CHUKA   **UNIVERSITY**
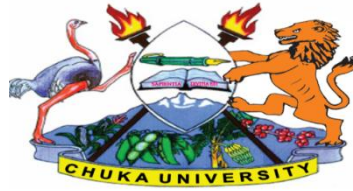
UNIVERSITY EXAMINATIONS

**FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF SCIENCE (NURSING)**

NURS 113: MEDICAL BIOCHEMISTRY I   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 7/12/2017   **8.30 A.M - 10.30 A.M.**

INSTRUCTIONS:
- **Answer Question ONE and any other TWO Questions.**

QUESTION ONE [30 MARKS]
(a) (i) Define colligative properties of water.   [1 Marks]
    (ii) Give four colligative properties of water.   2 Marks]

(b) Define osmotic lysis of cells and give one mechanism that have evolved to prevent this
    catastrophe.   [2 Marks]

(c) (i) From the dissociation of a weak acid HA into H^+ and A^-, derive the Henderson-
    Hasselbalch equation.   [5 Marks]

    (ii) Calculate the pKa of lactic acid given that when the concentration of lactic acid is 0.010m
    and the concentration of lactate is 0.087 m, the pH is 4.80.   [5 Marks]

(d) Briefly explain the following terms
    (i) Free energy
    (ii) Epimers
    (iii)Heteropolysaccharides
    (iv)apo enzyme
    (v) Catactor   [5 Marks]

    (e) Give two functions of glycosaminoglycans.   [2 Marks]

    (f) Differentiate between the following
        (i) Reversible and irreversible enzyme inhibition.   [2 Marks]
        (ii) Competitive and non competitive inhibitor.   [2 Marks]

    (g) Discuss two phases of glycolyis.   [4 Marks]

QUESTION TWO [20 MARKS]

(a) What is the concentration of OH^- in solution with a H^+ concentration of $1.3 \times 10^{-4}M$ $(KW = 1.0 \times 10^{-14}M^2)$. [4 Marks]

(b) (i) Draw the general formulae of a naturally occurring amino acids. [2 Marks]

(ii) Explain the following terms and give an example
   (a) Glycogenic amino acid
   (b) Ketogenic amino acid
   (c) Conjugated proteins. [6 Marks]

(c)Discuss three factors affecting enzyme activity. [6 Marks]

(d) Give four general functions of lipids. [2 Marks]

QUESTION THREE [20 MARKS]

(a) Discuss the four levels of organization of proteins. [8 Marks]

(b) Discuss the following
   (i) The lock and key model of enzyme action
   (ii) Michaels and Menten hypothesis of enzyme action. [4 Marks]

(c) Explain the process of glycogenolysis. [6 Marks]

(d) Differentiate between glycerophospholipids and sphingophospholipids. [20 Marks]

QUESTION FOUR [20 MARKS]

(a) (i) Define denaturation of proteins. [1 Mark]

(iii)Give three properties of a denatured protein. [3 Marks]

(b) Discuss three properties of enzymes. [3 Marks]

(c) Calculate the ratio of the concentration of a cetase and acetic acid required in a puffer system of pH 5.30. [5 Marks]

(d) Draw and discuss the citric acid cycle. [5 Marks]
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