

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

---

<b>SUBJECT:</b>	BIOLOGY
<b>DATE:</b>	5 <sup>th</sup> May 2016
<b>TIME:</b>	4:00 p.m. to 7:05 p.m.

---

### Directions to Candidates

- Write your index number in the space at the top left-hand corner of this page.
- Answer ALL questions in Section A and TWO questions from Section B.
- Write all your answers to questions from Section A in the spaces provided in this booklet. **Candidates are advised that under no circumstance should answers to Section A be submitted in the separate answer booklet provided.**
- Write all your answers to questions from Section B in the separate answer booklet provided.
- **If more than two questions from Section B are attempted, only the first two answers shall be taken into consideration.**
- The mark allocation is indicated at the end of each question. Marks allocated to parts of questions are also indicated.
- You are reminded of the necessity for good English and orderly presentation in your answers.
- In calculations you are advised to show all the steps in your working, giving your answer at each stage.
- The use of electronic calculators is permitted.

---

**For examiners' use only:**

Question	1	2	3	4	5	6	7	8	9	10	11	Total
<b>Score</b>												
<b>Maximum</b>	11	7	10	4	6	12	25	25	25	25	25	100

DO NOT WRITE ABOVE THIS LINE

---

**SECTION A:** Answer **ALL** questions in this section.

1. This question is about the chemicals found in living organisms.

1.1 List the **FOUR** most common chemical elements found in living organisms.**[two marks]**  

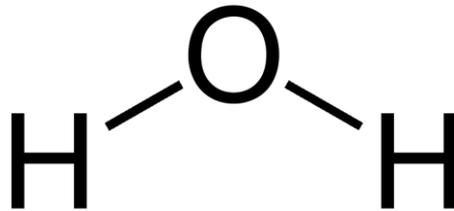
---

---

1.2 List another **TWO** chemical elements needed by organisms.**[one mark]**  

---

1.3 Label the diagram to show the polarity of the water molecule.

**[two marks]**

1.4 Explain the relationship between the following water properties and its uses in living organisms:

Water as a coolant:

---

---

Water as a transport medium:

---

---

Water as a habitat:

---

---

**[six marks]****[Total: eleven marks]**

DO NOT WRITE ABOVE THIS LINE

---

2. This question is about human impact on the environment.

2.1 Human activities can greatly accelerate the process of environmental degradation and loss of biodiversity. Describe **ONE** harmful effect on the environment caused by each of the activities listed in the table below.

Agriculture	
Waste disposal	
Environmental pollution	

[three marks]

2.2 The Paris UN Climate Conference in November 2015 represented a historic opportunity to put the world on course to meet the climate change challenge. Name **ONE** factor that is causing this drastic climatic change.

---

---

[two marks]

2.3 List **TWO** activities through which citizens can contribute to help place Malta on a more environmentally sustainable pathway.

---

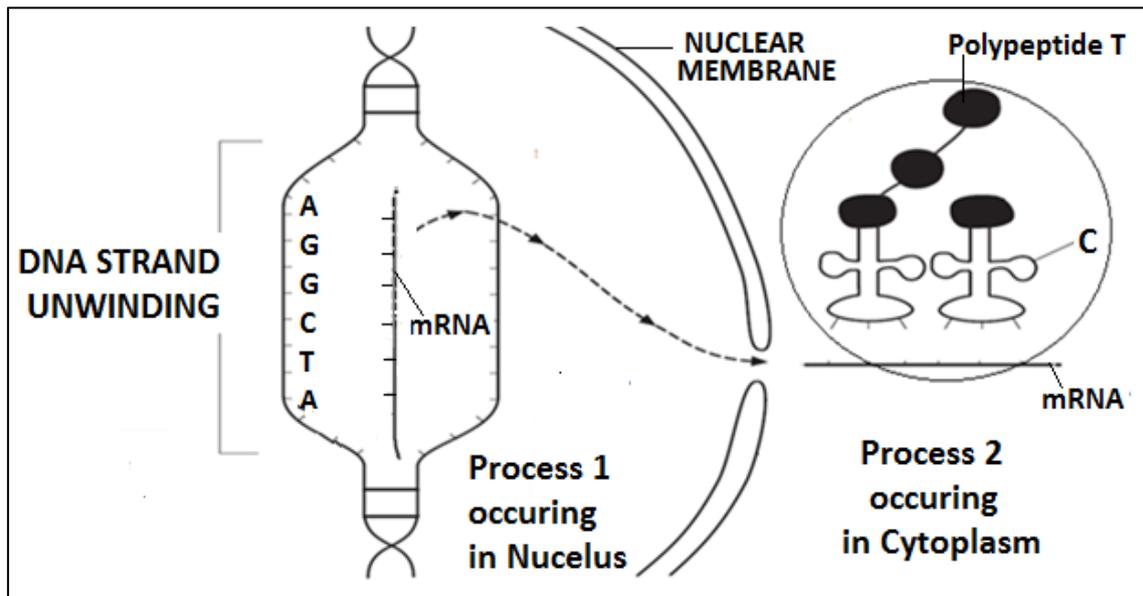
---

---

[two marks]

[Total: seven marks]

3. This question concerns protein synthesis.



A diagrammatic representation of Protein Synthesis occurring in a cell.

3.1 In protein synthesis the sequence of bases in DNA determines the order of amino acids in a polypeptide chain. If the DNA sequence in the diagram above is **AGGCTA**, what would the complementary sequence on the mRNA strand be?

[two marks]

3.2 Identify the following processes and structures shown in the diagram.

Process 1 \_\_\_\_\_

Process 2 \_\_\_\_\_

Structure C \_\_\_\_\_

[three marks]

3.3 Process 2 is initiated once the mRNA strand moves into the cytoplasm. What is the final product of Process 2?

[two marks]

DO NOT WRITE ABOVE THIS LINE

- 3.4 During Processes 1 and 2, various gene mutations can occur. The table shows the DNA base sequences that code for three amino acids.

DNA base sequence (s) coding for amino acids	Amino Acid
TAC	Methionine
GGA GGT GGC GGG	Proline
ATA ATG	Thyrosine

Using only the information in the table above, explain what feature of the DNA reduces the number of mutations during protein synthesis.

---



---

[three marks]

[Total: ten marks]

4. This question is about Diversity of Life.

Give the Kingdom which best fits the following descriptions:

Description	Kingdom
Multicellular organisms that lack a cell wall, and that are heterotrophs	
Eukaryotic organisms made up of hyphae	
Multicellular organisms having a cellulose cell wall and containing photosynthetic pigments	
Simple eukaryotic organisms that lack complex organ systems.	

[Total: four marks]

DO NOT WRITE ABOVE THIS LINE

---

5. Briefly describe the processes occurring during each of the following stages in the cell cycle.

5.1 Interphase: \_\_\_\_\_

---

---

5.2 Nuclear division: \_\_\_\_\_

---

---

5.3 Cell division: \_\_\_\_\_

---

---

**[Total: six marks]**

6. Hon Lik, a Chinese pharmacist, invented the Electronic-cigarette, to decrease tobacco- related death and disease. E-cigarettes typically have a heating element that atomizes a liquid solution containing nicotine and flavorings, amongst other chemicals. The act of inhaling vapour through one's personal vaporiser is called vaping.

6.1 The time of endurance during exercise for people who smoke or vape, is shorter than that of non-smokers. Why is this so?

---

---

---

**[two marks]**

DO NOT WRITE ABOVE THIS LINE

---

6.2 Briefly describe the process that occurs in the respiratory system during inhalation of the vapour.

---

---

---

---

[four marks]

6.3 The usefulness of having less tobacco in the e-cigarette is still unclear mainly due to the fact that nicotine is still present. Name **TWO** harmful effects of nicotine on the body.

---

---

[two marks]

6.4 List **FOUR** features of alveoli that allow them to supply the circulatory system with oxygen and remove carbon dioxide efficiently.

---

---

---

---

[four marks]

[Total: twelve marks]

**SECTION B:**

Answer any **TWO** questions from this section; each question carries twenty-five marks. If more than two questions are attempted, only the first two answers shall be taken into consideration.

Write all your answers to questions from this section in the separate answer booklet provided.

7. This question is about relationships in ecosystems.

7.1 With reference to the trophic levels in a typical ecosystem discuss:

7.1.1 the relationship between the different trophic levels;

[nine marks]

7.1.2 the flow of energy through trophic levels in the ecosystem.

[six marks]

7.2 Explain, through the use of examples, how each of the following keep the size of biological populations within the carrying capacity:

7.2.1 Predator-prey relationships;

[five marks]

7.2.2 Parasitism.

[five marks]

[Total: twenty-five marks]

8. This question is about the nervous system of the human body.

8.1 The brain and the spinal cord work together to coordinate all the body's activities and responses.

List **FOUR** skills or life sustaining systems that depend upon five different parts of the brain. Indicate what part of the brain provides that particular function.

[ten marks]

8.2 Using diagram/s, describe the structure and function of the spinal cord.

[fifteen marks]

[Total: twenty-five marks]

9. This question is about Photosynthesis.

9.1 Use diagrams to relate the structure of an angiosperm leaf to each of the following:

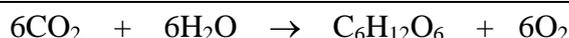
9.1.1 adaptations for photosynthesis;

[six marks]

9.1.2 adaptations for the transport of water and the products of photosynthesis.

[five marks]

9.2 The most commonly cited chemical equation to describe the process of photosynthesis is:



However, such an equation is an oversimplification of two different reactions. Name and describe each of the **TWO** reactions of photosynthesis.

[fourteen marks]

[Total: twenty-five marks]

10. This question is about cells.

10.1 What is a cell?

[two marks]

10.2 Name and draw a labelled diagram to show the structure of the simplest form of cell. Give **ONE** function of each labelled structure.

[twelve marks]

10.3 What is the difference between a unicellular and a multicellular organism?

[two marks]

10.4 Give **TWO** advantages of being multicellular.

[four marks]

10.5 Explain the importance of the surface area to volume ratio as a factor that limits cell size.

[five marks]

[Total: twenty-five marks]

11. Diabetes is a condition which affects persons who cannot produce the hormone insulin, or not enough of it. Persons who are affected by diabetes require daily injections of insulin to cope with this condition. Insulin is now being synthesized artificially through genetic engineering.

11.1 What is a 'hormone'?

**[two marks]**

11.2 Which organ of the human body is responsible for insulin production?

**[two marks]**

11.3 What is the principal function of insulin? Briefly explain which tissues or organs are targeted by insulin and its effect on them.

**[eight marks]**

11.4 Outline the procedure involved in the artificial production of human insulin by gene technology.

**[thirteen marks]**

**[Total: twenty-five marks]**

Blank Page

Blank Page