INTERNATIONAL BACCALAUREATE

ENVIRONMENTAL SYSTEMS

Subsidiary Level

Tuesday 14 May 1996 (afternoon)

Paper 2 — 1 hour 45 minutes

This examination paper consists of 2 Sections.

Section 1 consists of 4 questions.
The maximum mark for each question in Section 1 is 13.

Section 2 consists of 3 Options with 3 questions in each Option.
The maximum mark for each question in all the Options in Section 2 is 13.

The maximum mark for this paper is 39 marks.

This examination paper consists of 5 pages.

INSTRUCTIONS TO CANDIDATES

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

This paper comprises TWO Sections: Section 1 and Section 2.

Answer a total of THREE questions as follows:

Section 1: **Answer at least ONE question.**

Section 2: **Answer at least ONE question from your chosen Option.**

Your THIRD question must be chosen either from Section 1 or from the Option that you selected above.

EXAMINATION MATERIALS

Required/Essential:

None

Allowed/Optional:

Electronic calculator (neither programmable nor graphic display calculators are allowed)
A simple translating dictionary for candidates not working in their own language
Millimetre square graph paper

SECTION 1

Answer at least ONE question from this Section.

1. Human population growth in different countries is influenced by many cultural and economic factors.

(a) Name **five** of these factors and explain their role in the control of population growth. *[10 marks]*

(b) Describe the influence of **one** of the factors you have given above on the human population growth of a **named** country. *[3 marks]*

2. In recent years, much attention has been given to changes in the atmosphere caused by human activities. Describe **three** of these changes and explain how they could affect the life-supporting conditions of the planet. *[13 marks]*

3. Briefly describe a **named** ecosystem that you have studied. *[1 mark]*

For this ecosystem, explain how you could

(i) measure abiotic factors; *[3 marks]*

(ii) estimate abundance of organisms; *[3 marks]*

(iii) estimate biomass of trophic levels; *[3 marks]*

(iv) estimate species diversity. *[3 marks]*

Use diagrams where appropriate to illustrate your answer.

4. On August 26, 1883, the small island of Krakatoa off the West coast of Java in S.E. Asia was completely destroyed by a volcanic eruption. All living organisms on the island were killed and a barren ash-covered rock remained. The nearest land not destroyed by the event was 40 km away. Describe the processes that you think have occurred on the island since the eruption. *[13 marks]*

SECTION 2

This Section consists of three Options. Answer at least ONE question from your chosen Option.

Marine Option

5. The following data refer to the mean annual net primary productivity (NPP) of dry organic matter (g m^{-2} yr^{-1}) in several marine ecosystems:

Ecosystem	NPP/g m^{-2} yr^{-1}
Mangrove swamp	3000
Littoral zone	500
Neritic zone	350
Pelagic zone	170
Bathyal zone	<35
Coral reefs	2500
Benthic zone	35

(a) Define the term 'net primary productivity'. *[1 mark]*

(b) For **four** of the ecosystems above, explain the influence of physical conditions on the NPP. *[4 marks]*

(c) For any **two** of the ecosystems in the table, describe the differences in their structure and functioning, and how these are related to productivity. *[8 marks]*

6. (a) Describe how the distribution of organisms changes with (i) depth of sea, and (ii) latitude. Use diagrams to illustrate your answer. *[7 marks]*

(b) State and explain the main factors affecting the distribution you have described. *[6 marks]*

7. (a) There is a limited supply of fossil fuels. Alternative energy sources need to be found. With the aid of a diagram, briefly describe how we get useful energy from **one** of these alternative sources. *[6 marks]*

(b) What are the problems associated with the use of this alternative energy source? *[3 marks]*

(c) What are the advantages of the use of this alternative energy source compared to fossil fuels? *[4 marks]*

Terrestrial Option

8. The following data refer to the mean annual 'net primary productivity' (NPP) of dry organic matter (g m^{-2} yr^{-1}) in several terrestrial ecosystems:

Ecosystem	NPP/g m^{-2} yr^{-1}
Tropical forest	2000
Temperate grassland	500
Tundra	140
Arid and semi-arid scrub	10
Taiga (boreal forest)	800

(a) Define the term 'net primary productivity'. *[1 mark]*

(b) For **four** of the ecosystems above, explain the influence of physical conditions on the NPP. *[4 marks]*

(c) For any **two** of the ecosystems in the table, describe the differences in their structure and functioning, and how these are related to productivity. *[8 marks]*

9. (a) Describe how the distribution of organisms changes with (i) altitude, and (ii) latitude. Use diagrams to illustrate your answer. *[7 marks]*

(b) State and explain the main factors affecting the distribution you have described. *[6 marks]*

10. (a) There is a limited supply of fossil fuels. Alternative energy sources need to be found. With the aid of a diagram, briefly describe how we get useful energy from **one** of these alternative sources. *[6 marks]*

(b) What are the problems associated with the use of this alternative energy source? *[3 marks]*

(c) What are the advantages of the use of this alternative energy source compared to fossil fuels? *[4 marks]*

Freshwater Option

11. The following data refer to the mean annual net primary productivity (NPP) of dry organic matter (g m^{-2} yr^{-1}) in several freshwater ecosystems:

Ecosystem	NPP/g m^{-2} yr^{-1}
River	3000
Marsh	2500
Bog	900
Lake	170
Pond	250
Estuary	1500
Reservoir	100

(a) Define the term 'net primary productivity'. *[1 mark]*

(b) For **four** of the ecosystems above, explain the influence of physical conditions on the NPP. *[4 marks]*

(c) For any **two** of the ecosystems in the table, describe the differences in their structure and functioning, and how these are related to productivity. *[8 marks]*

12. (a) Describe how the distribution of organisms changes with (i) depth, and (ii) latitude. Use diagrams to illustrate your answer. *[7 marks]*

(b) State and explain the main factors affecting the distribution you have described. *[6 marks]*

13. (a) There is a limited supply of fossil fuels. Alternative energy sources need to be found. With the aid of a diagram, briefly describe how we get useful energy from **one** of these alternative sources. *[6 marks]*

(b) What are the problems associated with the use of this alternative energy source? *[3 marks]*

(c) What are the advantages of the use of this alternative energy source compared to fossil fuels? *[4 marks]*