

**MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD**  
**UNIVERSITY OF MALTA, MSIDA**  
**MATRICULATION EXAMINATION**  
**INTERMEDIATE LEVEL**  
**MAY 2014**

**SUBJECT:** ENVIRONMENTAL SCIENCE  
**DATE:** 6<sup>th</sup> May 2014  
**TIME:** 9.00 a.m. to 12.00 noon

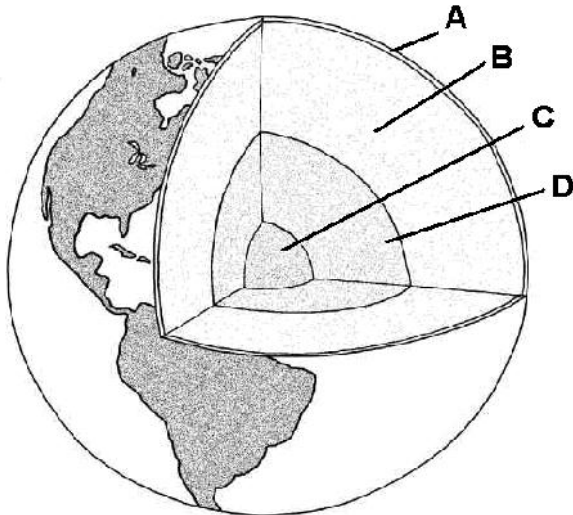
**Answer ALL questions in Section A and any TWO questions from Section B.**

*Section A carries 80 marks and Section B carries 40 marks. You are advised to spend about two hours on Section A and one hour on Section B.*

**Section A**

*Answer all questions from this section.*

1. (a) Label A to D in the diagram below.



A: \_\_\_\_\_

B: \_\_\_\_\_

C: \_\_\_\_\_

D: \_\_\_\_\_

**(4 marks)**

(b) What causes convective currents in **B** and what are their impacts on **A**?

\_\_\_\_\_

\_\_\_\_\_

**(2 marks)**

(c) What makes up the **lithosphere** and where is it found?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**(2 marks)**

**(Total: 8 marks)**

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2. (a) Name **two** human practices which increase the pressure on Maltese land.

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**(2 marks)**

(b) Name **two** physical features which identify different soil horizons.

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**(2 marks)**

(c) Complete the table below with the type of soil horizon that matches the description given in the last column of the table below.

Soil Horizon	Characteristic
	This horizon is characterised by partly weathered or decomposed rock.
	This is a mineral layer containing some organic material. It is usually darker than other layers.
	The makeup of this layer will vary according to the amount of clay, iron and aluminium it contains. Usually its colour is strong red or yellow.

**(3 marks)**

(d) Underline the correct word in each bracket in the following paragraph:

Loam soils generally contain (more / less) nutrients, moisture and humus than sandy soils and are (more / less) easy to till than clay soils. (Sandy / Clay / Loam) soils are considered ideal for gardening and agricultural uses because they retain nutrients and water well, while still allowing excess water to drain away.

**(3 marks)**

**(Total: 10 marks)**

3. (a) Name **three** main benefits of biodiversity.

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**(3 marks)**

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(b) What is **monocropping**? Give **one** example of how monocropping endangers biodiversity.

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*(2 marks)*

(c) Name **one** advantage and **one** disadvantage of using genetically modified crops.

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*(2 marks)*

(d) Name **two** effects by which land clearing may reduce biodiversity.

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*(2 marks)*  
**(Total: 9 marks)**

4. (a) Briefly explain the term **ozone layer**.

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*(2 marks)*

(b) Distinguish briefly between the formation of ozone in the **troposphere** and in the **stratosphere**.

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*(4 marks)*

(c) Name **one** chemical substance or class of chemical substances which have significant ozone depleting potential.

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*(2 marks)*

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(d) Explain how the substances mentioned in (c) react with ozone in the stratosphere.

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*(2 marks)*

(e) Name **two** consequences of ozone depletion.

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*(2 marks)*  
**(Total: 12 marks)**

5. (a) Name **three** types of water pollutants.

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*(3 marks)*

(b) Distinguish between **point sources** and **diffuse sources** of water pollution. Give **one** example of each.

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*(4 marks)*

(c) Explain what is meant by the term **eutrophication**.

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*(2 marks)*

(d) What is the origin of eutrophication?

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*(2 marks)*

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(e) Explain why eutrophication has a negative effect on aquatic life.

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**(3 marks)**

(f) Explain why polluted water smells like rotten eggs.

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**(2 marks)**

**(Total: 16 marks)**

**6. Define the following terms:**

(a) Succession:

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**(2 marks)**

(b) Seral stage:

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**(2 marks)**

(c) Pioneer community:

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**(2 marks)**

(d) Climax community:

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**(2 marks)**

**(Total: 8 marks)**

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7. Complete the table below about terrestrial biomes.

<b>Biome:</b>	Desert			
<b>Climate:</b>		Very cold harsh and long winters; short and cool summers	Cool in winter and hot in summer	Hot all year round
<b>Precipitation:</b>	less than 25cm in a year	10-25cm in a year	25-75cm in a year	200-400cm in a year
<b>Soil:</b>	Poor in animal and plant decay products, but rich in minerals			
<b>Characteristic vegetation:</b>		Lichens, dwarf shrubs, grasses, sedges and mosses	Tall grasses	Most plants are evergreen with large, dark green, leathery leaves.

**(Total: 8 marks)**

8. (a) Explain the meaning of each of the following terms related to population growth.

(i) Exponential growth: \_\_\_\_\_

\_\_\_\_\_  
**(2 marks)**

(ii) Doubling time: \_\_\_\_\_

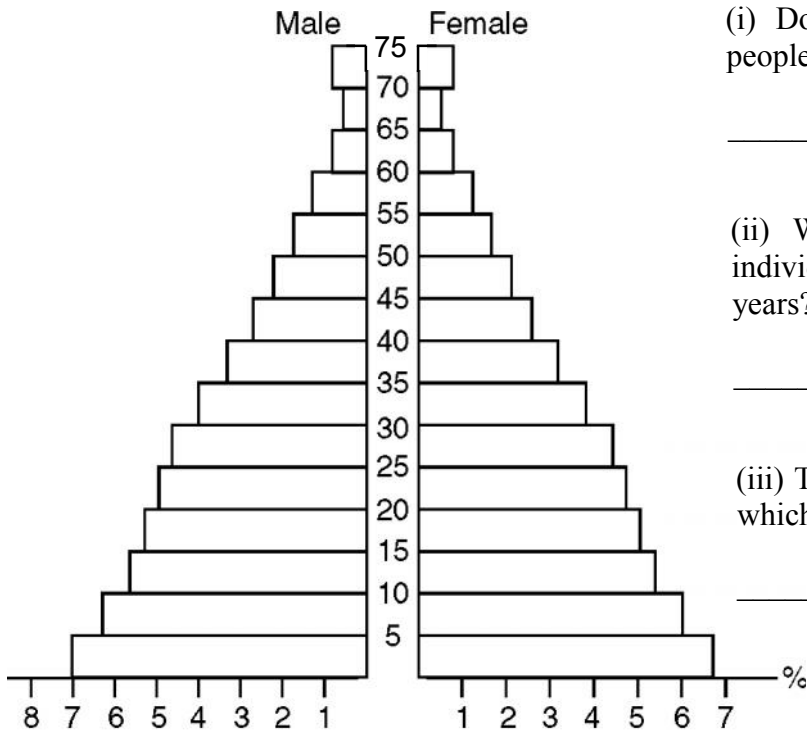
\_\_\_\_\_  
**(2 marks)**

(iii) Zero population growth: \_\_\_\_\_

\_\_\_\_\_  
**(2 marks)**

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(b) Study the age-gender diagram below and answer the questions that follow.



(i) Does this population have more young people or old people?

\_\_\_\_\_ **(1 mark)**

(ii) What will happen to the number of individuals in the population over the next ten years?

\_\_\_\_\_ **(1 mark)**

(iii) This age-gender diagram could belong to which country?

\_\_\_\_\_ **(1 mark)**  
**(Total: 9 marks)**

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**Section B**

Answer any *TWO* questions from this section.

Write your answers in the space provided in *THIS* booklet. If you need more space to continue your answers you may request another booklet from your invigilator.

1. (a) Explain how the level of carbon dioxide in the air changes during each of the following:
- (i) photosynthesis;
  - (ii) respiration; and
  - (iii) burning of fossil fuels. (2, 2, 2 marks)
- (b) Draw a simplified diagram highlighting the main processes involved in the Carbon Cycle. In your diagram include **all** of the following terms:
- |                                     |                              |                     |
|-------------------------------------|------------------------------|---------------------|
| <b>organic compounds in plants</b>  | <b>carbon dioxide</b>        | <b>fossil fuels</b> |
| <b>organic compounds in animals</b> | <b>dead organic material</b> |                     |
- (7 marks)
- (c) Explain how carbon dioxide contributes to the formation of acid rain. (3 marks)
- (d) Name **three** main sources of methane and explain its role as a pollutant. (4 marks)
2. (a) Name **two** advantages of **recycling** of materials. (4 marks)
- (b) Briefly discuss the following statements on recycling as a method of waste disposal.
- (i) Aluminium is one of the most efficiently and widely recycled materials.
  - (ii) Recycling of plastic tends to produce an inferior quality product.
  - (iii) Recycling of glass saves money.
  - (iv) Recycling of paper is not always cost effective. (12 marks)
- (c) Explain the meaning of the term **biodegradable plastic**. Give **two** advantages of using biodegradable plastics over other forms of plastic material. (4 marks)
3. Distinguish between each of the following terms, illustrating your account with suitable examples and diagrams where applicable.
- (a) **Primary**, **secondary** and **tertiary** treatment of sewage. (6 marks)
  - (b) Waste disposal by **open dumps**, **incineration** and **engineered landfill**. (6 marks)
  - (c) **Primary** and **secondary** air pollutants. (4 marks)
  - (d) **Hazardous waste** and **inert waste**. (4 marks)



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4. The atmosphere generally includes variable concentrations of polluting gases and particulate material, some of which are of natural origin, others being anthropogenic. Discuss the main sources and methods of control of **any four** of the following air pollutants, referring also to their possible interaction with other constituents of air.
- (a) oxides of carbon;
  - (b) oxides of sulfur;
  - (c) oxides of nitrogen;
  - (d) particulate matter;
  - (e) volatile organic compounds, VOCs. *(5, 5, 5, 5 marks)*
5. (a) Define **natural resources** and distinguish between **renewable** and **non-renewable** resources. *(3 marks)*
- (b) Discuss the ecological importance of forests. *(5 marks)*
  - (c) Define deforestation and describe the main factors that lead to deforestation. *(2, 5 marks)*
  - (d) Outline the main impacts of deforestation. *(5 marks)*
6. (a) Define the term ecosystem. *(1 mark)*
- (b) Distinguish between the **biotic** and **abiotic** components of an ecosystem and give an example of each. *(4 marks)*
  - (c) Describe how energy flows in an ecosystem in terms of trophic levels. *(7 marks)*
  - (d) Draw a **food chain** with four organisms. *(5 marks)*
  - (e) (i) Draw and label a **pyramid of numbers** for the food chain in (d).  
(ii) Explain why a pyramid of numbers may be inverted in some ecosystems.  
(iii) Describe the main difference between a pyramid of biomass and a pyramid of numbers. *(1, 1, 1 marks)*
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