



# KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF  
SCIENCE

SCH 312: BIOINORGANIC CHEMISTRY

DATE: Tuesday 3<sup>rd</sup> April 2012

TIME: 2.00p.m – 4.00p.m

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## INSTRUCTIONS

Answer **all** questions

The Question being answered **must be numbered** on every page

1. a) Explain the meanings of the phrases:-
  - i) “Essential Plant micronutrient” and name five such elements. [5marks]
- b) A bag of fertilizer has the letters and figures NPK: 18:45: 5. Give the meanings of these letters and figures and explain their significance. [7marks]

[Total for Q1.....12marks]
  
2. a) Draw a structure of the prosthetic group in myoglobin showing clearly all the main features. [10marks]
- b) Differentiate between hemoglobin and haemoglobin and specify the biological function of these molecules. [15marks]

[Total for Q2.....25marks]
  
3. a) Vitamin B<sub>12</sub> is naturally-occurring organometallic complex. Support this statement by drawing the structure of the prosthetic group showing clearly this vitamin. [15marks]
- b) State the biological role of this vitamin. [5marks]

[Total for Q3.....20marks]

4. Outline the biological function of the following:-

- i) Calcium [3marks]
- ii) Phosphorous, other than being a component of Vitamin B<sub>12</sub>. [5marks]
- iii) Iodine. [3marks]
- iv) Fluorine [3marks]
- v) Sulphur [6marks]

[Total for Q4.....20marks]

5. Explain what you understand by the following:-

- a) Dinitrogen Fixation [1mark]
- b) Biological Dinitrogen Fixation [1mark]
- c) State clearly the necessary conditions for biological Nitrogen Fixation. [3marks]
- d) During biological Nitrogen Fixation, it is presumed that dinitrogen is co-ordinated to one of the transition metals.
  - i) List the two metals found in most nitrogenases. [2marks]
  - ii) Give two examples of dinitrogen complexes which show that dinitrogen can actually behave as ligand. [2marks]
  - iii) Describe a simple experiment that supports the idea that before dinitrogen is converted to ammonia, it is actually co-ordinated to one these metal ions. [11marks]

[Total for Q5.....20marks]