AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCES
DEPARTMENT OF NURSING & MIDWIFERY SCIENCES
BACHELOR OF SCIENCE IN NURSING (DIRECT ENTRY/UPGRADING)
END OF SEMESTER DECEMBER, 2023 EXAMINATIONS

COURSE: BSN 213: MEDICAL BIOCHEMISTRY

DATE: 15-DECEMBER-2023

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 Section II: Short Answer Questions and Section III: Long Answer Questions
3. Answer ALL Questions.

SECTION I: MULTIPLE CHOICE QUESTIONS (20 MARKS)

1. The following statements are true for orotic aciduria except: -
   A. Orotic acid is excreted in urine.
   B. Anaemia is a symptom of this disease.
   C. Growth retardation is seen in affected people.
   D. Self mutilation is another symptom of this disease.

2. Carnitine is synthesis from : -
   A. Lysine and methionine
   B. Glycine and arginine
   C. Aspartate and glutamate
   D. Proline and hydroxyproline

3. The ratio that approximates the number of net molecule of ATP formed per mole of Glucose oxidized in presence of Oxygen to the net number formed in absence of Oxygen is:-

   A. 4: 1
   B. 10: 2
   C. 12: 1
   D. 18: 1

4. The α and β forms of D-Glucose are known as : -
   A. Anomer
   B. Epimer
   C. Racemic mixture
   D. Enediol

5. The following makes water a liquid at room temperature: -
   A. Noncovalent interactions
   B. Hydrogen bonds between water molecules
   C. Van der Waals forces of attraction
   D. Covalent bonding

6. Salvage pathway is used in the synthesis of: -

   A. Amino acid
   B. Carbohydrate
   C. Nucleotide
   D. Fatty acid

7. At a pH below the isoelectric point, an amino acid exists as:-

A. Cation

B. Anion

C. Zwitterion

D. Undissociated molecule

8. Serum amylase is increased in: -

A. Acute parotitis

B. Acute pancreatitis

C. Pancreatic cancer

D. All of these

9. Carnitine is synthesized from: -

A. Lysine and methionine

B. Glycine and arginine

C. Aspartate and glutamate

D. Proline and hydroxyproline

10. α helix has: -

A. 3.4 amino acid residue/turn
B. 3.0 amino acid/turn
C. 3.8 amino acid/turn
D. 3.6 amino acid/turn

11. Prostaglandins are synthesized in the body from: -

A. Myristic acid

B. Arachidonic acid

C. Stearic acid

D. Lignoceric acid.

12. These is a hereditary disease caused due to an error in amino acid metabolism: -

A. Homocystinuria

B. Albinism

C. Phenylketonuria

D. Branched-chain ketoaciduria

13. The following statement is FALSE regarding ketone bodies: -

A. They may result from starvation
B. They are formed in kidneys
C. They include acetoacetic acid and acetone
D. They may be excreted in urine.

14. A manifestation of vitamin A deficiency is: -

A. Painful joints
B. Night blindness
C. Loss of hair
D. Thickening of long bones

15. Fibre in the diet is beneficial in: -

A. Hyperglycemia
B. Hypercholestrolemia
C. Colon cancer
D. All the above conditions

16. Phosphofructokinase key enzyme in glycolysis is inhibited by:-

A. Citrate and ATP
B. AMP
C. ADP
D. TMP

17. Catecholamine hormones are synthesized in the: -

A. Chromaffin cells of adrenal medulla
B. Zona glomerulosa of adrenal cortex
C. Zona fasciculate of adrenal cortex
D. Zona reticularis of adrenal cortex

18. In thyroxine, tyrosine residues are iodinated at positions: -

A. 1 and 3
B. 2 and 4
C. 3 and 5
D. 4 and 6

19. Gout is a metabolic disorder of catabolism of:-

A. Pyrimidines
B. Purines
C. Alanine
D. PhenylalaninE

20. The primary storage form of lipids is_____ and are normally stored in the _____

A. Cholesterol; Muscle
B. Monoacylglycerols; Adipocytes
C. Triacylglycerols; Adipocytes
D. Triacylglycerols; Liver

SECTION II: SHORT ASSAY QUESTIONS (30 MARKS)

1. Outline **THREE** uses of Nicotinamide Adenine Dinucleotide Phosphate reduced(NADPH), generated in Pentose shunt. (3 Marks)
2. Calculate the pH of 1 L solution containing 0.1 M formic acid and 0.1 M sodium formate before and after the addition of 1 mL of 5 M NaOH. How much would the pH change if the NaOH were added to 1L of pure water? (5 Marks)
3. Explain:
   a. The fate of pyruvate in the cell (4½ Marks)
   b. Phenylketonuria disorder (1½ Marks)
   c. Mechanism of action of Allopurinol drug in minimizing uric acid excretion. (3 Marks)
4. Regarding fats
   a. Explain why we require fats in our diet. (2 Marks)
   b. Outline three (3) outstanding differences between biosynthesis and β oxidation of fatty acids. (3 Marks)
5. Outline Four (4) roles of metabolism. (4 Marks)
6. List **TWO** chemical groups carried by cofactors. **(**2 Marks**)**
7. Highlight FOUR (4) key enzymes of gluconeogenesis (2 Marks)

SECTION III: LONG ASSAY QUESTIONS (20 MARKS)

INSTRUCTIONS: Answer **ONLY ONE** Question

1. (a) i. Derive Henderson-Hasselbalch equation. (4 Marks)
   ii.What is the Henderson-Hasselbalch equation's application? (2 Marks)
   iii. Explain **THREE** limitations of Henderson-Hasselbalch equation (6 Marks)
   (b) Describe **FOUR** characteristics of water. (8 Marks)
2. (a) Describe in details various enzymatic steps involved in biosynthesis of purine nucleotides. (12 Marks)
   (b) Describe the regulation of purine nucleotide biosynthesis. (8 Marks)