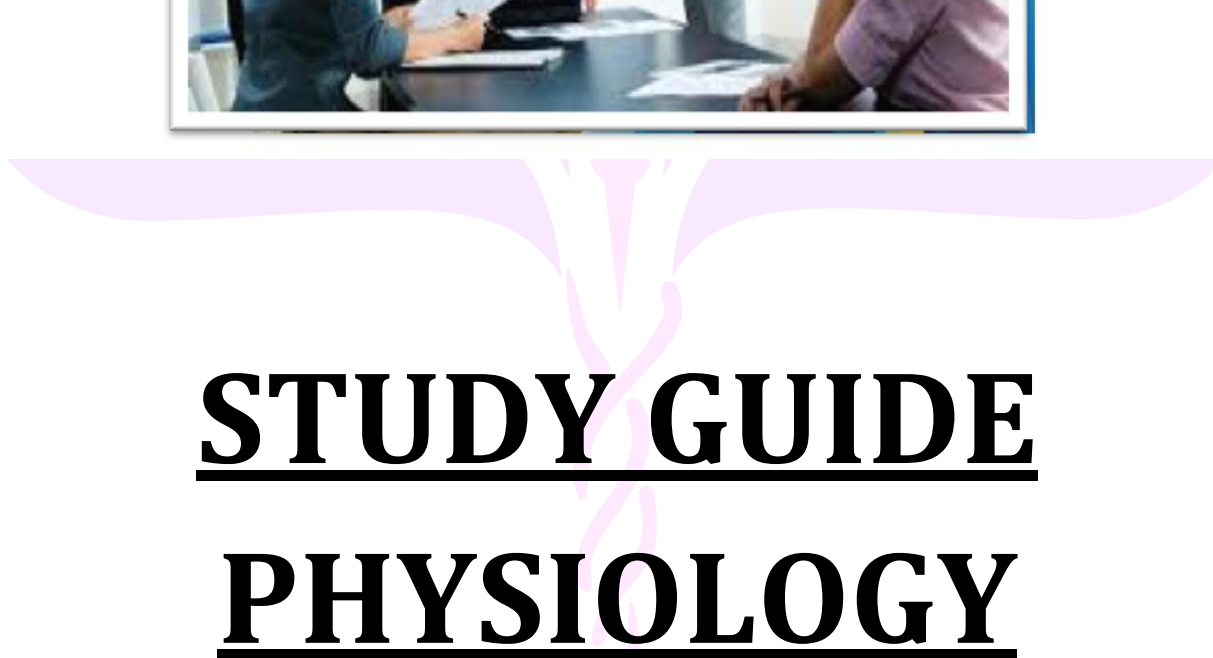


**STUDY GUIDE  
SECOND YEAR  
PHYSIOLOGY**



**STUDY GUIDE**  
**PHYSIOLOGY**

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## PHYSIOLOGY DEPARTMENT IN A GLANCE

Our body is nothing short of an amazing machine. 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.

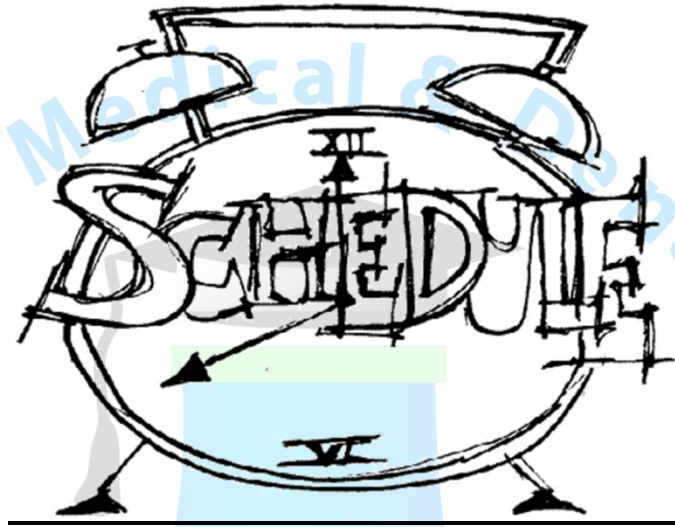
## Physiology Department Team- AFMDC

Positions	Name
Head of Department	Prof. Dr. Farah Amir Ali
Associate Professor	Dr. Shireen Javed
Assistant Professor	Dr. Benash Altaf
Senior Demonstrators	Dr. Shakeela Naz
Demonstrators	Dr. Anam
	Dr. Javeria
	Dr. Rooha
Laboratory Incharge	Mr. Abdul Rehman
Computer operator	Mr. Wasim Riasat
Laboratory assistant	Mr. Abdul Naveed
Laboratory attendant	Mr. Matloob

**TIME LINE for SYLABUS COMPLETION**  
**GHANTT CHART of SECOND YEAR LECTURES**

Topic	Jan	Feb	March	April	May	June	July	Aug	SEP	
Sensorium	█					Summer vacations				
Special senses		█								
Renal Physiology			█							
GIT				█						
Motor System					█					
Endocrinology								█		
Reproduction									█	

Summer vacations    sendup exam



### TIME TABLE

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

## SYLLABUS OUTLINE PHYSIOLOGY

The course outline is as follows :

### **Body Fluids and Kidney**

1. Components and quantitative measurements of body fluids.
2. Fluid compartments, tissue and lymph fluid.
3. Structure of the kidney and nephron. General function of the kidney.
4. GFR and its regulation.
5. Formation of urine including filtration, re-absorption and secretion.
6. Plasma clearance.
7. Mechanism of concentration and dilution of urine.
8. Water and electrolyte balance with reference to the kidney.
9. Role of the kidney in blood pressure regulation.
10. Hormonal functions of the kidney.
11. Acidification of urine and its importance.
12. Acid base balance with reference to the kidney.
13. Micturition and its control.

### **Clinical Module**

1. Renal function tests and their clinical importance.
2. Fluid excess and depletion.
3. Renal failure and dialysis.
4. Metabolic acidosis and alkalosis.
5. Abnormalities of micturition.

### **Nervous System**

1. General organization of the nervous system.
2. Classification of nerve fibers.
3. Properties of synaptic transmission.
4. Function of neurotransmitters and neuropeptides.
5. Type and function of sensory receptors.
6. Function of the spinal cord and ascending tracts.
7. Reflex action and reflexes.
8. Muscle spindle and muscle tone.
9. Mechanism of touch, temperature and pain.
10. Functions of the cerebral cortex.
11. Difference between the sensory and motor cortex and their functions.
12. Motor pathways including pyramidal and extrapyramidal.
13. Basal Ganglia and its functions.
14. Cerebellum and its function.
15. Control of posture and equilibrium.
16. Physiology of sleep.
17. Physiology of memory.
18. Mechanism and control of speech.
19. Function of the thalamus.
20. Function of the hypothalamus and limbic system.
21. Production of CSF.
22. Mechanism of temperature regulation.

23. Function of the autonomic nervous system.

24. The physiological changes of aging.

### **Clinical Module**

1. Significance of dermatomes.

2. Injuries of the spinal cord.

3. Hemiplegia and paraplegia.

4. Parkinsonism.

5. Effects of cerebellar dysfunction.

6. Hydrocephalus.

### **Endocrinology**

1. Classification of endocrine glands.

2. Mechanism of action, feedback and control of hormonal secretion.

3. Functions of the hypothalamus.

4. Hormones secreted by the anterior and posterior pituitary and their mechanism of action and function.

5. Function of the thyroid gland.

6. Function of the parathyroid gland.

7. Calcium metabolism and its regulation.

8. Secretion and function of calcitonin.

9. Hormones secreted by the adrenal cortex and medulla and their function and mechanism of action.

10. Endocrine functions of the pancreas.

11. Control of blood sugar.

12. Hormones secreted by the gastrointestinal system and their function.

13. Function of the thymus.

14. The endocrine functions of the kidney.

15. Physiology of growth.

### **Clinical Module**

1. Acromegaly, gigantism and dwarfism.

2. Effects of panhypopituitarism.

3. Diabetes insipidus.

4. Thyrotoxicosis and myxoedema.

5. Pheochromocytoma.

6. Cushing's disease.

7. Adrenogenital syndrome.

8. Diabetes mellitus and hypoglycaemia.

### **Gastrointestinal Tract**

1. General function of gastrointestinal tract

2. Enteric nervous system, control of gastrointestinal motility and secretion

3. Mastication, swallowing and their control

4. Function, motility and secretions of stomach

5. Function, motility and secretions of small intestine

6. Function, motility and secretions of large intestine

7. Function of GIT hormones

8. Mechanism of vomiting and its control pathway

9. Defecation and its control pathway



10. Functions of liver
11. Functions of gallbladder and bile in digestion
12. Endocrine & exocrine pancreas and functions of pancreas in digestion

### **Clinical Module**

1. Dysphagia
2. Physiological basis of acid peptic disease
3. Causes of vomiting
4. Diarrhea and constipation in clinical settings
5. Jaundice and liver function tests in clinical settings

### **Reproduction**

1. Function of the male reproductive system.
2. Spermatogenesis.
3. Mechanism of erection and ejaculation.
4. Production and function of testosterone.
5. Physiological changes during male puberty.
6. Function of the female reproductive system.
7. Production and function of oestrogen and progesterone.
8. Menstrual cycle.
9. Physiological changes during female puberty and menopause.
10. Pregnancy and the physiological changes taking place in the mother.
11. Function of the placenta.
12. Parturition and lactation.
13. Neonatal physiology.

### **Clinical Module**

1. Male infertility.
2. Female infertility.
3. Contraception.
4. Basis for pregnancy tests.

### **PHYSIOLOGY PRACTICAL**

#### **Nervous System**

- 1 Examination of superficial and deep reflexes.
- 2 Brief examination of the motor and sensory system.
- 3 Examination of the cranial nerves.

#### **Special Senses**

- 1 Measurement of the field of vision.
- 2 Measurement of light reflex.
- 3 Ophthalmoscopy.
- 4 Colour vision.
- 5 Hearing tests.
- 6 Testing taste and smell.

#### **Pregnancy tests**

Measurement and interpretation of body temperature

## LEARNING OBJECTIVES OF PHYSIOLOGY

### SECOND YEAR M.B.B.S

TOPIC	SUBTOPICS	LEARNING OBJECTIVES
The Body Fluids and Kidneys	The Body Fluid Compartments: Extracellular and Intracellular Fluids interstitial fluid and edema	<ul style="list-style-type: none"> <li>• List body fluid compartment.</li> <li>• Discuss each body fluid compartment along with its composition.</li> <li>• Discuss measurement of various body fluid compartments.</li> <li>• Explain defense of tonicity and volume with their causative factors.</li> <li>• Define edema; discuss its types and causes.</li> <li>• Explain safety factors against edema.</li> <li>• Discuss structure of kidney and nephrons.</li> <li>• List functions of kidney.</li> <li>• Define structural and functional relationship between the nephron and their associated blood vessels</li> </ul>
	Urine Formation by the Kidneys:	<ul style="list-style-type: none"> <li>• Enumerate steps of urine formation.</li> <li>• Discuss glomerular filtration rate and factors affecting GFR.</li> <li>• Explain auto regulation along with tubuloglomerular feedback mechanism.</li> <li>• Discuss method of measuring GFR along with role of inulin.</li> <li>• Explain the formation of diluted and concentrated urine.</li> <li>• Discuss countercurrent mechanism.</li> <li>• Describe absorptive capabilities of various tubules segment.</li> <li>• Enumerate absorption of various substances.</li> <li>• Explain the role of hormones in regulating tubular reabsorption</li> <li>• Discuss the tubular secretion along the various parts of nephrons.</li> </ul>
	Regulation of Extracellular Fluid Osmolarity and Sodium Concentration	<ul style="list-style-type: none"> <li>• Define osmoreceptors with its location</li> <li>• Discuss ADH hormone secretion, site of action and control of its secretion</li> <li>• Discuss the role of osmoreceptors feedback mechanism in regulating extracellular fluid osmolarity</li> <li>• Describe the role of renin and angiotensin in maintaining the volume of extracellular fluid.</li> <li>• Discuss the cascade of reaction that lead to the formation of angiotensin II and its metabolites in the circulation.</li> <li>• Enlist the functions of angiotensin II .</li> <li>• Discuss the role of thirst in controlling extracellular fluid osmolarity.</li> </ul>

		<ul style="list-style-type: none"> <li>• Explain the mechanism of regulation of <math>K^+</math> along with its tubular reabsorption and secretion mechanism.</li> <li>• Enlist the factors in causes which influence the intracellular <math>K^+</math> level.</li> <li>• Explain the mechanism of <math>Ca^{++}</math> regulation by kidney.</li> <li>• Describe the nervous and hormonal control of renal regulation.</li> <li>• Define the following : Pressure natriuresis Pressure diuresis</li> </ul>
	<b>Regulation of Acid-Base Balance</b>	<ul style="list-style-type: none"> <li>• Explain renal tubular handling of <math>H^+</math> secretion and <math>HCO_3</math> ions reabsorption</li> <li>• Describe tubular buffers</li> <li>• Explain the mechanism of acidification of urine.</li> <li>• Explain tubular secretion of <math>H^+</math> and <math>K^+</math> ions.</li> <li>• Discuss the acid base disorder with significance of anion gap</li> <li>• The above learning objective will be discussed in tutorial along with its clinical application.</li> <li>• Determine the specific gravity of the urine.</li> </ul>
	<b>Kidney Diseases and Diuretics</b>	<ul style="list-style-type: none"> <li>• Explain various classes of diuretics</li> <li>• Discuss the mechanism of actions of various diuretics.</li> <li>• Describe the tubular site of actions of various diuretics</li> <li>• Illustrate the functional anatomy of bladder along with its nerve supply.</li> <li>• Describe role of pudendal nerve and external sphincter control.</li> <li>• Define cystometrogram and its functions.</li> <li>• Discuss the mechanism of micturition reflex and its control</li> <li>• Explain the following abnormalities of micturition : a: Atonic bladder b: Automatic bladder c: Uninhibited neurogenic bladder</li> <li>• Describe acute renal failure along with pre renal, renal and post renal causes</li> <li>• Discuss chronic renal failure along with hypertension and changes in kidney due to it.</li> <li>• Discuss Nephrotic syndrome, its types and clinical manifestation.</li> <li>• Define glomerulonephritis with its types.</li> <li>• Discuss uremia.</li> </ul>
<b>Sensorium</b>	<b>Organization of the Nervous System, Basic Functions of Synapses, "Transmitter Substances</b>	<ul style="list-style-type: none"> <li>• Discuss the general design of nervous system.</li> <li>• Discuss the physiologic anatomy of synapse.</li> <li>• Describe the basic functions of synapse and transmitter substances.</li> <li>• Distinguish between electrical and chemical synapses.</li> <li>• Discuss special characteristics of synaptic transmission.</li> <li>• Differentiate between spatial and temporal summation.</li> <li>• Define the following terms a- Excitatory postsynaptic potentials- Inhibitory postsynaptic potentials. Presynaptic inhibition and facilitation. Postsynaptic inhibition. Direct</li> </ul>

		<p>inhibition. Indirect inhibition</p> <ul style="list-style-type: none"> <li>• Define neuropeptides with examples.</li> <li>• Define the following Convergence, Divergence Denervation Hypersensitivity Myasthenia gravis. Lambert Eaton syndrome.</li> </ul>
	<b>Somatic senses</b>	<ul style="list-style-type: none"> <li>• Explain the classification of somatic senses with its examples.</li> <li>• Discuss ascending pathways for detection and transmission of tactile and position senses.</li> <li>• Explain six types of tactile receptors with nerve fibers, muscle spindle as proprioceptive receptor and Golgi tendon as proprioceptive receptor.</li> </ul>
	<b>Ascending tracts</b>	<ul style="list-style-type: none"> <li>• Describe the following pathways. Dorsal column( medial lemniscal system) b: Anterolateral system</li> <li>• Explain the somatosensory areas along with its layers and its functions.</li> <li>• Discuss special aspects of somatosensory functions.</li> <li>• Define dermatomes</li> <li>• Describe the classification of sensory receptors.</li> <li>• Define labeled line principle.</li> <li>• Explain receptor potential with example of Pacinian corpuscle.</li> <li>• Distinguish between tonic and phasic receptors with examples.</li> <li>• Describe the physiological classification of nerve fibre with its functions.</li> <li>• Explain instability and stability of neuronal circuits.</li> <li>• Discuss synaptic fatigue as mean of stabilizing the nervous system.</li> </ul>
	<b>Somatic Sensations: Pain, Headache, and Thermal Sensations</b>	<ul style="list-style-type: none"> <li>• Explain types of pain along with its receptors and their qualities.</li> <li>• Discuss dual transmission of pain signals into central nervous system.</li> <li>• Describe neospinothalamic and paleospinothalamic pathways of pain.</li> <li>• Explain the difference between fast and slow pain and acute and chronic pain.</li> <li>• Discuss pain suppression (analgesic) system in brain and spinal cord</li> <li>• Explain the following a: Referred pain b: Visceral pain</li> <li>• Discuss headache and its types.</li> <li>• Explain the Brown-Squared Syndrome(CASE)</li> <li>• Explain thermal sensation along with its receptors and transmission in the central nervous system.</li> </ul>
	<b>EYE</b>	<ul style="list-style-type: none"> <li>• Discuss anatomy and functions of structural element of retina along with its neural circuits.</li> <li>• Describe photochemistry of vision in detail.</li> <li>• Illustrate Rhodopsin retinal cycle</li> <li>• Explain the process of light and dark adaptation</li> </ul>

		<ul style="list-style-type: none"> <li>• Explain principle of optics along with phenomenon of refraction</li> <li>• Compare rods and cones</li> <li>• Discuss the functions of horizontal cells, amacrine cells and ganglion cells</li> <li>• Explain the three means by which eye can determine distance of an object.</li> <li>• Discuss the visual acuity</li> <li>• Describe the mechanism of accommodation</li> <li>• Discuss errors of refraction with its correction</li> <li>• Define Young Helmholtz theory of color vision.</li> <li>• Discuss types of color blindness</li> <li>• Trace the visual pathway along with its lesions</li> <li>• Describe the functions of lateral geniculate nucleus of thalamus with magno cellular &amp; parvocellular pathway</li> <li>• Discuss the function of primary and secondary visual cortex</li> <li>• Trace pupillary pathway</li> <li>• To test the visual acuity of subject</li> <li>• To test accommodation reflex</li> <li>• To elicit pupillary light reflex</li> <li>• Examination of eye with ophthalmoscope</li> <li>• Determination of color vision</li> <li>• Determination of peripheral field of vision</li> </ul>
	<b>Ear</b>	<ul style="list-style-type: none"> <li>• Discuss physiological anatomy of external, middle internal ear</li> <li>• Explain the role of middle ear in conduction of sound</li> <li>• Illustrate the process of sound transduction</li> <li>• Define endocochlear potential and place principle</li> <li>• Describe the three ways to determine loudness by auditory system</li> <li>• Trace the auditory nervous pathway</li> <li>• Explain the process of determination of direction of sound</li> <li>• Discuss types of deafness in detail.</li> <li>• Discuss the functional anatomy of vestibular apparatus</li> <li>• Explain the role of utricle and saccule in linear acceleration.</li> <li>• Describe role of semicircular canal in angular acceleration.</li> <li>• Illustrate the predictive role of semicircular canal in the maintainance of equilibrium</li> <li>• To demonstrate the hearing test</li> </ul>
	<b>Taste and Smell</b>	<ul style="list-style-type: none"> <li>• Describe sense of taste along with primary sensation of taste</li> <li>• Taste buds and types of papillae</li> <li>• Discuss transmission of taste signals into CNS</li> <li>• Explain taste abnormalities.</li> <li>• Discuss sense of smell with olfactory membrane, olfactory cells</li> </ul>

		<ul style="list-style-type: none"> <li>• Illustrate the mechanism of excitation of olfactory cells</li> <li>• Explain olfactory pathway with its functions</li> <li>• Discuss the mechanism of adaptation and role of centrifugal fibers in olfaction</li> <li>• Explain smell abnormalities (Dysosmia, Anosmia and hyposmia, hyperosmia)</li> <li>• The above learning objective will be discussed in tutorial along with its clinical application.</li> <li>• Examination of 1st cranial nerve</li> <li>• Examination of 7th, 9th and 10th cranial nerve</li> </ul>
<b>Motor system</b>	<b>Motor Functions of the Spinal Cord; the Cord Reflexes</b> Exchange, Interstitial Fluid, and Lymph Flow	<ul style="list-style-type: none"> <li>• Discuss the organization of spinal cord for motor functions</li> <li>• Explain muscle spindle with respect to Structure, Sensory innervations and Motor innervations</li> <li>• Describe the static &amp; dynamic responses of muscle spindle</li> <li>• Enlist areas of brain for control of gamma motor system</li> <li>• Explain neuronal circuit of stretch reflex &amp; its clinical application</li> <li>• Illustrate the role Golgi tendon organ in control of muscle tension</li> <li>• Interpret the neuronal mechanism of flexor reflex, withdrawal reflexes &amp; crossed extensor reflex</li> <li>• Examination of motor system</li> </ul>
	<b>Cortical and Brain Stem Control of Motor Function</b>	<ul style="list-style-type: none"> <li>• Enlist the function of specific cortical areas.</li> <li>• Discuss areas of brain involved in language processing</li> <li>• Describe the descending tracts</li> <li>• Trace the pathway of pyramidal tract and extrapyramidal tracts</li> <li>• Differentiate between upper motor neuron &amp; lower motor neuron lesion</li> <li>• To elicit superficial and deep reflexes</li> </ul>
	<b>Contributions of the Cerebellum and Basal Ganglia to Overall Motor Control</b>	<ul style="list-style-type: none"> <li>• Explain the function of cerebellum in overall motor function</li> <li>• Describe the function unit of cerebellar cortex (the purkinje cell and deep nuclear cell)</li> <li>• Explain clinical abnormalities of cerebellum with its pathophysiology</li> <li>• Discuss basal ganglia with respect of caudate circuit &amp; putamen circuit along with its functions</li> <li>• Explain the Parkinson's disease (case)</li> <li>• Enlist other abnormalities of basal ganglia(CASE)</li> <li>• Assessment of cerebellar functions</li> </ul>
	<b>Behavioral and Motivational Mechanisms of the Brain—The Limbic system and memory</b>	<ul style="list-style-type: none"> <li>• Discuss functional anatomy of limbic system</li> <li>• Enlist the parts of limbic system and discuss their function</li> <li>• Discuss types of memory along with areas of brain involved</li> <li>• Describe retrograde &amp; anterograde amnesia (CASE)</li> </ul>
	<b>States of Brain Activity—Sleep,</b>	<ul style="list-style-type: none"> <li>• Discuss sleep with various types and stages</li> <li>• Describe electroencephalogram</li> </ul>

	<b>Brain Waves, Epilepsy, Psychoses</b>	<ul style="list-style-type: none"> <li>• Discuss the EEG waves in association with stages of sleep</li> <li>• Discuss epilepsy with its types(CASE)</li> </ul>
	<b>Autonomic nervous system</b>	<ul style="list-style-type: none"> <li>• Explain general organization of autonomic nervous system</li> <li>• Contrast the functions of parasympathetic &amp; sympathetic functions</li> <li>• Describe alarm response</li> </ul>
	<b>CSF</b>	<ul style="list-style-type: none"> <li>• Describe formation and reabsorption of cerebral spinal fluid (CSF), including the anatomy and function of the choroid plexus.</li> <li>• Locate and describe the function of circumventricular organs.</li> <li>• Describe the normal pressure, flow, volume (ventricular vs. cisternal), and composition of the CSF</li> <li>• Contrast the difference between a communicating and a non-communicating hydrocephalus.(CASE)</li> <li>• Describe the local factors affecting brain blood flow and contrast their effectiveness with that of autonomic regulation of cerebral blood flow</li> <li>• Enlist the effect of blockage of middle cerebral artery and posterior cerebral artery on body</li> </ul>
<b>ENDOCRINOLOGY</b>	<b>Introduction to Endocrinology</b>	<ul style="list-style-type: none"> <li>• Enumerate chemical messenger systems of human body</li> <li>• Classify hormones on the basis of their chemical structure</li> <li>• Discuss hormone secretion, transport and clearance of hormones</li> <li>• Explain mechanism of action of hormone</li> <li>• Describe methods of measurement of hormone concentrations in blood</li> <li>• Enlist hormones that uses tyrosine kinase signaling, cAMP Messenger system &amp; phospholipase messenger system</li> </ul>
	<b>Pituitary Hormones and Their Control by the Hypothalamus</b>	<ul style="list-style-type: none"> <li>• Describe different types of cells in anterior pituitary and different types of hormones secreted by it</li> <li>• Explain the parts of pituitary gland and its relation to the hypothalamus.</li> <li>• Discuss hypothalamic control of pituitary secretion.</li> <li>• Explain physiological functions of growth hormone along with its receptors and intermediate substances controlling its secretion</li> <li>• Describe the abnormalities of growth hormone.(case)</li> <li>• Describe post. pituitary gland along with its secretions, receptors ,functions&amp; Its abnormalities(case)</li> </ul>
	<b>Thyroid Metabolic Hormones</b>	<ul style="list-style-type: none"> <li>• Discuss thyroid hormone &amp; its receptor, formation and secretion</li> <li>• Discuss effects and function and regulation of thyroid hormones: T3 and T4</li> <li>• Describe the physiological functions of thyroid hormones</li> </ul>

		<ul style="list-style-type: none"> <li>• Explain the effects of thyroid hormone on specific bodily mechanism(CASE)</li> <li>• Discuss the regulation of thyroid hormone secretion</li> <li>• Explain hyperthyroidism &amp; hypothyroidism with its examples, causes and functions</li> <li>• Discuss anti-thyroid drugs</li> </ul>
	<b>Adrenocortical Hormones</b>	<ul style="list-style-type: none"> <li>• Discuss adrenal cortex gland &amp; its hormones,</li> <li>• Describe mineralocorticoid, their receptors, synthesis, secretion, transport, functions, regulation and abnormalities</li> <li>• Describe Glucocorticoid, their receptor synthesis, secretion, transport, functions, regulation and abnormalities(case)</li> <li>• Adrenal androgens, their receptors, synthesis, secretion, functions and abnormalities</li> <li>• Explain Adrenal medullary gland and its hormones</li> <li>• Describe the regulation of cortisol by ACTH .</li> </ul>
	<b>Insulin, Glucagon, and Diabetes Mellitus</b>	<ul style="list-style-type: none"> <li>• Describe physiological anatomy of pancreas.</li> <li>• Discuss Endocrine functions of pancreas.</li> <li>• Discuss Synthesis, receptors, functions &amp; regulation of insulin &amp; its metabolic effects</li> <li>• Explain factors affecting insulin secretion</li> <li>• Discuss role of insulin in glucose transporter in humans/mammals/consequences</li> <li>• Explain diabetes mellitus with its type, physiology of diagnosis and treatment(Case)</li> <li>• Discuss hyperinsulinism/ insulinoma(CASE)</li> <li>• Discuss changes in protein metabolism, fat metabolism in diabetes mellitus,</li> <li>• Discuss ketosis, acidosis, coma, insulin excess, compensatory mechanisms</li> <li>• Discuss Glucagon synthesis, secretion, receptors, functions and its regulation.</li> <li>• Describe the role of somatostatins on insulin and glucagon's secretion</li> <li>• Discuss blood glucose regulation mechanism</li> </ul>
	<b>PARATHYROID GLAND</b>	<ul style="list-style-type: none"> <li>• Discuss physiological anatomy of parathyroid gland</li> <li>• Discuss synthesis, secretion, receptors, functions, regulation &amp; abnormalities of PTH</li> <li>• Explain vitamin D formation along with its action and its abnormalities</li> <li>• Discuss calcitonin along with its effect of plasma calcium level concentration</li> <li>• Explain the physiology of bone and teeth</li> </ul>
<b>Reproduction</b>	<b>Male reproduction</b>	<ul style="list-style-type: none"> <li>• Discuss the physiologic anatomy of the male reproduction organs.</li> <li>• Discuss steps of Spermatogenesis</li> <li>• Enlist the cells involved in Spermatogenesis and explain their role.</li> <li>• Explain the Hormonal regulation of Spermatogenesis.</li> <li>• Explain the Effect of temperature on spermatogenesis.</li> <li>• Enlist the substance/hormones releases from sertoli</li> </ul>



		<p>and lending cells</p> <ul style="list-style-type: none"> <li>• Discuss the role of SRY gene and anti-mullerian hormone in sexual differentiation of gonads during embryonic development.</li> <li>• Discuss the composition of semen</li> <li>• Discuss the composition and importance of seminal vesicles and prostatic fluid</li> <li>• Definitions : Puberty , Capacitation ,Acrosome Reaction,</li> <li>• Cryptorchidism, Infertility, Pseudo hermaphroditism</li> <li>• Discuss the synthesis , transport , metabolism and, Degradation and Excretion testosterone</li> <li>• Discuss functions of testosterone</li> <li>• Explains the mechanism of action and regulation of testosterone</li> <li>• Discuss the Functions of Testosterone During Fetal development</li> <li>• Discuss the role of HCG in Fetal Development .</li> <li>• Discuss the effect of low sperm count, abnormal morphology and non motile sperm on fertility</li> <li>• Discuss synthesis, source and role of estrogen in male reproduction</li> </ul>
	<b>Female reproduction</b>	<ul style="list-style-type: none"> <li>• Discuss the physiological anatomy of female reproductive system</li> <li>• Explain monthly ovarian cycle with their phases</li> <li>• Describe the monthly endometrial cycle with its phases</li> <li>• Correlate the events of endometrial cycle and ovarian cycle</li> <li>• Discuss the functions of ovarian hormones i)estradiol , ii) progesterone</li> <li>• Explain anovulatory cycle</li> <li>• Definitions: Puberty, Menarche , Menopause</li> <li>• Discuss the placental hormones</li> <li>• Explain milk let down reflex</li> <li>• To perform pregnancy test</li> </ul>
<b>Gastrointestinal Physiology</b>	<b>General Principles of Gastrointestinal Function- Motility, Nervous Control, and Blood Circulation</b>	<ul style="list-style-type: none"> <li>• Describe the general principles of gastrointestinal motility.</li> <li>• Discuss the neural control of gastrointestinal function- enteric nervous system.</li> <li>• Discuss the hormonal control of gastrointestinal motility.</li> <li>• Enlist the functional types of movements in the gastrointestinal tract.</li> <li>• Explain the gastrointestinal blood flow-splanchnic circulation.</li> </ul>
	<b>Propulsion and mixing of food in the alimentary tract</b>	<ul style="list-style-type: none"> <li>• Describe the ingestion of food.</li> <li>• Enlist the motor functions of the stomach.</li> <li>• Describe the movements of the small intestine.</li> <li>• Describe the movements of the colon.</li> <li>• Enlist the other autonomic reflexes that affect bowel activity.</li> <li>• Describe the general principles of alimentary tract secretion.</li> <li>• Discuss the secretion of saliva.</li> </ul>

		<ul style="list-style-type: none"> <li>• Discuss the esophageal secretion.</li> <li>• Discuss the gastric secretion.</li> <li>• Discuss the pancreatic secretion.</li> <li>• Describe the bile secretion by the liver.</li> <li>• Describe the secretions of the small intestine.</li> <li>• Explain the secretion of mucus by the large intestine.</li> </ul>
	<b>Digestion and Absorption in the gastrointestinal tract</b>	<ul style="list-style-type: none"> <li>• Discuss the digestion of the various foods by hydrolysis.</li> <li>• Describe the basic principles of gastrointestinal absorption.</li> <li>• Describe the absorption in the small intestine.</li> <li>• Describe the absorption in the large intestine: formation of feces.</li> </ul>
	<b>Physiology of Gastrointestinal Disorders</b>	<ul style="list-style-type: none"> <li>• Enlist the disorders of swallowing and the esophagus.</li> <li>• Enlist the disorders of the stomach.</li> <li>• Enlist the disorders of the small intestine.</li> <li>• Enlist the disorders of the large intestine.</li> <li>• Describe the general disorders of the gastrointestinal tract.</li> </ul>



## 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 & twelfth 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



## LEARNING METHODOLOGIES

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

- Interactive Lectures
- Small Group Session
- Scenario discussion
- Practical
- Skills session
- Self Study

**INTERACTIVE LECTURES:** In large group, the lecturer introduces a topic or common physiological mechanisms, clinical conditions and explains the underlying phenomena through questions, pictures of patients' interviews, exercises, etc. Students are actively involved in the learning process.

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

**SCENARIO DISCUSSION:** A small group discussion format where learning is focused around a series of questions based on a clinical scenario. Students' discuss and answer the questions applying relevant knowledge gained in clinical and basic health sciences.

**PRACTICAL:** Basic science practical related to physiology are scheduled for student learning.

**SKILLS SESSION:** Skills relevant to respective unit are observed and practiced where applicable in skills laboratory.

**SELF STUDY:** Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study in library



## Assessment methodologies

- **Internal Assessment Policy:**

- i) 20 marks are allocated from UHS for internal assessment.
- ii) 80% attendance is mandatory to appear in annual prof. examination.
- iii) **Formative assessments:** After completion of each unit, test will be held on the pattern of university examination (SEQs, MCQs and OSPE)

At the end of session 20 marks are distributed as:

- 70% on monthly test
  - 20% on Send up
  - 10% weightage on attendance( Minimum 80 % attendance is required to appear in final professional exams)
- **Summative assessments:** At the end of session by students are assessed by professional examinations conducted by UHS.

### Methods of Feedback of curriculum and Assessment:

- Feedback on curriculum is taken by medical education department on feedback proforma.
- Feedback assessment is taken as post –test discussion in tutorial timings.
- Key of MCQs is displayed immediately after the test to found any discrepancy in MCQs and to address queries of students.
- Model Answer of SEQs are also displayed to facilitate the students to rectify the errors

### **RECOMMENDED TEXTBOOKS**

- **TEXT BOOK OF PHYSIOLOGY GUTYON & HALL (13<sup>TH</sup> Ed)**
- **GANONG'S REVIEW OF MEDICAL PHYSIOLOGY (23<sup>rd</sup> Ed)**

### **REFERENCE BOOKS**

- **HUMNAN PHYSIOLOGY BY LAURULI SHERWOOD LATEST Ed**
- **PHYSIOLOGY BY BERNE AND LEVY, LATEST Ed**
- **PHYSIOLOGY BY LINDA AND CONSTANZO (BRS) LATEST Ed**

# TABLE OF SPECIFICATIONS FOR PHYSIOLOGY

## THEORY PAPER FIRST PROFESSIONAL

CONTENTS		MCQs	SEQs
1.	Kidney and body fluids	08	02
2.	Nervous system	12	02
3.	Special senses	06	01
4.	Endocrines	08	02
5.	Reproduction	06	01
6.	GIT	05	01
<b>TOTAL ITEMS</b>		<b>45 MCQs</b>	<b>09 SEQs</b>
<b>TOTAL MARKS</b>		<b>45 Marks</b>	<b>45 Marks</b>

*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

### ➤ **OSPE: (25 marks)**

Non-observed stations      10 of 01 marks each (2 minutes each)

Observed stations            03 of 05 marks each (4 minutes each)

### ➤ **Practical (30 marks)**

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

Aziz Fatimah Medical & Dental College



Thank You