

First Semester

Environmental

(العلوم و البيئية)

(Questions)



سُلْطَنَةُ عُومَانِ
وَزَارَةُ التَّرْبِيَةِ وَالتَّعْلِيمِ

ختم المركز

حاضر

غائب

امتحان دبلوم التعليم العام للمدارس الخاصة (ثنائية اللغة)

للعام الدراسي ١٤٣٥/١٤٣٦ هـ - ٢٠١٤ / ٢٠١٥ م

الدور الأول - الفصل الدراسي الأول

- زمن الإجابة: ثلاث ساعات.
- الإجابة في الورقة نفسها.

- تنبيه المادة: العلوم والبيئة.
- الأسئلة في (١٦) صفحة.

تعليمات وضوابط التقدم للامتحان:

- الحضور إلى اللجنة قبل عشر دقائق من بدء الامتحان للأهمية.
- إبراز البطاقة الشخصية لمراقب اللجنة.
- يمنع كتابة رقم الجلوس أو الاسم أو أي بيانات أخرى تدل على شخصية الممتحن في دفتر الامتحان، وإلا ألغى امتحانه.
- يحظر على الممتحنين أن يصطحبوا معهم بمركز الامتحان كتباً دراسية أو كراسات أو مذكرات أو هواتف محمولة أو أجهزة النداء الآلي أو أي شيء له علاقة بالامتحان كما لا يجوز إدخال آلات حادة أو أسلحة من أي نوع كانت أو حقائب يدوية أو آلات حاسبة ذات صفة تخزينية.
- يجب أن يتقيد المتقدمون بالزي الرسمي (الدشداشة البيضاء والمصر أو الكمة للطلاب والدارسين والزي المدرسي للطالبات واللباس العماني للدارسات) ويمنع النقاب داخل المركز ولجان الامتحان.
- لا يسمح للمتقدم المتأخر عن موعد بداية الامتحان بالدخول إلا إذا كان التأخير بعذر قاهر يقبله رئيس المركز وفي حدود عشر دقائق فقط.
- يتم الالتزام بالإجراءات الواردة في دليل الطالب لأداء امتحان شهادة دبلوم التعليم العام.
- يقوم المتقدم بالإجابة عن أسئلة الامتحان المقالية بقلم الحبر (الأزرق أو الأسود).
- يقوم المتقدم بالإجابة عن أسئلة الاختيار من متعدد بتظليل الشكل (○) وفق النموذج الآتي:
س - عاصمة سلطنة عمان هي:
○ القاهرة ○ الدوحة
● مسقط ○ أبوظبي
- ملاحظة: يتم تظليل الشكل (●) باستخدام القلم الرصاص وعند الخطأ، امسح بعناية لإجراء التغيير.

صحيح ● غير صحيح ○
صحيح ○ خطأ ×
صحيح ○ خطأ ×
صحيح ○ خطأ ×
صحيح ○ خطأ ×

مُسَوِّدَةٌ، لَا يَتَمُّ تَصْحِيحُهَا

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Question 1**(28 marks)**

There are 14 multiple-choice items worth two marks each.
Shade in the **correct** answer for each of the following items.

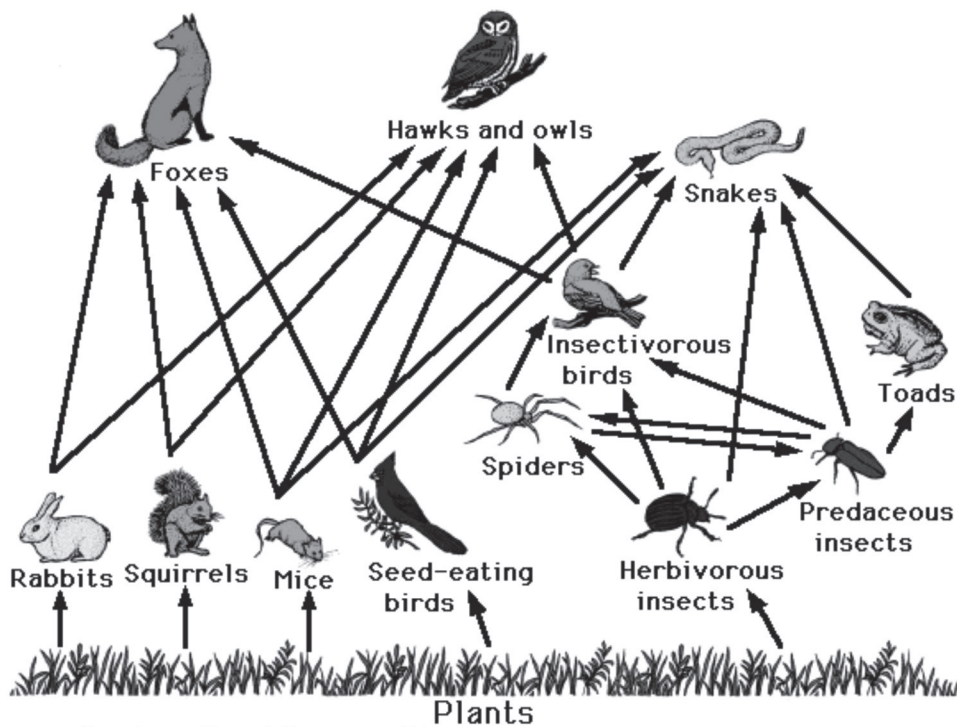
- 1) Which of the following are considered as biotic factors of an ecosystem?
- Light, air, water, soil, and climate.
- Animals, plants, bacteria, fungi, and rocks.
- Animals, plants, bacteria, fungi and protists.
- Temperature, light, protists, soil, and water.
- 2) In which population would you expect the most rapid evolutionary change?
- A small population with a high mutation rate in a changing environment.
- A small population with a low mutation rate in a stable environment.
- A large population with a high mutation rate in a changing environment.
- A large population with a low mutation rate in a stable environment.
- 3) Which of the following correctly describes the adaptation of a desert animal?

	Animal	Adaptation	Importance
<input type="checkbox"/>	Desert spider	Thick scaly skin	To prevent water loss
<input type="checkbox"/>	Spadefoot toad	Burying themselves in the ground (Estivating)	Survive scorching desert summers
<input type="checkbox"/>	Elf owl	Nests in cactus	Helps to retain water
<input type="checkbox"/>	Rattlesnake	Body covered with armor	To avoid predators

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Question 1 continued

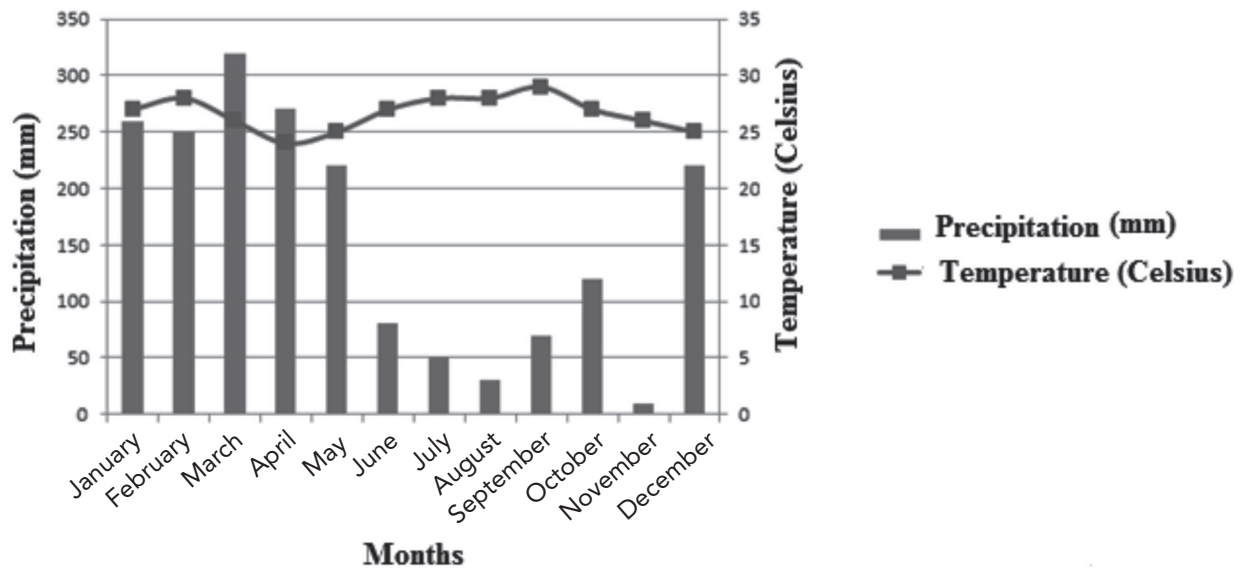
The figure below shows a food web. From this figure answer questions (4) and (5).



- 4) If all the mice were poisoned, which animals might also be poisoned?
- Rabbits, squirrels and seed-eating birds
- Foxes, hawks and snakes
- Herbivorous insects, rabbits and squirrels
- Rabbits, foxes and owls
- 5) If there are 100000 kJ of energy available in the plants, how much energy in kJ will be available to the toads?
- 10
- 100
- 1000
- 100000

Question 1 continued

6) The graph below shows the climate in Manaus, the capital city of Amazonas, Brazil.



Which of the following is correct about this biome?

	Climate	Temperature change during the year	Plants
<input type="radio"/>	Humid and warm	Constant	Wide variety
<input type="radio"/>	Rain during wet season only (few months)	Constant	Grasses and shrubs
<input type="radio"/>	Small amounts of rainfall and periodic droughts	High temperatures in summer	Grasses and wildflowers
<input type="radio"/>	Lack of precipitation	High temperatures during day	Shrubs and succulents

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Question 1 continued

7) What is the proper definition for each of the following terms?

	Nekton	Plankton	Benthos
<input type="radio"/>	Organisms that cannot swim against the current.	Bottom-dwellers that live attached to hard surfaces	Free swimming organisms such as fishes and whales.
<input type="radio"/>	Free-swimming organisms such as fishes and whales.	Organisms that cannot swim against the current.	Bottom-dwellers that live attached to hard surfaces.
<input type="radio"/>	Organisms that cannot swim against the current.	Free-swimming organisms such as fishes and whales.	Bottom-dwellers that live attached to hard surfaces.
<input type="radio"/>	Bottom-dwellers that live attached to hard surfaces	Free-swimming organisms such as fishes and whales.	Organisms that cannot swim against the current.

8) A negative rate of growth means that:

- the population size is decreasing
- the population size is increasing
- the population size is stable
- each pair of adults produces exactly two offspring

9) The cleaner fish feeds on parasites in the shark's mouth and gills. This kind of interaction is called:

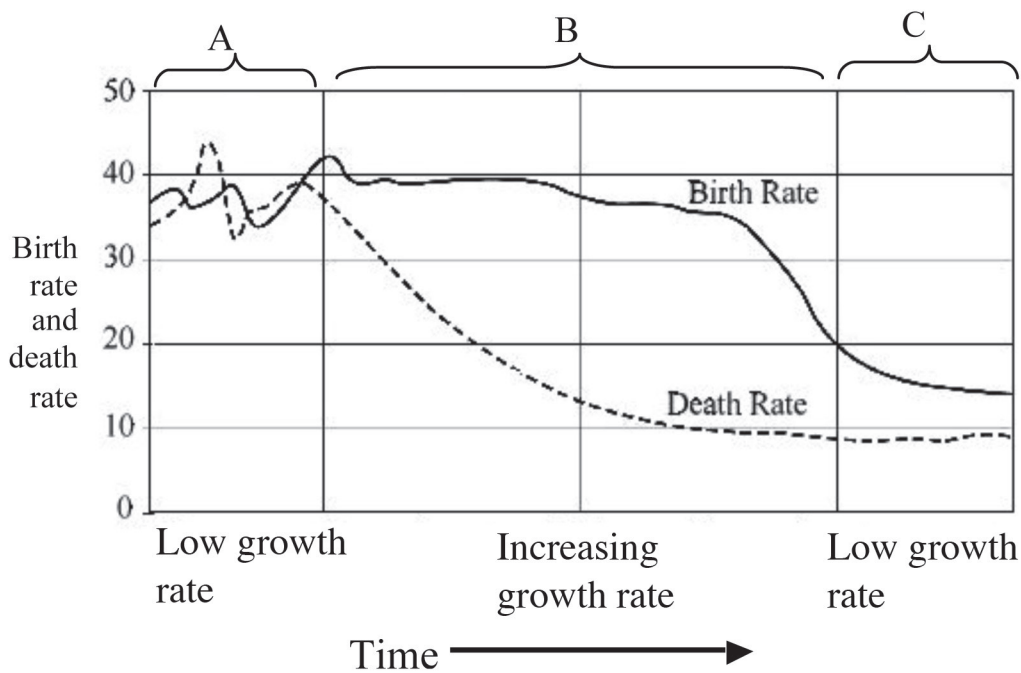
- commensalism
- mutualism
- parasitism
- predation

10) The species that are native to and found only within a limited area are said to be:

- threatened
- endemic
- endangered
- exotic

Question 1 continued

11) The diagram shows three stages only of the demographic transition.



Which of the following represents the stage labeled (B).

- | | |
|--|--|
| <input type="checkbox"/> Preindustrial conditions. | <input type="checkbox"/> Industrial stage. |
| <input type="checkbox"/> Postindustrial stage. | <input type="checkbox"/> Transitional stage. |

12) The best groundwater reservoirs have recharge zones with:

- low permeability and low porosity
- low permeability and high porosity
- high permeability and low porosity
- high permeability and high porosity

Question 1 continued

13) The following table lists the population sizes of five species in four different areas.

	Species A	Species B	Species C	Species D	Species E
Area 1	20	50	70	20	20
Area 2	0	60	80	40	20
Area 3	0	0	20	0	0
Area 4	40	30	80	110	0

Which of the following areas has the GREATEST biodiversity?

- 1 2
 3 4

14) The process of obtaining fresh water from salt water is called:

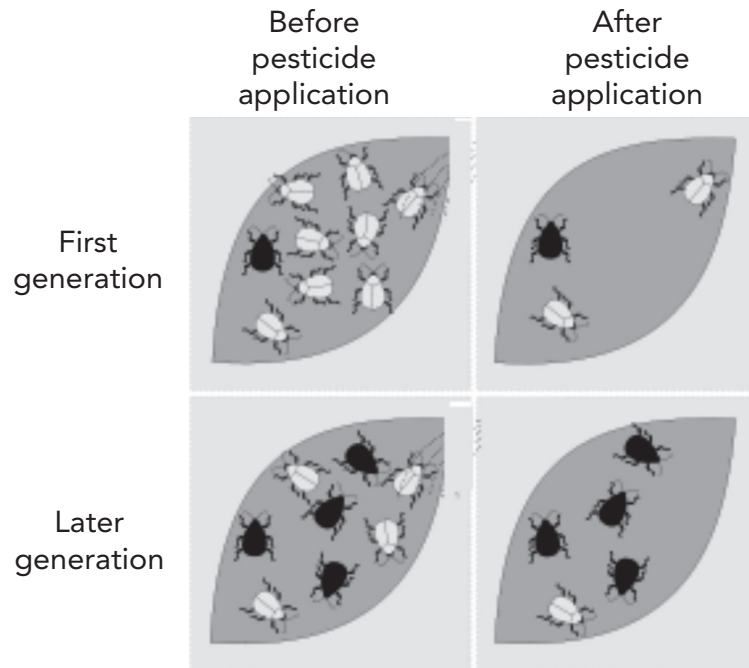
- desalination filtration
 sedimentation eutrophication

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Question 2

(14 Marks)

15) The figure below shows an example of the evolution of resistance. [4 Marks]



- a. In the first generations, what is the color of beetles that have resistance to pesticide?

- b. Why is this type of beetle able to survive after pesticide application?

- c. In the later generations, explain why the number of one type is greater than the other type after pesticide application?

- d. Which type of selection causes the evolution described in the figure?

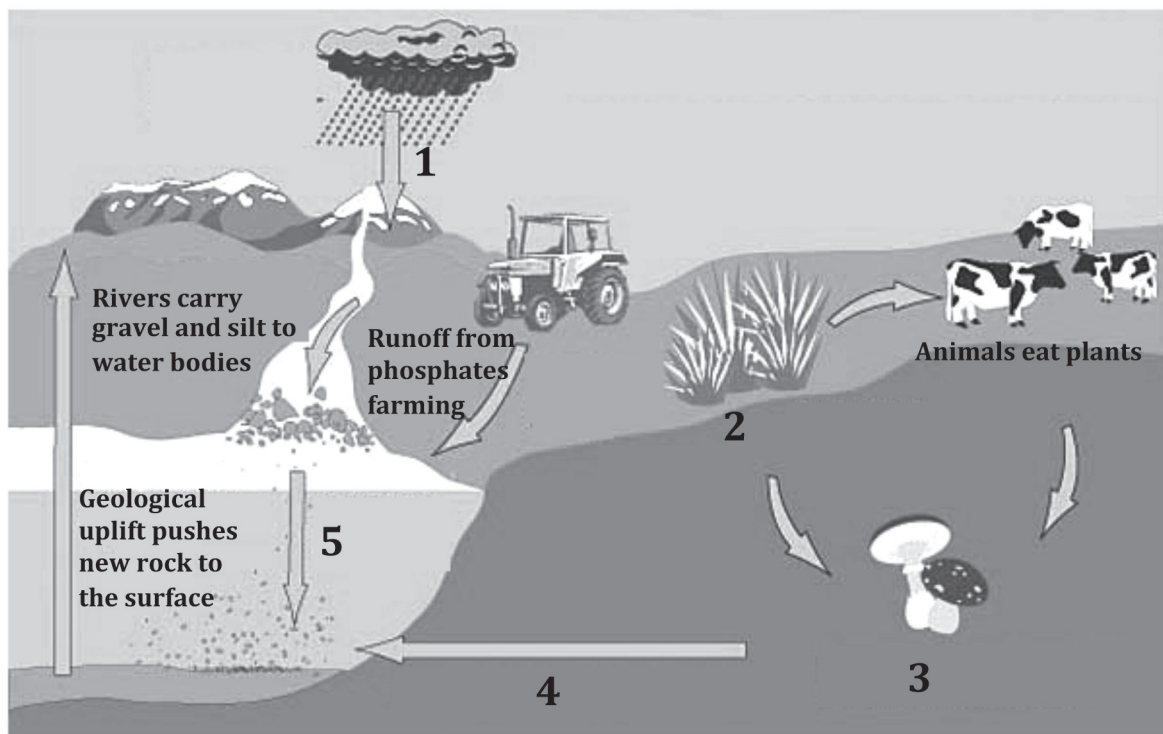
16) State two roles of bacteria in the environment. [2 Marks]

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Question 2 continued

17) The figure below shows the phosphorus cycle.

[4 Marks]



a. What are the ways labeled (1) and (4) in the figure by which phosphorus can enter water?

1: _____

4: _____

b. Write the number that shows how phosphorus can leach into the soil.

c. How can organisms labeled (2) get phosphates?

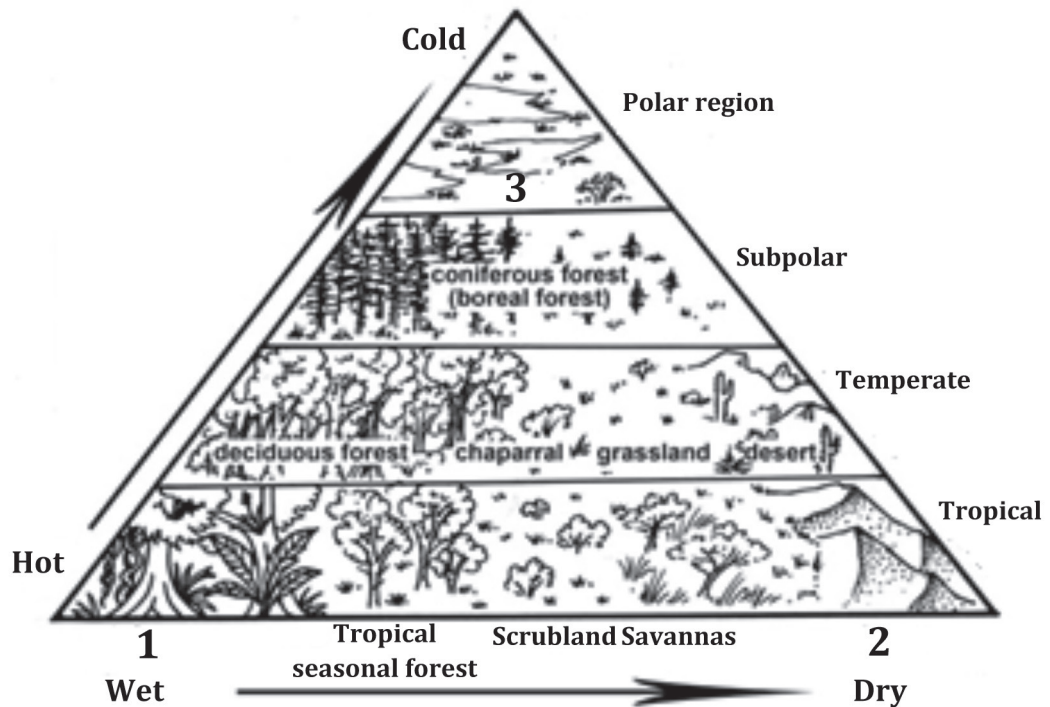
d. What is the fate of insoluble phosphate in the water as shown in step (5)?

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Question 2 continued

- 18) The figure below shows the effect of climate and distance from the equator on the biomes of earth. [4 Marks]



- How do the two climatic factors shown in the figure result in sparser plants?

- What is the effect of these two conditions on the vegetation of the biome labeled (1)?

- Explain why plants that grow in the biome labeled (3) tend to be short.

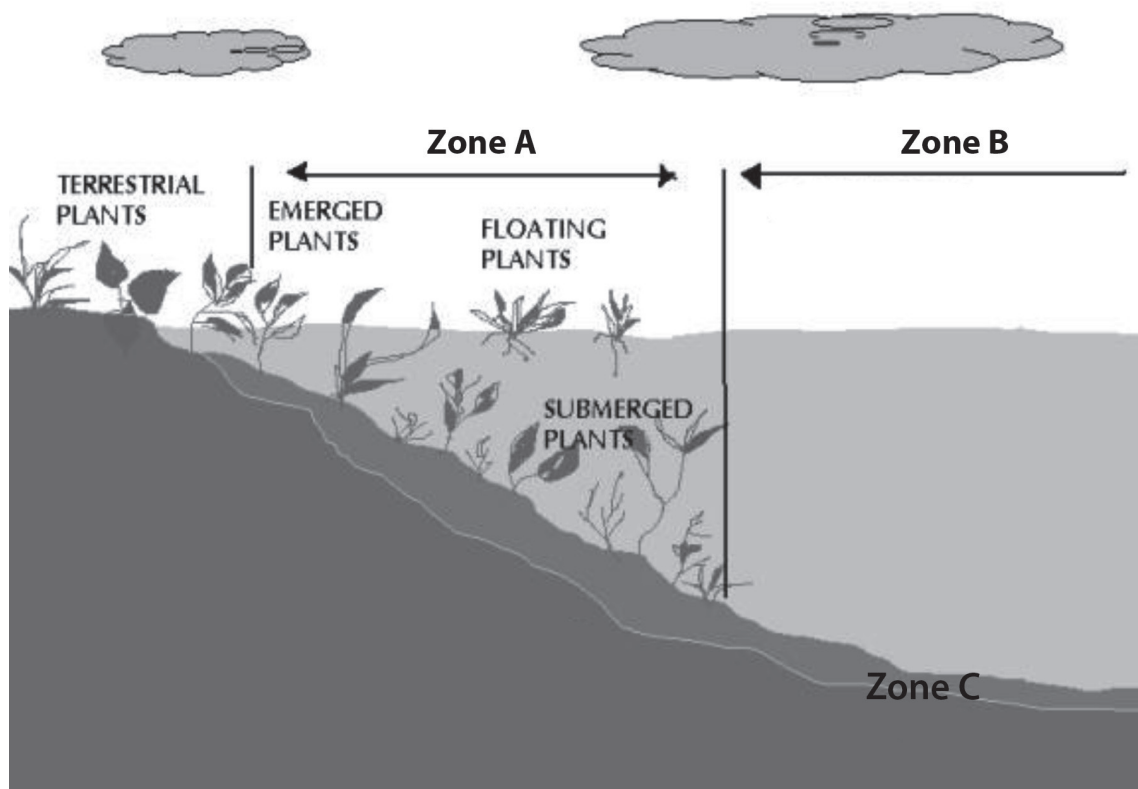
- Describe the vegetation of the biome labeled (2).

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Question 3**(14 Marks)**

19) The diagram below shows the major zones of a lake.

[5 Marks]



a. Name the zones labeled (A) and (B).

A: _____

B: _____

b. Explain how the organisms in the zone labeled (C) obtain their food.

c. Predict what would happen if an excess amount of nutrients are added to this lake.

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Question 3 continued

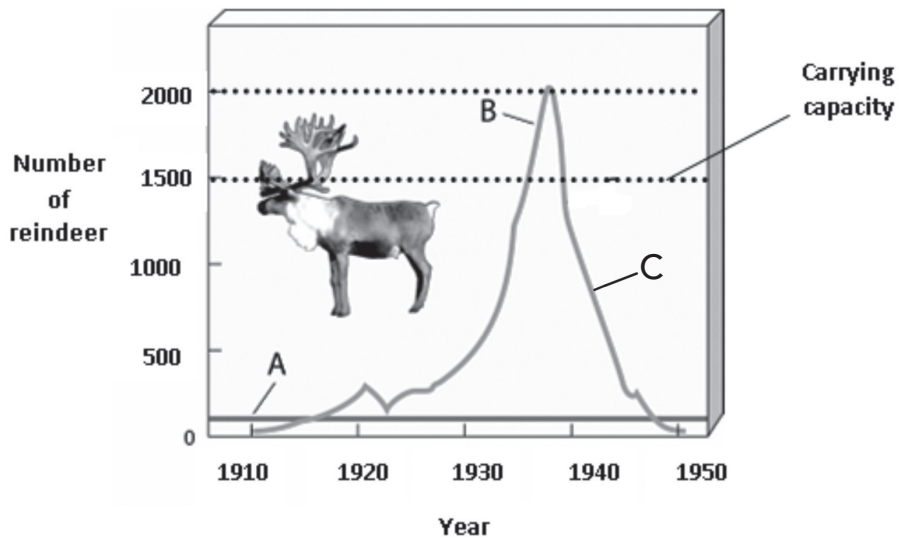
20) The table below shows the human population between 1650 and 2004. [3 Marks]

Year	1650	1750	1850	1925	1956	1966	1970	1974	1976	1980	1991	2000	2004
Number of people in billions	0.50	0.70	1.0	2.0	2.5	3.3	3.5	3.9	4.0	4.4	5.5	6.0	6.4

a. It took 1649 years for the world population to double, going from 0.25 billion people to 0.50 billion people. What is the shortest period taken by the population to double once again?

b. Identify the two factors that caused population growth in the intervals between 1925 and 2004

21) The figure below shows the exponential growth of reindeer. [3 Marks]



a. Write the letter in the graph that represents the population crash.

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Question 3 continued

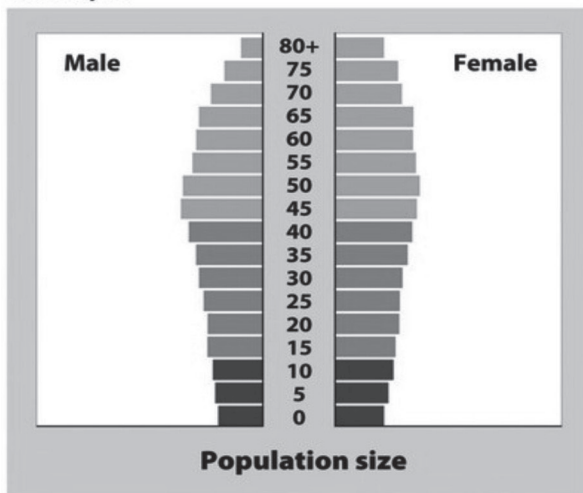
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- b. What is the maximum population of reindeer that the ecosystem can support?

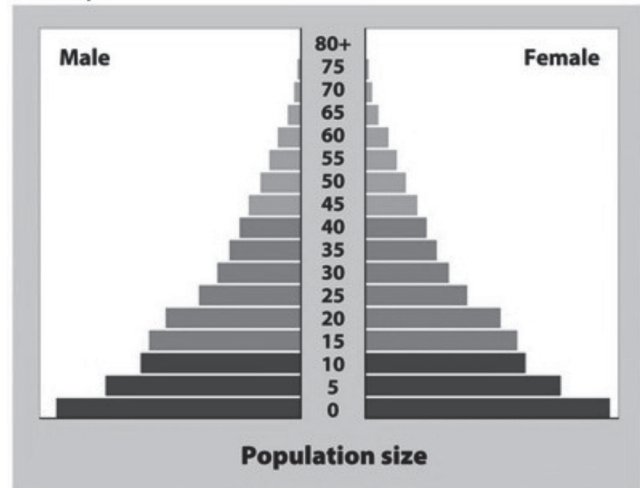
- c. Calculate the number of reindeer that exceeded the capacity of their environment.

- 22) The figure shows the age structure of two countries (A) and (B). [3 Marks]

Country A



Country B



- a. Define age- structure.

- b. Describe the growth rate of these two countries:

Country A: _____

Country B: _____

- c. Which is less developed country?

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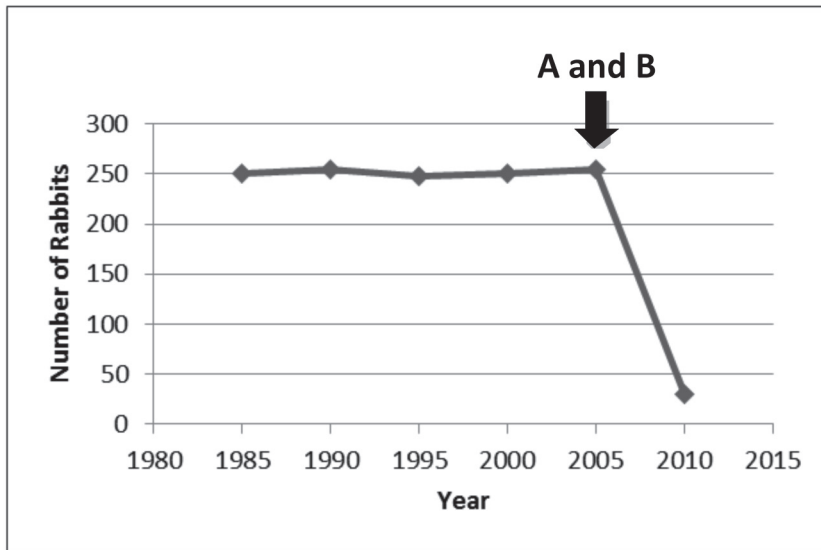
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Question 4

(14 Marks)

23) The graph below tracks a rabbit population over twenty years.

[2 Marks]



(A): Species sharing the same food with rabbits.
(B): Species eating the rabbits.

a. Explain the decline in population size of rabbits between 2005 and 2010 as a result of the invasion of species (A).

b. What kind of interaction took place between the rabbits and species (B).

24) Define an exotic species

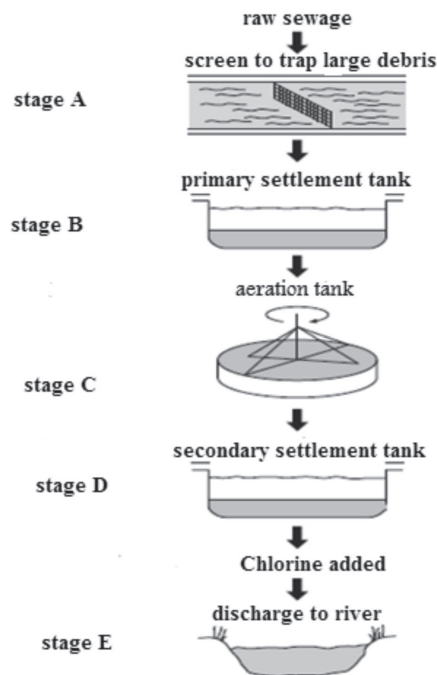
[1 Mark]

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Question 4 continued

25) The diagram below shows a wastewater treatment process.

[4 Marks]



a. Name the stage labeled (A).

b. Explain why:

i) bacteria are added in the stage labeled (C).

ii) chlorine is added before the stage labeled (E).

c. Describe what is happening at:

i) the stage labeled (B):

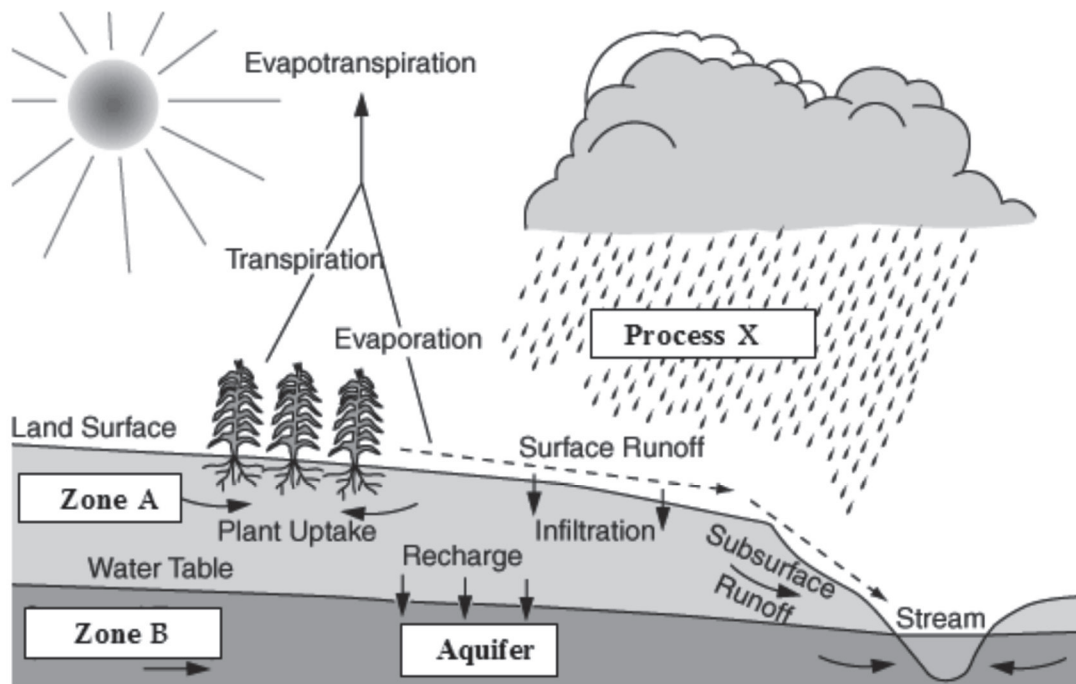
ii) the stage labeled (D):

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Question 4 continued

26) The diagram below shows groundwater recharge in the water cycle: [3 Marks]



a. Name the process labeled (X)

X: _____

b. Predict what will happen :

i) to the size of zone (B) if the amount of water pumping from the aquifer is higher than the amount of water recharging.

ii) if zone (A) has nonporous and impermeable rocks.

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Question 4 continued

27) African elephants, are endangered species whose numbers have fallen to approximately 3000 in the past thirty years. For this reason, the species was placed on Appendix I of the Convention on International Trade in Endangered Species (CITES). Since African elephants have been placed on the appendix, numbers have stabilized, or even increased. [4 Marks]

a. Define the term endangered species.

b. Why African elephants are endangered

c. State how the CITES helps to save endangered species.

d. Explain why protecting the entire ecosystem is better than protecting individuals

[End of Examination]

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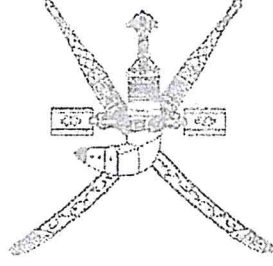
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First Semester

Environmental

(العلوم و البيئية)

(Answers)



SULTANATE OF OMAN
MINISTRY OF EDUCATION
DIRECTORATE GENERAL OF EDUCATIONAL EVALUATION

**GENERAL EDUCATION DIPLOMA EXAMINATION
FOR BILINGUAL PRIVATE SCHOOLS**

Environmental Science

First Semester - First Session

2014 / 2015

MARKING GUIDE

[This guide consists of 4 pages]

**ANSWERS****QUESTION 1 (28 marks)**

Each answer 2 marks

Question number	Answer			Page
1	Animals, plants, bacteria, fungi and protists			94
2	A small population with a high mutation rate in a changing environment.			99
3	Spadefoot toad	Burying themselves in the ground (Estivating)	Survive scorching desert summers	161
4	Foxes, hawks and snakes			122
5	1000			123
6	Humid and warm	Constant	Wide variety	146
7	Free swimming organisms such as fish and whales	Organisms that cannot swim against the current	Bottom- dwellers that live attached to hard surfaces	173
8	The population size is decreasing			198
9	Mutualism			208
10	endemic			248
11	Transitional stage			223
12	high permeability and high porosity			274
13	1			
14	desalination			283



Written Response

QUESTION 2 (14 marks)**15) (4 marks) P. 100-101**

- a. Black (1 mark)
- b. Have a version of gene that protects them from the pesticide. (1 mark)
- c. The surviving insects pass on the gene to their offspring. (1 mark)
- d. Artificial selection (1 mark)

16) (2 marks) P. 103

- 1) Break down the remains and wastes of other organisms and return nutrients to the soil.
- 2) Recycle mineral nutrients such as nitrogen and phosphorus.

17) (4 marks) P. 127

- a) (each one 1/2 mark)
 - (1): Weathering of phosphate from the rocks.
 - (4): Leaching into water from soil.
- b)
 - (3) (1 mark)
- c) By absorbing phosphates in the soil through their roots. (1 mark)
- d) It sinks to the bottom of water bodies and accumulates as sediments and the sediments become rocks. (1 mark)

18) (4 marks) P. 144-145

- a) As temperature and precipitation decrease (1Mark)
- b) The vegetation becomes taller and denser (1Mark)
- c) They cannot obtain enough water to grow larger (1Mark)
- d) Small trees, shrubs, grasses and cactuses (1Mark)



QUESTION 3 (14 marks)

19) (5 marks) P. 174-175

a) A: littoral zone (1 Mark)

B: limnetic zone (1 Mark)

b) Bacteria and decomposers live on dead plants and animals that drift down from the above. (1 Mark)

c) (2 Marks)

This will lead to eutrophication where the amount of plants and algae will multiply ($\frac{1}{2}$ Mark), the number of bacteria feeding on the decaying organisms also grows ($\frac{1}{2}$ Mark) and they will consume the oxygen ($\frac{1}{2}$ Mark) and this will kill oxygen loving organisms ($\frac{1}{2}$ Mark)

20) (3 marks) P. 219

a. 75 years from 1850 to 1925 (1 mark)

b. Any two answers (2 marks)

- industrial and scientific revolution
- increase in food production
- improvement in hygiene

21) (3 marks) p. 199-200

a - C (1 mark)

b - 1500 (1 mark)

c - $2000 - 1500 = 500$ individuals (1 mark)

22) (3 marks) P. 220

a) The distribution of ages in a specific population at a certain time. (1 Mark)

b) A: zero growth or declining. ($\frac{1}{2}$ Mark)

B: rapid growth. ($\frac{1}{2}$ Mark)

c) B (1 Mark)

**QUESTION 4 (14 marks)**

23) (2 marks) P.204-206

- a) Because of competition on food which causes food shortage for rabbits (1 Mark)
- b) B and rabbits : predation (1 Mark)

24) (1 mark)

Exotic species:

a species that is not native to particular region

25) (4 marks) P. 287

- a) Filtration (1 mark)
- b) i) To feed on the wastes using O_2 ($\frac{1}{2}$ mark)
ii) To disinfect the water ($\frac{1}{2}$ mark)
- c) i) Wastewater is sent into a large tank where smaller particles sink to the bottom and form sewer sludge. The sludge is removed from the water. (1 mark)
ii) Bacteria grown in the aeration tank, as well as other solid wastes, are removed in the form of sludge. (1 mark)

26) (3 marks) P. 269, 274, 275

- a) Precipitation (1 mark)
- b) i) It will shrink **OR** become small **OR** dry (1 mark)
ii) Will not allow flow of water to aquifer, so aquifer will shrink **OR** become small or dry (1 mark)

27) (4 marks) P. 255-256

- a) i) A species that likely to become extinct if protective measures are not taken immediately. (1 mark)
ii) Elephants were being killed by poachers who would sell the ivory tusks. (1 mark)
- b) The members of CITES proposed a world ban on all trade in ivory. (1 mark)
- c) By protecting entire ecosystem, we may be able to save most of the species in an ecosystem instead of only the ones that have been identified as endangered. (1 mark)

END OF ANSWER SCHEME