



**Institute of Dentistry,  
CMH Lahore Medical College**

**PHYSIOLOGY STUDY GUIDE  
First Year BDS**

**2021 - 2022**

# **INTRODUCTION TO STUDY GUIDE:**

This study guide book is designed for Dental undergraduates by consolidated effort of all subjects across the year to provide Dental students of IOD CMH Lahore Medical College a resource material which would highlight important aspects of curriculum. The study guide aims to promote self-regulated lifelong learning among students by giving them the control over their learning.

The pervasive curriculum aspects of undergraduates' competencies, assessment policies and curriculum coordinators are mapped in his guide book. Horizontal integration across the year better conceptual understanding while vertical integration promotes clinically relevant understanding. IOD CMH aims to improve health indicators of society by improvement of students and doctors in preventive health service provision and health education provision to society through community programs.

The study guide gives an overview of intended course outcomes and objectives in relation to the course content. The assessment methodology tailored to intuitional strategy is provided.

This study guide has been carefully designed keeping in view PMDC and NUMS curriculum and guide lining dedicated effort by faculty is done to make this guide tailored to student's needs. Students feedback has been seeded and incorporated at all stages during study guide development. Curriculum is a living dynamic entity. Our aim to improve it by every passing day. This humble effort of all faculty acts as a guiding light for our dear students.

## **VISION STATEMENT**

To ensure the development of internationally acclaimed quality standards and practices for NUMS Higher Education that benefits and lives up to the stakeholder's needs and expectations.

## **MISSION STATEMENT**

To provide an excellent learning and teaching environment, inculcating ethical values and social responsibilities in undergraduate and postgraduate medical & dental students and nursing and allied health sciences students to enhance the level of comprehensive healthcare in the Army/Country

## **Rationale of Curriculum**

The curriculum is designed to address both local and international needs. The curriculum is focused to prepare students for the international licencing exams and training abroad as well as empowering them to treat local patients with safety and efficiency. Dentists work as a healer in the community. A dentist should have evidence based and update knowledge about the epidemiology of the practicing area. The curriculum of IOD CMH LMC is planned with a collaboration of clinical and basic sciences faculty in addition to students and family medicine department to ensure that the prevailing health conditions of the society are treated and dealt with effectively. The emergence of new techniques in preservation of existing dentition and restoration of the lost dentition and oral structures has led to changes in the curriculum with more emphasis on new and advanced techniques, procedures and evolution of new and advanced technology (e.g. CAD/CAM & Implants).

# Introduction to Curricular Framework

This study guide is developed as resource assistance to the students and faculty.

The study guide development process included representation from teaching faculty, management, leadership of college and students. The study guide is made to achieve and alignment between societies' needs, institutional needs, patient needs & student's needs.

The curriculum implemented is a hybrid type of curriculum which has both horizontal and vertical integration. Spiral integration is introduced as an adjunct to horizontal and vertical integration. The curriculum spans over 3 phases

PHASE 1 (Year 1&2): Includes basic sciences Anatomy, Physiology, Biochemistry, Oral Biology & Tooth Morphology, Sciences of Dental Materials, Pharmacology and Community Dentistry, General Pathology, Islamiyat and Pakistan Studies.

It also includes preclinical Prosthodontics and Operative Dentistry.

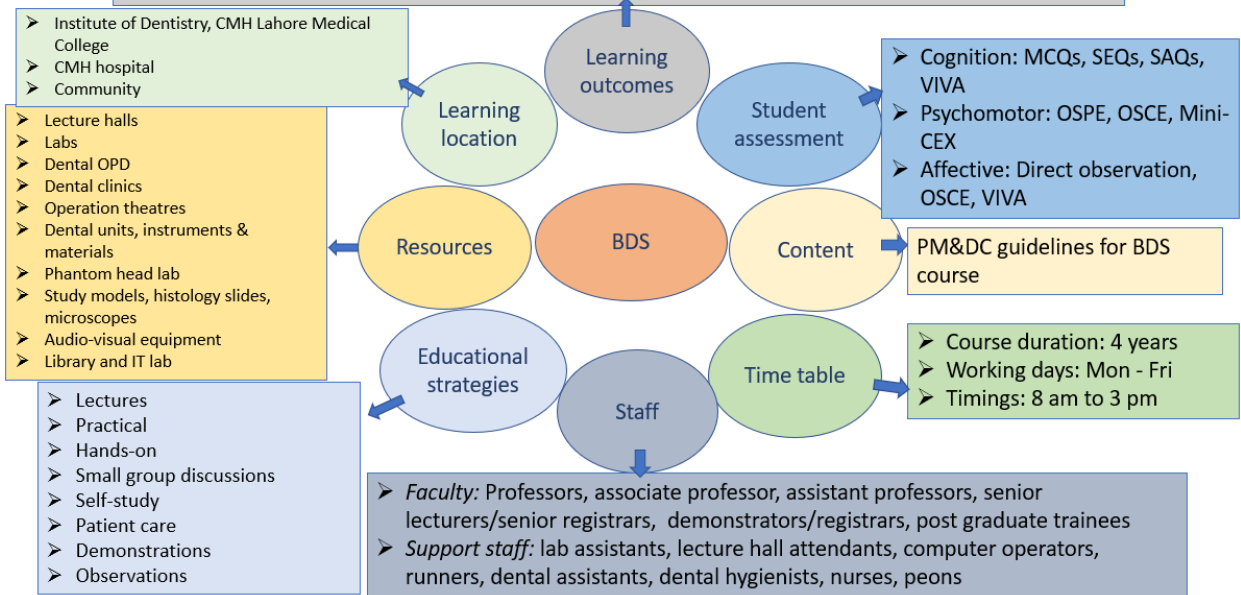
PHASE 2 (Year 3rd & Final Year): includes Periodontology, Oral Pathology, Oral Medicine, General Medicine, General Surgery, Oral Surgery, Prosthodontics, Orthodontics, Operative Dentistry.

## 4 Years Curricular Framework:

<b>BDS SCHEME OF STUDIES</b>
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BASIC DENTAL SCIENCES / PRE-CLINICAL YEAR		CLINICAL YEARS	
1st YEAR	2nd Year	3rd Year	Final Year
Anatomy	Science of Dental Material	Periodontology	Prosthodontics
Physiology	General Pathology	Oral pathology	Operative Dentistry
Biochemistry	Pharmacology	Oral Medicine	Oral Surgery
Pak studies & Islamic Studies	Community Dentistry	Gen. Medicine	Orthodontics
Oral Biology & Tooth Morphology	Pre-Prosthodontics	Gen. Surgery	
	Pre-Operative Dentistry	Oral Surgery	
		Prosthodontics	
Self-Directed Learning Sessions			

By the end of 4<sup>th</sup> year, BDS students will be able to co-relate and apply the basic and clinical dental sciences knowledge, skills and attitudes to effectively manage and treat dental patients according to the competencies laid down by PM&DC



## **BDS Programme Curricular Outcomes:**

At the end of four years dental undergraduate program, the graduates should be able to:

1. Independently assess the patients, order relevant investigations, and formulate a treatment plan.
2. Render treatments in the domain of general dental practitioners to their patients in time efficient and quality-controlled manner.
3. Practice evidence-based dentistry.
4. Correlate basic dental sciences knowledge and skills with clinical dental practice.
5. Modify dental treatments according to patient's special needs, if any, in the form of medical conditions, physical or mental disabilities etc.
6. Assess and refer the patients with case difficulty indices requiring consultation or treatment by specialists.
7. Show empathy and respect in their attitude and behaviour towards their patients.
8. Maintain high ethical and professional standards in their pursuit of clinical excellence.
9. Draw upon their existing knowledge and update it through continuing education programs.
10. Exercise infection control protocol guidelines laid out by their local health councils.
11. Exercise management qualities to maintain single or multiple unit private practices where applicable.
12. Work in a team of other health care professionals including dentists, dental assistants, dental hygienists, laboratory technicians, ceramists and dental nurses etc.
13. Maintain patient records with emphasis on legal and patient confidentiality aspects.
14. Provide basic life support to patients requiring critical care in or outside dental set up.
15. Manage dental emergencies in a dental set up.
16. Demonstrate clear verbal and written communication skills.

## **Co-ordinators First Year BDS 2020-2021:**

<b>Coordinator Name</b>	<b>Department</b>	<b>Tel Extension</b>
<b>Dr. Ansa Rabia</b> Professor & HOD	Anatomy	494
<b>Dr. Tanzeela Akram</b> Professor & HOD	Physiology	463
<b>Dr. Saira Atif</b> Professor & HOD	Oral Biology & Tooth Morphology	335
<b>Dr. Amenah Malik</b> Professor & HOD	Bio Chemistry	501



## Hours of Teaching for Year 1 BDS for the Session:

Sr. No.	Subject	Lecture & Tutorial hours	Practical/ Dissection hours	Self-study hours	Total hours at IOD	Hours required by PMC
1	Anatomy	116	336	-	452	400
2	Physiology	152	66	36	254	250
3	Biochemistry	132	66	-	198	170
4	Oral Biology & Tooth Morphology	135	72	-	207	160
5	Islamiyat & Pakistan Studies	36	-	-	36	35

### Introduction to Physiology Department:

The Physiology Department since inception of the college has made a steady and noteworthy progress. The department is headed by Prof. Dr. Tanzeela Akram ably supported by a team of seasoned and experience teachers. This department is well known for providing not only world class training to the under-graduates but also in breeding curiosity to know the unknown. The faculty members of this department who are highly qualified and dedicated are the source of inspiration for all their students to seek guidance for their academic and professional excellence. They along with the Head of the Department have established an up-to-date laboratory as well as BIOPAC student lab that is an integrated life science teaching solution that includes hardware, software and curriculum materials that students and faculty use to record data from their own bodies, animals or tissue preparations. A post-graduate section has been established where, under permission from the NUMS University we hope to start our M.Phil (Physiology) classes in the very near future.

### Aim:

- To expedite the academic growth and development of the undergraduate students.
- To enhance the culture of research in both under and post graduate students.
- Development of trained medical faculty in basic sciences.

### Resources:

- A. Teaching resources.
- B. Supporting staff.
- C. Infrastructure resources.

**Teaching Resources:****Faculty Members:**

<b>DEPARTMENT OF PHYSIOLOGY INVOLVED IN BDS TEACHING</b>			
1	Dr. Tanzeela Akram	Professor (HOD, IOD)	MBBS, M.Phil
2	Dr. Ayesha Sadiqa	Assistant Professor	BDS, M. Phil, PhD
3	Dr. Asma Khan	Demonstrator	BDS
4	Dr. Ayesha Fatima	Demonstrator	BDS
5	Dr. Abdullah Mumtaz	Demonstrator	BDS

**Supporting Staff**

- Lab in-charge 1.
- Lab assistants and technician 5.
- Computer operator 1.
- Personal assistant 1.
- Lecture hall attendant 1.
- Store keeper 1.
- Runner 1.

**Infrastructure Resources:**

<b>Sr. #.</b>	<b>Infrastructure Resources</b>	<b>Quantity</b>
<b>1</b>	Lecture hall <ul style="list-style-type: none"> <li>• Seating Capacity</li> <li>• Multimedia</li> <li>• Microphone</li> <li>• Computer system</li> <li>• White board</li> </ul>	1
<b>2</b>	Physiology lab <ul style="list-style-type: none"> <li>• Lab supplies</li> <li>• Equipment</li> <li>• Microscopes</li> </ul>	1
	Small group discussion room	1
<b>3</b>	Mini library	1

## **Teaching and Learning Strategies:**

- Multiple educational methods will be used comprising of self-study, interactive lectures, group discussions, tutorials, practicals, and manual dexterity skill sessions.

### **(i) Methods for achieving cognitive objectives:**

- Interactive lectures using audio visual aids on power point presentation.
- Group discussions in form of large group and small group.
- Collaborative learning.
- Self-study and reading from learning resources.

### **(ii) Methods for achieving psychomotor objectives:**

- Performing lab exercises and practical.

### **(iii) Methods for achieving affective objectives:**

- Interaction with peers, group members, teachers, support staff etc.
- Group discussions (small and large).
- Oral presentations by students

## **Learning Methodologies:**

The following teaching /learning methods are used to promote better understanding:

- Interactive lectures.
- Small group discussions.
- Practical and manual skill sessions.
- Self-directed learning.
- Assignments.
- Oral presentations by students.

### **Interactive lectures:**

In large group, the lecturer introduces a topic which explains the underlying phenomena through questions, pictures, exercise, etc. Students are actively involved in the learning process.

### **Small group discussions:**

This format helps students to clarify concepts and acquire skills and attitudes. Students exchange opinions and apply knowledge gained from lectures and self-study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

### **Practical and manual skills:**

In practical sessions students perform practical as assigned in the curriculum and syllabus provided by PMDC. They are also required to maintain a practical manual of the lab work. Understanding and effectively using the microscope, lab apparatus, blood pressure apparatus etc.

### **Self- directed learning:**

Students' take 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 or afterwards for self-study.

### **Assignments:**

Students are given written formative assignments on designated topics.

## Curriculum Implementation:

Curriculum implementation refers to putting into practice the official document including course content, objectives, learning and teaching strategies. Implementation process helps the learner to achieve knowledge, skills and attitudes required of the learning tasks. Learners are a pertinent component of the implementation process. Implementation occurs when the learner achieves the intended learning experiences, knowledge, ideas, skills and attitudes which are aimed to make the learner an effective part of the society. Curriculum implementation also refers to the stage at which curriculum is put into effect. There has to be an implementing agent as well. Teacher is an important part of this process and implementation of the curriculum is the way the teacher selects and utilizes various components of the curriculum. Implementation occurs when the teacher's formulated course content, teacher's personality and teaching and learning environment interact with the learners. Therefore, curriculum implementation is how the officially planned course of study is translated and reflected by the teacher into schemes of work, lesson plans, syllabus and resources are effectively transferred to the learners. Curriculum implementation can be affected by certain factors such as teachers, learners, learning environment, resource materials and facilities, culture and ideology, instructional supervision and assessments.

## Personnel involved in teaching and facilitation:

(i) Lectures delivery by:	Prof. Dr. Tanzeela Waqar	(HOD Physiology IOD)
	Dr. Ambreen Tauseef	(Professor)
	Dr. Huma Saeed Khan	(Associate Professor)
	Dr. Farhat Khurram	(Associate Professor)
	Dr. Qudsia Umaira	(Associate Professor)
	Dr Ayesha Sadiqa	(Assistant Professor)

### (ii) Demonstrators for practical sessions:

Dr. Asma Khan, Dr. Ayesha Fatima, Dr. Abdullah Mumtaz

### (iii) Support staff: 11

## Time Frame:

<b>Course duration:</b>	36 weeks
<b>Lectures:</b>	Monday (08:00 to 08:55am), Tuesday (8:55 to 9:50am), Thursday (12:10 to 01:05am), Friday (08:00-09:00)
<b>Total Hours Of Lectures:</b>	152
<b>Tutorial / SGD:</b>	Tuesday (9:50 to 10:45am) alternate week
<b>Practical:</b>	Wednesday (11:15am to 1:05pm), Thursday (1:05 to 3:00 pm), Friday (11:00am to 01:00pm)
<b>Total Hours of Practical / Tutorials / SGD :</b>	<b>66</b>
<b>Self-study:</b>	Friday (02:00 to 03:00pm)

**TOTAL HOURS OF SELF STUDY:** 36

**TOTAL STUDY HOURS:** 254

**Academic Calendar:**

<b>BLOCK I</b>  10+1=11 weeks	<b>BLOCK II</b>  8+1=9 weeks	<b>BLOCK III</b>  8+1=9 weeks
Research Methodology & Evidence based Medicine, Islamiyat, Pakistan Studies  Behavioural Science & Professionalism		

# PHYSIOLOGY BLOCK I

## CELL

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	<b>Homeostasis</b>	Appraise functional Organization of the Human Body and Control of the "Internal Environment"	<ul style="list-style-type: none"> <li>Recognize the interplay of various organ systems in maintaining homeostasis.</li> <li>Identify the role of feedback mechanisms (positive, negative, feed forward) in maintaining 'internal milieu'.</li> <li>Differentiate between composition of intracellular and extra cellular fluid</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>SGD</li> </ul>	<ul style="list-style-type: none"> <li>MCQ</li> <li>SAQ/SEQ</li> <li>Structured viva</li> </ul>
2.	<b>Cell Physiology</b>	Relate the structure of cell and its various components to metabolic processes, genetic control and locomotion	<ul style="list-style-type: none"> <li>Revisit the structure and function of the cell and its organelles (cell Membrane, cytoplasmic organelles, nuclear membrane, nuclear organelles)</li> <li>Classify various</li> <li>Compare and contrast modes of transport of substances across the cell-membrane with examples</li> <li>(osmosis, diffusion, facilitated diffusion, primary active transport, secondary active transport)</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>SGD</li> </ul>	<ul style="list-style-type: none"> <li>MCQ</li> <li>SAQ/SEQ</li> <li>Structured viva</li> </ul>

## NERVE AND MUSCLE

1.	<b>Membrane Potentials and</b>	Differentiate various types and phases of action	<ul style="list-style-type: none"> <li>Appraise basis of development of membrane potential</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>SGD</li> </ul>	<ul style="list-style-type: none"> <li>MCQ</li> <li>SAQ/SEQ</li> </ul>
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	<b>Action Potentials</b>	potentials on the basis of nerve morphology, concentration of ions in body fluid compartments and clinical significance.	<p>across excitable membrane.</p> <ul style="list-style-type: none"> <li>• Recognize Nernst potential and its importance in generation of membrane potential.</li> <li>• Identify various factors/mechanisms responsible for the genesis of membrane potential (role of channels, carrier proteins, stimuli).</li> <li>• Illustrate different phases of action potential mentioning details of ionic changes occurring during each phase of action potential.</li> <li>• Distinguish types and importance of refractory period.</li> <li>• Differentiate between myelinated and non-myelinated nerve fibers based on their structure and characteristics.</li> </ul>		<ul style="list-style-type: none"> <li>• Structured viva</li> </ul>
2.	<b>Excitation contraction coupling and NMJ</b>	Correlate the physiological mechanism of Neuromuscular, Transmission and Excitation-Contraction Coupling with various neuromuscular diseases.	<ul style="list-style-type: none"> <li>• Tabulate macroscopic, microscopic, functional differences of various types of muscles.</li> <li>• Illustrate neuromuscular junction, sequence of events taking place during neuromuscular transmission</li> <li>• Explain the physiological importance of a motor unit</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>



			<ul style="list-style-type: none"> <li>Describe the ionic and chemical basis of muscle contraction.</li> <li>Distinguish between phases of muscle contraction in detail.</li> <li>Relate the pathophysiology of neuromuscular transmission in myasthenia gravis</li> </ul>		
3.	<b>Excitation and Contraction of Smooth Muscle</b>	Appreciate characteristics of smooth muscle contraction with their physiological significance.	Describe the role of SER in smooth muscle contraction.	<ul style="list-style-type: none"> <li>Lectures</li> <li>SGD</li> </ul>	<ul style="list-style-type: none"> <li>MCQ</li> <li>SAQ/SEQ</li> <li>Structured viva</li> </ul>

## CVS

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	<b>Physiological anatomy of heart and cardiac action potential</b>	Appreciate the functional characteristics of cardiac muscle, action potential and cardiac impulse	<ul style="list-style-type: none"> <li>Appreciate the physiological arrangement of right and left hearts along with the parallel arrangement of systemic circulation.</li> <li>Recognize physiological anatomy of cardiac muscles, its functional syncytium and intercalated disc</li> <li>Differentiate between cardiac, skeletal and smooth muscles based on macro-, microscopic and functional differences, action potentials.</li> <li>Distinguish ionic changes in different phases of action potential within cardiac muscle</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>SGD</li> </ul>	<ul style="list-style-type: none"> <li>MCQ</li> <li>SAQ/SEQ</li> <li>Structured viva</li> </ul>

			<ul style="list-style-type: none"> <li>• Correlate the phases with ionic changes during pacemaker action potential in heart</li> <li>• Comprehend cardiac impulse transmission</li> </ul>		
2.	<b>Cardiac cycle</b>	Compare and contrast the pressure and volume changes in different components of circulatory system during cardiac cycle	<ul style="list-style-type: none"> <li>• Illustrate pressure and volume changes during various phases of cardiac cycle</li> <li>• Illustrate pressure-volume diagram of left heart</li> <li>• Comprehend preload and afterload, its influence on stroke volume (The Frank-Starling's mechanism)</li> <li>• Discuss the autonomic regulation of heart</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>
3.	<b>Control of Local Blood</b>	Identify the dynamics of local and peripheral Blood flow	<ul style="list-style-type: none"> <li>• Distinguish between acute and chronic control of local blood flow.</li> <li>• Conceptualize active and reactive hyperemia</li> <li>• Relate the blood flow control to total peripheral resistance</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>
4.	<b>Cardiac output and venous return</b>	Analyze the factors regulating venous return and cardiac output at rest and during exercise.	<ul style="list-style-type: none"> <li>• Understand the determinants of cardiac output and factors affecting cardiac output.</li> <li>• Appreciate the mechanics of low and high cardiac outputs along with their effects on heart.</li> <li>• Comprehend the factors affecting stroke volume, heart rate and total peripheral resistance.</li> <li>• List the functions of veins</li> <li>• Identify factors regulating venous return and significance of venous reservoirs.</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>

			<ul style="list-style-type: none"> <li>• Appreciate the equality of cardiac output and venous return.</li> </ul>		
5.	<b>Arterial blood pressure</b>	Summarize regulatory mechanisms of blood pressure & cardiac output control in health and disease	<ul style="list-style-type: none"> <li>• Comprehend the determinants of arterial pressure, factors affecting and mechanisms regulating blood pressure on short- and long-term basis.</li> <li>• Recognize mean arterial pressure and its significance.</li> <li>• Comprehend the individual and integrative role of baroreceptors, chemoreceptor, volume receptors, arterial natriuretic factors and Renin-angiotensin - aldosterone system in regulation of arterial pressure.</li> <li>• Understand the characteristics of regional circulations (skeletal muscles, pulmonary, coronary &amp; cerebral) and factors regulating thereof</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>
6.	<b>Circulatory shock</b>	Compare various types of shock and their pathophysiology	<ul style="list-style-type: none"> <li>• Discriminate various types of shock, its types and stages of development</li> <li>• Differentiate between compensated and uncompensated shock.</li> <li>• Recognize the short term and long-term compensatory mechanisms in circulatory shock.</li> <li>• Diagnose and treat various types of shock based on clinical scenarios</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>
7.	<b>ECG</b>	Interpret normal ECG	<ul style="list-style-type: none"> <li>• Comprehend basis of ECG, different ECG Leads and their placements</li> </ul>	<ul style="list-style-type: none"> <li>• LEC/Practical</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> </ul>

			<ul style="list-style-type: none"> <li>• Draw and label normal ECG showing various waves, segments and intervals</li> <li>• Understand significance of waves, segments and intervals of ECG</li> <li>• Calculation of heart rate and various intervals and segments</li> <li>• Appreciate relationship between vector and lead, type and locations of leads and principles for vector analysis in a normal heart</li> </ul>		<ul style="list-style-type: none"> <li>• Structured viva</li> </ul>
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**LIST OF PHYSIOLOGY PRACTICALS**

**BLOCK I**

1.	Record the Blood Pressure of an SP using palpatory and Auscultatory Method.
2.	Record the effects of posture and Exercise on Blood Pressure
3.	Record & Interpret normal ECG by placing all the chest and limb leads on an SP
4.	Examine the Radial Pulse and comment on rate, rhythm and character.
5.	Examine the Heart Sound on Pulmonary, Aortic, Mitral and Tricuspid areas

## PHYSIOLOGY BLOCK II:

### HEMATOLOGY AND IMMUNOLOGY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	<b>Hemopoiesis</b>	Describe the Morphology and Genesis of blood cells	<ul style="list-style-type: none"><li>• Differentiate between various types of blood cells on the basis of their morphological and physiological characteristics.</li><li>• Overview sites of hemopoiesis in the body during different stages of life along with composition and functions of bone marrow.</li><li>• Identify the factors regulating erythropoiesis and maturation of RBC.</li><li>• Appreciate the composition of blood and general functions of blood.</li></ul>	<ul style="list-style-type: none"><li>• Lectures</li><li>• SGD</li></ul>	<ul style="list-style-type: none"><li>• MCQ</li><li>• SAQ/SEQ</li><li>• Structured viva</li></ul>
2.	<b>Red Blood Cells Dyscrasias</b>	Differentiate between various types of anemias and their clinical and lab presentation	<ul style="list-style-type: none"><li>• Relate the morphology and physiology of different types of hemoglobin</li><li>• Compare and contrast different types of anemia on the basis of etiology, pathophysiology, clinical</li></ul>	<ul style="list-style-type: none"><li>• Lectures</li><li>• SGD</li></ul>	<ul style="list-style-type: none"><li>• MCQ</li><li>• SAQ/SEQ</li><li>• Structured viva</li></ul>

			<p>presentations and blood picture.</p> <ul style="list-style-type: none"> <li>• Describe etiology, pathophysiology and clinical presentation of polycythemia.</li> </ul>		
3.	<b>WBCs &amp; Immunity</b>	Classify different types of immunity on the basis of cell types and their role in defense mechanism.	<ul style="list-style-type: none"> <li>• Relate the morphology and physiology of different WBCs with clinical presentations of leucopenia, leukocytosis and leukemia.</li> <li>• Appraise the clinical significance of RES reticuloendothelial system.</li> <li>• Describe pathophysiology of inflammation and necrosis</li> <li>• Describe the physiological basis of vaccination.</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> </ul> <p>Structured viva</p>
4.	<b>Hemostasis and Blood Coagulation</b>	Compare and contrast various bleeding disorders.	<ul style="list-style-type: none"> <li>• Identify role of cells and proteins involved in the process of maintaining hemostasis.</li> <li>• Differentiate between intrinsic and extrinsic regulations of blood coagulation</li> <li>• Discuss the morphology,</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> </ul> <p>Structured viva</p>

			etiology, pathophysiology and clinical presentation of thrombocytopenia, thrombocytosis and hemophilia		
5.	<b>Blood grouping and Transfusion reactions</b>	Analyze transfusion reactions	<ul style="list-style-type: none"> <li>• Explain the principles of blood grouping keeping in view their physiological significance.</li> <li>• Identify the various blood groups and hazards of matched and mismatched blood</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured viva</li> </ul>

## RESPIRATORY AND HIGH ALTITUDE

S.NO	Topic	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1.	<b>Introduction to Respiratory System</b>	<ul style="list-style-type: none"> <li>• Correlate the anatomy of respiratory tract with its functions</li> <li>• Appreciate the role of conductive and gas exchange zones of lungs</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the functional anatomy of various parts of respiratory system</li> <li>• Highlight the non-respiratory functions of respiratory tract</li> </ul>	Lectures /SGD	MCQ/SAQ/ structured viva
2.	<b>Pulmonary Mechanics</b>	<ul style="list-style-type: none"> <li>• Analyze the mechanics of respiration</li> <li>• Analyze lung volume and pressure changes during quiet and forceful breathing</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish functions of inspiratory and expiratory muscles during quiet and forceful respiration</li> <li>• Correlate normal lung volumes/ capacities to various</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva

			pressures and volume changes during forceful respiration and changes in volume and capacities		
3.	<b>Pulmonary Compliance</b>	Explain factors determining pulmonary compliance	<ul style="list-style-type: none"> <li>• Discern lung and chest wall compliance</li> <li>• Identify composition &amp; role of surfactant in alveolar surface tension</li> <li>• State concept of work of breathing</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva
4.	<b>Respiratory Membrane &amp; Diffusion of Gases</b>	Compare the different modes of gas transport in blood	<ul style="list-style-type: none"> <li>• Appreciate the layers of respiratory membrane in detail</li> <li>• Appraise concept of diffusing capacity through respiratory membrane</li> <li>• Identify factors affecting gas diffusion through respiratory membrane</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva
5.	<b>Diffusion of gases &amp; Oxygen transport</b>		<ul style="list-style-type: none"> <li>• State the mechanics of oxygen diffusion from alveoli to blood</li> <li>• Distinguish mechanism of oxygen transport in the arterial blood, tissue fluid and cell</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva



6.	<b>Oxygen transport &amp; Dissociative curve</b>		<ul style="list-style-type: none"> <li>• Identify the role of Hb in oxygen transport</li> <li>• Analyze normal oxygen-hemoglobin dissociation curve by explaining factors that shift oxygen-hemoglobin dissociation curve to right and left</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva
7.	<b>Carbon dioxide transport</b>		<ul style="list-style-type: none"> <li>• Identify various chemical form in which CO<sub>2</sub> is transported in blood</li> <li>• Discern normal CO<sub>2</sub> dissociation curve explaining Bohr effect, haldane effect and chloride shift</li> </ul>	Lectures /SGD	MCQ/SAQ/ structured viva
8.	<b>Nervous regulation of respiration</b>	<ul style="list-style-type: none"> <li>• Compare the chemical and neural regulation of respiration during rest and exercise</li> <li>• Correlate ventilation with perfusion in different lung zones</li> </ul>	<ul style="list-style-type: none"> <li>• State different group of neurons composing respiratory center</li> <li>• Review nervous control of inspiration and respiratory rhythm</li> <li>• Recognize the regulatory mechanism of hering-breuer inflation reflex</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva
9.	<b>Chemical regulation of respiration</b>		<ul style="list-style-type: none"> <li>• Appraise location, function and stimulation (by CO<sub>2</sub> and H<sup>+</sup>) of central</li> </ul>	Lectures/ SGD	MCQ/SAQ/ structured viva

			chemosensitive area <ul style="list-style-type: none"> <li>Identify the role of peripheral chemoreceptors for control of respiration</li> <li>Determine the composite effects of PCO<sub>2</sub>, pH, &amp; PO<sub>2</sub> on alveolar ventilation</li> </ul>		
<b>GIT</b>					
S.No.	Topic/ Theme	Learning outcomes	Learning objectives/content	Instructional strategies	Assessment tool
1	<b>Neural control of GIT</b>	Analyze the interplay of autonomic and enteric nervous system in GI motility	<ul style="list-style-type: none"> <li>Appraise physiologic anatomy of gastrointestinal tract with specific focus on role of interstitial cells of <b>Cajal</b></li> <li>Compare functions of mesenteric and myenteric plexuses</li> <li>Link the role of autonomic nervous system in GI motility</li> </ul>	Lectures/SGD	MCQ/SAQ/structured viva
2	<b>Food Processing in oral cavity</b>	Correlate the Pathophysiology of Mastication and deglutition with specified clinical presentations	<ul style="list-style-type: none"> <li>Recognize the role of teeth, tongue, cheeks and saliva in assimilation and digestion of food.</li> <li>Distinguish three phases of deglutition reflex</li> </ul>	Lectures/SGD	MCQ/SAQ/structured viva

			<ul style="list-style-type: none"> <li>Outline different types of peristalsis in esophagus are taking place</li> </ul>		
3.	<b>Vomiting reflex</b>	Describe mechanism (stimuli, pathways, center) and clinical significance of vomiting Reflex	<ul style="list-style-type: none"> <li>Explain the mechanism of vomiting reflex</li> <li>Appraise the location and function of vomiting center/ chemoreceptor trigger zone in the brain</li> </ul>	Lectures/SGD/ CBL	MCQ/SAQ/ structured viva
4.	<b>Liver</b>	To analyze the non-metabolic functions of liver	<ul style="list-style-type: none"> <li>Explain the role of liver in non-metabolic domains and give clinical importance of each</li> </ul>	Lectures /SGD	MCQ/SAQ/ structured viva
<b>RENAL</b>					
<b>S. No</b>	<b>Theme/topic</b>	<b>Learning outcomes</b>	<b>Learning objectives/content</b>	<b>Teaching strategy</b>	<b>Assessment tool</b>
1	<b>Edema</b>	Elucidate edema types, clinical significance and factors responsible for causing edema	Analyze the role of starling forces and other safety factors (lymphatics, negative ISF pressure) in prevention of edema.	Lectures/SGD	MCQ/SAQ/structured viva
2	<b>Functional anatomy of kidney</b>	Recognize functions of kidneys.	<ul style="list-style-type: none"> <li>Outline the physiological anatomy of nephron and glomerular capillary membrane</li> <li>List primary and endocrinal functions of kidney</li> <li>Physiology of micturition reflex</li> </ul>	Lectures/SGD	MCQ/SAQ/structured viva

3	<b>Glomerular Filtration</b>	Analyze the process of formation of glomerular filtrate and its regulation	<ul style="list-style-type: none"> <li>• Relate the determinants of GFR to clinical conditions.</li> <li>• Identify the parameters involved in autoregulation of GFR and blood flow.</li> </ul>	Lectures/SGD/ CBL	MCQ/SAQ/structured viva
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**List of Practicals- Block II**

1	Study Neubauer's chamber in detail using Compound Microscope judiciously
2	Determination of RBC count by using Neubauer's chamber.
3	Determination of WBC count-TLC
4	Determination of Platelet count
5	Determination of Haemoglobin in the blood. (Sahili's method)
6	Determine Red cell indices.
7	Estimate haematocrit (PCV).
8	Estimate ESR by Westergren method
9	Determine ABO & Rh blood groups.
10	Estimate bleeding & clotting time.
11	Determination of DLC.

# PHYSIOLOGY BLOCK III

## Neurosciences

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	<b>Sensory receptors &amp; Receptor Potential</b>	Interpret the physiological mechanisms controlling the functions of sensory system.	<ul style="list-style-type: none"> <li>• Classify the various types of sensory receptors.</li> <li>• Explain the sensory stimuli and differential sensitivity of receptors.</li> <li>• Explain the sensory transduction into nerve impulses.</li> <li>• Describe the local electrical currents at nerve endings— receptor potentials, adaptation of receptors</li> <li>• Classify the nerve fibers that transmit different types of signals on the physiological basis.</li> <li>• Describe the transmission of signals of different intensity in nerve tract (spatial and temporal summation)</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured Viva</li> </ul>
2.	<b>Sensory tracts and cortex</b>	Explain the dorsal column medial lemniscal system and anterolateral pathways	<ul style="list-style-type: none"> <li>• Identify the sensations carried by different sensory tracts</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured Viva</li> </ul>

			<ul style="list-style-type: none"> <li>• Differentiate between different sensory tracts</li> <li>• Describe the somatosensory cortex and somatosensory association areas</li> <li>• Explain the various thermal sensations, thermal receptors and their excitation and transmission of thermal signals in the nervous system</li> </ul>		
3.	<b>Brain Analgesia System</b>	Correlate the pathophysiological basis of pain pathways to their clinical significance	<ul style="list-style-type: none"> <li>• Classify the different types of pain.</li> <li>• Compare and contrast the perception and transmission of the different types of pain.</li> <li>• Explain the pain suppression system in the brain and spinal cord.</li> <li>• Describe the brain's opiate system—endorphins and enkephalins. Describe the clinical abnormalities of pain and other somatic Sensations</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured Viva</li> </ul>
4.	<b>Motor system / Spindle / stretch reflex</b>	Interpret the physiological mechanisms controlling the	<ul style="list-style-type: none"> <li>• Relate the organization of grey and white matter in spinal cord to the</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	<ul style="list-style-type: none"> <li>• MCQ</li> <li>• SAQ/SEQ</li> <li>• Structured Viva</li> </ul>

		functions of motor system and higher mental functions.	<p>pathophysiology of various spinal cord injuries.</p> <ul style="list-style-type: none"> <li>• Explain the role of proprioceptors (muscle spindles and Golgi tendon organs) in motor movements</li> <li>• Explain stretch reflex</li> <li>• Describe the flexor reflex and the crossed extensor reflex.</li> <li>• Explain the reciprocal inhibition and reciprocal innervation.</li> <li>• Identify the reflexes of posture and locomotion in the spinal cord.</li> </ul>		
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## Special Senses

S.No	Module/ Topics	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1.	<b>Physiology of Eye</b>	Explain the physiology of optical system of eye and understand errors of refraction	<p>Explain refraction and concept of convergence and divergence.</p> <p>Define focal length, focal point and power of lens.</p> <p>Differentiate between emmetropia, myopia, hyperopia, astigmatism, presbyopia and describe their treatment</p>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> <li>• Practical demonstration and performance</li> </ul>	MCQ/SAQ/SEQ/structured Viva/OSPE
2.	<b>Physiology of Ear</b>	Explain the physiology middle ear	Describe the physiological Anatomy of ear	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	MCQ/SAQ/SEQ/structured Viva/OSPE

			Explain the mechanism of conduction of sound waves through the ear to the cochlea	<ul style="list-style-type: none"> <li>• CBL</li> <li>• Practical demonstration and performance</li> </ul>	
			Describe “Impedance Matching” and its importance		
			Describe the process of attenuation of sounds		
3.	Physiology of taste	Explain the physiology of taste sensation and its pathway	Describe the primary sensations of taste	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> <li>• Practical demonstration and performance</li> </ul>	MCQ/SAQ/SEQ/structured Viva/OSPE
			Describe the mechanism of stimulation of taste buds and the transmission of signals to CNS		
4.	Physiology of olfaction	Explain the physiology of olfaction and its pathway.	Explain the physiological anatomy of olfactory membrane.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	MCQ/SAQ/SEQ/structured Viva
			Explain the mechanism of stimulation of olfactory cells.		
			Identify the primary sensations of smell		
			Describe the transmission of signals of olfaction into the central nervous system		
<b>ENDOCRINOLOGY</b>					
S.No	Module/ Topics	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1.	Basics of endocrinology & Mechanism of action of hormones	Appraise the mechanisms of action of hormones	<ul style="list-style-type: none"> <li>• Identify the various hormone receptors and their activation</li> <li>• Explain the mechanism of intracellular signalling after hormone receptor activation</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> </ul>	MCQ/SAQ/SEQ/structured Viva



			<ul style="list-style-type: none"> <li>• Explain the second messenger mechanisms for mediating intracellular hormonal functions</li> <li>• Identify the hormones that act mainly on the genetic machinery of the cell</li> </ul>		
2.	<b>Hormones of hypothalamus and Pituitary gland</b>		<ul style="list-style-type: none"> <li>• Explain the pituitary gland and its relation to the hypothalamus</li> <li>• Summarize the hypothalamic-hypophysial portal blood vessels of the anterior pituitary gland and its Significance</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	MCQ/SAQ/SEQ/ structured Viva
			<ul style="list-style-type: none"> <li>• Recall the functions and regulation of growth hormone</li> <li>• Differentiate between hypopituitarism and hyperpituitarism and its pathophysiological basis</li> <li>• Explain the posterior pituitary gland and its relation to the hypothalamus</li> <li>• Describe the physiological functions of ADH and oxytocin Hormone</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	MCQ/SAQ/SEQ/ structured Viva

3.	Thyroid gland		<ul style="list-style-type: none"> <li>• Recall the synthesis and secretion of the thyroid hormone</li> <li>• Explain the functions of the thyroid hormone</li> <li>• Summarize the regulation of thyroid hormone secretion</li> <li>• Identify the disorders of the Thyroid gland and their pathophysiological basis</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	MCQ/SAQ/SEQ/ structured Viva
4.	Calcium regulating hormones		<ul style="list-style-type: none"> <li>• Explain the regulation of calcium and phosphate in the extracellular fluid and plasma</li> <li>• Enlist the actions of vitamin D</li> <li>• Explain the effect of parathyroid hormone on calcium and phosphate concentrations in the extracellular fluid</li> <li>• Summarize the control of parathyroid secretion by calcium ion concentration</li> <li>• Describe the actions of calcitonin</li> <li>• Explain the pathophysiology of parathyroid hormone, vitamin D, and bone diseases</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD</li> <li>• CBL</li> </ul>	MCQ/SAQ/SEQ/ structured Viva

5.	<b>Hormones of Adrenal cortex</b>	Appraise the mechanisms of action of hormones	<ul style="list-style-type: none"><li>• Explain synthesis and secretion of adrenocortical hormones</li><li>• Enlist the functions of aldosterone</li><li>• Enlist functions of the glucocorticoids</li><li>• Describe the disorders of adrenocortical secretion and their pathophysiological basis</li></ul>	<ul style="list-style-type: none"><li>• Lectures</li><li>• SGD</li><li>• CBL</li></ul>	MCQ/SAQ/SEQ/ structured Viva
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## REPRODUCTIVE SYSTEM

S.No	Module/ Topics	Learning Outcomes	LEARNING OBJECTIVES	Instructional Strategies	Assessment tools
1.	Pregnancy	Appreciate the physiological adjustments during pregnancy	<ul style="list-style-type: none"> <li>• Summarize the response of the mother's body to pregnancy</li> <li>• Explain the changes in the maternal circulatory system during pregnancy</li> <li>• Explain the role of human chorionic gonadotropin in pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• SGD PBL/ CBL</li> </ul>	MCQ/SAQ/SEQ/ structured Viva

### List of Physiology Practicals- Block III

1.	Examine the 1 <sup>st</sup> – 6 <sup>th</sup> Cranial nerves on an SP
2.	Examine the 7 <sup>th</sup> – 12 <sup>th</sup> Cranial nerves on an SP
3.	Perform Deep Tendon reflexes
4.	Perform Superficial reflexes on an SP
5.	Record the normal body temperature

### Learning Resources:

Subject components	Learning resources/Books
Blood	Guyton and Hall Textbook of Medical Physiology, 13th Edition by John E. Hall.
Nerve physiology	
Muscle	Human Physiology: From Cells to Systems, 8th Edition by Lauralee Sherwood.
Biological membranes, solutes and solutions	
Heart and circulation	Ganong's Review of Medical Physiology, 24th Edition (LANGE Basic Science) by Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwyn Brooks.
Respiratory system	
GIT	Electronic modes
Nervous system	
Special sensory including oral physiology	
Endocrine and reproductive physiology	
Renal physiology	

## Other Learning Resources:

Hands-on activities	Students will be involved in practical session and hands-on activities to enhance learning.
Labs	Utilize the lab to relate knowledge to specimens and models available.
Videos	Animated videos of developmental histology to clear the concepts of the students shown during interactive lecture sessions.
Computer lab/CDs/DVDs/Internet resources	To increase the knowledge, students should utilize the available internet resources and CDs/DVDs in main IT lab/personal laptops.
Self-study	Self-study is incorporated to help the student in managing individual tasks/assignments. Student will search for information through available resources.

## Departmental Library:

S. No.	Book Name	Edition	Author
1.	Guyton and Hall	12 <sup>th</sup> Edition	JOHN E. HALL
2.	Guyton and Hall	13 <sup>th</sup> Edition	JOHN E. HALL
3.	Human Physiology	3 <sup>rd</sup> Edition	Silverthorn
4.	Principles of Physiology	3 <sup>rd</sup> Edition	Robert M. Berne Matthew N. Levy
5.	USMLE Step 1(Lecture notes)	2007-2008 Edition	KAPLAN
6.	Basis of Clinical Physiology	Volume 2	Professor M. Akram
7.	Manual of Experimental Physiology	1 <sup>st</sup> Edition	Prof. Dr. Shireen Khawar
8.	Manual of Experimental Physiology	4 <sup>th</sup> Edition	Prof. Dr. Zafar Ali Choudry
9.	Practical Physiology	1 <sup>st</sup> Edition	Prof. Dr. Shafiq Ahmed Iqbal
10.	Basis of Clinical Physiology	Volume 1	Prof. Dr. Muhammad Akram
11.	Basis of Clinical Physiology	Volume 2	Prof. Dr. Muhammad Akram
12.	ACSM's Resources for Clinical Exercise physiology		
13.	System wise SEQs and MCQs with key Reference: Physiology by Guyton	1 <sup>st</sup> Edition	Prof. Dr. Samina Malik
14.	Application & Lange's Review of PHYSIOLOGY	Twentieth Edition	David G. Penney
15.	Guyton and Hall Physiology Review	Third Edition	JOHN E. HALL
16.	Human Physiology (A Study Guide for Student)		M. Yusuf Abro
17.	Lab Manual Physiology (P-1)	Second Edition	M. Mazhar Hussain
18.	Clinical Electrophysiology		
19.	Lippincott's Illustrated Reviews Physiology		Robin R. Preston
20.	Review of Medical Physiology	Twentieth edition	William G. Ganong
21.	Board Review Series Physiology	2 <sup>nd</sup> Edition	Linda S. Costanzo
22.	Clinical Scenarios in Physiology		Saqib Sohail
23.	Essentials of Medical Physiology (JAYPEE)	5 <sup>th</sup> Edition	K Sembulingam Prema Sembulingam
24.	Study Guide for Understanding Statistics	Seventh Edition	Robert R. Pagano
25.	High-Yield Physiology		Ronald W. Dudek
26.	Nerve And Muscle Excitation	Second Edition	Douglas Junge
27.	Essentials of Medical Physiology	Volume 1	Mushtaq Ahmad
28.	Essentials of Medical Physiology	Volume 2	Mushtaq Ahmad
29.	MCQ's Physiology	2 <sup>nd</sup> Edition	Vijaya D Joshi
30.	Human Physiology (MCQ's)	4 <sup>th</sup> Edition	Lan C. Roddie
31.	Practical Physiology	Second Edition	G K PAL
32.	Ganong's (Review of Medical Physiology)	23 <sup>rd</sup> Edition	Kim E. Barrett
33.	Principles and Practice of Medicine	Seventeenth Edition	Christopher R. W. Edwards

## Technical Equipment and Lab Supplies:

Sr. No	Items/ Nomenclature	Sr. No	Items/ Nomenclature
1.	Blood Pressure sets	49.	Divider
2.	Bed Sheets	50.	Table bell
3.	Centrifuge machine	51.	Slide box plastic
4.	Clinical hammer	52.	Height weight machines
5.	Digital balance	53.	Snellen's chart
6.	Illuminated Snellen chart	54.	Revolving screen
7.	DLC counter	55.	Syringe cutter
8.	Distillation plant	56.	Gallon plastic
9.	Haemocytometer	57.	Bucket plastic
10.	Haemometer	58.	Magnetic stirrer
11.	Hammer (steel)	59.	Biopac BSL physiology
12.	Kymo graph	60.	Advance half body with box
13.	Microscope	61.	Thermometer clinical
14.	Micropipette	62.	Beakers
15.	Measuring tape	63.	Bottle with stopper
16.	Neubauer's chamber	64.	Bottler with stopper 24
17.	Ophthalmoscope	65.	ESR tubes
18.	Over head projector (Apollo JL-3)	66.	Glass funnel
19.	Peak flow meter	67.	HB diluting tube
20.	Perimeter	68.	Test tubes
21.	Pipette sucker	69.	Wintrobe tube
22.	Stethoscope	70.	Urinometer
23.	Spirometer	71.	Measuring cylinders (500ml, 250ml, 100ml)
24.	Stethograph	72.	Pipette 2ml
25.	Surgical trays (small, medium, large)	73.	Pipette 5ml
26.	Stop match	74.	Pipette 10ml
27.	Test tube rack steel	75.	Thermometer
28.	Tuning fork (256)	76.	Ear model
29.	Tuning fork (128)	77.	Heart model
30.	Tuning fork (512)	78.	Kidney model
31.	Torch	79.	Eye model
32.	ECG machine	80.	Kidney model female complete
33.	Examination couch	81.	Stomach model
34.	Exercise cycle	82.	Lung model
35.	ESR stand	83.	Wall charts
36.	Weighing machine	84.	Coin jars (500ml) plastic
37.	White board	85.	Pricking pen
38.	White board stand		
39.	Tourniquet		
40.	Burner		
41.	Burner stand		
42.	Pipette stand		
43.	Screw driver set		
44.	Plaier		
45.	Glucometer		
46.	Ishihara book		
47.	Refrigerator		
48.	Stabilizer		

# **Summative Assessment Methods and Policies:**

## **Internal Assessment:**

- Weightage of internal assessment shall be 20 %, each for theory and practical, in BDS Professional Examination.
- The Internal Assessment shall comprise of monthly test / assignments / class presentation / send-ups /class tests / OSPE etc.
- The Internal Assessment record shall be kept in the respective department of the College / Institute and after approval of Principal, a summary as per University registration number shall be furnished to the Controller of Examinations, at least two weeks before the commencement of final examination.
- The result of all the class tests / tools which contribute towards IA will be displayed to the students during an academic year.
- The same internal assessment shall be counted both for annual and supplementary examinations. The students who are relegated, however, can improve the internal assessment during subsequent year
- Internal assessment tools of any subject may be changed after the approval of respective FBS

## **Annual Examination:**

- The weightage of Annual Examination shall be 80%, each for theory and practical, in BDS.
- The examination comprises of a theory paper and practical/clinical examinations as per PM&DC regulations and the Table of Specifications (TOS) of the University.
- The gap between two consecutive theory papers shall not be more than two days.
- The Theory Paper shall be of 3-hours duration, held under the arrangements of the university. It shall have two parts; MCQs and SEQs for the year 2020. It may be changed after the approval of Academic Council.

### **Internal Examiner:**

He/she shall be Professor and Head of Department who has been involved in teaching of the class being examined for at least six months and has delivered 50% of the total lectures. Second preference shall be Associate/Assistant Professor who is involved in teaching of the class and posted there for one year. Third preference shall be a recognized Professor of the subject.

### **External Examiner:**

He/she shall be a Professor/Associate Professor of a recognized Medical/Dental College or at least an Assistant Professor with three years teaching experience in the relevant subject.

### **Conflict of Interest:**

No person shall serve as an examiner whose close relative (wife, husband, son, daughter, adopted son, adopted daughter, grand-son, grand-daughter, brother, sister, niece /nephew, son and daughter- in-law brother and sister- in-law, parental and maternal uncle and aunt etc) is appearing in the examination. All examiners likely to serve as an examiner shall render a certificate in compliance to this para.

### **Paper Setting:**

- Each College / Institute shall forward a set of two question papers as per TOS along with the key for each subject to the Controller of Examinations, at least three months in advance of the annual examination. The question paper as a whole / a question without a comprehensive key shall not be considered towards final paper setting.
- The set of question papers shall be prepared by the respective Head of Department (HoD) and furnished to Controller of Examinations through Head of Institution (HoI)



- The Controller of Examinations shall approve the faculty for the final paper setting having fair representation of each college / institute

**Paper Assessment:**

- The Controller of Examinations shall approve the faculty for the theory paper marking, to be undertaken in the manner as deemed appropriate.
- The Examination Directorate shall coordinate directly with the faculty earmarked for the paper marking
- A student who scores 85% and above marks in any subject shall qualify for distinction in that particular subject.
- A fraction in aggregate marks of a subject shall be rounded off to whole number. If it is less than 0.5 then it will be rounded off to the previous whole number while 0.5 or more will be rounded off to the next whole number.

**Practical Examinations:**

- The Controller of Examiners shall approve the faculty to serve as the internal & external examiners.
- The number of external and internal examiners shall be equal.
- One external & internal examiner each shall be marked for a group of 100 students.
- Candidates may be divided into groups for practical examinations and be standardized by incorporating OSPE stations.
- Practical examination shall be held after the theory examination of the subject but in special cases, it may be held before the theory examination with the approval of the Controller of Examinations. For the purpose of practical/clinical examination, the candidates may be divided into sub groups by the examiners.
- The assessment of the practical examination duly signed by internal & external examiner shall be furnished to the Controller of Examinations within one week of the conclusion of examination.

**Pass Marks:**

- Pass marks for all subjects shall be 50 % in theory and practical, separately.
- No grace marks shall be allowed to any student in any examination.

**Declaration of Result:**

Every effort shall be made to declare the result of each examination within one month of the last practical examination or earlier.

**Promotion:**

No student shall be promoted to the higher classes unless he/she passes all the subjects of the previous class

**Re-totaling:**

Any student may apply to the Controller of Examinations on a prescribed form along with the specified fee.

**Supplementary Examination:**

The interval between a supplementary examination and the previous professional examination shall not be more than two months. There shall be no special supplementary examination.

**Academic Audit:**

The Vice Chancellor may get any academic matter deliberated in the manner as deemed appropriate.

**Issue of Academic Transcript/Detailed Marks Sheet:**

A student desirous of obtaining Academic Transcript / Detailed Mark Sheet may apply to Controller of Examinations along with the prescribed fee for each original copy.

**Withdrawal/Failure:**

Any student who fails to clear the first Professional in BDS or first in four chances, availed or un-availed, shall be expelled as per PM& DC policy and shall not be eligible for fresh admission as a fresh candidate in either BDS.

**Proposed First Professional BDS Examination - 2022**  
**PHYSIOLOGY**

**Table of Specifications for Annual First Professional Examination: Theory**

Time Allowed =03 hrs (Including MCQs)  
 Marks of theory paper =80  
 Internal assessment =20  
 Total marks =100  
 Pass Marks =50  
 40 x MCQs (on separate sheet) (40 Marks) Time = 50 Minutes  
 Q. No. 1,2,3,4,5,6,7,8  
 8x SAQs/SEQs (Recall) = 05 marks each

**Total Marks =40 Marks Time = 2 hour & 10 Minutes**

S. No	Topic	NUMBER OF MCQs (40) Recall: 40  (1 mark each)	NUMBER OF SAQs/SEQs (08) (05 marks each)
1.	Cell, Nerve and Muscle	07	01
2.	Blood	07	01
3.	GIT	04	01
4.	Body fluids and Renal Physiology	03	01
5.	CVS	06	01
6.	Respiration	04	01
7.	Nervous System / Special senses	05	01
8.	Endocrinology & reproduction	04	01
<b>Total</b>		<b>40 (40 Marks)</b>	<b>08 (40 Marks)</b>

## Internal Assessment Calculation (Theory Annual) - 20 Marks

Exams	Weightings	Exams	Percentage
<b>End of Block &amp; Pre- annual Exams</b>	80%	End of Block Exam - I	20
		End of Block Exam - II	20
		End of Block Exam- III	20
		Pre-Annual Exam	20
<b>Modular/ Class Performance</b>	20%	Modular/ Class Tests	20
<b>Total</b>	<b>100%</b>		<b>100%</b>

## Table of Specifications for Annual Professional Exam: Practical

Viva (Theory) 40 marks		Practical/OSCE/OSPE 40 marks			Total
Internal Examiner	External Examiner	OSPE (35)		Practical Journal	
		Observed	Un-observed		
		<b>20</b>	<b>20</b>		
		<b>25</b>	<b>10</b>	<b>5</b>	<b>80</b>

\*Number of observed stations are on the discretion of internal examiners but a minimum of three stations must be kept

<b>Example: - 1</b> Marks= 25 Maximum Stations = 5 Time per stations= 5 mins Total Time= 25 Minutes	<b>Example: - 2</b> Marks =25 Stations = 3 Marks/ Stations= 8+8+9 Time / Stations= 8 Minutes
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## Internal Assessment Calculation (Practical) - 20 Marks

Exams	Weightings	Exams	Percentage
<b>End of Block &amp; Pre- annual Exams</b>	80%	End of Block Practical/OSPE I	20
		End of Block Practical/OSPE II	20
		End of Block Practical/OSPE III	20
		Pre-Annual Exam	20
<b>Class Performance</b>	20%	*SGD/ CBL/ PBL/ Practical	20
<b>Total</b>	<b>100%</b>		<b>100%</b>

\* SGD= Small Group Discussion  
 CBL= Case Based Learning  
 PBL= Problem Based Learning

By the end of year 1, BDS students will be able to co-relate physiological mechanisms of various body systems, biochemical reactions and anatomical structures with clinical significance

