



# KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER  
SUPPLIMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF CHEMISTRY

**COURSE CODE:** SCH 422

**COURSE TITLE:** BIO – INORGANIC CHEMISTRY

**DURATION:** 2 HOURS

**DATE:** 23/11/2022 **TIME:** 11:00AM-1:00PM

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### INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of 3 printed pages. Please Turn Over



KIBU observes ZERO tolerance to examination cheating

### QUESTION ONE.

- [a] Briefly describe the mechanism of poisoning of carbon monoxide 3mrks
- [b] Explain using examples the process of nitrogen fixation 4mrks
- [c] Explain why plants are able to fix nitrogen under ambient conditions 4mrks
- [d] Briefly describe the toxicity due to CN on the cytochrome 4mrks
- [e] What are the essential elements? Explain how an essential elements can become toxic 3mrks
- [f] Using examples, demonstrate the essentially of elements to different biological functions 5mrks.
- [g] Identify three import rings in bioinorganic chemistry 3mrks.
- [h] Discuss the structure and function of chlorophyll in photosynthesis 4mrks.

### QUESTION 2

- (a) Explain the iron binding by transferrin 7mrks
- (b) Why does CO bind more tightly to iron (II) porphyrins? Explain 5mrks
- (c) In what way would CO binding change the reduction potential of an iron (III) porphyrin? 5mrks
- (d) Explain how cyanide alters the Fe (III)/Fe (II) reduction potential of an iron porphyrin Complex 3mrks.

### QUESTION THREE.

- (a) Graphically compare the O<sub>2</sub> affinity of hemoglobin and myoglobin 8mrks
- (b) List the common forms of O<sub>2</sub> and oxygen bearing species in relation to ROS 8mrks
- (c) Show with a picturesque presentation the role of distal imidazole heterocycle for trapping of O<sub>2</sub> by heoxy-Hb 4mrks.

### QUESTION FOUR

- (a) Explain transport, formation and degradation of hydrogen carbonate in our body 7mrks
- (b) Briefly present the aqueous iron chemistry in relation to the mineralization 7mrks
- (c) How mobilization of Fe<sup>3+</sup> is done by siderophores 6mrks.

### QUESTION FIVE

(a) Explain the pathways for inactivation of hemoglobin  
6mrks

(b) Explain O<sub>2</sub> binding in hemerythrin 6mrks

(c) Explain the different oxygen binding behavior of the CO(II) to prophyrin 4mrks

(d) Ferrochelatase is an enzyme which inserts iron into protoporphrin IX; the iron complex is then taken up by hemoglobin. Some people are deficient in this enzyme and have some iron free protoporphyrin IX. Such individuals develop dark lesions on their skin when they are in the sun. Explain the underlying cause of this disease. Do you expect this disease to be congenital? 4mrks