Index No.:_____ **IM05/13m**

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

MATRICULATION EXAMINATION
INTERMEDIATE LEVEL
MAY 2013

SUBJECT:	BIOLOGY
DATE:	13th May 2013
TIME:	9.00 a.m. to 12.00 noon

Directions to Candidates

- *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 circumstances 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**
Score												
Maximum	**13**	**8**	**8**	**9**	**6**	**6**	**25**	**25**	**25**	**25**	**25**	**100**

DO NOT WRITE ABOVE THIS LINE

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

1. Aerobic respiration is a process during which the chemical energy stored in glucose is released. The whole process may be divided into three stages: Glycolysis, Krebs' Cycle and Oxidative Phosphorylation. Some of the energy released during respiration is used to generate ATP.

1.1 Which organelle of eukaryotic cells is associated with aerobic respiration?

[one mark]

1.2 Name TWO other products, apart from energy, of aerobic respiration.

[two marks]

1.3 What is the principal function of ATP?

[one mark]

1.4 List THREE products of Glycolysis.

[three marks]

1.5 Briefly describe the principal events that take place in the following stages of respiration:

(a) Krebs' Cycle;

[two marks]

(b) Oxidative phosphorylation.

[two marks]

DO NOT WRITE ABOVE THIS LINE

1.6 In what way is aerobic respiration more efficient than anaerobic respiration?

[two marks]

[Total: thirteen marks]

2. Indicate whether each of the following statements concerning DNA and chromosomes is TRUE or FALSE. Give a reason for each answer.

2.1 In eukaryotes, chromosomes are composed solely of DNA molecules.

True or False:

Reason:

[two marks]

2.2 All living organisms have the same number of chromosomes.

True or False:

Reason:

[two marks]

2.3 All cells of the human body have the same number of chromosomes.

True or False:

Reason:

[two marks]

2.4 Alleles are different versions of the same chromosome.

True or False:

Reason:

[two marks]

[Total: eight marks]

DO NOT WRITE ABOVE THIS LINE

3. Many organic molecules are *polymers*.

3.1 What is a *polymer*?

[one mark]

3.2 Name the sub-units that each of these organic polymers is made out of:

Proteins:

Nucleic acids:

Polysaccharides:

[three marks]

3.3 Name, and briefly describe, the chemical reaction that leads to the polymerization of polypeptides.

[two marks]

3.4 How is the solubility of an organic polymer related to its size?

[two marks]

[Total: eight marks]

Please turn the page.

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4. This question is concerned with the growth of biological populations.

4.1 Draw and label a graph showing sigmoid population growth. The labels you should include are the following: exponential growth phase, transitional phase and plateau phase. Use the space below for your drawing.

[six marks]

4.2 Explain the significance of each of the three phases that you have labelled.

Exponential growth phase:

Transitional phase:

Plateau phase:

[three marks]

[Total: nine marks]

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5. The nervous system of the human body is composed of neurons, of which there are three basic types.

5.1 List the three types of neurons and give ONE function of each.

[Total: six marks]

6. Briefly describe the role of each of the following in the immune system of the human body:

6.1 Phagocytic leucocytes;

[two marks]

6.2 B-lymphocytes;

[two marks]

6.3 Antibodies;

[two marks]

[Total: six marks]

DO NOT WRITE ABOVE THIS LINE

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 concerned with the circulatory system of the human body.

7.1 Briefly outline the functions of the circulatory system of the human body.

[four marks]

7.2 Describe how the structure of each of the following components of the circulatory system is related to their function.

(a) The heart;

[twelve marks]

(b) Arteries;

[three marks]

(c) Veins;

[three marks]

(d) Capillaries.

[three marks]

[Total: twenty-five marks]

8. The Fungi were formerly classified in the Plant Kingdom but are now classified in a separate kingdom. Compare and contrast Fungi and Plants in terms of:

8.1 structure;

[fifteen marks]

8.2 mode of nutrition.

[ten marks]

[Total: twenty-five marks]

Please turn the page.

9. Agriculture is a land use that generates several impacts on the biosphere. Briefly describe how agriculture is related to each of the following environmental issues:

9.1 Loss of habitat;

[five marks]

9.2 Loss of biodiversity;

[five marks]

9.3 Air pollution;

[five marks]

9.4 Water pollution;

[five marks]

9.5 Waste generation.

[five marks]

[Total: twenty-five marks]

10. Write short notes on:

10.1 The significance of mitosis in asexual reproduction.

[eight marks]

10.2 The processes involved in DNA replication.

[five marks]

10.3 The processes involved in converting a DNA sequence to an RNA sequence.

[four marks]

10.4 The processes that give rise to genetic variation within a population.

[eight marks]

[Total: twenty-five marks]

11. The cells of Bacteria and the Protoctista differ considerably; compare and contrast the cells of Bacteria and Protoctista in terms of:

11.1 cells walls;

[six marks]

11.2 organelles;

[ten marks]

11.3 organisation of genetic material.

[nine marks]

[Total: twenty-five marks]