



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied and Health Sciences

Department of Pure & Applied Sciences

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN BIOCHEMISTRY

ABC 4201: PROTEIN BIOCHEMISTRY

SUPP/SPECIAL EXAMINATION

SERIES: PickyearDEC 2024

TIME:2HOURS

DATE:Pick DateDecPick Year2024

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

- (a) Compare and contrast α -helices and β -sheets as elements of protein secondary structure. (4 marks)
- (b) State the significance of proline hydroxylation in collagen. (1 mark)
- (c) Outline the cause, specific symptoms, and underlying mechanisms of the disorder Cutis Laxa. (3 marks)
- (d) Explain the Bohr effect in hemoglobin's role of transporting oxygen during exercise. (3 marks)
- (e) Outline how the nervous system controls skeletal muscle contraction. (4 marks)
- (f) Give TWO examples of glycoproteins. (2 marks)
- (g) Explain the general structure and function of glycoproteins. (3 marks)
- (h) What is the role of chondronectin and osteopontin in physiological processes. (4 marks)
- (i) State the clinical significance of heparin. (2 marks)
- (j) Mention the primary cause of osteoporosis. (1 mark)
- (k) State the role of vitamin D in bone health. (1 mark)

- (l) Outline the mechanism of action of bisphosphonates in the treatment of metabolic bone diseases. **(2 marks)**

QUESTION TWO

- (a) Describe the four levels of protein structure and explain how each level contributes to the overall function of a protein. **(8 marks)**
- (b) Describe the structural components of hemoglobin A (HbA) and its organization and function in the T and R conformations. **(12 marks)**

QUESTION THREE

With examples, discuss the different classes of proteins based on their structure, and function. **(20 marks)**

QUESTION FOUR

- (a) With examples, discuss the biological roles of enzymes, structural, and defense proteins. **(6 marks)**
- (b) Describe the structure, composition, biosynthesis and functions of α -Keratin. **(8 marks)**
- (c) Differentiate between sickle cell anemia and hemoglobin C disease in terms of their genetic basis and clinical consequences. **(6 marks)**

QUESTION FIVE

- (a) Describe the differences between skeletal, cardiac, and smooth muscles. **(9 marks)**
- (b) Discuss the energy sources used during muscle contraction. **(6 marks)**
- (c) Differentiate between fibrous and globular proteins, and state how these differences influence their biological functions. **(5 marks)**