KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF B.ED (SCIENCE)

COURSE CODE: SCH 350

COURSE TITLE: ENVIRONMENTAL CHEMISTRY

DATE: 12/10/2021 **TIME:** 2:00-4:00PM

INSTRUCTIONS TO CANDIDATES:

TIME: 2 Hours

Answer **question ONE** and **any TWO** of the remaining

KIBU observes ZERO tolerance to examination cheating

Question 1 [30 Marks]

i. The earths weather lies in the lower atmosphere, explain the possible reason for this phenomenon [4 Marks]

ii. From the image of the earth below, explain why it is the only planet that supports life [3 Marks]

iii. Explain why UV radiation is harmful to living things [4 Marks]

iv. Explain the difference between BOD and COD [4 Marks]

v. Briefly describe the water cycle [5 Marks]

vi. Highlight the importance of CaO and $Al_2(SO_4)_3$ during water treatment [2 Marks]

vii. Give examples of condensation, evaporation or precipitation observed in day to day activities [3 Marks]

viii. Describe acid rain [2 Marks]

ix. Explain the importance of green chemistry [3 Marks]

Question 2 [20 Marks]

i. As one moves higher in the atmosphere, the segments vary in characteristics, composition and temperature.
Briefly
   a. Describe the segments in order of increasing altitude [4 Marks]
   b. Describe the composition of each segment [4 Marks]
   c. Explain the causes for temperature variation in the atmosphere [8 Marks]

ii. Explain the common phrase "the higher you go, the cooler it becomes" [4 Marks]

Question 3 [20 Marks]

i. With the aid of a diagram describe the 5 stages in the nitrogen cycle [10 Marks]

ii. Describe eutrophication [2 Marks]

iii. Explain how the nitrogen cycle may affect eutrophication [5 Marks]

iv. Explain the acronym ANAMMOX as applied in the nitrogen cycle [3 Marks]

Question 4 [20 Marks]

i. List the major environmental divisions and describe the importance of each [8 Marks]

ii. CFCs are described as nontoxic, but their use is not desirable due to environmental concerns
   (a) Define CFC [1 Mark]
   (b) Give 2 reasons why the presence of CFCs is undesirable in the environment, yet they are nontoxic [4 Marks]
   (c) List 2 uses of CFCs [2 Marks]

iii. List the steps in municipal water treatment [5 Marks]

Question 5 [20 Marks]

i. Describe the process shown by the reaction below? [4 Mark]

$$2CH_2O_{(g)} \rightarrow CO_{2(g)} + CH_{4(g)}$$

ii. A student performed an analysis of a factory's effluent and determined the COD of the sample to be 25 mg of O_2 per litre.
   (a) The student titrated the sample with 0.0010 mol L^{-1} $Na_2Cr_2O_7$ solution. Calculate the volume of the titrant required to complete the reaction [12 Marks]
   (b) Describe a method that can be used to lower the COD of the factory's effluent and the possible byproducts of such a treatment [4 Marks]