

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

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

NURU 117: MEDICAL PHYSIOLOGY III

STREAMS: BSC NURSING (UPGRADING) Y3S2

TIME: 2 HOURS

DAY/DATE: TUESDAY 04/12/2018

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

- **Do not write anything on the question paper.**
- **Mobile phones and any other reference materials are NOT allowed in the examination room.**
- **The paper has three sections. Answer ALL questions in section I and II and ONE question in section III.**
- **All your answers for Section I (MCQs) should be on one page.**
- **Number ALL your answers and indicate the order of appearance in the space provided in the cover page of the examination answer booklet.**
- **Write your answers legibly and use your time wisely.**

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. Compared to the systemic circulation, pulmonary circulation has a:
 - (a) Higher blood flow
 - (b) Lower resistance
 - (c) Higher cardiac output
 - (d) Higher capillary pressure

2. Which of the following changes would occur as a result of residing at high altitude?
 - (a) Shift to the right of oxygen-hemoglobin dissociation curve
 - (b) Hypoventilation
 - (c) Decreased 2-3 diphosphoglycerate concentration
 - (d) Arterial PO_2 of greater than 100 mm Hg

3. The following hormone originates from the anterior pituitary gland:
 - (a) Thyroid stimulating hormone
 - (b) Growth hormone releasing hormone
 - (c) Corticotropin releasing hormone
 - (d) Oxytocin

4. If an area of the lung is not ventilated due to bronchial obstruction, the pulmonary capillary blood serving that area will have a PO_2 that is:
 - (a) Equal to atmospheric PO_2
 - (b) Equal to mixed venous PO_2
 - (c) Lower than mixed venous PO_2
 - (d) Higher than inspired PO_2

5. Messenger RNA (mRNA)
 - (a) Carries the genetic code to the cytoplasm
 - (b) Carries activated amino acids to the ribosomes
 - (c) Is single-stranded RNA molecules of 21 to 23 nucleotides that can regulate gene transcription
 - (c) Forms ribosomes

6. Which of the following hormones acts on its target tissues by a steroid hormone mechanism of action?
 - (a) Thyroid hormone
 - (b) Parathyroid hormone
 - (c) Antidiuretic hormone
 - (d) Glucagon

7. The largest air passages that engage in gas exchange with the blood are
 - (a) The primary bronchi
 - (b) The respiratory bronchioles
 - (c) The terminal bronchioles
 - (d) The alveoli

8. In controlling aldosterone secretion, angiotensin II acts on which of the following structures?
 - (a) Zona glomerulosa
 - (b) Zona fasciculata
 - (c) Zona reticularis
 - (d) Adrenal medulla

9. Which hormone would no longer be secreted if the hypothalamohypophyseal tract were destroyed?
- (a) Oxytocin
 - (b) Follicle-stimulating hormone
 - (c) Growth hormone
 - (d) Adrenocorticotrophic hormone
10. Which of these values would normally be the highest?
- (a) Tidal volume
 - (b) Inspiratory reserve volume
 - (c) Residual volume
 - (d) Vital capacity
11. Corticotropin released hormone secretion would not raise the blood concentration of:
- (a) ACTH
 - (b) Thyroxine
 - (c) Corticosterone
 - (d) Glucose
12. The non-polar tails of phospholipids of the plasma membrane are:
- (a) Hydrophilic
 - (b) Hydrophobic
 - (c) Permeable to water soluble molecules
 - (d) Impermeable to fat soluble molecules
13. Most of the CO_2 that diffuses from the blood into an alveolus comes from
- (a) Dissolved gas
 - (b) Carbaminohemoglobin
 - (c) Carboxyhemoglobin
 - (d) Carbonic acid
14. Some cells secrete chemicals into the extracellular fluid that act on cells in the same tissue. Which of the following refers to this type of regulation?
- (a) Neural
 - (b) Endocrine
 - (c) Paracrine
 - (d) Autocrine

15. If a 21-year old male patient has a cardiac reserve of 300% and a maximum cardiac output of 16 L/min, what is his resting cardiac output?
- (a) 3 L/min
 - (b) 4 L/min
 - (c) 6 L/min
 - (d) 8 L/min
16. Which of these has more exocrine than endocrine tissue?
- (a) The pancreas
 - (b) The pineal gland
 - (c) The thyroid gland
 - (d) The adrenal gland
17. Indicate in which compartment you would find a low concentration of both K⁺ ions and proteins
- (a) Intracellular fluid
 - (b) Plasma
 - (c) Interstitial fluid
 - (d) Extracellular fluid
18. The basic rhythm of respiration is generated by neurons in the medulla. Which of the following limits the duration of inspiration and increases respiratory rate?
- (a) Apneustic center
 - (b) Pneumotaxic center
 - (c) Dorsal respiratory group
 - (d) Ventral respiratory group
19. Where are the receptors for insulin located?
- (a) In the pancreatic β -cells
 - (b) On the target cell membrane
 - (c) In the target cell cytoplasm
 - (d) In the target cell nucleus
20. The following is the highest site of airway resistance:
- (a) Trachea
 - (b) Largest bronchi
 - (c) Medium-sized bronchi
 - (d) Smallest bronchi

Section B: Short answer questions (30 marks)

1. Describe the mechanism of endocrine signaling. (4 marks)
2. Explain how the following factors affect the alveolar ventilation.
 - (a) Distensibility of the lungs (3 marks)
 - (b) Respiratory rate (3 marks)
3. Explain how the following physiological factors control the release of insulin from the pancreas:
 - (a) The autonomic nervous system (3 marks)
 - (b) Blood glucose (3 marks)
4. Explain the mechanism of external respiration. (4 marks)
5. Describe three (3) physiological actions of the parathyroid hormone. (6 marks)
6. Describe the physiological control of prolactin hormone release. (4 marks)

Section C: Long answer questions (40 marks)

1. The respiratory system provides for gaseous exchange among other roles:
 - (a) Explain how external respiration occurs in the body. (4 marks)
 - (b) Describe the factors that affect the rate of pulmonary and systemic gas exchange. (16 marks)
 2. Explain the physiology of the endocrine system under the following subheadings:
 - (a) Five metabolic effects of glucocorticoids (10 marks)
 - (b) Three physiological functions of luteinizing hormone (6 marks)
 - (c) Control of luteinizing hormone release (4 marks)
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