STUDY GUIDE SECOND YEAR PHYSIOLOGY k

STUDY GUIDE PHYSIOLOGY

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PHYSIOLOGY DEPARTMENT IN A GLANCE

Our body is nothing short of an amazing m a chine. No machine ever constructed can perform even a minutest body-like function as effectively as our bodies can do.

Physiology aims to understand the fascinating mechanisms of our body. Human physiology studies how our cells, muscles and organs work together, how they interact. Physiology, sometimes referred to as "the science of life", looks at living mechanisms from molecular basis of cell function to the whole integrated behavior of the entire body.

Our shared vision is to develop high quality professionals to pursue the excellence in the field of medicine and surgery. Our mission here at the department of Physiology AFMDC is:

To provide theoretical and practical knowledge /skills through quality teaching

To provide standard education and practical skills

To impart under graduate students a quality education to cope up with the international standards

Physiology department has highly experienced, skilled and qualified faculty and laboratory staff focused on delivering quality education and skills. The Physiology is well equipped with all necessary equipment's along with latest power lab. It has the capacity of 35 students.

The department has also computer facility to maintain departmental record, prepare lecture slides and demonstrate audiovisual aids.

Teaching strategy includes interactive lecture, small group tutorial, and practical to provide flexible multi method learning opportunities.

Students are continuously assessed depending upon their performance throughout the year. Seminar and quiz are also conducted and arranged to involve the students and to increase their interest level. Teachers focus on self-expression, discovery and enthusiasm among learners.

Positions Name		Extension
Head of Department	Prof. Dr. Farah Amir Ali	181
Associate Professor	Dr. Shireen javed	
Assistant Professor	Dr. Beenish Altaf	170
Assistant Professor	Dr. Anam Rehman	
Senior	Dr. Hira	
Demonstrators		
Senior	Dr Hania Ali Chattah	
Demonstrators		
Demonstrators	DR Fairoz Ahsaan	161
	Dr. Javeria Manzoor	
	Dr. Ahmad Fayyaz	1
	Dr Zunaira	
Laboratory Incharge Mr. Shahid Hussain		
Computer operator	Mr. Kashan Ali Haider	220
Laboratory assistant Mr. Abdul Naveed		
Laboratory attendant	Miss Fatimah Gulzar	1

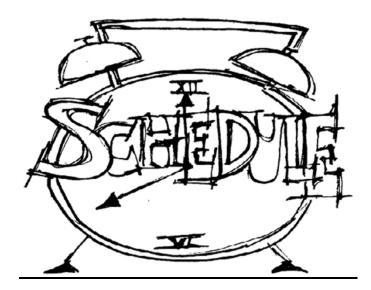
Physiology Department Team- AFMDC

TIME LINE for SYLABUS COMPLETION

GHANTT CHART of SECOND YE	EAR LECTURES
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Торіс	Jan	Feb	March	April	May	June	July	Aug	5	SEP
Sensorium										
Contal										
Special senses										
Renal										
Physiology										
GIT										
M. t. C. t										
Motor System										
Endocrinology										
8,										
Reproduction							_			
1										
					1	vacatio	1	ndun		

Summer vacations sendup exam



TIME TABLE

Date	1	2	3	4	5	6
	08:00-	09:00-	10:00-	11:00-	12:45-	13:15-
	09:00	10:00	11:00	12:45	13:15	15:00
Monday	Lec Phy			Practical		
Tuesday			Lec Phy	Practical		
Wednesday	Lec Phy			Tutorial		
Thursday		Lec Phy		Tutorial		Practical
Friday	08:00-	08:45-	09:30-	10:15-	11:30-	13:00-
	08:45	09:30	10:15	11:30	13:00	15:00
		Lec Phy		Tutorial		

LEARNING OBJECTIVES OF PHYSIOLOGY

SECOND YEAR M.B.B.S

TOPIC	SUBTOPICS	LEARNING OBJECTIVES
The Body Fluids and	The Body Fluid	List body fluid compartment.
Kidneys	Compartments: Extracellular and	 Discuss each body fluid compartment along with its composition
	Intracellular	composition.Discuss measurement of various body fluid
	Fluids	compartments.
	interstitial fluid	 Explain defense of tonicity and volume with their
	and edema	causative factors.
		 Define edema; discuss its types and causes.
		 Explain safety factors against edema.
		 Discuss structure of kidney and nephrons.
		 List functions of kidney.
		Define structural and functional relationship between
		the nephron and their associated blood vessels
	Urine Formation by the Kidneys:	Enumerate steps of urine formation.
	by the Ridneys.	 Discuss glomerular filtration rate and factors affecting GFR.
		 Explain auto regulation along with tubuloglomerular feedback mechanism.
		 Discuss method of measuring GFR along with role of inulin.
		• Explain the formation of diluted and concentrated urine.
		Discuss countercurrent mechanism.
		• Describe absorptive capabilities of various tubules
		segment.
		 Enumerate absorption of various substances.
		 Explain the role of hormones in regulating tubular reabsorption
		 Discuss the tubular secretion along the various parts of nephrons.
	Regulation of	Define osmoreceptors with its location
	Extracellular Fluid Osmolarity and	 Discuss ADH hormone secretion, site of action and control of its secretion
	Sodium Concentration	 Discuss the role of osmoreceptors feedback mechanism in regulating extracellular fluid osmolarity
		 Describe the role of renin and angiotensin in maintaining the volume of extracellular fluid.
		 Discuss the cascade of reaction that lead to the
		formation of angiotensin II and its metabolites in the circulation.
		 Enlist the functions of angiotensin II .
		 Discuss the role of thirst in controlling extracellular fluid
		osmolarity.
		 Explain the mechanism of regulation of K⁺ along with its
		tubular reabsorption and secretion mechanism.
		 Enlist the factors in causes which influence the
		intracellular K ⁺ level.
		 Explain the mechanism of Ca⁺⁺ regulation by kidney.

Describe the nervous and hormonal control of regulation.	renal
Define the following : Pressure natriuresis Pr diuresis	ressure
Regulation of Acid-Base Balance• Explain renal tubular handling of H+ secretion ions reabsorption 	
 Explain tubular secretion of H+ and K+ ions. Discuss the acid base disorder with significance gap The above learning objective will be discussed along with its clinical application. 	
Determine the specific gravity of the urine.	
 Kidney Diseases and Diuretics Explain various classes of diuretics Discuss the mechanism of actions of various d Describe the tubular site of actions of various Illustrate the functional anatomy of bladder al its nerve supply. Describe role of pudendal nerve and external control. Define cystometrogram and its functions. Discuss the mechanism of micturition reflex an control 	diuretics ong with sphincter
 Explain the following abnormalities of micturit Atonic bladder b: Automatic bladder c: Uninhi neurogenic bladder Describe acute renal failure along with pre rer and post renal causes Discuss chronic renal failure along with hypert and changes in kidney due to it. Discuss Nephrotic syndrome, its types and clin manifestation. Define glomerulonephritis with its types. Discuss uremia. 	bited nal, renal rension
SensoriumOrganization of the Nervous System, Basic Functions of Synapses, "Transmitter SubstancesDiscuss the general design of nervous system.• Discuss the physiologic anatomy of synapse. • Describe the basic functions of synapses, "Transmitter Substances• Discuss the physiologic anatomy of synapse and tr substances.• Discuss the physiologic anatomy of synapse and tr substances.• Discuss the physiologic anatomy of synapse and tr substances.• Discuss special characteristics of synaptic tran • Differentiate between spatial and temporal su • Define the following terms a- • Excitatory por potentials.• Define the following terms a- • Excitatory postsynaptic potentials.• Define the following terms a- • Define the following terms a- • Excitatory post potentials.• Define the following terms a- • Define the following terms a- • Excitatory post potentials.• Define the following terms a- • Define the following Convergence, Divergence Denervation Hypersensitivity Myasthenia grav Lambert Eaton syndrome.	ansmitter ynapses. smission. immation. stsynaptic t t
Somatic senses • Explain the classification of somatic senses with	th its

	 Discuss ascending pathways for detection and transmission of testile and position serves
	transmission of tactile and position senses.
	• Explain six types of tactile receptors with nerve fibers,
	muscle spindle as proprioceptive receptor and Golgi
According tracts	tendon as proprioceptive receptor.
Ascending tracts	 Describe the following pathways. Dorsal column(medial leminiscal system) b: Anterolateral system
	 Explain the somatosensory areas along with its layers and its functions.
	 Discuss special aspects of somatosensory functions.
	Define dermatomes
	 Describe the classification of sensory receptors.
	 Define labeled line principle.
	 Explain receptor potential with example of Pacinian
	corpuscle.
	 Distinguish between tonic and phasic receptors with examples.
	 Describe the physiological classification of nerve fibre with its functions.
	• Explain instability and stability of neuronal circuits.
	 Discuss synaptic fatigue as mean of stabilizing the
	nervous system.
Somatic Sensations: Pain,	 Explain types of pain along with its receptors and their qualities.
Headache, and	Discuss dual transmission of pain signals into central
Thermal Sensations	nervous system.
Schladions	Describe neospinaothalamic and paleospinothalamic
	pathways of pain.
	Explain the difference between fast and slow pain and
	acute and chronic pain.
	 Discuss pain suppression (analgesic) system in brain and spinal cord
	spinal cordExplain the following a: Referred pain b: Visceral
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EYE	 spinal cord Explain the following a: Referred pain b: Visceral pain Discuss headache and its types. Explain the Brown-Squared Syndrome(CASE) Explain thermal sensation along with its receptors and transmission in the central nervous system. Discuss anatomy and functions of structural element of retina along with its neural circuits. Describe photochemistry of vision in detail. Illustrate Rhodopsin retinal cycle Explain the process of light and dark adaptation Explain principle of optics along with phenomenon of refraction Compare rods and cones Discuss the functions of horizontal cells, amacrine ells and ganglion cells Explain the three means by which eye can determine distance of an object.

	Define Young Helmholtz theory of color vision.
	Discuss types of color blindness
	Trace the visual pathway along with its lesions
	Describe the functions of lateral geniculate nucleus of
	thalamus with magno cellular & parvocellular pathway
	 Discuss the function of primary and secondary visual cortex
	Trace pupillary pathway
	 To test the visual acuity of subject
	To test accommodation reflex
	To elicit pupillary light reflex
	• Examination of eye with ophthalmoscope
	Determination of color vision
	Determination of peripheral field of vision
Ear	Discuss physiological anatomy of external, middle
	internal ear
	• Explain the role of middle ear in conduction of sound
	Illustrate the process of sound transduction
	Define endocochlear potential and place principle
	 Describe the three ways to determine loudness by
	auditory system
	Trace the auditory nervous pathway
	 Explain the process of determination of direction of sound
	 Discuss types of deafness in detail.
	 Discuss the functional anatomy of vestibular apparatus
	 Explain the role of utricle and saccule in linear acceleration.
	• Describe role of semicircular canal in angular
	acceleration.
	 Illustrate the predictive role of semicircular canal in the maintainace of equilibrium
	 To demonstrate the hearing test
Taste and Smell	 Describe sense of taste along with primary sensation of
	taste
	 Taste buds and types of papillae
	 Discuss transmission of taste signals into CNS
	Explain taste abnormalities.
	 Discuss sense of smell with olfactory membrane,
	olfactory cells
	Illustrate the mechanism of excitation of olfactory cells
	 Explain olfactory pathway with its functions
	Discuss the mechanism of adaptation and role of
	centrifugal fibers in olfaction
	Explain smell abnormalities (Dysosmia, Anosmia and
	hyposmia, hyperosmia)
	 The above learning objective will be discussed in tutorial along with its glinical application
	along with its clinical application.Examination of 1st cranial nerve
Motor system Motor Functions	 Examination of 1st cranial nerve Examination of 7th, 9th and 10th cranial nerve Discuss the organization of spinal cord for motor

of the Spinal Cord; the Cord Reflexes Exchange, Interstitial Fluid,and Lymph Flow	 functions Explain muscle spindle with respect to Structure ,Sensory innervations and Motor innervations Describe the static & dynamic responses of muscle spindle Enlist areas of brain for control of gamma motor system Explain neuronal circuit of stretch reflex & its clinical application Illustrate the role Golgi tendon organ in control of muscle tension Interpret the neuronal mechanism of flexor reflex, withdrawal reflexes & crossed extensor reflex Examination of motor system
Cortical and Brain Stem Control of Motor Function	 Enlist the function of specific cortical areas. Discuss areas of brain involved in language processing Describe the descending tracts Trace the pathway of pyramidal tract and extrapyramidal tracts Differentiate between upper motor neuron & lower motor neuron lesion To elicit superficial and deep reflexes
Contributions of the Cerebellum and Basal Ganglia to Overall Motor Control	 Explain the function of cerebellum in overall motor function Describe the function unit of cerebellar cortex (the purkinje cell and deep nuclear cell) Explain clinical abnormalities of cerebellum with its pathophysiology Discuss basal ganglia with respect of caudate circuit & putamen circuit along with its functions Explain the Parkinson's disease (case) Enlist other abnormalities of basal ganglia(CASE) Assessment of cerebellar functions
Behavioral and Motivational Mechanisms of the Brain—The Limbic system and memory States of Brain Activity—Sleep, Brain Waves,	 Discuss functional anatomy of limbic system Enlist the parts of limbic system and discuss their function Discuss types of memory along with areas of brain involved Describe retrograde & anterograde amnesia (CASE) Discuss sleep with various types and stages Describe electroenceplogram
Autonomic nervous system	 Discuss the EEG waves in association with stages of sleep Discuss epilepsy with its types(CASE) Explain general organization of autonomic nervous system Contrast the functions of parasympathetic &
CSF	 sympathetic functions Describe alarm response Describe formation and reabsorption of cerebral spinal fluid (CSF), including the anatomy and function of the choroid plexus. Locate and describe the function of circumventricular

ENDOCRINOLOGY	Introduction to	 organs. Describe the normal pressure, flow, volume (ventricular vs. cisternal), and composition of the CSF Contrast the difference between a communicating and a non-communicating hydrocephalus.(CASE) Describe the local factors affecting brain blood flow and contrast their effectiveness with that of autonomic regulation of cerebral blood flow Enlist the effect of blockage of middle cerebral artery and posterior cerebral artery on body
ENDOCKINOLOGY	Endocrinology	 Enumerate chemical messenger systems of human body Classify hormones on the basis of their chemical structure Discuss hormone secretion, transport and clearance of hormones Explain mechanism of action of hormone Describe methods of measurement of hormone concentrations in blood Enlist hormones that uses tyrosine kinase signaling, cAMP Messenger system & phospholipase messenger system
	Pituitary Hormones and Their Control by the Hypothalamus	 Describe different types of cells in anterior pituitary and different types of hormones secreted by it Explain the parts of pituitary gland and its relation to the hypothalamus. Discuss hypothalamic control of pituitary secretion. Explain physiological functions of growth hormone along with its receptors and intermediate substances controlling its secretion Describe the abnormalities of growth hormone.(case) Describe post. pituitary gland along with its secretions, receptors ,functions& Its abnormalities(case)
	Thyroid Metabolic Hormones	 Discuss thyroid hormone & its receptor, formation and secretion Discuss effects and function and regulation of thyroid hormones: T3 and T4 Describe the physiological functions of thyroid hormones Explain the effects of thyroid hormone on specific bodily mechanism(CASE) Discuss the regulation of thyroid hormone secretion Explain hyperthyroidism & hypothyroidism with its examples, causes and functions Discuss anti-thyroid drugs
	Adrenocortical Hormones	 Discuss adrenal cortex gland &its hormones, Describe mineralocorticoid, their receptors, synthesis, secretion, transport, functions, regulation and abnormalities Describe Glucocorticoid, their receptor synthesis, secretion, transport, functions, regulation and abnormalities(case) Adrenal androgens, their receptors, synthesis, secretion,

		functions and abnormalities
		 Explain Adrenal medullary gland and its hormones
		 Describe the regulation of cortisol by ACTH .
	Insulin, Glucagon,	 Describe physiological anatomy of pancreas.
	and Diabetes	 Discuss Endocrine functions of pancreas.
	Mellitus	 Discuss Synthesis, receptors, functions & regulation of
		insulin & its metabolic effects
		 Explain factors affecting insulin secretion
		 Discus role of insulin in glucose transporter in humans/mammals/consequences
		 Explain diabetes mellitus with its type, physiology of diagnosis and treatment(Case)
		 Discuss hyperinsulinism/ insulinoma(CASE)
		 Discuss changes in protein metabolism, fat metabolism in diabetes mellitus,
		 Discuss ketosis, acidosis, coma, insulin excess, compensatory mechanisms
		 Discuss Glucagon synthesis, secretion, receptors, functions and its regulation.
		 Describe the role of somatostatins on insulin and glucagon's secretion
		 Discuss blood glucose regulation mechanism
	PARATHYROID	 Discuss physiological anatomy of parathyroid gland
	GLAND	 Discuss synthesis, secretion, receptors, functions ,regulation & abnormalities of PTH
		 Explain vitamin D formation along with its action and its abnormalities
		 Discuss calcitonin along with its effect of plasma calcium level concentration
		 Explain the physiology of bone and teeth
Reproduction	Male	 Discuss the physiologic anatomy of the male
	reproduction	reproduction organs.
		 Discuss steps of Spermatogenesis
		 Enlist the cells involved in Spermatogenesis and explain their role.
		• Explain the Hormonal regulation of Spermatogenesis.
		• Explain the Effect of temperature on spermatogenesis.
		 Enlist the substance/hormones releases from sertoli and lending cells
		 Discuss the role of SRY gene and anti-mullerian hormone in sexual differentiation of gonads during embryonic development.
		• Discuss the composition of semen
		 Discuss the composition and importance of seminal vesicles and prostatic fluid
		 Definitions : Puberty , Capacitation ,Acrosome Reaction,
		 Cryptorchidism, Infertility, Pseudo hermaphroditism
		• Discuss the synthesis, transport, metabolism and,
		Degradation and Excretion testosterone
		Discuss functions of testosteroneExplains the mechanism of action and regulation of
		 Discuss the Functions of Testosterone During Fetal
		 Discuss the Functions of Testosterone During Fetal

Gastrointestinal Physiology General Principles of Gastrointestinal Biod Circulation Discuss the order of HCG in Fetal Development . Biscuss the effect of low sperm count, abnormal morphology and non motile sperm on fertility Discuss synthesis, source and role of estrogen in male reproduction Female reproduction Female reproduction Female reproduction Discuss the physiological anatomy of female reproduction system Correlate the events of endometrial cycle with its phases Describe the monthly endometrial cycle and ovarian cycle Discuss the functions of ovarian hormones i]estradiol , ili progesterone Discuss the functions of ovarian hormones i]estradiol , ili progesterone Biscuss the functions of ovarian hormones i]estradiol , ili progesterone Discuss the functions of ovarian hormones i]estradiol , ili progesterone Biscuss the functional bound flow splanchnic control, and Biood Circulation Describe the general principles of gastrointestinal motility. Nervous Control, and Biood Circulation Discuss the normanic ontrol of gastrointestinal motility. Propulsion and mixing of food in the alimentary tract Describe the ingestion of food. Describe the movements of the somach. Describe the movements of the colon. Enlist the other autononic reflexes that affect bowel activity. Describe the movements of the somach. Describe the movements of the somali intestine. Discuss the gastrointestinal the other autononic reflex			development
Biscuss the effect of low sperm count, abnormal morphology and non motile sperm on fertility Discuss syntesis, source and role of estrogen in male reproduction Female reproduction Female reproduction Female reproduction Explain monthly ovarian cycle with their phases Discuss the physiological anatomy of female reproductive system Explain monthly ovarian cycle with their phases Describe the monthly endometrial cycle and ovarian cycle Discuss the functions of ovarian hormones ilestradiol, ili progesterone Explain anovulatory cycle Definitions: Puberty, Menarche, Menopause Discuss the placental hormones Explain milk let down reflex To perform pregnancy test Gastrointestinal Function- Motility, Nervous Control, and Blood Circulation Motility, Nervous Control, and Blood Circulation Propulsion and mixing of food in the alimentary tract Propulsion and mixing of food in the alimentary tract Discuss the parenets of the small intestine. Describe the movements of the small intestine. Describe the movements of the small intestine. Describe the movements of the small intestine. Discuss the gastrointestinal principles of alimentary tract secretion. Discuss the gastric secretion.			
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• Enlist the disorders of the stomach.			
• Enlist the disorders of the small intestine.		Disorders	

•	Enlist the disorders of the large intestine.
•	Describe the general disorders of the gastrointestinal
	tract.

LIST OF PRACTICAL FOR PHYSIOLOGY

Nervous System

- 1) To perform clinical examination of first, cranial nerve
- 2) To perform clinical examination of third, fourth and sixth cranial nerve
- 3) To perform clinical examination of fifth cranial nerve
- 4) To perform clinical examination of seventh cranial nerve
- 5) To perform clinical examination of nine & ten cranial nerve
- 6) To perform clinical examination of eleven & twelth cranial nerve
- 7) Clinical examination of sensory system
- 8) Clinical examination of motor system
- 9) To elicit superficial reflexes
- 10) To elicit deep reflexes
- 11) Assessment of cerebellar function

Special senses

- 1) To map the peripheral field of vision with perimeter
- 2) To test visual acuity of subject
- 3) To test accommodation reflex of subject
- 4) To elicit light reflex
- 5) Ophthalmoscopic examination of eye
- 6) Determination of color vision
- 7) To demonstrate the hearing tests
- 8) To determine the taste sensations

Kidney and reproduction:

- 1) Specific gravity of urine
- 2) To perform pregnancy test

RECOMMENDED TEXTBOOKS

TEXT BOOK OF PHYSIOLOGY GUTYON & HALL (13TH Ed)

GANONG'S REVIEW OF MEDICAL PHYSIOLOGY (23rd Ed)

REFERENCE BOOKS

- **>** HUMNAN PHYSIOLOGY BY LAURULI SHERWOOD
- > PHYSIOLOGY BY BERNE AND LEVY, LATEST Ed
- > PHYSIOLOGY BY LINDA AND CONSTANZO

TABLE OF SPECIFICATIONS FOR PHYSIOLOGY

THEORY PAPER	FIRST PROFESSIONAL
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CONTENTS		MCQs	SEQs
1.	Kidney and body fluids	08	02
2.	2. Nervous system		02
3.	Special senses	06	01
4.	Endocrines	08	02
5.	Reproduction	06	01
6.	GIT	05	01
TOT	TAL ITEMS	45 MCQs	09 SEQs
TOT	TAL MARKS	45 Marks	45 Marks

10% marks are allocated for 'Internal Assessment'

Total marks for theory paper: SEQ+ MCQ + Internal Assessment = 45 +45+10=100 Marks

ORAL AND PRACTICAL EXAMINATION FIRST PROFESSIONAL (PART-I)

The structure of OSPE/ Practical/Viva should be as follows.(Total Marks:90)

> Viva Voca(35 marks)

Internal-----15 marks External-----20 marks

> <u>OSPE:</u> (25 marks)

Non-observed stations10 of 01 marks each (2 minutes each)Observed stations03 of 05 marks each (4 minutes each)

Practical (30 marks)

- Practical 20 marks
 Procedure Writing 05 marks
- Yearly Workbook Assessment 05 marks

