CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE

NURS 113: MEDICAL BIOCHEMISTRY I

STREAMS: **TIME: 2 HOURS**

DAY/DATE: TUESDAY 04/12/2018 **8.30 A.M. – 10.30 A.M.**

INSTRUCTIONS:

- **Answer question 1 and any other TWO questions.**

QUESTION ONE (30 MARKS)

(i) Which of the following is not a colligative property of water

(a) Vapour pressure
(b) Boiling point
(c) Osmotic pressure
(d) Osmosis

(ii) What is the concentration of OH^- in a solution with H^+ concentration of $1.3 \times 10^{-4} M$

(a) $7.7 \times 10^{-10} M$
(b) $7.8 \times 10^{-10} M$
(c) $7.7 \times 10^{-10} M$
(d) $6.8 \times 10^{-11} M$

(iii) The following are ways of regulation of pyruvate dehydrogenase which one is not?

(a) Product inhibition by acetyl CoA
(b) Elevated levels of NADH
(c) Increased NADH/NAD^+ ratio
(d) Increase in insulin concentration

(iv) Which of the following is not function of the krebs cycle

(a) Energy generation
(b) Provide CO_2 for gluconeogenesis
(c) Fatty acid synthesis
(d) Glycogen digestion

(v) Which of the following is not a polysaccharide

(a) Starch
(b) Glycogen
(c) Sucrose
(d) Cellulose

(vi) Indicate which of the following is not a function of a lipid

(a) Efficient energy sources
(b) Source of heme
(c) Serve as thermal insulators
(d) Serve as precursors of hormones

(vii) Which is not a function of cholesterol

(a) Synthesis of bile salts
(b) Synthesis of steroid hormones
(c) Synthesis of vitamin D
(d) Synthesis of glycogen

(viii) Which of the following is not an essential amino acid
(a) Arginine
(b) Alanine
(c) Leucine
(d) Tryptophan

(ix) Indicate which of the following is not a conjugated protein
(a) Nucleoprotein
(b) Lipoprotein
(c) Phosphoprotein
(d) Globulin

(x) Which of the following is not a denaturing agent of proteins

(a) Temperature
(b) Pressure
(c) Mechanical sheer force
(d) Glucose levels

(xi) The following is a metal ion required for enzyme activity. Which one is not

(a) Ca^{2+}
(b) K^{+}
(c) Mg^{2+}
(d) Pb^{2+}

(xii) Which of the following is not a classification of enzymes

(a) Transterases
(b) Oxidoreductases
(c) Glyceradehyde-3-phosphate
(d) Hydrolases

(xiii) Which of the following is not a factor that affects enzyme action.

(a) Temperature
(b) pH
(c) Substrate/enzyme concentration
(d) Van der Waals forces

(xiv) The following are methods of regulating enzyme activity which one is not?

(a) Irreversible covalent modification
(b) Reversible covalent modification
(c) Allosteric modulation
(d) Alkaline phosphate

(xv) Indicate which of the following enzymes is not used in clinical diagnosis
(a) Lipase
(b) α −amylase
(c) Trypsin
(d) Chryomotrypsin elastase

(xvi) Indicate which is not a hexose
(a) Glucose
(b) Ribose
(c) Galactose
(d) Mannose

(xvii) Which of the following is not a physical property of a monosaccharide

(a) Colourless
(b) Crystalline
(c) Readily soluble in H_20
(d) Coloured

(xvxii) Solutions of equal osmolality are

(a) Hypertonic
(b) Isotonic
(c) Hypotonic
(d) Osmosis

(xix) Hydrophilic substances are
(a) Water loving
(b) Water hating
(c) Insoluble in water
(d) Water scarce

(xx) Which of the following does not determine the intermediate to which pyruvate is converted

(a) Types of cells
(b) Aerobic prokaryotes
(c) Anaerobic prokaryotes
(d) White blood cells

(xxi) Which of the following enzyme is not part of pyruvate dehydrogenase complex
(a) Pyruvate dehydrogenase
(b) Dihydrolipoyl trascelylase
(c) Dihydrocipoyl hydrogenase
(d) Succinyl CoA

(xxii) Which of the following is not a classification of carbohydrates
(a) Monosaccharides
(b) Oligosaccharides
(c) Phospolipid
(d) Polysaccharide

(xxiii) All the following proteins are soluble in $H_2 0$. Which one is not?
(a) Albumias
(b) Collagens
(c) Globucins
(d) Histores

(xxiv) The following are ways in which metal ions promotes enzyme action which one is not?

(a) Maintaining or producing the active structural conformation of the enzyme
(b) Promoting the formation of the enzyme substrate complex
(c) Acting as electron donors or acceptors
(d) Causing distortions in the substrate or the enzyme

(xxv) Which of the following is not a disaccharide?

(a) Maltose
(b) Lactose
(c) Sucrose
(d) Starch

(xxvi) The following is not an example of an non-standard amino acids

(a) 4-hydroxyproline
(b) 5-hydroxylysine
(c) Alanine
(d) 6-N-methyl cysteine

(xxvii) Which of the following is not a conjugated protein

(a) Nucleoprotein
(b) Lipoprotein
(c) Phosphoprotein
(d) Globulin

(xxviii) The following enzymes have been matched to the specific bond they catalyze. Which one is not?

(a) Esterases-Esterbond
(b) Peptidases -peptide bonds
(c) Glycosidases-Glycosidic bonds
(d) Trypsinogen-psinogen bonds

(xxix) Which of the following enzyme is not involved in glycolysis

(a) Hexokinase
(b) Phosphohexose isomerise
(c) Phosphofuctukinase
(d) Insulin

(xxx) Which of the following is not an electron carrier

(a) NAD^+
(b) $NADP^+$
(c) FAD
(d) Pyruvate

QUESTION 2 (20 MARKS)

(a) Explain the relevance of measurement of pH in medical diagnosis (2 marks)

(b) Define the following terms

(i) Buffers
(ii) Osmosis
(iii) Free energy

(c) Energy released upon hydrolysis of high energy phosphate bond may result in the following. (3 marks)

(d) Draw and label the mitochondria (3 marks)

(e) Differentiate between

(i) Aldoses and ketoses
(ii) Homopolysaccharides and heteropolysaccharides
(iii) Simple lipids and complex lipids (6 marks)

(f) Give three functions of phospholipids (3 marks)

QUESTION 3 (20 MARKS)

(a) Explain the mechanisms in animals and plants that prevent osmotic lysis. (3 marks)

(b) Calculate the pKa of lactic acid given that when the concentration of lactic acid is 0.010m and the concentration of lactate is 0.087M, the pH is 4.80. (4 marks)

(c) Define the following

(i) Oxidation
(ii) Reduction
(iii) Exergonic
(iv) Endergonic (4 marks)

(d) Give three functions of glycosaminoglycans (3 marks)

(e) Differentiate between

(i) Ketogenic and glucogenic amino acids
(ii) Essential and non-essential amino acids (4 marks)

(f) Draw the general formula of a naturally occurring amino acid. (2 marks)

QUESTION 4 (20 MARKS)

(a) Briefly discuss the four levels of organization of proteins. (4 marks)

(b) Give two properties of a denatured proteins. (2 marks)

(c) Define the following terms

(i) Apoenzyme
(ii) Cofactor
(iii) Coenzyme
(iv) Prosthetic group (4 marks)

(d) Discuss three properties of enzymes (6 marks)

(e) Discuss briefly the Michaels and Menten hypothesis of enzyme action. (2 marks)

(f) Differentiate between irreversible and reversible enzyme inhibition. (2 marks)

-