

**UNIVERSITY OF SWAZILAND**  
**FACULTY OF HEALTH SCIENCES**  
**DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE**  
**MAIN EXAMINATION [MAY 2015]**

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COURSE TITLE - ENVIRONMENTAL PHYSICS  
COURSE CODE - EHM 103  
ACADEMIC YEAR - 2014/2015  
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. BEGIN YOUR ANSWERS TO EACH QUESTION ON A NEW PAGE OF THE ANSWER BOOKLET. ENSURE THAT YOU HAVE NUMBERED YOUR PAGES CORRECTLY.

SPECIAL REQUIRMENTS: NONE

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## QUESTION ONE (COMPULSORY) : 25 MARKS

Choose the correct answer;

1. Which of the statements below best describes the law of thermodynamics?
  - a. Energy can be created through generation and lost through usage
  - b. Energy cannot be created or destroyed, but only converted from one form to another
  - c. Whenever energy is converted from one form to another we end up with lower or no energy at all
  - d. Energy can be recycled and recovered
2. Which form of energy is generated from moving electrons among the atoms of matter?
  - a. Thermal Energy
  - b. Kinetic Energy
  - c. Electromagnetic Energy
  - d. Electrical Energy
3. What form of energy is characterised by the release of glucose when reacted with oxygen
  - a. Potential energy
  - b. Chemical energy
  - c. Nuclear energy
  - d. Thermal energy
4. What form of energy is stored in fuel cells or batteries
  - a. Thermal energy
  - b. Electrochemical energy
  - c. Solar energy
  - d. Chemical energy

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5. Which spectrum of the electromagnetic radiation emits lower energy?
- Long wavelength
  - Ultraviolet radiation
  - Short wavelength
  - Visible light
6. Which is of the following makes up the shortest wavelength?
- Infrared radiation
  - Ultraviolet radiation
  - Gamma rays
  - X-rays
7. Short wave radiation is characterised by ionizing radiation. What is important to know about them?
- Make mobile network communication efficient
  - Do not contain enough energy to form ions
  - It is energy released from the sun
  - Affect living tissues when exposed to them
8. What is the primary energy input into the Photovoltaic system of energy production
- Electrochemical energy
  - Electrical energy
  - Electromagnetic energy
  - Thermal energy

9. Cogeneration processes have been identified economic and sustainable in the production cycle. Which of the statements below best describes the process?
- Production of steam and electricity from renewable resources
  - Efficient use of water resources
  - Significant reduction in Greenhouse gases
  - High thermal energy production
10. Which is the most reliable source of renewable energy
- Wind energy
  - Photovoltaic energy
  - Thermal power
  - Hydropower
11. What geological process is believed to have resulted to the formation of the Himalaya mountains in India
- Subduction of plates
  - Converging of plates
  - Transformation of plates
  - Diverging of plates
12. Which of the following best describes the nature of the lithosphere?
- volatile
  - molten and subtle
  - rigid and brittle
  - Hard solid

13. 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

14. Which of the following is a non-metal mineral resource?

- a. Manganese
- b. Lead
- c. Asbestos
- d. Platinum

15. What are the two fundamental characteristics of a mineral that distinguish it from all other types of minerals?

- a. Hard and shiny
- b. Chemical composition and density
- c. Period of creation and inorganic nature
- d. Chemical composition and crystal structure

16. Which of the following groupings are the primary Greenhouse Gases (GHGs)

- a. CFCs, O<sub>3</sub>, N<sub>2</sub>O, O<sub>2</sub>
- b. CO<sub>2</sub>, O<sub>3</sub>, N<sub>2</sub>O, H<sub>2</sub>O
- c. CH<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub>O, CFCs
- d. CO<sub>2</sub>, O<sub>3</sub>, CFCs, N<sub>2</sub>O

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17. Which of the following major air pollutant has an irritating odour

- a. SO<sub>2</sub>
- b. CO<sub>2</sub>
- c. NO<sub>x</sub>
- d. Particulate Matter

18. What is very important to know about petrochemicals?

- a. Very scarce resources
- b. Their pollution effects
- c. Their ability to be transported over long distances
- d. Their chemical composition

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

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

20. 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

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21. 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

22. What is the other name for Photovoltaic (PV)

- a. Solar cell
- b. Photo voltage
- c. Electric current
- d. Concentrated solar

23. What is cogeneration in energy production?

- a. Concentrated Solar Power systems
- b. Biomass Energy Production system
- c. Steam powered system
- d. Combined heat and power system

24. Which statement below best describes a passive solar heating system?

- a. A combined heat and power solar system
- b. A system that absorbs and stores heat from the sun directly with a well insulated structure
- c. A system that captures energy from the sun by pumping a heat absorbing fluid through special collectors
- d. A solar geyser

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25. Biodiesel has been recently found to a panacea for the effects of car exhaust fumes. Which of the following is a raw material for the production of biodiesel?

- a. Biomass
- b. Bagasse
- c. Vegetable oil
- d. Municipal waste

## **QUESTION 2 : 25 MARKS**

1. What is the greenhouse effect [3]
2. Identify and discuss two major human activities that significantly contribute to the increase in the concentration of Greenhouse Gases in the atmosphere [4]
3. Describe the natural processes contributing to climate disruption [5]
4. Describe briefly the Global Warming phenomenon? [5]
5. The atmosphere is divided into layers, each with distinct physical, chemical and temperature characteristics. Describe the composition of the atmosphere [8]

## **QUESTION 3 : 25 MARKS**

1. Discuss briefly the theory of plate tectonics [5]
2. Earthquakes are one of the natural disasters occurring in the world. Describe the formation of a Tsunami and explain its associated effects. [5]
3. Landslides and Mass Wasting are some of the natural disasters experienced worldwide caused by sudden failure of a steep slope. What are the common factors influencing slope failure [4]
4. Identify and discuss the two classes of Geological processes [6]
5. Describe the formation of sedimentary rocks? [3]
6. What is weathering? [2]



## QUESTION 4 : 25 MARKS

1. The earth is endowed with beautiful landforms and has a wide range of natural resources which are a key driver for economic growth. Some of these resources are available only in fixed amounts whilst others have the potential of perpetual usage. However, the exploitation of the natural resources in the pursuit of economic development has contributed immensely to the climate change effects experienced globally.
  - a. ***“Some of these resources are available only in fixed amounts whilst others have the potential of perpetual usage”***. Define the **classes** of resources referred to by the statement and give an example of each [6]
  - b. How does the exploitation of the natural resources in pursuit of economic development contribute to climate change [5]
2. Distinguish between adaptation and mitigation on issues of climate change [3]
3. Describe the use of Solar in energy production systems [3]
4. What are the advantages of Photovoltaic systems [4]
5. What are the disadvantages associated with large hydropower generation systems [4]