FOUNDATION UNIVERSITY COLLEGE OF DENTISTRY & HOSPITAL, ISLAMABAD

DEPARTMENT OF PHYSIOLOGY:
Students' Study Guide
Year: 1ST Year BDS

1. VISION AND MISSION OF DEPARTMENT

- **Vision:** To be a top- ranked teaching and research-intensive department with best ethical practices
- **Mission:** To educate scholars about physiological basis of diseases in integration with other basic and clinical sciences at undergraduate and postgraduate level so that they can display excellence in professional growth, academics, research and delivery of medical care to the community.
- To produce dedicated and updated faculty in the field of Physiology
- To conduct high quality research for publication in impact factor journals.

Learning Outcomes of Course of Physiology

After completing the course of physiology, the student of 1st Year BDS will be able to:

- Understand physiological mechanisms though which the body meets changing demands while maintaining the internal constancy necessary for all cells and organs to function.
- Understand the basic organization of the cell and the functions of its component parts.
- Explain how the differences in the concentrations of important electrolytes and other substances in the *extracellular fluid* and *intracellular fluid* are brought about by the transport mechanisms of the cell membranes
- Explain how membrane potentials are generated both at rest and during action by nerve and muscle cells.
- Discuss the physiological principles underlying the functioning of skeletal muscles, cardiac muscles and smooth muscles.
- Understand how the cardiovascular system circulation carries out its functions to transport nutrients to the body tissues, to transport waste products away, to transport hormones from one part of the body to another, and, in general, to maintain an appropriate environment in all the tissue fluids of the body for optimal survival and function of the cells.
- Discuss how immune system works for combating the different infectious and toxic agents.
- Understand how respiratory system provides oxygen to the tissues and removes carbon dioxide at rest, during increased respiratory demand and in unusual environmental conditions.
- Explain how central nervous system integrates millions of bits of information from the different sensory

nerves and sensory organs to determine responses to be made by the body.

- Discuss how the alimentary tract provides the body with a continual supply of water, electrolytes, vitamins, and nutrients
- Explain how endocrine and neuroendocrine hormone systems interact with one another to maintain homeostasis.

Learning Teaching Methods

Teaching and learning methods are primarily focused on promoting dynamic learning through active participation of the learner. Active learners are in take charge of their own learning, actively seeking guidance and performance feedback from tutors, and routinely conducting self-assessment of their own learning needs.

The teaching-learning sessions of this course will be of diverse nature and will include: -

1. Large group interactive sessions. (LGIS)
2. Small group discussions (SGIS) including tutorials, demonstrations and practicals.
3. Sessions of Self-directed learning. This is the time during which students are expected to revise what they have learnt in the class, clear their confusions by consulting different text and reference books and prepare their assignments and projects.

Student Assessment

The assessment pattern follows annual examination system.

The theory paper will consist of multiple-choice questions (MCQs) and short essay type questions (SEQs). The practical component is assessed by objective practical exam (OSPE) along with viva voce of the subject.

Reading Material

Textbook: Pocket Companion to Textbook of Medical Physiology by Guyton & Hall. 1st South Asian edition

Reference books:

- Textbook of Medical Physiology by Guyton and Hall. 13th ed
- From Cells to Systems by Lauralee Sherwood. 9th ed
- Physiology by S. Costanzo. 5th ed

2. FACULTY OF PHYSIOLOGY DEPARTMENT

Head of department: Professor Dr. Sadia Ahsin, MBBS, FCPS (Physiology)

Coordinator for BDS: Prof. Dr. Gule Naghma Saeed, MBBS, MPhil (Physiology), FCPS (Physiology)

Faculty members:

1. Professor Dr. Sadia Ahsin MBBS FCPS (Physiology)
2. Prof. Dr Gule Naghma Saeed MBBS, MPhil (Physiology), FCPS (Physiology)
3. Assoc. Prof. Dr Madiha Imran MBBS, MPhil (Physiology), FCPS (Physiology)
4. Assistant Prof. Dr Hira Ashraf MBBS, MPhil (Physiology)
5. Assistant Prof. Dr Hira Ayaz MBBS, MPhil (Physiology
6. Assistant Prof. Dr. Nasar Abbas MBBS, MPhil (Physiology)
7. BDS Demonstrator: Dr. Maryam Naseem
8. BDS Demonstrator: Dr. Fatima Zaheer

COURSE OUTLINE

S #	Course Content	Learning Objectives By the end of the session, students of 1st year BDS will be able to:	Teaching Strategy	Assessment Tool
1	Homeostasis	➢ Define all the terms and their definition ➢ Discuss homeostasis ➢ Explain control systems and feedback mechanisms and relate examples where body control systems fail	LGIS SGIS SDL Structured Tutorials	MCQs SEQs Quiz
2	Structural and physiological functions of Cell, Nerve and Muscle	➢ Discuss functional organization of Cell ➢ Explain functions of organelles ➢ Explain transport mechanisms across cell membrane including diffusion and osmosis ➢ Explain Primary and secondary Active transports ➢ Discuss Resting membrane potential ➢ Discuss Generation and Conduction of action potential ➢ Explain skeletal muscle physiological structure and contraction mechanics ➢ Discuss Smooth muscle physiological structure and contraction mechanics ➢ **Identify** hemocytometer kit, microscope and its parts ➢ **Focus** hemocytometer under microscope ➢ **Determine** Red blood cell and WBC count using hemocytometer ➢ **Demonstrate** Simple Muscle Twitch	LGIS SGIS SDL Structured Tutorials Lab Demonstrations	MCQs SEQs Quiz OSCEs Viva Voce Formative assessments

3	**Blood / Immunity/ Hemostasis**	1. Discuss composition and general functions of blood 2. Describe erythropoiesis, blood Indices, Anemia and its types 3. Elaborate blood groups, blood Transfusion; complications, matching & significance 4. Discuss white blood cells, their functions, leucopoiesis, and leucocytosis 5. Outline Reticuloendothelial systems, lines of defense against infection and Innate	LGIS SGIS SDL Structured Tutorials	MCQs SEQs Quiz

		immunity 6. Discuss types and cells of acquired immunity 7. Discuss platelets, thrombocytopenia, Hemostasis and Bleeding disorders 8. Outline cascades of blood coagulation and clotting disorders 9. Identify different types of WBCs under microscope 10. Determine DLC by preparing stained slides 11. Estimate own Hb 12. Determine ESR 13. Determine PCV 14. Determine BT and CT 15. Find own blood group	Lab Demonstration Video demonstrations	OSPEs Viva Voce Formative assessments
4	**Cardiovascular System:** • **Heart** • **Circulation**	1. Discuss function of cardiac muscle /Cardiac pacemaker and cardiac muscle contraction 2. Explain regulation of cardiac pumping 3. Explain Cardiac cycle with its Clinical significance and correlation of heart sounds 4. Discuss recording and interpretation ECG with its physiological basis and correlation to cardiac cycle 5. Describe types of blood vessels, their functions, and hemodynamics of blood flow 6. Discuss microcirculation including capillary fluid exchange, interstitial fluid formation and edema 7. Describe mechanisms of Local and humoral control of tissue blood flow 8. Discuss arterial blood pressure, and its short- and long-term regulation 9. Discuss Cardiac output, Venous return & its regulation 10. Describe cardiovascular changes during exercise 11. Discuss cardiac failure 12. Outline types of Shock and its treatment 13. Demonstrate: 1. Examination of Apex Beat and auscultation of Heart Sounds 2. ECG recording/interpretation 3. Examination of arterial pulse 4. Measurement of arterial blood pressure and Effect of exercise & posture on BP	LGIS SGIS SDL Structured Tutorials Lab Demonstration	MCQs SEQs OSPEs

5	**Respiratory System**	1. Describe Organization / functions of Respiratory Tract 2. Explain Mechanics of Breathing 3. Discuss Pulmonary hemodynamics 4. Describe Gaseous exchange through the respiratory membrane 5. Explain Ventilation / perfusion ratio 6. Describe transport of O_2 & CO_2 in blood 7. Explain nervous and chemical regulation of respiration 8. Discuss different conditions of respiratory insufficiency and role of O_2 therapy 9. Demonstrate: 1. Measurement of Pulmonary volumes and capacities (Spirometry) 2. Measurement of Forced expiratory volumes	LGIS SGIS SDL Structured Tutorials Lab Demonstration	MCQs SEQs OSPEs
6	**Gastrointestinal Tract**	1. Describe structure and general functions Enteric nervous system (Gut Brain) 2. Discuss Mastication, Stages of Swallowing and disorders of dysphagia, achalasia 3. Describe functions of stomach, Peptic Ulcer / hormones and secretions of GIT 4. Explain functions and movements of gut / Vomiting and defecation reflex 5. Discuss Functions of Liver	LGIS SGIS SDL Structured Tutorials	MCQs SEQs OSPEs
7	**Renal system**	1. Discuss the functional anatomy and urine formation by the kidneys 2. Discuss the micturition reflex 3. Explain the determinants of Glomerular Filtration Rate 4. Explain the regulation of GFR and renal blood flow	LGIS SGIS SDL	MCQs SEQs Quiz Structured Tutorials

8	**Central Nervous System** • **Sensory Nervous System** • **Motor nervous system**	1. Explain organization of Nervous system 2. Describe classification of nerve fibers 3. Describe Properties of Synaptic transmission 4. Explain types and function of sensory Receptors 5. Discuss physiological basis of touch, temperature and pain sensations 1. Discuss general organization of motor system 2. Describe functions of spinal cord, cord reflexes 3. Explain functions of muscle spindle, Golgi	LGIS SGIS SDL	MCQs SEQs Quiz Structured Tutorials

	• **Higher mental functions** • **Special sense**s	tendon organ **4.** Discuss functions of specific regions of Cerebral cortex, pyramidal & extra Pyramidal tracts and their functions **5.** Outline brainstem functions and the role of brain stem in generation of muscle tone **6.** Describe the role of vestibular system in balance and equilibrium **7.** Discuss functions of cerebellum **8.** Discuss functions of Basal Ganglia and physiological basis of features of Parkinson's disease **1.** Discuss speech physiology **2.** Discuss learning and memory **3.** Describe physiology of sleep / EEG **4.** Explain role of Hypothalamus in temperature regulation **5.** Give an overview of composition of Cerebrospinal fluid and its functions **6.** Give an overview of Autonomic Nervous system **7.** Give an overview of Taste & smell physiology **8.** Give an overview of Auditory perception, signal transduction and transmission to cerebral cortex **9.** Discuss optics of eye, phototransduction, Optic pathways and physiological basis of refractive errors **10.** Demonstrate: **1.** Examination of superficial reflexes **2.** Examination of deep reflexes **3.** Clinical Examination of cranial nerves **4.** Recording of body temperature **5.** Examination of Taste sensation **6.** Examination of Olfaction **7.** Hearing tests **8.** Tests for Visual acuity	Lab Demonstration	OSPEs

9	**Endocrinology**	1. Give an overview of general classification and mechanism of action of hormones 2. Enumerate anterior & Posterior Pituitary hormones and outline their functions 3. Briefly discuss functions of Thyroid hormones 4. Give an overview of Parathyroid hormone	LGIS SGIS SDL Lab Demonstration	MCQs SEQs Quiz Structured Tutorials OSCEs
		5. Briefly discuss functions of Pancreatic hormones 6. Give an overview of functions of Adrenal hormones		

BDS First Professional Examination
Physiology Marks Distribution

Theory Marks Distribution:

Total Marks of MCQs = 40

Total Marks of SEQs = 50 (Each SEQ of 5 Marks)

Internal Assessment: 10

Total Marks of Theory: 100

Practical Marks Distribution:

Total Marks of OSPE = 40

Total marks of Minor Viva= 10

Total Marks of Major Viva = 40 (Internal Examiner: 20; External Examiner: 20)

Internal Assessment: 10

Total Marks of Viva/OSPE: 100

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