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 (NURS Y1S1 **TIME: 2 HOURS**

DAY/DATE: TUESDAY 05/12/2017 **8.30 A.M. – 10. 30 A. M.**

INSTRUCTIONS:

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

SECTION A: MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. Thyroid hormone contains the amino acid
   a) Lysine
   b) Leucine
   c) Glycine
   d) Tyrosine

2. Extracellular fluid differs from intracellular fluid in that its:
   a) Volume is greater
   b) Osmolarity is lower
   c) pH is lower
   d) Anions are mainly inorganic

3. Follicle stimulating hormone:
   a) Helps in maturation and growth of follicles
   b) In the presence of LH, facilitates release of estrogen by the theca interna of the graafian follicle
   c) Facilitates spermatogenesis
   d) All of the above

4. The following hormone is released by axon endings in the posterior pituitary:
   a) Follicle stimulating hormone
   b) Thyroid-stimulating hormone
   c) Human growth hormone
   d) Antidiuretic hormone

5. In controlling aldosterone secretion, angiotensin II acts on which of the following structures?
   a) Zonaglomerulosa
   b) Zonafasciculata
   c) Zonareticularis
   d) Adrenal medulla

6. The following cellular component is the sorting and packaging centre of the cell:
   a) Golgi apparatus
   b) Lysosome
   c) Nucleus
   d) Rough endoplasmic reticulum

7. Which of the following statements about peptide or protein hormones is usually true?
   a) They have longer half-lives than steroid hormones
   b) They have receptors on the cell membrane
   c) They have a slower onset of action than both steroid and thyroid hormones
   d) They are not stored in endocrine-producing glands

8. The following is not part of the respiratory center:
   a) The pneumotaxic area
   b) The medullary rhythmicity area
   c) The apneustic area
   d) The supraoptic nuclei

9. The following hormones causes the conversion of lipids to glucose:
   a) Cortisol
   b) Aldosterone
   c) Thyroid hormone
   d) Melanocyte stimulating hormone

10. Pulmonary surfactant increases:
    a) The surface tension of the fluid lining alveolar walls
    b) Lung compliance
    c) In effectiveness as the lungs are inflated
    d) In amount when the pulmonary blood flow is interrupted

11. Oxygen unloading:
    a) Increases with increased $PaCO_2$
    b) Decreases with increase in temperature
    c) Decreases with increase in 2,3 DPG
    d) Increases with increased PaO_2

12. In primary active transport, energy is derived from:
    a) Ionic differences across the inside and outside of the plasma membrane
    b) ATP breakdown
    c) Co-transport of glucose and amino acids
    d) Smooth endoplasmic reticulum

13. In a cell, movement of molecules from an area of low concentration to an area of high concentration
    a) Uses facilitated diffusion
    b) Requires cellular energy
    c) Needs associated (peripheral) proteins
    d) Uses its concentration gradient to move

14. Carbon dioxide:
    a) Is carried as carboxyhemoglobin on the hemoglobin molecule
    b) Uptake by the blood increases its oxygen-binding power
    c) Uptake by blood increases in H^+ and HCO_3^- ion concentrations
    d) Content is greater than oxygen content in arterial blood

15. Concerning lung compliance:
    a) Compliance is directly related to lung elasticity
    b) In high compliance the lungs and chest wall expand easily
    c) In low compliance the lungs resist expansion
    d) Increased compliance is a common feature in pulmonary conditions

16. 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) Neuroendocrine
    d) Paracrine

17. The following transport process will be affected directly if the mitochondria in a cell are not functioning properly:
    a) The movement of glucose into a cell
    b) The movement of water into and out of the cell
    c) The movement of oxygen across the cell membrane
    d) The movement of sodium out of the cell

18. 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

19. The resting membrane potential of a mammalian cell:
    a) Occurs when there is an action potential
    b) Gives a negative voltage to the cell membrane
    c) Is largely dependent on movement of proteins across the cell membrane
    d) Gives a positive charge to the cell membrane

20. Concerning the transport of oxygen in the blood:
    a) Oxygen and hemoglobin bind in an irreversible reaction to form oxyhemoglobin
    b) About 98.5% of blood O_2 is bound to hemoglobin in RBCs
    c) The concentration of oxygen in arterial blood, by volume, is about 20 mL/dL
    d) Oxygen does not dissolve easily in water

SHORT ANSWER QUESTIONS (30 MARKS)

1. Explain how the following factors affect the affinity of hemoglobin for oxygen:
    a) pH (2 marks)
    b) Partial pressure of carbon dioxide (2 marks)
2. Explain the difference between internal respiration and external respiration (4 marks)
3. Describe how carbon dioxide is transported in blood (6 marks)
4. State five (5) metabolic effects of glucocorticoids (5 marks)
5. Describe the mechanism of endocrine signaling (5 marks)
6. Describe the physiological functions of the parathyroid hormone (6 marks)

LONG ANSWER QUESTIONS (20 MARKS)

1. The main physiological function of the respiratory system is to facilitate gas exchange:
    a) Describe how the exchange of oxygen and carbon dioxide occurs across the respiratory membrane (6 marks)
    b) Explain three (3) factors that affect the rate of pulmonary and systemic gas exchange (9 marks)
    c) Briefly explain how the following factors influence respiration:
        i. Pain (1 mark)
        ii. Temperature (1 mark)
        iii. Airway irritation (1 mark)
        iv. Blood pressure (1 mark)
        v. Limbic system (1 mark)

2. The endocrine system broadcasts its hormonal messages to essentially all body cells by secretion into blood and ECF:
   a) State five (5) physiological effects of thyroid hormones (5 marks)
   b) Explain the main effects of insulin on the following metabolic processes:
      i. Carbohydrate metabolism (3 marks)
      ii. Protein metabolism (3 marks)
      iii. Lipid metabolism (3 marks)
   c) Explain the physiological mechanisms that control the following hormone secretions:
      i. Follicle stimulating hormone (2 marks)
      ii. Adrenocorticotrophic hormone (2 marks)
      iii. Prolactin (2 marks)
