



**KISII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**SPECIAL EXAMINATION**  
**SECOND YEAR EXAMINATION FOR THE AWARD OF**  
**THE DEGREE OF BACHELOR IN EDUCATION SCIENCE**  
**SECOND SEMESTER 2021/2022**  
**(JULY, 2022)**

**CHEM 213: BIONORGANIC CHEMISTRY**

**STREAM: Y2 S2**

**TIME: 2 HOURS**

**DAY: MONDAY, 8.00 AM – 10.00 AM**

**DATE: 25/07/2022**

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**INSTRUCTIONS:**

- 1. Do not write anything on this question paper.***
- 2. Answer ALL Questions in section A and any TWO Questions in Section B.***

**SECTION A**

- Distinguish between R and T states of haemoglobin (3 marks)
- (a) What is co-operative effect as applied to oxygen binding to haemoglobin (2 marks)  
(b) Describe the difference between concerted and sequential models of haemoglobin (4 marks)
- Using a structure, explain the characteristics of the porphine that makes it serve as good coordinating agent in formation of bio-inorganic compounds (6 marks)
- Describe the mode of action of vitamin B12 in the body (4 marks)
- (a) What is meant by the term metal ion poisoning (2 marks)  
(b) Explain the meaning of the term chelation therapy describe how it is carried out (4 marks)
- Explain the function of the following bio-inorganic compounds (6 marks)
  - Haemoglobin
  - Nitrogenase

7. (a) What is meant by the term chromatography (2 marks)  
(b) Explain the concept of column chromatography as a separation technique (3 marks)
8. Describe the poisoning effect caused by the following heavy metal;
- (i) Cadmium
  - (ii) Manganese (4 marks)

### **SECTION B**

9. With the aid of a structure, describe the importance of vitamin B12 in the body (15 marks)
10. (a) Chlorophyll is a green pigment that is found in plants. With the aid of a well labeled diagram, describe the role of chlorophyll in photosynthesis (8 marks)
- b (i) Distinguish between cathoresis and anaphoresis as applied in electrophoresis (3 marks)
- ii) Describe how the process of electrophoresis helps in separation (4 marks)
11. (a) Explain what is meant by the term metalloproteins (2 marks)
- (b) Give any three examples of metalloproteins and highlight the importance of each of them (6 marks)
  - (c) Using structures distinguish between chlorin and corrin rings and explain their importance (7 marks)