NEUROSCIENCES-II MODULE

4th Year MBBS

KMU (IHPER)- Central Curriculum Committee

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Khyber Medical University (KMU) Vision:

Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Medical University (KMU) Mission:

Khyber Medical University aims to promote professional competence through learning and innovation for providing comprehensive quality health care to the nation.

Institute of Health Professions Education & Research (IHPER) Mission:

To produce leaders, innovators and researchers in health professions education who can apply global knowledge to resolve local issues.

Themes

Table 1: Thematic Distribution

S. No	Themes	Duration in days
1	Disturbed sleep	5
2	Disturbed mood & behaviour	5
3	Right-sided weakness and inability to speak	3
4	Loss of consciousness and Fits	5
5	Tremors	2
6	Headache	5
7	Paraplegia	2
8	Numbness and tingling	3

Teaching Hours Allocation

Table 2: Subject Wise Hours Distribution

S#	Subject	Hours (approximate)
1	Pathology	24
2	Pharmacology	22
3	Forensic medicine	20
4	Community medicine	36
5	General medicine	12
6	Psychiatry	10
7	Paediatrics	5
8	Neurosurgery	2
9	Orthopaedics	1
10	Anaesthesia	4
11	PRIME/MEDICAL EDUCATION	2
12	PRIME/RESEARCH*	16**
13	Family medicine	1
	TOTAL	139

* two hours per week for research project in the whole academic session

**the final marks of research events are NOT included in total hours as these are not used in developing assessment blueprints.

Learning Objectives

By the end of NS II Module, 4th year MBBS students will be able to:

1) Describe anxiety disorders and their pharmacological management.
2) Explain the concepts of Mood disorders and their pharmacological management.
3) Explain psychotic disorders and their pharmacological management.
4) Describe the pathophysiology and management of Dementias.
5) Elaborate the pathophysiology, clinical features, management, and prevention of cerebrovascular diseases.
6) Classify epilepsy and describe the pharmacological management of epilepsy in children and adults.
7) Describe the types and protocols of anesthesia and explain the drugs used as anesthetics.
8) Explain the pathology and clinical features of cerebellar diseases.
9) Elaborate the clinical features and pharmacological management of Parkinson`s disease.
10) Explain the clinical features and management of Motor neuron disease and Friedrich`s ataxia.
11) Describe the pathology and management of head injury.
12) Describe the pathogenesis, clinical features, and management of common CNS infections.
13) Classify brain, spinal cord, and peripheral nerves tumors, and describe their clinical features and management.
14) Explain the pathophysiology, clinical features, investigations and management of Multiple sclerosis, transverse myelitis, and Guillain Barre syndrome.
15) Classify peripheral neuropathies and elaborate their etiologies and clinical presentations.
16) Explain the clinical features and forensic approach to a patient with neurotoxic poisons.
17) Explain the forensic aspects of insanity and head injury.

Specific Learning Objectives

Table 3: Theme Wise Learning objectives

Theme I: Disturbed sleep					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Psychiatry	Sleep disorders	Describe the types of sleep disorders	Sleep disorders and its management	1 Hour
			Explain the pharmacological and non-pharmacological management of sleep disorders		
			Describe the ways of improving healthy sleep		
		Non-organic insomnia	Define non-organic insomnia	Non-organic insomnia and its treatment	
			Explain the management of non-organic insomnia		
		Sleep wake cycle disorders	Describe the concept of sleep-wake cycle disorder	Sleep Walk and its treatment	
			Describe the pharmacological and non-pharmacological		

			management of sleep-wake wake cycle disorder		
2.	Pharmacology	Introduction to the Pharmacology of CNS	Describe basic terms like neurotransmitters, neuromodulator/neurotropic factors, withdrawal symptoms (abstinence syndrome), cross-tolerance, reverse tolerance (sensitization) and cross-dependence	Common terminologies BBB Neurotransmitters Ion channels and its receptors	1 Hour
			Describe the blood-brain barrier and its clinical significance		
			Enlist the principal neurotransmitters and their receptors in the CNS		
			Describe voltage-gated, ligand-gated (ionotropic), ion channels and metabotropic receptors on the neuronal membrane		

			Classify the drugs acting on the CNS		
		Sedative-hypnotics (Minor tranquilizers)	Classify broadly the Sedative-Hypnotics	Minor tranquilizers	
		Benzodiazepines	Classify Benzodiazepines	Benzodiazepines and its pharmacological characteristics	
			Describe the pharmacokinetics of Benzodiazepines		
			Describe the mechanism of action of Benzodiazepines		
			Describe the pharmacological effects of Benzodiazepines		
			Describe the clinical uses of Benzodiazepines		
			Describe the adverse effects of Benzodiazepines		
			Describe the tolerance and dependence on Benzodiazepines		

			Describe the drug interactions of Benzodiazepines		
			Name the antidote (competitive antagonist) to Benzodiazepines		
		Barbiturates	Classify barbiturates		
			Describe the mechanism of action and clinical uses of barbiturates		
			Describe the difference regarding the mechanism of action of Barbiturates in comparison to Benzodiazepines		
		Buspirone	Describe the mechanism of action and clinical use of Buspirone		
			Describe the merits and demerits of Buspirone in comparison to Benzodiazepines		

		Ramelteon	Describe the mechanism of action and clinical use of Ramelteon		
		CNS stimulants	Classify CNS stimulants		
		Respiratory analeptics (Doxapram, Nikethamide)	Describe the mechanism of action, clinical uses and adverse effects of Respiratory analeptics	Respiratory Aneleptics	
		Methyl xanthine/Theophylline, Caffeine, Theobromine)	Describe the mechanism of action, clinical uses and adverse effects of Methyl xanthine	Methylxanthine	
		Sibutramine	Describe the mechanism of action and clinical use of Sibutramine	Sibutramine	
3.	Forensic Medicine	Classification of neurotoxins	Define and classify neurotoxins	Classifications	1 Hour
		Cerebral Poisons-Somniferous Poisons • Morphine • Opium	Describe and enlist Somniferous poison. Describe the mechanism of action for the Somniferous poison.	Types MOA Sign and symptoms	

		Heroin	Describe different signs, symptoms and autopsy appearance in a typical of Somniferous poisons.	Autopsy appearance Fatal dose Treatment and diagnosis Medicolegal importance	
			Describe fatal dose, treatment, and diagnosis for the Somniferous poisons.		
			Describe medico-legal importance for the Somniferous poisons.		
			Describe and enlist Somniferous poison.		
		Inebriant Poisons • Ethyl Alcohol • Methyl Alcohol	Describe and enlist Inebriant poison.	Types MOA Sign and symptoms Autopsy appearance Fatal dose Treatment and diagnosis	
			Describe mechanism of action for the Inebriant poison.		
			Describe different sign, symptoms, and autopsy appearance in a typical of Inebriant poisons.		

			Describe fatal dose, treatment, and diagnosis for the Inebriant poisons.	Medicolegal importance	
			Describe medico-legal importance for the Inebriant poisons.		
		Sedative & Hypnotics • Chloral hydrate • Barbiturates	Describe and enlist sedative and hypnotics	Types MOA Sign and symptoms Autopsy appearance Fatal dose Treatment and diagnosis Medicolegal importance	
			Describe mechanism of action for the Sedative and hypnotics.		
			Describe different sign, symptoms, and autopsy appearance in a typical of Sedative and hypnotics.		
			Describe fatal dose, treatment, and diagnosis for the Sedative and hypnotics.		
			Describe medico-legal importance for the Sedative and hypnotics.		

		Fuels, stimulants and hallucinogens • Agrochemical poisons • Kerosene • Hallucinogens-LSD • Stimulants-Amphetamines	Describe and enlist fuels, stimulants and hallucinogens.	Fuels: Stimulants Hallucinogens Sign and symptoms Autopsy appearance Fatal dose Treatment and diagnosis	
			Describe mechanism of action of fuels, stimulants and hallucinogens.		
			Describe different sign, symptoms and autopsy appearance in a typical case of fuels, stimulants and hallucinogens poisoning.		
			Describe fatal dose, treatment, and diagnosis of fuels, stimulants and hallucinogens.		
			Describe medico-legal importance of fuels, stimulants and hallucinogens.		
		Drug Dependence	Describe Drug dependence and its psychological effects.	Drug dependence Its psychological effects	

			Describe drug abuse and outline the procedure to investigate a case due to narcotics.	Drug abuse	
4.	Community medicine/epidemiology	Epidemiology	Define epidemiology	Definition Concept	1 Hour
			Explain the basic concepts of epidemiology		
		Study design	Classify and elaborate study designs	Study Design	
		Screening	Explain the screening in epidemiology	Screening	
		Measures of mortality and morbidity	Explain the measures of morbidity and mortality	Measurement of mortality and morbidity	

Theme II: Disturbed Mood & Behaviour					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Psychiatry (mood and anxiety disorders)	Depressive disorders	Classify depressive disorders	Classification Aetiology C/F Management	2 Hours
			Describe the aetiology, clinical features and management protocols of different depressive disorders		
		Bipolar Affective Disorder	Describe the clinical features and management protocols of Bipolar affective disorders	Clinical presentation Management	
		Suicide	Describe the preventive measures of suicide	Preventive measures	
		Anxiety Disorders	Classify anxiety disorders	Classification Differences Management	
			Differentiate between medical and psychiatric causes of anxiety		
			Differentiate between anxiety and phobia		

			Describe the pharmacological and non-pharmacological management of different anxiety disorders including relaxation techniques and breathing exercises		
		Dissociative disorders	Explain the different behavioral and neurological presentations of dissociative disorders	Types Management	
			Describe the pharmacological and non-pharmacological management of dissociative disorders		
		Stress related disorders	Classify stress related disorders	Classification and management	
			Explain the concept of stress in stress related disorders		

			Explain the pharmacological and non-pharmacological management of stress related disorders		
		Somatoform disorders	Classify somatoform disorders	Classification Counselling of patient	
			Describe the concept of medically unexplained symptoms		
			Counsel a patient with medically unexplained symptoms		
		Atypical depression and seasonal affective disorder	Describe the clinical presentation of atypical depression	C/F Management	
			Recognize the symptoms of atypical depression		
			Describe the management of atypical depression and seasonal affective disorders		
2.	Psychiatry (Psychotic illnesses)	Personality disorders	Classify personality disorders	Classification C/F	1 Hour

			Describe the clinical features, diagnostic criteria and management of personality disorder	Diagnosis Management	
		Psychotic disorders	Differentiate between organic and non-organic psychosis	Types concept Classifications	
			Explain the concept of psychosis		
			Classify psychotic disorders		
		Schizophrenias	Describe the clinical features, diagnostic criteria and management of Schizophrenias	C/F Diagnosis Management Psychotherapy Electroconvulsive Rehabilitations strategies	
			Explain the role of psychotherapy and Electroconvulsive therapy in Schizophrenias		
			Describe the rehabilitations strategies with patients of Schizophrenias		

		Delusional disorders	Describe the types and management of delusional disorders	Management and Types	
			Describe the ways of differentiating delusional disorders from Schizophrenias		
		Substance abuse disorder	Describe the concept of drug dependence	General concept Classification Management Harm reduction	
			Classify of drug abuse		
			Describe the principles of management of substance abuse		
			Explain the concept of harm reduction		
3.	General Medicine	Alzheimer`s disease and Dementias	Explain the pathophysiology, clinical features and management of Alzheimer`s disease	Pathophysiology C/F Management Dementia and its types	1 Hour
			Describe the reversible and irreversible causes of Dementia		

4.	Pharmacology	Depression	Describe the Monoamine hypothesis of depression	Monoamine hypothesis	2 Hours
		Antidepressants	Classify antidepressants	Classification	
		SSRIs (Selective Serotonin Reuptake Inhibitors)	Enlist SSRIs	Types MOA Clinical uses Adverse Effects	
			Enlist the most selective SSRIs		
			Describe the pharmacokinetics, mechanism of action, clinical uses, adverse effects and drug interactions of SSRIs		
			Classify antidepressants		
		TCAs (Tricyclic Antidepressants)	Enlist TCAs	Types MOA Clinical uses Adverse Effects	
			Describe the mechanism of action, clinical uses, adverse effects and drug interactions of TCAs		
			Enlist TCAs		
		MAOIs (Monoamine Oxidase Inhibitors)	Enlist MAOIs	Monoamine Oxidase Inhibitors	
			Describe the pharmacokinetics,		

			mechanism of action, clinical use, adverse effects and drug interactions of MAOIs		
			Describe Serotonin syndrome		
			Describe Hypertensive Cheese reaction		
			Describe St John's Wort		
			Describe the procedure of switching-over from one category of antidepressants to another one		
			Describe "Augmentation" of antidepressant therapy		
			Describe Electroconvulsive Therapy (ECT) for depression		
		Psychoses (Schizophrenia and others)	Describe the Dopamine hypothesis of Schizophrenia	Dopamine hypothesis	
			Classify Antipsychotics		

		Antipsychotics (Anti-schizophrenic drugs)	Describe the advantages of Atypical antipsychotics over the Typical (Classical/Traditional/Old) agents	Antipsychotic drugs	
			Describe the mechanism of action of Antipsychotics		
			Describe the pharmacological effects of Antipsychotics		
			Describe the clinical uses of Antipsychotics		
			Describe the drug interactions of Antipsychotics		
			Describe the adverse effects of Antipsychotics		
			Explain the drug treatment of extrapyramidal syndrome		

		Bipolar affective disorder (Manic Depressive illness)	Describe the concept of “mood-stabilization” in Bipolar affective disorder (Manic Depressive illness)	Mood stabilization	
		Mood-stabilizing drugs	Enlist Mood-stabilizing drugs	Types	
		Lithium carbonate	Describe the pharmacokinetics, mechanism of action, clinical uses, adverse effects and drug interactions of Lithium carbonate	Pharmacokinetics MOA Clinical uses Averse Effects	
		Alcohols	Describe alcoholism	Alcoholism and its pharmacological characteristics	
			Describe the pharmacokinetics of Ethanol		
			Describe the mechanism of action of Ethanol		
			Describe the pharmacological effects of Ethanol		

			Describe the clinical uses of Ethanol		
			Describe the adverse effects of Ethanol		
			Describe Disulfiram-like reaction with example of drugs causing it		
			Describe the management of Ethanol intoxication		
			Describe the management of Ethanol withdrawal symptoms		
			Describe the treatment of alcoholism		
			Describe briefly Methanol poisoning		
		Opioids (Morphine, Diamorphine, Codeine, Pethidine, Methadone, Pentazocine,	Differentiate between Opioids and Opiates	Types MOA Adverse Effects Pharmacological features	
			Describe the term “narcotic”		
			Describe the source of Opium		

		Buprenorphine, Dextromethorphane)	Enlist the “brain’s own Morphine” (endogenous Opioids)		
			Classify Opioids		
			Enlist Opioids with mixed agonist-antagonist properties		
			Enlist Opioids with partial agonist activity		
			Describe the pharmacokinetics, mechanism of action, pharmacological effects, clinical uses, adverse effects and drug interactions of Opioids		
			Describe the use of opioids as palliative care in terminal illness		
			Describe opioid rotation		
			Describe the treatment of Opioid over dosage		

			Describe the Opioid antagonists (antidotes)		
			Describe Opioid dependence		
			Describe the management of Opioid dependence		
			Describe the contraindications of Opioids		
			Enlist the drugs used for pain in opioid addicts		
		Tramadol	Describe the mechanism of action and clinical use of Tramadol	MOA	
		Drugs of abuse	Describe substance abuse, drug dependence, addiction and habituation	Substance abuse Drug dependence Addiction Habituation Dopamine hypothesis Types of drugs that causes addiction	
			Describe the Dopamine hypothesis of addiction		
			Enlist the drugs causing addiction		
			Enlist the non-addictive drugs of abuse		
			Describe “Club drugs”		

			Enlist the drugs having high-risk of addiction (scored 5 on the list of relative-risk of addiction)	Non-addictive drugs "Club drugs" Nicotine, Alcohol, Cannabis Opioids Drugs used in sports.	
			Enlist the drugs having moderate-risk of addiction (scored 4 on the list of relative-risk of addiction)		
			Describe the drug treatment of Nicotine, Alcohol, Cannabis and Opioid abuse		
			Describe the drug abuse in sports with examples		
5.	Forensic Medicine	Insanity and relationship to criminal charges	Define insanity.	Insanity and relationship to criminal charges	1 Hour
			Classify insanity and explain its sub-types		
			Describe relationship of insanity with criminal charges.		
			Describe different pleas and its legal exception based on unsoundness of mind.		

			Describe McNaghten rules, Durham`s rule and Impulse along with its application and criticism.		
			Differentiate between true and feigned insanity		
		Forensic Psychiatry	Define and describe Forensic Psychiatry.	Definition Common terminologies	
			Describe different terms used in Forensic Psychiatry: a) Affect b) Confabulation c) Delirium d) Delusion e) Fague f) Hallucination g) Illusion h) Intelligent Quotient i) Lucid Interval j) Neurosis k) Psychopath l) Psychosis		

			m) Stupor Twilight states		
		Mental health act	Define mental disorders based on mental health act	Types of mental disorders Admission and discharge procedure Wandering lunatic	
			Describe procedure of admission and discharge of mentally ill patient based on mental health act		
			Describe procedure of handling a wandering lunatic		
		Will	Define testamentary capacity	Testamentary capacity Valid Will features Dr-patient Will	
			Enlist conditions required for a valid Will		
			Describe the role of a doctor in taking a Will from a sick person		
		Civil and criminal responsibility of mentally ill patients	Explain the concept of civil and criminal responsibility of mentally ill patients	Civil and criminal responsibility of mentally ill patients	

6.	Community medicine	Mental health	Describe classification of mental health illnesses	classification Definition Global perspectives Epidemiology Risk Factors Prevention and Control	1 Hour
			Define mental health		
			Discuss global perspectives and epidemiology of mental health disorders		
			Discuss risk factors leading to mental health problems		
			Discuss prevention and control of mental health disorders		
7.	PRIME/MEDICAL EDUCATION	Conflict resolution	Explain the prerequisites for conflict resolution as a leader	Prerequisites Skills demonstration	1 Hour
			Show the ability to solve problems regarding difficult patients/attendant.		
8.	Community medicine/biostatistics	Biostatistics: Introduction	Describe the significance of biostatistics in health and epidemiology	Significance	1 Hour
		Data and variable types	Define and classify variables	Definition and Types	

		Sampling	Define sampling	Definition	
			Discuss types of sampling	Types	
		Biases in epidemiological studies	Define Bias	Definition	
			Discuss different types of biases	Types Prevention	
			Discuss how bias can be prevented		

Theme III: Right-sided weakness and inability to speak					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Pathology	Hypoxia, ischemia, and infarction	Define hypoxia, ischemia, and infarction, and describe its morphology and consequences in the context of CNS involvement	Common terminologies	1 Hour
		Intracranial haemorrhage	Describe the aetiology, risk factors and morphology of intracranial haemorrhage	C/F Aetiology Risk Factors	
		Strokes syndromes	Describe the aetiology, risk factors, morphology, and clinical and radiological features of stroke		
		Subarachnoid haemorrhage (SAH)	Explain the aetiology, risk factors and clinical features of SAH		
2.	General Medicine	Stroke	Describe the risk factors of stroke	Risk Factors Types C/F, radiological findings	1 Hour
			Explain the types of strokes		

			Describe the clinical features, radiological features, and management of a patient with intracerebral bleed	Management of intracerebral bleed and infarction	
			Describe the clinical features, radiological features, and management of a patient with stroke due to an infarction		
3.	Community medicine	Non-communicable diseases: Strokes	Discuss the epidemiological determinants of stroke in community	Epidemiology Prevention Rehabilitation	1 Hour
			Discuss the prevention and rehabilitation of strokes		
4.	Neurosurgery		Describe the neurosurgical management of stroke and Subarachnoid hemorrhage	Management	1 Hour
5.	Community medicine/biostatistics	Measures of central tendency	Classify measures of central tendency	Central tendency	1 Hour
			Calculate measures of central tendency		

			Interpret and signify the results		
			Describe the advantages and disadvantages of different measures		
		Measures of dispersion	Classify measures of dispersion	Dispersion	
			Calculate measures of dispersion		
			Interpret the results of measures of dispersion		
			Explain the advantages and disadvantages of measures of dispersion		
			Explain the use of different measures in specific circumstances		
		Normal distribution	Define normal distribution	Normal distribution curve and its significance	
			Describe normal distribution		
			Calculate and graphically represent normal distribution		

			Explain its use & significance in relation to data		
			Describe percentile and interquartile range		
			Calculate and depict percentile and interquartile range		
			Explain use and significance of these in different situations		
		Confidence Interval, Confidence level, Standard error	Define confidence level and interval	Confidence interval, confidence level Standard errors	
			Describe confidence level and interval		
			Calculate confidence level and interval		
			Explain their use and significance in different situations		
		P value, critical region, rejection	Define P value, critical region, rejection region, α ß errors	P Value and its significance	

		region, alpha beta errors	Describe P value, critical region, rejection region, α ß errors		
			Calculate P value, critical region, rejection region, α ß errors		
			Describe their use and significance in different situations		

Theme IV: Loss of consciousness and Fits					
S#	**Subjects**	**Topics**	**LOS**	**Contents**	**Hours**
1.	General Medicine	Seizures	Define seizures	Definition Classification Pathophysiology C/F Investigations Risk Factors Management	1
			Differentiate between a seizure and syncope		
			Classify epilepsy		
			Explain the pathophysiology, clinical features, risk factors, investigations and treatment of Tonic-Clonic epilepsy		
			Explain the pathophysiology, clinical features, investigations and treatment of absence seizures		
			Explain the pathophysiology, clinical features, investigations and treatment of psychomotor epilepsy		
			Explain the management of a patient with status epilepticus		
2.	Anaesthesia		Define anaesthesia	Definition	1

		Introduction to the subject	Describe different types of anaesthesia	Types	
		General anaesthesia	Describe the methods of induction of anaesthesia	Methods of induction	
		Neuroaxis block	Describe the following terms: • Spinal block • Epidural block • Caudal block Combined spinal /Epidural	Common terminologies	
		Regional anaesthesia	Describe the following terms: • Nerve block • Single shot • Continuous infusion Local infiltration		
		Preoperative evaluation and risk assessment	Explain the purpose of preoperative evaluation	Preoperative evaluation and risk assessment	
			Perform risk assessment of patient undergoing general anaesthesia		

			Describe the steps of history taking in preoperative evaluation for anaesthesia		
			Describe the plans of general and regional anaesthesia techniques		
			Describe the ASA classification for pre-operative risk assessment		
		Monitoring in anaesthesia	Describe the non-invasive and invasive techniques of patients` monitoring for the following parameters during general anaesthesia <u>Non-invasive:</u> a. Oxygenation b. Hemodynamic c. Temperature d. Electrical activity e. Neuromuscular activity f. Circulation <u>Invasive:</u>	Non-invasive and Invasive techniques	

			a. Oxygenation b. Hemodynamic c. Temperature d. Cardiac output e. Central venous pressure Circulation		
3.	Pharmacology	Anti-seizure drugs (Anti-epileptics)	Classify anti-seizure drugs	Classifications	1
			Enlist the "Broad-spectrum" anti-epileptics (Valproate and Lamotrigine)		
		Carbamazepine	Describe the mechanism of action, clinical uses, adverse effects and drug interactions of Carbamazepine	Clinical uses MOA Adverse Effects Drugs interactions	
		Phenytoin	Describe the pharmacokinetics of Phenytoin with reference to the phenomenon of zero-order kinetics		
			Describe the mechanism of action, clinical uses, adverse effects and drug interactions of Phenytoin		

		Valproate	Describe the mechanism of action, clinical uses, adverse effects and drug interactions of Valproate		
		Ethosuximide	Describe the mechanism of action, clinical uses and adverse effects of Ethosuximide		
		Phenobarbitone	Describe briefly the historic role of phenobarbitone in the management of epilepsy	Clinical uses	
		Benzodiazepines	Name the benzodiazepines used in the management of epilepsy		
		Lamotrigine, Topiramate and others	Name the new antiepileptic drugs	Anti-epileptic drugs and its features	
			Describe the mechanism of action, clinical uses and adverse effects of Lamotrigine and Topiramate		
			Describe the use of antiepileptics during pregnancy		

			Describe drug interaction of antiepileptics with oral contraceptive pills		
		Status epilepticus	Describe the management of status epilepticus	Management	
		General anaesthetics	Describe the stages of general anaesthesia	General anaesthetics	
			Describe balanced anaesthesia		
		Inhaled anaesthetics (N_2O, Halothane, Isoflurane, Sevoflurane, Desflurane)	Describe the pharmacokinetics of Inhaled anaesthetics	Inhaled anaesthetics	
			Discuss the clinical significance of Blood: Gas partition coefficient of Inhaled anaesthetics		
			Describe the mechanism of action of Inhaled anaesthetics		
			Define MAC_{50} (minimum Alveolar Concentration- 50%)		
			Describe the significance of MAC_{50}		
			Describe the pharmacological effects of Inhaled anaesthetics		

			Describe the adverse effects of Inhaled anaesthetics		
			Describe second gas effect		
			Describe diffusion hypoxia		
			Describe Malignant hyperthermia and its management		
			Describe the properties of an ideal inhaled anaesthetics		
		IV anaesthetics (Thiopentone, Propofol, Etomidate, Ketamine, Midazolam, Fentanyl)	Describe the mechanism of action, clinical use and adverse effects of Intravenous anaesthetics	IV anaesthetics	
			Describe re-distribution of Thiopentone		
			Define neuroleptanalgesia and neuroleptanaesthesia		
			Describe dissociative anaesthesia		
			Name the anaesthetic agent that causes dissociative anaesthesia		
			Describe TIVA (Total Intravenous Anaesthesia) technique		

		Pre-anaesthetic medications	Describe Pre-anaesthetic medications	Pre-anaesthetic medications	
			Describe the drugs used as Pre-anesthetic medications		
		Obstetric analgesia	Describe the drugs for obstetric analgesia	Obstetric analgesia	
4.	Forensic medicine	Deliriant Poisons • Dhatura • Hyocyamus nigra Cannabis indica	Describe and enlist Deliriant poisons.	Deliriant Poisons	1
			Describe mechanism of action of the Deliriant poisons.		
			Describe different sign, symptoms and autopsy appearance in a typical of Deliriant poisons.		
			Describe fatal dose, treatment, and diagnosis of the Deliriant poisons.		
			Describe medico-legal importance of the Deliriant poisons.		
			Describe and enlist Deliriant poisons.		

5.	Community medicine/biostatistics	Z test & it's application, Types / shapes of frequency distribution	Define & Describe 'z' test	Z test & it's application, Types / shapes of frequency distribution	1
			Describe its use in different statistical settings		
			Calculate 'z' test		
			Explain its application in hypothesis testing		
			Interpret and apply to clinical settings		
			Discuss various shapes of frequency distribution		
			Describe the applications of parametric and non-parametric tests		

Theme V: Tremors					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Pathology	Neurodegenerative disorders: • Alzheimer`s disease • Parkinson`s disease • Huntington's Disease and Spinocerebellar ataxias Motor Neuron disease	Describe the aetiology, risk factors, morphology and clinical features of Alzheimer`s disease Describe the ethology, risk factors, morphology and clinical features of Parkinson`s disease Describe the aetiology, risk factors, morphology and clinical features of Huntington`s disease Describe the clinical features of spinocerebellar ataxias	Common Neurological disorders	1
2.	General Medicine	Parkinson`s disease	Describe the aetiology, risk factors, morphology and	Aetiology Risk factors	1

			clinical features of Motor Neuron Disease	Morphology Clinical features Types	
			Describe the types, clinical presentation and management of Motor neuron disease		
3.	Pharmacology	Drugs for Parkinsonism	Classify drugs for Parkinsonism	Classification	1
		Levodopa (with Carbidopa)	Describe the pharmacokinetics, mechanism of action, adverse effects, contraindications and drug interactions of Levodopa	MOA Clinical uses Adverse Effects	
			Discuss the rationale of combining Carbidopa (or Benserazide) with Levodopa		
			Describe the on-off phenomenon		
			Describe the end-of-dose akinesia		

			Describe “drug holidays” for Levodopa		
		Bromocriptine	Describe the mechanism of action, clinical uses and adverse effects of Bromocriptine		
		Selegiline	Describe the mechanism of action and clinical uses of Selegiline		
			Describe the differentiating point regarding the use of Selegiline as antiparkinsonian drug and its use as an antidepressant drug		
		Apomorphine	Describe the mechanism of action and clinical use of Apomorphine		
		Drug-induced Parkinsonism	Enlist the drugs causing Parkinsonism-like symptoms	Drug-induced Parkinsonism	

			Enlist the drugs used in the management of drug-induced Parkinsonism		
			Describe the rationale of avoiding Levodopa in drug-induced Parkinsonism		
4.	Paediatrics	Cerebellar ataxias	Describe the clinical features and management of Friedreich's Ataxia	Friedreich's Ataxia	1
5.	Community medicine/biostatistics	"t" test & its application	Define & Describe 't' test	t" test & its application	1
			Explain its use in different statistical settings		
			Calculate 't' test		
			Describe its application in hypothesis testing		
			Interpret and apply to clinical settings		
			Calculate degree of freedom		
		Chi square test & its application	Describe 'x^2' test	Chi square test & its application	
			Describe its use in different statistical settings		

			Calculate 'x^2' test		
			Explain its application in hypothesis testing		
			Interpret and apply to clinical settings		
		Correlation, regression	Describe Correlation & Regression	Correlation, regression	
			Interpret and apply to clinical settings		
		Practical Problems in biostatistics	Discuss practical problems encountered in the application of biostatistics and SPSS	Practical Problems in biostatistics	

Theme VI: Headache					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Pathology	Meningitis	Explain the aetiology, clinical features, investigations and complications of acute pyogenic meningitis	Aetiology C/F Investigations Managements	2
			Explain the aetiology, clinical features, investigations and complications of Tuberculous meningitis		
		Encephalitis	Explain the aetiology, clinical features, investigations and complications of viral encephalitis		
		Brain abscess	Explain the aetiology, clinical features, investigations and complications of brain abscess		
		Cerebral Toxoplasmosis	Explain the aetiology, clinical features, investigations and		

			complications of Cerebral Toxoplasmosis		
		Tumours of CNS • Gliomas • Embryonal neoplasms • Meningioma Other neoplasms	Describe the classification of brain tumours on the basis of primary and secondary origin and benign and malignant	Common CNS tumours	
			Describe the classification, gross and microscopic morphology and clinical features of Gliomas		
			Describe the classification, gross and microscopic morphology and clinical features of embryonal neoplasms of brain		
			Describe the gross and microscopic morphology and clinical features of Meningioma		
			Enlist brain neoplasms other than gliomas, meningioma and embryonal cell neoplasms		

			Enlist the metastatic brain neoplasms		
2.	Pharmacology	Migraine and Cluster headaches	Classify drugs used for the treatment of Migraine and Cluster headaches	Classification	1
			Enlist the drugs used for the prophylaxis of Migraine and Cluster headaches		
		Triptans (Sumatriptan and others)	Describe the mechanism of action, clinical use and adverse effects of Sumatriptan	MOA, clinical uses and adverse effects	
		Ergot alkaloids	Enlist Ergot alkaloids		
			Describe the pharmacological effects of Ergot alkaloids		
		Ergotamine	Describe the mechanism of action, clinical use and adverse effects of Ergotamine		
3.	Forensic Medicine	Head Injury	Describe head injury in relation to scalp and skull injuries.	Head Injuries and its characteristics	1
			Classify different varieties of skull fractures.		

			Explain commonest site of skull fracture.		
			Describe mechanism of cerebral injury including coup and counter coup mechanism.		
			Describe injuries to cranial content and its medicolegal importance.		
			Describe intracranial haemorrhages and its types in detail as per medicolegal point of view.		
			Describe the medicolegal aspects of Punch drunk syndrome		
4.	General Medicine	Meningitis	Explain the aetiology, pathogenesis, clinical presentation, investigations and management of Acute pyogenic meningitis	Pyogenic Tuberculous Meningitis	1
			Explain the aetiology, pathogenesis, clinical		

			presentation, investigations and management of Tuberculous meningitis		
5.	Community medicine	Rabies	Explain the aetiology, clinical presentation of a patient with Rabies	Aetiology C/F Prophylaxis	1
			Describe post-exposure prophylaxis of Rabies		
6.	Family medicine	Rabies prophylaxis	Describe the types of wounds inflicted by rabid dog bite	Wounds caused by rabid dogs Types of immunizations	1
			Explain the types of active and passive immunisation for Rabies post-exposure prophylaxis		
			Describe the indications of Rabies vaccine and immunoglobulins		
7.	Paediatrics	Meningitis	Explain the aetiology, pathogenesis, clinical presentation, investigations and management of Acute pyogenic meningitis in children and neonates	Aetiology, pathogenesis, clinical presentation, investigations	1

		TBM	Explain the aetiology, pathogenesis, clinical presentation, investigations and management of Acute pyogenic meningitis in children	and management	
8.	Psychiatry	Chronic daily headache	Differentiate between neurological and psychological headache (chronic tension headache)	Types C/F Management	1
			Identify the red signs in patients with headache		
			Describe the principles of management of acute and chronic headaches		
9.	PRIME/RESEARCH	Data analysis	Use MS Excel for data analysis	Data analysis	1
			Use SPSS for data analysis		
			Use Endnote for reference management		
			Compile, analyze and write a dissertation		

Theme VII: Paraplegia					
S#	**Subjects**	**Topics**	**Los**	**Contents**	**Hours**
1.	Pathology	Multiple sclerosis and other demyelinating disorders of CNS	Explain the pathogenesis, morphology and clinical features of multiple sclerosis Describe the morphology of the following: • Acute demyelinating encephalomyelitis Acute necrotizing haemorrhagic encephalitis	Multiple Sclerosis Common pathological demyelinating disorders	1
2.	Forensic Medicine	Neurotoxins:	Describe and enlist spinal poison. Describe mechanism of action for the spinal poison. Describe different sign, symptoms and autopsy appearance in a typical case of spinal poisons. Describe fatal dose, treatment, and diagnosis for the spinal poisons.	Sign, symptoms and autopsy appearance	1

			Describe medico-legal importance for the spinal poisons.		
			Describe vertebral and spinal injuries		
		Snake bite neurotoxins	Describe different sign, symptoms and autopsy appearance in a typical case of snake bite poisons		
		Botulism toxins	Describe different sign, symptoms and autopsy appearance in a typical case of botulism		
3.	General Medicine	Multiple sclerosis	Explain the pathophysiology, clinical features and management of Multiple sclerosis	Pathophysiology, clinical features and management	1
		Transverse myelitis	Describe the aetiology, pathophysiology, clinical features and management of Transverse myelitis		
		Caries spine	Explain the pathophysiology, clinical features, investigations and management of Caries spine		
4.	Orthopaedics		Describe the general management of a patient with traumatic paraplegia	Management of traumatic paraplegia	1
5.	Neurosurgery		Describe the general management of a patient with traumatic paraplegia	Traumatic paraplegia Spinal Tumor	1
			Describe the types, clinical features and surgical management of spinal tumours		

Theme VIII: Numbness and tingling					
S#	**Subjects**	**Topics**	**LOS**	**Contents**	**Hours**
1.	Pathology	Patterns and types of peripheral nerves injury	Describe the patterns and types of neuronal injury	Types pathophysiology clinical features	1
		Acute and chronic demyelinating neuropathies	Describe the pathophysiology and clinical features of Guillain Barre syndrome		
			Explain the pathophysiology of Chronic demyelinating polyneuropathies		
		Myasthenia Gravis	Describe the pathophysiology and clinical features of Myasthenia Gravis	pathophysiology clinical features	
		Tumors of Peripheral nerve	Enlist the tumours of peripheral nerves	Types Neurofibromatosis	
			Describe the clinical features, of Neurofibromatosis		

2.	Pharmacology	Local anaesthetics (Lignocaine and others)	Classify Local anaesthetics	Local anaesthetics	1
			Enlist the Local anaesthetics used for surface anaesthesia		
			Enlist the Local anaesthetics used for infiltration anaesthesia, nerve block, spinal anaesthesia and epidural anaesthesia		
			Describe EMLA (Eutectic Mixture of Local Anaesthetics) and its clinical use		
			Describe the pharmacokinetics of Local anaesthetics		
			Describe the mechanism of action of Local anaesthetics		
			Describe the pharmacological effects of Local anaesthetics on nerves		
			Describe the differential blockade of peripheral nerves by Local anaesthetics		

			Describe the pharmacological effects of Local anaesthetics on other excitable membranes		
			Describe the clinical uses of Local anaesthetics		
			Describe the major advantages of adding Adrenaline to Lignocaine for infiltration anaesthesia		
			Calculate the quantity of Adrenaline/ml in the traditionally used combinations of Adrenaline and Lignocaine (i.e. 1:200,000 & 1: 80,000)		
			Describe the adverse effects of Local anaesthetics		
			Classify Local anaesthetics		
3.	Forensic Medicine	Neurotoxins: Peripheral poison	Describe and enumerate peripheral poisons.	Peripheral poison	1
			Describe mechanism of action for the peripheral poisons.		

			Describe different sign, symptoms and autopsy appearance in a typical of peripheral poisons.		
			Describe fatal dose, treatment, and diagnosis for the peripheral poisons.		
			Describe medico-legal importance for the peripheral poisons.		
4.	General Medicine	Guillain Barre syndrome	Explain the pathophysiology, clinical features and management of Guillain Barre syndrome	pathophysiology, clinical features and management	1
		Neuropathies	Describe the causes, types, distribution and clinical features of different neuropathies		
		Myasthenia Gravis	Explain the pathophysiology, clinical features and management of Myasthenia Gravis	Myasthenia Gravis Neurofibromatosis	
			Describe the clinical features, types and management of Neurofibromatosis		

5.	Paediatrics	Hereditary neuropathies	Describe the types, clinical features and management of hereditary neuropathies	types, clinical features and management	1
6.	Orthopaedics	Peripheral nerve injury	Describe the types and management of peripheral nerve injury	types, clinical features and management	1
			Explain entrapment neuropathies		
			Describe the risk factors, clinical features and management of Carpal tunnel syndrome		

Practical Work				
S#	**Subjects**	**Topics**	**LOS**	**Hours**
1.	Pathology	CSF	Describe the chemical, cytological composition of CSF	1
			Estimate the following analysis of CSF: • Chemistry • Cytology • Gram stain • Microbiology	
		Histopathological specimens of brain tumours	Identify the gross structure and microscopic features of: • Meningioma • Glioma/Astrocytoma	
2.	Pharmacology	Depression	Formulate a prescription for a newly diagnosed case of depression	
		Epilepsy	Formulate prescriptions for patients with Tonic-Clonic and Petit-mal epilepsy	
		Migraine headache	Formulate prescription for a patient with migraine headache	

3.	Forensic medicine	Somniferous poisons	Recognition of Opium and Heroin	
		Inebriant poisons	Recognition of Ethyl Alcohol and its examination	
		Fuel	Recognition of Kerosene oil	
		Deliriant	Recognition of Dhatura and Cannabis	
		Spinal poison	Recognition of Nux Vomica seeds	
4.	Community medicine	Data presentation • pie chart • histogram • bar chart and its types • venn diagram • scatter plot	Identify and interpret the charts	
		Application and Interpretation of statistical data	Apply a statistical test on a given scenario	
		Data interpretation	Interpret the normal distribution curve, skewed distribution, bi and poly-modal distribution & Standard Normal Curve	

Learning Resources

Table 4: Reference Textbooks

S#	Subjects	Resources
1.	Community medicine	1. Preventive and Social Medicine by K Park 2. Community Medicine by M. llyas 3. Basic Statistics for the Health Sciences by Jan W Kuzma 4. Textbook of Community Medicine and Public Health, 2018. Saira Afzal, Sabeena Jala
2.	Neurology	1. Davidson's Principles and Practice of Medicine 2. Kumar and Clark's Clinical Medicine, Edited by Parveen Kumar, 9th Edition
3.	Neurosurgery	1. Bailey & Love's Short Practice of Surgery , 26th Edition
4.	Pathology	1. Robbins & Cotran, Pathologic Basis of Disease,9 th edition. 2. Rapid Review Pathology,4 th edition by Edward F. Goljan MD
5.	Pediatrics	1. Nelson Textbook of Pediatrics, 19th Edition 2. Textbook of Pediatrics by PPA, preface written by S. M. Haneef 3. Clinical Pediatrics by Lakshmanaswamy Aruchamy, 3rd Edition
6.	Pharmacology	1. Lippincot Illustrated Pharmacology 2. Basic and Clinical Pharmacology by Katzung
7.	Psychiatry	1. Oxford textbook of psychiatry by Michael G. Gelder, 2nd Edition 2. Handbook of Behavioural Sciences, by Mowadat H. Rana 3. Drugs used in Psychiatry, by Prof. Muhammad Iqbal Afridi 4. Kaplan Series, Behavioural Sciences, Psychiatry

Assessment Plan - 4th Year MBBS

The year-4 will be assessed in 4 blocks

1) Block-1 (Neurosciences-2 module) will be assessed in **paper-J**
2) Block-2 (GIT and hepatobiliary module) will be assessed in **paper-K**
3) Block-3 (Renal-2, Endocrine & Reproduction-2 module) will be assessed in **paper-L**
4) Block-4 (ENT and EYE modules) will be assessed in **paper-M**
5) Each written paper consists of 120 MCQs.
6) Internal assessment will be added to final marks in KMU as shown in below table.
7) In OSPE, each station will be allotted 6 marks, and a total of 120 (+10% marks of internal assessment) marks are allocated for each OSPE/OSCE examination.

4th Year MBBS Modules Assessment Plan

Theory paper	Modules	Theory marks	Internal assessment theory (10%)	OSPE/OSPE	Internal assessment OSPE/OSPE (10%)	Total Marks
Paper J	Neurosciences-2	120	13	120	13	266
Paper K	GIT & Hepatobiliary-2	120	13	120	13	266
Paper L	Renal-2, Endocrine & Reproduction-2	120	14	120	13	267
Paper M	ENT and EYE	120	13	120	13	266
Research*				20	15	35
Total Marks		**480**	**53**	**500**	**67**	**1100**

*Research viva of 20 marks will be conducted in paper-L. However, the rest of 15 marks will be decided by the concerned department internally for the contribution of the students in research project/thesis.

Assessment Blueprints

Table 5: Paper J (MCQs)

Subject	Total MCQs
Pharmacology	20
Pathology	22
Forensic medicine	18
Community medicine	27
PRIME	02
Medicine	11
Psychiatry	09
Neurosurgery	02
Pediatrics	05
Anesthesia	03
Family medicine	01
Total	**120**

Table 6: OSPE/OSCE distribution of Paper J

Subject	Viva stations	OSPE/OSCE Stations	Total Stations
Pharmacology	2	3	5
Pathology	2	2	4
Forensic medicine	2	2	4
Community medicine	2	3	5
Medicine (neurological examination)	X	1	1
Psychiatry (counselling)	x	1	1
Total	8	12	20

* A minimum of 20 stations will be used in final exams. Total marks will be 120 (6 marks for each station).