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

FINAL EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL PHYSICS
COURSE CODE	EHS106
DURATION	2 HOURS
DATE	MAY 2018
TOTAL NUMBER OF MARKS	100
INSTRUCTIONS	1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO. 2. ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS. 3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE. ENSURE THAT ALL ANSWER SHEETS ARE NUMBERED CORRECTLY. 4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS. 5. ANY FORM OF MISCONDUCT DURING THE EXAMINAION IS PUNISHABLE IN LINE WITH RELEVANT ACADEMIC REGULATIONS.

QUESTION ONE [25 MARKS]

1. The severity of an earthquake is often measured by;
   (a) The extent of damage on buildings, road, bridges and other structures such as railway lines
   (b) The magnitude of its seismic waves
   (c) The concentrated power of its focal point
   (d) The number of people that are often killed by being buried under the piles of rubble that results from collapsed buildings
2. A mining technique (in a fairly flat terrain) where a gigantic earthmover strips away the overburden, and a power shovel (which can be as tall as a 20-story building) removes the mineral deposit is;
   (a) Surface strip mining
   (b) Area strip mining
   (c) Subsurface mining
   (d) Contour strip mining
3. Flowing water, electricity, wind, etc., are all examples of;
   (a) Electricity
   (b) Kinetic energy
   (c) Potential energy
   (d) Heat
4. A mining technique where explosives, earth movers, large power shovels, and other machines with huge buckets (called draglines) are used to remove the top of a mountain and expose seams of coal, which are then removed is;
   (a) Mountainside removal
   (b) Mountaintop removal
   (c) Dragline removal
   (d) Sub-surface mining
5. A geologic process that results in material being dissolved, loosened, or worn away from one part of the earth's surface and deposited elsewhere is;
   (a) Weathering
   (b) Erosion
   (c) Deposition
   (d) Transportation
6. Without energy from the sun, the earth could be as cold as;
   (a) -240^0C
   (b) -270^0C
   (c) -260^0C
   (d) -250^0C
7. The physical, chemical, and biological processes that break down rocks into smaller particles that help to build soil are an example of;
   (a) External geologic processes
   (b) Internal geologic processes
   (c) Asthenospheric geologic processes
   (d) Lithospheric geologic processes
8. Energy quality is defined as;
   (a) The measure of an energy source's ability to do useful work
   (b) As the capacity do work and transfer heat
   (c) The total kinetic energy of all moving atoms, ions or molecules within a given substance, excluding the overall motion of the whole object
   (d) The total kinetic energy of all moving atoms, ions or molecules within a given substance, including the overall motion of the whole object

9. An earthquake classified as insignificant is one that is;
   (a) Less than 4.0 on the Richter scale
   (b) Less than 3.0 on the Richter scale
   (c) Less than 2.0 on the Richter scale
   (d) Less than 1.0 on the Richter scale
10. High quality energy;
   (a) Is organized
   (b) Has high total heat content but its average temperature is low
   (c) Is disorganized but can be used to achieve high quality work
   (d) Is concentrated with high speed molecules dispersed in the atmosphere.
11. In order to extract mineral deposits that lie in large horizontal beds close to the earth's surface, mining companies normally use the;
   (a) Surface mining
   (b) Open-pit mining
   (c) Surface strip mining
   (d) Strip mining
12. A magnitude 5.0 earthquake would result in;
   (a) 4 times more ground shaking than a magnitude 4.0 earthquake
   (b) 6 times more ground shaking than a magnitude 4.0 earthquake
   (c) 8 times more ground shaking than a magnitude 4.0 earthquake
   (d) 10 times more ground shaking than a magnitude 4.0 earthquake
13. The five nations that supply most of the world's non-renewable mineral resources are
   (a) USA, South Africa, China, Canada and Brazil
   (b) Brazil, USA, China, Japan and North Korea
   (c) North Korea, Iraq, USA, Canada and China
   (d) United States of America (USA), Canada, Russia, South Africa and Australia
14. Geologic processes that typically build up the earth's surface by pushing up the continental and oceanic crusts, forming mountains and volcanoes are;
   (a) External geologic processes
   (b) Asthenospheric geologic processes
   (c) Lithospheric geologic processes
   (d) Internal geologic processes
15. A series of large waves generated when part of the ocean floor suddenly rises or drops are known as a;
   (a) Oceanic crust subsidence
   (b) Oceanic subduction
   (c) Abyssal plane release
   (d) Tsunami
16. Earthquakes that cause tsunamis often occur offshore in subduction zones where;
   (a) An oceanic tectonic plate slips under a continental plate
   (b) A continental plate slips under an oceanic plate
   (c) A transform fault slips under a tectonic fault
   (d) Magma is subducted into the inner core
17. As a tsunami approaches a coast with its shallower waters, it slows down, its wave crests squeeze closer together, and their heights;
   (a) Remain the same
   (b) Grow rapidly
   (c) Are lowered
   (d) Can be the as high as a 25 story building

18. Since energy can neither be created nor destroyed, when one fills a car tank with diesel and drive off, the only thing that is lost is;
    (a) Battery power
    (b) Diesel energy
    (c) Energy quality
    (d) Kinetic energy
19. The energy of the earth's tremendous internal stress is released in the form of;
    (a) Underground thrusts
    (b) Tidal waves
    (c) Intertidal plane waves
    (d) Seismic (shock) waves
20. The correct statement is that;
    (a) The core consists of a solid inner core surrounded by a liquid core of molten material.
    (b) The core consists of a molten inner core surrounded by a solid core of molten material.
    (c) The core consists of a solid inner core surrounded by a solid core of molten material.
    (d) The core consists of a molten inner core surrounded by the lithosphere and the mesosphere.
21. The main elements that make up the inner and outer core are;
    (a) Iron and nickel
    (b) Iron and oxygen
    (c) Iron and magnesium
    (d) Iron and silicon
22. With regard to density;
    (a) The inner core has higher density than the outer core
    (b) The outer core has higher density than the inner core
    (c) The density of the outer inner core and that of the outer core is the same
    (d) None of the above
23. The source of the earth's magnetic field is;
    (a) The core
    (b) The mantle
    (c) The lithosphere
    (d) The asthenosphere
24. The focus of an earthquake is;
    (a) The point of initial movement of the stressed part of the earth, resulting in release of energy.
    (b) The study done to predict the impact that an earthquake is likely to cause on infrastructure.
    (c) The amount of energy released during the occurrence of an earthquake.
    (d) Points (b) and (c) are correct.
25. The epicenter is;
    (a) The point on the surface directly above the focus.
    (b) The point on the surface directly below the focus.
    (c) The point where two adjoining plates move laterally along the fault line.
    (d) Points (b) and (c) are correct.

QUESTION TWO [25 MARKS]

1. A study to establish the reproductive success in songbirds and black duck populations at Bulembu Bird Sanctuary (BBS), north of Swaziland, was conducted between 1965 and 2015, and the results are presented in **Figure 1**. The key causes of declining reproductive success in birds were linked with coal burning sugar mills and sugar cane farming activities in the south of the country, which is over 1000km away. Study the results of the survey and answer the questions that follow.

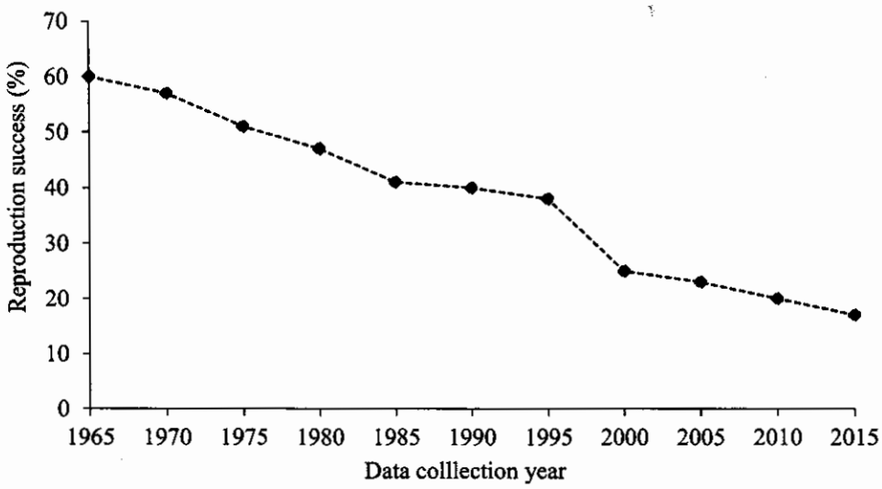

Figure 1: Reproductive success in songbirds and black duck populations at Bulembu Bird Sanctuary, North of Swaziland, between 1965 and 2015.

1.1 State (using not more than two sentences for each) two process of pollution that are responsible for the problems shown in **Figure 1.** **[4]**

1.2 State the three most important pollutants that could have contributed to the problems shown in **Figure 1.** **[3]**

1.3 Describe the connection between coal burning power plants and pollution processes that contribute to the problems observed in the BBS. **[10]**

1.4 Describe the specific ways by which pollutants derived from coal burning and farming activities contribute to the problems observed in the BBS. **[6]**

1.5 State any two major pollutants that result from the burning of coal in power plants and industries. **[2]**

QUESTION THREE [25 MARKS]

1. Use not more than two sentences in demonstrating your understanding of the following terms;
   (a) Fossil fuels **[2]**
   (b) Non-renewable energy **[2]**
   (c) Energy quality **[2]**
   (d) Asthenosphere **[2]**
   (e) Mineral **[2]**
   (f) Mineral resource **[2]**
   (g) Chemosynthesis **[2]**
2. State any three impacts of smaller, nonfatal doses of UV radiation on plants. **[3]**
3. Discuss any two ecological and economic costs of tree damage, as a result of acid deposition. **[4]**
4. State any four properties of CFCs, which lead to their widespread production **[4]**

QUESTION FOUR [25 MARKS]

Global climate change is one of the greatest environmental problems that is affecting the earth in various ways. Demonstrate your understanding of this problem by answering the following questions.

1. Differentiate between greenhouse effect and global warming. **[10]**
2. Human activities are said to have contributed to the emission of greenhouse gases. In order of their importance, what are the four main activities that have contributed to greenhouse gases? **[4]**
3. The world's oceans absorb CO_2 from the atmosphere as part of the carbon cycle and thus help to moderate the earth's average surface temperature and its climate. What are the effects of increasing atmospheric temperature on the oceans' ability to absorb CO_2? **[3]**
4. Describe any four effects of CO_2 in oceans? **[8]**

QUESTION FIVE [25 MARKS]

1. Severe droughts are some of the major problems that are associated with increasing global climate change. Describe four problems that could be experienced when droughts increase. **[8]**
2. Damage to the ozone layer is said to have started with the discovery of the first CFCs in 1930. State any five properties of CFCs, which made them famous. **[5]**
3. State any uses in which CFCs were important. **[5]**
4. State any two examples of dry acid deposition and two examples of wet acid deposition. **[4]**
5. Acid deposition can damage forests in two ways. Describe these two ways. **[3]**