



(University of Choice)

**MASINDEMULIROUNIVERSITY OF
SCIENCE AND TECHNOLOGY**

(MMUST)

MAIN EXAMINATION

(MAIN CAMPUS)

UNIVERSITY MAIN EXAMINATIONS

2022/2023 ACADEMIC YEAR

SCHOOL OF NURSING, MIDWIFERY AND PARAMEDICAL SCIENCES

FIRST YEAR SECOND TRIMESTER

COURSE CODE: NCN 126

**COURSE TITLE: MEDICAL BIOCHEMISTRY: FOUNDATIONS OF
MEDICAL BIOCHEMISTRY**

DATE: THURSDAY, 13TH APRIL, 2023 TIME: 11.30AM-2.30PM

INSTRUCTIONS TO CANDIDATES:

**ANSWER ALL QUESTIONS IN SECTION A, SECTION B AND ONLY TWO (2)
QUESTIONS IN SECTION C.**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 6 Printed Pages. Please Turn Over.

SECTION A:

ANSWER ALL QUESTIONS (20 MARKS):

1. Phosphofructokinase-1 is
 - (a) An enzyme of glycolysis
 - (b) Inhibited by fructose-6-phosphate
 - (c) An allosteric enzyme of glycolysis
 - (d) Activated by ATP

2. Which one of the following statements is correct regarding pyruvate dehydrogenase?
 - (a) It is present in cytosol
 - (b) It is a multienzyme complex
 - (c) It is multi enzyme complex present in mitochondria
 - (d) Acetyl-CoA is its substrate

3. Which one is the largest particulate of the cytoplasm?
 - (A) Lysosomes
 - (B) Mitochondria
 - (C) Golgi apparatus
 - (D) Endoplasmic reticulum

4. Degradative processes are categorized under the heading of?
 - (A) Anabolism
 - (B) Catabolism
 - (C) Metabolism
 - (D) None of the above

5. Which one among the following is the best example of a pentose sugar?
 - (A) Dihydroxyacetone
 - (B) Ribulose
 - (C) Erythrose
 - (D) Glucose

6. The reaction catalyzed by α -ketoglutarate dehydrogenase in the citric acid cycle requires
 - (A) NAD
 - (B) NADP
 - (C) ADP
 - (D) ATP

7. The pentose sugar present mainly in the heart muscle is
 - (A) Lyxose
 - (B) Ribose
 - (C) Arabinose
 - (D) Xylose

8. Polysaccharides are:
- (A) Polymers
 - (B) Acids
 - (C) Proteins
 - (D) Oils
9. What is the general test for detection of carbohydrates?
- (A) Iodine test
 - (B) Molisch test
 - (C) Barfoed's test
 - (D) Osazone test
10. Cerebrosides mostly consist of which sugar?
- (A) Glucose
 - (B) Fructose
 - (C) Galactose
 - (D) Arabinose
11. Benedict's test is less likely to give weakly positive results with concentrated urine due to the action of
- (A) Urea
 - (B) Uric acid
 - (C) Ammonium salts
 - (D) Phosphates
12. Excessive intake of ethanol increases the ratio:
- (A) $\text{NADH} : \text{NAD}^+$
 - (B) $\text{NAD}^+ : \text{NADH}$
 - (C) $\text{FADH}_2 : \text{FAD}$
 - (D) $\text{FAD} : \text{FADH}_2$
13. Proteins contain
- (A) Only L- α - amino acids
 - (B) Only D-amino acids
 - (C) DL-Amino acids
 - (D) Both (A) and (B)
14. Oxidative decarboxylation of pyruvate requires
- (A) NADP^+
 - (B) Cytochromes
 - (C) Pyridoxal phosphate
 - (D) CoA-SH

15. Dehydrogenase enzymes of the hexose monophosphate shunt are
(A) NAD⁺ specific
(B) NADP⁺ specific
(C) FAD specific
(D) FMN specific
16. Sulphur containing amino acid is
(A) Methionine
(B) Leucine
(C) Valine
(D) Asparagine
17. An aromatic amino acid is
(A) Lysine
(B) Tryptophan
(C) Taurine
(D) Arginine
18. A Zwitterion is
(A) Positive ion
(B) Negative ion
(C) Both (A) and (C)
(D) None of these.
19. Million's test is used for identification of
(A) Tyrosine
(B) Tryptophan
(C) Proline
(D) Arginine
20. Which of the following has the highest cholesterol content?
(A) Egg yolk
(B) Egg white
(C) Meat
(D) Fish

SECTION B:

ANSWER ALL QUESTIONS IN THIS SECTION. EACH QUESTION CARRIES 10 MARKS (TOTAL OF 40 MARKS):

1. Outline 5 factors that could influence the activity of enzymes in Biochemical processes. **(10 Marks)**
2. Stating its biological significance, discuss Cori-cycle. **(10 Marks)**
3. What are the major classes of carbohydrates? Explain the basis of each classification. **(10 Marks)**
4. Using Haworth projections, indicate the functional group of the following biomolecules.
 - a) D-glucose. **(2 Marks)**
 - b) Raffinose. **(2 Marks)**
 - c) L- Fructose. **(2 Marks)**
 - d) Glyceraldehyde-3-phosphate. **(2 Marks)**
 - e) Fructose-1,6-bisphosphate. **(2 Marks)**

SECTION C:

ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION (TOTAL OF 40 MARKS):

1. Bicarbonate buffer system is present in the blood and helps maintain the pH of the blood by converting excess hydrogen ions into carbonic acid which can then be easily removed by the lungs during exhalation.
 - a. The concentration of hydrogen ions (H^+) in human blood is normally tightly regulated and maintained at a normal pH of 7.4 on the pH scale. If the pH of 500ml human blood deviates to 7.6, how many moles of hydrogen ions should be converted into carbonic acid for exhalation by the lungs to regain pH homeostasis? **(10 Marks)**
 - b. Using carbonic acid, show that $pH = pKa + \log \left(\frac{[CO_3^{2-}]}{[H_2CO_3]} \right)$ **(15 Marks)**
2. Using appropriate structures, outline the steps and conditions necessary for the Hexose monophosphate shunt to occur **(20 Marks)**.
3. Proteins are important biomolecules needed for normal cellular functions.
 - a. Giving 3 examples, define essential amino acids. **(5 Marks)**.
 - b. With appropriate examples, discuss the hierarchy of proteins. **(8 Marks)**.
 - c. State the structural difference between hemoglobin and myoglobin. What are their functions? **(7 Marks)**.
4. Stating the differences, discuss glycogenesis and glycogenolysis in living systems. **(20 Marks)**

******THE END******