KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BSC (CHEMISTRY)

COURSE CODE: SCH 316

COURSE TITLE: ENVIRONMENTAL CHEMISTRY

DATE: 21/07/2021 **TIME:** 9:00-11:00PM

INSTRUCTIONS TO CANDIDATES:

TIME: 2 Hours

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

Question 1 [30 Marks]

i. Differentiate between LD_{50} and LOD_{50} [4 Marks]

ii. Differentiate between the atmosphere and troposphere [2 Marks]

iii. Discuss the health and environmental effects likely to result from Ozone depletion [4 Marks]

iv. Describe the following terms [6 Marks]
   (a) Green chemistry
   (b) Anthropogenic chemicals
   (c) Ionosphere

v. Complete the following equations and state the processes involved that show the fate of atmospheric carbon dioxide.

$CO_2 + H_2O + Sunlight\ energy \rightarrow$ [2 Marks]

$CH_4 + 2O_2 \rightarrow$ [2 Marks]

$CO_2 + H_2O + CaCO_3 \rightarrow$ [2 Marks]

vi. Describe the process of soil formation [5 Marks]

vii. Explain the difference between environmental science, environmental chemistry and environmental biochemistry [3 Marks]

Question 2 [20 Marks]

i. With the aid of equations briefly explain the formation and dissociation of ozone in the stratosphere [8 Marks]

ii. Briefly explain why temperature decreases with altitude in the troposphere but increases with altitude in the stratosphere. [4 marks]

iii. A pilot is flying a commercial aircraft at altitudes between 9.5 km and 11.5 km, if the air temperature drops uniformly at a rate of 6.5 ° C per 1000 m, determine the
   a. temperature at the highest altitude of the aircraft [3 Marks]
   b. temperature difference between the lowest altitude and the top of the troposphere [5 Marks]

Question 3 [20 Marks]

i. Explain how overpopulation results in environmental degradation [8 Marks]

ii. Explain the difference between a contaminant and a pollutant [4 Marks]

iii. With examples, explain the difference between point and nonpoint sources of pollution. [4 Marks]

iv. Explain the major pollutants responsible for acid rain and their sources [4 Marks]

Question 4 [20 Marks]

i. With the aid of a diagram describe the water cycle [5 Marks]

ii. Explain how the absence of greenhouse gases may affect the water cycle [3 Marks]

iii. Differentiate between classical smog and photochemical smog [6 Marks]

iv. Describe the process of sewage treatment [8 marks]

Question 5 [20 Marks]

A laboratory technician is in the process of developing a laboratory manual for undergraduate chemistry students. Describe ways in which the practicals can be designed to minimize environmental pollution