



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

**COURSE CODE AND TITLE: BSN 114: Medical Biochemistry I
(MAIN PAPER)**

DATE: 6TH AUGUST 2026

Duration: 2 HOURS

Start: 9:00AM

Finish: 11:00AM

INSTRUCTIONS

1. This exam is out of 70 marks
2. This Examination comprises THREE Sections. Section I: Multiple Choice Questions (20 marks) Section II: Short Answer Questions (30 marks) and Section III: Long Answer Questions (20 marks)
3. Answer ALL Questions.
4. Do not write anything on the question paper. Use the back of your booklet for rough work if needed.

SECTION I: MULTIPLE CHOICE QUESTIONS- 20 MARKS

Choose the correct response

1. The normal blood pH range in a healthy adult is:
 - A. 6.8 – 7.0
 - B. 7.8 – 8.0
 - C. 8.35 – 8.45
 - D. 7.35 – 7.45
2. Which organ is mainly responsible for removing carbon dioxide from the body?
 - A. Pancreas
 - B. Lungs
 - C. Liver
 - D. Kidney
3. Which of the following is classified as a monosaccharide?
 - A. Glucose
 - B. Lactose
 - C. Glycogen
 - D. Sucrose
4. The main function of buffers in the body is to:
 - A. Digest carbohydrates
 - B. Produce hormones
 - C. Prevent changes in pH
 - D. Increase body temperature
5. Water has a high heat of vaporization because of:
 - A. Hydrogen bonding
 - B. Metallic bonding
 - C. Ionic bonding
 - D. Covalent bonding
6. A nurse reviews the arterial blood gas results of a patient and notes the following values: pH = 7.28, PaCO₂ = 60 mmHg and HCO₃⁻ = 24 mEq/L. These findings are most consistent with:
 - A. Metabolic alkalosis
 - B. Respiratory alkalosis
 - C. Respiratory acidosis
 - D. Metabolic acidosis
7. Which carbohydrate reaction is commonly used to identify reducing sugars?
 - A. Benedict's reaction
 - B. Esterification
 - C. Osazone formation
 - D. Enediol formation

8. Which statement best describes the bicarbonate buffer system in blood?
- A. It increases hydrogen ion concentration in blood
 - B. It consists of a strong acid and strong base
 - C. It functions only in the kidneys
 - D. It prevents drastic changes in blood pH using carbonic acid and bicarbonate
9. During intense exercise, rapid breathing helps reduce acidity in blood by:
- A. Increasing lactic acid production
 - B. Removing excess carbon dioxide
 - C. Increasing bicarbonate excretion
 - D. Decreasing oxygen delivery
10. Which vitamin is required for conversion of pyruvate to acetyl-CoA?
- A. Vitamin D
 - B. Vitamin K
 - C. Thiamine (Vitamin B1)
 - D. Vitamin C
11. Which of the following best explains the significance of carbohydrates in the body?
- A. They are the primary source of energy for cells
 - B. They function only in hormone synthesis
 - C. They cannot be stored in the body
 - D. They are only structural molecules
12. A patient with chronic obstructive pulmonary disease develops carbon dioxide retention due to poor ventilation. Which acid–base disorder is most likely present?
- A. Metabolic alkalosis
 - B. Respiratory alkalosis
 - C. Metabolic acidosis
 - D. Respiratory acidosis
13. Which of the following pathways produces NADPH needed for protection against oxidative damage?
- A. Glycolysis
 - B. Pentose phosphate pathway
 - C. Glycogenesis
 - D. TCA cycle
14. A child develops hemolytic anemia after taking primaquine. Laboratory findings confirm G6PD deficiency. The main function of G6PD in red blood cells is to:
- A. Produce glycogen
 - B. Synthesize hemoglobin
 - C. Protect cells from oxidative damage
 - D. Convert pyruvate to lactate
15. Which structure is responsible for ATP generation during oxidative phosphorylation?
- A. Outer mitochondrial membrane
 - B. Cytoplasm
 - C. Ribosome
 - D. Inner mitochondrial membrane

16. Which statement correctly describes glycogen synthesis?
- It occurs only during starvation
 - It converts glycogen into glucose
 - It is stimulated by insulin
 - It occurs only in red blood cells
17. The final electron acceptor in the electron transport chain is:
- Carbon dioxide
 - Oxygen
 - NADH
 - ATP
18. A child develops vomiting, jaundice, and liver enlargement after feeding on milk. The most likely diagnosis is:
- Type II diabetes mellitus
 - Glycogen storage disease
 - Respiratory alkalosis
 - Classic galactosemia
19. Which component of the electron transport chain directly transfers electrons to oxygen?
- ATP synthase
 - Coenzyme Q
 - Cytochrome oxidase
 - NADH dehydrogenase
20. A patient who has been vomiting for several days presents with muscle cramps and irritability. Which acid–base imbalance is most likely present?
- Respiratory acidosis
 - Respiratory alkalosis
 - Metabolic acidosis
 - Metabolic alkalosis

SECTION II: SHORT ANSWER QUESTIONS- 30 MARKS

Answer all questions

- State five biological functions of water in the human body (5 marks).
- Explain how glucose-6-phosphate dehydrogenase (G6PD) deficiency affects susceptibility to malaria. (5 marks).
- Using the bicarbonate buffer system, explain how blood pH is maintained within the normal range (7 marks).
- Briefly describe any four glycogen storage diseases, stating the enzyme defect or metabolic problem in each (8 marks).
- Differentiate between the following carbohydrate terms: (5 marks).
 - Monosaccharides and polysaccharides
 - Stereoisomers and epimers

SECTION C: LONG ANSWER QUESTION- 20 MARKS

Describe glycolysis and discuss its importance in energy production in human cells.