



UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 305: CHEMISTRY OF CARBOHYDRATES AND PROTEINS

DATE: APRIL 12, 2018

TIME: 8:30-10:30AM

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

- a) Carbohydrates can be considered to be hydrates of carbon. Explain (3 marks)
- b) Illustrate cyclization of D-fructose to form a furanose ring (3 marks)
- c) Explain the structural difference between amylose and amylopectin (3 marks)
- d) Apart from glycine, all other amino acids are considered chiral. Explain (3 marks)
- e) Using a specific example, explain why amino acids are considered to be Zwitter ions (3 marks)
- f) List three levels of protein structure (3 marks)
- g) Using a specific example describe a titration curve of an amino acid (3 marks)
- h) Give the structure and name of any amino sugar (3 marks)
- i) Explain the concept of anomerism in sugar chemistry (3 marks)
- j) Explain a structural characteristic a globular protein (3 marks)

QUESTION TWO (20 MARKS)

- a) With a specific example, illustrate the use of Fischer Kilian synthesis in carbohydrates chemistry (5 marks)

- b) Explain why sucrose is a no-reducing f sugar (5 marks)
- c) Cyclization of glucose introduces a new chiral center in the molecule. Explain (5 marks)
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- d) Illustrate the mechanism of peptide bond formation in proteins (5 marks)

QUESTION THREE (20 MARKS)

- a) With a specific example, illustrate the use of Edman's degradation in carbohydrate chemistry (5 marks)
- b) Using a specific example, describe the structure of a glycoprotein (5 marks)
- c) Illustrate how you would perform solid phase synthesis of a tripeptide using amino acids of your choice (10 marks)

QUESTION FOUR (20 MARKS)

- a) With a specific example, describe osazone formation in carbohydrates (5 marks)
- b) Cyclic D-glucose is a hemiacetal. Explain (5 marks)
- c) Describe structural futures of the following sugar derivatives (10 marks)
- i) Hydrazones
 - ii) Cyclodextrins

QUESTION FIVE (20 MARKS)

- a) Amino acids can be classified based on acidic or basic properties of their side chains. Explain (6 marks)
- b) Give correct structure of the following amino acids (6 marks)
- i) Tryptophan
 - ii) Histidine
 - iii) Proline
- c) Explain structural differences between globular and fibrous proteins (6 marks)
- d) Give the structure of a sulfur containing amino acid and explain its occurrence in nature (2 marks)

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