MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCE

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR EDUCTION (SCIENCE)

SCH 407 : ENVIRONMENTALCHEMISTRY

DATE: 6/12/2021 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

- The paper consists of **two** sections.
- Section **A** is **compulsory** (30 marks).
- Answer any **two** questions from section **B** (each 20 marks).

SECTION A COMPULSORY
QUESTION ONE (30 MARKS)

a) The major primary atmospheric pollutants produced by human activity are SO_x, NO_x, CO, volatile organic compounds (VOCs) and particulates.

i. Describe in details with the help of chemical equations where applicable, how each of the above pollutant is generated. (10 marks)

ii. Describe what effect each of the above group of pollutants causes to the environment as a whole. (6 marks)

b) Acid rain is part of the consequences of some of the pollutants listed in (a) above.

i. Describe how acid rain is formed. (4 marks)

ii. What effects do acid rains cause to aquatic environment, soil and physical structures erected on the Earth´s surface? (6 marks)

c) Describe the steps being undertaken currently or have already been taken to control emissions from both industrial activities and automobiles to mitigate against environmental pollution. (4 marks)

QUESTION TWO (20 MARKS)

a) Ozone (O_3) is an important ingredient of the stratosphere that acts as a protective layer against harmful

high energy UV radiation.

i. Describe with the help of chemical equations how ozone is made and maintained at a steady state in the Stratosphere (4 marks)

ii. Briefly explain how ozone is depleted by pollutants in the stratosphere. (4 marks)

b) Smog is loosely defined as any kind of air pollution that reduces visibility in urban areas.

i. Briefly explain the two types of smog, industrial smog and photochemical smog. (4 marks)

ii. Explain what is ground level ozone, which is different from the stratospheric ozone described in (a)i. (4 marks)

c) With the help of examples explain what green-house gases are and their environmental effect. (4 marks)

QUESTION THREE (20 MARKS)

a) Pollution of water results from many sources which discharge pollutants into the aquatic environment.

i. Explain what effects the discharge of organic wastes into water can have on the water quality. (3 marks)

ii. What effects does effluent rich in organic waste have on water quality? (3 marks)

iii. Explain the term biological oxygen demand (BOD) and its effects on water quality. (2 marks)

iii. Describe how eutrophication of an aquatic system occurs and its negative environmental effects. (3 marks)

b) Dissolved oxygen in water is from the atmospheric air and photosynthesis by aquatic plants.

i. Explain what influences the optimum amount of dissolved oxygen in water which is about 10ppm. (2 marks)

ii. What effect can discharge of effluents with high temperature have on water quality? (2 marks)

c) Explain briefly how do we ensure our water resources are not polluted? (5 marks)

QUESTION FOUR (20 MARKS)

a) Pesticides are broadly classified as organochlorines and organophosphates based on their persistence in the environment.

i. Which of the two groups is more persistent than the other in the environment? (2 marks)

ii. Define the terms biomagnification and bioaccumulation of pesticides as applied to the effect of the pesticide residues on food chains. (3 marks)

iii. Explain factors which influence the persistence of the pesticides in the environment? (4 marks)

b) Dissipation behavior of pesticides is defined as the eventual disappearance of the pesticide from the

initial point of application on soil.

i. State the two major processes by which pesticides are known to dissipate. (3 marks)

ii. Describe what each of these two processes named in b(i) involves in details. (4 marks)

c) Describe in details factors which influence the differences in behavior of pesticides in the temperate and tropical conditions. (4 marks)

QUESTION FIVE (20 MARKS)

a) Describe the various disposal methods of industrial, agricultural and domestic wastes. (12 marks)

b) What environmentl regulations guide Kenyan industries on environmentl pollution? (8 marks)