# NERVOUS SYSTEM & PSYCHOLOGY (GMT 201)

| NO. | TOPIC/SUBTOPIC | LECTURE | PRACTICAL | OTHER TEACHING MODE | DEPARTMENT | LEARNING OUTCOME |
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| | | | | | | By the end of the course, students will be able to: |
| 1. | Overview of nervous system | √ | | | ANATOMY | describe the general overview of the nervous system |
| 2. | Osteology | | | | | |
| 3. | The skull | √ | √ | | ANATOMY | state the division of the skull bones<br>state the types of development of the bones of the skull<br>state the pneumatised bones<br>describe the important sutures<br>describe the fontanelles<br>state the bony landmarks<br>state the skull bones that form the cranial fossae<br>state the openings in the skull and the structures that pass through them<br>state the parts of the mandible<br>identify the skull bones, the parts and the relevant structures from different views of the skull |
| 4. | The vertebral column | √ | √ | | ANATOMY | describe the gross anatomy of the vertebral column<br>describe the organization, curvatures and postnatal developmental changes of vertebral column<br>describe the cervical, thoracic, lumbar, sacral and coccygeal vertebrae<br>describe the intervertebral articulations and intervertebral discs<br>describe the applied anatomy of vertebral column<br>identify the feature of vertebral column<br>identify the parts of vertebra<br>identify and differentiate the cervical, thoracic and lumbar vertebrae<br>identify the features of the sacrum |
| 5. | Structural organization of nervous system | | | | | |
| 6. | Development of the nervous system | √ | | | ANATOMY | recall the neurulation<br>state the derivatives of neural tube and neural crest cells<br>describe the histogenesis of cells in the central nervous system<br>describe the development of the spinal cord<br>state the brain flexures<br>describe the derivatives of the primary and secondary brain vesicles<br>describe the development of sensory and motor neurons<br>describe the developmental basis of congenital anomalies of nervous system |
| 7. | Brainstem | √ | | | ANATOMY | describe the features and parts of the brainstem<br>describe the external features and internal structure of medulla<br>describe the external features and internal structure of pons<br>describe the external features and internal structure of midbrain<br>describe the applied anatomy of the brainstem |

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| 8. | Cerebellum | √ | | | ANATOMY | describe external and internal features of cerebellum and its division<br>state the anatomical and functional subdivision of cerebellum and its important connections<br>describe the applied anatomy of the cerebellum |
| 9. | Brainstem & cerebellum | | √ | | ANATOMY | identify the different parts and features of brainstem<br>identify the lobes, fissures and features of cerebellum |
| 10. | Cerebral hemisphere and | √ | | | ANATOMY | desribe the external features, lobes, sulci and gyri of the cerebrum<br>describe the gray and white matter of the cerebrum<br>describe the applied anatomy of the cerebrum |
| 11. | Basal ganglia | √ | | | | describe the location and the components (nuclei) of basal ganglia<br>state the neural connections and functions of basal ganglia<br>describe the applied anatomy of the basal ganglia |
| 12. | Functional areas of the cortex | √ | | | ANATOMY | describe area of cerebral cortex subserving major special functions like motor, sensory, auditory, visual, speech and personality<br>define the cerebral dominance and lateralization of cortical functions<br>describe the applied anatomy of functional areas of cerebral hemispheres |
| 13. | Diencephalon | √ | | | ANATOMY | lists different components of diencephalon<br>describe the location, relation, parts, nuclei and important connections of thalamus<br>describe the location, relation, parts, nuclei and important connections of hypothalamus<br>describe location and parts of epithalamus<br>describe location and parts of subthalamus<br>describe the applied anatomy of the diencephalon |
| 14. | Cerebral hemisphere & its functional areas, basal ganglia & diencephalon | | √ | | ANATOMY | identify the lobes, sulci and gyri of cerebral hemisphere<br>identify the corpus callosum and the internal capsule<br>identify the nuclei of basal ganglia in transverse and coronal sections<br>identify the different parts of diencephalon |
| 15. | Anatomy of limbic system | √ | | | ANATOMY | define the limbic system<br>state the functions of the limbic system<br>describe the components of the limbic system<br>describe the nuclei of limbic system<br>describe the pathways of limbic system<br>describe the applied anatomy of the limbic system |
| 16. | Histology of the Nervous System | √ | √ | | ANATOMY | describe the structure of neurons<br>state the classification of neurons<br>describe the neuroglia<br>describe the myelination<br>describe the microscopic structure of the nerve<br>describe the microscopic structure of spinal cord<br>describe the microscopic structure of cerebrum<br>describe the microscopic structure of cerebellum<br>identify the neurons<br>identify the histological features of the nerve trunk, nerve fascicle and nerve fibres<br>identify the histological features of spinal cord at different segments<br>identify the histological features of cerebral cortex<br>identify the histological features of cerebellum |
| 17. | Blood supply of the Central Nervous System | √ | | | ANATOMY | describe their course, branches and areas of supply of the internal carotid artery<br>describe their course, branches and areas of supply of the vertebral artery |

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| | | | | | | describe their course, branches and areas of supply of the basilar artery<br>describe the formation and importance of circle of Willis<br>describe the veins of the brains<br>describe the dural venous sinuses<br>describe the blood supply of the spinal cord<br>describe the applied anatomy of blood supply of brain<br>describe the applied anatomy of blood supply of central nervous system |
| 18. | Meninges & circulation of Cerebrospinal Fluid (CSF) | √ | | | ANATOMY | describe the layers of meninges in relation with brain<br>describe the layers of meninges in relation with spinal cord<br>describe the extradural, subdural and subarachnoid spaces<br>describe the ventricles including their communications<br>describe site of formation, circulation, absorption and function of cerebrospinal fluid<br>describe the applied anatomy of meninges and cerebrospinal fluid circulation |
| 19. | Blood supply of the CNS; Meninges & circulation of CSF | | √ | | ANATOMY | identify the arteries and veins of the brain<br>identify the arteries and veins of the spinal cord<br>identify the dural folds and dural venous sinuses<br>identify meninges surrounding the brain and spinal cord<br>identify ventricles and their communications |
| 20. | Anticonvulsants (antiepileptics) | √ | | | PHARMACOLOGY | Describe:<br>- the conventional and new antiepileptic drugs (AED)<br>- drug selection factors<br>- combination therapy<br>- mechanism of AED<br>- AED for children, elderly and in pregnancy<br>- side effects of AED |
| 21. | Neuropharmacology of movement disorders | √ | | | PHARMACOLOGY | 1. Describe the drugs used in treatment of Parkinson's disease that increase nigrostriatal dopaminergic activity (dopamine agonists, levodopa, MAO-A inhibitors, COMT inhibitors) – their mechanism of action, pharmacokinetics and adverse drug reactions<br>2. Describe the drugs used in treatment of Parkinson's disease that decrease striatal cholinergic activity<br>3. List drugs used in other movement disorders (Huntington's disease, tremor, ballismus, tics, dystonia) |
| 22. | Clinical relevance & congenital anomalies of nervous system | | | √ (PBL) | NEUROSCIENCES/ ANATOMY | **KNOWLEDGE**<br>**ANATOMY**<br>1. Describe the embryological development of the Nervous System<br>**PATHOLOGY**<br>1. List the common congenital anomalies of the nervous system<br>2. Discuss the pathological features of common congenital anomalies such as<br>a) Spina Bifida<br>b) Hydrocephalus |

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| | | | | | | 3. Explain the causative factors of congenital anomalies of the nervous system<br><br>**ATTITUDE**<br>1. Understand the socio-economic and health implications of congenital anomalies |
| 23. | Convulsion | √ | | √ (PBL) | NEUROSCIENCES | **KNOWLEDGE**<br><br>**PHYSIOLOGY**<br>1. Explain the mechanism of conduction of nervous impulses and the factors that influence it.<br><br>**PATHOLOGY**<br>1. Define the term "convulsion"<br>2. List clinical features that are attributed to convulsions<br>3. Differentiate the various subtypes of convulsion<br>4. List clinical disease that result in convulsions<br>5. Explain the pathological mechanism underlying convulsions<br><br>**PHARMACOLOGY**<br>1. Discuss regarding anticonvulsive drugs and their mechanism of actions<br><br>**ATTITUDE**<br>1. Understand the socio-economic and health implications of convulsive disorders |
| 24. | Meningitis & encephalitis | √ | | | NEUROSCIENCES | **KNOWLEDGE**<br><br>ANATOMY<br>1. Describe the anatomy of the meninges<br><br>PHYSIOLOGY<br>1. Define the function of the meninges in the nervous system<br><br>PATHOLOGY<br>1. Describe the pathological features of Meningitis and Encephalitis<br>2. List the clinical features of Meningitis And Encephalitis<br><br>BIOCHEMISTRY<br>1. Describe the biochemicalabnormalities noted in the CSF in<br>Meningitis and Encephalitis<br><br>SKILLS<br>1. Demonstrate the technique to elicit signs of meningeal irritation ;-<br>Kernigs & Brudzinskis sign |
| 25. | CNS infections | | √ | | MICROBIOLOGY | 1. Outline laboratory methods for identification of the following bacteria, viruses, fungi and protozoa that causes CNS infections:<br>• Bacteria: *S. pneumoniae, H. influenzae, N. menigitidis, L. monocytogenes, E. coli,* GBS, *Mycobacterium tuberculosis*.<br>• Viruses: enteroviruses, HSV<br>• Fungi: *Cryptococcus* spp.<br>• Protozoa: *T. gondii*, free living amoeba |

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| | | | | | | 2. Outline appropriate specimen collection and transportation for microbiological examination. |
| 26. | Spinal cord and peripheral nerves | | | | | |
| 27. | Spinal cord, spinal nerves, plexus and dermatomes | √ | √ | | ANATOMY | describe the location, extent, segments, external features and internal structures of spinal cord<br>describe the applied anatomy of the spinal cord<br>describe the organization of spinal nerves and their functional component<br>define nerve plexus<br>state the different nerve plexuses<br>define the dermatomes<br>describe the dermatomes and map out the dermatomes of the body<br>describe the applied anatomy of dermatomes<br>identify external and internal features of spinal cord<br>identify the spinal nerves |
| 28. | Autonomic Nervous System | √ | | | ANATOMY | define autonomic nervous system<br>compare between somatic and autonomic nervous system<br>describe the general features of autonomic nervous system<br>describe the anatomical components of autonomic nervous system<br>state the subdivision of autonomic nervous system<br>describe the differences between sympathetic and parasympathetic nervous systems<br>describe the sympathetic pathways<br>describe the parasympathetic pathways |
| 29. | Pathophysiology of peripheral nerve injury | √ | | | NEUROSCIENCES | KNOWLEDGE<br>ANATOMY<br>1. List the anatomical structures that form the peripheral nervous system<br><br>PATHOLOGY<br>1. Describe the pathophysiological features of peripheral nerve injury |
| 30. | Immune-mediated neurological diseases | √ | | | IMMUNOLOGY | Understand the pathophysiology of immunologic diseases involving the nervous system including:<br>1) Multiple sclerosis<br>2) Guillain-Barre sysndrome<br>3) Myasthenia gravis |
| 31. | Spinal cord lesions and peripheral neuropathies | | | √ (PBL) | NEUROSCIENCES | KNOWLEDGE<br><br>ANATOMY<br>1. Describe the spinal cord with regard to its location and extent, external features & Internal structure<br><br>PATHOLOGY<br>1. Discuss the pathological features of spinal cord lesions<br>2. Describe the clinical features that occur due to spinal cord lesions<br>3. Discuss the pathological features of Peripheral neuropathy<br>4. Describe features of peripheral neuropathy |
| 32. | Cranial Nerves | | | | | |
| 33. | CN I, II, III, IV & VI | √ | | | ANATOMY | describe the functional component, nuclei of origin, course, distribution and functional significance of cranial nerves I, II, III, IV & VI |

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| | | | | | | describe the applied anatomy of cranial nerves I, II, III, IV & VI |
| 34. | CN, V, VII & VIII | √ | | | ANATOMY | describe the functional component, nuclei of origin, course, distribution and functional significance of cranial nerves V, VII & VIII<br><br>describe the applied anatomy of cranial nerves V, VII & VIII |
| 35. | CN, IX, X, XI & XII | √ | | | ANATOMY | describe the functional component, nuclei of origin, course, distribution and functional significance of cranial nerves IX, X, XI and XII<br><br>describe the applied anatomy of cranial nerves IX, X, XI and XII |
| 36. | Cranial Nerves | | √ | | ANATOMY | identify the cranial nerves and their important branches |
| 37. | Special senses | | | | | |
| 38. | Visual and lacrimal apparatus | √ | | | ANATOMY | describe the gross anatomy of the visual apparatus<br>describe the microscopic anatomy of the visual apparatus<br>describe the gross anatomy of extraocular muscles<br>describe the gross anatomy of lacrimal apparatus<br>describe the applied anatomy of visual and lacrimal apparatus |
| 39. | Ears | √ | | | ANATOMY | describe the features and functional anatomy of external ear and external auditory meatus<br>describe the structure of tympanic membrane<br>describe the gross anatomy of middle ear<br>describe the functional anatomy of internal ear<br>describe the features of microscopic structure of organ of Cortii<br>describe the applied anatomy of auditory apparatus |
| 40. | Visual and lacrimal apparatus & Ears | | √ | | ANATOMY | identify the extraocular muscles and parts of visual and lacrimal apparatus<br>identify the parts of external middle and inner ear<br>identify the microscopic structures of organ of Corti |
| 41. | Hearing | √ | | | PHYSIOLOGY | Regarding the mechanism of hearing<br>1. describe the function of the outer ear, middle ear and inner ear<br>2. describe the functions of cochlea and state the mechanism underlying the appreciation of the frequency and loudness of sound<br>3. outline the auditory pathways |
| 42. | Vision | √ | | | PHYSIOLOGY | Regarding the mechanism of vision<br>1. outline the functions of the parts of the eye and the associated glands<br>2. describe visual optics and explain the common errors of image formation<br>3. define visual field and visual acuity and state how these are tested in a subject<br>4. differentiate rods and cones and state the basis of colour vision and light dark adaptation<br>5. describe the visual pathway<br>6. describe the pathways and components of light reflex and accommodation reflex |
| 43. | Vitamin A metabolism and vision | √ | | | CHEMICAL PATHOLOGY | Describe the functional (emphasis on rhodopsin cycle), metabolic and nutritional aspects of vitamin A |
| 44. | Taste and smell | √ | | | PHYSIOLOGY | Describe the mechanism of olfaction and taste and outline their neural pathways |

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| 45. | Special senses (Physiology) | | √ | | PHYSIOLOGY | Measure visual acuity using Snellen's chart and near vision chart<br>Perform the test for colour vision using Ishihara colour chart<br>Perform the test for field of vision using confrontation method<br>Elicit light reflex and accomodation reflex<br>Perform the Rinne and Weber tests<br>Recognise the perimeter and audiometer and charts used with these instruments<br>Perform the tests for taste and olfaction |
| 46. | Motor and sensory systems | | | | | |
| 47. | Ascending and descending tracts | √ | | | ANATOMY | define tracts<br>state the ascending tracts<br>describe the origin, course of the ascending tracts and types of sensory input carried by them<br>state the descending tracts<br>describe the origin, course, and functions of the descending tracts<br>describe the applied anatomy of ascending and descending tracts |
| 48. | Functions of Sensory system | √ | | | PHYSIOLOGY | Regarding the components of sensory system and their function<br>1. define and classify sensory receptors and state their properties<br>2. explain the generation of receptor potential and its role in the stimulation of the afferent nerve<br>3. describe the ascending sensory pathways that subserve perceived sensations and state the functions of collaterals from sensory pathways |
| 49. | Functions of Motor system | √ | | | PHYSIOLOGY | Describe the components of a reflex arc and state their functions<br>Describe the physiology of stretch and withdrawal reflex with regard to<br>1. the role of muscle spindle in static and dynamic motor responses<br>2. the location and function of Golgi tendon organ<br>3. the principal differences between stretch reflex and withdrawal reflex<br>Describe the physiology and the various qualities of pain<br>Regarding the neural control of voluntary movements<br>1.define motor unit, lower motor neuron and upper motor neuron<br>2. describe the control of motor functions<br>3. describe the role of pyramidal and extrapyramidal systems in the control of motor function<br>Discuss the importance of muscle tone and posture for voluntary movements and enumerate the functions of cerebellum and basal ganglia in relation to motor activity |
| 50. | Functions of Autonomic nervous system | √ | | | PHYSIOLOGY | Regarding the autonomic nervous system<br>1 outline the functional differences between somatic and autonomic nervous systems |

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| | | | | | | 2 explain the basis of the division of the autonomic nervous system into sympathetic and parasympathetic divisions<br>3 describe neurotransmitters and their effects on the stimulation of the sympathetic and parasympathetic systems<br>4 list the functions of hypothalamus |
| 51. | Sensory and reflexes | | √ | | PHYSIOLOGY | Elicit superficial and deep reflexes<br>Examine the tone and power of a muscle<br>Perform the tests for cutaneous sensations |
| 52. | Weakness of one side of the body | | | √ (PBL) | NEUROSCIENCES | **KNOWLEDGE**<br><br>**ANATOMY**<br>1. List the components of the nervous system that are involved in conscious movement.<br>2. Illustrate the neural pathway involved in conscious movement.<br><br>**PHYSIOLOGY**<br>1. Discuss the role of the following structures in conscious movement<br>a) Cerebral Cortex<br>b) Brain Stem<br>c) Spinal Cord<br>d) Lower Motor Neuron Structures<br>e)Pyramidal Tract<br><br>**PATHOLOGY**<br>1. Discuss the pathological conditions that could result in weakness over one side of the body<br>2. List the clinical features related to a lesion involving the components of the nervous system involved in conscious movement<br>3 Classify the causes of weakness due to either I) upper and II) lower motor neuron<br><br>**SKILLS**<br>1. Recognize the sequence of examinations to evaluate conscious motor function<br><br>**ATTITUDE**<br>1. Understand the heterogeneous nature of disease in the nervous system that may manifest as body weakness |
| 53. | Overview of brain energy metabolism | √ | | | CHEMICAL PATHOLOGY | Describe the metabolic processes in the brain with particular emphasis on energy and neurotransmitter metabolism |
| 54. | Synapse and their transmitters | √ | | | PHYSIOLOGY | Describe central synapses with regard to<br>1. their properties of central synapses<br>2. the functional anatomy of a synapse<br>3. the mechanism of synaptic transmission<br>4. the excitatory post-synaptic potential (EPSP) and inhibitory post-synaptic potential (IPSP)<br><br>Outline<br>1. the criteria for the classification of neurotransmitters and describe their functions<br>2. the basis of classification of receptors for these neurotransmitters |
| 55. | Pathology of cerebrovascular diseases | √ | | | PATHOLOGY | 1.Describe the pathophysiological changes that occur in the following conditions: Stroke, intracranial/ Subarachnoid hemorrhage,infarction,ischaemia<br>2. Explain the causes of the above conditions. |

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| | | | | | | 3. Outline the pathological changes of the above conditions. |
| 56. | Pathology of neurodegenerative diseases | √ | | | PATHOLOGY | 1.Describe the pathophysiological changes that occur in Demyelinating disorders,<br>Degenerative disorders of the CNS and pheripheral nervous system<br>2. Explain the causes of the above conditions.<br>3. Outline the pathological changes of the above conditions. |
| 57. | Pathology of brain & spinal cord tumours | √ | | | PATHOLOGY | 1.Describe thepathophysiological changes that occur in Tumours of brain and spinal cord<br>2. Explain the causes of the above conditions.<br>3. Outline the pathological changes of the above conditions. |
| 58. | CNS Tumours | | √ | | PATHOLOGY | Recognise the morphological changes of CNS tumours at tissue and cellular level, for example meduloblastoma, glioblastoma, meningioma, metastatic brain tumour. |
| 59. | History taking of neurological disorders & Physical Examination in nervous system | √ | √ | | | Perform basic history taking relevant to neurological disorders<br>Perform physical examination for the following:<br>– Examination of Motor System<br>– Examination of Sensory System<br>– Cranial Nerve Examination<br>– Examination of the cerebellum |
| 60. | Psychology | | | | | |
| 61. | Introduction I | √ | | | PSYCHIATRY | **A. Normal Functions Of The Mind**<br>1. Define mental health.<br>2. Describe the theory of the mind<br>- id, ego, superego<br>- conscious, preconscious, subconscious and unconscious<br><br>**B. Altered Function Of The Mind**<br>1. Grasp the different definitions of abnormal behaviour as described by clinical psychologists :<br>1.1. abnormal behaviour as statistical deviations<br>1.2. abnormal behaviour as violation of social norms<br>1.3. abnormal behaviour as maladaptive behaviour<br>1.4. abnormal behaviour as personal distress<br>2. The medical model of abnormal behaviour :<br>2.1. the disease concept of psychiatric illness<br>2.2. the biopsychosocial perspective of understanding and managing abnormal behaviour<br>3. Defense mechanism<br>3.1. Define the concept of defenses mechanisms<br>3.2. List out common defense mechanisms<br>3.3. Define and give examples of these defenses in everyday life, both illness and in normality<br>3.4. Know the defense that can be classified as mature and possibly begin using them, instead of immature and neurotic ones. |
| a. | Introduction II | √ | | | PSYCHIATRY | 4. Classification of mental illness<br>4.1. Know some history on the development of the present nomenclature |

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| | | | | | | 4.2. Outline the general principles of classification of psychiatric illness according the International Classification of Diseases (ICD) and (DSM IV)<br>5. Causes of mental illnesses<br>5.1. Understand the characteristic symptomatology of specific mental illness<br>5.2. Understand the mulifactorial causation of abnormal behaviour understood in terms of the predisposing, precipitating and perpetuating factors<br>5.3. Know the biological, psychological and social aspects that contribute to the above aetiological factors discussed in general.<br>5.4. Know how to evaluate the severity of abnormal behaviour<br>6. Outline the phenomenology of psychoses, neuroses and cognitive disorders.<br>7. Outline the principles of management comprising of curative, preventive and the psycho-social aspects. |