



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (ANALYTICAL CHEMISTRY)

SBC 103 PROTEINS AND ENZYMES

DATE: 12/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

1. Answer 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A

QUESTION ONE (COMPUSORY) (30 MARKS)

- a) Describe with the help of a structure the features of the following amino acids
 - a. Asparagine (1 mark)
 - b. Glutamine (1 mark)
 - c. Tyrosine (1 mark)
- b) A polypeptide has the following sequence: Asp-Asn-Gln-His-Gly-Gly. Calculate the net charge and describe what can be done to change its PH without altering the numbers of amino acids (3 marks)
- c) Describe the properties of an amino acids at a neutral PH (3 marks)
- d) Using example discuss the Fischer projections of amino acids (3 marks)
- e) Describe the forces tha hold proteins structures. (3 marks)
- f) Identify and describes the components of the induced fit enzymatic models (3 marks)
- g) Using acid – base enzymatic catalysis enumerate tautomerization (3 marks)
- h) Proteins can fold and refold. Discuss (3 marks)
- i) Describe the physical meaning of Vmax, Kcat and Km in Michaelis-Menten equation (3 marks)
- j) Describe the following terminologies:
 - a. Lyases: (1 mark)
 - b. Active site: (1 mark)
 - c. Ligases: (1 mark)

SECTION B: ANSWER ANY OTHER TWO QUESTIONS

QUESTION TWO (20 MARKS)

In accordance with Linus Pauling theory of enzymatic reaction, derive the Michael-Menten equation

QUESTIONS THREE (20 MARKS)

- a) Describe the working principles and the properties of enzymes (10 marks)
- b) Discuss 5 enzyme inhibitors that you know (10 marks)

QUESTIONS FOUR (20 MARKS)

Some enzymes function in conjunction with Co-factors. Discuss .

QUESTION FIVE (20 MARKS)

- a) Using example discuss Zymogens (5 marks)
- b) With examples describe FIVE key characteristics/features which can distinguish amino acids in proteins (15 marks)