

UNIVERSITY OF SWAZILAND

Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

FIRST SEMESTER FINAL EXAMINATION PAPER DECEMBER 2011

TITLE OF PAPER : ENVIRONMENTAL ECOLOGY1

COURSE CODE : EHS 555

DURATION : TWO HOURS

MARKS : 100

INSTRUCTIONS : ANSWER ONLY FOUR QUESTIONS

: EACH QUESTION CARRIES 25 MARKS

: QUESTIONS ONE IS 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

Select the most appropriate answer from the choices provided

1. Compared to the other natural sciences, environmental science focuses more on
 - a. reductionistic thinking
 - b. comparing experimental groups to control groups
 - c. connections and interactions
 - d. isolating one variety for study

2. Which of the following is a property of a system?
 - a. Functions in a regular and predictable manner
 - b. Highly random in its function
 - c. Cannot be accurately modeled
 - d. Consists solely of inputs and outputs

3. A positive feedback loop is illustrated by all of the following except
 - a. Compound interest in a savings account
 - b. Exponential population growth
 - c. A thermostat
 - d. The greenhouse effect

4. positive feedback loops
 - a. accelerate change and go on infinitely
 - b. accelerate change and are finite
 - c. slow down change and go on infinitely
 - d. slow down change and are finite

5. A negative feedback loop is illustrated by all of the following except
 - a. Decelerating loss of heat as a pan of hot water is removed from the stove
 - b. Exponential population growth
 - c. Sweating to cool your body down during and after vigorous exercise
 - d. A thermostat to maintain a certain temperature in your house

6. A negative feedback loop keeping an accumulation stable is
 - a. Homeostasis
 - b. A synergistic interaction
 - c. Leverage
 - d. Chaos

7. An example of a situation where a long time delay results in environmental degradation include
 - a. Clear-cutting a forest
 - b. Building new four-lane highways
 - c. Depletion of the ozone layer
 - d. Fish kills from oil spills

8. A community of living organisms interacting with one another and the physical and chemical factors of their nonliving environment is called
- A species
 - An ecosystem
 - A population
 - A lithosphere
9. Biodiversity emerges from all of the following except
- Mutation
 - Natural selection
 - Extinction
 - Succession
10. An ecosphere is the same as
- Atmosphere
 - Lithosphere
 - Biosphere
 - Hydrosphere
11. organisms that feed on both plants and animals are called
- detritus feeders
 - Omnivores
 - Carnivores
 - Herbivores
12. As an environmentalist in the field, you observe a lion chase, kill, and eat a gazelle. A vulture pecks away at the left over meat scrapes. Beetles attack the remaining fragments. Finally, bacteria complete the breakdown and recycling of organic material. If you were to apply a general classification to the feeders, what would be the correct sequence?
- Decomposer → scavenger → detritus feeder → carnivore
 - carnivore → detritus feeder → scavenger → decomposer
 - carnivore → scavenger → detritus feder → decomposer
 - carnivore → scavenger → decomposer → detritus feeder
13. Which of the following ecosystems has the lowest level of kilocalories per square meter per year?
- Open ocean
 - Tropical rain forest
 - Agricultural land
 - Lakes and streams

14. of the following processes of the water cycle, the one working against gravity is
- percolation
 - infiltration
 - runoff
 - transpiration
15. Humans are most likely to alter the Earth's thermostat through their impact on the compound
- Carbon dioxide
 - Nitrogen gas
 - Phosphate
 - Hydrogen sulfide
16. Inorganic nitrogen-containing ions are converted into organic molecules through
- Nitrification
 - Nitrogen fixation
 - Denitrification
 - Assimilation
17. When organisms die, their nitrogenous organic compounds are converted to simpler inorganic compounds such as ammonia through the process of
- Nitrification
 - Nitrogen fixation
 - Denitrification
 - Ammonification
18. Which one of the following best describe biologists' current hypothesis about the production of earth's atmospheric oxygen?
- Photosynthesis by terrestrial plants produced atmospheric oxygen
 - The breakdown of iron ore deposits produced atmospheric oxygen
 - Photosynthesis by cyanobacteria produced atmospheric oxygen
 - Chemosynthesis by terrestrial plants produced atmospheric oxygen
19. The gas that is least likely to have formed the earth's primitive atmosphere is
- Methane
 - Ammonia
 - Oxygen
 - Water vapor
20. Species belonging to different taxonomic groups may develop a resemblance resulting from adaptation to similar environments. This process is called
- Coevolution
 - Microevolution
 - Convergent evolution
 - Macroevolution

21. As you study a population of fruit flies, *Drosophila melanogaster*, you notice that pink eye color is the most common, although white eyes and red eyes are also present. Over the course of time and many generations, you notice that the proportion of individuals with pink eyes steadily increases. You conclude that this population is undergoing
- Continuous natural selection
 - Disruptive natural selection
 - Directional natural selection
 - Stabilizing natural selection
22. You study fossils of giraffes. Although there appears to be considerable variability in lengths of necks, there appears to be a definite shift to longer necks over the course of time. You conclude that this species is undergoing
- Continuous natural selection
 - Discontinuous natural selection
 - Disruptive natural selection
 - Directional natural selection
23. The term upwelling refers to the movement of
- Warm surface water
 - Cool nutrient-rich water from the bottom to the surface
 - Warm water replacing cool water
 - Cool water from the Arctic towards the equator
24. The fragility of the desert ecosystem is indicated by
- The rapid growth rate of plants
 - High species diversity
 - Presence of succulent plants
 - Long regeneration time from vegetation destruction
25. The deepest part of the ocean is the
- Abyssal zone
 - Euphotic zone
 - Estuary zone
 - Bathyal zone

TOTAL 25 MARKS

QUESTION TWO

Random genetic variation and natural selection lead to evolution, adaptation, niche specialization, and partitioning of resources in biological communities. Discuss this statement.

TOTAL 25 MARKS
QUESTION THREE

Describe four different kinds of wetlands and explain why they are important sites of biological diversity and biological productivity.

TOTAL 25 MARKS

QUESTION FOUR

- a. Every year, fires burn tracts of forest land and bush velds in Swaziland. Describe the process of succession that occurs after a forest fire destroys an existing biological community (8 marks)
- b. Is the composition of the final successional community likely to be the same as that which existed before the fire? (2 marks)
- c. What factors might alter the final outcome of the successional process? (5 marks)
- d. As an environmental manager, give reasons why periodic fire may be beneficial to a community of living organisms? (10 marks)

TOTAL 25 MARKS

QUESTION FIVE

- a. Explain the reality and gravity of the looming global environmental crisis (10 marks)
- b. As an environmental manager, explain why it is necessary to use the system approach as a study tool to unravel the complexity of the environment (5 marks)
- c. Temperature and rainfall determine the kind of biome in an area. Altitude, latitude and longitude are also very important factors in determining the biome of a place. Mbabane falls at an average altitude of 1243m above sea level and it is situated at latitude of 26°19'S and a longitude of 31°08' E. The following table gives you the monthly average temperatures in °C and rainfall in mm for Mbabane.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp.	26	25	22	20	16	13	13	16	20	23	25	25
Rainfall	250	209	171	78	34	18	22	29	64	127	177	210

- i. Based on the information given above, under what biome does Mbabane fall? (2 marks)
- ii. Why are tropical moist forests often less suited for agriculture and human occupation than tropical deciduous forests? (8 marks)

TOTAL 25 MARKS