ENVIRONMENTAL SYSTEMS

Standard Level

Thursday 11 November 1999 (morning)

Paper 3   1 hour 15 minutes

A

Candidate name:	Candidate category & number:

This examination paper consists of 2 sections, Section I and Section II.
Section I refers to Options A, B, and C.
Section II refers to Options D, E, and F.
The maximum mark for each question is 15.
The maximum mark for this paper is 45.

INSTRUCTIONS TO CANDIDATES

Write your candidate name and number in the boxes above.

Do NOT open this examination paper until instructed to do so.

Section I: Answer question one.

Section II: Answer TWO options from Section II in the space provided.

At the end of the examination, complete box B below with the letters of the options answered.

B

OPTIONS ANSWERED
I/
II/
II/

C

EXAMINER	TEAM LEADER
/15	/15
/15	/15
/15	/15
TOTAL /45	TOTAL /45

D

IBCA	EUR
/15	/15
/15	/15
/15	/15
TOTAL /45	TOTAL /45

EXAMINATION MATERIALS

Required:
Calculator

Allowed:
A simple translating dictionary for candidates not working in their own language

SECTION I

Options on Analysing Ecosystems—Options A, B and C

The compulsory question below relates to the detailed study of an ecosystem in a marine, terrestrial or freshwater environment. Select the option on which you will base your answers by marking (x) ONE box only.

		Mark (x) ONE box
A	Analysing Marine Ecosystems	
B	Analysing Terrestrial Ecosystems	
C	Analysing Freshwater Ecosystems	

1.   (a)   (i)   Briefly describe a method for measuring gross primary productivity (GPP) and net primary productivity (NPP) in a named ecosystem. *[4]*

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(ii)   Explain **one** way in which humans might change the net primary productivity (NPP) of this system. *[1]*

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(This question continues on the following page)

(Question 1 continued)

(b)   (i)   Briefly describe a method for measuring gross and net secondary productivity of a named organism.   *[2]*

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(ii)   List **three** reasons why the results obtained in (b) (i) might be inaccurate.   *[3]*

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(c)   Compare the net primary productivity (NPP) in **two** named ecosystems from your chosen option. Relate the difference in physical factors in the two ecosystems to their NPP.   *[5]*

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SECTION II

This section contains a question on each of Options D, E and F. Answer TWO of these questions, related to your chosen options.

Option D—Impacts of Resource Exploitation

2.   The graph below shows the rate of growth and predicted growth of the world's population, urban population and number of motor vehicles between 1950 and 2020. (Note the figures are given in the form of indices where the value in 1950 equals 100. Thus a doubling of the 1950 figure would represent an increase from 100 to 200.)
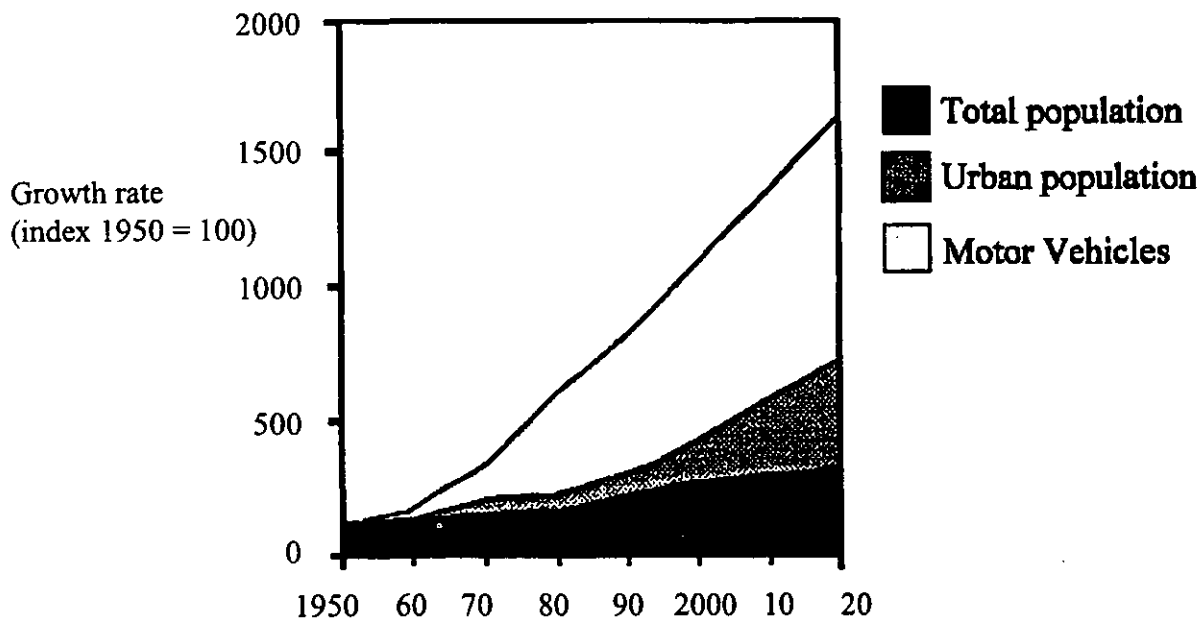
(a)   Which of the three variables is increasing

     (i)   most rapidly? . . . .

     (ii)   least rapidly? . . . .   *[1]*

(b)   Using the data above, state approximately how many times:

     (i)   the number of motor vehicles increases between 1950 and 2000.   *[1]*

     . . . .

     (ii)   the urban population increases between 1950 and 2000.   *[1]*

     . . . .

(This question continues on the following page)

(Question 2 continued)

(c) Describe and explain the possible environmental effects of the long-term increases shown in the graph on:

    (i)   world energy resources. *[4]*

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    (ii)   world food resources. *[4]*

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(d) Give **four** examples of the ways in which a large urban population could have an impact upon the area that surrounds it. *[4]*

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Turn over

Option E— Biodiversity and Conservation

3.   (a)   Describe how a new species could arise when part of the population becomes geographically isolated.   *[3]*

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(b)   The table below shows the number of endangered species of animals and plants in selected countries.

	Proportion of total land area that is protected (%)	Number of endangered plant species	Number of endangered animal species
Germany	26	16	11
Indonesia	10	281	242
Brazil	4	483	367

(i)   Using the data above, state what the relationship is between the number of endangered species and the proportion of the total land area protected.   *[1]*

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(ii)   State **two** other factors that explain why there are more endangered species in Indonesia and Brazil than in Germany.   *[2]*

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(This question continues on the following page)

(Question 3 continued)

(c) (i) What is the CITES criterion for extinction? *[1]*

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(ii) Explain why it is difficult to determine the numbers of all species becoming extinct. *[2]*

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(d) (i) What is the CITES criterion for an endangered species? *[1]*

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(ii) Why is it likely that endangered species will become extinct? *[2]*

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(e) Review the case history of a named species that was endangered but is now removed from the endangered list. *[3]*

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Option F—Pollution

4. The table below gives emissions from road transport as a percentage of all emissions.

Pollutant	Percentage of total emissions caused by road transport
carbon monoxide	89
carbon dioxide	19
hydrocarbons	36
nitrogen oxides	51
lead	70
PM_{10} particulates	35

(a) Catalytic converters (CATs) can be fitted to petrol-fuelled (gasoline-fuelled) motor vehicles. If CATs were fitted to all petrol-fuelled vehicles, name the pollutants listed in the table which would

    (i) decrease ....

    (ii) remain constant .... *[2]*

(b) What is the source of the PM_{10} particles and what harmful effects do they have on organisms? *[3]*

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(This question continues on the following page)

(Question 4 continued)

(c) Petrol (gasoline), unlike biogas, methane and alcohol, is obtained from fossil fuels. Describe the uses of these other fuels and their sources. Outline the advantages and disadvantages of using **one** of these non-fossil fuels. *[5]*

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(d) (i) Name **two** features of a community that a biotic index is designed to evaluate. *[2]*

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(ii) Describe a practical procedure by which you could use a biotic index to measure the impact of motor vehicle pollutants at different distances from a road. *[3]*

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