



**AMREF INTERNATIONAL UNIVERSITY  
SCHOOL OF MEDICAL SCIENCES  
DEPARTMENT OF REHABILITATIVE MEDICINE  
BACHELOR OF SCIENCE IN PHYSIOTHERAPY**

**END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2023**

**UNIT CODE: PHT 211**

**UNIT NAME: HUMAN PHYSIOLOGY, NERVOUS SYSTEM AND SPECIAL SENSES**

**DATE: 18<sup>TH</sup> APRIL 2023**

**TIME: 9AM-11AM**

**INSTRUCTIONS**

- 1. All students will have two (2) hours to complete the examination**
- 2. Attempt all questions as per the instruction**
- 3. It is the student's responsibility to report any page and number missing in this paper.**
- 4. Check that the paper is complete**

1. Sensory receptors responsible for detecting temperature changes are classified as:
  - a) Chemoreceptors
  - b) Thermoreceptors
  - c) Photoreceptors
  - d) Mechanoreceptors
2. Which sensory pathway is responsible for transmitting information about touch and pressure?
  - a) Spinothalamic tract
  - b) Dorsal column-medial lemniscus pathway
  - c) Trigeminal pathway
  - d) Corticospinal tract
3. The primary sensory cortex is located in which lobe of the brain?
  - a) Frontal lobe
  - b) Parietal lobe
  - c) Occipital lobe
  - d) Temporal lobe
4. Which sensation refers to the ability to perceive the position and movement of body parts?
  - a) Kinesthetic sensation
  - b) Tactile discrimination
  - c) Vibration sense
  - d) Crude touch
5. The mechanism of pain sensation involves:
  - a) Activation of nociceptors
  - b) Inhibition of pain pathways
  - c) Stimulation of mechanoreceptors
  - d) Activation of the vestibular system

6. The gate control theory of pain modulation suggests that:
- a) Pain perception is directly proportional to stimulus intensity
  - b) The spinal cord contains a gate that controls pain transmission
  - c) Pain signals can be blocked by activating inhibitory interneurons
  - d) Emotional factors have no impact on pain perception
7. Damage to the motor cortex can result in:
- a) Sensory deficits
  - b) Impaired coordination
  - c) Muscle weakness or paralysis
  - d) Memory loss
8. Which reflex pathway involves a single synapse between sensory and motor neurons?
- a) Monosynaptic reflex
  - b) Polysynaptic reflex
  - c) Superficial reflex
  - d) Deep reflex
9. The stretch reflex is an example of:
- a) Monosynaptic reflex
  - b) Polysynaptic reflex
  - c) Superficial reflex
  - d) Deep reflex
10. Muscle tone is defined as:
- a) The ability of muscles to contract quickly
  - b) The resistance of muscles to passive stretch
  - c) The strength of muscle contractions
  - d) The coordination of muscle movements

11. Which structure is responsible for coordinating voluntary movements and maintaining balance?

- a) Cerebellum
- b) Brainstem
- c) Thalamus
- d) Hypothalamus

12. The reticular formation is involved in:

- a) Regulating sleep-wake cycles
- b) Processing visual information
- c) Controlling voluntary movements
- d) Regulating body temperature

13. Basal ganglia dysfunction is associated with:

- a) Parkinson's disease
- b) Alzheimer's disease
- c) Multiple sclerosis
- d) Huntington's disease

14. Brodmann's areas are subdivisions of the:

- a) Cerebellum
- b) Brainstem
- c) Thalamus
- d) Cerebral cortex

15. Which lobe of the cerebral cortex is primarily responsible for processing visual information?

- a) Frontal lobe
- b) Parietal lobe
- c) Occipital lobe
- d) Temporal lobe

16. The function of the limbic system includes:

- a) Regulating body temperature
- b) Processing emotions and memory
- c) Controlling voluntary movements
- d) Regulating sleep-wake cycles

17. REM sleep is characterized by:

- a) Slow brain waves
- b) Rapid eye movements
- c) High muscle tone
- d) Decreased dreaming

18. CSF is produced by the:

- a) Brainstem
- b) Spinal cord
- c) Choroid plexus
- d) Cerebellum

19. A condition characterized by the accumulation of CSF in the brain is called:

- a) Meningitis
- b) Hydrocephalus
- c) Encephalitis
- d) Cerebral edema

20. The blood-brain barrier helps to:

- a) Protect the brain from toxins
- b) Regulate blood pressure in the brain
- c) Facilitate the exchange of nutrients
- d) Control body temperature

21. The parasympathetic nervous system is responsible for:
- a) Increasing heart rate
  - b) Dilating blood vessels
  - c) Stimulating digestion
  - d) Mobilizing energy reserves
22. Photopic vision refers to:
- a) Night vision
  - b) Color vision
  - c) Peripheral vision
  - d) Central vision
23. The functional anatomy of the eyeball includes:
- a) Cornea, lens, and retina
  - b) Retina, optic nerve, and sclera
  - c) Iris, pupil, and vitreous humor
  - d) Optic disc, fovea, and ciliary body
24. Visual acuity is measured by:
- a) The ability to detect colors
  - b) The sharpness of vision
  - c) The sensitivity to light
  - d) The range of peripheral vision
25. Which reflex is responsible for adjusting the shape of the lens to focus on near objects?
- a) Accommodation reflex
  - b) Papillary reflex
  - c) Light reflex
  - d) Visual reflex

26. Damage to the optic nerve would most likely result in:

- a) Blurred vision
- b) Loss of peripheral vision
- c) Double vision
- d) Color blindness

27. Scotopic vision is most effective in:

- a) Bright light conditions
- b) Low light conditions
- c) Color perception
- d) Central vision

28. The function of the thalamus includes:

- a) Regulating body temperature
- b) Processing sensory information
- c) Controlling voluntary movements
- d) Regulating sleep-wake cycles

29. The hypothalamus plays a key role in:

- a) Controlling hormone secretion
- b) Processing visual information
- c) Regulating voluntary movements
- d) Facilitating learning and memory

30. The CSF circulates within the:

- a) Subarachnoid space
- b) Epidural space
- c) Ventricles of the brain
- d) Cerebral cortex

31. Which part of a neuron transmits an electrical signal to a target cell?
- a) dendrites
  - b) soma
  - c) cell body
  - d) axon
32. Which term describes a bundle of axons in the peripheral nervous system?
- a) nucleus
  - b) ganglion
  - c) tract
  - d) nerve
33. which functional division of the nervous system would be responsible for the physiological changes seen during exercise (e.g., increased heart rate and sweating)?
- a) somatic
  - b) autonomic
  - c) enteric
  - d) central
34. What type of glial cell provides myelin for the axons in a tract?
- a) oligodendrocyte
  - b) astrocyte
  - c) Schwann cell
  - d) satellite cell
35. If a thermoreceptor is sensitive to temperature sensations, what would a chemoreceptor be sensitive to?
- a) light
  - b) sound
  - c) molecules
  - d) vibration
36. Which of these locations is where the greatest level of integration is taking place in the example of testing the temperature of the shower?
- a) skeletal muscle
  - b) spinal cord
  - c) thalamus
  - d) cerebral cortex



37. What ion enters a neuron causing depolarization of the cell membrane?

- a) sodium
- b) chloride
- c) potassium
- d) phosphate

38. Voltage-gated Na<sup>+</sup> channels open upon reaching what state?

- a) resting potential
- b) threshold
- c) repolarization
- d) overshoot

39. What does a mechanically gated channel respond to?

- a) physical stimulus
- b) chemical stimulus
- c) increase in resistance
- d) decrease in resistance

40. Which of the following is probably going to propagate an action potential fastest?

- a) thin, unmyelinated axon
- b) thin, myelinated axon
- c) thick, unmyelinated axon
- d) thick, myelinated axon

### **Short answer questions**

- 41. Describe the mechanism of pain sensation and explain how the gate control theory contributes to pain modulation. (6 marks)
- 42. Explain the difference between monosynaptic and polysynaptic reflexes. Provide an example of each and describe the neural pathways involved. (6 marks)
- 43. Discuss the role of the cerebellum in motor coordination and balance. Include an explanation of how damage to the cerebellum may affect these functions. (6 marks)
- 44. Describe the formation, circulation, and functions of cerebrospinal fluid (CSF) in the central nervous system. Explain the significance of lumbar puncture in diagnosing neurological conditions. (6 marks)
- 45. Describe different types of receptors and give an example in each (6marks)

### **Long Essay Questions**

- 46. Describe the hearing pathway and two pathologies associated with it ( 20 marks)