



SUBJECT: **Environmental Science**
 DATE: 20th May 2023
 TIME: 9:00 a.m. to 12:05 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) Complete the passage below by inserting the correct word or term in the spaces provided. Each term may be used once or not at all.

atmosphere	biosphere	climate	densest
exosphere	gravity	hydrosphere	infrared
least dense	mesosphere	ozone	stratosphere
thermosphere	troposphere	ultraviolet	weather

The _____ refers to the gases that surround the Earth and is held in place by _____. This layer of gases is not uniform, and its properties change with altitude. It can be considered in terms of different layers that can be distinguished from each other. The layer closest to Earth is known as the _____. It is the _____ layer and _____ occurs mainly in this layer. Above this layer we find the _____. Part of this layer has a relatively high concentration of _____ which reduces the amount of _____ radiation reaching the Earth's surface. The next layer is the _____, above which is the _____, where temperatures are very high. The outermost layer is the _____ which is the _____ layer.

(6)

Question continues on next page.

(b) Briefly describe how a temperature inversion occurs and how it affects the atmosphere.

(4)

(Total: 10 marks)

2. (a) Distinguish between the lithosphere and the asthenosphere.

(4)

(b) Complete the table below about terms concerning earthquakes.

	The place (geographic location) on the earth's surface vertically above which an earthquake rupture originates.
	The place within the Earth's crust where an earthquake actually starts.
Aftershocks	
Magnitude	
Intensity	

(5)

(c) Name and briefly describe the **THREE** types of plate boundaries.

(i) _____ : _____

(3)

(ii) _____ : _____

(3)

(iii) _____ : _____

_____ (3)

(Total: 18 marks)

3. Mention **TWO** examples to illustrate each of the following terms.

(a) Toxic metal water pollutants: _____

_____ (2)

(b) Greenhouse gases: _____

_____ (2)

(c) Fossil fuels: _____

_____ (2)

(d) Biofuels: _____

_____ (2)

(e) Renewable energy sources: _____

_____ (2)

(f) Pollutants removed by the catalytic converter: _____

_____ (2)

(g) Acids found in acid rain: _____

_____ (2)

(h) Organic waste products: _____

_____ (2)

(i) Hazardous waste: _____

_____ (2)

(Total: 18 marks)

4. Distinguish clearly between the following closely related concepts.

(a) Ecosystem and Biosphere

_____ (2)

Question continues on next page.

(b) Primary Pollutants and Secondary Pollutants

_____ (2)

(c) Eutrophication and Biomagnification

_____ (2)

(d) Weather and Climate

_____ (2)

(Total: 8 marks)

5. (a) Complete the table by selecting the appropriate term from the list below. Each term may be used once, more than once or not at all.

- crude birth rate**
- recruitment**
- population density**
- density dependent factors**
- natality**
- carrying capacity**
- density independent factors**
- mortality**
- census**

Statement	Term
The maximum number of individuals in a population that a particular habitat can support.	
They include interactions between individuals such as competition and predation.	
They include physical and chemical phenomena such as a sudden fall in temperature and seasonal cycles.	
The introduction of new individuals into a population either through birth, maturation, or immigration.	
Their intensity increases as the number of individuals in a population increase.	

(5)

(b) Complete the table by identifying the appropriate demographic transition stage number.

	Statement	Stage number
(i)	The stage experiencing the highest growth rate.	
(ii)	Population is still adapting to the new environment, thus experiencing a very low growth rate.	
(iii)	The population is experiencing low birth rate and an increase in the aging population.	
(iv)	Carrying Capacity is reached.	
(v)	Increasing birth rate and decreasing death rate.	

(5)

(Total: 10 marks)

6. The two food chains shown below are commonly present in free-range farms. The first one is composed of four trophic levels whilst the second one is composed of only two trophic levels.

Corn → Slug → Chicken → Human

Corn → Human

(a) Define the term trophic level.

(1)

(b) Only 10% of the available energy is passed across trophic levels. If the corn provides 1600 J of energy, in the space below, calculate the approximate amount of energy that reaches the human:

(i) After the human ate a chicken, which ate slugs that ate the corn. *Show your working.*

(3)

Question continues on next page.

(ii) After the human ate the corn directly. *Show your working.* (1)

(c) With reference to the answers in part (b), state which food chain shows the greater ecological efficiency and explain why.

(3)

(d) (i) From the food chains above, identify a predator. (1)

(ii) Explain why the predator's population is commonly smaller than the prey's population.

(2)

(iii) Chickens feeding on slugs can seriously become ill or even die due to worms living inside the slugs. State and describe the biological interaction between the worms and the chickens that is causing this illness.

(3)

(iv) Describe the effect on the first food chain shown above, if the population of chickens would decrease due to the illness mentioned in part (d)(iii).

(2)

(Total: 16 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. Give brief explanations and distinguish between the following terms relating to the water cycle:
- (a) Surface runoff and groundwater. (4)
 - (b) Evaporation and transpiration. (4)
 - (c) Condensation and precipitation. (4)
 - (d) Perched and mean sea level aquifers. (4)
 - (e) Infiltration and interception. (4)

(Total: 20 marks)

2. Explain how **each** of the following agricultural practices is negatively impacting biodiversity and for **each** practice suggest **ONE** action that can be adopted to reduce its negative impact.
- (a) Monocropping. (4)
 - (b) Clearing of land. (4)
 - (c) Use of pesticides. (4)
 - (d) Use of chemical fertilizers. (4)
 - (e) Genetically modified crops. (4)

(Total: 20 marks)

3. (a) Distinguish briefly between natural and anthropogenic climate change. (2)
- (b) Explain what is meant by the term Milankovitch cycles and how these contribute to natural fluctuations in the climate of our planet. (4)
- (c) Name **TWO** other natural phenomena that affect climate change. (2)
- (d) Describe **THREE** possible anthropogenic causes of global climate change. (6)
- (e) Briefly outline **THREE** significant consequences of global warming that are **not** derived from natural sources. (6)

(Total: 20 marks)

4. (a) Explain what is meant by water pollution. (2)
- (b) Explain why water is said to be uniquely vulnerable to becoming polluted. (2)
- (c) Describe **TWO** major sources of water pollution. (4)
- (d) Distinguish between point source and diffuse (non-point) source water pollution, giving **ONE** example of **each** type. (4)
- (e) Explain the term groundwater and indicate how this can become polluted. (4)
- (f) Describe **ONE** effect of water pollution on human health and **ONE** impact on the environment. (4)

(Total: 20 marks)

5. Australia has one of the largest population of wild camels. This rapidly spreading species was introduced in Australia in the 19th century and is now considered as a pest.
- (a) Identify and sketch the model of population growth that is representing the camel population in Australia. Explain your answer. (5)
 - (b) State and describe the biome that camels typically inhabit. (5)
 - (c) Describe **TWO** adaptations of animals (such as the camel) living in the biome mentioned in part (b). (4)
 - (d) In terms of stability of ecosystems explain the stability of grasslands when faced with wildfires. (6)

(Total: 20 marks)

Please turn the page.

