

STUDY GUIDE

FIRST YEAR MBBS

13TH SEPT- 7TH OCT 2021

DURATION: 4 WEEKS



Angioplasty & Stenting

Atherectomy

Embolic Protection

Percutaneous Valve Repair

Balloon Angioplasty



Aortic & Thoracic Endograft



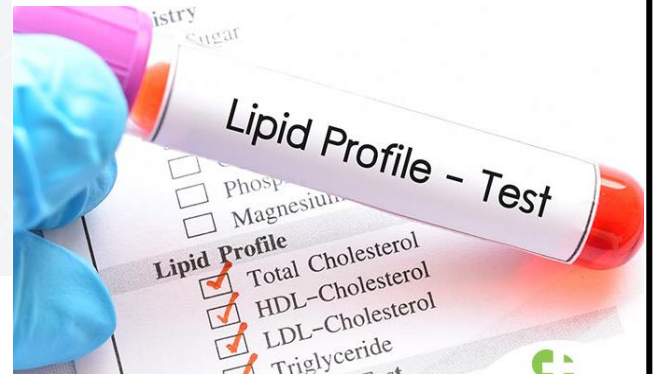
Thrombectomy



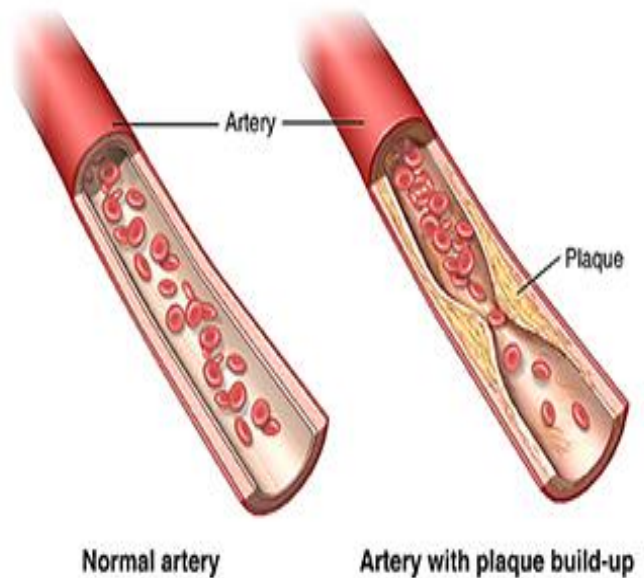
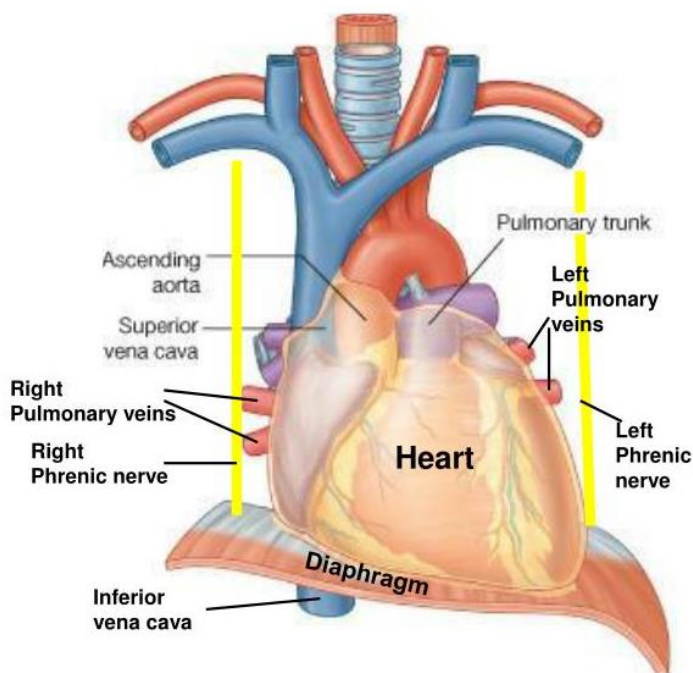
Endovascular Aortic Reconstruction



Cardiac Catheterization



CARDIOVASCULAR SYSTEM MODULE- I



LIAQUAT NATIONAL HOSPITAL AND MEDICAL COLLEGE

Institute for Postgraduate Medical Studies & Health Science



STUDY GUIDE FOR CARDIOVASCULAR SYSTEM MODULE-I

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Module name: **Cardiovascular System-I** Year: **One** Duration: **4 weeks (Sept-Oct 2021)**

Timetable hours: **Lectures, Case-Based Learning (CBL), Self-Study, Practicals, Skills, Demonstrations**

MODULE INTEGRATED COMMITTEE

MODULE COORDINATOR:	<ul style="list-style-type: none"> Professor Shaheen Sharafat (Microbiology)
CO-COORDINATORS:	<ul style="list-style-type: none"> Dr. Naila Parveen (Physiology)

DEPARTMENTS' & RESOURCE PERSONS' FACILITATING LEARNING

BASIC HEALTH SCIENCES	CLINICAL AND ANCILLARY DEPARTMENTS
ANATOMY Professor Zia-ul-Islam	CARDIOLOGY <ul style="list-style-type: none"> Dr. Faisal Ahmed Dr. Imran Sandeelo
BIOCHEMISTRY Professor Kashif Nisar	MEDICINE Professor KU Makki
COMMUNITY MEDICINE Dr. Saima Zainab	RADIOLOGY Dr. Muhammad Misbah Tahir
PATHOLOGY Professor Naveen Faridi	RESEARCH & SKILLS DEVELOPMENT CENTER Dr. Kahkashan Tahir
PHYSIOLOGY Professor Syed Hafeezul Hassan	
DEPARTMENT of HEALTH PROFESSIONS EDUCATION	
<ul style="list-style-type: none"> Professor Nighat Huda Professor Sobia Ali Dr. Afifa Tabassum Dr. Sana Shah 	
LNH&MC MANAGEMENT	
<ul style="list-style-type: none"> Professor Karimullah Makki, Principal, LNH&MC Dr. Shaheena Akbani, Director A.A & R.T LNH&MC 	
STUDY GUIDE COMPILED BY: Department of Health Professions Education	

INTRODUCTION

WHAT IS A STUDY GUIDE?

It is an aid to:

- Inform students how student learning program of the module has been organized
- Help students organize and manage their studies throughout the module
- Guide students on assessment methods, rules and regulations

THE STUDY GUIDE:

- Communicates information on organization and management of the module. This will help the student to contact the right person in case of any difficulty.
- Defines the objectives which are expected to be achieved at the end of the module.
- Identifies the learning strategies such as lectures, small group teachings, clinical skills, demonstration, tutorial and case based learning that will be implemented to achieve the module objectives.
- Provides a list of learning resources such as books, computer assisted learning programs, web- links, journals, for students to consult in order to maximize their learning.
- Highlights information on the contribution of continuous and semester examinations on the student's overall performance.
- Includes information on the assessment methods that will be held to determine every student's achievement of objectives.
- Focuses on information pertaining to examination policy, rules and regulations.

CURRICULUM FRAMEWORK

Students will experience integrated curriculum of previous modules.

INTEGRATED CURRICULUM comprises of system-based modules such as Locomotor system, Respiratory System and Cardiovascular system which links basic science knowledge to clinical problems. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have better understanding of basic sciences when they repeatedly learn in relation to clinical examples. Case-based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of integrated teaching program.

SMALL GROUP SESSION (SGS): This format helps students to clarify concepts acquire skills or attitudes. Sessions are structured with the help of specific exercises such as patient case, interviews or discussion topics. Students exchange opinions and apply knowledge gained from lectures, tutorials and self study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

CASE- BASED LEARNING: A small group discussion format where learning is focused around a series of questions based on a clinical scenario. Students' discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences during the module.

PRACTICAL: Basic science practicals related to anatomy, biochemistry, pathology, pharmacology and physiology are scheduled for student learning.

SKILLS SESSION: Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Department of Physiotherapy.

SELF STUDY: Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Center, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study.

E-LEARNING: E-Learning is a strategy by which learning occurs through the utilization of electronic media, typically the Internet. The basic aspects of medical professionalism and ethics will be addressed through an e-learning course.

MODULE 5: CARDIOVASCULAR SYSTEM-I

INTRODUCTION

Welcome to the Cardiovascular System Module-I. In the next four weeks you will have the opportunity to develop understanding of the basic concepts of cardiovascular system through an integrated course designed by basic and clinical sciences faculty.

Heart being the main organ of cardiovascular system is responsible for distributing blood all over human body. A perfectly functioning cardiovascular system is so important for human body, that if it stops for a minute, rapid death may occur. In the 3rd year in cardiovascular system - II module students will learn in depth about the cardiovascular diseases.

In Pakistan cardiovascular diseases account for about 19% of all deaths and about 38% of deaths occurring due to non-communicable diseases. It is also one of the leading causes of illness and reduces quality of life.

The medical curriculum is not only the study of disease outcomes but also about “prevention being better than cure” Unhealthy lifestyle choices such as rich fat diet, overweight, smoking, increase the risk of cardiovascular diseases. Therefore as a medical student it is important to understand how the risk of cardiovascular disorders can be reduced by adapting healthy lifestyle.

We hope you enjoy the next four weeks. There will be other modules ahead, but a good grounding in cardiovascular module will be an important stage of your journey through this system-based course. As a physician you are expected to manage individuals, families and communities on prevention of illnesses including cardiac disorders

1. *World Health Organization – Non-communicable Diseases (NCD) Country Profiles, 2014*

COURSE OBJECTIVES AND STRATEGIES

At the end of the module the students will be able to:

ANATOMY

OBJECTIVES	LEARNING STRATEGY
1. Middle Mediastinum: Pericardium	Interactive Lectures/ Case-Based Learning/ Small Group Discussion
• Describe the boundaries of middle mediastinum	
• Discuss the contents of the middle mediastinum	
• Explain the different coverings of heart (pericardium)	
• Discuss the location of pericardial sinuses	
• Discuss the clinical conditions associated with the pericardium	Interactive Lectures/ Small Group Discussion
2. Overview of Cardiovascular system	
• Explain the organization of cardiovascular system	
• Enumerate the components of cardiovascular system	
• Enumerate the vessels related to the heart	
3. External features of the Heart	
• Describe the location, coverings, borders & surfaces of the heart	
• Discuss the external features of heart	
• Briefly discuss the chambers and valves of the heart	
• Discuss the different circulatory circuits and their working	
4. Heart: Internal features- I & II	
• Describe the anatomical position of the heart.	
• Describe the chambers and valves of the heart	
• Discuss the internal features of chambers and valves of right & left sides of heart.	
5. Histology of Heart	
• Discuss the basic structure of blood circulatory system	
• Enumerate the layers of the walls of heart	
• Describe the histological characteristics of cardiac muscle	
• Discuss the structure and significance of intercalated discs	
• Describe the characteristic histological features of cardiac muscle and layers of heart walls under the light microscope	
6. Coronary blood vessels, blood supply of heart	
• Describe coronary circulation and its importance	
• Name the different branches of coronary arteries and their area of supply	
• Describe variations of coronary arteries and right and left dominance	
• Discuss variations of coronary artery disease	
• Discuss clinical manifestations of blockage of coronary arteries	
• Discuss Myocardial Infarction and Angina Pectoris in relation to vessel occlusion	
• Describe the characteristic histological features of blood vessels under the light microscope	

7. Conducting system of heart and nerve supply	Interactive Lectures
<ul style="list-style-type: none"> Describe the conducting system of heart 	
<ul style="list-style-type: none"> Explain the different components of conducting system 	
<ul style="list-style-type: none"> Discuss blood supply of conducting system of heart 	
8. Surface markings of heart, valves and great vessels	Interactive Lectures/ Small Group Discussion/ Practical
<ul style="list-style-type: none"> Describe the position of the heart 	
<ul style="list-style-type: none"> Identify the surface anatomy of heart on a mannequin or normal subject 	
<ul style="list-style-type: none"> Identify the surface marking of the borders, great vessels and valves of heart 	
9. Development of Heart	Interactive Lectures/Case-Based Learning
<ul style="list-style-type: none"> Discuss the development of heart tube 	
<ul style="list-style-type: none"> Describe the development of atria and interatrial septum, AV valves and aortic and pulmonary valves, ventricles and interventricular septum 	
<ul style="list-style-type: none"> Describe the partitioning of outflow tract and contribution of neural crest cells to this process 	
10. Congenital Anomalies of the Heart	
<ul style="list-style-type: none"> Describe congenital heart defects 	
<ul style="list-style-type: none"> Discuss clinical features of heart defects 	
11. Development of arterial system & anomalies	
<ul style="list-style-type: none"> Discuss the relation of pharyngeal arches and aortic arches 	
<ul style="list-style-type: none"> Explain the fate and formation of aortic arches 	
<ul style="list-style-type: none"> Describe the formation of brachiocephalic trunk, common carotid and left subclavian arteries 	
<ul style="list-style-type: none"> Describe the anomalies of arterial system 	
12. Development of veins and their anomalies	
<ul style="list-style-type: none"> Describe the major veins of heart, coronary sinus, anterior cardiac veins, venae cordis minimae 	
<ul style="list-style-type: none"> Explain the development and fate of umbilical, vitelline and cardinal veins 	
<ul style="list-style-type: none"> Describe the anomalies of venous system 	
13. Fetal Circulation	
<ul style="list-style-type: none"> Describe the components of fetal circulation 	
<ul style="list-style-type: none"> Describe the location of foramen ovale 	
<ul style="list-style-type: none"> Describe the ductus arteriosus 	
<ul style="list-style-type: none"> Explain the path of fetal circulation 	
<ul style="list-style-type: none"> Explain the changes in circulation after birth 	
<ul style="list-style-type: none"> Discuss the problems with persistence of fetal components of circulation after birth (Patent ductus arteriosus and patent foramen ovale) 	
14. Anatomic Radiology	
<ul style="list-style-type: none"> Identify parts of the heart and major vessels on normal chest X ray 	

BIOCHEMISTRY

OBJECTIVES	LEARNING STRATEGY
LIPID METABOLISM	
1. Fatty Acid & Triacylglycerol Metabolism	
<ul style="list-style-type: none"> Briefly describe the digestion and absorption of lipids Discuss the biochemical significance of Fatty Acids Discuss the synthesis of fatty acids Discuss the regulation of fatty acid synthesis Describe energy requirement during fatty acid synthesis Describe the synthesis of Triacylglycerol Identify the chemical tests and bio-techniques to detect Triacylglycerol Outline the method for detection of Triacylglycerol in a sample Describe the estimation of TAGs in the given sample by Spectrophotometry Interpret clinical conditions correlated with their laboratory investigations 	Interactive Lectures/ Small Group Discussion/ Practical
2. Beta oxidation	
<ul style="list-style-type: none"> Discuss the beta oxidation of fatty acids Discuss the regulation of beta oxidation Describe energy generation during beta oxidation Name the steps of unsaturated fatty acid oxidation Compare fatty acid synthesis with fatty acid oxidation 	Interactive Lectures/ Small Group Discussion
3. Cholesterol Metabolism	
<ul style="list-style-type: none"> Briefly describe the structure and functions of cholesterol Describe the mechanism of cholesterol synthesis and its degradation Discuss the regulation of cholesterol metabolism Explain the formation of Bile salts and vitamin D Describe the clinical significance of cholesterol Discuss the biochemical role of cholesterol in CVS diseases Discuss the clinical significance of hyperlipidemia 	Interactive Lectures/ Small Group Discussion/ Case- Based Learning
4. Transport of Lipids	
<ul style="list-style-type: none"> Classify the lipoproteins Discuss the metabolism, transport and clinical significance of lipoproteins Identify the chemical tests and bio-techniques to detect total cholesterol, HDL & LDL Outline the method for detection of total cholesterol, HDL & LDL in a sample Perform the estimation of total cholesterol, HDL & LDL in serum by Spectrophotometry Interpret clinical conditions correlated with their laboratory investigations 	Interactive Lectures/ Small Group Discussion/Practical
5. Lipid Profile	
<ul style="list-style-type: none"> Discuss the importance of lipid profile in CVS diseases Interpret clinical conditions correlated with their laboratory investigations 	Small Group Discussion

6. Ketone Bodies Metabolism	Interactive Lectures/ Small Group Discussion/ Case- Based Learning
<ul style="list-style-type: none"> Classify the Ketone bodies 	
<ul style="list-style-type: none"> Describe the biochemical role of Ketone bodies, their synthesis and utilization 	
<ul style="list-style-type: none"> Discuss the mechanism of ketoacidosis Discuss the clinical significance of ketone bodies 	
7. Oxidants & Antioxidants	Interactive Lectures/ Small Group Discussion
<ul style="list-style-type: none"> Classify oxidants and antioxidants 	
<ul style="list-style-type: none"> List the sources of oxidants and antioxidants 	
<ul style="list-style-type: none"> Discuss their biochemical role specially with reference to CVS diseases 	
8. Role of Minerals in Blood Pressure Regulation	Small Group Discussion/Practical
<ul style="list-style-type: none"> Discuss hypertension and its risk factors 	
<ul style="list-style-type: none"> Describe the mechanism of action of sodium and potassium in blood pressure regulation 	
<ul style="list-style-type: none"> Explain dietary approaches to reduce hypertension List other life style interventions for the management of hypertension 	
9. Cardiac Biomarkers	Small Group Discussion/Practical
<ul style="list-style-type: none"> Discuss the importance of cardiac biomarkers in CVS diseases 	
<ul style="list-style-type: none"> Interpret clinical conditions correlated with their laboratory investigations 	
<ul style="list-style-type: none"> Outline the bio-techniques for detection of cardiac biomarkers in a sample Discuss the importance of cardiac biomarkers in the diagnosis of CVS disease 	

CARDIOLOGY

OBJECTIVES	LEARNING STRATEGY
Basics of interventional cardiology	Interactive Lecture
<ul style="list-style-type: none"> Know about various cardiology intervention procedures 	

COMMUNITY MEDICINE

OBJECTIVES	LEARNING STRATEGY
Risk Factors of Cardiovascular Disease	Interactive Lectures
<ul style="list-style-type: none"> Define Risk Factors 	
<ul style="list-style-type: none"> Enumerate Risk Factors for Cardiovascular disease in the local and global context based on evidence 	
<ul style="list-style-type: none"> Apply the web-of-disease-causation to cardiovascular risk factors Briefly discuss preventive measures based on lifestyle modifications of cardiovascular risk factors 	

MEDICINE

OBJECTIVES	LEARNING STRATEGY
Heart sounds	Small Group Discussion
<ul style="list-style-type: none"> Evaluate the mechanism of heart sounds. 	
<ul style="list-style-type: none"> Discuss the abnormal heart sounds. 	

PATHOLOGY

OBJECTIVES	LEARNING STRATEGY
Pathophysiology of atherosclerosis	Interactive Lecture
<ul style="list-style-type: none"> Describe the pathophysiological process of atherosclerosis 	

PHYSIOLOGY

OBJECTIVES	LEARNING STRATEGY
1. Properties of cardiovascular muscles	Interactive Lectures/ Small Group Discussion
<ul style="list-style-type: none"> Define the properties of cardiac muscles 	
<ul style="list-style-type: none"> Explain the phenomenon of generation of action potential in cardiac muscles and process of excitation contraction coupling 	
2. Excitatory and conductive system of heart	Interactive Lectures/ Small Group Discussion
<ul style="list-style-type: none"> Describe conducting system of heart and role of pacemaker in maintaining cardiac rhythm Explain the regulation of heart rhythmicity and conduction by autonomic nervous system 	
3. Cardiac cycle and heart sounds	Interactive Lectures/ Small Group Discussion
<ul style="list-style-type: none"> Describe events of cardiac cycle and associated events (pressure changes and heart sound generation), and its effect on volume of heart chambers and vessels (aorta, pulmonary artery) 	
4. ECG 1: Lead System	Interactive Lectures/ Small Group Discussion/Practical
<ul style="list-style-type: none"> Describe 12 lead ECG record Define Einthoven's triangle & Einthoven's law 	
5. ECG 2: Normal ECG pattern	Interactive Lectures/Practical
<ul style="list-style-type: none"> Explain the normal ECG waves 	
6. ECG 3: Vector Analysis	Interactive Lectures
<ul style="list-style-type: none"> Analyze ECG vectors and their interpretation Define right & left axis deviation 	
7. Cardiac arrhythmias	Interactive Lectures/ Small Group Discussion
<ul style="list-style-type: none"> Define arrhythmia Discuss the common cardiac arrhythmias, their causes and effects 	
8. Overview of circulation (blood flow, pressure, resistance)	
<ul style="list-style-type: none"> Define vascular distensibility and compliance Define blood flow pressure and resistance in different blood vessels Explain veins and their functions 	
9. Cardiac output, venous return and its regulation	
<ul style="list-style-type: none"> Define cardiac output and factors regulating cardiac output 	
10. Nervous regulation of circulation and arterial pressure	Interactive Lectures/ Small Group Discussion/Case- Based Learning
<ul style="list-style-type: none"> Define arterial blood pressure state mechanism of regulation of blood pressure (short, intermediate, long term) 	
11. Intermediate and long term control of blood pressure	Interactive Lectures/ Small Group Discussion/Case- Based Learning
<ul style="list-style-type: none"> Discuss the processes and regulatory mechanisms of intermediate and long term control of blood pressure 	

12. Local control of blood flow	Interactive Lectures
• Explain the process of Acute and long term blood flow regulation	
• Discuss auto regulation of blood flow	
• Describe humoral regulation of circulation	
13. Micro-circulation	
• Describe Starling Equilibrium for capillary exchange	
14. Lymphatic system and edema	
• List the functions of lymphatic systems	
• Define edema and its types	
• Describe the process of edema formation	
15. Circulatory shock	Case-Based Learning
• Explain physiological causes of shock, its stages and types	
16. CVS adaption during exercise	
• Describe cardiovascular adaptation to exercise	Practical
17. Ischemic Heart Diseases (IHD)	
• List the common ischemic heart diseases	
• Define common IHDs	
• Discuss the changes and effects of common IHDs	
18. Power lab: The refractory period of cardiac muscle	
• Describe how to record refractory period of cardiac muscles through power lab	
19. ECG (its major components, Correlation of ECG and heart sounds)	
• Describe how to setup ECG machine and arrangement of leads	
20. Normal and abnormal heart sounds	
• Describe how to differentiate between normal and abnormal heart sounds	
21. Examination of arterial pulses	
• Examine arterial pulses in normal human subject	
• Define common abnormal arterial pulsations	
22. Recording of blood pressure	
• Describe how to record blood pressure by palpatory and auscultatory methods	

RADIOLOGY

OBJECTIVES	LEARNING STRATEGY
• Interpret different parts of cardiovascular system on radiological images.	Interactive Lectures

RESEARCH & SKILLS DEVELOPMENT CENTER

OBJECTIVES	LEARNING STRATEGY
Normal and abnormal heart sounds	Small Group Discussion
• Identify normal and abnormal heart sounds	

LEARNING RESOURCES

SUBJECT	RESOURCES
ANATOMY	<p>A. <u>GROSS ANATOMY</u></p> <ol style="list-style-type: none"> 1. K.L. Moore, Clinically Oriented Anatomy 2. Neuro Anatomy by Richard Snell <p>B. <u>HISTOLOGY</u></p> <ol style="list-style-type: none"> 1. B. Young J. W. Health Wheather’s Functional Histology <p>C. <u>EMBRYOLOGY</u></p> <ol style="list-style-type: none"> 1. Keith L. Moore. The Developing Human 2. Langman’s Medical Embryology
BIOCHEMISTRY	<p>A. <u>TEXTBOOKS</u></p> <ol style="list-style-type: none"> 1. Harper’s Illustrated Biochemistry 2. Lehninger Principle of Biochemistry 3. Biochemistry by Devlin
PHYSIOLOGY	<p>A. <u>TEXTBOOKS</u></p> <ol style="list-style-type: none"> 1. Textbook Of Medical Physiology by Guyton And Hall 2. Ganong ‘ S Review of Medical Physiology 3. Human Physiology by Lauralee Sherwood 4. Berne & Levy Physiology 5. Best & Taylor Physiological Basis of Medical Practice <p>B. <u>REFERENCE BOOKS</u></p> <ol style="list-style-type: none"> 1. Guyton & Hall Physiological Review 2. Essentials Of Medical Physiology by Jaypee 3. Textbook Of Medical Physiology by Indu Khurana 4. Short Textbook Of Physiology by Mrthur 5. NMS Physiology

ASSESSMENT METHODS:

- **Best Choice Questions(BCQs)** also known as MCQs (Multiple Choice Questions)
- **Objective Structured Practical/Clinical Examination (OSPE or OSCE)**

BCQs:

- A BCQ has a statement or clinical scenario of four options (likely answers).
- **Correct answer carries one mark, and incorrect 'zero mark'. There is NO negative marking.**
- Students mark their responses on specified computer-based sheet designed for LNHMC.

OSCE:

- All students rotate through the same series of stations in the same allocated time.
- At each station, a brief written statement includes the task. Student completes the given task at one given station in a specified time.
- Stations are observed, unobserved, interactive or rest stations.
- In unobserved stations, flowcharts, models, slide identification, lab reports, case scenarios may be used to cover knowledge component of the content.
- Observed station: Performance of skills /procedures is observed by assessor
- Interactive: Examiner/s ask questions related to the task within the time allocated.
- In Rest station, students in the given time not given any specific task but wait to move to the following station.

Internal Evaluation

- Students will be assessed comprehensively through multiple methods.
- 20% marks of internal evaluation will be added to JSMU final exam. That 20% may include class tests, assignment, practicals and the internal exam which will all have specific marks allocation.

Formative Assessment

Individual department may hold quiz or short answer questions to help students assess their own learning.

The marks obtained are not included in the internal evaluation

For JSMU Examination Policy, please consult JSMU website!

More than 75% attendance is needed to sit for the internal and final examinations
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LNMC EXAMINATION RULES & REGULATIONS

- Student must report to examination hall/venue, 30 minutes before the exam.
- **Exam will begin sharp at the given time.**
- No student will be allowed to enter the examination hall after 15 minutes of scheduled examination time.
- Students must sit according to their roll numbers mentioned on the seats.
- **Cell phones are strictly not allowed in examination hall.**
- If any student is found with cell phone in any mode (silent, switched off or on) he/she will be not be allowed to continue their exam.
- No students will be allowed to sit in exam without University Admit Card, LNMC College ID Card and Lab Coat
- Student must bring the following stationary items for the exam: Pen, Pencil, Eraser, and Sharpener.
- Indiscipline in the exam hall/venue is not acceptable. Students must not possess any written material or communicate with their fellow students.

SCHEDULE:

WEEKS	1 ST YEAR	MONTH
WEEK 1	LOCOMOTOR MODULE	14 th June 2021
WEEK 2		13 th Aug 2021
WEEK 3		
WEEK 4		
WEEK 5		
WEEK 6		
WEEK 7		
WEEK 8		
WEEK 9		13 th Aug 2021
WEEK 1	RESPIRATORY MODULE	16 th Aug 2021
WEEK 2		11 th Sep 2021
WEEK 3		
WEEK 4		
WEEK 1	CVS MODULE	13 th Sep 2021
WEEK 2		7 th Oct 2021
WEEK 3		
WEEK 4		
PRE PROF EXAM*		

*Final dates will be announced later