

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA
MATRICULATION EXAMINATION
INTERMEDIATE LEVEL
MAY 2016

SUBJECT: ENVIRONMENTAL SCIENCE
DATE: 23rd April 2016
TIME: 4:00 p.m. to 7:05 p.m.

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) Soil is mainly formed by the decomposition of dead residues and rock weathering. Name and describe the **THREE** main types of weathering.

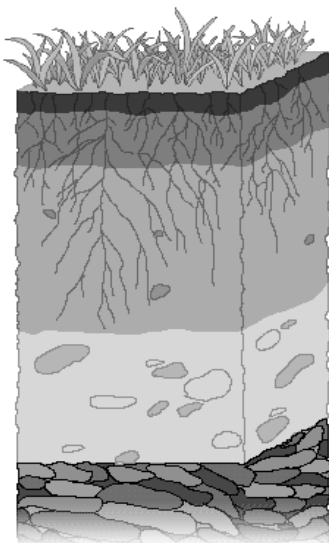
(i) _____ : _____

(ii) _____ : _____

(iii) _____ : _____

(2, 2, 2 marks)

(b) The diagram represents a soil profile showing the different soil layers.



(i) Give another term used instead of 'layers': _____
(1 mark)

(ii) Complete the following table by choosing the appropriate term from the following:

Weathered parent material Subsoil Topsoil

	Formed from 10,000 to 100,000 years ago
	Very rich in organic matter
	Plant roots hardly penetrate into this layer

(3 marks)

DO NOT WRITE ABOVE THIS LINE

(c) Briefly describe **TWO** ways in which the management of the topography can be useful in preventing soil erosion.

(4 marks)
(Total: 14 marks)

2. (a) The diagram shows the three different zones of an open sea where the water column is illuminated to different degrees. Name the **THREE** zones and identify the principal inhabitants, stating their characteristic feature.

Zone P: _____

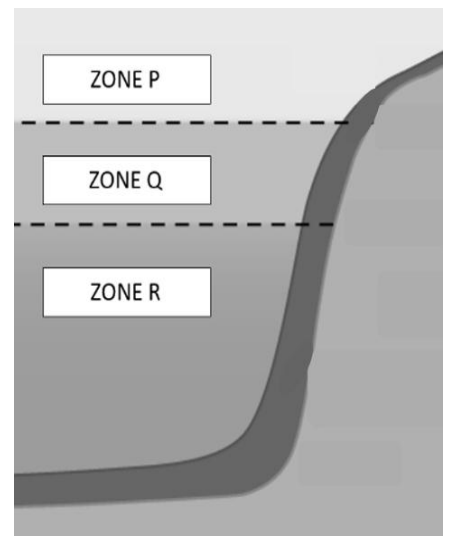
Zone Q: _____

Zone R: _____

(6 marks)

(b) Give **TWO** reasons why the coastal zone is very important for the fishing industry.

(2 marks)



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(c) Fill in the missing term to complete the following sentence:

A _____ is an oceanic water layer in which water temperature decreases rapidly with increasing depth. (1 mark)

(d) Briefly describe how tides are formed.

(2 marks)

(Total: 11 marks)

3. (a)

(i) Distinguish between a **primary** and a **secondary** atmospheric pollutant.

Primary pollutant: _____

Secondary pollutant: _____

(1, 1 mark)

(ii) Classify the following as primary pollutants, secondary pollutants or non-polluting components of air:

sulfur dioxide	carbon monoxide	sulfuric acid	ozone
nitrogen	water vapour	smog	volatile organic compounds

Primary pollutant/s	Secondary pollutant/s	Non-polluting substance/s

(4 marks)

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(b) Explain what is meant by **anthropogenic** and **natural** sources of air pollution, illustrating your answer by giving **TWO** examples of each.

(i) **Anthropogenic source of pollution:** _____

Two examples of anthropogenic sources: _____

(ii) **Natural source of pollution:** _____

Two examples of natural sources: _____

(3, 3 marks)

(Total: 12 marks)

4. A recent study showed that Malta’s groundwater and surface water are among the European Union’s most polluted by nitrates.

(a) Distinguish between the terms **groundwater** and **surface water**.

Groundwater: _____

Surface water: _____

(4 marks)

(b) Name **TWO** human activities that may bring about an increase in the concentration of nitrates in groundwater.

Activity 1: _____

Activity 2: _____

(2 marks)

(c) Explain why:

(i) the water sources in regions such as Mizieb and Comino were found to have acceptable levels of nitrates;

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(ii) crops requiring a high level of irrigation exceed acceptable limits of nitrates;

(iii) a high level of nitrates in water is undesirable.

(2, 2, 2 marks)

(d) Briefly explain how climate change affects groundwater resources.

(4 marks)

(Total: 16 marks)

5. (a) Give **TWO** reasons why living organisms require energy.

(2 marks)

(b) How do green plants obtain their energy?

(3 marks)

(c) How do animals obtain the energy they need?

(1 mark)

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(d) In the space provided, draw a food chain with **FOUR** local organisms.

(4 marks)

Referring to your food chain:

(i) Name the **producer** and **secondary consumer**:

Producer: _____

Secondary consumer: _____

(1, 1 marks)

(ii) What does each arrow in the food chain represent?

(1 mark)

(iii) What is a trophic level?

(1 mark)

(iv) How many trophic levels does your food chain consist of? _____

(1 mark)

(Total: 15 marks)

6. (a) Where does primary succession occur?

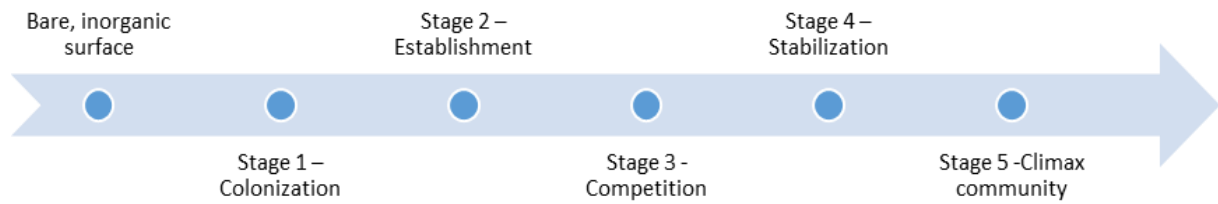
(1 mark)

(b) Why does secondary succession proceed faster than primary succession?

(1 mark)

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(c) The diagram below shows the different stages in a succession.



(i) In which stage would there be the highest diversity of organisms? _____
(1 mark)

(ii) Give **TWO** characteristics of plants that you would expect to find in Stage 1.

(2 marks)

(iii) What do plants compete for in Stage 3?

(2 marks)

(iv) What determines the type of vegetation found in the climax community?

(1 mark)

(d) What can be the effects of disturbance in a succession?

(2 marks)

(e) Mention **TWO** ways how humans can interfere with the process of succession.

(2 marks)
(Total: 12 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) Rocks can be grouped in three classes. Name and give a brief description of each class. (6 marks)
 - (b) With the aid of a diagram, explain how the **THREE** classes are connected in the **rock cycle**. (6 marks)
 - (c) “The Maltese Islands are made up of layers of *biogenic sedimentary rocks*”. Explain the term in italics and identify the rocks of the Maltese Islands giving their principal characteristics, including the approximate thickness of the rock layer and typical fossil remains. In your description, place the rocks in a sequence according to age, identifying **clearly** the oldest and youngest rock. (8 marks)
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2. (a) Draw a diagram of the Earth’s interior structure. Indicate the **FOUR** main layers and give a brief description about each layer. (10 marks)
 - (b) Distinguish between:
 - (i) the asthenosphere and the lithosphere; (4 marks)
 - (ii) converging, diverging and conservative plate boundaries. (6 marks)
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3. (a) Write an illustrated account explaining the main features of the natural greenhouse effect. (8 marks)
 - (b) What is the major factor causing an enhanced greenhouse effect? Briefly describe any **THREE** effects that are thought to be linked to the enhanced greenhouse effect and **TWO** measures which may be taken to reduce it. (12 marks)
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4. (a) Allotropy is the property of some chemical elements to exist in two or more different forms, in the same physical state. Ozone is said to be an ‘allotrope of oxygen’. State how ozone is different from ordinary oxygen in terms of molecular structure and chemical reactivity. Write a chemical equation to show the conversion of ozone to oxygen. (3 marks)
 - (b) Explain what is meant by the **ozone layer** and how it is related to ultra-violet radiation reaching the earth. In your account, mention how pollution is leading to ozone depletion and include **THREE** effects brought about by ozone depletion. (11 marks)
 - (c) Ozone is one of the main components of photochemical smog.
 - (i) Explain how ozone is formed in the troposphere.
 - (ii) Explain why tropospheric ozone is considered as a health hazard. (6 marks)

