SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY AND MOLECULAR BIOLOGY AND BACHELOR OF SCIENCE IN BIOLOGY

BCH 101: STRUCTURE OF BIOMOLECULES

14TH DECEMBER, 2016 **TIME: 10.30-12.30 P.M**

INSTRUCTIONS TO CANDIDATES

(a) Answer ALL the Questions in Section A
(b) Answer ANY TWO Questions in Section B
(c) Illustrate your answers with well labeled diagrams where appropriate

SECTION A (30 MARKS)

1. Describe the common structural features and the differences for each of the following pairs:
   a) Cellulose and glycogen (**1 mark**)
   b) D-glucose and D-fructose (**1 mark**)
   c) Maltose and sucrose (**1 mark**)
2. Name **three** classes of enzymes giving the type of reactions they catalyze. (**3 marks**)
3. Name and briefly describe the levels of protein structure. (**3 marks**)
4. Giving an example, explain how the activation energy is useful in enzymatic reactions. (**3 marks**)
5. a) Describe the formation of a peptide bond. (**1 mark**)
   b) Using structures and names,give the full equation of the formation of a tripeptide consisting of glycine, alanine and serine. (**4 marks**)

6. List the main components of nucleic acid. (**3 marks**)

7. Calculate the following:

   a) The H^+ concentration of a solution with pH 6.52? (**1 mark**)

   b) The molar ratio of HPO_4^{2-} to $H_2PO_4^-$ in a solution that would produce a pH of 7.0? Phosphoric acid (H_3PO_4) is a tribasic with pK_a values: 2.14, 6.86 and 12.4. (**1 mark**)

   c) Calculate the pH of the buffer containing 0.020 mol of lactic acid ($CH_3CH(OH)COOH$) ($pK_a = 3.86$) and 0.03 mol of sodium lactate per litre.(**1 mark**)

8. Briefly explain thebasis of a purine-pyrimidine base pair in a DNA molecule. (**2 marks**)

9. State the class of lipids that bile acids belongand give their biological function.(**2 Marks**)

10. Explain how one would test for peptides. (**3 marks**)

SECTION B (40 MARKS)

11. Describe enzyme inhibition. (**20 marks**)

12. Discuss the structure of tRNA. (**20 marks**)

13. Discuss the classification of amino acids. (**20 marks**)

14. Describe in detail the following carbohydrates.

   a) Starch (**10 marks**)

   b) Cellulose (**5 marks**)

   c) Pectin (**5 marks**)