



AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF NURSING & MIDWIFERY SCIENCES
END OF SEMESTER APRIL 2026 EXAMINATIONS

COURSE CODE AND TITLE: BSN 113 Medical Physiology 1

DATE: 8TH APRIL 2026

Duration: 2-HOUR

Start: 9AM

Finish: 11PM

INSTRUCTIONS

1. This exam is out of 70 marks
2. This Examination comprises ONE Sections. Section I: Multiple Choice Questions (70 marks)
3. Answer ALL Questions.

SECTION I: MULTIPLE ANSWER QUESTIONS (20 MARKS)

1. Approximately what percentage of ATP is formed in the mitochondria?
 - A. 50%
 - B. 60%
 - C. 75%
 - D. 95%
2. Glycolysis occurs in the:
 - A. Nucleus
 - B. Cytoplasm
 - C. Mitochondrial matrix
 - D. Golgi apparatus
3. The Golgi apparatus is primarily responsible for:
 - A. Energy production
 - B. Protein packaging and modification
 - C. Lipid oxidation
 - D. DNA replication
4. Lysosomes are called “suicidal bags” because they:
 - A. Produce ATP
 - B. Contain DNA
 - C. Cause autolysis of the cell

- D. Store calcium
5. The acidic pH of lysosomes is maintained by:
- Sodium pump
 - Proton pump (H^+ ATPase)
 - Calcium channel
 - Porins
6. Peroxisomes are involved in:
- Protein synthesis
 - DNA replication
 - Hydrogen peroxide metabolism
 - ATP production
7. A nerve fiber is permeable only to potassium (K^+). Given that intracellular K^+ concentration is much higher than extracellular concentration (35:1 ratio), the expected membrane potential will be approximately:
- +61 mV
 - 94 mV
 - 70 mV
 - 0 mV
8. Equation used to calculate the resting membrane potential when the membrane is permeable to multiple ions (Na^+ , K^+ , and Cl^-):
- Fick's Law
 - Starling's Equation
 - Nernst Equation
 - Goldman-Hodgkin-Katz equation
9. Example of **secondary active transport**
- Calcium pump in the cell membrane
 - Hydrogen ion secretion in gastric parietal cells
 - Sodium-glucose co-transport
 - Sodium-potassium pump
10. Subunit of the Sodium-potassium pump with ATPase activity
- β -subunit
 - γ -subunit
 - α -subunit
 - Ligand subunit
11. A mutation reduces membrane permeability to potassium while sodium permeability remains unchanged. What is the most likely effect on resting membrane potential?
- It becomes more negative (hyperpolarized)
 - It becomes less negative (depolarized)
 - It remains unchanged
 - It becomes +61 mV
12. Ion that binds to troponin to initiate the interaction between actin and myosin;
- Sodium (Na^+)
 - Potassium (K^+)
 - Calcium (Ca^{2+})
 - Chloride (Cl^-)
13. Receptors that primarily detect changes in muscle length

- A. Golgi tendon organ
 - B. Pacinian corpuscle
 - C. Muscle spindle
 - D. Free nerve ending
14. A weightlifter drops a heavy load due to excessive muscle tension; which receptor mediates this protective response?
- A. Muscle spindle detecting stretch
 - B. Golgi tendon organ detecting tension
 - C. Pacinian corpuscle detecting vibration
 - D. Nociceptor detecting pain
15. Lung volume represents the amount of air remaining in the lungs after a normal tidal expiration:
- A. Inspiratory reserve volume
 - B. Residual volume
 - C. Functional residual capacity
 - D. Tidal volume
16. In which of the following situations would the V/Q ratio be highest?
- A. Pulmonary embolism
 - B. Airway obstruction
 - C. Severe asthma attack
 - D. Pneumonia
17. Acid–base disturbance most likely develops:-
- A. Respiratory acidosis
 - B. Metabolic acidosis
 - C. Respiratory alkalosis
 - D. Metabolic alkalosis
18. The primary function of pulmonary surfactant:
- A. Increases alveolar surface tension
 - B. Prevents airway collapse during expiration
 - C. Reduces alveolar surface tension
 - D. Enhances carbon dioxide production
19. The primary force responsible for filtration of fluid out of capillaries is:
- A. Plasma oncotic pressure
 - B. Tissue hydrostatic pressure
 - C. Capillary hydrostatic pressure
 - D. Lymphatic pressure
20. Which plasma protein is most important for blood coagulation?
- A. Albumin
 - B. Fibrinogen
 - C. Globulin
 - D. Hemoglobin

Section II: short answer questions

1. Explain the physiological significance of the **ventilation–perfusion (V/Q) ratio** in gas exchange 5marks

2. Explain the sequence of events that occur at a chemical synapse from the arrival of an action potential at the presynaptic terminal to the initiation of a response in the postsynaptic cell (5 marks)
3. Describe the role of proprioceptors in muscle reflexes in the maintenance of posture and coordination of movement (5marks)
4. Define homeostasis and explain its importance in maintaining normal physiological function in the human body (5marks)
5. Describe the role of the cell membrane in regulating the movement of substances and maintaining the internal environment of the cell (5 marks)
6. Explain the physiological functions of the lymphatic system in fluid balance and immune defense (5marks)

SECTION III: LONG ANSWER QUESTION

1. A 58-year-old patient presents with hypertension and signs of left ventricular hypertrophy. Using your knowledge of cardiovascular physiology, answer the following.
 - a. Explain the relationship between cardiac output, peripheral resistance, and blood pressure (5 MARKS)
 - b. Describe the conducting system of the heart and how it coordinates cardiac contraction (5 MARKS)
 - c. Discuss the mechanisms involved in capillary filtration and reabsorption (5 Marks)
 - d. Explain the physiological mechanisms that regulate blood vessel diameter (5 Marks)