AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCE
DEPARTMENT OF REHABILITATION MEDICINE
BACHELOR OF SCIENCE IN PHYSIOTHERAPY
END OF SEPT-DECEMBER 2024 TRIMESTER EXAMINATIONS

UNIT CODE: PHT 224 **UNIT NAME: NEUROSCIENCE 1**

DATE: **Monday/ 02/ December**
TIME: **TWO HOURS**
START: **9am** **STOP : 11am**

INSTRUCTIONS

1. **Do not write on this question paper**

(Marks and questions distribution as per program curriculum.)

1. This exam is marked out of 70 marks
2. This Examination comprises 3 Sections
3. This online exam shall take 2 Hours

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQ) 30 MARKS

1. Wernicke's area is located where in the brain, and what purpose does it have?
    A. The Frontal Lobe controls the motor aspect of speech.
    B. The parietal Lobe controls the motor aspect of speech.
    C. Temporal Lobe controls the motor aspect of speech.
    D. The parietal Lobe controls language comprehension.
    E. Temporal Lobe controls language comprehension.
2. Which of the following spinal cord pathways is responsible for pain and temperature?
    A. Dorsal columns
    B. Lateral spinothalamic
    C. Anterior spinothalamic
    D. Spinocerebellar
    E. Reticulospinal
3. Which of the following symptoms is NOT commonly presented with damage to the middle cerebral artery?
    A. Sensory Ataxia
    B. Contralateral hemiparesis arms more affected than legs.
    C. Contralateral sensory loss legs more affected than arms.
    D. Homonymous hemianopsia
    E. Global aphasia
4. Besides skill, which other factor influences motor skill performance?
    A. Neuromuscular system (motor control)
    B. Performance environment
    C. Actions
    D. Skill is the only contributing factor
5. A glove-&-stocking pattern of sensory disturbance usually develops with disease in:
    A. Peripheral nerves
    B. The spinal cord
    C. The brainstem
    D. The thalamus
6. The patient with apraxia cannot:
    A. Name his fingers
    B. Carry out an imagined act
    C. Draw simple diagrams
    D. Speak fluently

7. The damage to IX, X & XII cranial nerves produce:
    A. Bulbar palsy
    B. Pseudobulbar palsy
    C. Brown-sequard syndrome
    D. Argyle-robertson syndrome
8. The polyneuropathic pattern of sensory loss suggests presence of the following syndrome:
    A. Numbness & pain in distal parts of extremities
    B. Numbness & analgesia in half of the body
    C. Pain & sensory ataxia in half of the body
    D. Analgesia & sensory ataxia in proximal parts of extremities
9. Which of the following is NOT a principle of motor learning?
    A. Practice variability
    B. Feedback frequency
    C. Transfer of learning
    D. Reinforcement
10. What type of practice involves repeatedly performing the same task in the same environment?
    A. Blocked practice
    B. Random practice
    C. Serial practice
    D. Varied practice
11. Which of the following factors does NOT affect skill acquisition?
    A. Age
    B. Biological factors
    C. Emotional factors
    D. Social factors
12. Which of the following is an example of implicit motor learning?
    A. Riding a bicycle
    B. Memorizing dance steps
    C. Performing a gymnastics routine
    D. Playing a musical instrument
13. Which of the following is NOT a stage of motor learning?
    A. Cognitive stage
    B. Associative stage
    C. Autonomous stage
    D. Preparatory stage

14. The use of augmented feedback during practice refers to:
    A. Feedback from an external source
    B. Feedback from one's own senses
    C. Feedback from a coach or trainer
    D. Feedback through introspection

15. Which of the following is an example of a closed skill?
    A. Tennis serve
    B. Driving in heavy traffic
    C. Basketball free throw
    D. Skateboarding tricks
16. What term describes the process of gradually reducing external support or assistance during skill acquisition?
    A. Fading
    B. Chaining
    C. Prompting
    D. Guided discovery
17. 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
18. 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
19. 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

20. 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

21. 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

22. 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.

23. 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.

24. 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

25. 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?
    A. Vestibular system
    B. Parasympathetic nervous system
    C. Sympathetic nervous system
    D. Enteric nervous system

26. 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?
    A. Narcotics stimulate parasympathetic activity, thus shutting down peristalsis.
    B. Narcotics can change the level of serotonin in the enteric nervous system, thereby creating bowel problems.
    C. Narcotics block messages sent from the enteric nervous system to the autonomic nervous system signalling the start and stop of peristalsis.
    D. Drugs with morphine and narcotic properties attach to the intestine's opiate receptors and can produce constipation.

27. 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?
    A. Sciatic nerve
    B. Peroneal nerve
    C. Ulnar nerve

28. 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:
    A. Lupus
    B. myasthenia gravis
    C. Epstein-Barr virus
    D. Fibromyalgia

29. 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

30. 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

SECTION B: SHORT ANSWER QUESTIONS (SAQ) 20 MARKS
ANSWER ALL QUESTIONS.

31. What are the three key structures of the brain stem and what impact do they have on human behaviour? (5 marks)
32. Describe the location and function of the structures that comprise the diencephalon (5 marks)
33. Describe the sensations assessed during the somatosensory examination (5 marks)
34. Describe the three components of a synapse (5 marks)

SECTION C: LONG ANSWER QUESTIONS (LAQS) 20 MARKS
ANSWER ANY TWO QUESTIONS

35. Associate the following neuromessengers with their agonists and antagonists, associated disorders, and common actions on postsynaptic membranes: acetylcholine (ACh), norepinephrine (NE), dopamine (DA), serotonin, γ-aminobutyric acid (GABA), glutamate, and glycine (10 MARKS)
36. Describe the pathways for relaying high-fidelity nonconscious proprioceptive information from the body to the cerebellar cortex. Include where each of the neurons starts and terminates and identify if and where the information decussates (crosses midline). (10 marks)
37. Discuss TWO tests used to confirm Benign Paroxysmal Positional vertigo (BPPV) (10 marks)