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UNIVERSITY EXAMINATIONS 2024/2025

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN NURSING

NND/NNU 3112- MEDICAL PHYSIOLOGY I

DATE: JANUARY 2024 **TIME: 3 HOURS**

INSTRUCTIONS: *All questions are compulsory*

Ensure that all your answers are properly numbered

Part 1 Multiple Choice Questions (MCQs): Write the correct answer on the space provided in the answer booklet. Each MCQ is one mark.

Part 11: Short Answer Questions-Answer questions following each other on the answer booklet

Part 111: Long Answer Questions-Answer the questions on the answer booklet.

SECTION A: Multiple Choice Questions (20 MARKS)

1. If the DNA strand sequence of bases is CTT AGA CTA ATA, what would the tRNA read?
    a. GAA TCT GAT TAT
    b. CUU AGA CUAAUA
    c. GAA UCU GAU UAU
    d. GUU ACA GUA AUA
2. In what form is the majority of carbon dioxide that is generated by cellular respiration, transported to the lungs?

a. As dissolved carbon dioxide in the blood plasma.
b. Bound to haemoglobin in red blood cells.
c. As carbonic acid inside red blood cells.
d. As bicarbonate ions in the blood plasma.

3. In the nucleus of the cell DNA is used as a template to form mRNA. What is the process called?
    a. Translation
    b. Transcription
    c. Transportation
    d. Transmutation
4. Which of the following has the slowest conduction velocity?
    a. Aa fibers
    b. Af3 fibers
    c. B fibers
    d. C fibers
5. People with occupations that involve standing all day are at risk of varicose veins. Why should this be true?
    a. Veins have a larger lumen than arteries so they hold more blood which distendsthem.
    b. Veins have only two tunics so their walls are more easily stretched into varicosity.
    c. Gravity acting on blood in the legs puts stress on the vessel walls increasing the likelihood that they will stretch and distort.
    d. When standing still, the valves stay open and blood accumulates in the legveins.
6. Which factor below does NOT assist venous return of blood?
    a. Breathing
    b. Gravity
    c. Smooth muscle contraction
    d. Skeletal muscle contraction
7. Which capillaries allow cells and plasma proteins to enter or leave their lumen?
    a. Continuous
    b. Fenestrated
    c. Sinusoidal

d. Anastomatic

8. In which organs would be found continuous, fenestrated, and sinusoid capillary-ies respectively?
    a. Brain, small intestine, liver
    b. Bone marrow, brain, spleen
    c. Liver, bone marrow, brain
    d. Small intestine, liver, brain
9. When listening to the "lub-dup" sound of the heart with a stethoscope, what is he cause of the "dup" sound?
    a. The blood flowing through the open semilunar valves
    b. The blood flowing through the open atrioventricular valves
    c. The turbulent blood flow through closing atrioventricular valves
    d. The turbulent blood flow through closing semilunar valves
10. The blood group known as the ABO system is based on the presence of what proteins on blood cells?
    a. Antibodies
    b. Antigens
    c. Agglutinins
    d. Immunoglobulins
11. The carbonic acid and bicarbonate buffer system is one of the buffers that help to maintain the blood's pH within the healthy range by doing which of the following?
    a. Carbonic acid destroys excess base in the blood while bicarbonate destroys excess acid.
    b. Carbonic acid destroys excess acid in the blood while bicarbonate destroys excess base.
    c. Carbonic acid and bicarbonate destroy excess acid.
    d. Carbonic acid and bicarbonate destroy excess base.
12. When an action potential arrives at a synapse, what happens first?
    a. A neurotransmitter is released into the synaptic cleft
    b. Extracellular na+ crosses the post-synaptic membrane

c. Choline in the synaptic cleft enters the nerve cell and is converted to acetylcholine

d. Extracellular Ca^{++} enters the nerve cell

13. Which word correctly completes the statement; "All motor neurons are …"

a. Interneurons

b. Multipolar

c. Bipolar

d. Unipolar

14. The definition of mean arterial pressure (MAP) may be written as:

a. MAP = stroke volume ^{x} heart rate

b. MAP (diastolic pressure + systolic pressure) + 2

c. MAP cardiac output x peripheral resistance

d. MAP diastolic pressure + pulse pressure

15. Which of the following chemicals would cause blood pressure to decrease when they appear in blood?

A. Anti-diuretic hormone

B. Angiotensin ii

C. Aldosterone

D. Atrial natriuretic peptide

16. Which protein(s) are found in thin myofilaments?

A. Actin

B. Actin and tropomyosin

C. Actin, tropomyosin, and troponin

D. Actin, myosin, tropomyosin and troponin

17. During muscle cell contraction, what happens because of Ca binding to troponin?

A. The binding site on actin is uncovered.

B. Acetylcholine (ACh) is released.

C. The cross-bridge disengages from the thin filament.

D. ATP hydrolyses to ADP.

18. How many nucleotides are required to code for a single amino acid?

a. Twenty

b. Five

c. Three

d. One

19 Which factors does not influence rate of diffusion of gases in the lungs.

a. Simple area of alveolar
b. Thickness of alveolar membrane
c. Concentration gradient
d. Temperature of the blood in veins

20. What is the purpose of the "sodium/potassium pump',

a. To perform endocytosis
b. To move sodium and potassium by facilitated diffusion.
c. To perform bulk transport through the plasma membrane.
d. To produce a concentration gradient for sodium ions

SECTION B: SHORT ANSWER QUESTIONS (40 MARKS)

1. State five protective mechanisms of the respiratory system (5 marks)
2. Explain the physiological role of body water (5 marks)
3. Describe the neural control of breathing (5marks)
4. Define the Frank-Starling mechanism and describe its relationship to excitation contraction coupling (5marks)
5. Describe the ways $C0_2$ is carried in blood (5marks)
6. Describe the non-respiratory functions of the lungs (5marks)
7. List the five lymphatic trunks and state their functions (5 marks)
8. Define negative feedback mechanism and describe two examples (5 marks)

SECTION C: LONG ANSWER QUESTIONS (40 MARKS)

1. With reference to cell physiology and basic cell genetics;
   a. Using a diagram, illustrate the physiological events that occur during the various phases of the Cell Cycle (10 marks)
   b. Explain the role of the nucleus in the stages of protein synthesis (10 marks)
2. Cellular communication is essential for the functioning of living organisms.
   a. Giving examples, explain the several key mechanisms involved in cellular communication (1 0marks)
   b. Explain the significance of cellular communication (10marks)