

Department of Physiology



**Study Guide For
2nd YEAR MBBS**

**Sharif Medical & Dental College,
Lahore**



PREFACE

Study Guide can make a major contribution to learning. They are sometimes likened to a tutor sitting on the student's shoulder-available 24 hours a day to advise the student what he/she should be doing at any stage in their study. Study guides are different from textbooks. They apprise the student at the beginning of an academic session about the course outline, the teaching methodology to be followed throughout the year, learning objectives of each academic activity and the assessment methodology to be followed in an academic session. At SMDC we follow the traditional annual academic schedule in which the subject of Physiology is taught in the 2nd academic year of a medical student. Keeping in view the mission of UHS, Lahore and vision of our institute we have designed a training program which is intensive and at the same time interesting for the young minds. This guide includes details about various teaching activities which are to take place throughout the academic year along with the time allocation of each. A list of lectures to be conducted in this session with names of the instructors is attached. A broad learning outcome of every section from the course accompanied by specific learning objective of every lecture is also included. A complete list of practical work to be carried out in the laboratory is part of this document. Details of various assessments and testing methodology are included and marks distribution for the subject in the 2nd Professional examinations has been given. Names and email contacts of faculty have also been mentioned to foster better interaction between the teacher and the taught. A list of prescribed text and reference books forms part of this study guide. Since this document is the first of its kind we intend to improve upon it in light of the student-feedback every year. We shall be focusing on integrating research and education and the fusion of technology and clinical care in endeavour to produce graduates who can provide cutting edge in healthcare. We shall imbibe in our students the highest values of medical ethics to be exemplary physicians who can be a source of enlightenment for others and be leaders in their fields.

Prof. Dr. Ghazal Mansoor

MBBS, M.Phil

Head of Physiology Department SMDC, Lahore.



Vision & Mission of UHS

Qualitative and Quantitative Revolution in Medical Education and Research through Evolution and thereby improve Health Care delivery to Populace.

UHS shall be innovative global center of excellence in learning and research, supporting a community of scholars and professionals committed to serving society, promoting the development of students to reach their true potential in becoming competent, ethical, caring, and inquiring health professionals for the benefit of the country and the wider world.

Mission of SMDC

Sharif Medical & Dental College is dedicated to best serve the nation through preservation and dissemination of advanced knowledge and educating the students by latest trends in learning and research reaching levels pars excellence.

The Institution is committed to provide standardized quality medical education to its students by inculcating professional knowledge, skills and responsibilities in them with the aim of:

- Preparing them as modern physicians having initiative to act as future leaders in their respective fields and becoming lifelong learners.
- Encouraging the spirit of critical thinking through research and publication.
- Building up an understanding of the ethical values compatible with our religion, culture and social norms.
- Developing a sense of being responsible citizens of the society possessing professional competence and instilling in them the values of hard work and dedication thus preparing them to be accountable to the stakeholders and the state.

The Institution is devoted to keep abreast its faculty with the latest trends in Medical Education encompassing teaching/learning methodologies, assessment tools, research opportunities and professionalism to facilitate their professional development, competencies and commitment towards continues learning.

Our patient-centered mission is achieved by outstanding medical care & services in professional practice with due emphasis and focus on our local health needs.

Our mission further elaborate upon establishing academic and research facilities in areas of local demand under global gold standards and leading advancement in research, education & patient care.

Vision of SMDC

To be recognized for the provision of a safe and functional environment conducive to collaborative teaching & learning, comfortable working atmosphere, and conducting world class research through professionalism and excellence.



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PLANNED TEACHING ACTIVITIES FOR 2ND YEAR MBBS DEPARTMENT OF PHYSIOLOGY

PMC has allocated 200 hours of teaching in the subject of Physiology for the 2nd Year MBBS course. In order to meet this requirement following teaching modules have been planned. These modules have been carefully designed to impart core knowledge of Physiology in a manner that an undergraduate student can grasp the subject fully and is adequately prepared for university examinations.

Lectures:

A total of 216 lectures are planned for the entire year. The lectures will be conducted by the Professor, Associate and Assistant Professors or by Senior Demonstrator in the subject of Physiology. The lectures will be interactive and students should actively participate in them to clear their doubts. Interactive lectures using multimedia, white-boards & Zoom application will introduce concepts, theories and application of the subject by using relevant examples. The students are required to take notes of the lectures and study the topic with the help of prescribed text books in light of the learning objectives of the topic enunciated by the teacher at the beginning of each lecture.

Class Activities (PBL):

Problems based learning classes will be conducted from time to time throughout the academic year. A clinical scenario with short history will be discussed at the end of relevant topics. Students are exposed to Group Discussion & Q/A Session with teachers in Small Group twice a month. During this time complex concepts and time practical application is further explained.

Practical classes:

Clinical important concepts are augmented by performing practicals in Physiology Lab. Like examinations of superficial and deep reflexes. Examinations of cranial nerves. One practical class has been planned per week.

Tutorials (SGD):

Important topics of modules taught in lectures & practicals are discussed again for more elaboration in Tutorial Classes. One tutorial class per week is proposed throughout the academic session. The class is divided into 04 batches. Topics for the tutorial will be notified at least one week before the class.

Two instructors, one senior and one junior, will be deputed for every batch on rotation basis. During this interactive session the students must clear their concepts regarding the topic by actively engaging with their respective teachers.

Class Presentations:

Class presentations are conducted in the Tutorials to allow the students to demonstrate the knowledge about an important topic in Physiology and improve their communication skills.

Class Assignments:

Some of the important topics which are core curriculum of the subject are given to the students to prepare their assignments. Grading of these assignments give good feedback to the teachers and prepare the students for university exams.



TRAINING PROGRAM FOR LECTURES
DEPARTMENT OF PHYSIOLOGY
2nd YEAR MBBS CLASS

Human Physiology is the scientific study of different functions of Human body. Human body is incredible in the sense that it is made up of multiple cells that come together to form tissues, organs and various systems. Physiology includes two approaches to explain any event that is normally occurring within the human body; one emphasizes upon the purpose and the other the underlying mechanism. All of the human body systems serve a useful purpose and Physiology helps in determining what mechanistic process will work and be useful under a particular circumstance. So, Physiology explains how the Human body works with all systems working in harmony to maintain a balanced environment in the body during different circumstances.

1. Body Fluids & Kidney:

(i) Body Fluids:

S.No.	Title of Lectures	Name of Instructor
1	The Body Fluid Compartments and their Abnormalities	Dr. Rabia Sattar
2	Water Balance	Dr. Rabia Sattar
3	Edema	Dr. Rabia Sattar

(ii) Renal Physiology:

S.No.	Title of Lectures	Name of Instructor
1	Introduction to renal physiology	Dr. Rabia Sattar
2	GFR and its regulation	Dr. Rabia Sattar
3	Processing of glomerular filtrate; tubular reabsorption and secretion	Dr. Rabia Sattar
4	Plasma clearance	Dr. Rabia Sattar
5	Regulation of Potassium Calcium, Phosphate and Magnesium	Dr. Rabia Sattar
6	Regulation of B.P.	Dr. Rabia Sattar
7	Renal regulation of osmolarity	Dr. Rabia Sattar
8	Formation of dilute concentrated urine	Dr. Rabia Sattar
9	Acid Base balance	Dr. Rabia Sattar
10	Acid base disorders	Dr. Rabia Sattar
11	Diuretics	Dr. Rabia Sattar
12	Micturition	Dr. Rabia Sattar
13	Kidney Diseases	Dr. Rabia Sattar



2. Endocrinology:

S.No.	Title of Lectures	Name of Instructor
1	Introduction to endocrinology	Dr. Sana Javaid
2	Mechanism of action of hormones	Dr. Sana Javaid
3	Hypothalamus and Pituitary gland physiological anatomy and its control	Dr. Sana Javaid
4	Growth hormone	Dr. Sana Javaid
5	Thyroid gland	Dr. Sana Javaid
6	Adrenal gland	Dr. Sana Javaid
7	Adrenal medullary hormones	Dr. Sana Javaid
8	Abnormalities of adrenal gland	Dr. Sana Javaid
9	Calcium regulating hormones	Dr. Sana Javaid
10	Insulin, Glucagon, and Diabetes Mellitus	Dr. Sana Javaid

3. Reproduction System:

S.No.	Title of Lectures	Name of Instructor
1	Male Reproductive System	Dr. Mudassir
2	Female reproductive system	Dr. Qurat-ul-Ain
3	Menstrual cycle	Dr. Qurat-ul-Ain
4	Pregnancy	Dr. Qurat-ul-Ain
5	Placenta	Dr. Qurat-ul-Ain
6	Parturition	Dr. Qurat-ul-Ain

4. Gastrointestinal Tract (GIT):

S.No.	Title of Lectures	Name of Instructor
1	GIT Physiology	Dr. Nazish Jamil
2	Chewing/Swallowing reflex	Dr. Nazish Jamil
3	Functions of Stomach and gastric emptying	Dr. Nazish Jamil
4	Functions of small intestine	Dr. Nazish Jamil
5	Functions of Large intestine	Dr. Nazish Jamil
6	Defecation reflex	Dr. Nazish Jamil
7	Vomiting reflex	Dr. Nazish Jamil
8	Hormones of GIT	Dr. Nazish Jamil
9	Functions of liver	Dr. Nazish Jamil
10	GIT Disorders	Dr. Nazish Jamil



5. Special Senses:

S.No.	Title of Lectures	Name of Instructor
1	Chemical senses (olfaction)	Dr. Qurat-ul-Ain
2	Chemical senses (gustatory)	Dr. Qurat-ul-Ain
3	Hearing physiology External ear	Dr. Qurat-ul-Ain
4	Middle Ear	Dr. Qurat-ul-Ain
5	Inner Ear	Dr. Qurat-ul-Ain
6	Vestibular Sensation and Equilibrium Control	Dr. Qurat-ul-Ain
7	Eye (Optics of vision)	Dr. Qurat-ul-Ain
8	Eye (Retina)	Dr. Qurat-ul-Ain
9	Color vision	Dr. Qurat-ul-Ain
10	Phototransduction	Dr. Qurat-ul-Ain
11	Visual pathway	Dr. Qurat-ul-Ain

6. Central Nervous System (CNS):

(i) Sensory System:

S.No.	Title of Lectures	Name of Instructor
1	Functional organization of the Central Nervous system	Dr. Sana Qanber
2	Major levels of Central Nervous System Functions	Dr. Sana Qanber
3	Synapses	Dr. Sana Qanber
4	Sensory Receptors	Dr. Sana Qanber
5	Neuronal Pools	Dr. Sana Qanber
6	Somatic Senses	Dr. Sana Qanber
7	Sensory Cortex & Sensory Tracts/Pathways	Dr. Sana Qanber
8	Pain Sensation	Dr. Sana Qanber
9	Analgesia System in Brain & Spinal cord	Dr. Sana Qanber
10	Pain and Associated Clinical Abnormalities	Dr. Sana Qanber
11	Thermal Sensation	Dr. Sana Qanber



(ii). Motor System:

S.No.	Title of Lectures	Name of Instructor
1	Muscle Sensory Receptors	Prof. Dr. Ghazal Mansoor
2	Spinal Cord reflexes	Prof. Dr. Ghazal Mansoor
3	Cerebral Cortex & Voluntary Motor Function	Prof. Dr. Ghazal Mansoor
4	Motor Tracts/Pathways	Prof. Dr. Ghazal Mansoor
5	Brain Stem and Control of Motor Function	Prof. Dr. Ghazal Mansoor
6	Cerebellum & Motor Control	Prof. Dr. Ghazal Mansoor
7	Basal Ganglia & Motor Control	Prof. Dr. Ghazal Mansoor
8	Role of Cerebral Cortex in Learning	Prof. Dr. Ghazal Mansoor
9	Speech & Communication	Prof. Dr. Ghazal Mansoor
10	Memory	Prof. Dr. Ghazal Mansoor
11	Behavioral & Motivational Mechanisms of Brain	Prof. Dr. Ghazal Mansoor
12	Limbic System and Hypothalamus	Prof. Dr. Ghazal Mansoor
13	Sleep	Prof. Dr. Ghazal Mansoor
14	Epilepsy	Prof. Dr. Ghazal Mansoor
15	Psychoses & Dementia	Prof. Dr. Ghazal Mansoor
16	Cerebrospinal Fluid (CSF)	Prof. Dr. Ghazal Mansoor
17	Brain Metabolism	Prof. Dr. Ghazal Mansoor

(iii): Autonomics Nervous System:

S.No.	Title of Lectures	Name of Instructor
1	General Organization of ANS	Prof. Dr. Ghazal Mansoor
2	Cholinergic and Adrenergic Fibers of ANS	Prof. Dr. Ghazal Mansoor
3	Cholinergic and Adrenergic Receptors in Effector Organs	Prof. Dr. Ghazal Mansoor
4	Excitatory and inhibitory actions of sympathetic and parasympathetic stimulation	Prof. Dr. Ghazal Mansoor
5	Autonomic Tone and Autonomic Reflexes	Prof. Dr. Ghazal Mansoor
6	Responses by ANS stimulation	Prof. Dr. Ghazal Mansoor
7	Drugs acting on ANS	Prof. Dr. Ghazal Mansoor



LIST OF LECTURES IN THE SUBJECT OF PHYSIOLOGY AND THEIR
LEARNING OBJECTIVES
DEPARTMENT OF PHYSIOLOGY
2ND YEAR MBBS CLASS

1. Body Fluids and Kidney:

In this unit students will study the physiological aspects of Renal System which deals with the excretion of waste products, Regulation of acid base balance, water and electrolytes balance and role of kidney in regulation of blood pressure. Renal diseases are common in community so the basics causes and pathophysiology of common understand Renal System Disorder. So, on the completion of unit student must be able to describe the Physiological Anatomy and functions of Kidney along with the related pathologies:

i. Body Fluids:

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1	The Body Fluid Compartments and their Abnormalities: By the end of the topic students will be able to: <ol style="list-style-type: none">1. Explain total body water content and its distribution in different body compartments2. Describe the components and quantitative measurements of body fluids.3. Know the ionic composition of ECF and ICF
2	Water Balance: By the end of the topic students will be able to: <ol style="list-style-type: none">1. Understand the basic principles of osmosis and osmotic pressure2. Know the mechanism of maintenance of osmotic equilibrium between ICF and ECF3. Explain the effect on ICF and ECF compartments when isotonic, hypotonic and hypertonic solution is added to ECF with concept of dehydration, rehydration, over hydration and edema.
3	Edema: By the end of the topic students will be able to: <ol style="list-style-type: none">1. Define edema, its types.2. Describe the causes of intracellular edema and extracellular edema3. Understand the role of starling forces in the development/ prevention of edema4. Describe role of lymphatics in prevention of edema5. Define safety factor and its role in the prevention of edema.

ii. Renal Physiology:

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
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1	<p>Introduction to renal physiology:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. State the major endocrine and none endocrine functions of the kidney 2. Know the brief physiological anatomy of kidney. 3. Define the components and types of the nephron and their interrelationships: renal corpuscle, glomerulus, nephron, and collecting-duct system. 4. Describe juxtaglomerular apparatus and its cell types. 5. Explain the processes involved in urine formation resulting from glomerular filtration, tubular reabsorption, and tubular secretion
2	<p>GFR and its regulation:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the composition of the glomerular filtrate and glomerular capillary membrane 2. Defines podocytes, foot processes, slit diaphragms ,glomerular mesangial cells and states their functions 3. Define GFR and discuss the determinants GFR. 4. Explain the factors affecting the GFR, role of sympathetic nervous system, hormones and autacoids that influence GFR. 5. Define renal blood flow, renal plasma flow, filtration fraction, their formulas and values. 6. Discuss the physiological control of renal blood flow. 7. Describe the effects of changes in afferent and efferent arteriolar resistances on renal blood flow 8. Define autoregulation of GFR and renal blood flow. 9. Describe the myogenic tubuloglomerular feedback mechanism of autoregulation
3	<p>Processing of glomerular filtrate; tubular reabsorption and secretion:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the mechanism of reabsorption and secretion by the renal tubules 2. Explain the passive and active mechanisms; the major characteristics of diffusion, facilitated diffusion, primary active transport, secondary active transport and endocytosis involved in tubular reabsorption 3. Explain the concept of transport maximum and gradient-time transport. 4. Draw and interpret the glucose titration curve. 5. Discuss the reabsorption and secretion along different parts of the nephron 6. Discuss the peritubular capillary and renal Interstitial fluid physical force 7. Explain the regulation of tubular reabsorption



4	<p>Plasma clearance:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the use and importance of clearance methods to quantify kidney function. 2. Estimation of GFR by inulin clearance, and plasma creatinine clearance 3. Understand PAH clearance for estimation of renal plasma flow 4. Interpret the calculation of filtration fraction, tubular reabsorption and secretion from renal clearance
5	<p>Regulation of Potassium Calcium, Phosphate and Magnesium:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the internal potassium distribution and factors that can alter potassium distribution between the intracellular and extracellular fluid 2. Understand the potassium secretion by principal cells of late distal and cortical collecting tubules 3. Explain different factors that regulate potassium secretion: plasma potassium concentration, aldosterone, tubular flow rate, and hydrogen ion concentration 4. Discuss the excretion and extracellular concentration of calcium ion , Phosphate and magnesium ion 5. Identify the factors that alter renal calcium and phosphate excretion.
6	<p>Regulation of B.P:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define the role of kidneys in pressure natriuresis and diuresis 2. Understand the renal regulation of body fluid volumes and arterial pressure 3. Explain role of nervous and hormonal factors in renal-body fluid feedback control
7	<p>Renal regulation of osmolarity:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the regulation of extracellular fluid osmolarity and sodium concentration by kidneys 2. Describe the osmoreceptor-ADH feedback system 3. Discuss the physiology and pathophysiology of ADH in the formation dilute and concentrated urine. 4. Understand the role of thirst in controlling extracellular fluid osmolarity and sodium concentration 5. Explain the role of angiotensin II and aldosterone in controlling extracellular fluid osmolarity and sodium concentration 6. Illustrate the concept of “Free Water” and osmolar clearances
8	<p>Formation of dilute concentrated urine:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concept of obligatory urine volume

	<ol style="list-style-type: none"> 2. Explain about the requirements for excreting a concentrated urine—high ADH levels and hyperosmotic renal medulla 3. Describe the countercurrent mechanism producing a hyperosmotic renal medullary interstitium 4. Discuss the role of distal tubule and collecting ducts in excreting a concentrated urine 5. Explain role of urea in hyperosmotic renal medullary interstitium and formation of concentrated urine 6. Describe the role of countercurrent exchange in the vasa recta in preservation of hyperosmolarity of the renal medulla 7. Explain the concentrating mechanism and changes in osmolarity in different segments of the tubule
9	<p>Acid Base balance:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the basic concept of acid base, pH and buffers. 2. Explain the defenses against changes in hydrogen ion concentration: 3. Name the Buffer Systems operating in the Body 4. Discuss the bicarbonate buffer system, phosphate buffer system, proteins: important intracellular and extracellular buffers 5. Explain the respiratory regulation and renal control of acid-base balance 6. Describe the mechanism of acidification of urine and its importance.
10	<p>Acid base disorders:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the mechanism and effects of metabolic acidosis and alkalosis on human body and their compensations. 2. Discuss the Renal Correction of acidosis—increased excretion of hydrogen ions and addition of bicarbonate ions to the extracellular fluid 3. Discuss the renal correction of alkalosis—decreased tubular secretion of hydrogen ions and increased excretion of bicarbonate ions 4. Know the use of the acid-base nomogram for diagnosis of acid base disorders. 5. Understand causes of acid base disorders. 6. Explain the concept of anion gap.
11	<p>Diuretics:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Classification of diuretics, their mechanisms of action, and tubular sites of action.
12	<p>Micturition:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the physiological anatomy and nerve supply of urinary bladder

	<ol style="list-style-type: none"> 2. Understand the mechanism of bladder filling; Cystometrogram 3. Explain the micturition reflex and facilitation and inhibition of micturition by higher centers 4. Discuss the abnormalities of micturition.
13	<p>Kidney Diseases: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the acute renal injury with its categories and their causes. 2. Discuss the physiological effects of acute kidney injury 3. Understand how the vicious cycle of chronic kidney disease lead to end-stage renal disease 4. Know the causes of chronic kidney disease 5. List the renal function test and discuss their clinical significance. 6. Understand the principle of dialysis.

2. Endocrinology:

Endocrine system coordinates and integrates the cellular activities in the human body. The objective of this unit is to know the basic concept of molecular endocrinology, knowledge of endocrine glands and their relation with hypothalamus of action, Physiological functions and the related disorders with the completion of this unit student must be able to identify the common endocrinological disorder.

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1	<p>Introduction to endocrinology: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the general principle of endocrinology (classification, mechanism of action and feedback control). 2. Understand the hormone secretion, transport, and clearance from the blood
2	<p>Mechanism of action of hormones: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the intracellular signaling after hormone receptor activation. 2. Explain the second messenger mechanisms for mediating intracellular hormonal functions 3. Discuss the mechanism of action of hormones that act mainly on the genetic machinery of the cell 4. Describe measurement of Hormone Concentrations in the Blood 5. Understand the technique of ELISA
3	<p>Hypothalamus and Pituitary gland physiological anatomy and its control: By the end of the topic students will be able to:</p>

	<ol style="list-style-type: none"> 1. Discuss the neuroendocrine functions of the hypothalamus 2. Discuss the hypothalamic-hypophysial portal blood vessels of the anterior pituitary gland 3. Enumerate the hormones of anterior and posterior pituitary. 4. Explain the relation of posterior pituitary gland and hypothalamus 5. Describe formation, release and physiological functions of Oxytocin 6. Describe formation, release and physiological functions of ADH. 7. Discuss the etiology, clinical features, investigations and treatment of a patient with diabetes Insipidus and SIADH.
4	<p>Growth hormone:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Identify the factors and hormones that affect growth beside the growth hormone. 2. Know the physiological functions of growth hormone and metabolic effect of growth hormone. 3. Identify the relationship between growth hormone and insulin-like growth factors 4. Discuss the regulation of growth hormone secretion 5. Describe the hypopituitarism and hyperpituitarism 6. Describe the etiology, clinical features , pathophysiology, investigations and treatment of Dwarfism, Sheehan's syndrome, Gigantism and Acromegaly 7. Describe the endocrine function of pineal gland and biological effect of melatonin hormone.
5	<p>Thyroid gland:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Enumerate the hormones secreted from thyroid gland 2. Describe synthesis, Secretion, transport , mechanism of action and regulation of thyroid hormones 3. Describe the physiologic function and effects of Thyroid Hormone on Growth, metabolism and body systems 4. Explain the etiology, clinical features , pathophysiology, investigations and treatment of hyperthyroidism 5. Explain the etiology, clinical features , pathophysiology, investigations and treatment of hypothyroidism 6. Know the types and mechanism of action of Antithyroid drugs
6	<p>Adrenal gland:</p> <ol style="list-style-type: none"> 1. By the end of the topic students will be able to: 2. Hormones of adrenal cortex 3. Know the physiological anatomy and histology of adrenal gland 4. Enumerate the hormones secreted from adrenal cortex 5. Discuss the synthesis, transport, fate and secretion of adrenocortical hormones

	<p>6. Describe the functions and regulation of the mineral corticoids/aldosterone</p> <p>7. Describe the functions and regulation of the glucocorticoids</p> <p>8. Discuss the abnormalities of adrenocortical secretion</p>
7	<p>Adrenal medullary hormones: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Enumerate the hormones secreted from adrenal medulla 2. Discuss the secretion, mechanism of action, regulation and metabolic effects of Adrenal medullary hormones
8	<p>Abnormalities of adrenal gland: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the abnormalities of adrenal gland, CAH (Congenital Adrenal Hyperplasia), Cushing disease/ syndrome, Addison disease, Pheochromocytoma, Conn's syndrome and Adrenogential system.
9	<p>Calcium regulating hormones: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the regulation of calcium and phosphate in the extracellular fluid and plasma 2. Discuss the hormones that play role in calcium homeostasis 3. Explain the activation and physiological role of vitamin D 4. Discuss the Physiological functions , mechanism of action and Control of the Parathyroid hormone 5. Explain the physiological functions of calcitonin in Calcium metabolism 6. Describe the pathophysiology of parathyroid hormone, vitamin D, and bone disease.
10	<p>Insulin, Glucagon, and Diabetes Mellitus: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the endocrine functions of the pancreas and regulation of blood glucose level. 2. Explain the Mechanism of action of insulin & its regulation 3. Describe the effects of insulin on carbohydrates, proteins and Fats metabolism 4. Explain functions and regulation of glucagon secretion 5. Describe the physiological actions of Somatostatins 6. Discuss the types , causes ,clinical features , pathophysiology, investigations, complications and management of diabetes mellitus 7. Discuss hypoglycaemia.



3. Reproduction System:

The reproductive system or genital system is a set of organs that works together to produce offspring. Female reproductive system is design to produce carry transport fertilize and implant the zygote in the uterine wall. Male reproduction is designed to produce male gametes and secondary sexual characteristics in males.

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1	<p>Male Reproductive System:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the physiologic anatomy of male sexual organs 2. Discuss the process of spermatogenesis 3. Explain the function of the seminal vesicles and prostate gland 4. Comprehend abnormal spermatogenesis and male fertility 5. Understand the testosterone and other male sex hormones to be able to describe the physiological changes during male puberty. 6. Interpret semen analysis.
2	<p>Female reproductive system:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the physiology of the female reproductive system. 2. Explain the production and function of oestrogen and progesterone. 3. Know the gonadotropic hormones and their effects on ovarian follicle growth- luteal phase of the ovarian cycle corpus luteum 4. Know the ovarian and endometrial cycle. 5. Describe the physiological changes during female puberty and menopause.
3	<p>Menstrual cycle:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the regulation of the female monthly cycle 2. Explain pituitary ovarian system 3. Understand interplay between the ovarian and hypothalamic-pituitary hormones and feedback oscillation of the hypothalamic 4. Explain female puberty, menarche and menopause
4	<p>Pregnancy:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the maturation and fertilization of the ovum , transportation of the fertilized ovum in the fallopian tube (physiology of pregnancy) 2. Understand the implantation of mechanism and nutrition of the embryo
5	<p>Placenta:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the functions of placenta. 2. Know the placental hormones



	3. 3. Understand effects of human chorionic gonadotrpip hormone
6	Parturition: By the end of the topic students will be able to: 1. Discuss the hormones regulating parturition, lactation and development of breast.

4. Gastrointestinal (GIT):

The GIT includes the digestive tract and its accessory organs, which process food into molecules by different enzymatic and hormonal actions. To be absorb by the cell of the body through passes through esophagus, stomach, small & large intestines and base product are eliminated. Digestive process is controlled by both hormones and nerves.

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1	Introduction to GIT: By the end of the topic students will be able to: 1. Understand the physiologic Anatomy of gastrointestinal tract. 2. Comprehend the role of intestinal cells of cajal in the electrical activity of GIT smooth muscle 3. Discuss the enteric nervous system and its role in control of GIT function
2	Chewing/Swallowing reflex: By the end of the topic students will be able to: 1. Explain the importance of chewing defines mastication and its mechanism. 2. Describe the process of swallowing. 3. Understand different stages of swallowing reflex. 4. Understand different steps of involuntary phase of swallowing. 5. Know how different types of peristalsis in esophagus are taking place. 6. Discuss the importance of esophageal sphincter.
3	Functions of Stomach and gastric emptying: By the end of the topic students will be able to: 1. Categorize different functions of stomach. 2. Understand the process of stomach emptying. 3. Describe hunger pains and their mechanism. 4. Explain MMC (migrating motor complex). 5. Explain the different factors regulating stomach emptying. 6. Know different hormones taking place in stomach. 7. Comprehend the mechanism of HCl secretion.
4	Functions of small intestine: By the end of the topic students will be able to: 1. Discuss different types of movements taking place in small intestine. 2. Understand role of ileocecal valve.

	<p>3. Explain secretory functions of small intestine.</p> <p>4. Define peristaltic rush.</p>
5	<p>Functions of Large intestine:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain different colonic movements. 2. Classify movements of colon. 3. Understand the role of gastrocolic and duodenocolic reflexes in regulation of mass movements. 4. Explain the secretory functions of large intestine & its nervous control
6	<p>Defecation reflex:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the process of defecation. 2. Understand the pathway of defecation reflex. 3. Know different types of defecation reflex. 4. Know the pathophysiological bases of mega colon.
7	<p>Vomiting reflex:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the factors causing the process of vomiting. 2. Explain location of vomiting center in the brain and vomiting reflex. 3. Explain the role of chemoreceptor trigger zone for initiating vomiting.
8	<p>Hormones of GIT:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Classify different types of G.I.T hormones. 2. Understand the secretion of different hormones and their regulation.
9	<p>Functions of liver:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the type, cause and clinical features of Jaundice. Enlist and interpret liver function tests. 2. Describe the functions of liver and gall bladder. 3. Enlist and interpret liver function tests. 4. Know the synthetic functions of liver.
10	<p>GIT Disorders:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the causes and clinical findings of Dysphagia. 2. Describe Achalasia, peptic ulcer and Megacolon. 3. Explain the physiology of Diarrhea and constipation.



5. Special Senses:

In this unit the students will study the Physiological aspects of special senses and their clinical correlation. The Special Senses that have specialized organs vision (the eye), hearing and balance (the ear, which includes the auditory system and vestibular system), smell (the nose), taste (the tongue).

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1	<p>Chemical senses (olfaction):</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the physiology of olfaction its pathway and abnormalities. 2. Understand the olfactory transduction. 3. Discuss abnormalities related to olfactory mechanism
2	<p>Chemical senses (gustatory):</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the physiology of taste, its pathway and abnormalities. 2. Describe different taste transduction
3	<p>Hearing physiology External ear:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain physiological anatomy of external ear. 2. Enlist functions of external ear
4	<p>Middle Ear:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain physiological anatomy of middle ear. 2. Understand impedance matching 3. Explain attenuation reflex along physiological importance
5	<p>Inner Ear:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain physiological anatomy of the inner ear. 2. Discuss mechanism of hearing. 3. Describe the signal transduction for hearing and auditory pathway. 4. Explain the Phenomena of determination of the sound frequency, loudness and direction of sound. 5. Discuss deafness.
6	<p>Vestibular Sensation and Equilibrium Control:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define and locate Vestibular Apparatus. 2. Understand the Functional anatomy of Vestibular Apparatus. 3. Explain the role of Sensory Organs Utricle & Sacculle in controlling orientation of head with respect to gravity. 4. Describe the sensitivity of stereocilia and kinocillium in detecting head direction. 5. Explain semicircular ducts and their role in detecting head rotation and

	<p>direction.</p> <p>6. Illustrate Static equilibrium and its control by Utricle and Saccule.</p> <p>7. Explain the role of Neck proprioceptors and other factors in controlling equilibrium.</p>
7	<p>Eye (Optics of vision):</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand structure of human eye. 2. Discuss the errors of refraction. 3. Understand fluid system of the eye
8	<p>Eye (Retina):</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain physiological anatomy of retina. 2. Explain photochemistry of vision. 3. Understand Wald visual cycle and night blindness. 4. Describe neural functions of the retina.
9	<p>Color vision:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe theories of color vision, primary colors. 2. Explain color blindness.
10	<p>Phototransduction:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe phototransduction cascade of receptor potential. 2. Understand mechanism of dark and light adaptation.
11	<p>Visual pathway:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Discuss the lesions of the visual pathway. 2. Discuss Argyll Robertson pupil and Horner's syndrome. 3. Define visual field, blind spot and abnormalities of visual field.

6. Central Nervous System (CNS):

The nervous system is a highly complex system of the Human body that helps all parts of the body to communicate with each other. The nervous system has three broad functions: Sensory input, information processing, and motor output. It has two major divisions; Central Nervous System (CNS) and Peripheral Nervous system (PNS). Central nervous system (CNS) consists of the brain and spinal cord, and the peripheral nervous system (PNS) consists of nerve fibers that carry information between the CNS and other parts of the body (the periphery).

S.NO	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Sensory System:</p> <p>Functional organization of the Central Nervous system: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe Basic Organization of the Central Nervous system. 2. Define a Neuron. 3. Explain types of Neurons. 4. Describe the structure and functions of Neurons. 5. Differentiate between the Sensory, integrative/processing, and motor parts of the nervous system.
2.	<p>Major levels of Central Nervous System Functions: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand three major levels of Central Nervous System. 2. Describe Spinal Cord level and its specific functional characteristics. 3. Explain the lower brain or subcortical level and associated with the subconscious control. 4. Describe the functions of Higher Brain or Cortical Level.
3.	<p>Synapses: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the synaptic functions of neurons. 2. Differentiate between types of synapses. 3. Explain transmission along a Chemical synapse. 4. Describe the role of excitatory and inhibitory receptors and second messenger system in the postsynaptic neuronal membrane. 5. Define Neurotransmitters. 6. Explain the criteria for labeling a substance as neurotransmitter. 7. Know the different classes of neurotransmitters. 8. Describe Excitatory and Inhibitory post synaptic potentials. 9. Illustrate the phenomenon of Summation in synapses. 10. Describe the special characteristics of synaptic transmission.
4.	<p>Sensory Receptors: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the type of sensory receptors and the stimuli detected by the sensory receptors. 2. Understand the concept of Differential Sensitivity. 3. Explain The Labeled Line Principle and its significance. 4. Define Receptor Potentials and explain their mechanism. 5. Illustrate Receptor Potential of Pacinian corpuscle. 6. Describe the mechanism of Adaptation of Receptors.
5.	<p>Neuronal Pools: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define Neuronal Pools. 2. Describe transmission and processing of signals in neuronal pools.

	<ol style="list-style-type: none"> 3. Understand the concepts of divergence and convergence of signals in neuronal pools. 4. Explain prolongation of signals by neuronal pools by after discharge.
6	<p>Somatic Senses: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define and classify Somatic senses. 2. Differentiate three physiological types of somatic senses, mechanoreceptive somatic senses, thermoreceptive, and pain somatic senses. 3. Describe detection and transmission of Tactile Sensations. 4. Explain the structure and function of Tactile receptors. 5. Describe the structure and function of mechanoreceptors and free nerve endings.
7	<p>Sensory Cortex & Sensory Tracts/Pathways: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the sensory part of cerebral cortex, the Somatosensory Cortex. 2. Differentiate between Somatosensory areas I & II. 3. Describe the location and functions of somatosensory areas I & II. 4. Understand the functions of Somatosensory Association Areas. 5. Know the major sensory pathways for transmitting somatic signals into the Central nervous system. 6. Describe Dorsal medial Leminiscal tract (DCMLS), trace its pathway, and explain its functions. 7. Describe Anterolateral tract, trace its pathway, and explain its functions.
8	<p>Pain Sensation: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define Pain Sensation 2. Classify types of Pain. 3. Understand different pain stimuli. 4. Describe the pain receptors and their characteristics. 5. Explain fast and slow pain fibers. 6. Describe dual pathways, Neospinothalamic and Paleospinothalamic pathways for pain transmission. 7. Compare & contrast Neospinothalamic and Paleospinothalamic pathways for pain transmission. 8. Describe various theories of pain.
9	<p>Analgesia System in Brain & Spinal cord: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the components of Analgesia system. 2. Explain the function of Analgesia system.

	<ol style="list-style-type: none"> 3. Describe the transmitter substances of Analgesia system. 4. Know the role of morphine opiate, endorphins, and enkephalins in producing analgesia.
10	<p>Pain and Associated Clinical Abnormalities: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe Referred pain with examples. 2. Explain the concept of visceral pain & illustrate its mechanism with examples. 3. Understand the concept of parietal pain caused by diseases of viscera & role of different pathways. 4. Know about common clinical abnormalities associated with pain e.g., Hyperalgesia, Herpes Zoster (Shingles), Tic Douloureux. 5. Explain the effects of Brown Sequard Syndrome upon one sided spinal cord transaction and its association with loss of pain and thermal sensations. 6. Describe Headache as a type of referred pain. 7. Explain intracranial and extracranial types of headache.
11	<p>Thermal Sensation: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the grades of thermal sensations. 2. Describe different thermal sensory receptors. 3. Explain the mechanism of stimulation of thermal receptors. 4. Understand the transmission of thermal signals in the nervous system.
12	<p>Motor System: Motor Neurons & Motor functions of Spinal Cord: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain Spinal cord organization for motor functions. 2. Describe two major types of motor neurons in the spinal cord; Anterior Motor Neurons and Alpha Motor Neurons. 3. Understand the functions of interneurons and gamma motor neurons.
13	<p>Muscle Sensory Receptors: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Know the two sensory receptors in muscles; Muscle spindle and Golgi tendon organ. 2. Describe the structure of muscle spindle and Golgi tendon organ. 3. Explain the receptor function of muscle spindle and Golgi tendon organ. 4. Describe Muscle Stretch reflex and illustrate the role of muscle spindle in Muscle stretch reflex. 5. Understand the types of Muscle stretch reflex. 6. Explain the clinical applications of Muscle stretch reflex. 7. Describe Golgi Tendon Reflex & its significance.
14	<p>Spinal Cord reflexes:</p>

	<p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain Flexor and Withdrawal reflexes and their neuronal mechanism. 2. Understand Crossed Extensor reflex and its significance. 3. Describe the phenomena of Reciprocal Inhibition and Reciprocal Innervations 4. Explain different reflexes of posture and locomotion. 5. Describe the Autonomic Reflexes in the spinal cord. 6. Understand the concept of Spinal Cord Transection and Spinal shock.
15	<p>Cerebral Cortex & Voluntary Motor Function: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Describe the Motor Cortex and its three subareas. 2. Explain the location and functions of Primary motor cortex, Premotor area, and Supplementary motor area. 3. Define and locate specialized motor areas in human cortex.
16	<p>Motor Tracts/Pathways: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand how signals are transmitted from Motor cortex to the Muscles. 2. Describe Corticospinal (Pyramidal) tract, trace its pathway, and explain its functions. 3. Explain Extrapyramidal Tracts for motor signal transmission. 4. Compare & contrast Pyramidal and Extrapyramidal tracts for motor control. 5. Explain minor motor pathways.
17	<p>Brain Stem and Control of Motor Function: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Identify different parts of Brain stem. 2. Understand the special control functions and command signals of the brain stem. 3. Describe the role of Reticular and Vestibular Nuclei in support of the body against gravity. 4. Explain the role of pontine and medullary reticular systems in motor control. 5. Understand the control of antigravity muscles by vestibular nuclei. 6. Define and explain the concept of Decerebrate Spastic Rigidity.
18	<p>Cerebellum & Motor Control: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define & locate Cerebellum. 2. Describe the anatomical & functional areas of Cerebellum. 3. Explain the neuronal circuitry of Cerebellum (Afferent and Efferent Cerebellar pathways). 4. Describe the functional organization of Cerebellar cortex.

	<ol style="list-style-type: none"> 5. Enumerate Deep Cerebellar nuclei and enlist their functions. 6. Understand the differences in the role of Cerebellar Mossy and Climbing fibers in controlling motor functions. 7. Explain the coordination of motor control at three levels of Cerebellum; Vestibulocerebellum, Spinocerebellum, and Cerebrocerebellum. 8. Describe the clinical signs and functions of cerebellum in detail. 9. Explain the clinical abnormalities of Cerebellum.
19	<p>Basal Ganglia & Motor Control: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand how Basal ganglia function as an accessory motor system in conjunction with other motor systems. 2. Enumerate Basal ganglia. 3. Describe the anatomical relations of Basal ganglia with other structures of the brain. 4. Explain the neuronal circuitry of Basal ganglia. 5. Describe the Putamen circuit, its significance and associated abnormalities. 6. Understand the role of Caudate circuit of Basal ganglia in cognitive control. 7. Describe the functions of Basal ganglia in reference to primitive motor cortex. 8. Explain different neurotransmitters in Basal ganglia. 9. Describe the role of Dopamine and GABA in controlling motor functions through Basal ganglia. 10. Explain Parkinson's Syndrome, its clinical manifestations, and treatment options.
20	<p>Role of Cerebral Cortex in Learning: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the Physiological anatomy of Cerebral cortex. 2. Describe the Thalamocortical System and its significance. 3. Explain the functions of specific cortical areas and cortical association areas. 4. Define and locate the general interpretative area, Wernicke's area and describe its functions. 5. Understand the concept of Dominant Hemisphere. 6. Explain Prefrontal Association areas and their significance in human intellect.

21	<p>Speech & Communication:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the function of Brain in Speech & Communication. 2. Explain the Sensory & Motor aspects of speech. 3. Describe Wernicke's Aphasia & Global Aphasia. 4. Explain Motor aphasia and its association with the Broca's motor speech area. 5. Illustrate the phenomenon of Articulation and explain the structures responsible for Articulation.
22	<p>Memory:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the role of Corpus Callosum in transferring thoughts, memories and information between the two cerebral hemispheres. 2. Explain the Physiological basis of Memory and role of synaptic facilitation and synaptic inhibition in memory. 3. Classify and describe the mechanism of three principal types of Memories. 4. Explain the term Consolidation of Memory. 5. Define the role of Hippocampus in Memory. 6. Describe Amnesia and its types.
23	<p>Behavioral & Motivational Mechanisms of Brain:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the Activating systems of the Brain. 2. Describe the role of Brain stem excitatory and inhibitory signals to control behavior and motivation. 3. Understand the role of excitatory and inhibitory neurohormones, norepinephrine, dopamine, and serotonin in providing long periods of control.
24	<p>Limbic System and Hypothalamus:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the role of Limbic system in controlling Behavior. 2. Describe the functional anatomy of limbic system. 3. Enlist parts of limbic system. 4. Explain how Hypothalamus is the physiological centre of the limbic system. 5. Trace the limbic system. 6. Describe various functions of Hypothalamus in relation to its nuclei. 7. Explain Reward and Punishment centers and their significance in controlling behavior. 8. Define the role and functions of other parts of limbic system in behavior such as Hippocampus & Amygdala. 9. Explain Kluver-Bucy syndrome

25	<p>Sleep:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define Sleep & differentiate between sleep and coma. 2. Describe the two types of sleep, REM and NREM sleep. 3. Explain the basic theories of sleep. 4. Define the role of neuronal centers and neurohumoral substances in causing sleep. 5. Describe the physiological functions of Sleep. 6. Explain different types of Brain Waves, their origin, interpretation, and role of EEG. 7. Describe the changes in EEG during sleep and wakefulness.
26	<p>Epilepsy:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the concept of symptomatic seizures and Epilepsy. 2. Describe different types of Epilepsy. 3. Explain the treatment of Epilepsy.
27	<p>Psychoses & Dementia:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the role of different specific neurotransmitters in Psychoses. 2. Explain Depressive & Maniac-Depressive Psychoses. 3. Define Schizophrenia explain its pathophysiology. 4. Describe Alzheimer's disease and one of leading causes of dementia.
28	<p>Cerebrospinal Fluid (CSF):</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand the mechanism of cerebral blood flow and its regulation. 2. Describe cerebral microcirculation. 3. Explain Cerebral Stroke. 4. Define Cerebrospinal Fluid system. 5. Describe the general characteristics and composition of CSF. 6. Explain the site of synthesis of CSF. 7. Trace the pathway of flow of CSF in brain ventricles. 8. Describe the role of Arachnoidal villi in absorption of CSF. 9. Explain the functions of CSF. 10. Describe the Cushioning Effect. 11. Explain Coup and Counter coup brain injuries. 12. Describe the significance of measurement of CSF pressure and role of Lumbar Puncture. 13. Explain Hydrocephalus and its types. 14. Differentiate between Blood brain Barrier and Blood CSF barrier. 15. Compare and Contrast Hydrocephalus and Brain edema.

29	<p>Brain Metabolism: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the total brain metabolic rate and metabolic rate of neurons. 2. Describe the importance of continuous oxygen supply to brain. 3. Understand the role of glucose in maintaining brain energy under normal conditions.
30	<p><u>Autonomic Nervous System (ANS):</u> General Organization of ANS: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand that ANS operates through centers located in spinal cord, brain stem, hypothalamus, and also through visceral reflexes. 2. Describe two major divisions of ANS; Sympathetic and Parasympathetic Nervous systems. 3. Explain the Physiological Anatomy of Sympathetic and Parasympathetic Nervous systems.
31	<p>Cholinergic and Adrenergic Fibers of ANS: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain Cholinergic and Adrenergic Fibers of ANS in terms of neurotransmitters secreted by these fibers. 2. Explain neurotransmitters secreted by preganglionic and postganglionic Sympathetic and Parasympathetic fibers. 3. Describe acetylcholine and norepinephrine as major neurotransmitters of ANS. 4. Explain mechanisms of Transmitter secretion and removal at postganglionic endings. 5. Describe synthesis, secretion, destruction, and duration of action of Acetylcholine. 6. Describe synthesis, secretion, destruction, and duration of action of norepinephrine.
32	<p>Cholinergic and Adrenergic Receptors in Effector Organs: By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand that acetylcholine and norepinephrine bind to specific receptors on the effectors to produce action. 2. Describe the two principal types of acetylcholine receptors; Muscarinic & Nicotinic Receptors. 3. Explain the two principal types of adrenergic receptors; alpha and beta receptors.

33	<p>Excitatory and inhibitory actions of sympathetic and parasympathetic stimulation:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. List the effects on different visceral functions of the body caused by stimulating either the parasympathetic nerves or the sympathetic nerves. 2. Understand that sympathetic and parasympathetic stimulation causes excitatory effects in some organs but inhibitory effects in others. 3. Demonstrate that the two systems occasionally act reciprocally to each other. 4. Explain the effects of sympathetic stimulation on functions of Adrenal medulla.
34	<p>Autonomic Tone and Autonomic Reflexes:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Define sympathetic and parasympathetic tone. 2. Explain the examples and significance of Autonomic tone. 3. Describe the effects of loss of sympathetic and parasympathetic tone after denervation. 4. Enlist different autonomic reflexes and illustrate their significance in regulating visceral functions.
35	<p>Responses by ANS stimulation:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Explain Mass Discharge by Sympathetic System. 2. Describe specific localized responses by Parasympathetic system. 3. Define and explain Alarm or Stress Response.
36	<p>Drugs acting on ANS:</p> <p>By the end of the topic students will be able to:</p> <ol style="list-style-type: none"> 1. Understand symptomimetic drugs, their names and actions. 2. Explain sympatholytic drugs with examples. 3. Describe parasympathomimetic and parasympatholytic drugs with examples.



PHYSIOLOGY PRACTICALS:

Nervous System

1. Examination of superficial reflexes.
2. Examination of deep reflexes.
3. Examination of motor system.
4. Perform the cerebellar function tests.
5. Examination of sensory system.
6. Study the triple response of Lewis.
7. Demonstrate the clinical tests for examination of 12 cranial nerves.

Special Senses

1. Plot the peripheral field of vision (Perimetry and confrontational methods).
2. Elicitation of light reflex (direct and consensual) and accommodation reflex.
3. Test the visual acuity for near and distant vision.
4. Examine the fundus of eye (Ophthalmoscopy).
5. Demonstrate the hearing and equilibrium test.
6. Testing the colour vision.
7. Test the senses of taste and smell.

Reproduction

1. Perform and interpret the Pregnancy Test.

Skin and body temperature regulation

1. Record the human body temperature using a clinical thermometer.

Renal Physiology:

1. To determine the specific gravity by Urinometer.



ASSESSMENT PLAN
DEPARTMENT OF PHYSIOLOGY
SHARIF MEDICAL & DENTAL COLLEGE LAHORE

Following modes of assessment are planned for 2ndYear MBBS class in the subject of Physiology. This plan has been designed keeping in view the university curriculum and hopefully will facilitate the students in preparing for 2ndProfessional Examinations in the subject.

UNITS Tests:

Two tests will be conducted from each unit. The test will comprise of MCQs and SEQs on the pattern of university examinations. A preparatory time of at least one week shall be given prior to these tests.

VIVA VOCE:

Viva for every unit will be conducted after the completion of each topic.

OSPE Tests:

In order to prepare the students for practical examinations at least two OSPE tests will be conducted on the pattern of university examinations.

SEND-UPS:

This will be conducted at the completion of course exactly following the format of UHS Professional Exams. This will comprise of MCQ's, SEQ's and viva segments and a sizeable portion of the total course will be included in each of them.

Internal Assessment:

Internal assessment will be calculated out of 20 on the basis of all these tests that will be conducted throughout the year.



STAFF CONTACTS

S.NO.	Name of Faculty's Member	Email Address
1	Prof. Dr. Ghazal Mansoor	ghazalmajeed100@gmail.com
2	Dr. Rabia Sattar	rabia.ahsan100@gmail.com
3	Dr .Sana Qanber Abbasi	sanaqanberabbasi@gmail.com
4	Dr. Qurat-ul-Ain	quratkundi@gmail.com
5	Dr. Nazish Jamil	nazishjamil875@gmail.com
6	Dr. Sana Javaid	sana5120@hotmail.com
7	Dr. Mudassir Rasheed	dr.mudassirrasheed@gmail.com
8	Dr. Hira Ijaz	hira.ijaz004@gmail.com
9	Dr. Ali Abbas	alichaudhary955@gmail.com
10	Dr. Amina Ahmed	aminaahmed9418@gmail.com



PRESCRIBED TEXT & REFERENCES BOOKS

Recommended Books:

- Textbook of Physiology by Guyton and Hall, Latest Ed,
- Review of Medical Physiology by William F. Ganong, Latest Ed, published by McGraw –Hill education.
- Physiology Practical Notebook

Reference Books:

- Human Physiology by Laurali Sherwood, Latest Ed, published by Yolando Cossio.
- Physiology by Berne and Levy, latest edition.
- Essentials of Medical Physiology by Prof. Mushtaq Ahmad.
- Physiology by Linda and Costanzo, Latest Ed, published by Elsevier Health Sciences.
- Essential of Medical Physiology (Jaypee), Latest Ed, published by Brothers Medical Publishers.