



**BACHELOR OF PARA MEDICAL TECHNOLOGY (BPMT)**

**Course Name:- Cardiology**

**Learning Objectives**

By the end of the course, the student should be able to:

**1<sup>st</sup> Year**

**Anatomy:**

1. Describe the anatomy of heart, lungs and great vessels in detail Physiology:
2. Describe the physiology of cardiovascular system
3. Describe the physiology of respiratory system
4. Describe what is Heart rate
5. Describe Blood pressure
6. Take accurate blood pressure measurements on a patient

**Biochemistry**

7. Describe the role of different Cardiac enzymes, KFT, Blood Sugar
8. Describe the coagulation system
9. Describe electrolyte imbalance

**Cardiology**

10. Record and monitor vital signs of patient
11. Describe the steps of ECG recording

**2nd Year**

**Pathology:**

12. Describe the pathophysiology of common heart diseases
13. Describe the pathophysiology of common lung diseases
14. Describe the pathology of heart
15. Describe the pathology of lungs

**Pharmacology:**

16. Enumerate common drugs used for cardiac and respiratory conditions
17. Collect samples for various blood tests
18. Collect blood sample for ABG analysis

**Forensic Medicine:**

1. Understand legal aspects in cardiology
2. Take informed consent from the patient

## **Cardiology**

### **Introduction to Cath Lab:**

1. Identify different equipments in the cathlab
2. Identify equipments used during administering anesthesia
3. Provide proper Pre and post operative patient care
4. Perform routine maintenance of the cathlab

## **3rd Year**

### **Medicine:**

5. Describe changes happening in : IHD, Hypertension, Congestive cardiac failure, cardiomyopathies, Rheumatic Heart diseases, congenital heart diseases, arrhythmias

### **Cardiology:**

6. Describe TMT, Echo, Radiology, CT, MRI
7. Understand Nuclear Cardiology
8. Understand the use of catheters and balloon
9. Do cardiac monitoring in invasive and non-invasive procedures.
10. Operate cathlab C-arm
11. Arrange trolley and assist in angiography
12. Assist the cardiologist in putting lines and in endotracheal intubation
13. Able to perform Cardiac resuscitation
14. Arrange for TMT
15. Able to sterilise equipments
16. Able to take ECG
17. Assist during cathlab procedures

### **Cardiac Surgery:**

18. Understand the various cardiac surgical procedures



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**1<sup>st</sup> Year: Assessment System & Syllabus**

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Basic Sciences		30	60	90	30	80	110	200
2	Paper – II	Applied Basics		30	60	90	30	80	110	200
3	Paper - III	Introduction to cath lab & Cath lab maintenance		30	60	90	30	80	110	200

**Paper – I**

**Subject: - Basic Sciences**

Sr. No.	Topics	Theory	Practical
1	Introduction to human body as a whole.	2	2
2	Bone (Only nomenclature)	2	2
3	Study of cell with special reference to cardiac cells, conduction tissue, pericardium.	1	1
4	Blood cells, groups, transfusion reactions.	1	1
5	Joints and their types, names (eg. Elbow, hip etc.)	2	1
6	Muscles- Identification of major groups related to applied anatomy,	2	2
7	GIT (oesophagus, stomach, small and large intestines, liver, gall bladder, pancreas) and functions.	2	2
8	Sense organs (Brief anatomy of eye, nose, ear, skin related to sensations).	2	2
9	Respiratory system- nose, pharynx, trachea, bronchi, lungs	2	2
10	Cardio vascular system- heart (chambers, valves), aorta, vena cava, artery and veins identification. Pulse- rate, rhythm, volume, Blood pressure- how to measure, normal and abnormal	6	4
11	Kidney- ureter, bladder, urethra	2	1

**Paper – II**

**Subject: - Applied Basics**

Sr. No.	Topics	Theory	Practical
<b>Section A</b>			
<b>Gross anatomy and structural features of heart</b>			
1	Location, size, surface features, venous area, septum and atrial appendage.	1	1
2	Right atrium structural features, venous area, septum and appendage.	1	1
3	Left atrium structural features venous area, septum and appendage.	2	1
4	Right ventricle structural features inflow and outflow characteristics.	2	1
5	Left ventricle structural features inflow and outflow characteristics.	2	2
6	Valves location, structure and functions of each valve.	2	2
7	Blood supply of Heart in brief: Coronary arteries.	2	2
8	Innovation: Sympathetic and parasympathetic sensory.	2	1
9	Mediastinum and its divisions	2	2
10	Great vessels	2	2
11	Major Arteries and their branches	2	2

12	Major veins and their tributaries	2	1
13	Concepts of coronal, sagittal and oblique sections	1	1
14	Cross sectional Anatomy of Heart	1	1
<b>Section B</b>			
1	Introduction to CVS physiology	1	1
2	Functions of CVS and blood circulation. Tissue perfusion and microcirculation	1	2
3	Cardiac output definition, measurements, regulation and control	1	1
4	Stroke volume, Arterial pressure and its regulation	1	1
5	Peripheral resistance, Venous return, Heart rate	1	1
6	Cardiac cycle with special reference to waveforms of pressure tracing	1	1
7	Heart as a pump physical characteristics of atria, ventricles and valves	1	1
8	Mechanism of contraction	1	1
9	Description and organization of pacemaker and conduction system	1	1
10	Specialized conduction tissues, Sinus node, Inter nodal tracts	1	1
11	Atrioventricular node, His bundle, Bundle branches	1	1
12	Nodal electricity	1	1
13	Nervous control of heart rate	1	1
14	Cardiovascular regulatory mechanism.	1	1
15	Vasodilation, Auto regulation (myogenic theory)	1	1
16	Baro and chemo receptors	1	1
17	Physics of ventilation- principles of elasticity compliance and airway resistance.	1	1
18	Mechanism and regulation of respiration, Principles of gaseous exchange	1	1
19	Pulmonary function studies, lung volumes and capacities by use of spirometry	1	1
20	Brief concept of artificial ventilation	1	1
21	Components of blood-their normal values and function	1	1
22	Blood groups and briefly procedures involved in blood transfusion	1	1
23	Briefly coagulation factors and coagulation cascade	1	1
24	Renal function tests	1	1
25	Routine biochemical investigations	2	1
26	Cardiac profiles – biochemical markers of myocardial infarction, basic principles, evaluation and application	2	1
27	Basic principles and estimation blood gas and PH	2	1
28	Basic principles and estimation of electrolytes	2	1

### Paper – III

#### Introduction to Cath lab & Cath lab Maintenance

Sr. No	Topics	Theory	Practical
1	Identification and use of resuscitation equipments available on trolley. (Ambu bag, endotracheal tubes size, tracheostomy tray)	1	1
2	Description and working of machines and appliances like airway, endotracheal tubes, laryngoscopes, cathlab, ventilators, C arm, cardiac table.	1	1
3	Their component parts, cleaning, sterilization, care, maintenance, assembly and dismantling.	1	1
4	Drugs in cathlab- premedication (oxygen, Glycopyrrolate, atropine, ondansetron, ranitidine, midazolam, pentazocine, fentanyl, diclofenac), IV beta blockers, heparin, angiography dyes,	2	2
5	Types of anaesthesia. (Local, sedation, epidural, general, regional blocks)	1	1
6	Local anaesthetics (Lignocaine, Bupivacaine),	1	1
7	Pre Procedure evaluation, consent for procedure, Preparation,	1	1

	position of patient, required drugs, doses, side effects.		
8	Epidural anaesthesia- Preparation, position of patient, required drugs, doses, side effects.	1	1
9	Lay out of trolley for all types of cath lab procedures.	1	1
11	O2 cylinders, Central gas pipeline, Manifold system, Liquid O2,	1	1
12	Central suction, electrical, foot suction.	2	1
13	Explosion risks. Fire-fighting.	2	1
15	Pre procedure protocols	1	1
16	Post procedure care.	1	1
18	Legal aspects	1	1
19	Consent	1	1
20	Communicating with patients and relatives	2	1
<b>Cath Lab Maintenance</b>			
1	Cleanliness and sterilization of cathlab.	1	1
2	Lighting facility.	2	1
3	Helping cardiologists and others to wash up and drape for operation.	2	1
4	Handling of sterilized articles.	1	1
5	Washing, cleaning, testing recyclable disposables and preparing them for sterilization and packing.	1	1
7	Lay out of instruments trolley,	-	1
9	Application of bandages, dressings, tourniquets.	2	1
10	Reception and preparation of patients for cathlab, removing sheath	1	4
11	Observation of patients during operation, post operative period, recording pulse and BP, urine output, ECG recording,	1	8
12	Attaching patient to multi para monitor	1	1
13	Universal safety precautions	1	1

#### **ROTATIONAL POSTING :**

**Each day student will remain in the Cath Lab for 4 hours in the morning for practicals and theory classes will be held in the afternoon**



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**Course Name:- Cardiology**

**2<sup>nd</sup> Year : Assessment System & Syllabus**

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Basic Sciences as applicable to cardiology, anatomy, pathology, Physiology		30	60	90	30	80	110	200
2	Paper – II	Cardiac Disease principle of Medical & Non medical Management		30	60	90	30	80	110	200
3	Paper - III	Investigations and equipments in Non Invasive Cardiology		30	60	90	30	80	110	200

**Paper – I**

**Subject: - Basic sciences as applicable to Cardiology, Anatomy, Pathology, Physiology**

Sr. No.	Topics	Theory	Demo / Practical
1	Introduction to paramedical Training in cardiology	2	2
2	Anatomy of Heart , general , Valves ,coronary , anatomy of conduction system.	3	3
3	Function of heart, Cardiac cycle , Perfusion , haemodynamics .	3	3
4	Circulatory system Systemic arterial and venous Pulmonary	2	2
5	Pathophysiology in common heart diseases	5	5
6	Physical examination of cardiovascular system	2	2

**Paper – II**

**Subject: - Cardiac Disease Principle of Medical & Non-Medical Management**

Sr. No.	Topics	Theory	Demo / Practical
1	General principles of patient care in ward and intensive cardiac units	2	2
2	Diagnosis in cardiology general principles	4	4
3	Classification of Rheumatic heart disease , congenital and coronary artery disease.	5	5
4	Principles and management of Common Heart Disease	5	5
5	Cardiology ward documentation and procedures	2	2
6	Patient education and Rehabilitation in Cardiology	2	2
7	Cardiology Prescriptions General Principles	5	5
8	Cardiopulmonary Resuscitation	4	4

**Paper – III**  
**Subject: - Investigations and Equipment in Non Invasive  
 Cardiology**

Sr. No.	Topics	Theory	Demo/ Practical
1	Electrocardiography	4	4
2	Stress testing	4	4
3	Echocardiography	8	8
4	Radiology of heart and Blood vessels, Cardiac CT, Cardiac MRI, CT/ MR angiography	8	8
5	Nuclear Cardiology	3	3
6	Defibrillator	2	2
<b>Cath Lab and Maintenance</b>			
1	Use of cath lab table and C arm,	2	4
2	Maintenance of cath lab equipments, records and charts.	1	1
3	Recording video of procedure and labelling of procedure done, taking print outs and dictation of cardiologist, To prepare CD of procedure.	2	2
4	Identification use, care, maintenance and sterilisation of common types of instruments, needles, stents, guide wires, balloons used in cath-lab	1	1
5	Procedures like angiography, angioplasty, balloon dilatation of valves, pacemakers (temporary, permanent), device closures.	4	4
6	Operating C-arm	2	4

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**3<sup>rd</sup>Year : Assessment System & Syllabus**

Sr. No	Paper	Subject	Subject Code	Theory			Practical			Total Marks
				IA	Final	Total	IA	Final	Total	
1	Paper – I	Cardiac intensive care and emergencies		30	60	90	30	80	110	200
2	Paper – II	Cardiac diseases and principals of invasive management		30	60	90	30	80	110	200
3	Paper - III	Investigations and equipments in invasive Cardiology		30	60	90	30	80	110	200

**Paper – I**

**Subject: - Cardiac Intensive Care and Emergencies**

Sr. No.	Topics	Theory	Demo/ Practical
1	Introduction to intensive cardiac care	4	4
2	Monitoring in intensive care – non invasive & invasive	6	6
3	Acute coronary syndrome including clinical presentation & principles of management	8	8
4	Cardiac failure (Clinical Presentations & principles of management	6	6
5	Drugs in intensive care unit including thrombolytics (formulations, administration & adverse effects)	8	8
6	Cardiac arrhythmias (Clinical Presentations & principle of management)	6	6
7	Circulatory and ventilatory assistance in intensive care	3	3

**Paper – II**

**Subject: - Cardiac Diseases and invasive management**

Sr. No.	Topics	Theory	Demo / Practical
1	Introduction to invasive cardiology & cardiac catheterisation	3	3
2	Radiation safety	1	1
3	Coronary angiography	2	2
4	Coronary angioplasty	3	3
5	Pacemaker implantation	2	2
6	Balloon valvotomy	3	3
7	Paediatric catheterisation and interventions	3	3
8	Pericardiocentesis	1	1
9	Complications of cardiac intervention and their management	2	2
10	Principles of electro physiological studies and ablation.	2	2

**Paper – III**  
**Subject: - Investigations and equipments in invasive cardiology**

<b>Sr. No.</b>	<b>Topics</b>	<b>Theory</b>	<b>Demo / Practical</b>
1	Pre catheterisation assessment	2	2
2	Post catheterisation care and assessment	2	2
3	Sterilization procedures (including autoclave, ETO, fumigation)	4	4
4	Catheterisation laboratory infrastructure and equipments	6	6
5	Hardware used in Catheterisation laboratory (including catheters, wires, leads, devices, balloon, stents etc)	8	8
6	Radio opaque contrast	2	2
7	Drug used in invasive cardiology (antiplatelets, anticoagulant, GpIIb/IIIa inhibitors etc.)	3	3
8	Introduction to cardio vascular surgery	3	3

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**List of Suggested Books for reading**

Sr. No.	Subject / Topic	Author/ Editor	Title of Book	Publisher
I)	Anatomy	BD Chaurasia	Human Anatomy	CBS
II)	Physiology	Chatterjee	Human Physiology	CBS
III)	Biochemistry	Satyanarayan	Biochemistry	Elsevier
IV)	Pathology	Harsh Mohan	Textbook Of Pathology	Jaypee
V)	Pharmacology	Tripathi	Essentials Of Medical Pharmacology	Jaypee
VI)	Forensic medicine	Reddy	The Essentials Of Forensic Medicine And Toxicology	Jaypee
VII)	Medicine	Davidson	Principles & Practice of Medicine	Elsevier
VIII)	CVTS	Lectures only		
IX)	Cardiology	1. Brunwald 2. Hurst	Heart Disease The Heart	Elsevier Jaypee

Lecture notes/Modules should be prepared by the teachers