



UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE

FINAL EXAMINATION PAPER: MAY 2016

TITLE OF PAPER	ENVIRONMENTAL ASSESSMENT
COURSE CODE	EHS 106
DURATION	2 HOURS
TOTAL NUMBER OF MARKS	75
INSTRUCTIONS	<ol style="list-style-type: none">1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR.2. QUESTION ONE IS COMPULSORY. CHOOSE TWO OTHER QUESTIONS IN ADDITION TO QUESTION ONE.3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE OF THE ANSWER BOOKLET. ENSURE THAT ALL PAGES OF THE ANSWER BOOKLET ARE NUMBERED CORRECTLY.4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS.5. NECESSARY PENALTIES SHALL BE APPLIED AGAINST ANY FORM OF MISCONDUCT DURING THE COURSE OF THE EXAMINATION.

QUESTION ONE [25 MARKS]

1. The Mall Spar Group of companies recently started constructing a new shopping mall in an area that was a flood plain for over six hundred years. When construction began, the area was quite rocky. Most likely, the rocks encountered here are;
 - (a) Igneous rocks
 - (b) Metamorphic rocks
 - (c) Sedimentary rocks
 - (d) Granite rocks
2. The continental crust underlies the;
 - (a) Continental crust
 - (b) Subduction zone
 - (c) Continents
 - (d) Mantle
3. Tectonic plates are about 100km thick and are composed of;
 - (a) The crust and the asthenosphere
 - (b) The asthenosphere and the lithosphere
 - (c) The crust and the outermost part of the mantle
 - (d) The crust and the inner mantle
4. The theory explaining the movement of the plates and the process that occur at their boundaries is called;
 - (a) Plate tectonics
 - (b) Plate motion
 - (c) Plate boundaries
 - (d) Plate movement
5. The type of plate movement that is likely to result in minimal destruction or no destruction at all is;
 - (a) Divergent plate boundary
 - (b) Transform fault boundary
 - (c) Convergent boundary
 - (d) Subduction boundary
6. The bulk of the earth's crust consists of;
 - (a) Metamorphic rocks
 - (b) Igneous rocks
 - (c) Sedimentary rocks
 - (d) A combination of igneous and sedimentary rocks
7. A zone of hot, partly melted rock that flows and can be deformed like a soft plastic is known as;
 - (a) Convection plane
 - (b) Asthenosphere
 - (c) Lithosphere
 - (d) Continental sphere

8. With regard to acid mine drainage, the chief pollutant and the cause of damage in receiving streams is;
- (a) H_2S
 - (b) H_2SO_4
 - (c) CO_2
 - (d) CH_4
9. Natural gas is a mixture of highly toxic hydrogen sulfide (H_2S), butane (C_4H_{10}), methane (CH_4), ethane (C_2H_6) and propane (C_3H_8). The largest constituent of natural gas is;
- (a) Ethane
 - (b) Methane
 - (c) Propane
 - (d) Butane
10. The type of UV radiation that is of concern to the earth is;
- (a) UV-A
 - (b) UV-B
 - (c) UV-C
 - (d) UV-D
11. In oil extraction, the use of steam to force some of the heavy oil into the well cavity for pumping to the surface is done in;
- (a) Tertiary oil recovery
 - (b) Secondary oil recovery
 - (c) Underground oil suction
 - (d) Combined oil dredging
12. The impacts of acid deposition in soils are likely to be more severe in soils that are particularly deficient of;
- (a) $CFCl_3$
 - (b) H_2SO_4
 - (c) SO_3
 - (d) $CaCO_3$
13. With regard to acid deposition, one of the main primary pollutants that results in the formulation of acid particles is;
- (a) H_2S
 - (b) N_2O
 - (c) NO_2
 - (d) NH_4
14. One of the observed impacts of global climate change on various species of animals includes;
- (a) Molting of their hair as a result of increased temperatures
 - (b) Extension of their normal ranges
 - (c) Still births
 - (d) Low birth weights

15. Worldwide, the major source of CO₂ emissions is;
- (a) Decomposition of waste in landfills
 - (b) Volcanic eruptions
 - (c) Decomposition of plant matter under water in newly constructed hydroelectric dams
 - (d) Coal-fired power plants
16. A major disadvantage of both passive and active solar heating systems is that they;
- (a) Need access to the sun 70% of the time during the day
 - (b) Need access to the sun 50% of the time during the day
 - (c) Need access to the sun 60% of the time during the day
 - (d) Need access to the sun 40% of the time during the day
17. The fermentation of sugar and grain crops (such as sugarcane, sugar beets, sorghum, sunflowers and corn) would result in;
- (a) Methanol
 - (b) Gasohol
 - (c) Biogas
 - (d) Ethanol
18. Salmon usually move to upstream areas to reproduce. Hydroelectric dams, which are built across rivers, are particularly a problem because;
- (a) The advancing fish often come against cold water, and so they are forced to return to sea.
 - (b) Dams eliminate current
 - (c) Dams are so deep and so most pregnant fish often struggle to swim past such deep water
 - (d) Fish cannot see anything, since in deep water light cannot reach to lower levels, so fish lose their way.
19. One of the most important factors that affect the longevity of hydroelectric dams is;
- (a) Global climate change
 - (b) Sediment
 - (c) Ever increasing demands for power
 - (d) Seismic activity
20. In hydroelectric dams, the construction of fish ladders is important in;
- (a) Enabling reservoir employees to climb into the reservoir and carry out inspections on biodiversity.
 - (b) Enabling fish to have sites where they could lay their eggs because they cannot do so in the middle of the reservoir.
 - (c) Fish movement to spawning sites
 - (d) The cleaning of reservoirs
21. The increased rate of erosion below hydroelectric dams is related to ;
- (a) Reduced sediment
 - (b) Increased flow rate
 - (c) Increased sediment
 - (d) Reduced flow rate

22. One of the greatest challenges facing solar energy is;
- (a) Conversion from AC current to DC
 - (b) The disposal of used batteries which contain plutonium
 - (c) Intermittency
 - (d) Unaffordable costs
23. Biogas is a mixture of;
- (a) 60% CH₄ and 40% CO₂
 - (b) Liquid ethanol and liquid methanol
 - (c) Wood alcohol and liquid ethanol
 - (d) 50% CH₄ and 50% CO₂
24. The earth's core is a molten mass of material which is as hot as 400⁰C. Practically speaking, geothermal energy is a very good source of renewable energy. The only main concern is that;
- (a) It induces volcanic eruptions
 - (b) It requires controlled production
 - (c) It is not suitable for small households, because as the heat comes from the ground it is around 400⁰C, and so, only suitable for large industries.
 - (d) It leads to pollution of nearby groundwater sources
25. Rock that contains a large enough concentration of a particular mineral – often a metal – to make it profitable for mining and processing is known as;
- (a) An ore
 - (b) A reserve
 - (c) Low-grade ore
 - (d) A reserve ore

QUESTION TWO [25 MARKS]

1. Briefly explain why water is the factor that may limit the production of electricity from solar thermal power plants [4].
2. Briefly describe the main difference between large-scale hydropower projects and small-scale hydropower projects [2].
3. Although the generation of electricity in hydropower plants is not associated with high CO₂ emissions, hydropower infrastructure can lead to production of more greenhouse gases than coal-fired power plants. Explain how this might happen [3].
4. Describe any three impacts of reservoirs on fish [6].
5. One of the disadvantages of wind turbines is the killing of birds. However, proponents of wind turbines argue that there are ways of reducing their impacts on birds. Describe any two such measures [6].
6. Wood is a renewable resource, but it can also be a non-renewable resource. Explain how this is possible [2].
7. What do you understand by the following statement: "there is no net CO₂ increase in burning biomass"? [2]

QUESTION THREE [25 MARKS]

1. Briefly summarize the main findings of Sherwood Rowland and Mario Molina's ground-breaking research that led to a call for an immediate ban of CFCs in spray cans [5].
2. One of the serious threats from ozone depletion is that the resulting increase in UV radiation could impair or destroy phytoplankton. Describe some of the environmental problems linked to destruction of phytoplankton [4].
3. In the absence of the protective ozone layer, state any three diseases that could be experienced by humans on earth [3].
4. Prior to their prohibition, CFCs were used in many industrial processes. State any three such uses [3].
5. Beginning in the 80s, scientists discovered that about 40 – 50% of the ozone layer over Antarctica was being destroyed during the Antarctic spring and early summer (September – December), when sunlight returns after the dark Antarctic winter. Using your knowledge of the processes that make Antarctica vulnerable to ozone destruction, describe;
 - 5.1 The role of ice crystals in the processes that lead to ozone destruction [3].
 - 5.2 The role of the returning of sunlight and summer in the processes that lead to ozone destruction [3].
6. Discuss any two benefits of natural ozone to life on earth [4].

QUESTION FOUR [25 MARKS]

1. Depletion curves for a non-renewable resource are shown **Figure 1** shows. Study the diagram carefully and answer the questions that follow.
 - (a) State any two factors that are linked with future supply of non-renewable minerals [2].
 - (b) What is depletion time? [2]
 - (c) When does a mineral become economically depleted? [2]
 - (d) The depletion of non-renewable resources is based on a different set of assumptions. State any two assumptions that may lead to depletion of mineral reserves at each of the three depletion times shown in **Figure 1**. Any assumption may only be stated once [6].
2. Describe some of the primary effects of earthquakes and their consequences [3].
3. Describe any two strategies that can be used to reduce the loss of life and property damage from earthquakes [4].
4. Based on the way they form, rocks are placed in three broad classes, namely metamorphic, sedimentary and igneous rocks. For each of these, briefly discuss the main processes involved in their formation [6].

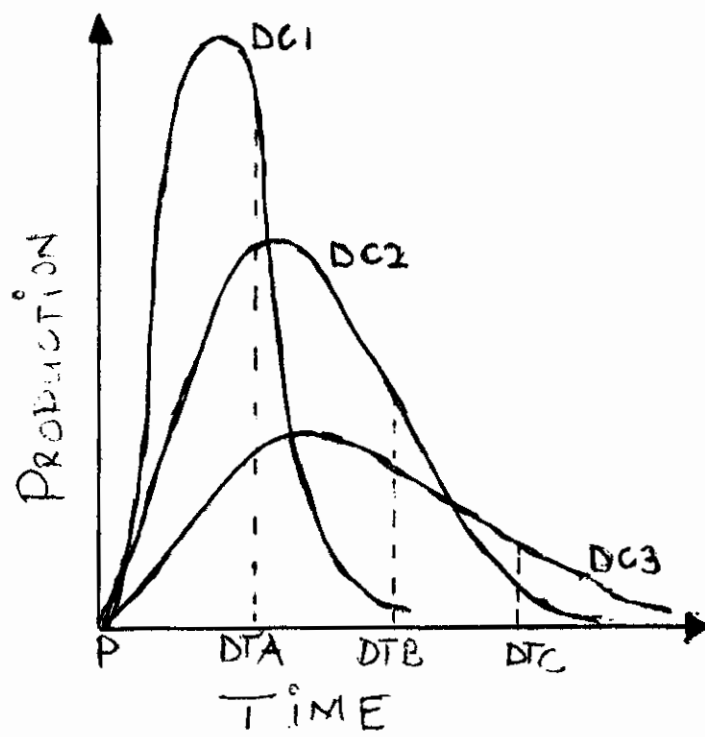


Figure 1: Natural capital depletion. Note: P – present; DTA to DTC are depletion times A to C; DC1 to DC3 are depletion curves 1 to 3. Dashed vertical lines represent the times at which 80% depletion occurs.