Practice Question Set For A-Level
Subject : Biology
Paper-2 Topic:5 Energy Transfer In And Between Organisms

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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

(a) In the following passage, the numbered spaces can be filled with biological terms.

An ecosystem supports a certain size of population of a species, called the __(1)__ capacity. There are often numerous habitats within an ecosystem. Within a habitat, a species occupies a __(2)__ governed by an adaption to both __(3)__ and biotic conditions. Populations of different species form a __(4)__.

Write the correct biological term beside each number below that matches the space in the passage.

1 _____

2 _____

3 _____

4 _____

(2)

(b) Suggest **two** reasons for conserving rainforests.

1 _____

_____

2 _____

_____

(2)

(c) Give **three** reasons for the low efficiency of energy transfer from secondary consumers to tertiary consumers in an ecosystem.

1 _____

_____

2 _____

_____

3 _____

_____

(3)
(Total 7 marks)

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Q2.

Nitrogen-fixing bacteria such as *Azotobacter chroococcum* use the enzyme nitrogenase to produce ammonia from nitrogen gas in the air. *A. chroococcum* can use ammonium chloride as a direct source of ammonia. When a source of ammonia is not available this bacterium uses nitrogen fixation.

A scientist investigated the effect of an increase in the concentration of ammonium chloride on the activity of nitrogenase in this bacterium. He prepared several liquid medium cultures of the bacterium. Each liquid culture had the same volume. He grew each culture in a different concentration of ammonium chloride.

In each culture:

- he recorded the nitrogenase activity in arbitrary units
- he removed the bacteria and then recorded the concentration of ammonium chloride remaining in each liquid medium.

The table below shows the scientist's results.

Concentration of ammonium chloride / µg cm^{-3}	**Nitrogenase activity / arbitrary units**	**Concentration of ammonium chloride remaining in liquid medium / µg cm^{-3}**
0	45	0
20	30	0
40	17	0
60	7	0
80	0	6
100	0	14
120	0	20

(a) Apart from temperature and pH, give **two** variables the scientist would have controlled when **preparing** the liquid medium cultures.

1 _____

_____

_____

_____

2 _____

_____

_____

_____

(2)

(b) A student concluded that this investigation showed that ammonia inhibits nitrogenase activity

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in nitrogen-fixing bacteria. Use all the information to evaluate the student's conclusion.

(3)

(c) Nitrogenase catalyses the reduction of nitrogen during nitrogen fixation. The reaction requires 16 molecules of ATP for each molecule of nitrogen that is reduced.
When ammonia inhibits nitrogenase activity, nitrogen-fixing bacteria may benefit.
Explain how.

(2)
(Total 7 marks)

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Q3.

(a) Put a Tick (✓) in the box next to the equation that shows how the net production of consumers, *N*, can be calculated where
I represents the chemical energy store in ingested food
F represents the chemical energy lost to the environment in faeces and urine
R represents the respiratory losses to the environment.

$N = (I - F) + R$ ☐

$N = I - (F + R)$ ☐

$N = I + (F + R)$ ☐

$N = I - (F - R)$ ☐

(1)

In the UK, some female cattle are only used for breeding. This female breeding herd has dairy cows and beef cows.

The table below shows data on dairy cows and beef cows in the UK female breeding herd in December 2013 and December 2017.

Date	**Total number in female breeding herd / millions**	**Percentage of total female breeding herd**	
		Dairy cows	**Beef cows**
December 2013	3.35	54	46
December 2017	3.45	55	45

(b) In December 2017, the female breeding herd was 48% of all female cattle in the UK.
Use the table above to calculate the percentage of all female cattle that were beef cows in the UK in December 2017.

Answer _____ %

(1)

(c) Use the table above to calculate the increase in the number of dairy cows in the UK female breeding herd between December 2013 and December 2017.

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Show your working.

Increase in number _____

(2)

(d) Farming cattle for humans to eat is less efficient than farming crops because of energy transfer.
Explain why.

_____

_____

_____

_____

_____

_____

_____

_____

(2)

(Total 6 marks)

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