
UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF ENVIRONMENTAL HEALTH SCIENCE



FINAL EXAMINATION

TITLE OF PAPER	ENVIRONMENTAL ECOLOGY
COURSE CODE	EHS338
DURATION	TWO HOURS
DATE	MAY 2019
TOTAL NUMBER OF MARKS	100
INSTRUCTIONS	<ol style="list-style-type: none">1. DO NOT OPEN THIS PAPER UNTIL YOU ARE INSTRUCTED TO DO SO.2. ANSWER QUESTION ONE AND ANY OTHER THREE QUESTIONS.3. BEGIN YOUR ANSWERS TO EACH QUESTION ON A FRESH PAGE.4. POOR HANDWRITING AND CARELESSNESS IN ENGLISH LANGUAGE GRAMMAR SHALL RESULT IN LOSS OF MARKS.5. ANY FORM OF MISCONDUCT DURING THE EXAMINATION IS PUNISHABLE IN LINE WITH RELEVANT ACADEMIC REGULATIONS.

QUESTION ONE [25 MARKS]

1. An example of a generalist species is;
 - (a) Cattle
 - (b) Rats
 - (c) Rabbits
 - (d) Baboons
2. Generalist species have;
 - (a) Broad niches
 - (b) Broad ecosystems
 - (c) Broad communities
 - (d) Broad habitats
3. Specialist species have;
 - (a) Narrow ecosystems
 - (b) Narrow communities
 - (c) Narrow niches
 - (d) Narrow habitats
4. An example of a specialist species is;
 - (a) Bald eagles
 - (b) Lions
 - (c) Giraffes
 - (d) Spotted owls
5. Under rapidly changing environmental conditions;
 - (a) Specialist species are better off than generalist species
 - (b) Generalist species are better off than specialist species
 - (c) Both generalist and specialist species are at risk
 - (d) Both generalist and specialist species can withstand any impacts through natural selection
6. A species' way of life or functional role in an ecosystem is it's;
 - (a) Niche
 - (b) Fundamental niche
 - (c) Realized niche
 - (d) Adaptation
7. In diversifying natural selection;
 - (a) Environmental conditions favour individuals at one end of the genetic spectrum
 - (b) Environmental conditions eliminate individuals at both extremes of the genetic spectrum
 - (c) Environmental conditions favour individuals at both extremes of the genetic spectrum
 - (d) Environmental conditions eliminate individuals at one end of the genetic spectrum
8. Diversifying natural selection is also called;
 - (a) Specific natural selection
 - (b) Genetic natural selection
 - (c) Mutational natural selection
 - (d) Disruptive natural selection
9. One of the myths about evolution through natural selection is "survival of the fittest means survival of the strongest". As far as ecology is concerned, the fittest individuals are those that;
 - (a) Are physically the strongest, not those that leave the most descendants
 - (b) Leave the most descendants, not those that are physically the strongest
 - (c) Are physically strong with a very broad niche
 - (d) Are physically strong with a very broad ecosystem

10. An example of the fittest individuals is;
 - (a) Rats
 - (b) Lions (especially African lions)
 - (c) Elephants
 - (d) Whales
11. When different groups of the same population of a species become physically isolated from one another for a long time, the end result may be;
 - (a) Speciation
 - (b) Speciation through geological isolation
 - (c) Speciation through geographic isolation
 - (d) Speciation through geographic evolution
12. Divergence is a process whereby;
 - (a) One species moves in a different direction from the other
 - (b) Mutation and natural selection operate hand in hand in the gene pools of two geographically isolated populations
 - (c) Two groups of a population are separated by a natural feature such as a mountain range
 - (d) Mutation and natural selection operate independently in the gene pools of two geographically isolated populations
13. Every use and transfer of energy by organisms involves a loss of some degraded high-quality energy to the environment as heat. This is in accordance with;
 - (a) The law of conservation of energy
 - (b) The second law of thermodynamics
 - (c) The third law of energy
 - (d) Energy efficiency
14. The percentage of usable energy transferred as biomass from one trophic level to the next is called;
 - (a) Ecological efficiency
 - (b) Ecosystem efficiency
 - (c) Consumer efficiency
 - (d) Trophic level efficiency
15. The percentage of usable energy transferred as biomass from one trophic level to the next ranges from;
 - (a) 10% – 25%
 - (b) 15% – 30%
 - (c) 5% – 20%
 - (d) 20% – 35%
16. Every use and transfer of energy by organisms involves a loss of some degraded high-quality energy to the environment as heat. This loss is estimated to be;
 - (a) 75% – 90%
 - (b) 70% – 85%
 - (c) 65% – 80%
 - (d) 80% – 95%
17. The study of how organisms interact with one another and with their nonliving environment is;
 - (a) Macroevolution
 - (b) Ecology
 - (c) Biodiversity
 - (d) Genetic diversity

18. The basic unit of life in an organism is;
 - (a) Cell
 - (b) Genes
 - (c) DNA
 - (d) Chromosomes
19. Populations of different species living in a particular place, and potentially interacting with each other constitute;
 - (a) The biosphere
 - (b) An ecosystem
 - (c) A community
 - (d) An organism
20. A community of different species interacting with one another and with their nonliving environment of matter and energy is;
 - (a) The biosphere
 - (b) An organism
 - (c) A population
 - (d) An ecosystem
21. Sexual reproduction usually gives the species a greater chance of survival under changing environmental conditions than the genetic clones produced by asexual reproduction. This statement;
 - (a) Is false
 - (b) Is true
 - (c) Is true, but not always
 - (d) Is true only for aquatic organisms
22. Organisms that reproduce asexually are classified in the same species if, under natural conditions;
 - (a) They can actually or potentially breed with one another and produce live, fertile offspring
 - (b) They survive hostile environmental conditions
 - (c) Their habitat is the same
 - (d) They have the same genetic traits
23. In most natural populations, individuals vary slightly in their genetic makeup which is why they do not all look or act alike. This is called;
 - (a) A population's gene pool
 - (b) A population's DNA variability
 - (c) A population's genetic diversity
 - (d) A population's microevolution
24. The place or environment where a population (or an individual organism) normally lives is its;
 - (a) Community
 - (b) Niche
 - (c) Ecosystem
 - (d) Habitat
25. A community of different species interacting with one another and with their physical environment of matter and energy is;
 - (a) A biosphere
 - (b) An ecosystem
 - (c) A habitat
 - (d) A niche

QUESTION TWO [25 MARKS]

1. A generalized pyramid of energy flow is shown in Figure 3. Study the diagram carefully and answer the questions that follow.

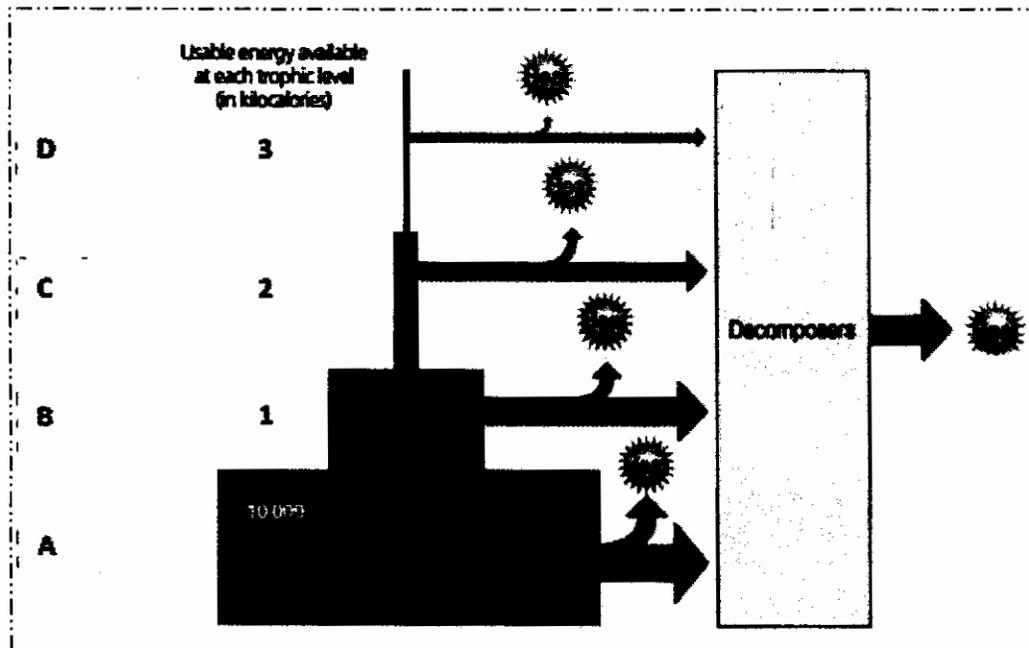


Figure 3: Generalized pyramid of energy flow (Miller & Spoolman 2012)

- 1.1 State one type of organism that feed at all trophic levels [2].
- 1.2 Assuming 10% ecological efficiency at each trophic transfer, if green plants in an area manage to capture 10000 units of energy from the sun, how much energy is available in 1, 2, and 3? [6]
- 1.3 Demonstrate your knowledge of energy flow in ecosystems by labelling A to D [8]
- 1.4 Why do representations of energy flow always have a pyramidal shape (always broader at the base and narrower moving up)? [3]
- 1.5 According to the simple food chain shown in Fig 3, there are only four trophic levels (A to D); why are there no more trophic levels beyond D? [2]
- 1.6 The world can support more human beings if they feed at [1];
- D
 - A
 - C
 - B
- 1.7 Eagles, hawks, tigers and white sharks feed at [1];
- D
 - A
 - C
 - B
- 1.8 The first animals to suffer when ecosystems that support them are disrupted are those feeding at [1];
- D
 - A
 - C
 - B

- 1.9 Species vulnerable to extinction are those feeding at [1];
- (a) D
 - (b) A
 - (c) C
 - (d) B

QUESTION THREE [25 MARKS]

1. State any six abiotic factors affecting terrestrial ecosystems [6].
2. State any five examples of omnivores [5].
3. State any four examples of scavengers [4].
4. State any two examples of decomposers [2].
5. State any five examples of detritus feeders [5].
6. Describe one significance of a food chain [3].

QUESTION FOUR [25 MARKS]

1. In what ways does the lower atmosphere support life on earth? [10]
2. Choose and define any five major living components of ecosystems [15].

QUESTION FIVE [25 MARKS]

1. One of the best documented examples of evolution by natural selection involves camouflage colouration in the peppered moth, which is found in England. Describe this example [10].
2. Describe the difference between a species fundamental niche and its realized niche [5].
3. State any five examples of generalist species [5].
4. In what ways does the geosphere support life on earth? [5]