

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES
FINAL EXAMINATION PAPER
FIRST SEMESTER [2011/2012]

TITLE OF PAPER : ENVIRONMENTAL PHYSICS ONE
COURSE CODE : EHS 411
TIME : 3 HOURS
MARKS : 100

INSTRUCTIONS

1. DO NOT OPEN THIS EXMANINATION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR.
2. CHOOSE AND ANSWER FOUR QUESTIONS ONLY, OUT OF THE FIVE QUESTIONS PRESENTED IN THIS PAPER.
3. NO FORM OF PAPER SHOULD BE BROUGHT INTO NOR TAKEN OUT OF THE EXAMINATION ROOM.
4. BEGIN YOUR ANSWERS TO EACH QUESTION ON A SEPARATE SHEET OF PAPER.
5. NUMBER ALL YOUR ANSWER SHEETS IN ACCORDANCE WITH THE FLOW OF YOUR ANSWERS.
6. WRITE CLEARLY; MARKS WILL NOT BE AWARDED WHERE HANDWRITING IS NOT POSSIBLE TO READ.
7. USE PROPER ENGLISH LANGUAGE GRAMMAR; POOR ENGLISH GRAMMAR SHALL RESULT IN LOSS OF MARKS.

QUESTION ONE

The questions presented below are related to the nature and properties of matter and soil properties.

- a) According to the properties of matter, gases can be compressed whereas solids cannot. Explain why? [4 Marks]
- b) Using one example for each, describe physical and chemical changes. [6 Marks]
- c) Many sugar cane farms in Big Bend have been well watered and fertilizers have been used for all the time since sugar cane farming began. There have been no droughts, no soil erosion, no flooding and no desertification. Surprisingly, the productivity of these farms was recently found to be declining rapidly. What could be the cause of this decline in productivity? [8 Marks]
- d) Physical and chemical properties are essential in distinguishing one portion of matter from another. For each, state two examples. [4 Marks]
- e) State the three types of water erosion. [3 Marks]

Total number of marks under question one

[25]

QUESTION TWO

The questions presented below are related to soil processes, mining operations and the law of conservation of matter.

- a) An area that has been affected by mining operations will often stay barren for tens to hundreds of years without any vegetation, despite receiving sufficient rainfall annually, why? [4Marks]
- b) A farmer obtained one-year old fruit trees and planted them in his two plots. When digging holes to plant his fruit trees, he did not care to maintain the same depth. As a result, some holes were 30cm while others were quite deep, over 1m. A significant number of trees in the 1m holes did not survive, why? [5 Marks]
- c) In Namibia, to form 2.5cm of top soil from hard rock takes 200 years, whereas in Norway it takes up to 1200 years to form the same amount of soil. Both Namibia and Norway are relatively flat. What is the main cause of this difference in the rate of soil formation? [4 Marks]
- d) What is desertification? [2 Marks]
- e) State two consequences of desertification. [2 Marks]

- f) Local authorities in many cities often dump thousands of tons of waste in state of the art landfills on a daily basis. Many people consider this as the best way of throwing away waste. However, as far as the Law of Conservation of Matter is concerned there is no such thing as “throwing away”, why? [8 Marks]

Total number of marks under question two

[25]

QUESTION THREE

The questions presented below are related to mineral resources, the impact of mining operations and soil conservation.

- a) A number of houses in a village located 4km away from an abandoned underground mine rely on gas for their heating and cooking purposes. Recently, a number of such houses reported gas smells coming from their basements, and many are afraid of gas explosions. Where may these gas leaks be coming from? [5 Marks]
- b) Mining operations at Bulembu have resulted in the accumulation of millions of tons of waste material (soil and rocks). The decline in fish populations in a river flowing 4km below the mine waste was associated with the mine waste. Describe how this waste is associated with the decline in fish populations. [10 Marks]
- c) Farming is one of the activities that leads to increased soil erosion. Farmers, however, can employ certain techniques which can greatly reduce erosion. Discuss three such techniques. [6 Marks]
- d) Discuss two factors that are related to significant reductions in mineral resource supplies. [4 marks]

Total number of marks under question three

[25]

QUESTION FOUR

The questions presented below are related to soil formation, soil conservation, mineral reserves and recycling and conservation.

- a) Using three examples, describe the role of living organisms in soil formation processes. [6 Marks]

- b) The price of one ton of coal presently costs E500.00, and projections are that coal reserves will be depleted in the next seven years. The Swaziland Environmental Economics Association argues that present reserves could last another 50 years if only the price of one ton was E1000.00. Do you agree? Why? [5 Marks]
- c) Describe how recycling and conservation can greatly slow the depletion of mineral resources. [8 Marks]
- d) Despite rising costs of operations, global reserves of key minerals have increased dramatically since the 70s. How is this possible? [2Marks]
- e) Due to lack of suitable farming land at Elangeni, the Ministry of Agriculture and Cooperatives is now allowing farmers to plough in the slopes of Mdzmba Mountain, following the recently concluded EIA, which recommended a range of techniques that will be used. Discuss one technique suitable for this terrain. [4 Marks]

Total number of marks under question four

[25]

QUESTION FIVE

The questions presented below are related to energy forms and the impacts of mining operations.

- a) Using two examples for each, distinguish between kinetic and potential energy [6 Marks].
- b) What are the human health and safety impacts of mining? [5 Marks].
- c) Recently, there have been many complaints from the public about the proposed reopening of the Ngwenya Iron Ore mine. The Government, on the other hand, is not worried because it is going to use recently enacted legislation to ensure that the mine is rehabilitated after closure.
1. What legislation is this? [1 Mark]
 2. Discuss the key provisions that will be used by the Government to ensure that the mine is rehabilitated. [9 Marks].
- d) A number of old mines are still a major cause for concern because they have not been reclaimed, and they continue to be a source of soil and water pollution. Could this be related to earlier poor legislation? [4 Marks]

Total number of marks under question five

[25]