



UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

**FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE
(NURSING)**

HNS 112: MEDICAL PHYSIOLOGY I

DATE: APRIL 12, 2018

TIME: 2:00 – 5:00 PM

INSTRUCTIONS:

Answer:

All MCQs in Section A;

All Short-answer Questions in Section B

All Long-answer Questions in Section C

Cancelled work should be done neatly by crossing with a single line in the essay and by use of X in the MCQs

SECTION A: MULTIPLE CHOICE QUESTIONS (TOTAL: 20 MARKS)

Choose (CIRCLE/TICK) only one correct answer from the following questions

1. Cellular respiration is defined as:
 - A) an intracellular, energy-producing process
 - B) an extracellular, energy-producing process
 - C) an intracellular, energy-requiring process
 - D) an extracellular, energy-requiring process
2. Which of the following is a specialty in physiology?
 - A) Renal physiology
 - B) Cardiovascular physiology
 - C) Sensory physiology
 - D) Systemic physiology

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3. Which of the following is a second messenger in a signal transduction pathway?
 - A) cAMP
 - B) Insulin
 - C) Glucocorticoid
 - D) Steroid hormone-receptor complex

4. The rate of diffusion of substance across the cell membrane is inversely proportional to
 - A) Concentration gradient for the substance
 - B) Diffusion coefficient
 - C) Surface area available for diffusion
 - D) Thickness of the membrane
5. The membrane potential at which net flux of an ion across the membrane is zero is called:
 - A) Resting membrane potential
 - B) Threshold potential
 - C) Electronic potential
 - D) Equilibrium potential of that ion
6. Which one of the following statement about electrotonic potentials is correct?
 - A) They are signal responses
 - B) They are autocrine in nature
 - C) They may be depolarizing or hyperpolarizing
 - D) They are produced by a threshold stimulus
7. Inhibitory interneurons in the spinal cord release:
 - A) Substance P
 - B) Glycine
 - C) Neuropeptide Y
 - D) Neuropeptide X
8. In human spinal shock is characterized by:
 - A) Hypertonia
 - B) Hyperreflexia
 - C) Spastic paralysis
 - D) Loss of autonomic function

9. _____ mimics a hormone stereochemically, but binds to the receptor non-productively.
- A) Agonist
 - B) Protagonist
 - C) Antagonist
 - D) A and B
10. Intensity of a sensory stimulus is encoded by:
- A) Size of generator (receptor) potentials
 - B) Frequency of action potentials in motor neurons
 - C) Recruitment of sensory receptors
 - D) Size of action potential
11. Somatic nervous system:
- A) Is involuntary
 - B) Is voluntary
 - C) Conducts impulses from CNS to cardiac muscles
 - D) B and C
12. The light reflex is integrated in the
- A) Frontal eye field
 - B) Medulla
 - C) Midbrain
 - D) Primary visual area
13. Which neuron stimulate intact innervated muscles to contract?
- A) Alpha motor neurons
 - B) Gamma motor neurons
 - C) Beta motor neurons
 - D) Delta neurons
14. The force of skeletal muscle contraction is sensed by:
- A) Nuclear bag fiber
 - B) Nuclear chain fiber
 - C) Golgi tendon organ
 - D) Golgi apparatus

15. The cerebellum receives sensory input from the:
- A) Labyrinth
 - B) Proprioceptors
 - C) Eyes
 - D) All of the above
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16. The circadian rhythm generator in the hypothalamus receives input chiefly from:
- A) Superior colliculus
 - B) Thalamus
 - C) Medial geniculate nucleus
 - D) Suprachiasmatic nucleus
17. _____ is secreted by anterior pituitary gland and stimulates secretion of progesterone by the corpus luteum:
- A) Growth hormone (GH)
 - B) Thyroid stimulating hormone (TSH)
 - C) Luteinising hormone (LH)
 - D) Follicle stimulating hormone (FSH)
18. Which of the following has the longest biological half-life?
- A) Angiotensin II
 - B) Glucagon
 - C) Thyroxine
 - D) Nitric oxide
19. Which hormone acts on the intestines and causes increased calcium absorption?
- A) calcitonin
 - B) calcitriol
 - C) thyroxine
 - D) pancreatic polypeptide
20. Mechanism of action of Anti Diuretic Hormone
- A) Insertion of water channels (pores) into basolateral membrane
 - B) Increase in Glomerular Filtration Rate
 - C) Insertion of water channels into luminal (apical) membrane
 - D) Removal of water pores from apical membrane

SECTION B: Answer ALL the questions in this section (40 marks; Use the answer booklet provided)

1. Define the following terms: (5 marks)
 - a) Neuron,
 - b) Axon,
 - c) Dendrite,
 - d) Myelin sheath,
 - e) Afferent neuron.
2. Explain the positive feedback mechanism in blood clotting (5 marks)
3. Describe the role of membrane carbohydrates in cell-cell recognition (3 marks)
4. State three major functions of membrane proteins (3 marks)
5. Explain the membrane permeability during action potential (6 marks)
6. Describe the modalities of sensory systems (6 marks)
7. State at least 6 functions of visual projection areas in the human brain (6 marks)
8. State the functions of principal afferent systems to the cerebellum (6 marks)

SECTION C: Answer ALL the questions in this section (40 marks; Use the answer booklet provided)

1. Catecholamines are released into the blood from the adrenal medulla during stimulation of the sympathetic nervous system.
 - a) State the principal catecholamines found in the body (3 marks)
 - b) Catecholamines potentiate the fight or flight response after initial sympathetic stimulation by: (9 marks)
 - c) Describe mechanism of the body long term response to stress (8 marks)
2. Neurons generate and conduct action potential reaching their ending to trigger the effector organ or tissue.
 - a) State properties of action potential (6 marks)
 - b) Describe mechanism of action potential (9 marks)
 - c) Describe the responses of ion channel gates (5 marks)

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