

**UNIVERSITY OF SWAZILAND  
FACULTY OF HEALTH SCIENCES  
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE  
MAIN EXAMINATION [MAY 2014]**

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**COURSE TITLE** - **ENVIRONMENTAL PHYSICS**  
**COURSE CODE** - **EHM 103**  
**ACADEMIC YEAR** - **2013/2014**  
**TIME ALLOCATED** - **2 HOURS**

**INSTRUCTIONS**

- 1. DO NOT OPEN THIS EXAMINATION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO BY THE INVIGILATOR**
- 2. ANSWER THREE QUESTIONS. QUESTION ONE (COMPULSORY) AND CHOOSE ANY TWO QUESTIONS FROM THE OTHER SECTIONS**
- 3. EACH QUESTION IS 25 MARKS**
- 4. BEGIN YOUR ANSWERS TO EACH QUESTION ON A NEW PAGE OF THE ANSWER BOOKLET. ENSURE THAT YOU HAVE NUMBERED YOUR PAGES CORRECTLY.**
- 5. MARKS WILL BE DEDUCTED FOR UNTIDY WORK**

**QUESTION ONE (COMPULSORY) : 25 MARKS**

**SECTION A**

**Choose the correct answer;**

1. What form of energy is used by the human body to generate heat and mechanical force?
  - a. Potential energy
  - b. Chemical energy
  - c. Nuclear energy
  - d. Thermal energy
  
2. Photosynthesis involves the conversion of one form of energy to another. Which one below is the correct sequential energy convention for photosynthesis?
  - a. Potential energy → Nuclear energy
  - b. Solar radiation → Kinetic energy
  - c. Chemical energy → Potential energy
  - d. Electromagnetic energy → Chemical energy
  
3. What form of energy is stored in fuel cells or batteries
  - a. Thermal energy
  - b. Electrochemical energy
  - c. Solar energy
  - d. Chemical energy
  
4. Which energy form is associated with the compression air molecules which is then transformed into kinetic action
  - a. Solar radiation
  - b. Geothermal energy
  - c. Nuclei energy
  - d. Sound energy

5. Photovoltaic (PV) is a sustainable energy production system. What is the primary energy input into the system
  - a. Thermal energy
  - b. Electrochemical energy
  - c. Solar energy
  - d. Chemical energy
  
6. Cogeneration processes have been identified economic and sustainable in the production cycle. Which of the statements below best describes the process?
  - a. Production of steam and electricity from renewable resources
  - b. Efficient use of water resources
  - c. Significant reduction in Greenhouse gases
  - d. High thermal energy production
  
7. What results to the formation of coal?
  - a. Compression of the earth layers of millions of years
  - b. Accumulation of molten magma beneath the earth crust
  - c. Biomass decomposition and layered sediments deposits beyond human time scale
  - d. Igneous and sedimentary rocks which have been changed as result of high temperature or pressure
  
8. What geological process is believed to have resulted to the formation of the Himalaya mountains in India
  - a. Subduction of plates
  - b. Converging of plates
  - c. Transformation of plates
  - d. Diverging of plates
  
9. Earthquakes are one of the devastating natural phenomena. What causes earthquakes?

- a. Diverging and subduction of plates due to natural processes
- b. Rapid release of giant sea waves characterised by high velocity and wavelength
- c. Earth stress from rapid population growth on earth
- d. Abrupt movements of the earth crust that release stored energy

10. What is the characteristic of explosive volcanoes?

- a. Eruption of large clouds of gas and rock materials
- b. The release of energy from the epicentre as a body of waves
- c. Typical of flows of basaltic lava (magma)
- d. Eruption of magma through fissures (cracks)

11. Minerals are one of the important natural resources for economic growth. What is most challenging about them.

- a. They occur deep in the earth crust, hence difficult to mine
- b. They are finite in nature
- c. It is hazardous to extract minerals
- d. The mineral extraction and purification process uses toxic chemicals

12. The movement of plates (tectonic activity) is due to the gradual release of energy that has accumulated beneath the earth crust. What is the estimated rate of movement of the plates?

- a. The rate of the speed of light
- b. The rate of human growth
- c. The rate at which human finger nails grow
- d. Not yet known

13. What is weathering?

- a. The disintegration of rocks into finer particles
- b. The accumulation of carbon dioxide in the atmosphere
- c. The release of energy from the epicentre as a body of waves

- d. The movement of mass Earth material down slope as result of the pull of gravity
14. The Sun, nuclear reactors and the interior of the earth all have “**nuclear reactions**” as the source of energy. What kind of reactions are these?
- Fusion reactions
  - Fission reactions
  - Reactions that involve changes in the structure of the nuclei of atoms
  - Atomic reactions
15. At what spectrum of the electromagnetic radiation are the radio waves?
- Long wavelengths
  - Ultraviolet radiation
  - Short wavelength
  - Visible light
16. Short wave radiation is characterised of ionizing radiation. What is important to know about them?
- Make mobile network communication efficient
  - Affect living tissues when exposed to them
  - Do not contain enough energy to form ions
  - It is energy released from the sun
17. Which of the following groupings are the primary Greenhouse gases (GHGs) in the atmosphere?
- CH<sub>4</sub>, CO<sub>2</sub>, SO<sub>2</sub>, N<sub>2</sub>O
  - CFCs, O<sub>3</sub>, N<sub>2</sub>O, O<sub>2</sub>
  - CO<sub>2</sub>, N<sub>2</sub>, N<sub>2</sub>O, H<sub>2</sub>O
  - CO<sub>2</sub>, O<sub>3</sub>, H<sub>2</sub>O, N<sub>2</sub>O
18. What is the major contributor of Greenhouse gases in the world over?
- Fossil fuel combustion

- b. Land filling
- c. Agricultural activities
- d. Mining

19. Which of the following is associated with the formation of acid rain

- a.  $\text{SO}_2 + \text{NO}_x + \text{H}_2\text{O}$
- b. CFCs +  $\text{O}_3 + \text{H}_2\text{O}$
- c.  $\text{H}_2\text{O} + \text{NO}_x + \text{O}_3$
- d.  $\text{O}_2 + \text{O}_3 + \text{H}_2\text{O}$

20. Ozone is highly concentrated in the;

- a. Mesosphere
- b. Atmosphere
- c. Stratosphere
- d. Troposphere

21. What is the principal cause of ozone layer depletion?

- a. Global warming
- b. CFC emissions
- c. Ultraviolet radiation
- d. Sulphur dioxide emissions

22. What international instrument is aimed at addressing Climate Change?

- a. CCD
- b. CBD
- c. CITES
- d. UNFCCC

23. A car is parked in a hot sunny day. It then rains latter in the day and mist accumulates in the car. What is the scientific terminology that explains the occurrence?

- a. Climate Change
- b. Greenhouse Effect
- c. Global Warming
- d. Atmospheric Pollution

24. Which of the following is an example of an energy efficient technology?

- a. Photovoltaic
- b. Concentrated Solar Power
- c. Glass House
- d. Thermal power plant

25. The effects of Climate Change are observed nowadays. Which of the following is an example of the effects of climate change?

- a. Increase in production due to heavy rains
- b. Erratic precipitation
- c. Industrialization
- d. Incurable diseases

## **QUESTION 2 : 25 MARKS**

1. What is the distinction between renewable and non-renewable natural resources? [2]
2. Most of the primary non-renewable resources are known to cause significant environmental impacts or effects. Identify an example of the primary non-renewable energy resources and describe its associated environmental impacts [5]
3. Explain why fossil fuels are also referred to as hydrocarbons? [2]
4. Describe why nuclear energy production is a non-renewable energy resource [3]
5. Explain why hydropower energy generation is regarded a renewable energy source? [2]
6. List four advantages of photovoltaic energy generation systems [4]

7. Cogeneration has been identified as a solution to atmospheric pollution and a boost to industrial economic muscle. Describe how cogeneration systems are so valuable? [5]
8. Describe the ideal place or environment for the establishment of solar generation systems such as photovoltaic. [2]

### **QUESTION 3 : 25 MARKS**

1. The earth is made up of distinct spheres. What are they? [4]
2. What is characterised by the theory of plate tectonics? [3]
3. Earthquakes are one of the natural disasters occurring in the world. Describe the formation of a Tsunami and its associated effects. [4]
4. State the two types of volcanoes or volcanic landforms which are a result of the nature of the eruption [2]
5. What are the environmental effects associated with volcanic eruptions [3]
6. How are sedimentary rocks formed? [3]
7. What is weathering? [2]
8. The earth crust is made up of two types. What are they? [2]
9. When does subduction occur during the movement of plates? [2]

### **QUESTION 4 : 25 MARKS**

1. Distinguish between weather and climate [2]
2. The atmosphere is made up of layers varying in temperature and gaseous composition. Which of the layers is a home for Greenhouse gases (GHGs) and what are they (GHGs) [4]
3. Which of the atmospheric layers is characterised with the increase in temperature with increasing height and what is the common gas found in that layer [2]
4. What is the greenhouse effect? [3]



5. The increase accumulation of Greenhouse gases in the atmosphere is believed to have serious repercussions or effects to human health. Identify and describe two effects of global warming to human health. [4]
6. Industrialization is said to be a 'necessary evil' for economic growth. What are the significant environmental impacts associated with industrial operation [3]
7. How is methane generated from landfills [2]
8. What is the gaseous combination that results to the formation of acid precipitation [2]
9. Explain what is meant by adaptation and mitigation strategies on issues of climate change [3]