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पाटन स्वास्थ्य विज्ञान प्रतिष्ठान सेवाआयोग

प्राज्ञिक सेवा, शल्यचिकित्सा समूह, Neuro-Surgery उपसमूह, सहायक प्राध्यापक पद, नवौं (९ ख) तहको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper II: Technical Subject
Section (A) - 45 Marks
(1 critical analysis Q -15 mark + 3 long Q- 30 marks)
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A. Objectives

A neurosurgeon is expected to be able to:

- Describe the clinically relevant anatomy, physiology and pathology of the nervous and other related systems.
- Describe the underlying rationale and be able to interpret the result of various investigations like EEG, EMG, evoked potentials, plain radiology of the skull & spine, neurosonology, CT, MRI, PET, SPECT & MEG scans, cerebral & spinal angiography and myelography.
- Demonstrate broad understanding of surgical care (encompassing general and neurological surgery) including history of surgery, the general trends in research and new developments in care as they relate to our population.
- Deliver comprehensive neurosurgical service in head and spinal injuries, cerebrovascular disease, brain and spinal tumours and infections and degenerative diseases of the spine.
- Develop and manage at least one and provide basic care in all subspecialties - stereotactic and functional, interventional therapy, epilepsy surgery, paediatric neurosurgery, skull base, neuro-endoscopy, neuro-oncology, ICU monitoring, neuro-ophthalmology and pain management.
- Arrange and supervise the rehabilitation of neurosurgical patients.
- Undertake and report researches and participate in the training of other categories of students.

B. Outline of the topics :

1. **Anatomy:**

   The student should be able to describe the structure (both microscopic and macroscopic) and function of the head, neck and spine.

   1.1 **Head:**

   1.1.1 Detailed knowledge of the structure of the scalp, cranial and facial bones, skull base, cranial cavities and meninges with emphasis on surgical approaches.

   1.1.2 Should be able to describe the structure and function of cerebral hemispheres, brainstem, cerebellum and the cranial nerves.

   1.1.3 Should be able to describe the arterial supply and venous drainage of the brain with special emphasis on microsurgical anatomy of the carotid and vertebral system.

   1.1.4 Should be able to describe neuroembryology and anomalies resulting form maldevelopment.

   1.2 **Spine:**

   1.2.1 Should be able to describe the anatomical structure of the cervical thoracic and lumbo sacral spines with structures around them and be able to plan surgical approaches to the spine anteriorly, posteriorly and laterally.

   1.2.2 Should be able to describe the microsurgical anatomy of the spinal cord and its vascular supply and drainage.

   1.3 **Peripheral Nerves:**

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     1.3.1   Should be able to describe the anatomical basis of surgical exposure of the peripheral nerves.

  1.4   **Developmental Anatomy:**
     1.4.1   Should be able to describe the development of the nervous system and the embryological basis of various congenital abnormalities of the cranium, spine, brain and spinal cord.

2. **Physiology:**
  2.1   Should be able to describe the generation and propagation of impulse in the excitable tissue, synaptic transmission, role of neurotransmitters and physiological basis of EMG and nerve conduction velocity.
  2.2   Should be able to describe the mechanism of arousal, sleep, electrical activity of the brain and the physiological basis of EEG and Evoked potentials.
  2.3   Should be able to describe of control of posture and movement and the underlying basis of postural reflexes.
  2.4   Should be able to describe the function of the pituitary, endocrine abnormality related to the pituitary and the pituitary function tests.
  2.5   Should be able to describe:
     2.5.1   Cerebral metabolism, BBB, ICP, cerebral blood flow, autoregulatio, cerebral metabolism and the pathophysiology of ischemic brain damage, blood-brain barrier and physiology of the cerebrospinal fluid, Pulmonary and cardiovascular physiology relating to neurosurgical critical care
     2.5.2   Rehabilitation after CNS Lesions
     2.5.3   Neurosurgical epidemiology and outcome assessment evaluation of new technologies and evidence based approach to practice.
     2.5.4   Basic Computer Skill and Tele-medicine

3. **Pain:**
  3.1   Pain: general historical considerations, approach to the patient with Chronic Pain and medical and surgical management of pain.

4. **Radiation Therapy and Radiosurgery:**
  4.1   General and historical considerations of radiotherapy and radiosurgery, Radiobiology, Principles of radiotherapy, Fractionated radiation therapy for malignant brain tumours, Radiotherapy for benign skull base tumours, Fractionated radiation therapy for pituitary tumours, Radiotherapy of tumours of the spine, Radiosurgery of tumours, Radiosurgery for arteriovenous malformations, Functional radiosurgery, Interstitial and intracavitary irradiation of brain tumours, Linac radiosurgery, Gamma knife radiosurgery, Proton radiosurgery and Fractionated and stereotactic radiation, Extracranial stereotactic radiation, intensity modulation, and multileaf collimation.

5. **Trauma:**
  5.1   Modern neurotraumatology: a brief historical review, Cellular basis of injury and recovery from trauma, Clinical pathophysiology of traumatic brain injury, and investigation and management of traumatic brain and spinal injury.

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Section (B) - 55 Marks
(1 critical analysis Q -15 marks + 4 long Q -40 marks)

6. **Introduction to Neurological Surgery**

   6.1 History and physical examination, Differential diagnosis of altered states of consciousness, Neuro-ophthalmology, Neuro-otology, Neurourology, Neuropsychological assessment, Brain death, Radiology of the skill, Magnetic resonance imaging of brain, Molecular imaging of the brain with positron emission tomography, Radiology of the spine, Anesthesia : preoperative evaluation, Complication avoidance in neurosurgery, General principles of operative positioning, Surgical positioning and exposures for cranial, procedures, Surgical exposures and positioning for spinal surgery and Peripheral nerves.

7. **Oncology**

   7.1 Brain tumors : epidemiology, histological classification, Clinical features, investigations and management of primary and secondary brain tumors including basic principles of cranial surgery for brain tumors, basic principles of skull base surgery, surgical complications and their avoidance, surgical navigation for brain tumours as well as principles of chemotherapy and radiotherapy.

8. **Vascular**

   8.1 Historical considerations, ischemic disease and stroke, Carotid occlusive disease, Traumatic carotid injury, Nonatherosclerotic carotid lesions, Extracranial vertebral artery, Intracranial occlusion disease, Cerebral venous and sinus thrombosis, Spontaneous intracerebral hemorrhage, intracranial aneurysms, arteriovascular malformations, spinal cord vascular lesions .

9. **Epilepsy:**

   9.1 General and historical considerations of epilepsy surgery, Basic science of post-traumatic epilepsy, Approaches to the diagnosis and classification of epilepsy, Antiepileptic medications : Identification of candidates for epilepsy surgery, Motor, sensory, and language mapping, monitoring for cortical Resections and Monitoring and mapping of vision in the neurosurgical patient, Epilepsy surgery

10. **Functional Neurosurgery:**

    10.1 History of functional neurosurgery, Rationale for surgical interventions in movement disorders, Approach to movement disorders, Patient selection in movement disorder surgery and different surgeries for movement disorders.

11. **Paediatric:**

    11.1 Neurological surgery in childhood: general and historical considerations, Neurological examination in infancy and childhood, Neuroanesthesia in children, and diagnosis and management of neurosurgical conditions in infancy and childhood including Encephaloceles, Myelomeningocele and myelocystocele, Lipomyelomeningocele, Tethered spinal cord, Occult spinal dysraphism and the tethered spinal cord, Dandy-walker syndrome, Arachnoid cysts, hydrocephalus in children, arteriovenous malformations and intracranial aneurysms in children, and head trauma in children and brain tumors in children.

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12. **Perpheral Nerve:**
    12.1 General principles in evaluating and treating peripheral nerve injuries, Peripheral neuropathies

13. **Spine:**
    13.1 Overview and historical considerations, Biologic strategies for central nervous system repair, Concepts and mechanisms of biomechanics, Intraoperative electrophysiologic monitoring of the spinal cord and nerve roots, Bone metabolism and it relates to spinal disease and treatment, Normal and abnormal embryology of the spinal cord and spine
    13.2 Approach to the patient and medical management of spinal disorders, Metabolic and other nondegenerative, Infections of the spine and spinal cord, Treatment of disk and ligamentous diseases of the spine, Benign extradural lesions of the dorsal spine, Treatment of disk disease of the spine, Adult thoracolumbar scoliosis, Acquired abnormalities of the craniocervical junction, Tumours of the craniovertebral junction, Spinal cord tumours in adults, Tumours of the vertebral axis: benign, primary malignant, and metastatic tumours,
    13.3 Spine trauma: approaches to the patient and diagnostic evaluation

Following pattern will be used for formation of paper I & II as far as possible.

Paper I				
Part	Section	Weightage	No. Questions & Weightage	
			Objective Multiple Choice	Subjective
I	A	20		2 Questions x 10 Mark = 20
	B	30		3 Questions x 10 Mark = 30
II	C	25	25 Questions x 1 Mark = 25	
	D	25	25 Questions x 1 Mark = 25	
Paper II				
Section		Weightage	No. Questions & Weightage	
			Long answer	Critical Analysis
A		45	3 Questions x 10 Mark = 30	1 Questions x 15 Mark = 15
B		55	4 Questions x 10 Mark = 40	1 Questions x 15 Mark = 15

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