Environmental Systems SL P2

2007 November

School Level 12th IB Diploma Programme

Board Exam

International Baccalaureate (IB Board)

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IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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N07/4/ENVSY/SP2/ENG/TZ0/XX

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ENVIRONMENTAL SYSTEMS
STANDARD LEVEL
PAPER 2

Friday 2 November 2007 (afternoon)

1 hour 15 minutes

Candidate session number

0	0							

INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all of Section A in the spaces provided.
- Section B: answer one question from Section B. Write your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the numbers of the questions answered in the candidate box on your cover sheet and indicate the number of sheets used in the appropriate box on your cover sheet.

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SECTION A

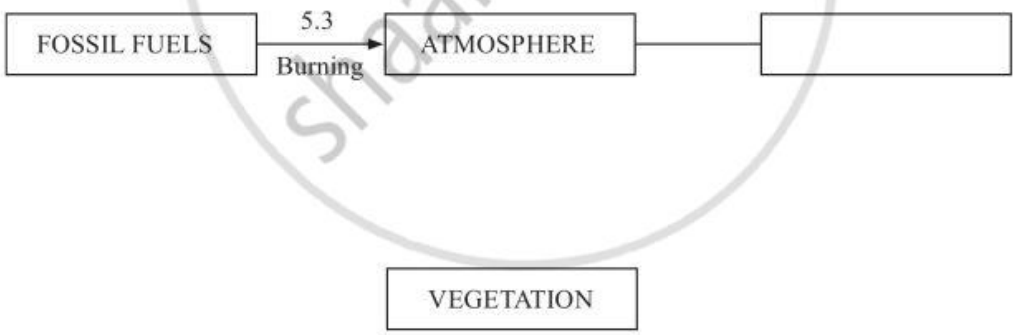
*Answer **all** the questions in the spaces provided.*

1. The table below shows the global carbon transfers during one year.

Carbon inputs to atmosphere / 10^9 tonnes yr^{-1}		**Carbon removed from atmosphere / 10^9 tonnes yr^{-1}**	
Burning fossil fuels	5.3	Increase in biomass of existing plants	1.3
Deforestation	1.6	Absorption by oceans	2.0
		Regrowth of forest after deforestation	0.5

[Source: adapted from E.I. Newman, (2000) *Applied Ecology and Environmental Management*, 2nd edition, Blackwell Science, Oxford, page 17]

(a) Use the information in the table above to complete the flow diagram to show the flows and storages of carbon in 10^9 tonnes yr^{-1}. *[5]*



(b) Calculate the net increase in carbon levels in the atmosphere after one year. *[1]*

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(This question continues on the following page)

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(Question 1 continued)

(c) (i) State the process by which carbon is transferred from the atmosphere and assimilated by plants. *[1]*

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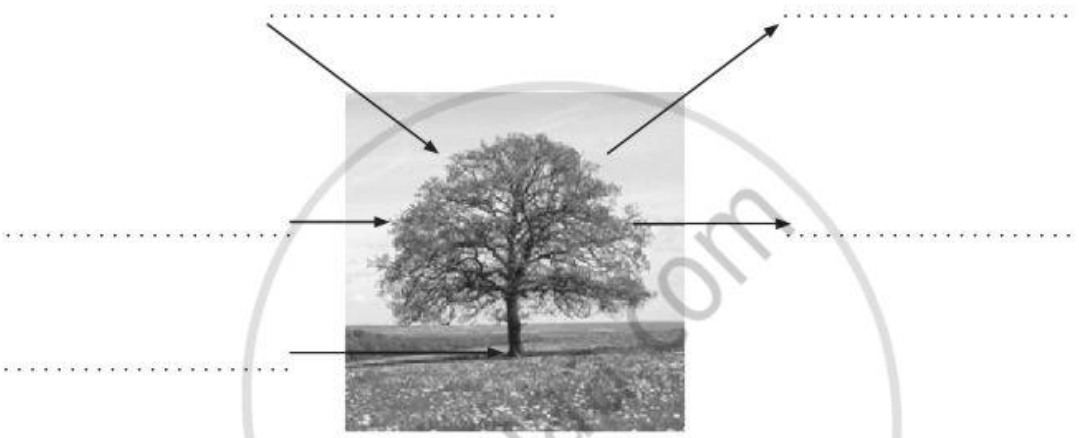
(ii) For the process named in (c) (i), label the arrows in the following diagram to show the inputs and outputs of energy and matter for the plant. *[3]*



(d) (i) Explain why the rate of increase in the amount of carbon in the atmosphere should be controlled. *[2]*

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(ii) Explain, using examples, how international cooperation can help to control levels of atmospheric carbon. *[3]*

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2. (a) Distinguish between the terms *predator* and *parasite*. *[2]*

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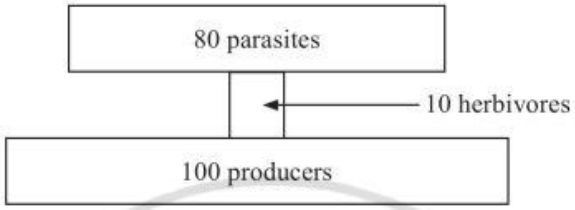

(b) (i) State the name of the type of diagram shown above. *[1]*

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(ii) Suggest why there are often more organisms at the third trophic level than at the second trophic level in a food chain containing parasites. *[2]*

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(c) Explain why the energy available to the predators in a food chain is much less than that fixed by the producers. *[3]*

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3. The table below shows demographic data for the human population of a country in 2004.

Birth rate / 1000	Death rate / 1000	Number of live children per female	Mean age of mother at first live birth / years
13	16	1.2	29

(a) (i) Define the term *natural increase rate*. *[1]*

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(ii) Calculate the percentage natural increase rate for the data above. *[1]*

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(b) (i) Predict how the population of the country is likely to change over the next 5 years. *[1]*

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(ii) Identify **two** pieces of data that support your prediction in (b) (i) above. *[2]*

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(c) Outline **two** reasons why women in developing countries usually have children at a younger age than those in developed countries. *[2]*

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SECTION B

*Answer **one** question. Write your answers on the answer sheets provided. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.*

Each essay question is marked out of a total of 20 marks of which 3 are allocated to the expression and development of ideas as follows:

0 No expression of relevant ideas.
1 Expression and development of relevant ideas is limited.
2 Ideas are relevant, satisfactorily expressed and reasonably well developed.
3 Ideas are relevant, very well expressed and well developed.

4. (a) Describe the composition and structure of the atmosphere. *[7]*

(b) Discuss the formation of tropospheric ozone and its effects on living organisms. *[6]*

(c) Evaluate **two** ways of reducing photochemical smog formation. *[4]*

Expression of ideas [3]

5. (a) Distinguish between natural capital and natural income. *[2]*

(b) Define the term *sustainable yield* and explain how a resource can be managed to obtain a sustainable yield from:

(i) a **named** renewable natural resource.

(ii) a **named** replenishable natural resource. *[8]*

(c) Discuss whether or not the world's total human carrying capacity can continue to increase through the use of technology. *[7]*

Expression of ideas [3]

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6. (a) Describe and explain, with examples, how diversity and productivity differ in pioneer and climax communities. *[7]*

(b) Draw a flow diagram showing how phosphorus cycles amongst rocks, soil and water, and producers, consumers and decomposers. *[5]*

(c) Explain how phosphorus storages and flows differ between early, mid and late succession. *[5]*

Expression of ideas *[3]*

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