



**BACHELOR OF SCIENCE IN PHYSIOTHERAPY (UPGRADING AND DIRECT)
SPECIAL/SUPPLEMENTARY**

COURSE CODE: PHT 224

COURSE TITLE: NEUROSCIENCE

DATE: APRIL 2024

TIME:

INSTRUCTIONS TO CANDIDATES

Answer All Questions

Section A: Multiple Choice Questions (MCQ)

30 Marks.

Section B: Short Answer Questions (SAQ)

20 Marks.

Section C: Long Answer Question (LAQ)

20 Marks

TIME: 2 Hours

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQ) 30 MARKS

1. After a gunshot wound to the head, Jose has been in a vegetative state. Although he shows no response to verbal commands, his cough and gag reflex, swallowing reflex, and pupillary response all remain intact. Which neurological structure is responsible for these reflexive functions?
 - A. Thalamus
 - B. Brainstem
 - C. Frontal lobe
 - D. Basal ganglia
2. From the time Francis was a young child, he displayed tics and uncontrollable movements (eg, tongue protrusion and neck snapping). Although these dyskinesias have improved somewhat as he has aged, they remain to a moderate extent as an adult. Which neurological structure is believed to be responsible for this movement disorder?
 - A. Occipital lobe
 - B. Brainstem
 - C. Hippocampus
 - D. Basal ganglia
3. After a viral infection of the upper respiratory tract, Ms. Schumacher began to experience vertigo, nausea, balance problems, and nystagmus. Her physician diagnosed _____, which is caused by damage to the _____.
 - A. Trigeminal neuralgia; CN 5 trigeminal nerve
 - B. Vestibular neuritis; CN 8 vestibulocochlear nerve
 - C. Vestibular neuritis; CN 10 vagus nerve
 - D. Bell palsy; CN 7 facial nerve
4. After a head injury resulting from a fall, Mrs. Mazziotta has lost both the gag and swallowing reflexes. She is also experiencing dysphonia (hoarse voice), dysphagia (difficulty swallowing), and dysarthria (difficulty speaking clearly). These symptoms likely result from damage to which 2 cranial nerves?
 - A. CN 11 accessory nerve, CN 12 hypoglossal nerve
 - B. CN 9 glossopharyngeal nerve, CN 12 hypoglossal nerve
 - C. CN 10 vagus nerve, CN 8 vestibulocochlear nerve
 - D. CN 9 glossopharyngeal nerve, CN 10 vagus nerve

5. Ms. Lee was diagnosed with a chronic autoimmune disorder affecting the neuromuscular junction of voluntary muscles. In this disease, acetylcholine receptor antibodies destroy acetylcholine receptors at the neuromuscular junction, resulting in severe muscular weakness and fatigue. The disease first affects the eye and head musculature and then progresses to the limbs and respiratory muscles. This disease is known as:
 - A. Amyotrophic lateral sclerosis
 - B. Multiple sclerosis
 - C. Myasthenia gravis
 - D. Muscular dystrophy

6. Ms. Mendoza was diagnosed with a tumour in her right optic tract. Her occupational therapist has detected a contralateral homonymous hemianopia causing:
 - A. Right visual field cut.
 - B. A left visual field cut.
 - C. Complete blindness
 - D. Tunnel vision.

7. Mr. Takahashi was diagnosed with tunnel vision, in which the temporal fields in both eyes have been lost. This condition results from:
 - A. Lesion to the right optic tract.
 - B. Lesion to the left optic tract.
 - C. Lesion to the lateral regions of the optic chiasm.
 - D. Lesion to the central region of the optic chiasm.

8. Ricardo is in first grade and has difficulty with attention and concentration. He becomes easily distracted by noise in the hallway or by movement and sound from his classmates. When distracted, Ricardo cannot refocus on his schoolwork and instead rises from his chair and walks around the classroom. Which neurological system plays a role in screening sensory information so that the cortex can attend to the most salient information while filtering extraneous information from the environment?
 - A. Vestibular system
 - B. Enteric nervous system
 - C. Limbic system
 - D. Reticular formation

9. Emile is walking home from work late at night. The street he is walking on is dimly lit and silent. Emile believes that he can hear someone walking behind him in the distance. He is carrying a large sum of money that he must deposit in the bank tomorrow. As he hears the footsteps growing closer, Emile's heart rate accelerates. The hunger that he felt has dissipated, as blood flow has shifted from his gastrointestinal tract to his skeletal muscles and brain. Emile's blood pressure has increased, and he feels alert and anxious. Which neurological system has become dominant and is responsible for these physiological changes?
- Vestibular system
 - Parasympathetic nervous system
 - Sympathetic nervous system
 - Enteric nervous system
10. Adam has been taking codeine, a narcotic prescription medication for pain, after injuring himself at work. Although the narcotic controls his pain level, Adam has noticed that he has developed constipation despite having no dietary changes. Explanations accounting for Adam's constipation include all but which one of the following?
- Narcotics stimulate parasympathetic activity, thus shutting down peristalsis.
 - Narcotics can change the level of serotonin in the enteric nervous system, thereby creating bowel problems.
 - Narcotics block messages sent from the enteric nervous system to the autonomic nervous system signalling the start and stop of peristalsis.
 - Drugs with morphine and narcotic properties attach to the intestine's opiate receptors and can produce constipation.
11. Mr. Zimmerman has foot drop and a steppage gait in which he lifts his right bent knee high enough to avoid dragging his foot. Compression of which nerve results in foot drop?
- Sciatic nerve
 - Peroneal nerve
 - Ulnar nerve
12. Sophia has chronic pain and tenderness throughout her neck, back, shoulders, and legs. She also reports extreme fatigue, sleep dysfunction, common headaches, and periods of cognitive fog. Sophia's physicians cannot find an anatomical cause of her pain. Patients with this condition are also likely to be diagnosed with chronic fatigue syndrome, rheumatoid arthritis, Lyme disease, and irritable bowel syndrome. This condition is known as:
- Lupus
 - myasthenia gravis
 - Epstein-Barr virus

D. Fibromyalgia

13. Mr. Kaminski, who has diabetes, presents with weakness, numbness, paraesthesia, and causalgia in his lower and upper extremities. He reports that this condition first developed bilaterally in his feet and legs, and then progressed to both hands and arms. This type of peripheral neuropathy is called _____ and results from _____.
- A. Plexopathy; damage to the brachial or lumbar plexus
 - B. Radiculopathy; nerve root impingement
 - C. Polyneuropathy; bilateral damage to multiple peripheral nerves
 - D. Mononeuropathy; damage to one peripheral nerve
14. Mr. Kim had a complete spinal cord injury at L2. He experiences flaccidity in his lower extremities and hyporesponsive reflexes below the lesion level. Mr. Kim's spinal cord injury involved:
- A. Lower motor neurons
 - B. Upper motor neurons
15. Manuel has just been admitted to the emergency unit after a spinal cord injury. He is currently in a state of areflexia involving flaccid paralysis below the lesion level, loss of reflexes below the lesion level, and loss of autonomic function. This state is referred to as _____, occurs immediately after SCI, and can last anywhere from hours to weeks after a SCI. When this state resolves, all spinal reflex activity returns.
- A. Autonomic dysreflexia
 - B. Orthostatic hypotension
 - C. Spinal shock (neurogenic shock)
 - D. Poikilothermy
16. Laura's SCI occurred at T2. One day, when her therapist is helping her to sit upright, Laura experiences significantly decreased blood pressure, dizziness, excessive sweating above the lesion level, and blurred vision. Although she feels faint, she does not lose consciousness. The condition resolves after her therapist declines her position and allows her to rest. This condition is called:
- A. Spinal shock (neurogenic shock)
 - B. Poikilothermy
 - C. Orthostatic hypertension
 - D. Autonomic dysreflexia

17. Jackson's SCI occurred at C4. After injury, Jackson is unable to sweat, shiver, and regulate his body temperature. His body's ability to control blood vessel responses that conserve or dissipate heat is lost. As a result, Jackson's body takes on the temperature of the environment, and he is in danger of becoming too hot or cold. This condition is known as:
- A. Spinal shock (neurogenic shock)
 - B. Poikilothermy
 - C. Orthostatic hypertension
 - D. Autonomic dysreflexia
18. Mrs. Goldstein has been diagnosed with Parkinson disease. When the therapist attempts to passively range her elbow joint, the movement is characterized by a uniform and continuous resistance to passive movement. This form of hypertonicity is known as:
- A. Cogwheel rigidity
 - B. Clasp knife phenomenon.
 - C. Clonus
 - D. Lead pipe rigidity.
19. After his stroke, Mr. Nakai is observed to exhibit scapular elevation and retraction, shoulder abduction and external rotation, elbow flexion, forearm supination, and wrist and finger flexion. This upper extremity pattern is a stereotyped set of movements that occur in response to neurological damage and may be further promoted by an environmental stimulus or by the patient's voluntary movement. This movement pattern is known as:
- A. An associated reaction
 - B. Decerebrate rigidity
 - C. A synergy patterns.
20. After Mrs. Perloff's stroke, she demonstrates increased spasticity in her right upper extremity when she brushes her hair or engages in any effortful movement using her left arm. This phenomenon is called _____ and results from an inability to selectively inhibit the interneurons that synapse on motor cell bodies of the opposing limb.
- A. An associated reaction
 - B. A synergy patterns.
 - C. Decorticate rigidity.

21. Since her head injury causing cerebellar damage, Mrs. Johnson has difficulty understanding where her limbs are in relation to each other and where her body is in space. Which neurological system is responsible for the recognition of an organism's position in relationship to the environment?

- A. Vestibular system
- B. Proprioceptive system
- C. Basal ganglia system
- D. Ventricular system

22. Jose lost consciousness after a traumatic brain injury and has not regained it 2 months status post-injury. He can open his eyes and appears to display regular sleep-wake cycles but does not have cognitive function or awareness. Jose's cough, gag, and swallowing reflexes all remain intact. This state of altered consciousness is called _____ and is caused by severe damage to the _____:

- 1. brain death
 - 2. persistent vegetative state
 - 3. Cortex
 - 4. brainstem.
- A. 1, 3
 - B. 2, 3
 - C. 1, 4.
 - D. 2, 4

23. Jose's friend Alejandro, who was in the car accident with Jose, also sustained a traumatic brain injury. Alejandro is in a state of sleep-like (eyes closed) unarousability. All cognitive function has been lost as well as cough, gag, and swallowing reflexes. Alejandro's heartbeat continues from ANS regulation; however, Alejandro has been hooked up to life support because of a severe respiratory infection. This type of coma is called _____ and results from severe damage to the _____.

- 1. brain death
 - 2. persistent vegetative state
 - 3. Cortex
 - 4. brainstem
- A. 1, 3

- B. 2, 3
- C. 1, 4
- D. 2, 4

24. After his stroke, Mr. Donatelli has difficulty expressing meaningful verbal communications to others and has hemiparesis and hemiparesthesia of his right side. His stroke likely occurred in which cerebral hemisphere?
- A. Left
 - B. Right
25. Mr. Kagan is experiencing numbness and weakness in his left arm and leg, blurred vision, dizziness, and confusion. His daughter calls 911, because she recognizes these signs as indicative of a:
- A. Visual-perceptual disorder
 - B. Migraine-induced aura
 - C. Transient ischemic attack
 - D. Tactile agnosia
26. Along with Wernicke aphasia, Ms. Walsh has difficulty understanding gestures and symbols commonly used in social communication. This form of receptive aphasia is called:
- A. Aprosodia
 - B. Dyslexia
 - C. Asymbolia
 - D. Dyslexithymia
27. Marrero has been diagnosed with Parkinson disease. The loss of this neurotransmitter from the substantia nigra and the nigrostriatal pathway is a primary cause of Parkinson disease, causing movement paucity, festinating gait, and masked face. This neurotransmitter is called:
- A. Dopamine
 - B. Serotonin
 - C. Norepinephrine
 - D. Glutamate

28. Adelphi has obsessive compulsive disorder (OCD) and depression. One primary neurotransmitter that has been shown to be associated with disruption in sleep-wake cycles, eating disorders, OCD, depression, and aggression is:
- A. Norepinephrine
 - B. serotonin
 - C. substance P
29. This neuropeptide acts as a neurotransmitter in the nociceptive pathway and is involved in the transmission of pain sensation.
- A. Glutamate
 - B. Dopamine
 - C. Substance p
 - D. Endorphins
30. While the previous neurotransmitter is responsible for pain sensation, the neuropeptide called _____ is responsible for the inhibition of pain and is referred to as the body's natural painkiller.
- A. Dopamine
 - B. GABA
 - C. Serotonin
 - D. Opioid (endorphin, enkephalin, dynorphin)

SECTION B: SHORT ANSWER QUESTIONS (SAQ)

20 MARKS

ANSWER ALL QUESTIONS. Each question is 5 marks

1. Describe the stages of ALS (Amyotrophic Lateral Sclerosis) (5 marks)
2. Describe the categories of multiple sclerosis (5 marks)
3. Differentiate between upper motor neuron and lower motor neuron lesions (5 marks)
4. What is clasp knife phenomena? Differentiate between clasp knife and lead pipe rigidity (5 marks)

SECTION C: LONG ANSWER QUESTIONS (LAQS)

20 MARKS

ANSWER ANY TWO QUESTIONS

1. Discuss TWO tests used to confirm Benign Paroxysmal Positional vertigo (BPPV) (10 marks)
2. Discuss the neurovascular (stroke) syndromes (10 marks)
3. Examine the cognitive function of a patient who sustained Traumatic Brain Injury (10marks)