UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

BSC IN ENVIRONMENTAL HEALTH SCIENCE

SECOND SEMESTER SUPPLEMENTARY EXAMINATION PAPER
JULY 2015

TITLE OF PAPER	:	ENVIRONMENTAL CHEMISTRY
COURSE CODE:	:	EHM104
DURATION	:	TWO HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER ONLY FOUR QUESTIONS
	:	EACH QUESTION CARRIES 25 MARKS
	:	QUESTIONS ONE, TWO AND THREE ARE COMPULSORY
	:	NO QUESTION PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

QUESTION ONE

1. Water supports all forms of life. It would be a grave mistake to temper with its chemistry. Support this argument. [8]
2. Discuss the role of Oxidation-Reduction reactions in the chemistry of dissolved chemical species in water. [8]
3. Briefly explain how climatic and topographic factors may affect the intensity and dispersion of air pollution in a city. [9]

Total 25 marks

QUESTION TWO

1. Why is it that at very high altitudes, normally reactive species such as atomic oxygen, O, persist for long periods of time? (i)----------[1]. The fact that hydrogen has not been lost to outer space from Earth's atmosphere is due to the existence of (ii)----------[1]. The existence of the ionosphere is due to the action of (iii)---------- [1] under conditions of (iv)---------- [1]. Air masses move from regions of (v)---------- [1] to regions of (vi)---------- [1] An atmospheric condition that is particularly important for air pollution and sometimes affected by topography is that of (vii)---------- [1].

2. The most important unique properties of water that largely determine its environmental chemical behavior are (i) ----------[1], (ii) ----------[1], (iii) ----------[1], (iv) ----------[1], (v) ----------[1] (vi) ----------[1], (vii) ----------[1], (viii) ----------[1]. The ability of solutes in water to neutralize added strong acids is called (ix) ----------[1] and water hardness is due mostly to the presence of (x)----------[1] while for water near neutral pH, the major contributor to alkalinity is (xi) ----------[1].

3. In as far as plant life and growth is concerned, the most important layer of soil is the (i)----------[1] which consists of (ii)----------[1] (iii)----------[1] and (iv)----------[1]. The most common indicator of soil formation from parent rocks consists of (v)----------[1]. The reaction $MnO_2 + 4H^+ + 2e^- \rightarrow Mn^{2+} + 2H_2O$, indicates that the soil is (vi)---------- [1]. Which one function does organic matter perform in the soil? (vii) ----------. [1]

Total 25 marks

QUESTION THREE

1. Describe how biological, chemical and physical weathering processes contribute to the formation of soil. [12]
2. With the help of a chemical equation, show how pyrite oxidation contributes to soil acidity. [6]
   Briefly explain how nitrification and denitrification processes are brought about in soil chemistry. Include chemical equations where necessary. [7]

Total 25 marks

QUESTION FOUR

Polyvinyl chloride is one of the anthropogenic organic chemical substances that are of environmental concern. You are the Environmental Manager at the newly established Mankayane Town Board and your Board wants to purchase various materials made of PVC for several development applications within the new town. As an environmentalist, you reject the proposal by your employer for the purchase of these materials. You decide to prepare a presentation to convince the Town Board to drop their proposal under the following themes:

1. What is Polyvinyl Chloride (PVC)? [5]
2. The properties that makes PVC appropriate for several applications [9]
3. Environmental impact and occupational health and safety aspects of PVC which forms the basis of your rejection to this option for the development [11]

Give the details that you will include under the themes listed above.

Total 25 marks

QUESTION FIVE

1. Briefly describe the importance of the first two layers (from the earth surface) of the atmosphere in supporting life on earth. [13]
2. Water has a higher surface tension than any other liquid. Explain how this surface tension comes about and how it influences water chemistry. [12]

Total 25 marks