

# UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

SECOND SEMESTER FINAL EXAMINATION PAPER 2008

**TITLE OF PAPER** : ENVIRONMENTAL PHYSICS II

**COURSE CODE** : EHS 412

**DURATION** : TWO HOURS

**MARKS** : 100

**INSTRUCTIONS** :

- : ANSWER ONLY FOUR QUESTIONS
- : EACH QUESTION CARRIES 25 MARKS
- : QUESTIONS ONE AND TWO ARE COMPULSARY
- : NO QUESTION PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM
- : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER



**DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR**

## QUESTION ONE

1. protons, neutrons, and electrons are all
  - a. forms of energy
  - b. equal in mass
  - c. subatomic particles
  - d. negative ions
  
2. isotopes differ from each other by their number of
  - a. ions
  - b. protons
  - c. atoms
  - d. neutrons
  
3. all of the following are examples of ionizing radiation except
  - a. cosmic rays
  - b. gamma rays
  - c. microwaves
  - d. X rays
  
4. all of the following are given off by natural radioactivity except
  - a. alpha particles
  - b. delta particles
  - c. gamma rays
  - d. beta particles
  
5. multiple nuclear fissions
  - a. occur when two nuclei hit each other
  - b. require isotopes with small mass numbers
  - c. occur best with a small mass of isotopes
  - d. may result in chain reaction
  
6. Radon-222 is
  - a. A nauseating gas
  - b. A product of organic decay
  - c. Particularly concentrated in underground deposits of limestone and sand stone
  - d. Basically a problem in confined spaces, such as basements, and underground wells over radon-containing deposits
  
7. Radioactive ----- is a product of uranium decay and indoor air pollutant
  - a. Radon
  - b. Radium
  - c. Plutonium
  - d. Lead

8. You have been looking for your first house for months. You find one in just the right neighborhood at just the right price for you. In the course of negotiations, you have a radon test done and find that the level is 1 picocurie/liter. A reasonable course of action would be to
  - a. Get out of the housing market
  - b. Back out of the deal quickly and look for another house
  - c. Make a purchase offer, but recognize you will need to make some changes over the course of a few years
  - d. Make a purchase and move in happily ever after
  
9. Of the following motor vehicle fuels, the greatest polluter is
  - a. Gasoline
  - b. Hydrogen gas
  - c. Alcohol
  - d. Natural gas
  
10. The quickest, cheapest, and most effective way to reduce the buildup of carbon dioxide in the atmosphere is to
  - a. Switch from fossil fuels to nuclear fuels
  - b. Increase the efficiency of energy use
  - c. Plant trees to trap more carbon dioxide
  - d. Stop deforestation
  
11. Petroleum is a gooey liquid consisting primarily of
  - a. Hydrocarbon compounds
  - b. Nitrogen
  - c. Sulfur
  - d. Oxygen
  
12. Secondary oil recovery involves
  - a. Pumping out the oil that flows by gravity into the bottom of the well
  - b. Using steam to soften the heavy oil
  - c. Using carbon dioxide to force heavy oil into the well
  - d. Using water under pressure to remove oil
  
13. World oil supplies and prices are expected to be controlled over the long term by
  - a. Russia
  - b. USA
  - c. Arab World
  - d. OPEC
  
14. A strategic disadvantage of oil is that it
  - a. Produces more carbon dioxide than any other fuels
  - b. Produces destruction of nature through oil spills
  - c. Can contaminate groundwater supplies
  - d. Will be commercially depleted within 50 to 70 years

15. Liquefied petroleum gas consists of
- Methane
  - Butane and propane
  - Ammonia
  - Nitrogen oxides
16. Compared to oil-burning, coal-burning, and nuclear plants, production of electricity with combined-cycle natural gas systems
- Is more expensive
  - Contributes more to global warming
  - Is more energy efficient
  - Contributes more air pollution
17. The fissionable fraction of the fuel in a nuclear reactor is
- Uranium-235
  - Uranium-238
  - Uranium-239
  - Plutonium-239
18. Control rods in a nuclear reactor
- Contain uranium
  - Absorb neutrons
  - Contain plutonium
  - Reduce heat
19. The moderator in a reactor
- Releases neutrons
  - Absorbs neutrons
  - Reflects neutrons
  - Slows down neutrons
20. The most common moderator used in nuclear reactors is
- Graphite
  - Boron
  - Argon
  - Water
21. A melt down of the reactor core would occur if
- Control rods were inserted into the core
  - Too much coolant was lost
  - The proportion of uranium-238 was too high
  - The containment building developed an air leak

22. The useful operating life of today's nuclear power plants is suspected to be ----- years
- 20
  - 30
  - 40
  - 50
23. The coolant employed in a breeder reactor is liquid
- Sodium
  - Plutonium
  - Nitrogen
  - Lithium
24. Hydroelectric plants
- Need to be shut down frequently for maintenance checks
  - Offer low net useful energy yield
  - Have relatively high operating and maintenance costs
  - Help control flooding and supply of a regulated flow of irrigation water to areas below the dam
25. What are micropower systems?
- Miniaturized photovoltaic cells
  - Small power stations distributed throughout a region
  - A way of transmitting electricity via microwaves
  - Installing electrical generators in individual homes and buildings

**Total 25 Marks**

#### QUESTION TWO

- Explain what happens to the atomic numbers and mass numbers of an isotope when it emits (i) alpha, (ii) beta, and (iii) gamma radiations respectively (5 marks)
- Radioactivity poses a great hazard to human and environmental health. Discuss this statement (14 marks)
- Mention six ways which one can use to reduce the amount of radiation received (6 marks)

**Total 25 Marks**

#### QUESTION THREE

Energy efficiency is the best way to protect the environment from degradation and resources from depletion. Discuss this statement with specific reference to commercial buildings.

**Total 25 Marks**

#### QUESTION FOUR

Discuss geothermal energy resource under the following themes

- (a) Dry steam (2 marks)
- (b) Wet steam (2 marks)
- (c) How it can be tapped (9 marks)
- (d) Advantages (6 marks)
- (e) Disadvantages (6 marks)

**Total 25 Marks**

#### QUESTION FIVE

Discuss coal as an energy resource under the following themes

- (a) what is it and what does it contain (4 marks)
- (b) how is it extracted (4 marks)
- (c) how it is used and which country consumes most of it (3 marks)
- (d) advantages (5 marks)
- (e) disadvantages (5 marks)
- (f) its liquefaction and gasification (4 marks)

**Total 25 Marks**

**GOOD LUCK!!!!!!!!!!**