

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA
MATRICULATION EXAMINATION
INTERMEDIATE LEVEL
MAY 2015

SUBJECT: ENVIRONMENTAL SCIENCE
DATE: 28th April 2015
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) Rewrite the following terms in increasing order of size, starting from the smallest:

Galaxy

Solar System

Universe

Planet

(1 mark)

(b) (i) How many planets are found in our solar system? _____

(ii) What is the Earth's place relative to the sun in our solar system? _____
(1, 1 marks)

(c) (i) Define the term **albedo**.

(1 mark)

(ii) Name a region on Earth that has a high albedo: _____
(1 mark)

(iii) Briefly explain how the Earth maintains a temperature that is suitable for life.

(5 marks)

(Total: 10 marks)

DO NOT WRITE ABOVE THIS LINE

2. Answer the following questions with reference to the Carbon Cycle.

(a) Name and briefly explain **one** process **involving living organisms** (except humans) by which carbon is **removed** from the atmosphere.

_____ :

_____ (2 marks)

(b) Name **two** processes **involving living organisms** (except humans) by which carbon is **returned** to the atmosphere. Briefly explain each process.

(i) _____ :

(ii) _____ :

_____ (2, 2 marks)

(c) Mention **two** human activities that **increase** the amount of carbon dioxide in the atmosphere.

_____ (2 marks)

(d) Mention **two** human activities that help **reduce** the amount of carbon dioxide in the atmosphere.

_____ (2 marks)

(Total: 10 marks)

3. (a) Briefly explain how each of the following procedures contribute to soil erosion.

(i) Deforestation: _____

(ii) Overgrazing: _____

_____ (2, 2 marks)

DO NOT WRITE ABOVE THIS LINE

(b) Briefly explain how each of the following agricultural practices conserve soil.

(i) Strip cropping: _____

(ii) Contour ploughing: _____

(iii) Field terracing: _____

(2, 2, 2 marks)
(Total: 10 marks)

4. Carbon monoxide is an example of a **primary atmospheric pollutant**.

(a) Explain what is meant by the term 'primary atmospheric pollutant'.

_____ *(2 marks)*

(b) Explain why car exhaust usually contains some carbon monoxide.

_____ *(2 marks)*

(c) Explain why carbon monoxide is considered as a particularly dangerous pollutant.

(4 marks)

(d) Name **one** important measure taken to control the level in the atmosphere of carbon monoxide, especially in traffic congested urban areas.

_____ *(2 marks)*

DO NOT WRITE ABOVE THIS LINE

(e) Name **two** other primary air pollutants.

(2 marks)
(Total: 12 marks)

5. Complete the following account on sewage treatment by choosing the appropriate term from the following list of terms. Each term is only to be used **once**.

aerobic	lagoons	phosphates	gravel
bacteria	microorganisms	precipitation	oxygen
ecosystem	nitrates	settling	solid
fats and oils	organic	sludge	

In the primary treatment of wastewater / sewage, the waste is first filtered by passing through _____ which removes the _____ waste and converts it into _____. The waste is then passed into _____ tanks to allow some time for the smaller particles to settle to the bottom and the lighter substances such as _____ to rise to the top.

Secondary treatment breaks down waste using _____ such as _____ bacteria which consume the _____ components of the sewage. Sewage is often mixed with air to facilitate decomposition as _____ is critical to the growth of _____.

Tertiary treatment is applied to further clean water before being discharged into a sensitive _____. Nutrients such as _____ and _____ can be removed using _____ which contain native plants, bacteria, algae and zooplankton. Heavy metal ions and phosphates are usually removed by chemical _____.

(Total: 15 marks)

DO NOT WRITE ABOVE THIS LINE

6. (a) What is a niche?

(1 mark)

(b) Why do organisms compete?

(2 marks)

(c) Which type of competition is more intense: interspecific or intraspecific? Why?

(2 marks)

(d) Define succession.

(1 mark)

(e) Distinguish between the following terms:

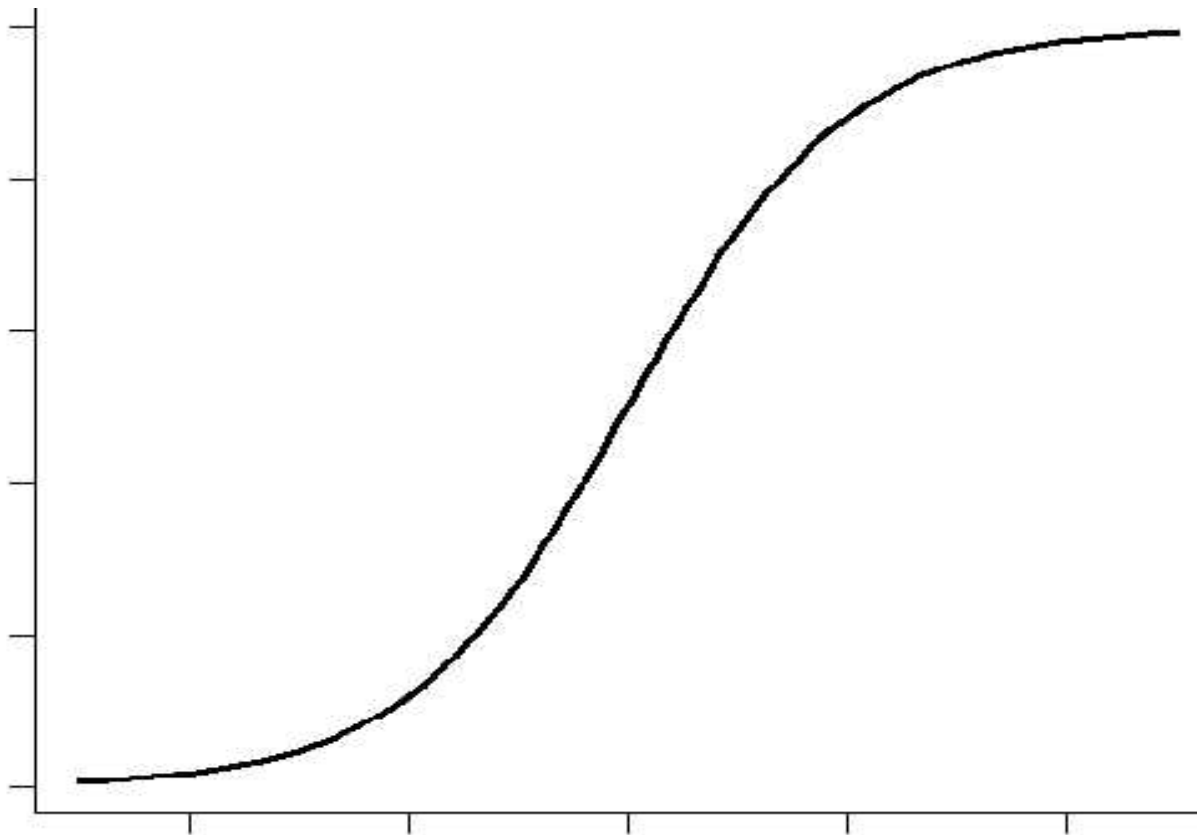
(i) Pioneer community: _____

(ii) Climax community: _____

(1, 1 marks)
(Total: 8 marks)

DO NOT WRITE ABOVE THIS LINE

7. (a) Label the axes and the key phases of a sigmoidal population growth curve in the diagram below.



(6 marks)

(b) Fill in the table below to distinguish between the different phases in a sigmoidal population growth curve. The first one has been completed for you.

Phase	Rate of growth	Reason
Lag	Very low	Population is still acclimatizing to the new environment
Exponential		
Transitional		
Stationary		

(6 marks)

DO NOT WRITE ABOVE THIS LINE

- (c) Define **carrying capacity** and label the point on the graph with an **X** to show when carrying capacity has been reached.

(3 marks)

(Total: 15 marks)

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) Distinguish between the terms **mineral** and **rock**. (1, 1 marks)
- (b) Use a table, with the headings shown below, to summarise the origin of each type of different rock, giving an example in each case.

Type of rock	How was it formed?	Example
--------------	--------------------	---------

(6 marks)

- (c) With reference to specific examples, explain the negative environmental impact of mining and purification methods used for the extraction of mineral ores. (12 marks)
2. (a) Briefly explain how earthquakes are caused. (5 marks)
- (b) Draw a diagram to show the relationship between a fault line and an earthquake's focus and epicentre. (3 marks)
- (c) In terms of plate tectonics, explain why earthquakes tend to occur in specific regions of the world. (2 marks)
- (d) Briefly describe how volcanoes are formed. (4 marks)
- (e) Give **three** reasons why people choose to live close to volcanoes. (6 marks)
3. (a) Describe how ozone molecules are formed in the stratosphere. (3 marks)
- (b) Explain why stratospheric ozone is considered as 'good ozone'. Outline how ozone depletion occurs in the stratosphere and name **two** negative effects of this depletion. (10 marks)
- (c) Explain why ozone forming in the troposphere is considered to be 'bad ozone'. Name **two** negative effects of tropospheric ozone pollution. (7 marks)

DO NOT WRITE ABOVE THIS LINE

4. (a) Distinguish between the terms **biological oxygen demand** (BOD) and **chemical oxygen demand** (COD). **(4 marks)**
- (b) Explain why a high BOD has a detrimental effect on aquatic organisms. **(2 marks)**
- (c) Explain the meaning of the term **eutrophication**. **(4 marks)**
- (d) Name the **two** ions which are usually responsible for eutrophication of lakes and rivers, and state **one** possible source of each of these ions. **(4 marks)**
- (e) Describe **one** negative effect of eutrophication on a freshwater system. **(3 marks)**
- (f) Lakes and rivers which have experienced serious eutrophication can sometimes develop a foul smell. Name **two** gases which might be produced and explain their origin. **(3 marks)**
5. (a) What is a biome? **(2 marks)**
- (b) Choose any **two** biomes from the following: Tundra, Desert, Temperate forests, Grassland, Mediterranean scrubland, and Tropical rainforest. State the climatic patterns (precipitation and temperature) and the dominant type of vegetation of the biomes chosen. **(3, 3 marks)**
- (c) Distinguish between an **ecotone** (transitional ecosystem) and an **ecosystem** and give an example of each. **(3, 3 marks)**
- (d) Distinguish between **resistance** and **resilience** of ecosystems. Illustrate your answer with specific examples. **(3, 3 marks)**
6. (a) What is parasitism? **(2 marks)**
- (b) Distinguish between **ectoparasites** and **endoparasites** and give an example of each. **(4 marks)**
- (c) Choose a parasite and list **three** adaptations to its parasitic way of life. **(3 marks)**
- (d) Explain the relationship between a predator and a prey and give **one** example of such a relationship. **(3 marks)**
- (e) Suggest **two** ways how prey can become adapted to their predator. **(2 marks)**
- (f) Define mutualism and give **one** example stating the role of each organism in the relationship. **(3 marks)**
- (g) Explain the principle of competitive exclusion. **(3 marks)**
-

