

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL
SEPTEMBER 2014

SUBJECT:	ENVIRONMENTAL SCIENCE
DATE:	6 th September 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) Briefly explain what causes the movement of tectonic plates.

(3 marks)

(b) The place where the two tectonic plates meet is called a plate boundary. Use the space below to (i) *name* the three different types of plate boundaries and (ii) draw simple diagrams to illustrate them.

(6 marks)

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(c) Name and briefly explain **two** physical Earth features that are a result of plate tectonics.

(i) _____ : _____

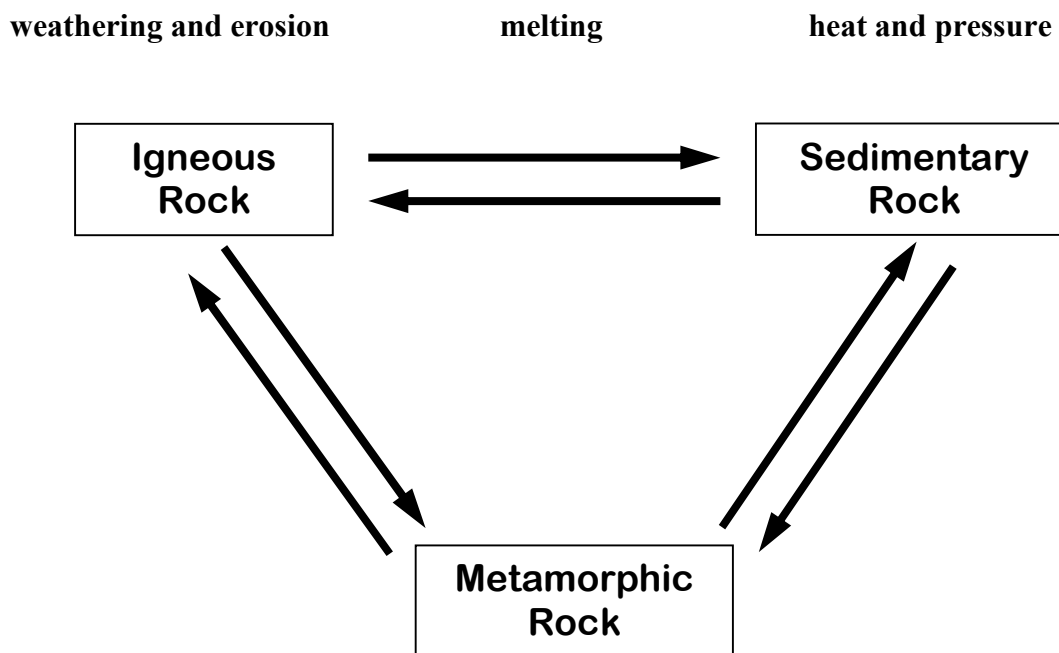
(ii) _____ : _____

(4 marks)
(Total: 13 marks)

2. (a) Give **two** differences between rocks and minerals.

(2 marks)

(b) Complete the diagram of the Rock Cycle shown below by labelling **every** arrow with any one of the following terms. *Each term may be used more than once.*



(6 marks)

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(c) Give **one** example of:

(i) an igneous rock: _____

(ii) a sedimentary rock: _____

(iii) a metamorphic rock: _____

(3 marks)

(d) In the space below draw a simple diagram showing the different layers of rocks of the Maltese Islands.

(6 marks)

(Total: 17 marks)

3. (a) Explain why:

(i) Pure water is neutral and has a pH of 7.0 while natural unpolluted rainwater has a pH of about 5.6.

(2 marks)

(ii) Acid rain has a lower pH than natural rainwater.

(2 marks)

(iii) Human activity increases dramatically the concentrations of acid-producing oxides in the atmosphere.

(2 marks)

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(iv) Maltese tap water is said to be 'hard' and tends to have a pH higher than 7.0.

(2 marks)

(b) Write a chemical equation to explain the reaction which makes natural unpolluted water acidic and name the acid that forms during the reaction.

(3 marks)

(c) Mention **two** effects of acid rain on the environment.

(4 marks)**(Total: 15 marks)**

4. Complete the following account on atmospheric pollution by choosing the appropriate term from the following list. *Each term may be used once, more than once or not at all.*

carbon monoxide	oxygen	sulfur dioxide
haemoglobin	sunlight	particulate matter
visibility	primary	secondary
incomplete	respiration	nitrates & sulfates
lung and heart	vegetation	volatile organic compounds

Ground level ozone is a _____ pollutant as it is not emitted directly into the air. It is produced by reaction of other pollutant gases including _____ in the presence of _____.

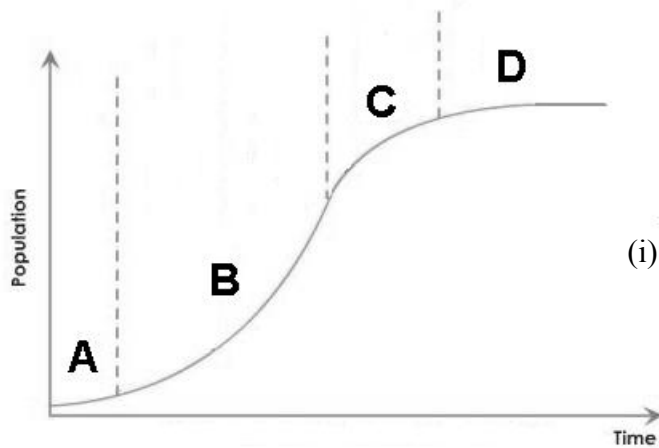
Breathing ozone can trigger a number of problems related to _____.

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Ozone can also harm _____ . Pollution from _____ is made up of a number of components such as _____, organic compounds, metallic compounds and soil. This type of pollution affects people suffering from _____ problems. It also reduces _____ by scattering light. _____ is a colourless, odourless gas produced during the _____ combustion of fuels. It reacts with _____ in the blood and reduces delivery of _____ to the organs and tissues of the human body.

(Total: 13 marks)

5. (a) The diagram below shows the growth curve of a population of yeast.



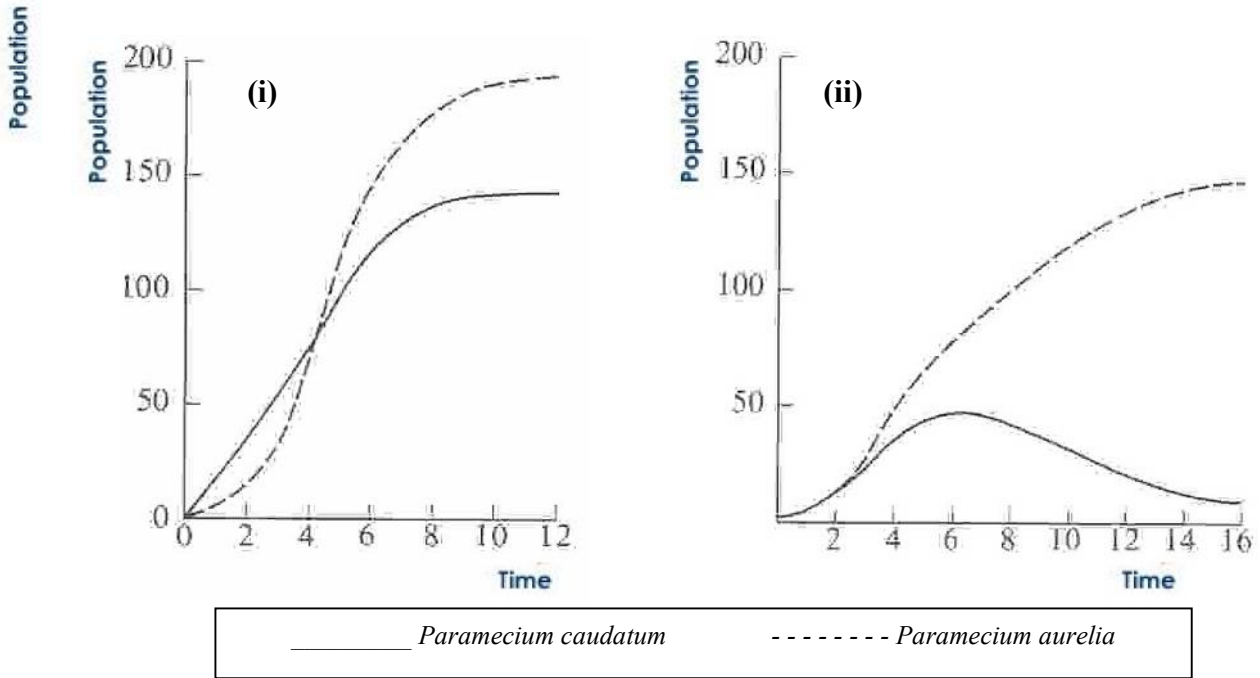
(i) Briefly describe what is happening to the yeast population in the phases outlined on the graph.

- A: _____
- _____
- B: _____
- _____
- C: _____
- _____
- D: _____
- _____

(4 marks)

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(b) The diagram below shows the growth of two species of Paramecium when (i) cultured separately and (ii) cultured together.



Describe and explain the differences in the growth patterns exhibited by the two species when:

(i) cultured separately: _____

_____ (1 mark)

(ii) cultured together: _____

(4 marks)
 (Total: 9marks)

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6. Fill the following table by inserting either the keyword or the definition.

Keyword	Definition
	The organisms that make up the final stage of ecological succession
Conservation	
	Competition between organisms of different species
	Competition between organisms of the same species
Pioneer species	
	A group of interbreeding organisms of one species in a habitat
Secondary succession	
	A group of organisms that can breed together to produce fertile offspring
Community	

(Total: 13 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) Malta is listed among the ten poorest countries globally in terms of water resources per inhabitant. List **four** factors which contribute to Malta's position in terms of water resources. **(4 marks)**
 - (b) Explain the consequences on the island's mean sea level aquifer, when groundwater is pumped beyond its natural recharge rate. **(4 marks)**
 - (c) The quality of the groundwater is degraded by the increasing concentrations of nitrates.
 - (i) Name **two** major sources of nitrates in groundwater. **(2 marks)**
 - (ii) Explain how nitrates reach the groundwater. **(2 marks)**
 - (d) Briefly describe the main processes occurring in a reverse osmosis plant. **(6 marks)**
 - (e) Comment about **one** advantage and **one** disadvantage concerning the use of reverse osmosis plants by small islands. **(2 marks)**

2. (a) Describe how **each** of the following agricultural practices endangers the soil's biodiversity:
 - (i) Monocropping.
 - (ii) Clearing of land.
 - (iii) Use of pesticides. **(3, 3, 3 marks)**
- (b) Briefly explain the meaning of the term **sustainable agriculture**. **(2 marks)**
- (c) Explain how each of the following soil conservation techniques enhances sustainable agricultural practices:
 - (i) Terracing.
 - (ii) Multicropping.
 - (iii) Windbreaks. **(3, 3, 3 marks)**

3. (a) Draw a well-labelled diagram and use it to explain the 'greenhouse effect' and 'global warming'. **(8 marks)**
 - (b) Briefly describe **two** ways in which *named* greenhouse gases containing carbon are emitted into the atmosphere. **(2 marks)**
 - (c) Name **two** greenhouse gases that do not contain carbon. **(2 marks)**
 - (d) Write an equation that represents a chemical reaction by which carbon dioxide is removed from the atmosphere. **(2 marks)**

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- (e) Name **three** observed changes which indicate that planet Earth is experiencing a climate change. **(3 marks)**
- (f) Explain the impact of 'deforestation' on the greenhouse effect. **(3 marks)**
4. (a) Distinguish between industrial smog and photochemical smog. **(4 marks)**
- (b) Name **two** pollutants associated with industrial smog and another **two** pollutants which may be found in photochemical smog. **(4 marks)**
- (c) Explain the origin of the *brown haze* in photochemical smog. **(2 marks)**
- (d) Sketch a graph of height (altitude) against temperature and use it to explain the formation of a temperature inversion (or thermal inversion). Explain how temperature inversion affects the quality of air. **(4 marks)**
- (e) Describe **two** harmful effects of photochemical smog on living things. **(4 marks)**
- (f) Discuss **one** effective way of reducing the formation of photochemical smog. **(2 marks)**
5. (a) Define each the following terms: trophic level; food chain; food web; producer; consumer; and decomposer. **(12 marks)**
- (b) Explain how energy enters an ecosystem and is transferred between organisms. **(4 marks)**
- (c) Mention **four** ways by which energy is lost along a food chain. **(4 marks)**
6. (a) Explain the principle of competition and list **three** factors that organisms compete for. **(5 marks)**
- (b) Explain parasitism and distinguish between ectoparasites and endoparasites, illustrating your answer with examples. **(6 marks)**
- (c) List **three** ways by which parasites can be transmitted. **(3 marks)**
- (d) Compare commensalistic and mutualistic interactions, using **two named** examples for each interaction. **(6 marks)**
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