

# **UNIVERSITY OF SWAZILAND**

**Faculty of Health Sciences**

**(BSC) IN ENVIRONMENTAL HEALTH**

**FIRST SEMESTER FINAL EXAMINATION PAPER DECEMBER 2010**

**TITLE OF PAPER** : ENVIRONMENTAL PHYSICS 1

**COURSE CODE** : EHS 411

**DURATION** : TWO HOURS

**MARKS** : 100

**INSTRUCTIONS** :

- : ANSWER ONLY FOUR QUESTIONS
- : EACH QUESTION CARRIES 25 MARKS
- : QUESTIONS ONE AND TWO ARE COMPULSORY
- : 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 (COMPULSORY)

1. "You are a raft of order floating on the high seas of entropy." which scientific law is best described by this analogy?
  - a. law of conservation of matter
  - b. law of conservation of energy
  - c. law of conservation of matter and energy
  - d. second law of thermodynamics
  
2. The earth is essentially an open system for
  - a. matter
  - b. energy
  - c. matter and energy
  - d. neither matter nor energy
  
3. Which of the following sources of iron would be of the highest quality?
  - a. iron deposits on the ocean floor
  - b. a field of spinach
  - c. a large, scrap metal junkyard
  - d. a one-half-mile-deep deposit of iron ore
  
4. All of the following statements can be concluded from the law of conservation of matter *except*
  - a. we can't throw anything away because there is no away
  - b. we will eventually run out of matter if we keep consuming it at current rates
  - c. there will always be pollution of some sort
  - d. everything must go somewhere.
  
5. Liquid, solid, and gas are
  - a. physical forms of matter
  - b. chemical form of matter
  - c. mixtures
  - d. compounds
  
6. Nodules of ----- are found on the floor of deep ocean
  - a. chromium
  - b. boron
  - c. platinum
  - d. manganese
  
7. One example of subsurface mining is
  - a. dredging
  - b. contour strip mining
  - c. long wall mining
  - d. area strip mining

8. Of the following options to deal with non-degradable pollutants, the *least* effective is to
- remove them from contaminated air, water, or soil
  - reuse them
  - recycle them
  - refrain from introducing them into the environment
9. In an energy transformation, some of the energy usually end up as
- heat energy that flows into the environment
  - mechanical energy that performs useful work
  - chemical energy that performs useful work
  - electrical energy that performs useful work.
10. Which of the following represents the most common way ore deposits are formed?
- hydrothermal processes
  - magma cooling
  - chemosynthesis
  - sedimentary sorting
11. Which of the following statements does *not* apply to the second law of thermodynamics?
- energy conversion results in lower-quality energy
  - energy can neither be created nor destroyed
  - energy conversion results in more-dispersed energy
  - heat is usually given off from energy conversion
12. Which of the following mineral resources often occur in placer deposits?
- manganese
  - cobalt
  - gold
  - lead
13. Which of the following statements is *not* an observation derived from applying the second law of thermodynamics to living systems?
- life is a creation and maintenance of ordered structures.
  - high-quality energy sources are required to maintain life.
  - living things give off heat.
  - cooking foods turn them into high-quality energy sources.
14. Acid mine drainage
- occurs when anaerobic bacteria produce nitric acid from nitrogen oxides
  - enhances aquatic life
  - neutralizes the pH of surface and groundwater
  - may contaminate groundwater

15. The asthenosphere is
- the outer atmosphere
  - the inner core of the earth
  - a plastic region in the mantle
  - a plastic region in the crust
16. The matter and energy laws tell us that, we can recycle
- both matter and energy
  - neither matter nor energy
  - matter but not energy
  - energy but not matter
17. When ore undergoes processing, a waste called ----- is produced
- hazardous
  - spoil
  - gangue
  - tailings
18. High quality energy is needed to do all of the following *except*
- run electric lights
  - run electric motors
  - run electric appliances
  - heat the parliament during winter.
19. An ejecta is
- debris released from a volcano
  - substances injected into faults to relieve pressure
  - material released from rifts on the floor of the ocean
  - the depressed region inside the cone of an inactive volcano
20. The matter and energy laws tell us that we can recycle
- both matter and energy
  - neither matter nor energy
  - matter but not energy
  - energy but not matter
21. A low-through put economy would do all of the following except
- use energy more efficiently
  - shift to perpetual and renewable energy sources
  - recycle and reuse most matter that is now discarded
  - create goods with a short life cycle to increase recycling

22. The majority of earthquakes and volcanoes occur
- in the interior of continents
  - on oceanic islands
  - along the edge of continents
  - in the open ocean
23. The strength of an earthquake is measured on the ----- scale
- Richter
  - Miller
  - Mercalli
  - Geiger
24. An earthquake is most directly caused by
- the creation of a fault (fracture in rock) or shifting along an existing fault
  - a change in ocean currents
  - dumping of toxic wastes
  - comets crashing into earth
25. Which of the following is true
- the common element in the center of the earth's core is iron
  - the inner core is liquid, whereas the outer core is solid
  - extreme pressure makes the interior of the earth liquid
  - the core of the earth occupies most of its volume

**TOTAL 25 MARKS**

**QUESTION TWO (COMPULSORY)**

- Mountain climbers in the process of acclimatization to height may develop a condition known as----- (1 mark)
- In four statements, summarize the kinetic theory and give four evidences of this theory (6 marks)
- Name the fourth state of matter and explain how and where a state can be produced under natural conditions (7 marks)
- Scientists can now develop affordable artificial forms of the state in (a) above. Name eleven of its uses and (11 marks)

**TOTAL 25 MARKS**

### QUESTION THREE

- (a) What is the diameter of the earth (1 mark)?
- (b) Name the three consecutive zones of the earth and indicate the temperature of the central zone (4 marks)?
- (c) In detail describe the outer layer of the earth and indicate the important geologic processes involved in this layer (10 marks)
- (d) State hook's law. A force of 2000N extends a spring by 100cm. Find the elastic potential energy of the spring when it is extended by 300cm (5 marks).
- (e) State the law of conservation of matter and explain what this law means in terms of our resource consumption (5 marks)

**TOTAL 25 MARKS**

### QUESTION FOUR

- a. Assess the possibility of increasing mineral resource supplies through
  - i. finding new deposits (5 marks);
  - ii. improving technology of mining low-grade ore (5 marks); and
  - iii. getting minerals from ocean (5 marks).
  
- b. An American war airplane flying in the skies of Baghdad during the Iraq – American war flying at a velocity of 540m/s at its lowest point of the loop of a vertical circle of radius 4500m. What is its velocity at the highest point of this loop? Show all calculations (10 marks).

**TOTAL 25 MARKS**

### QUESTION FIVE

- A man has been diagnosed with hypothermia. Discuss his condition under the following themes:
- a. Diagnosis (5 marks);
  - b. Symptoms (5 marks);
  - c. Causes (5 marks);
  - d. Treatment (5 marks); and
  - e. Control (5 marks).

**TOTAL 25 MARKS**