecture/SGD	2	MCQs/SEQs	03
79		Classification	Explain classification of different types of seizures (generalized, focal)	C2						
80		Causes and risk factors	Describe common causes and Epilepsy	C3						
81		Pathophysiology, Clinical features	Explain the Pathophysiology Epilepsy and Identify the clinical features and symptoms of Epilepsy	C4						
82		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests). Discuss the pharmacological and non-pharmacological treatments and summarize preventive strategies for Epilepsy							
83		Practical performance	Demonstration of the EEG for the Epilepsy.		P4					
84		SOPs compliance	Comply SOPs for EEG demonstration and interpretation.			A4	Role Play			
TOPIC: STROKE (ISCHEMIC & HEMORRHAGIC)										
85	Week-15	Introduction	Introduction to Stroke	C1			Interactive Lecture/SGD	2	MCQs/SEQs	04
86		Classification	Explain classification of different types Stroke (Ischemic & Hemorrhagic)	C2						
87		Causes and risk factors	Describe common causes and Stroke (Ischemic & Hemorrhagic)	C3						
88		Pathophysiology, Clinical features	Explain the Pathophysiology Stroke (Ischemic & Hemorrhagic) and identify the clinical features and symptoms of Stroke (Ischemic & Hemorrhagic)	C3						
89		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C4						

			Discuss the pharmacological and non-pharmacological treatments And summarize preventive strategies for Stroke (Ischemic & Hemorrhagic)							
90		Practical performance	Demonstrate the clinical examination of a patient with Stroke, including neurological assessments, GCS (Glasgow Coma Scale)		P4		Demo	2	OSPE/OSCE	2
91		SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examinations and interpreting findings related to Stroke			A4	Role Play			
TOPIC: BRAIN TUMORS										
92	Week-16	Introduction	Introduction to Brain Tumors	C1			Interactive Lecture/SGD	2	MCQs/SEQs	02
93		Classification	Explain classification of different types of Brain Tumors (benign and malignant)	C2						
94		Causes and risk factors	Describe common causes and Brain Tumors (benign and malignant)	C2						
95		Pathophysiology, Clinical features	Explain the Pathophysiology Brain Tumors (benign and malignant) and identify the clinical features and symptoms of Brain Tumors (benign and malignant)	C3						
96		Diagnosis, treatment and prevention	Explain diagnostic approaches (clinical examination and Lab tests).	C3						
			Discuss the pharmacological and non-pharmacological treatments and summarize preventive strategies for Brain Tumors (benign and malignant)	C3						
94	Practical performance	Demonstrate clinical examination of a patient with Brain Tumors, including neurological assessments		P4		Demo	2	OSPE/OSCE	2	
	SOPs compliance	Adopt Standard Operating Procedures (SOPs) for conducting physical examination and interpreting findings related to Brain Tumors			A4	Role Play				

Recommended Books:

1. Kumar and Clark's Clinical Medicine (Kumar, Kumar and Clark's Clinical Medicine), 10th edition
2. Davidson's Principles and Practice of Medicine, 21st edition
3. Clinical Medicine by Inam Danish 13 Edition

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Oral thrush and candidiasis	03	0	
2	Abdominal Pain	05	1	Static and Interactive
3	GERD (Gastro-esophageal reflux disease)	05	1	Static
4	Peptic Ulcer disease, Inflammatory bowel disease (Crohn's disease & Ulcerative colitis)	05	1	Interactive
5	Diarrhea and Constipation in Irritable bowel syndrome	03	1	Interactive
6	Appendicitis	05	1	Interactive
7	Jaundice, Hepatomegaly, Hepatitis A, B, C	05	1	Static
8	Liver Cirrhosis and Hepatic encephalopathy	05	1	Static
9	Gall stone & Acute Cholecystitis and Pancreatitis	05	1	Interactive
10	Rheumatoid arthritis, Osteoarthritis & Infective arthritis	05	1	Static
11	Gout and Osteoporosis	05	1	Interactive
12	Systemic Lupus erythematosus	04	1	Static
13	Meningitis and Encephalitis	05	1	Static and Interactive
14	Epilepsy	03	1	Static
15	Stroke (Ischemic & Hemorrhagic)	05	1	Static and Interactive
16	Brain Tumors	02	0	Static and Interactive
Total	16	70	14	14

613 Pulmonary Diseases 3 (2+1)

Course Description

This course introduces students to the fundamental concepts of pulmonary diseases, including the diagnosis, investigation, and management of respiratory diseases. Students will gain knowledge of various diseases affecting the respiratory system, understand investigative tools, and develop practical skills for history-taking, clinical examination, and management planning for pulmonary diseases. This course integrates theoretical knowledge with practical applications, enabling students to interpret clinical investigations and formulate comprehensive treatment plans.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Describe the basic introduction and investigations used in respiratory medicine.
2. Explain various diseases of the respiratory tract.
3. Diagnose diseases of the upper and lower respiratory tract.
4. Plan treatment strategies for different respiratory conditions.

Psychomotor Domain

By the end of this course, students should be able to

1. Perform clinical examinations for respiratory diseases.
2. Interpret results of respiratory investigations.
3. Develop management plans for respiratory diseases.

Affective Domain

By the end of this course, students should be able to

1. Demonstrate professionalism during clinical interactions.
2. Exhibit ethical behavior in diagnosis and treatment planning.
3. Follow established guidelines for clinical practice and investigation.

Demonstrate respect and empathy in interactions with patients.

TABLE OF SPECIFICATIONS

TOS - Pulmonary Diseases 3 (2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/Hours	Assessment	No of Items
				C	P	A				
TOPIC: EXAMINATION OF THE RESPIRATORY SYSTEM										
1	Week-1	Introduction	Explain the basic steps of the respiratory system examination	C1			Interactive Lecture/SGD	2	MCQs	05
2		Examination of chest	Explain the steps of chest examination, i.e., inspection, palpation, percussion, and auscultation	C2						
3		General Physical examination related to respiratory system	Identify general signs related to respiratory disorders, i.e., General appearance, hand, and head & neck	C2						
4		Practical performance	Breathing rate calculation, apex beat palpation, tracheal palpation, measuring chest expansion using a measuring tape Normal and abnormal lung sounds video demonstration		P1		Demo	2	OSPE	2
5		SOPs compliance	Ensure correct technique during practical demonstration			A4	Role Play			
TOPIC: INVESTIGATION USED TO INVESTIGATE RESPIRATORY DISEASES										
6	Week-2	Sputum analysis and Chest X-ray	Explain the diagnostic significance of sputum analysis and interpret chest X-ray findings in respiratory diseases	C1			Interactive Lecture/SGD	2	MCQs	04
7		CT Scan, Ventilation-Perfusion scan (V/Q scan), ultrasound, mediastinoscopy & Fiberoptic Bronchoscopy	Discuss the role of advanced imaging and invasive diagnostic techniques in identifying respiratory diseases	C3						
8		Pleural Aspiration and Biopsy	Explain the indications, contraindications, procedures, and clinical significance of pleural aspiration and biopsy	C2						
9		Practical performance	Demonstrate the sputum findings and Chest X-ray interpretation using chart demonstration		P4		Demo	2	OSPE	2
10		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: INVESTIGATION USED TO INVESTIGATE RESPIRATORY DISEASES										
11	Week-3	Pulmonary functions Tests (PFTs)	Explain the principles, types, indications and contraindications of pulmonary function tests (PFTs).	C1			Interactive Lecture/SGD	2	MCQs	05

12		Spirometry & Peak Expiratory flow rate (PEFR)	Explain the basic spirometry results to assess respiratory function and detect abnormalities	C2						
13		Arterial blood gas analysis	Discuss the procedure, normal values, and interpretation of arterial blood gas analysis to assess respiratory function and identify abnormalities.	C2						
15		Practical performance	Spirometry procedure video demonstration Practical demonstration of performing Peak expiratory flow rate Arterial blood gas sampling method using video demonstration and ABGs interpretation through chart demonstration		P4		Demo	2	OSPE	2
16		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: DISEASES OF THE UPPER RESPIRATORY TRACT										
17	Week-4	Introduction	Outline the importance of understanding diseases of the upper respiratory tract				Interactive Lecture/SGD	2	MCQs/SEQs	05
18		Common cold Sinusitis Rhinitis	Explain the introduction, etiology, pathophysiology, clinical features, investigations, diagnosis and management of these conditions							
19		Pharyngitis Acute laryngotracheobronchitis Acute epiglottitis	Discuss the introduction, etiology, pathophysiology, clinical features, investigations, diagnosis and management of these conditions							
20		Practical performance	Oropharyngeal Examination and Airway Visualization		P4		Demo	2	OSPE	2
21		SOPs compliance	Follow standard protocols and ensure patient safety during oropharyngeal examination and airway visualization.			A4	Role Play			
TOPIC: ASTHMA										
22	Week-5	Introduction	Defining Asthma and describing the prevalence of Asthma	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
23		Classification	Classify types of asthma	C2						
24		Pathogenesis & Pathophysiology	Distinguish etiology, pathogenesis and pathophysiology of asthma	C2						
25		Clinical features	List clinical features of Asthma	C1						
26		Investigations, Management & Prognosis	Explain investigations used for the diagnosis of asthma and stepwise approach to the management of asthma and its prognosis	C2						
27		Acute severe asthma	Describe acute severe asthma and its management	C2						
28		Practical performance	Demonstrate the use of a peak flow meter and proper inhaler technique using a video or chart.		P4		Demo	2	OSPE	1

29		SOPs compliance	Follow standard guidelines for using a peak flow meter and inhaler			A4	Role Play			
TOPIC: PNEUMONIA										
30	Week-6	Definition	Define Pneumonia	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
31		Classification	Classify various types of Pneumonia and its causes	C2						
32		Pathophysiology, clinical features, investigations and management	Explain pathophysiology, clinical features, investigations and management of various types of Pneumonia	C2						
33		Practical performance	Demonstrate the clinical features, causes, and types of pneumonia using detailed chart.		P4		Demo	2	OSPE	2
34		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: TUBERCULOSIS										
35	Week-7	Introduction	Explain epidemiology and pathophysiology of tuberculosis	C2			Interactive Lecture/SGD	2	MCQs/SEQs	05
36		Pathogenesis	Describe pathogenesis of tuberculosis	C2						
37		Clinical features and diagnosis	Explain clinical features of pulmonary and extrapulmonary tuberculosis and its diagnosis	C2						
38		Management and control	Describe management, Control and prevention of tuberculosis	C2						
39		Practical performance	Demonstrate sputum and chest X-ray findings of tuberculosis using chart demonstrations.		P4		Demo	2	OSPE	2
40		SOPs compliance	Adopt how to take care of charts			A4	Role Play			
TOPIC: CHRONIC OBSTRUCTIVE PULMONARY DISEASE										
41	Week-8	Definition	Define Chronic obstructive pulmonary disease (COPD)	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
42		Epidemiology and etiology	Describe prevalence, etiology, pathophysiology and clinical features of COPD	C2						
43		Investigations and Management	Explain various investigations used for the diagnosis, management and prognosis of COPD	C2						
44		Acute exacerbations	Explain acute exacerbations of COPD and its Management	C2						
45		Practical performance	Demonstrate the administration of oxygen therapy and proper use of nebulizers using video or chart demonstrations		P4		Demo	2	OSPE	2
46		SOPs compliance	Adopt how to take care of charts			A4	Role Play			
TOPIC: ACUTE LUNG INJURY/ ACUTE RESPIRATORY DISTRESS SYNDROME										
47	Week-9	Definition	Define acute lung injury (ALI/ARDS)	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
48		Causes	List causes of ALI/ARD	C1						
49		Pathogenesis and pathophysiology	Explain pathogenesis and pathophysiology of ALI/ARDS	C2						

50		Clinical presentation and Management	Explain clinical presentation and management of ALI/ARDS	C2						
51		Prognosis	Describe prognosis of ALI/ARDS	C2						
52		Practical performance	Demonstrate the clinical features and management of ARDS using a video or chart.		P4		Demo	2	OSPE	1
53		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: PULMONARY HYPERTENSION										
54	Week-10	Introduction	Explain the significance and causes of pulmonary hypertension	C1			Interactive Lecture/SGD	2	MCQs/SEQs	04
55		Pathophysiology of Pulmonary Hypertension	Discuss the pathophysiological mechanisms involved in pulmonary hypertension	C2						
56		Clinical features and diagnosis	Identify the clinical signs and diagnostic criteria for pulmonary hypertension	C1						
57		Investigation of Pulmonary Hypertension (ECG, Echo, CT Scan, right heart catheterization)	Discuss the diagnostic investigations and their role in confirming pulmonary hypertension	C2						
58		Practical performance	Demonstrate clinical examination and interpretation of diagnostic tests		P4		Demo	2	OSPE	2
59		SOPs compliance	Adhere to standard operating procedures in managing patients with pulmonary hypertension			A4	Role Play			
TOPIC: PULMONARY EMBOLISM										
60	Week-11	Introduction	Explain the importance of early detection and management of pulmonary embolism	C1			Interactive Lecture/SGD	2	MCQs/SEQs	04
61		Etiology and risk factors of Pulmonary Embolism	Discuss the various risk factors that predispose to pulmonary embolism	C2						
62		Pathophysiology of Pulmonary Embolism	Discuss the pathophysiological changes that occur in pulmonary embolism	C1						
63		Treatment and management of Pulmonary Embolism	Discuss the treatment modalities such as anticoagulation, thrombolytics, and surgery	C2						
64		Practical performance	Demonstrate clinical examination, interpret diagnostic findings, and manage a case of pulmonary embolism		P4		Demo	2	OSPE	2
65		SOPs compliance	Follow SOPs while managing patients with suspected or diagnosed pulmonary embolism			A4	Role Play			
TOPIC: BRONCHIAL CARCINOMA										
66	Week-12	Introduction to Bronchial Carcinoma	Explain the epidemiology and risk factors of bronchial carcinoma (lung cancer)	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05

67		Types of Lung Cancer (Small cell vs. Non-small cell carcinoma)	Discuss the different types of lung cancer and their characteristics	C2						
68		Pathophysiology of Bronchial Carcinoma	Explain the cellular and molecular mechanisms involved in the development of bronchial carcinoma	C1						
69		Treatment and management of Bronchial Carcinoma	Discuss the treatment options including surgery, chemotherapy, radiation, and immunotherapy	C2						
70		Practical performance	Demonstrate clinical examination and interpretation of diagnostic findings in bronchial carcinoma		P4		Demo	2	OSPE	1
71		SOPs compliance	Adhere to standard operating procedures in managing a patient with lung cancer			A4	Role Play			
TOPIC: FUNGAL INFECTIONS OF THE RESPIRATORY SYSTEM										
71	Week-13	Introduction	Explain fungal infections of respiratory system/ aspergillosis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	03
72		Pathogenesis	Discuss etiology and pathogenesis of fungal infections of respiratory system	C1						
73		Classification	Explain various classification of Aspergillosis (allergic bronchopulmonary aspergillosis)	C2						
74		Clinical features	Enlist clinical features of infective bronchopulmonary aspergillosis	C3						
75		Investigation and treatment	Explain various investigations for diagnosis, and treatment strategy for allergic bronchopulmonary aspergillosis							
76		Practical performance	Video demonstration of chest X-ray images, PFT reports and aspergillus antigen		P4		Demo	2	OSPE	2
77		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: FUNGAL INFECTIONS OF RESPIRATORY SYSTEM										
78	Week-14	Introduction	Explain intracavitary Aspergilloma, Invasive pulmonary Aspergillosis	C1			Interactive Lecture/SGD	2	MCQs/SEQs	02
79		Clinical features	Enlist clinical features of interactive and invasive pulmonary aspergillosis	C2						
80		Investigation	Discuss various investigations for diagnosis of interactive and invasive pulmonary aspergillosis	C3						
81		Treatment and management	Explain treatment and management of interactive and invasive pulmonary aspergillosis	C4						
82		Prognosis	Describe prognosis of interactive and invasive pulmonary aspergillosis							
83		Practical performance	Video demonstration of chest X-ray images, PFT reports and aspergillus antigen		P4		Demo	2	OSPE	2

84		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: OCCUPATIONAL LUNG DISEASE										
85	Week-15	Introduction	Explain the basic introduction and major classification of occupational lung disease	C1			Interactive Lecture/SGD	2	MCQs/SEQs	05
86		Coal-worker's pneumoconiosis	Describe the pathogenesis, clinical features, and preventive measures.	C2						
87		Silicosis	Identify the risks, diagnostic methods, and complications of silica exposure.	C3						
88		Asbestosis	Outline the clinical presentation, diagnostic criteria, and health risks of asbestos exposure.	C3						
89		Practical performance	Demonstrate the different occupational lung disease with the help of color charts & models		P4		Demo	2	OSPE	2
90		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			
TOPIC: LUNG TRANSPLANTATION										
91	Week-16	Introduction	Explain the basic concepts and principles of lung transplantation.	C1			Interactive Lecture/SGD	2	MCQs/SEQs	03
92		Indications and patient selection	Identify the criteria for selecting patients suitable for lung transplantation.	C2						
93		Donor and recipient selection	Describe the process and criteria for selecting organ donors and recipients.	C3						
94		Complications	Recognize the potential complications associated with lung transplantation.	C3						
95		Prognosis	Explain the factors affecting the prognosis and outcomes of organ transplantation.							
96		Practical performance	Lung transplantation procedure by video demonstration		P4		Demo	2	OSPE	1
97		SOPs compliance	Adopt how to take care of charts and models			A4	Role Play			

Recommended Books:

1. Kumar and Clark's Clinical Medicine (Kumar, Kumar and Clark's Clinical Medicine), 10th edition
2. Davidson's Principles and Practice of Medicine, 21st edition
3. Clinical Medicine by Inam Danish 13 Edition

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Examination of the respiratory system	5	0	Static
2	Investigation used to investigate respiratory diseases	4	1	Static and Interactive
3	Investigation used to investigate respiratory diseases	5	1	Interactive
4	Diseases of the upper respiratory tract	5	1	Static
5	Asthma	5	1	Static
6	Pneumonia	5	1	Static
7	Tuberculosis	5	1	Static
8	Chronic obstructive pulmonary disease	5	1	Interactive
9	Acute Lung Injury/ Acute respiratory distress syndrome	5	1	Interactive
10	Pulmonary hypertension	4	1	Static
11	Pulmonary embolism	4	1	Static
12	Bronchial carcinoma	5	1	Static
13	Fungal Infections of the Respiratory system	3	1	Interactive
14	Fungal Infections of Respiratory system	2	0	Interactive
15	Occupational Lung Disease	5	1	Static
16	Lung Transplantation	3	1	Interactive
Total	16	70	14	14

CAR-612 Echocardiography-II 3(2+1)

Course Description

Echocardiography II is an advanced-level course designed for students pursuing a Bachelor of Science in Cardiology Technology. Focusing on advanced imaging techniques, diagnostic assessments, and the application of echocardiographic methods in clinical practice. Students will gain expertise in performing and interpreting advanced echocardiographic studies including stress echocardiography, transthoracic echocardiography (TTE) with its modalities for diagnosing different heart diseases.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Integrate echocardiographic information in clinical decision making
2. Assess ventricular and valvular function using Doppler hemodynamics.
3. Integrate echocardiographic assessment of cardiomyopathies and systemic disease in patient management.
4. Define Clinical uses of stress echocardiography, transthoracic echocardiography (TTE)
5. Recognize how echocardiography is used to help manage patients with congenital heart diseases, pericardial diseases and diseases of aorta
6. Integrate echo information in the management of complex valvular and prosthetic valvular heart disease.

Psychomotor Domain

By the end of this course, students should be able to

1. Prepare advanced echocardiography equipment, including transducers, imaging consoles and accessories.
2. Optimize machine settings for specific echocardiographic techniques, such as stress echocardiography, transthoracic echocardiography (TTE)
3. Demonstrate proper handling of echocardiographic probes during complex examinations.
4. Perform advanced Doppler techniques for assessing hemodynamics and valvular function.
5. Adapt imaging techniques to specific patient conditions, such as congenital abnormalities or poor acoustic windows.
6. Integrate echocardiographic findings into clinical decision making and patient management.
7. Safely and effectively perform transthoracic echocardiography (TTE) in a clinical environment ensuring patient comfort and minimizing risks
8. Ensure patient safety and comfort throughout the imaging process adhering to standard operating protocols.

Affective Domain

By the end of this course, students should be able to

1. Performing advanced echocardiographic procedures, including punctuality and adherence to clinical schedules
2. Dedication to continuous learning and skill improvement in echocardiography
3. Respect when interacting with patients undergoing echocardiographic procedures.
4. Ensure patient comfort dignity and confidentiality throughout the diagnostic process.
5. Communicate effectively to address patient concerns during procedure and clinical environments with a positive attitude.
6. Work collaboratively with healthcare professionals, including cardiologists, nurses, and technologists, to ensure optimal patient outcomes during echocardiographic procedure.

TABLE OF SPECIFICATION

TOS-ECHOCARDIOGRAPHY-II 3(2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/Hours	Assessment	No of Items
				C	P	A				
TOPIC: MITRAL VALVE DISEASES										
1	Week-1	Definition	Define mitral valve disease and its types i.e. MS & MR	C1			Interactive Lecture/SGD	2	MCQs	05
2		Anatomy of common mitral valve diseases	Explain Etiology, echocardiographic anatomy and pathophysiology of mitral valve diseases, flail mitral leaflets and mitral valve prolapse	C2						
3		Using Echo modalities for determination and severity of MS & MR	Describe 2D, M-mode and Doppler approach on echocardiography for determination of severity of MS, MR and secondary pulmonary hypertension. Doppler criteria for MS & MR	C4						
4		Practical performance	Practical and video Demonstration for performing echocardiography of mitral Stenosis/Regurgitation		P4		Demo	2	OSPE/OSCE	2
5		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: AORTIC VALVE DISEASES										
6	Week-2	Definition	Define aortic valve diseases & their types i.e. AS & AR	C1			Interactive Lecture/SGD	2	MCQs	05
7		Anatomy	Explain the anatomy of Aortic Valve Diseases on echocardiography	C2						
8		Using Echo modalities for determination and severity of AS & AR	Describe 2D, M mode and Doppler approach on echocardiography for determination of severity of AS & AR. Doppler Criteria for AS & AR	C4						
9		Practical performance	Practical and Video Demonstration for performing echocardiography of aortic Stenosis/Regurgitation		P4		Demo/Practical	2	OSPE/OSCE	2
10		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: PULMONARY VALVE DISEASES										
11	Week-3	Definition	Define pulmonary valve diseases & its types i.e. PS & PR	C1			Interactive Lecture/SGD	2	MCQs	04
12		Anatomy	Explain Anatomy of pulmonary valve on echocardiography	C2						
13				C3						

14		Using Echo modalities for determination and severity of PS & PR	Describe 2D, M mode and Doppler approach on echocardiography for determination of severity of PS & PR. Doppler Criteria for PS & PR							
15		Practical performance	Practical and Video Demonstration for performing echocardiography of Pulmonary Stenosis/Regurgitation		P4		Demo/Practical	2	OSPE/OSCE	2
16		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: TRICUSPID VALVE DISEASES										
17	Week-4	Definition	Define tricuspid valve diseases & their types i.e. TS & TR	C1			Interactive Lecture/SGD	2	MCQs	03
18		Anatomy	Explain Anatomy of tricuspid valve on echocardiography	C2						
19		Using Echo modalities for determination and severity of TS & TR	Describe 2D, M mode and Doppler approach on echocardiography for determination of severity of PS & PR. Doppler Criteria for TS & TR	C3						
20		Practical performance	Video and practical Demonstration for performing echocardiography of Tricuspid Stenosis/Regurgitation		P4		Demo/Practical	2	OSPE/OSCE	2
21		Practical performance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: PROSTHETIC VALVES										
22	Week-5	Introduction	Introduction to prosthetic valves, types and normal prosthetic valve function	C2			Interactive Lecture/SGD	2	MCQs	04
23		Echo assessment of prosthetic valves	Describe 2D, M mode, Doppler and color flow imaging of Mitral and aortic valves prosthesis	C4						
24		complications and follow-ups	Explain Complications and Follow-Up in the form of thrombus or paravalvular leak in prosthetic valves	C3						
25										
26		Practical performance	Video and Practical Demonstration for performing echocardiography of different prosthetic valves		P4		Demo	2	OSPE/OSCE	2
27		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: STRESS ECHO										
28	Week-6	Definition	Define stress echocardiography and its basics	C1			Interactive Lecture/SGD	2	MCQs	05
29		Methods of stress echo	Explain Methods of stress echocardiography, treadmill, Bicycle ergometry and dobutamine stress echocardiography	C3						

30		Indications and contraindications	Indications and contraindications of stress echocardiography	C2						
31		Interpretation of stress echo	Explain evaluation, interpretation and reporting of stress echo in setting of ischemic heart disease	C4						
32		Practical performance	Video Demonstration to explain how the stress echo is performed		P4		Demo	2	OSPE/OSCE	1
33		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: DILATED CARDIOMYOPATHIES (DCM)										
34	Week-7	Definition	Define dilated cardiomyopathy and its causes	C1			Interactive Lecture/SGD	2	MCQs	05
35		Echo views/windows	Explain importance of views for diagnosing DCM	C2						
36		Echocardiographic assessment	Describe 2D, M-mode and Doppler echocardiography assessment for dilated cardiomyopathy (DCM)	C3						
37		Quantification of ventricular function	Explain Quantification of systolic and diastolic function in dilated cardiomyopathy (DCM)	C4						
38										
39		Practical performance	Practical and Video Demonstration for performing echocardiography of DCM		P4		Demo	2	OSPE/OSCE	1
40		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: HYPERTROPHIC CARDIOMYOPATHY										
41	Week-8	Definition	Define hypertrophic cardiomyopathy	C1			Interactive Lecture/SGD	2	MCQs	04
42		Using Echocardiographic modalities	Describe 2D, M-mode and doppler echocardiography for assessment and quantification of hypertrophic cardiomyopathy	C2						
43		Differentiate b/w HCM, LVH & HOCM	Explain application of 2D, M-mode and Doppler echo to differentiate HCM from LVH and HOCM	C4						
44		Practical performance	Practical and Video Demonstration for performing echocardiography of HCM		P4		Demo	2	OSPE/OSCE	1
45		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: INFILTRATIVE AND RESTRICTIVE CARDIOMYOPATHY										
46	Week-9	Definition	Define infiltrative and restrictive cardiomyopathies (e.g., amyloidosis, sarcoidosis, and idiopathic restrictive cardiomyopathy)	C1			Interactive Lecture/SGD	2	MCQs	03
47		Restrictive cardiomyopathy vs pericardial constriction	Explain Differentiate between restrictive cardiomyopathy and constrictive pericarditis according to echocardiographic features	C2						
48				C3						

49		Echocardiographic evaluation	2D, M-mode and Doppler Evaluation of Restrictive Cardiomyopathy							
50		Practical performance	Practical and Video Demonstration for performing echocardiography of Restrictive cardiomyopathy		P4		Demo	2	OSPE/OSCE	2
51		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: INTRODUCTION TO CONGENITAL HEART DISEASES										
52	Week-10	Definition	Define congenital heart disease (CHD), differentiate cyanotic and a cyanotic defect	C1			Interactive Lecture/SGD	2	MCQs	04
53		Anatomy in CHD	Explain The echocardiographic examination A segmental approach to anatomy in CHD i.e. Cardiac situs, situs inversus, ventricular morphology and great artery connections	C2						
54		Using Echocardiographic modalities	Describe 2D, M-mode, and Doppler Evaluation Abnormalities of right ventricular inflow, Ebstein anomaly and abnormalities of left ventricular inflow pulmonary veins, LA, Mitral valve, pulmonary valve, pulmonary artery and abnormalities of RV outflow, LV outflow (Sub valvular obstruction and coarctation of aorta) in CHD	C3						
55		Interpretation of findings in CHD	Explain and interpret echocardiographic findings in clinical cases involving common and complex congenital heart diseases	C4						
56		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases		P4		Demo	2	OSPE/OSCE	2
57		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: CARDIAC SEPTATIONS ABNORMALITIES (ASD's)										
58	Week-11	Definition	Define cardiac septation abnormalities (e.g., atrial septal defect (ASD), ventricular septal defect (VSD)	C1			Interactive Lecture/SGD	2	MCQs	05
59		Classification of ASD	Explain atrial septal defect (ASD) and its types (e.g., ostium secundum, ostium primum & sinus venosus)	C2						
60		Echo windows/views for ASD	Importance of Echo windows/views for diagnosing ASD	C2						
61		Using Echocardiographic evaluation	Describe 2D, M-mode, contrast echo & Doppler Evaluation for ASD and its types	C4						

62		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases (ASD and its types)		P4		Demo	2	OSPE/OSCE	2				
63		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play							
TOPIC: VENTRICULAR SEPTAL DEFECTS (VSD's)														
64	Week-12	Definition	Define ventricular septal defect (VSD)	C1			Interactive Lecture/SGD	2	MCQs	05				
65		Types of VSD	Explain classification of different types of VSD's (e.g., peri membranous, muscular & outlet)	C2										
66		Echo windows/views for VSD's	Importance of Echo views for diagnosing VSD	C2										
67		Echocardiographic evaluation	Describe 2D, M-mode and Doppler echocardiography for assessment, differentiation and quantification of ventricular septal defects	C3										
68		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases (VSD and its types)		P4						Demo	2	OSPE/OSCE	2
69		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play							
TOPIC: PATENT DUCTUS ARTERIOSUS (PDA)														
70	Week-13	Definition	Define patent ductus arteriosus (PDA) and describe its embryological basis.	C1			Interactive Lecture/SGD	2	MCQs	05				
71		Echo windows/views for PDA	Explain Importance of Echo windows/views for diagnosing patent ductus arteriosus (PDA)	C2										
72		Echocardiographic evaluation	Describe 2D, M-mode and Doppler echocardiography for assessment and diagnosis of patent ductus arteriosus (PDA)	C3										
73														
74														
75		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases (PDA)		P4						Demo	2	OSPE/OSCE	2
76			SOPs compliance	Adopt how to take care of Echo machine							A4	Role Play		
TOPIC: TETRALOGY OF FALLOT (TOF)														
77	Week-14	Definition	Define tetralogy of Fallot and its four features	C1			Interactive Lecture/SGD	2	MCQs	05				
78		Echo windows/views for PDA	Explain Importance of Echo windows/views for diagnosing tetralogy of Fallot (TOF)	C2										
79		Echocardiographic modalities	Describe 2D, M-mode and Doppler echocardiography for assessment, quantification and diagnosis of TOF	C3										
80														
81														

82		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases (TOF)		P4		Practical/Demo	2	OSPE/OSCE	1
83		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: DISEASES OF AORTA (COARCTATION OF AORTA)										
84	Week-15	Definition and normal anatomy of aorta and appropriate criteria using echocardiography	Define diseases of the aorta and classification anatomy and appropriate criteria (e.g., aneurysm, dissection & coarctation)	C1			Interactive Lecture/SGD	2	MCQs	03
85		Echo windows/views for diseases of aorta	Explain Importance of Echo windows/views for diagnosing of aortic coarctation	C2						
86		Echocardiographic evaluation and of aorta and differentiation between Aortic Dilation and Aneurysm on the basis of echocardiography	Describe 2D, M-mode and Doppler echocardiography for assessment and quantification of coarctation of aorta and differentiation between Aortic Dilation and Aneurysm based on echocardiography	C3						
87										
88										
89		Using Echocardiographic modalities for assessment and quantification of dissection, coarctation of aorta	Explain Echocardiographic evaluation 2D, mode and doppler echocardiography for assessment and quantification of dissection, coarctation of aorta	C3						
90		Practical performance	Practical and Video Demonstration for performing echocardiography of congenital heart diseases (Coarctation of Aorta)		P4		Practical/Demo	2	OSPE/OSCE	2
91		SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			
TOPIC: PERICARDIAL DISEASES										
92	Week-16	Definition	Define pericardial diseases and classify them (e.g., pericardial effusion, pericarditis, constrictive pericarditis)	C1			Interactive Lecture/SGD	2	MCQs	05
93		Pericardial or pleural effusion	Explain Detection and Quantitation of Pericardial Fluid on echocardiography and Differentiation of Pericardial from Pleural Effusion	C2						

94	Echo windows/views	Explain Importance of Echo windows/views for diagnosing pericardial diseases	C2						
95	Echocardiographic evaluation	Describe 2D, M-mode and Doppler echo features of cardiac tamponade, constrictive pericarditis.	C3						
	constrictive pericarditis vs restrictive cardiomyopathy	Explain 2D, M-mode and Doppler echo features to differentiate between constrictive pericarditis and restrictive cardiomyopathy	C4						
96	Practical performance	Video Demonstration for performing echocardiography of pericardial diseases		P4		Demo	2	OSPE/OSCE	1
97	SOPs compliance	Adopt how to take care of Echo machine			A4	Role Play			

Recommended Books:

1. Echocardiography by Feigenbaum 7th edition
2. Echocardiography by Gabriel A 2nd edition
3. Clinical Echocardiography by Michael Y 2nd edition

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	MITRAL VALVE DISEASES	5	1	Static
2	AORTIC VALVE DISEASES	5	1	Static
3	PULMONARY VALVE DISEASES	4	1	Interactive
4	TRICUSPID VALVE DISEASES	3	1	Interactive
5	PROSTHETIC VALVES	4	1	Interactive
6	STRESS ECHO	5	1	Static
7	DILATED CARDIOMYOPATHIES (DCM)	5	1	Static
8	HYPERTROPHIC CARDIOMYOPATHY	4	1	Static
9	INFILTRATIVE AND RESTRICTIVE CARDIOMYOPATHY	3	1	Static
10	INTRODUCTION TO CONGENITAL HEART DISEASES	4	0	Static
11	CARDIAC SEPTATIONS ABNORMALITIES (ASD's)	5	1	Interactive
12	VENTRICULAR SEPTAL DEFECTS (VSD's)	5	1	Interactive
13	PATENT DUCTUS ARTERIOSUS (PDA)	5	1	Interactive
14	TETRALOGY OF FALLOT (TOF)	5	1	Static
15	DISEASES OF AORTA (COARCTATION OF AORTA)	3	1	Static
16	PERICARDIAL DISEASES	5	0	Static
Total	16	70	14	14

CAR-611 Diagnostic Equipment's in Cardiology 3 (2+1)

Course Description

This course provides students an in-depth understanding of diagnostic equipment used in cardiology. Students will explore the principles, indications, contraindications, and clinical applications of a wide range of diagnostic tools, including ECG machines, echocardiography machines, angiography systems, Ultrasound machine, Cardiac CT, Cardiac MRI, Cardiac X-Ray, Holter monitors, Electrophysiology Laboratory systems, Swan Ganz catheter, and Temporary pacemaker. The course emphasizes patient preparation, test protocols, interpretation of results, and the ability to troubleshoot technical issues. A practical component ensures hands-on experience with identifying, operating, and maintaining these devices, preparing students for real-world clinical settings.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Identify and describe the principles, functions, and clinical applications of cardiology diagnostic equipment.
2. Explain the indications, contraindications, and complications associated with specific diagnostic tests.
3. Analyze test protocols and procedures for various cardiology diagnostic tools.
4. Interpret test results accurately to assist in the diagnosis and management of cardiac conditions.
5. Predict potential complications of diagnostic procedures and recommend preventive measures.

Psychomotor Domain

By the end of this course, students should be able to

1. Demonstrate proper handling and operation of cardiology diagnostic equipment, such as ECG and echocardiography machines.
2. Identify and label the components of various diagnostic devices.
3. Perform basic troubleshooting to resolve technical faults in the equipment.
4. Calibrate diagnostic equipment to ensure accuracy and reliability.
5. Prepare patients appropriately for specific diagnostic procedures.

Affective Domain

By the end of this course, students should be able

1. Show responsibility and attention to detail when preparing patients for tests.
2. Exhibit professionalism and empathy during patient interactions.
3. Display a commitment to ethical practices when performing and interpreting diagnostic tests.
4. Maintain a collaborative attitude when working with healthcare teams in the cardiology setting.
5. Appreciate the importance of accuracy and safety in using diagnostic equipment.

TABLE OF SPECIFICATION

TOS - Diagnostic Equipment's in Cardiology 3 (2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: ECG Machine										
1	Week-1	Introduction	Define Electrocardiogram and Electrocardiography	C1			Interactive Lecture/S GD	2	MCQs	05
2		Types of ECG	Discuss ECG rest, stress ECG, and ambulatory ECG recording	C2						
3		Modes of ECG Machine	Explain Single, Three, Six and Twelve channel ECGs	C2						
4		Parts of ECG Machine	Identify and label components such as electrodes, leads, amplifier, filter, display screen, printer, control panel, and power supply	C2						
5		Working/Principle	Explain cardiac electrical activities from its generation, reception, and to the creation of ECG waves by ECG machine	C3						
6		Procedure	Explain procedure of obtaining an ECG (patient preparation, electrode placement, connections and recording)	C3						
7		Indications, contraindications, and complications	List indications, contraindications, and complications of electrocardiography	C2						
8		Uses of ECG	List uses of ECG as diagnostic tool, monitoring, screening and prevention	C2						
9		Practical performance	Perform proper patient preparation, electrode placement, recording, and interpretation of ECG		P4		Demo	2	OSPE	3
10		SOPs compliance	Ensure safe and effective use of ECG machines to acquire accurate diagnostic cardiac electrical waves			A4	Role Play			
TOPIC: ETT Machine										
11	Week-2	Introduction	Define Exercise Tolerance Test / Cardiac Stress Test	C1			Interactive Lecture/S GD	2	MCQs	04
12		Exercise Physiology, VO ₂ , METS, Rate-Pressure Product	Describe cardiovascular changes during exercise Explain total oxygen uptake, Metabolic equivalents, maximum oxygen uptake and Rate-Pressure Product	C2						
13		Equipment	Identify and label components such as Treadmill, electrodes, monitors, pulse oximeter, and stethoscope/sphygmomanometer	C2						
14		Technical Components	Explain Patient Assessment for Exercise Testing (Patient History and Physical Examination)	C3						
15		Modality and Protocols	Discuss Bruce and Modified Bruce Protocol for treadmill exercise testing	C3						

16		Indications, contraindications, and complications/ risks	Discuss indications, absolute and relative contraindications, and Complications of exercise testing	C2						
17		Indications for Terminating ETT	List absolute and relative indications for Terminating the Exercise Test	C2						
18		Patient Monitoring During Exercise Testing	Discuss patient monitoring during the exercise and recovery period	C2						
19		Practical performance	Perform proper patient preparation, electrode placement, resting, peak and recovery ECGs and their interpretations.		P4		Demo	2	OSPE	2
20		SOPs compliance	Ensure safe and effective use of ETT machine to acquire proper ECG records			A4	Role Play			
TOPIC: PULSE OXIMETRY										
21	Week-3	Introduction	Define Pulse Oximeter	C1		Interactive Lecture/S GD	2	MCQs	04	
22		Parts	Identify and label components such as probe body, light emitting diodes, receptors, battery, and screen display	C2						
23		Working/Principle	Explain oxygen saturation and Beer Lambert's Law	C3						
24		Red/Infrared light	Describe the role of red and infrared light	C3						
25		Reading sites	Discuss the reading site for accurate measurement	C2						
26		Indications and contraindications	Discuss the indications and contraindications of pulse oximetry	C2						
27		Advantages and Limitations	Discuss the benefits and list of limitations of pulse oximetry	C2						
28		Practical performance	Demonstrate the steps to operate a pulse oximeter safely and effectively		P4		Demo	2	OSPE	1
29		SOPs compliance	Ensure safe and correct application of pulse oximeter			A4	Role Play			
TOPIC: CARDIAC MONITORS										
30	Week-4	Definition	Define Cardiac monitor	C1		Interactive Lecture/S GD	2	MCQs/SEQs	05	
31		Parts/Components	Explain display monitors, Spo2 probe, NIBP cuff, Temp probe, ECG cable	C2						
32		Principle	Explain the principle used during cardiac monitoring	C1						
33		Parameter	Discuss parameters that are monitored like ECG Rhythm, Rate, CVP, BP, Spo2, CO and Temperature	C2						
34		Application	Discuss clinical applications of in the hospital setting	C2						
35		Complications	Identify complications such as skin allergies, electrode detachment, electric leakage, malfunction and others	C2						
36		Practical performance	Demonstrate patient preparation and the steps to operate a cardiac monitor safely and effectively		P4		Demo	2	OSPE	2
37		Practical performance	Ensure safe and correct application of cardiac monitor			A4	Role Play			

TOPIC: DEFIBRILLATOR

38	Week-5	Definition	Define Defibrillator	C1			Interactive Lecture/S GD	2	MCQs/SEQs	05
39		Principle	Describe the principle of delivering electrical shocks to restore normal heart rhythm	C2						
40		Types	Differentiate between types of defibrillators (manual, automated external defibrillators (AEDs), implantable, and wearable defibrillators)	C2						
41		Parts	Identify and label various components of a defibrillator, including paddles/pads, charging system, monitor, and control panel	C1						
42		Indications and Contraindications	List indications and contraindications for defibrillator use	C1						
43		Synchronized and Unsynchronized Shocks	Differentiate between synchronized and unsynchronized shocks, their indications, and mechanisms	C2						
44		Defibrillation and Cardioversion	Explain the difference between defibrillation and cardioversion used in different arrhythmias	C2						
45		Role in Emergencies	Explain the role of defibrillators in cardiac emergencies	C2						
46		Complications	Identify potential complications such as burns or arrhythmias caused by improper use.	C1						
47		Practical performance	Demonstrate the steps to operate a defibrillator safely and effectively		P4					
48	SOPs compliance	Ensure safe and correct use of defibrillator pads/paddles during cardiac emergencies			A4	Role Play				

TOPIC: ECHOCARDIOGRAPHY MACHINE

49	Week-6	Introduction	Define echocardiography	C1			Interactive Lecture/S GD	2	MCQs/SEQs	05				
50		Principle / Working	Explain the generation and reception of sound waves to create images of cardiac structures.	C2										
51		Types	Discuss types of echocardiography (e.g., transthoracic, transesophageal, stress echo, 3D echo)	C2										
52		Modes	Differentiate between B-mode (2D imaging), M-mode (motion assessment), and Doppler mode (flow analysis)	C2										
53		Parts	Identify key components of an echocardiography machine, including the probe, control panel, and monitor	C1										
54		Indications and contraindications	List indications and contraindications of echocardiography	C1										
55		Practical performance	Demonstrate proper probe handling and imaging techniques for transthoracic echocardiography		P4						Demo	2	OSPE	2
56		SOPs compliance	Ensure proper handling and positioning of the echocardiography probe to obtain clear and accurate images			A4					Role Play			

TOPIC: ULTRASOUND MACHINE

57	Week-7	Introduction	Define an ultrasound machine	C1			Interactive Lecture/S GD	2	MCQs/SEQs	05				
58		Applications	Describe its general applications in imaging	C2										
59		Principle	Explain the principle of high-frequency sound waves used for imaging	C2										
60		Types	Discuss types of ultrasound machines, including portable, Doppler, 3D/4D, and point-of-care ultrasound devices	C2										
61		Parts	Identify and label components such as the transducer/probe, monitor, control panel, and gel application	C1										
62		Working	Explain the working mechanism, including sound wave generation, probe movement, and image processing.	C2										
63		Modes	Describe imaging modes such as B-mode (brightness), M-mode (motion), and Doppler mode (blood flow analysis)	C2										
64		Indications & Contraindications	Classify the indications and contraindications for ultrasound use	C2										
65		Practical performance	Perform the basic steps to operate an ultrasound machine, including probe handling and image acquisition.		P4						Demo	2	OSPE	2
66	SOPs compliance	Ensure safe and effective use of ultrasound probes to acquire accurate diagnostic images			A4	Role Play								
TOPIC: CARDIAC CT														
67	Week-8	Definition	Define cardiac CT and describe its role in advanced imaging for coronary artery disease	C2			Interactive Lecture/S GD	2	MCQs/SEQs	05				
68		Principle	Explain the use of X-rays and computer algorithms to generate cross-sectional and 3D images of the heart	C2										
69		Techniques in Cardiac CT	Describe the different techniques (e.g., coronary CT angiography, calcium scoring) and their clinical uses	C2										
70		Parts	Identify the major components, including the CT scanner, gantry, patient table, contrast injector, and workstation.	C1										
71		Techniques	Explain techniques such as ECG gating, contrast enhancement, and image post-processing.	C2										
72		Indications and Contraindications	Classify indications requiring cardiac CT (e.g., coronary artery stenosis, congenital anomalies) and contraindications (e.g., pregnancy, contrast allergies)	C2										
73		Advantages and Limitations	Discuss the benefits (e.g., non-invasive, detailed imaging) and limitations (e.g., radiation exposure, high cost) of cardiac CT	C2										
74		Practical performance	Demonstrate patient preparation (e.g., use of contrast agents, managing heart rate), scanning protocols, and image acquisition.		P4						Demo	2	OSPE	2
75		SOPs compliance	Ensure safe and effective use of contrast agents for cardiac CT imaging			A4					Role Play			
TOPIC: CARDIAC MRI														
76	Week-9	Introduction	Explain the principles and significance of Cardiac MRI in diagnosis	C2			Interactive	2	MCQs/SEQs	05				

77		Physics of MRI and Imaging Techniques	Understand the physics behind MRI technology and its cardiac applications	C2			Lecture/S GD			
78		Image Interpretation and Analysis	Interpret and analyze images from Cardiac MRI scans for diagnostic purposes	C3						
79		Advanced Techniques and Future of Cardiac MRI	Discuss future advancements in Cardiac MRI technology	C3						
80		Practical performance	Demonstrate the ability to use Cardiac MRI in clinical scenarios		P4		Demo	2	OSPE	1
81		SOPs compliance	Comply SOPs			A4	Role Play			
TOPIC: CARDIAC X-RAY										
82	Week-10	Introduction	Define cardiac X-ray and explain it in diagnosing heart diseases	C2			Interactiv e Lecture/S GD	2	MCQs/SEQs	04
83		Interpretation	Describe the key findings and interpretation of cardiac X-ray images	C2						
84		Analysis	Analyze common abnormalities seen in cardiac X-rays (e.g., cardiomegaly, pulmonary edema)	C2						
85		Practical performance	Demonstrate the steps of interpretation of cardiac X-ray		P4		Demo	2	OSPE	1
86		SOPs compliance	Ensure safe and effective methods for the safety of X-rays			A4	Role Play			
TOPIC: ANGIOGRAPHY MACHINE										
87	Week-11	Introduction	Define angiography and describe its significance in diagnosing coronary artery diseases	C2			Interactiv e Lecture/S GD	2	MCQs/SEQs	04
88		Equipment	Explain the components of the angiography machine, including X-ray tube, image intensifier, patient table, catheterization system, and contrast injector	C2						
89		Principle and Working Mechanism	Explain the principle of fluoroscopy and the role of contrast agents in visualizing blood vessels during angiography	C2						
90		Procedure	Describe the technique and steps involved in performing cardiac angiography	C2						
91		Interpretation	Interpret angiographic images to detect abnormalities such as blockages, stenosis, or aneurysms	C3						
92		Practical performance	Demonstrate patient positioning, and preparation techniques for cardiac angiography		P4		Demo	2	OSPE	
93		SOPs compliance	Discuss the risks, benefits, and precautions in cardiac angiography			A4	Role Play			
TOPIC: HOLTER MONITORS										
94	Week-12	Introduction	Define Holter monitoring and explain its role in assessing heart rhythm disorders	C2			Interactiv e Lecture/S GD	2	MCQs/SEQs	04
95		Procedure	Describe the procedure for setting up and using a Holter monitor	C2						
96		Indications and Contraindications	Discuss the indications for using a Holter monitor and its limitations	C1						

97		Analysis and interpretation	Analyze the data collected by the Holter monitor to assess abnormal heart rhythms	C2						
98		Practical performance	Perform proper patient preparation, electrode placement, and data recording with a Holter monitor		P4		Demo	2	OSPE	2
99		SOPs compliance	Ensure proper placement of the Holter monitor and its safety			A4	Role Play			
TOPIC: EQUIPMENT USED IN ELECTROPHYSIOLOGY LABORATORY										
100	Week-13 and Week-14	Introduction	List all equipment used in the electrophysiology lab (e.g. Imaging and Fluoroscopy Equipment, Electrophysiology Recording and Monitoring Systems, Energy Delivery Systems, Cardiac Pacing Systems)	C1			Interactive Lecture/S GD	2	MCQs/SEQs	07
101		Guidewires and introducers, Steerable and fixed sheaths	Identify various guidewires and introducers/ sheaths for EP study and device implantation	C2						
102		Diagnostic EP catheters	Identify electrophysiology catheters and its uses	C3						
103		Ablation catheters	Identify ablations catheters and equipment	C3						
104		Practical performance	Procedure performance of EP study and cardiac device implantation		P4		Demo	2	OSPE/OSCE	2
105		SOPs compliance	Highlight SOPs for impedance checks, power monitoring, and real-time documentation of ablation parameters to ensure procedural safety and efficacy and catheters identification			A4	Role Play			
TOPIC: SWAN GANZ CATHETER										
106	Week-15	Introduction	Define a Swan-Ganz catheter and list its components	C2			Interactive Lecture/S GD	2	MCQs/SEQs	04
107		Indications	List indications for the use of a Swan-Ganz catheter	C2						
108		Procedure for Insertion	Explain procedure and understand its purpose and role in monitoring hemodynamic parameters.	C2						
110		Working	Explain the process of measuring cardiac output using a Swan-Ganz catheter	C3						
111		Complications and Management	Explain evaluating complications, and troubleshooting issues	C3						
112		Practical performance	Procedure performance for a Swan-Ganz catheter		P4		Demo	2	OSPE	
113		SOPs compliance	Ensure proper maintenance and care of Swan-Ganz Catheter use			A4	Role Play			
TOPIC: TEMPORARY PACEMAKER										
114	Week-16	Introduction	Define temporary pacemakers	C1			Interactive Lecture/S GD	2	MCQs/SEQs	04
115		Types	Explain types of temporary pacemakers	C2						
116		Components	Describe components and design of a temporary pacemaker	C2						
117		Indications and contraindications	Explain indications and contraindications for use of a temporary pacemaker	C3						
118		Procedure	Describe insertion sites and procedure of TPM insertion	C3						

119		Practical performance	Demonstrate procedure of insertion and maintenance of temporary pacemakers		P4		Demo	2	OSPE	2
120		SOPs compliance	Comply SOPs for Temporary Pacemaker usage and maintenance and Care of Pacemakers			A4	Role Play			

Recommended Books:

1. Various books provide descriptions of the equipment and procedural protocols.

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	ECG Machine	5	1	Static
2	ETT Machine	4	1	Static and Interactive
3	Pulse Oximetry	4	1	Interactive
4	Cardiac Monitors	5	1	Static
5	Defibrillator	5	1	Interactive
6	Echocardiography Machine	5	1	Interactive
7	Ultrasound Machine	5	1	Interactive
8	Cardiac CT	5	1	Static
9	Cardiac MRI	5	1	Static
10	Cardiac X-Ray	4	1	Static
11	Angiography Machine	4	1	Interactive
12	Holter Monitors	4	1	Static
13	Equipment used in Electrophysiology Laboratory	4	1	Static
14	Equipment used in Electrophysiology Laboratory	3	0	Static
15	Swan Ganz Catheter	4	0	Static
16	Temporary Pacemaker	4	1	Interactive
Total	16	70	14	14

CAR-618 Cardiac Surgery 3 (2+1)

Course Description

The Cardiac Surgery course for Cardiology Technology students provides essential knowledge and skills related to surgical interventions for heart diseases. Topics include surgical approaches to the heart and great vessels, preparation for cardiopulmonary bypass, heart valve surgeries, coronary artery disease treatments, and congenital heart defect repairs. Through lectures, practical demonstrations, and simulations, students will learn key surgical techniques, patient care, and sterile practices, preparing them for roles in assisting cardiac surgeries and contributing to patient management in a clinical setting.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to.

1. Explain the surgical approaches to the heart and great vessels
2. Describe the steps involved in preparing for cardiopulmonary bypass
3. Identify different types of heart valve diseases
4. Analyze the surgical techniques used in coronary artery disease management
5. Discuss the treatment strategies for congenital heart defects
6. Explain the pathophysiology of cardiac tumors and their surgical management

Psychomotor Domain

By the end of this course, students should be able to.

1. Perform basic cardiac examination techniques
2. Practicing the steps of coronary artery bypass using simulation technology (e.g., suturing techniques, graft placement).
3. Demonstrating skills in valve repair and replacement procedures, both through simulation and cadaver dissection
4. Developing the skills required to suture delicate cardiac tissues, ensuring minimal damage and optimal outcomes
5. Preparing for procedures like ASD closure or PDA ligation, practicing incision, suturing, and closure techniques

Affective Domain

By the end of this course, students should be able to

1. Exhibit professionalism in the operating room
2. Show empathy and compassion towards patients undergoing heart surgery
3. Ensuring strict compliance with safety guidelines, such as infection control measures, during cardiac surgeries.
4. Maintaining a positive attitude towards learning, staying updated on advances in cardiac surgery, and seeking feedback for self-improvement.
5. Understanding the importance of informed consent and involving patients in the decision-making process regarding their surgical treatment.

TABLE OF SPECIFICATION

TOS - CARDIAC SURGERY 3 (2+1)

S. No	Weeks	Contents	Learning Outcome	Domain			MIT's	Time/Hours	Assessment	No of Items	
				C	P	A					
TOPIC: SURGICAL ANATOMY OF THE HEART											
1	Week-1	Introduction	Introduction to surgical anatomy and location of heart with chambers, valves, and vessels.	C1			Interactive Lecture/SGD	2	MCQs	3	
2		Relation with Surrounding Structures	Explain the spatial relationships between the heart and surrounding thoracic organs to understand their surgical significance.	C2							
3		Pericardium and Its Reflections	Define Pericardium and Its Reflections	C1							
4		Mediastinal Nerves and Their Relation to the Heart	Identify key mediastinal nerves (phrenic, vagus, and sympathetic trunk). Describe their course and relation to the heart.	C3							
5		Practical performance	Demonstrate appropriate scrubbing techniques for surgical procedures.			P4		Demo	2	OSPE/OSCE	
6		SOPs compliance	Comply Standard operating procedures for scrubbing and sterile techniques.			A4	Role Play				
TOPIC: SURGICAL APPROACHES TO THE HEART AND GREAT VESSELS											
7	Week-2	Definition	Define the key anatomical landmarks involved in surgical approaches to the heart and great vessels.	C1			Interactive Lecture/SGD	2	MCQs	5	
8		Classification	Explain various approaches (Median Sternotomy, Thoracotomy, Anterolateral thoracotomy, Posterolateral thoracotomy, Bilateral Transverse, Thoracosternotomy (Clamshell Incision). Alternative Surgical Approaches, Full Sternotomy through Sub mammary Incision, Full Sternotomy through a Limited Midline Incision, Lower Ministernotomy, Upper Ministernotomy, Sub mammary Right Thoracotomy).	C3							
9		Techniques	Discuss techniques used in each approach	C3							
10		Complications its management and closure	Describe complications occurred in different surgical approach, its management and closure of each approach.	C2							
11		Practical performance	Use anatomical models or mannequins to practice identifying key landmarks for surgical access (e.g., sternal angle, midline incision, and pericardium).			P4		Demo	2	OSPE	2

			Practice making incisions on synthetic skin models or through cadaveric tissue to access major thoracic structures.							
12		SOPs compliance	Adopt the correct procedures for maintaining models and charts for compliance.			A 4	Role Play			
TOPIC: COMPONENTS OF CARDIOPULMONARY BYPASS CIRCUIT										
11	Week-3	Introduction	introduction to Cardiopulmonary bypass	C1			Interactive Lecture/SGD	2	MCQs	7
12		components	Enlist the required equipment and instruments for cardiopulmonary bypass (HLM, Hypothermia, oxygenator with integrated parts, Tubing and different cannulas)	C2						
13		Function	Describe the primary components of the cardiopulmonary bypass circuit and explain the function of each component within the cardiopulmonary bypass circuit	C2						
14		Practical performance	Identification of various components used in CPB		P4		Demo	2	OSPE	2
15				SOP Compliance	Adopt how to take care of CPB Components					
TOPIC: PREPARATION FOR CARDIOPULMONARY BYPASS										
17	Week-4	Definition	define myocardial protection and patient heparinization	C1			Interactive Lecture/SGD	2	MCQs/SEQs	5
18		exposure of the heart	discuss techniques used for exposure of heart	C2						
19		dissection	Describe techniques used for Dissection around the Aorta, vana cavae and femoral artery.	C3						
		Cannulation, complications and its management	Describe techniques used for arterial, venous cannulation, complications and its management	C3						
20		practical performance	Demonstrate Pre-Op requirements of a particular procedure					2	OSPE	2
21				SOP Compliance	Adopt how to take care of patient charts					
TOPIC: SURGERY OF AORTIC VALVE										
22	Week-5	Surgical Anatomy	Introduction Surgical anatomy of the heart valves especially aortic valve	C1			Interactive Lecture/SGD	2	MCQs/SEQs	3
23		Aortic valve repair and replacement	Discuss conditions/indications for aortic valve repair and replacement	C2						
24		Cannulation and	Discuss cannulation techniques and myocardial	C3						

		Myocardial protection	protection method							
25		Approaches to aortic valve and its exposure	Describe approaches to aortic valve and its exposure	C3						
26		Excision of aortic valve and prosthesis sizing	Describe excision and sizing of prosthesis	C3						
27		practical performance	Demonstration Cardiopulmonary Bypass set up till bypass initiation.		P4	A4	Demo	2	OSPE/OSCE	
		SOP Compliance	Adopt how to take care of CPB Components				Role Play			
TOPIC: SURGERY OF AORTIC VALVE										
28	Week-6	prosthetic valve and its types	Discuss prosthetic valve and its types	C2			Interactive Lecture/SGD	2	MCQs/SEQs	3
29		techniques for suturing aortic prosthetic valve	Explain techniques for suturing aortic prosthetic valve	C3						
30		Seating of the prosthetic valve	Discuss proper seating of the prosthetic valve	C3						
31		complications and its management	discuss complications and its management during aortic valve repair and replacement	C3						
		closure of the approaches	describe proper closure of the approaches	C4						
32		Practical performance	Demonstration of prosthetic valve Aortic valve		P4		Demo	2	OSPE/OSCE	2
33		SOPs compliance	Adopt how to take care of prosthetic valves			A4	Role Play			
TOPIC: SURGERY OF MITRAL VALVE										
34	Week-7	Surgical Anatomy	Introduction Surgical anatomy of the heart valves especially Mitral valve	C1			Interactive Lecture/SGD	2	MCQs/SEQs	3
35		Mitral valve repair and replacement	Discuss conditions/indications for Mitral valve repair and replacement	C2						
36		Cannulation and Myocardial protection	Discuss cannulation techniques and myocardial protection method	C3						
37		Approaches to	Describe approaches to Mitral valve and its exposure	C3						

		Mitral valve and its exposure								
38		Excision of Mitral valve and prosthesis sizing	Describe excision and sizing of prosthesis	C3						
39		prosthetic valve and its types	Discuss prosthetic valve and its types							
40		Practical performance	Demonstration of prosthetic valve (mechanical and Biological) Mitral Valve		P4			2	1	
41		SOPs compliance	Adopt how to take care of prosthetic valves			A4				
TOPIC: SURGERY OF MITRAL VALVE										
42	Week-8	Seating of the prosthetic valve	Discuss proper seating of the prosthetic valve	C3			Interactive Lecture/SGD	2	MCQs/SEQs	3
43		complications and its management	Discuss complications and its management during Mitral valve repair and replacement	C3						
44		closure of the approaches	Describe proper closure of the approaches	C4						
45		procedure for mitral stenosis	Describe procedures with techniques (open Commissurotomy, Close Commissurotomy)							
46		Practical performance	Demonstration of real or simulated MVR procedures		P4		Demo/Video/simulation	2	OSPE/OSCE	1
47		SOPs compliance	Comply SOPs for MVR			A4	Role Play			
TOPIC: SURGERY FOR CORONARY DISEASE										
48	Week-9	introduction	Introduction to Surgery for coronary disease	C1			Interactive Lecture/SGD	2	MCQs/SEQs	8
49		Indication for CABG and its types	discuss indications for CABG and its types	C2						
		Internal thoracic artery harvesting	Discuss harvesting Internal thoracic artery harvesting (RIMA and LIMA)							
50		Arterial and venous conduits	Discuss various conduits arterial, venous its harvesting	C2						
		GSV, radial artery and harvesting	Discuss harvesting (open and endoscopic) of arterial and venous conduits along with complications and its management	C3						
51		General Principles of Arteriotomy, proximal and distal	Explain General Principles of Arteriotomy, General Principles of Arteriotomy, proximal and distal anastomosis of graft	C3						

		anastomosis								
52		complication and its management	Discuss complications and its management during CABG	C3						
53		Trans myocardial revascularization	Discuss Trans myocardial revascularization	C2						
54		Practical performance	Perform Identification of LIMA, RIMA and GSV in CABG		P4			2	OSPE/OSCE	3
55		SOPs compliance	Comply SOPs for CABG Surgery			A 4	Role Play			
TOPIC: SURGERY OF ATRIAL SEPTAL DEFECT (ACQUIRED AND CONGENITAL)										
56	Week-10	Introduction And types	introduction to ASD and its types	C1			Interactive Lecture/SGD	2	MCQs/SEQs	5
57		Approaches to ASD and cannulation	discuss approaches used to expose ASD and cannulation for CPB	C2						
58		Myocardial protection and temperature	discuss myocardial protection methods and temperature required in this procedure	C2						
59		Techniques	Describe techniques used for closing of each type of ASD	C3						
60		Practical performance	Identification of various types of ASD using charts or videos		P4		Demo	2	OSPE/OSCE	1
61		SOPs compliance	Adopt how to take care of models and charts			A 4	Role Play			
TOPIC: SURGERY OF CARDIAC TUMORS										
62	Week-11	Introduction	Introduction to cardiac tumors	C1			Interactive Lecture/SGD	2	MCQs/SEQs	3
63		Types of cardiac tumors	Discuss types of the cardiac tumors (Benign and malignant) and its further types	C2						
64		Techniques for surgery	Describe techniques for cardiac tumor surgery; approach to hear, arterial, venous cannulation, myocardial protection and exposure of heart chambers	C3						
65		Complications	Explain complications and its management arise during this procedure	C3						
TOPIC: SURGERY OF PATENT DUCTUS ARTERIOSUS										
66	Week-12	Introduction	Introduction to surgical procedure for PDA ligation or closure.	C1			Interactive Lecture/SGD	2	MCQs/SEQs	4
67										

		Surgical anatomy and types of PDA	discuss surgical anatomy and Types of PDA							
68		Patent ductus arteriosus ligation	Explain step wise surgical and device closure of PDA.	C2						
69		Techniques	Discuss techniques for surgical and device closure of PDA.	C1						
70		Complications and its management	Discuss complications and its management during PDA ligation	C2						
71		Practical performance	Demonstrate PDA ligation on a practice tube.		P4		2	OSPE/OSCE	1	
		SOPs compliance	Comply SOPs for PDA ligation			A 4				
TOPIC: SURGERY OF COARCTATION OF THE AORTA										
72	Week-13	Introduction	Introduction to surgical procedure for Coarctation of the aorta	C1			Interactive Lecture/SGD	2	MCQs/SEQs	5
73		Surgical anatomy and types of Coarctation of the aorta	Discuss surgical anatomy and Types of Coarctation of the aorta	C2						
73		Techniques	Discuss techniques for Cortectomy	C2						
74		Different procedures	Explain different procedures for Coarctation of aorta	C3						
75		Complications and its management	discuss different complications and its management during Coarctation of aorta	C4						
76		Practical performance	Demonstrate Various techniques for Surgery of Coarctation of the aorta		P4		Demo/video	2	OSPE/OSCE	2
77		SOPs compliance	Comply SOPs for Surgery of Coarctation of the aorta			A 4				
TOPIC: TRANSPOSITION OF GREAT VESSEL										
78	Week-14	Introduction	Introduction to TGA	C1			Interactive Lecture/SGD	2	MCQs/SEQs	4
79		surgical anatomy a	discuss surgical anatomy of TGA	C2						
80		Arterial Switch operation	Discuss Arterial Switch operation	C2						
81		senning and mustard procedure	Explain senning and mustard procedure for TGA	C3						
82		complication and its management	describe the complications and its management during this procedure	C3						

83		Practical performance	Demonstrate Techniques for Transposition of great vessel		P4		Demo/video	2	OSPE/OSCE	1
84		SOPs compliance	Comply SOPs for Surgery of Coarctation of the aorta			A4				
TOPIC: NORWOOD AND FONTAN PROCEDURE										
85	Week-15	Introduction	Introduction to HLHS (Hypo plastic left heart syndrome)	C1			Interactive Lecture/SGD	2	MCQs/SEQs	4
86		Norwood and Fontan procedures	Explain the congenital heart defects that necessitate Norwood and Fontan procedures, including hypo plastic left heart syndrome	C2						
87		Techniques	Describe complete techniques for Norwood and Fontan procedures	C3						
88		Damus Kaye Stansel Procedure	Discuss Damus Kaye Stansel Procedure	C3						
89		complications and its management	discuss different complications and its management occurred in this procedure	C3						
90		Practical performance	Demonstrate Identification of Hypo plastic Left Heart syndrome through models, charts and video		P4		Demo/video	2	OSPE/OSCE	2
	SOPs compliance	Adopt how to take care of Charts and models			A4					
TOPIC: DRUGS USED IN CARDIAC SURGERY.										
91	Week-16	Introduction	Introduction to Drugs used during cardiac procedures	C1			Interactive Lecture/SGD	2	MCQs/SEQs	5
92		Drugs used in cardiac surgery	Enlist common drugs used in cardiac surgery (anticoagulants, anesthetic, antiarrhythmic, inotropic drugs, buffering agents and electrolytes).	C2						
93		pharmacokinetics and pharmacodynamics	discuss pharmacokinetics and pharmacodynamics of each class of drug	C3						

Recommended Books:

1. Cardiac Surgery by Siavosh Khonsari. Lippincott 4th edition
2. Cardiac Surgery by Kerlin 4th edition
3. Cardiothoracic Surgery by Michael S 2nd edition

ASSESSMENT BREAKDOWN

S. No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Surgical anatomy of the heart	3	1	Interactive
2	Surgical Approaches to the Heart and Great Vessels	5	1	Static and Interactive
3	components of cardiopulmonary bypass circuit	7	1	Interactive
4	Preparation for cardiopulmonary bypass	5	1	Static and Interactive
5	Surgery of Aortic valve	3	1	Static
6	Surgery of Aortic valve	3	1	Static
7	Surgery of Mitral valve	3	1	Static and Interactive
8	Surgery of Mitral valve	3	1	Static
9	Surgery for coronary disease	8	1	Static and Interactive
10	Surgery of Atrial septal defect (acquired and congenital)	5	1	Interactive
11	Surgery of Cardiac Tumors	3	0	
12	Surgery of Patent ductus arteriosus	4	1	Static and Interactive
13	Surgery of Coarctation of the aorta	5	1	Static and Interactive
14	Transposition of great vessel	4	1	Static
15	Norwood and Fontan Procedure	4	1	Static
16	Drugs used in cardiac surgery.	5	0	
Total	16	70	14	14

CP-607 Perfusion Technology - II 3 (2+1)

Course Description:

This course provides an in-depth exploration of the principles and practices involved in cardiopulmonary bypass (CPB) and related technologies in the context of cardiac surgery. It covers essential topics such as blood gases, inflammation, organ damage, and renal morbidity during CPB, as well as specialized cases including minimally invasive techniques and the use of intra-aortic balloon pumps. Emphasis is placed on human factors, teamwork, and leadership in surgical settings, with practical applications to enhance patient safety and outcomes. Through theoretical instruction and hands-on training, students will develop a comprehensive understanding of the perfusion field, preparing them for advanced clinical practice.

Learning Objectives

Cognitive Domain

By the end of this course, students should be able to

1. Explain the principles of blood gas analysis, the oxygen dissociation curve, and the management of acidosis and alkalosis.
2. Describe the systemic inflammatory response to CPB and strategies for mitigating associated organ dysfunctions.
3. Identify the risk factors, pathophysiology, and prevention strategies for acute kidney injury in CPB.
4. Discuss the techniques and challenges involved in CPB for aortic surgeries, transplantations, and other complex cases.
5. Classify MiECC systems, explain their benefits, and outline the training pathway for their effective use.
6. Describe the indications, contraindications, insertion techniques, and management of intra-aortic balloon pumps.
7. Explain the role of human factors, teamwork, and leadership in reducing errors and improving outcomes in cardiac surgery.

Psychomotor Domain

By the end of this course, students should be able to

1. Perform fundamental perfusion techniques, including CPB setup, blood gas monitoring, and the management of perfusion equipment. Participate in simulations to enhance skills in emergency response, team collaboration, and the implementation of standardized protocols.
2. Engage in practical exercises to develop proficiency in using specialized equipment such as MiECC systems and IABP.

Affective Domain

By the end of this course, students should be able to

1. Demonstrate a commitment to patient safety and the continuous improvement of perfusion practices.
2. Value the importance of effective teamwork and communication in surgical settings.
3. Show empathy towards patients undergoing complex cardiac procedures and a dedication to delivering high-quality care.

TABLE OF SPECIFICATION

TOS-CP-607-Perfusion Technology-II-3(2+1)

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/ Hours	Assessment	No of Items
				C	P	A				
TOPIC: BLOOD GASES										
1	Week-1	Hemoglobin Oxygen Effect	Explain the hemoglobin-oxygen effect and the Bohr/Haldane effect.	C2			Interactive Lecture /SGD/TBL	2	MCQ's	10
2		Hemoglobin Oxygen dissociation curve	Describe the shape and significance of the hemoglobin-oxygen dissociation curve.	C1						
3		Oxygen Calculation	State the formulas for calculating arterial oxygen content (CaO ₂).	C1						
4		Carbon Dioxide	Explain the role of CO ₂ in acid-base balance.	C2						
5		pH	Define pH and describe the bicarbonate buffer system.	C1						
6		Buffer Systems	Explain how the body maintains pH balance through buffer systems.	C2						
7		Acidosis Alkalosis	Differentiate between metabolic and respiratory acidosis/alkalosis.	C1						
8		Shunting	Explain shunting, its types and the physiological implications of shunting on oxygenation.	C2						
9	Week-1	Practical	Accurately perform arterial blood gas (ABG) sampling and analysis to assess oxygenation status, pH balance, and buffer system effectiveness in real-time clinical scenarios		P4		Demo/ Clinicals	2	OSCE/ OSPE	2
10			Value the importance of precise ABG analysis and its role in ensuring accurate diagnosis and effective patient management.			A1				
11	Week-2	Alpha and pH Stat	Explain alpha stat and pH stat blood gas management strategies.	C2			Interactive Lecture /SGD/TBL	2	MCQ's	10
12		Normal ABG Values	Memorize normal ranges for pH, PaO ₂ , PaCO ₂ , HCO ₃ ⁻ , and SaO ₂ .	C1						
13		ABG Interpretation	Interpret ABG results to determine the type and cause of acid-base imbalances	C2						
14		Corrective actions	Identify corrective actions for various acid-base imbalances.	C1						
15	Week-2	Practical	Perform accurate blood gas sampling and analysis, applying both alpha stat and pH stat management strategies to		P4		Demo/		OSCE/OSPE	

			optimize patient outcomes during cardiopulmonary bypass.				Clinicals	2		1
16			Value the role of personalized blood gas management strategies (alpha stat and pH stat) in optimizing patient care, showing a willingness to adapt techniques to individual patient needs.			A2	Roleplay			
TOPIC: INFLAMMATION AND ORGAN DAMAGE DURING CARDIOPULMONARY BYPASS										
17	Week-3	Systemic Inflammatory Response	Explain the mechanisms by which CPB triggers systemic inflammation and subsequent organ damage.	C3			Interactive Lecture /SGD/TBL	2	MCQ's	10
18		Gastrointestinal Dysfunction Pulmonary Dysfunction Myocardial Dysfunction	Describe the pathophysiology of organ dysfunctions during CPB.	C2						
19		Therapeutic Strategies	Identify various therapeutic strategies aimed at attenuating the systemic inflammatory response during CPB.	C4						
20	Week-4	Practical	Develop proficiency in using pharmacological and non-pharmacological strategies to manage inflammation during CPB.		P4		Demo/ Clinicals	2	OSCE/OSPE	1
21			Recognize the importance of mitigating the systemic inflammatory response to improve patient outcomes during and after CPB.			A1				
TOPIC: RENAL MORBIDITY ASSOCIATED WITH CARDIOPULMONARY BYPASS										
22	Week-5	Definition	Define acute kidney injury (AKI).	C1			Interactive Lecture /SGD/TBL	2	MCQ's	5
23		Epidemiology	Describe its epidemiology in the context of cardiopulmonary bypass.	C2						
24		Pathophysiology	Explain the pathophysiological mechanisms leading to AKI during CPB.	C2						
25		Risk factors	Identify the major risk factors contributing to AKI in patients undergoing CPB.	C3						
26		Prevention	Discuss both pharmacological and non-pharmacological interventions for preventing AKI in the CPB setting (Hemoconcentrator, Mannitol, Frusemide).	C4						
27		Practical	Apply knowledge of epidemiology and pathophysiological mechanisms to identify early indicators of AKI during CPB, ensuring timely intervention to mitigate renal damage.		P4		Demo/ Clinicals	2	OSCE/OSPE	1
28	Recognize the significance of early identification and prevention of AKI in improving patient outcomes after CPB.				A1	Roleplay				
TOPIC: SPECIAL CASES OF CARDIOPULMONARY BYPASS										

29	Week-6	Deep Hypothermic Circulatory Arrest (DHCA)	Define deep hypothermic circulatory arrest (DHCA).	C1			Interactive Lecture /SGD/TBL	2	MCQ's	10
30		Aortic Surgeries with Deep Hypothermic Circulatory Arrest	Explain the application and risks associated with DHCA in aortic surgeries.	C2						
31		Thoracic Surgeries	Describe the role of CPB in thoracic surgeries.	C1						
32		Pulmonary Transplantation	Explain the use of CPB in pulmonary transplantation.	C2						
33		Heart Transplantation	Explain the use of CPB in Heart transplantation.	C1						
34		Liver Transplantation	Describe the role of CPB in liver transplantation.	C1						
35		Accidental Hypothermia	Explain the role of CPB in rewarming patients with accidental hypothermia.	C2						
36	Week-7	Practical	Demonstrate the ability to set up, manage, and monitor cardiopulmonary bypass (CPB) during various surgeries, such as aortic surgeries, transplants, and hypothermia cases.		P4		Demo/ Clinicals	2	OSCE/OSPE	1
			Show a commitment to patient safety and well-being during the use of cardiopulmonary bypass (CPB) in various surgeries			A4				
37	Week-8	Cold Agglutination	Explain the pathophysiology of cold agglutination and its implications during CPB.	C1			Interactive Lecture /SGD/TBL	2	MCQ's	
			Discuss strategies to manage CPB in patients with cold agglutination.	C2						
38		Sickle Cell Anemia	Discuss strategies to manage CPB in patients with Sickle Cell Anemia.	C2						
39		Pulmonary Embolism	Describe the pathophysiology of pulmonary embolism and the role of CPB in its management.	C1						
40		Pregnancy	Discuss the unique considerations for CPB in pregnant patients.	C1						
41		Jehovah Witness Patients	Understand the ethical and clinical challenges in managing CPB for Jehovah Witness patients.	C2						
42	Neurosurgeries	Explain the role of CPB in neurosurgical procedures requiring circulatory support.	C1							

43		Practical	Demonstrate the ability to manage cardiopulmonary bypass (CPB) effectively in a variety of complex patient scenarios.		P4		Demo/ Clinicals/ Video Simulation	2	OSCE/OSPE	1
44			Demonstrate a commitment to understanding and addressing the unique physiological and psychological needs of patients undergoing specialized CPB procedures.			A1	Roleplay			
TOPIC: ISOLATED LIMB PERFUSION										
45	Week-9	Isolated Limb Perfusion	Define isolated limb perfusion (ILP) and explain its therapeutic applications.	C1			Interactive Lecture /SGD/TBL	2	MCQ's	5
46		Circuits	Describe the components and function of the perfusion circuit used in ILP.	C2						
47		Priming	Explain the process of circuit priming and the importance of maintaining sterility.	C3						
48		Conduct	Identify the steps involved in conducting ILP, including drug administration and monitoring.	C4						
49		Leak detection Removal of drug	Discuss techniques for detecting leaks during ILP and strategies for effective drug removal.	C5						
50		Wean off	Explain the weaning process from ILP and the measures taken to ensure patient safety.	C6						
51		Practical	Perform isolated limb perfusion (ILP) setup, drug administration, monitoring, and weaning, ensuring safety and effectiveness.		P4					
52			Demonstrate a commitment to patient safety and precision during the preparation and conduct of ILP.			A1	Roleplay			
TOPIC: ACCIDENTS AND DISASTERS										
53	Week-10	Massive Air Embolism	Identify the causes of air embolism in CPB and the immediate steps required for management.	C2			Interactive Lecture /SGD/TBL	2	MCQ's	5
54		Water to Blood Leak	Explain the physiological impact of water contamination in the bloodstream and the corrective measures to take.	C2						
55		Oxygenator Failure	Define oxygenator failure and list the signs and symptoms that indicate oxygenator malfunction during CPB.	C1						
56		Oxygenator Changeout	Explain the indications for an oxygenator changeout during CPB and the process involved.	C1						
57		Practical	Demonstrate the ability to identify and manage complications during CPB.		P4		Demo/ Clinicals	2	OSCE/OSPE	2

58			Demonstrate a strong commitment to patient safety and well-being by effectively managing complications during cardiopulmonary bypass (CPB).			A4	Roleplay			
59	Week-11	Power Cutt Off	Describe backup systems and protocols designed to manage power failures in the operating room	C2			Interactive Lecture /SGD/TBL	2	MCQ's	
60		Oxygen Supply Cutt off	Detail the emergency procedures for restoring oxygen supply or providing alternative oxygenation methods.	C2						
61		Methemoglobinemia	Discuss the clinical signs, diagnosis, and treatment options for methemoglobinemia during CPB.	C2						
62		Malignant Hyperthermia	Describe the signs of malignant hyperthermia and the immediate treatment protocol, including the use of dantrolene.	C2						
63		Practical	Effectively manage emergencies during cardiopulmonary bypass and implement backup systems, emergency procedures, and appropriate treatments to ensure patient safety.		P4		Demo/ Clinicals/ Video Stimulation	2	OSCE/OSPE	
64	Demonstrate a calm, patient-centered approach and effective teamwork when managing emergencies during cardiopulmonary bypass (CPB), ensuring clear communication and prompt action to maintain patient safety and well-being.				A4	Roleplay				
TOPIC: CARDIOPULMONARY BYPASS FOR MINIMAL INVASIVE CARDIAC SURGERY										
65	Week-12	Minimal Invasive Cardiac Surgery (MICS)	Define minimally invasive cardiac surgery (MICS) and explain how CPB is adapted for these procedures.	C1			Interactive Lecture /SGD/TBL	2	MCQ's	5
66		Canulation Strategies	Describe various cannulation strategies used in MICS and their advantages over traditional approaches.	C2						
67		Myocardial Protection Strategies	Explain myocardial protection strategies, including the use of cardioplegia, in the context of MICS.	C3						
68		Perfusion Management & Monitoring	Discuss the principles of perfusion management and monitoring tailored to MICS to ensure optimal patient outcomes.	C4						
69		Patient selection	Identify the criteria for patient selection for MICS, considering anatomical and clinical factors.	C5						
70		Practical	Demonstrate proficiency in setting up and managing CPB circuits optimized for MICS, ensuring precision in cannulation and myocardial protection.		P1		Demo/ Clinicals/ Video Stimulation	2	OSCE/OSPE	1
71	Value the benefits of minimally invasive approaches for patient recovery and outcomes, and demonstrate a commitment to refining techniques to enhance these benefits.				A1	Roleplay				

TOPIC: MINIMAL INVASIVE EXTRACORPOREAL CIRCULATION (MIECC)										
72	Week-13	Minimal Invasive Extracorporeal Circulation (MiECC)	Define Minimally Invasive Extracorporeal Circulation (MiECC).	C1			Interactive Lecture /SGD/TBL	2	MCQ's	5
73		Classification of MiECC systems	Describe the different classifications of MiECC systems.	C1						
74		Team approach to MiECC System	Discuss the importance of a team-based approach in MiECC systems, highlighting the roles and responsibilities of each team member.	C3						
75		Advantages of Modular MiECC design	Explain the advantages of a modular MiECC over conventional extracorporeal circulation systems.	C2						
		Training Pathway for MiECC System	Outline the training pathway required for proficiency in MiECC systems.	C4						
76	Practical	Apply knowledge of Minimally Invasive Extracorporeal Circulation (MiECC) systems by identifying classifications, collaborating in a team, and recognizing the benefits of modular systems.		P3		Demo/ Clinicals/ Video Simulation	2	OSCE/OSPE	1	
77		Value the importance of teamwork and collaboration in operating MiECC systems, showing respect for each team member's role and commitment to patient-centered care.			A3	Roleplay				
TOPIC: INTRA-AORTIC BALLOON PUMP										
78	Week-14	IABP	Define Intra-Aortic Balloon Pump and its working principle (IABP).	C1			Interactive Lecture /SGD/TBL	2	MCQ's	10
79		Indications	Identify the clinical indications for the use of IABP.	C1						
80		Contraindications	Explain and enlist the risks associated with using IABP in patients with contraindications.	C2						
81		Techniques of Insertion	Describe the step-by-step procedure for the insertion of an IABP, including vascular access and positioning.	C1						
82		Preparation	Explain the pre-procedure preparation required for IABP insertion, including patient stabilization and equipment setup.	C1						
83		Practical	Demonstrate the ability to prepare, insert, and manage an IABP in clinical practice.		P4		Demo/ Clinicals/ Video Simulation	2	OSCE/OSPE	2
84			Show a calm and patient-centered approach when managing Intra-Aortic Balloon Pump (IABP) insertion,			A4	R Roleplay			

			ensuring clear communication and responsiveness to patient needs.							
85	Week-15	Timing	Define the timing of IABP inflation and deflation in relation to the cardiac cycle.	C1			Interactive Lecture /SGD/TBL	2	MCQ's	
86		Triggers	Identify the various triggers used to synchronize IABP with the cardiac cycle.	C1						
87		Effects	Explain the physiological effects of IABP on myocardial oxygen demand, coronary artery perfusion, and cardiac output.	C1						
88		Inflation & Deflation	Describe the mechanics of IABP inflation and deflation and their impact on augmentation.	C1						
89		Maintenance	Discuss routine maintenance procedures for IABP, including monitoring for complications.	C1						
90		Weaning	Explain the process of weaning a patient off IABP.	C1						
91		Practical	Effectively manage IABP timing, inflation, deflation, maintenance, and weaning, ensuring patient safety and optimal cardiac support.		P4		Demo/ Clinicals/ Video Simulation			
92		Demonstrate a patient-focused approach, ensuring clear communication and responsiveness during IABP management.			A4	Roleplay				
TOPIC: HUMAN FACTOR AND TEAMWORK IN CARDIAC SURGERY										
93	Week-16	Human Factors	Define human factors in the context of cardiac surgery.	C1			Interactive Lecture /SGD/TBL	2	MCQ's	5
		Error	Explain how human factors influence error prevention and patient.	C2						
94		Team Work & Leadership	Describe the principles of effective teamwork and leadership in the cardiac surgery environment.	C2						
95		Creating Team	Explain the process of creating and maintaining a cohesive surgical team.	C3						
96		Practical solutions	Discuss practical solutions for minimizing errors in cardiac surgery.	C4						
97		AmSECT handoff	Explain the AmSECT (American Society of Extracorporeal Technology) handoff protocol.	C5						
98		Practical	Practice implementing the AmSECT handoff protocol in clinical simulations, ensuring accurate and efficient transfer of patient information.		P2		Demo/ Clinicals	2	OSCE/OSPE	1

99		Demonstrate a commitment to fostering a positive team environment, emphasizing mutual respect, trust, and open communication.			A2	Roleplay			
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Recommended Books:

1. The Manual of Clinical Perfusion by Bryan V. Lich and D. Marj Brown 2nd edition
2. Cardiopulmonary Bypass and Mechanical Support Principles and Practice 4th edition by Glenn P. Gravlee MD.
3. Cardiopulmonary Bypass Principles and Techniques by Mohammad Ibrahim Barham
4. Cardiopulmonary Bypass by Florian Falter, Albert C Perrino, and Robbert A Baker 3rd Edition

ASSESSMENT BREAKDOWN

S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Blood Gases	10	2	Static / Interactive
2	Inflammation and Organ damage during Cardiopulmonary Bypass	10	1	Static / Interactive
3	Renal Morbidity associated with Cardiopulmonary Bypass	5	1	Static / Interactive
4	Special Cases of Cardiopulmonary Bypass	10	2	Static / Interactive
5	Isolated Limb Perfusion	5	1	Static / Interactive
6	Accidents and Disasters	5	2	Interactive
7	Cardiopulmonary Bypass for Minimal Invasive Cardiac Surgery	5	1	Static
8	Minimal Invasive Extracorporeal Circulation (MiECC)	5	1	Static
9	Intra-Aortic Balloon Pump	10	2	Static/Interactive
10	Human Factor and Team Work in Cardiac Surgery	5	1	Static
Total	10	70	14	14

CP-606 Pharmacology Related to Perfusion 3 (2+1)

Course Description:

This advanced course covers pharmacological agents used in managing patients during cardiopulmonary bypass (CPB) and related procedures. It focuses on various drug classes, their mechanisms, clinical applications, and considerations for optimizing patient outcomes during high-risk surgeries. Emphasizing pharmacology's role in managing coagulation, circulation, anesthesia, and metabolic control, the course prepares students to handle complex clinical scenarios in the perfusion environment effectively.

Learning Objectives

Cognitive Domain

By the end of this course, students will be able to:

1. Identify the Trade Name(s) of drugs
2. Describe the Therapeutic Indication and Contraindication of drugs
3. Explain the Site of Action Within the Body of drugs
4. List and Explain the Common Adverse Effects of drugs
5. Calculate and Interpret the Appropriate Dosage of drugs

Psychomotor Domain

By the end of this course, students will be able to:

1. Administer and Adjust the Dosage of various drugs used in Cardiovascular Surgery
2. Interpret and Manage Glucose Readings
3. Prepare and Administer Steroid Injections
4. Troubleshoot Complications During Plasma Substitute Administration
5. Monitor and Adjust Electrolyte Management

Affective Domain

By the end of this course, students will be able to:

1. Recognize the Importance of Patient Safety During Heparin and Protamine Sulfate Administration

2. Prioritize Patient Safety in the Administration of Aspirin and Clopidogrel Bisulfate
3. Exhibit Responsibility in the Administration of Streptokinase, Epsilon Aminocaproic Acid, and Aprotinin
4. Show Commitment to Patient Care When Administering Diuretics and Antihypertensive Medications
5. Exhibit a Calm and Composed Demeanor in Stressful Situations.

TABLE OF SPECIFICATION

TOS-CP-607-Perfusion Technology-II-3(2+1)

S.No	Weeks	Content	Learning Outcome	Domain			MIT's	Time/Hours	Assessment	No of Items
				C	P	A				
TOPIC: ANTICOAGULANTS AND ANTICOAGULANT ANTAGONISTS										
1	Week-1	Sodium Heparin	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQs	5
2		Coumarin, Warfarin	Describe the therapeutic indication and contraindication of each agent	C2						
3		Antithrombin								
4		Citrate Phosphate Dextrose	Explain the site of action within the body of each agent	C2						
5		Citrate Phosphate Dextrose	List and explain the common adverse effects of each agent	C4						
6		Adenine		C3						
7		Protamine Sulfate	Calculate and interpret the appropriate dosage of each agent							
8		Phytonadione								
8		Practical	Perform heparin and protamine sulfate administration under supervision, ensuring proper injection techniques and adjusting protamine dose based on heparin reversal needs, while monitoring for adverse reactions.		P3		Clinical Rotation	2	OSPE/OSCE	1
9		Patient Safety	Recognize the importance of patient safety during heparin and protamine sulfate administration and value timely intervention for adverse reactions			A2	Role Play		Teacher Observation	
TOPIC: ANTIPLATELET AGENTS										
10	Week-2	Acetylsalicylic acid	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
11		Dipyridamole	Describe the therapeutic indication and contraindication of each agent	C2						
12		Abciximab		Explain the site of action within the body of each agent	C2					
13		Clopidogrel Bisulfate	List and explain the common adverse effects of each agent	C4						
14		Ticlopidine HCL		C3						
15		Eptifibatide	Calculate and interpret the appropriate dosage of each agent							
16		Aspirin / Extended-Release Dipyridamole								
17		Practical	Administer acetylsalicylic acid and clopidogrel orally under supervision, ensuring proper dosage, monitoring for immediate side effects like gastrointestinal discomfort, and bleeding, and documenting the patient's		P3		Clinical Rotation	2	OSPE/OSCE	1

			response.							
18		Patient Safety	Prioritize patient safety and demonstrate responsibility by monitoring for adverse effects and providing education during the administration of aspirin and clopidogrel bisulfate.			A3	Role Play		Peer Rating	
TOPIC: FIBRINOLYTIC, THROMBOLYTICS, AND FIBRINOLYTIC INHIBITORS										
19	Week-3	Streptokinase	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
20		Urokinase	Describe the therapeutic indication and contraindication of each agent	C2						
21		Alteplase, Recombinant	Explain the site of action within the body of each agent	C2						
22		Desmopressin Acetate	List and explain the common adverse effects of each agent	C4 C3						
23		Epsilon Aminocaproic Acid	Calculate and interpret the appropriate dosage of each agent							
24		Aprotinin Injection								
25	Practical	Prepare and administer streptokinase, epsilon aminocaproic acid, and aprotinin injection under supervision, ensuring accurate dosage, technique, and monitoring for adverse reactions.			P3		Clinical Rotation	2	OSPE/OSCE	2
26	Responsibility	Exhibit a responsible attitude by ensuring precise administration of streptokinase, epsilon aminocaproic acid, and aprotinin injections, while actively monitoring and addressing potential adverse reactions.			A3	Role Play		Teacher Observation		
TOPIC: DIURETICS AND ANTIHYPERTENSIVE AGENTS										
27	Week-4	Furosemide	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	6
28		Ethacrynic Acid	Describe the therapeutic indication and contraindication of each agent	C2						
29		Acetazolamide	Explain the site of action within the body of each agent	C2						
30		Bumetanide	List and explain the common adverse effects of each agent	C4						
31		Mannitol		C3						
32		Sodium Nitroprusside	Calculate and interpret the appropriate dosage of each agent							
33		Trimethaphane								
34		Hydralazine HCL								
35		Phentolamine								
36		Propranolol								
37	Nadolol									

38		Chlorpromazine								2
39		Nitroglycerin								
40		Practical	Administer hydralazine HCL and furosemide under supervision, ensuring correct dosage and technique, while monitoring for adverse reactions like hypotension, tachycardia, and electrolyte imbalances.		P3		Clinical Rotation	2	OSPE/OSCE	
41		Commitment	Show commitment to patient care by safely administering diuretics and antihypertensive medications and adjusting treatment based on patient response.			A4	Role Play		Feedback	
TOPIC: VASOPRESSOR AGENTS										
42	Week-5	Epinephrine	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	5
43			Describe the therapeutic indication and contraindication of each agent	C2						
44		Norepinephrine	Explain the site of action within the body of each agent	C2						
45			List and explain the common adverse effects of each agent	C4						
46		Phenylephrine HCL	Calculate and interpret the appropriate dosage of each agent	C3						
47		Metaraminol Bitartrate								
49		Ephedrine Sulphate								
50		Dobutamine HCL								
51		Dopamine HCL								
56		Methoxamine HCL								
57		Mephentermine Sulphate								
58	Practical	Administer vasopressors under supervision during cardiopulmonary bypass, ensuring proper dosage, route, and monitoring for adverse effects like hypotension or arrhythmias.		P3		Clinical Rotation	2	OSPE/OSCE	1	
59	Accountability	Take responsibility for safely administering vasopressors during cardiopulmonary bypass and monitoring for complications.			A3	Role Play		Feedback		
TOPIC: IONOTROPIC AGENTS AND CARDIAC GLYCOSIDES										
60		Amrinone	Identify the trade name(s) of each agent	C1			Interactive	2	MCQ's	
61		Milrinone Lactate	Describe the therapeutic indication and contraindication	C2						

62	Week-6	Digoxin	of each agent	C2 C4 C3		Lectures / SGD			3
63		Digitoxin	Explain the site of action within the body of each agent List and explain the common adverse effects of each agent Calculate and interpret the appropriate dosage of each agent						
64		Practical	Analyze ECG and heart rate data to assess the effects of positive and negative inotropes, and evaluate signs of digoxin toxicity to adjust treatment based on observed symptoms						
65		Value	Demonstrate the importance of patient safety by monitoring ECG data and adjusting treatment for digoxin toxicity.			Role Play		Reflection	
TOPIC: ANTIARRHYTHMIC AGENTS									
66	Week-7	Quinidine Gluconate	Identify the trade name(s) of each agent	C1 C2 C2 C4 C3		Interactive Lectures / SGD	2	MCQ's	5
67		Procainamide HCL	Describe the therapeutic indication and contraindication of each agent						
68		Lidocaine HCL	Explain the site of action within the body of each agent						
69		Bretylum Tosylate	List and explain the common adverse effects of each agent						
70		Propranolol	Calculate and interpret the appropriate dosage of each agent						
71		Isoproterenol Hydrochloride							
72		Verapamil							
73		Diltiazem							
74		Esmolol							
75		Nifedipine							
76		Atropine Sulfate							
77		Epinephrine							
78		Disopyramide							
79		Methoxamine HCL							
80		Practical	Administer amiodarone for atrial fibrillation or lidocaine		P3	Clinical	2	OSPE/OSCE	

			for ventricular arrhythmias under supervision, while monitoring the patient's ECG and vital signs and evaluating the effectiveness of the therapy to adjust the treatment plan as needed.				Rotation			
81		Composure	Exhibit a calm and composed demeanor, especially in stressful situations, such as when adjustments need to be made to the treatment plan.			A3	Role Play		Teacher Observation	
TOPIC: INHALATION AGENTS AND NARCOTIC ANALGESICS										
82	Week-8	Nitrous Oxide	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	5
83		Halothane	Describe the therapeutic indication and contraindication of each agent	C2						
84		Enflurane	Explain the site of action within the body of each agent	C2						
85		Isoflurane	List and explain the common adverse effects of each agent	C4						
86		Morphine	Calculate and interpret the appropriate dosage of each agent	C3						
87		Meperidine								
89		Fentanyl								
90		Sufentanil Citrate								
91		Practical	Demonstrate proper technique for administering inhalation anesthetics (sevoflurane, isoflurane) using a vaporizer and breathing circuit.			P3				
92	Carefulness	Pay close attention to every aspect of the procedure, including properly calibrating the vaporizer, appropriate flow settings, and ensuring that the breathing circuit is functioning optimally.				A3	Role Play		Self-Report	
TOPIC: NEUROMUSCULAR BLOCKING AGENTS										
93	Week-9	Pancuronium Bromide	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
94		Succinylcholine	Describe the therapeutic indication and contraindication of each agent	C2						
95		d-tubocurarine	Explain the site of action within the body of each agent	C2						
96		Vecuronium	List and explain the common adverse effects of each agent	C4						
			Calculate and interpret the appropriate dosage of each agent	C3						
97	Practical	Administer neuromuscular blocking agents, monitor the patient's response (muscle paralysis, respiratory function), and adjust the dosage based on clinical signs.			P3		Clinical Rotations	2	OSPE/OSCE	1

98		Responsibility	Take responsibility for monitoring the patient's response.			A3	Role Play		Rating Scale	
TOPIC: ANESTHESIA ADJUNCTS AND LOCAL ANESTHESIA AGENTS										
99	Week-10	Thiopental Sodium	Identify the trade name(s) of each agent Describe the therapeutic indication and contraindication of each agent Explain the site of action within the body of each agent List and explain the common adverse effects of each agent Calculate and interpret the appropriate dosage of each agent	C1			Interactive Lectures / SGD	2	MCQ's	8
100		Diprivan		C2						
101		Diazepam		C2						
102		Midazolam		C4						
103		Hydroxyzine pamoate		C3						
104		Diphenhydramine								
105		Promethazine								
106		Sodium Pentobarbital								
107		Fentanyl and drperidol combination								
108		Ketamine hydrochloride								
109		Scopolamine Hydrobromide								
110		Atropine Sulfate								
111		Neostigmine methylsulfate								
112		Dantolene Sodium								
113	Naloxone									
114	Week-11	Lidocaine								
115		Procaine								
116		Practical	Administer local anesthetics, monitor patient responses and vital signs, and adjust dosages as needed to ensure optimal patient safety and comfort.		P3		Clinical Rotations	2	OSPE/OSCE	

117		Professionalism	Maintain a calm and professional demeanor, particularly when making dosage adjustments or responding to patient condition changes.			A3	Role Play		Teacher Observation	1
118		Practical	Administer anesthesia adjuncts, monitor patient responses and vital signs, and adjust dosages as needed, ensuring optimal patient safety and comfort.		P3		Clinical Rotations	2	OSPE/OSCE	
119		Professionalism	Maintain a calm and professional demeanor, particularly when making dosage adjustments or responding to changes in the patient's condition.			A3	Role Play		Teacher Observation	
TOPIC: DRUGS USED FOR HYPERGLYCEMIA AND HYPOGLYCEMIA										
120	Week-12	Regular Insulin	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	3
121		Glucagon	Describe the therapeutic indication and contraindication of each agent	C2						
			Explain the site of action within the body of each agent	C2						
			List and explain the common adverse effects of each agent	C4						
			Calculate and interpret the appropriate dosage of each agent	C3						
122		Practical	Monitor blood glucose using a glucometer, interpret the results, and adjust insulin or glucose dosages based on the patient's condition.		P3		Clinical Rotations	2	OSPE/OSCE	2
123		Clinical Judgment	Exercise sound clinical judgment when interpreting glucose readings and adjusting treatments, ensuring safety and optimal care.			A3	Role Play		Self-Report	2
TOPIC: STEROIDS										
124	Week-13	Prednisone	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
125		Methylprednisolone sodium succinate	Describe the therapeutic indication and contraindication of each agent	C2						
126		Hydrocortisone sodium succinate	Explain the site of action within the body of each agent	C2						
127		Dexamethasone	List and explain the common adverse effects of each agent	C4						
			Calculate and interpret the appropriate dosage of each agent	C3						

128		T3	agent							
129		Practical	Demonstrate the proper technique for preparing and administering a steroid injection under supervision.		P3		Clinical Rotations	2	OSPE/OSCE	1
130		Advocacy	Advocate for safe and effective steroid use in clinical practice.			A3	Role Play		Feedback	
TOPIC: PLASMA SUBSTITUTES										
131	Week-14	Albumin	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
132		Hydroxyethyl Starch (HES)	Describe the therapeutic indication and contraindication of each agent	C2						
133		Gelatine Based Solutions	Explain the site of action within the body of each agent	C2						
134		Dextran	List and explain the common adverse effects of each agent	C4 C3						
135		Practical	Troubleshoot and resolve minor complications during plasma substitute administration		P3		Clinical Rotations	2	OSPE/OSCE	4
136		Judiciousness	Exercise sound clinical judgment when deciding on the use of plasma substitutes, ensuring that clinical decisions are patient-centered and evidence-based.			A3	Role Play		Self-Report	
TOPIC: INTRAVENOUS CRYSTALLOID SOLUTIONS										
137	Week-15	Isotonic (Sodium Chloride 0.9% Lactated Ringer Plasma Lyte)	Identify the trade name(s) of each agent	C1			Interactive Lectures / SGD	2	MCQ's	4
138		Hypotonic (Half Sodium Chloride 0.45%, Dextrose 5%)	Describe the therapeutic indication and contraindication of each agent	C2						
139		Hypertonic (Saline 3%, Saline 7.5 %)	Explain the site of action within the body of each agent	C2						
140		Balanced (Lactated Ringer Plasma Lyte)	List and explain the common adverse effects of each agent	C4 C3						
141		Unbalanced (Sodium Chloride 0.9%)	Calculate and interpret the appropriate dosage of each agent							
142		Practical	Correctly prepare and administer intravenous crystalloid solutions using aseptic technique.		P4		CBL	2	OSPE/OSCE	2
143		Valuing	Demonstrate responsibility and attention to detail when administering intravenous crystalloid solutions to ensure patient safety and comfort.			A3	Role Play		Feedback	
TOPIC: ELECTROLYTE MANAGEMENT AGENTS										
144		Sodium Management Agents (Sodium Chloride, Hypertonic Saline, Sodium Bicarbonate)	Identify the trade name(s) of each agent Describe the therapeutic indication and contraindication of each agent	C1 C2			Interactive Lectures / SGD	2	MCQ's	

145	Week-16	Potassium Management Agents (Potassium Chloride, Potassium Phosphate, Insulin with Dextrose, Sodium Polystyrene Sulfonate, Calcium Gluconate)	Explain the site of action within the body of each agent List and explain the common adverse effects of each agent Calculate and interpret the appropriate dosage of each agent	C2 C4 C3						6
146		Calcium Management Agents (Calcium Gluconate, Calcium Chloride, Vitamin D Analogues, Bisphosphonates)								
147		Magnesium Management Agents (Magnesium Sulfate, Magnesium Oxide)								
148		Phosphorus Management Agents (Potassium Phosphate, Sodium Phosphate, Sevelamer)								
149		Chloride Management Agents								
150		Acid-Base Management Agents (Sodium Bicarbonate, Tris-hydroxymethyl amino methane, Lactated Ringer, Acetazolamide, Ammonium Chloride)								
151	Practical	Evaluate the patient's electrolyte levels and clinical response, and adjust the administration of electrolyte management agents accordingly		P3		CBL	2	OSPE/OSCE	2	
152	Prioritizing	Prioritize patient safety and effective treatment by thoughtfully managing the administration of electrolyte agents and ensuring proper monitoring of electrolyte balance.			A3	Role Play		Feedback		

Recommended Books:

1. Lippincott Pharmacology 9th edition by Karen Whalen
2. Katzung Basic & Clinical Pharmacology 16th edition by Todd W.Vanderah
3. Applied Therapeutics, The Clinical Use of Drugs 9th edition by Caroline S. Zeind

ASSESSMENT BREAKDOWN

S.No	Topics	No of MCQ	No of OSPE / OSCE Stations	Static / Interactive
1	Anticoagulants and Anticoagulant Antagonists	5	1	Interactive
2	Antiplatelet Agents	4	1	Interactive
3	Fibrinolytic, Thrombolytics, and Fibrinolytic Inhibitors	4	1	Interactive
4	Diuretics and Antihypertensive Agents	6	1	Static
5	Vasopressor Agents	5	1	Static
6	Inotropic Agents and Cardiac Glycosides	3	1	Static
7	Antiarrhythmic Agents	5	1	Static
8	Inhalation Agents and Narcotic Analgesics	5	1	Static
9	Neuromuscular Blocking Agents	4	1	Static
10	Anesthesia Adjuncts and Local Anesthesia Agents	8	1	Static and Interactive
11	Drugs Used for Hyperglycemia and Hypoglycemia	3	1	Interactive
12	Steroids	4	1	Static
13	Plasma Substitutes	4	-	-
14	Intravenous Crystalloid Solutions	4	-	-
15	Electrolyte Management Agents	6	1	Static
16				Static
Total	15	70	14	14

END