

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE IN NURSING

NURS 115: MEDICAL BIOCHEMISTRY I

STREAMS: BSC. NURS

TIME: 2 HOURS

DAY/DATE: MONDAY 14/04/2025

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS

Ensure that all your answers are properly numbered.

Part I: Multiple Choice Questions (MCQ): write the correct answer on the space provided in the booklet. Each MCQ in one mark.

Part II: Short Answer Questions – Answer all questions following each other on the answer booklet.

Part III: Long Answer Questions: Answer any two questions on the answer booklet.

PART I: MCQ (20 MARKS)

1. Which of the following is NOT a physiological buffer?
 - (a) Bicarbonate buffer
 - (b) Inorganic phosphate
 - (c) Haemoglobin.
 - (d) Acetate buffer

2. Which of the following mixtures in an aqueous solution of equimolar concentration act as a buffer solution?
 - a) NH_4OH (excess) + HCl
 - b) HNO_3 + NaOH
 - c) CH_3COOH + NaOH (excess)
 - d) H_2SO_4 + KOH

3. Which of the following is NOT a member of aldose family?
 - a) Erythrose
 - b) Ribose
 - c) Ribulose
 - d) Glucoce
4. Which of the following is a heteropolysaccharide?
 - a) Heparin
 - b) Glycogen
 - c) Dextrins
 - d) Cellulose
5. _____ is a neutral amino acid
 - a) Arginine
 - b) Leucine
 - c) Glutamate
 - d) Lysine
6. The stability of an α -helix is **not** affected by which of the following?
 - a) Bulkiness
 - b) Occurrence of alanine and glycine residues
 - c) Electrostatic repulsion
 - d) Interaction between R groups spaced three residues apart
7. _____ amino acid participates in methyl group transfer:
 - a) Leucine
 - b) Valine
 - c) Lysine
 - d) Methionine
8. Which of the following catalyzes the reversible degradation of 2-phosphoglycerate to phosphoenolpyruvate?
 - a) Trypsin
 - b) Enolase
 - c) Chymotrypsin
 - d) Hexokinase

9. Which of the following statement is **true**?
- a) Glycolysis occurs only in mammalian cells
 - b) Glycolysis occurs in mitochondria
 - c) Glycolysis occurs in the presence and absence of oxygen
 - d) Glycolysis occurs when ATP concentration is high.
10. In which of the following glucose residues are linked by β -1,4 glycosidic bonds?
- a) Starch
 - b) Cellulose
 - c) Glycogen
 - d) Amylose
11. Which of the following is the study of energy relationships and conversions in biological systems?
- a) Biochemistry
 - b) Biophysics
 - c) Biotechnology
 - d) Bioenergetics
12. Which of the following enzymes is responsible for the conversion of glucose 1-phosphate to glucose 6-phosphate?
- a) Epimerase
 - b) Phosphoglucomutase
 - c) Glycogen phosphorylase
 - d) Isomerase
13. Increased levels of hydrogen ions in the inter-membrane space of the mitochondria results in?
- a) Decreased levels of chemiosmosis
 - b) Increased levels of water in inter-membrane space
 - c) Increase ATP production
 - d) Decreased levels of oxidative phosphorylation
14. Which of the following enzymes is responsible for glycogen breakdown?
- a) Glycogen phosphorylase
 - b) Glycogen phosphatase

- c) Glycogen hydrolase
 - d) Glycogen phospho beta-glucosidase
15. Which of the following proteins is required for *de novo* synthesis of glycogen?
- a) Glycoprotein
 - b) Glycogenin
 - c) Proteoglycan
 - d) Glucogenin
16. Cholesterol serves as the precursor for the following biosynthetic pathways, EXCEPT?
- a) Bile acid synthesis
 - b) Steroid hormone synthesis
 - c) Aldosterone synthesis
 - d) Thyroid hormone synthesis
17. All of the following are complex lipids, **Except**?
- a) Phosphatidic acid
 - b) Cerebroside
 - c) Cardiolipin
 - d) Cholesterol
18. Which of the following process does **not** occur in prokaryotes?
- a) Replication
 - b) Splicing
 - c) Translation
 - d) Transcription
19. Which of the following base-pairing rules is **true**?
- a) Adenine pairs with Guanine and Thymine pairs with Cytosine
 - b) Adenine pairs with Thymine and Guanine pairs with Cytosine
 - c) Adenine pairs with Cytosine and Guanine pairs with Thymine
 - d) DNA base pairing is nonspecific
20. Which of the following statements is FALSE regarding DNA replication?
- a) The DNA synthesis i.e. addition of nucleotide occurs from 5'-3' position
 - b) The DNA synthesis is semi-continuous with continuous leading strand and discontinuous lagging strand.

- c) The synthesis of leading and lagging strands occurs simultaneously
- d) None of the Above

PART II: SHORT ANSWER QUESTIONS (30 MARKS)

- 1. Highlight any SEVEN functions of proteins in the human body. (7 marks)
- 2. Illustrate the structures of maltose and lactose. (8 marks)
- 3. Explain any FOUR ways by which metal ions promote enzyme action. (4 marks)
- 4. Briefly describe the cause and clinical manifestations of lactose intolerance. (6 Marks)
- 5. Explain any FIVE medical importance of a cell membrane. (5 marks)

PART III: LONG ANSWER QUESTIONS. ANSWER ANY TWO. (20 MARKS)

- 1. Explain any TEN functions of lipids in a biological system. (10 marks)
- 2. Describe the FIVE factors that affect enzyme activities. (10 marks)
- 3. Explain any TEN differences between DNA and RNA. (10 marks)
- 4. Explain any FIVE functions of Glycosaminoglycans (GAGS) in the human body. (10 marks)

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