



**ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 1**

Wednesday 15 November 2000 (afternoon)

45 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. Which of the following factors would prevent the ecosphere being classified as a *closed system*?
 - A. The input of solar energy
 - B. The re-radiation to space of heat energy
 - C. The arrival of rocks as meteorites from space
 - D. The unstable state of its equilibrium

2. Lime was put into Scandinavian lakes in the 1980s as
 - A. a response to acid rain from the combustion of fossil fuels in other European countries.
 - B. an attempt to replace nitrogen lost by excessive harvesting of fish.
 - C. an attempt to combat eutrophication caused by excessive local use of fertilisers.
 - D. a waste product from local industrial processes.

3. It is difficult to estimate accurately the global carrying capacity for the human population because
 - A. population densities vary from country to country.
 - B. technological developments may lead to changes in rates of resource consumption.
 - C. birth and death rates in different countries vary greatly.
 - D. humans produce more waste products than any other species.

4. Which of the following correctly describes the components of a population, community, ecosystem and habitat?

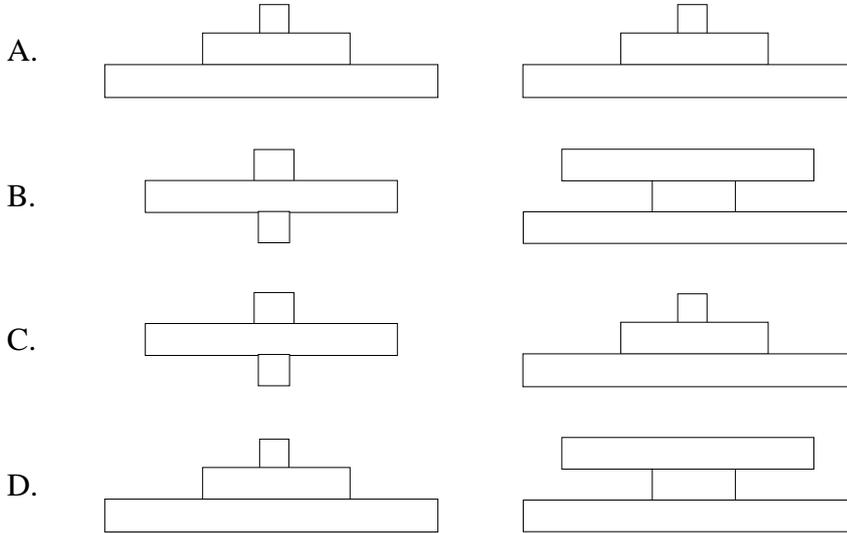
	Population	Community	Ecosystem	Habitat
A.	Biotic only	Biotic only	Biotic and abiotic	Biotic and abiotic
B.	Biotic only	Biotic and abiotic	Biotic and abiotic	Biotic and abiotic
C.	Biotic and abiotic	Biotic and abiotic	Biotic only	Abiotic only
D.	Biotic only	Biotic only	Biotic and abiotic	Abiotic only

5. An *ecological niche* is
- A. where a species lives.
 - B. all the populations of an ecosystem.
 - C. what a species eats.
 - D. the role a species has in an ecosystem.
6. If the rates of photosynthesis and respiration (in a plant) were exactly equal, which of the following would be true?
- A. Net Productivity would equal respiration
 - B. Net Productivity is at a maximum
 - C. Net Productivity would equal Gross Productivity
 - D. Net Productivity would be zero
7. The Vienna and Montreal agreements were aimed at reducing the
- A. amount of ozone-depleting substances released into the atmosphere.
 - B. loss of biodiversity, particularly in tropical rainforests.
 - C. release of all greenhouse gases through burning of fossil fuels.
 - D. amount of acid rain affecting Europe and North America.

8. In a mature forest, the trees are eaten by small primary consumers which are then eaten by much larger secondary consumers. Which of the following pyramids best represent this ecosystem?

Pyramid of numbers

Pyramid of biomass



9. Volcanic activity occurs
- A. only at the constructive margins of crustal plates.
 - B. only at the destructive margins of crustal plates.
 - C. at both constructive and destructive margins of crustal plates.
 - D. only within 200 km of the oceans, as it is caused by water seeping into the Earth's interior.
10. Which of the following statements about food chains is true?
- A. Herbivores are usually found at the third trophic level.
 - B. Carnivores are never at the second trophic level.
 - C. Primary producers can be found at any trophic level.
 - D. Secondary consumers are at the second trophic level.

11. Oceans make climates less extreme because
- A. they release and absorb heat slowly.
 - B. their currents move more slowly than air currents.
 - C. they provide a major source of water vapour.
 - D. they transfer energy from the poles to the equator.
12. The following are processes occurring in mineral cycles:
- I. conversion of carbon dioxide to organic matter
 - II. conversion of phosphates to organic matter
 - III. convection of water vapour
 - IV. conversion of nitrites to nitrates

Which of the above processes does **not** depend directly on input of solar energy?

- A. I, II and IV only
 - B. II only
 - C. III only
 - D. IV only
13. An animal population is given 50 kg of feed per day, of which 40 kg is consumed. 20 kg of feed per day is used in respiration and 15 kg of faeces per day is released. Which of the following are the correct values for gross and net productivity?

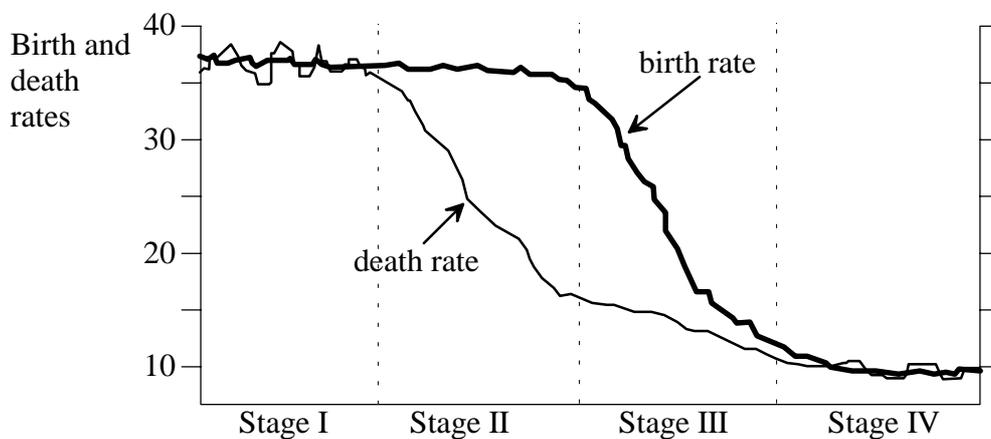
	Gross Productivity (kg day ⁻¹)	Net Productivity (kg day ⁻¹)
A.	40	25
B.	25	5
C.	50	35
D.	40	5

14. Tropical cyclones are
- A. low pressure areas, often associated with high winds, forming over the oceans in low latitudes.
 - B. convection cells at the equator caused by the rapid movement of warm air.
 - C. circular or near-circular ocean currents close to the equator.
 - D. waves of air in the upper atmosphere that give rise to mid-latitude depressions.
15. The carrying capacity of an environment for a given species
- A. can never be exceeded.
 - B. is greater for a population with a slow reproductive rate.
 - C. is achieved when birth rates equal death rates.
 - D. can only be exceeded with unsustainable use of resources.
16. A parasite, infecting the organs of its host, spreads from host to host more rapidly when the host population, in a given area, is higher. Assuming infection with the parasite reduces fertility, this would be an example of control of the host population through
- A. an external, density independent factor.
 - B. an internal, density dependent factor.
 - C. an external, density dependent factor.
 - D. an internal, density independent factor.
17. Which of the following conditions would lead to *unsustainable* harvesting of timber from a forest.
- I. Harvesting trees before they are fully mature.
 - II. Regularly harvesting the full natural income from the forest.
 - III. Reducing mineral content of soil through harvesting.
- A. I and III only
 - B. III only
 - C. I and II only
 - D. I, II and III

18. In the process of succession, earlier communities disappear because
- A. they are displaced through competition.
 - B. their gross productivity decreases with age.
 - C. they eventually produce disadvantageous changes to their physical environment.
 - D. their biodiversity is low.
19. The main difference between ‘S’ and ‘J’ population growth curves is that
- A. ‘S’ curves demonstrate exponential growth.
 - B. ‘J’ curves demonstrate exponential growth.
 - C. ‘S’ curves reach no stable maximum.
 - D. ‘J’ curves reach no stable maximum.
20. Which of the following contributes most effectively to self-regulation within a system?
- A. Rapid transfer of materials
 - B. Inputs of energy being greater than outputs
 - C. Negative feedback mechanisms
 - D. Positive feedback mechanisms
21. The ozone layer can be considered as natural capital which is
- A. replenishable and provides an essential service.
 - B. replenishable and provides valuable goods.
 - C. renewable and provides an essential service.
 - D. renewable and provides valuable goods.

22. Some animals of Australia and South America show similarities because
- A. the animals could walk between the two continents in the Ice Age when the sea level was much lower.
 - B. the similar climates of the continents produced similar patterns of evolution.
 - C. the animals have not been affected by the introduction of other species.
 - D. the animals have common ancestors from Gondwanaland.
23. Which of the following environmental impacts is **not** associated with the burning of fossil fuels?
- A. Thermal expansion of oceans
 - B. Damage to vegetation through toxic effects of ozone
 - C. Increase in pH of aquatic systems
 - D. Changing global weather patterns
24. The concentration of ozone in the atmosphere is greatest in the
- A. upper stratosphere.
 - B. lower stratosphere.
 - C. upper troposphere.
 - D. lower troposphere.

Questions 25–28 refer to the demographic transition model given below:

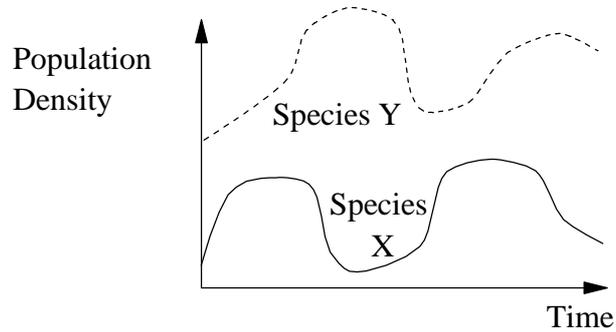


25. The units used for birth rate and death rate in this model are most likely to be
- A. percentage of total population per year.
 - B. numbers per square kilometre.
 - C. numbers per thousand individuals per year.
 - D. total numbers per year.
26. Which stage of the demographic transition model would most clearly represent a period of exponential growth for the population?
- A. Stage I
 - B. Stage II
 - C. Stage III
 - D. Stage IV
27. The natural increase rate at the end of Stage II is approximately
- A. 1.6
 - B. 3.5
 - C. 16
 - D. 35
28. Which of the following most likely represents the stages of demographic transition reached by the given countries:

	Sweden	Kenya	India	USA
A.	IV	I	III	II
B.	IV	II	III	IV
C.	II	IV	II	III
D.	III	I	II	IV

29. The main deserts of the world are found at
- A. latitudes between the tundra and temperate forests.
 - B. lower latitudes than temperate and tropical forests.
 - C. latitudes between the temperate and tropical forests.
 - D. higher latitudes than the tundra.

30. The following graphs represent the changes in population density of two species:



Which of the following most likely represents the relationship between these two species?

- | | X | Y |
|----|----------|----------|
| A. | predator | prey |
| B. | prey | predator |
| C. | parasite | host |
| D. | host | parasite |