**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**
END OF SEMESTER 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. Attemptquestion ONE (Compulsory) and any other TWO questions.
**Do not write on the question paper.**

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**QUESTION ONE**

(a) Explain the consequences of protein misfolding and denaturation. **(4marks)**
(b) With examples, state the biological roles of the following proteins in physiological processes.
  i) Transport Proteins. **(2 marks)**
  ii) Motor Proteins. **(2 marks)**
  iii) Storage Proteins. **(2 marks)**
(c) Explain how an increase in 2,3-bisphosphoglycerate concentration affect hemoglobin's affinity for oxygen. **(3 marks)**
(d) Discuss the clinical relevance of muscle contraction in the following disorders.
  i) Muscular dystrophy. **(2 marks)**
  ii) Heart failure. **(2 marks)**

(e) State the role of the following glycoproteins.
  i) Fibronectin **(1 mark)**
  ii) Laminin **(1 mark)**
(f) Explain clinical conditions associated with altered levels of osteopontin. **(2 marks)**
(g) Identify the components of proteoglycans. **(2 marks)**
(h) Identify the location and main function of hyaluronic acid. **(2 marks)**
(i) Define mucopolysaccharidosis (MPS). **(1 mark)**

**(j)** Differentiate between rickets and osteomalacia. **(2 marks)**

**(k)** State TWO symptoms of Paget's disease of bone. **(2 marks)**

**QUESTION TWO**

(a) Identify and explain causation of TWO disorders associated with the following proteins.

ii) α-Keratin **(6 marks)**

iii)Elastin **(6 marks)**

(b) Describe the structure, composition, biosynthesis and functions of collagen. **(8 marks)**

**QUESTION THREE**

Explain the role of cytochromes and chlorophyll in biological processes, highlighting their similarities and differences related to their heme structures. **(20 marks)**

**QUESTION FOUR**

(a) Differentiate between the oxygen-dissociation curve of hemoglobin and that of myoglobin, and state what this difference indicates about their functions. **(6 marks)**

(b) Discuss the role calcium plays in the contraction of skeletal, cardiac, and smooth muscles. **(8 marks)**

(c) Explain the structure, composition, biosynthesis, and functions of elastin. **(6 marks)**

**QUESTION FIVE**

(a) Describe the sliding filament theory of muscle contraction. **(14 marks)**

(b) Describe the key differences between hemoglobin C disease, and thalassemia in terms of their genetic basis and clinical consequences. **(6 marks)**