UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

BSC IN ENVIRONMENTAL HEALTH

FIRST SEMESTER FINAL EXAMINATION PAPER DECEMBER 2013

TITLE OF PAPER	:	ENVIRONMENTAL ECOLOGY 1
COURSE CODE	:	EHS 555
DURATION	:	TWO HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER ONLY FOUR QUESTIONS
	:	QUESTION ONE IS COMPULSORY
	:	EACH QUESTION CARRIES 25 MARKS
	:	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. You are an evolutionary biologist studying a population of bats in the rainforest of Congo. Most of the population possesses moderate length wings, although some individuals have long wings and some individuals have short wings. Over the course of time, you notice that the frequency of moderate-length wings increases. You conclude that the most likely cause of this development is
    a. Stabilization natural selection
    b. Directional natural selection
    c. Diversifying natural selection
    d. Coevolution

2. The deepest part of the ocean is the
    a. Abyssal zone
    b. Euphotic zone
    c. Estuary zone
    d. Bathyal zone

3. 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

4. The term upwelling refers to the movement of
    a. Warm surface water
    b. Cool nutrient-rich water from the bottom to the surface
    c. Warm water replacing cool water
    d. Cool water from the Arctic towards the equator

5. 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

6. 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

7. 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

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

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

10. A community of living organisms interacting with one another and the physical and chemical factors of their non-living environment is called
    a. A species
    b. An ecosystem
    c. A population
    d. A lithosphere

11. Biodiversity emerges from all of the following, except
    a. Mutation
    b. Natural selection
    c. Extinction
    d. Succession

12. An ecosphere is the same as
    a. Atmosphere
    b. Lithosphere
    c. Biosphere
    d. Hydrosphere

13. Organisms that feed on both plants and animals are called
    a. Detritus feeders
    b. Omnivores
    c. Carnivores
    d. Herbivores

14. As an environmentalist in the field, you observe a lion chase, kill, and eat a gazelle. A vulture pecks away at the leftover 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?
    a. Decomposer → scavenger → detritus feeder → carnivore
    b. Carnivore → detritus feeder →scavenger → decomposer
    c. Carnivore → scavenger → detritus feder → decomposer
    d. Carnivore → scavenger → decomposer → detritus feeder

15. Which of the following ecosystems has the lowest level of kilocalories per square meter per year?
    a. Open ocean
    b. Tropical rain forest
    c. Agricultural land
    d. Lakes and streams

16. Of the following processes of the water cycle, the one working against gravity is
    a. percolation
    b. infiltration
    c. runoff
    d. transpiration

17. Humans are most likely to alter the Earth's thermostat through their impact on
    a. Carbon dioxide
    b. Nitrogen gas
    c. Phosphate
    d. Hydrogen sulfide

18. Inorganic nitrogen-containing ions are converted into organic molecules through
    a. Nitrification
    b. Nitrogen fixation
    c. Denitrification
    d. Assimilation

19. When organisms die, their nitrogenous organic compounds are converted to simpler inorganic compounds such as ammonia through the process of
    a. Nitrification
    b. Nitrogen fixation
    c. Denitrification
    d. Ammonification

20. The gas that is least likely to have formed the earth's primitive atmosphere is
    a. Methane
    b. Ammonia
    c. Oxygen
    d. Water vapor
21. Which one of the following best describe biologists' current hypothesis about the production of earth's atmospheric oxygen?
    a. Photosynthesis by terrestrial plants produced atmospheric oxygen
    b. The breakdown of iron ore deposits produced atmospheric oxygen
    c. Photosynthesis by cyanobacteria produced atmospheric oxygen
    d. Chemosynthesis by terrestrial plants produced atmospheric oxygen

22. Species belonging to different taxonomic groups may develop a resemblance resulting from adaptation to similar environments. This process is called
    a. Coevolution
    b. Microevolution
    c. Convergent evolution
    d. Macroevolution

23. As you study a population of fruit flies, *Drosophila melanongaster*, 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
    a. Continuous natural selection
    b. Disruptive natural selection
    c. Directional natural selection
    d. Stabilizing natural selection

24. The fragility of the desert ecosystem is indicated by
    a. The rapid growth rate of plants
    b. High species diversity
    c. Presence of succulent plants
    d. Long regeneration time from vegetation destruction

25. 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
    a. Continuous natural selection
    b. Discontinuous natural selection
    c. Disruptive natural selection
    d. Directional natural selection

Total 25 marks

QUESTION TWO

1. What is the effect of the second law of thermodynamics on
    a. The flow of energy through an ecosystem? (4 marks)
    b. The amount of food energy available to top carnivores and humans. What effects would this cause on life? (7 marks)
2. Briefly describe the connections among mutations, adaptations, natural selection, and biological evolution (4 marks)
3. Define the following ecological terms
    a. Pyramid of energy (2 marks);
    b. Pyramid biomass (2 marks);
    c. Pyramid of numbers (2 marks);
    d. Environmental management (2 marks); and
    e. Range of tolerance (2 marks)

Total 25 marks

QUESTION THREE

Describe the concept of caring for the earth including a detailed discussion on its nine principles (25 marks)

QUESTION FOUR

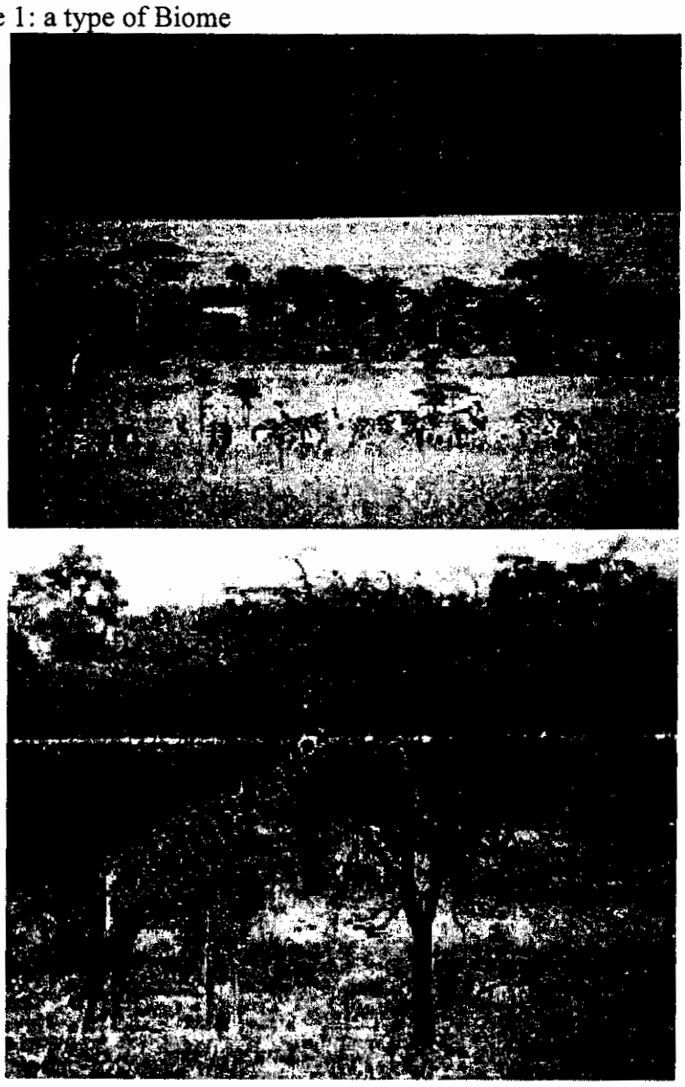
1. List four characteristics of a community structure (4 marks)
2. Discuss the factors that affect species diversity in an ecosystem (8 marks)
3. List the general types of species, explain their roles, and describe four kinds of species interactions (13 marks)

Total 25 marks

QUESTION FIVE

The picture below depicts a particular biome. Study it carefully and describe it in terms of the following themes:

Picture 1: a type of Biome



1. What type of biome is it giving examples? (3 marks)
2. What kind of climatic factors do you find in this biome? (4 marks)
3. What organisms (plants and animals) would you find in this biome? (6 marks)
4. How do these groups of organisms adapt to survival in this biome? (6 marks)
5. Discuss the kinds of human influence on this biome. (6 marks)

Total 25 marks