



TEST CODE **22107020**

FORM TP 2008160

MAY/JUNE 2008

CARIBBEAN EXAMINATIONS COUNCIL

ADVANCED PROFICIENCY EXAMINATION

BIOLOGY

UNIT 1 – PAPER 02

2 $\frac{1}{2}$ hours

Candidates are advised to use the first 15 minutes for reading through this paper carefully.

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of SIX questions.
2. Section A consists of THREE questions. Candidates must answer ALL questions in this section. Answers to this section MUST be written in this question paper.
3. Section B consists of THREE questions. Candidates must answer ALL questions in this section. Answers to this section MUST be written in the separate answer booklet provided.
4. The use of silent non-programmable calculators is allowed.

SECTION A

Answer ALL questions in this section. You must write your answers in the spaces provided on the question paper.

1. (a) Carbohydrate molecules may be joined by either α or β linkages.

Figure 1 shows 2 glucose molecules joined by an α -1-4 glycosidic linkage.

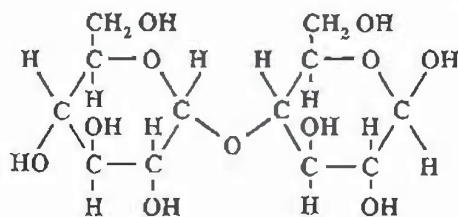


Figure 1. Two glucose molecules

- (i) Using an α -1-6 linkage, attach a third glucose molecule in Figure 1.
[2 marks]
- (ii) Name ONE example of a carbohydrate that is made up of components with BOTH an α -1-4 glycosidic linkage and an α -1-6 linkage.

[1 mark]
- (iii) Distinguish between an ' α glycosidic linkage' and a ' β linkage'.

[1 mark]
- (iv) Comment on the difference in function between a carbohydrate with α linkages and a carbohydrate with β linkages.

[2 marks]

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- (b) (i) Keratin, a protein found in hair, is made up of α helices. Describe the α helix bond in keratin.

[2 marks]

- (ii) In contrast to keratin, fibroin, a protein found in silk, is made up of β pleated sheets. Comment on TWO differences in physical properties of these proteins. Write your answer in the table below.

α helixes	β pleated
1	
2	

[2 marks]

- (iii) Figure 2 shows another two structural bonds found in proteins.

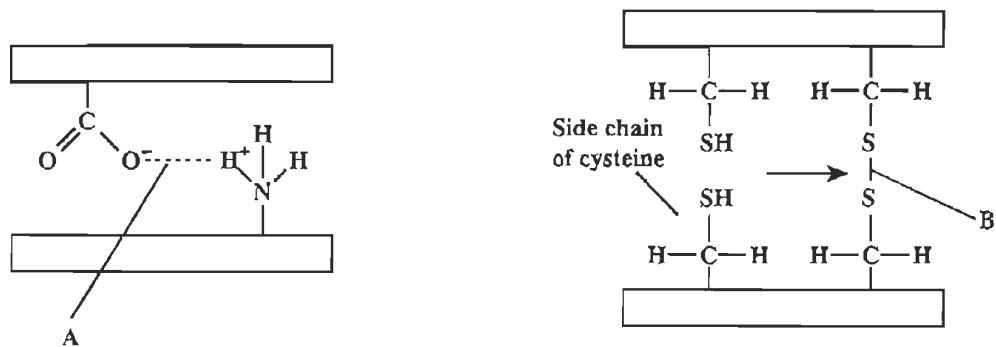


Figure 2. Structural bonds in proteins

Identify the TWO bonds labelled A and B as shown in Figure 2.

A _____

B _____

[2 marks]

(c) Outline an experiment to determine experimentally the presence of catalase in chick peas.

[3 marks]

Total 15 marks

2. (a) (i) Briefly outline the role of DNA in genetic inheritance.

[2 marks]

(ii) Distinguish between the terms 'chromatin' and 'chromosome'.

Chromatin _____

Chromosome _____

[4 marks]

(b) State **THREE** reasons why mitosis is important in the life cycle of a eukaryotic organism.

1. _____

2. _____

3. _____

[3 marks]

(c) Figure 3 shows two phases of the early stages of Meiosis I. In the labelled boxes provided in Figure 3, DRAW three **consecutive** phases to illustrate the **MAIN** changes that occur between the two phases shown.

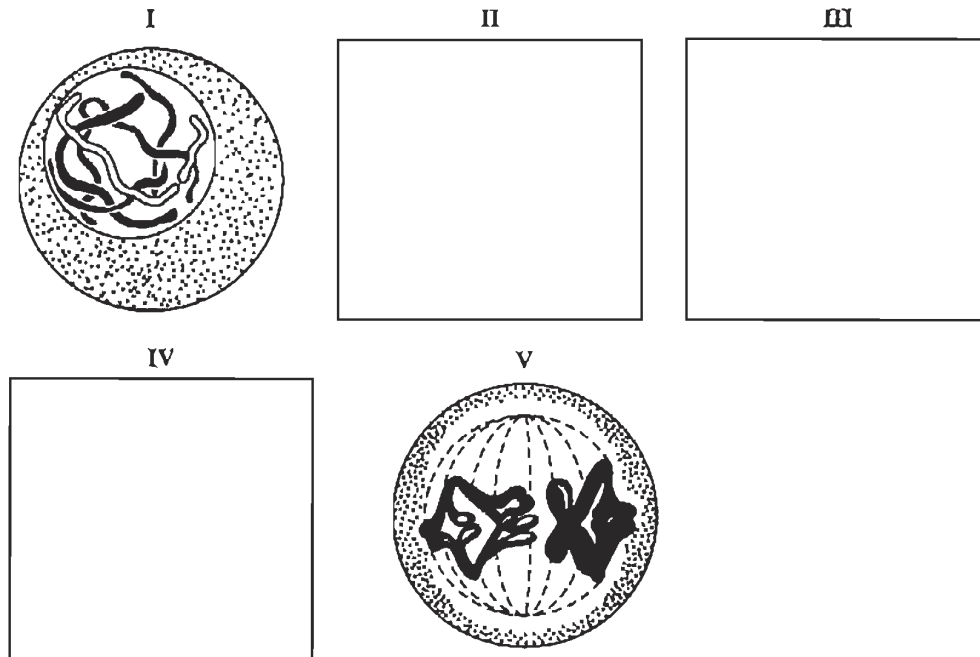


Figure 3. Diagrams showing two phases in Meiosis I

[6 marks]

Total 15 marks

3. (a) Figure 4 represents an incomplete longitudinal section (LS) through a carpel just prior to fertilization.

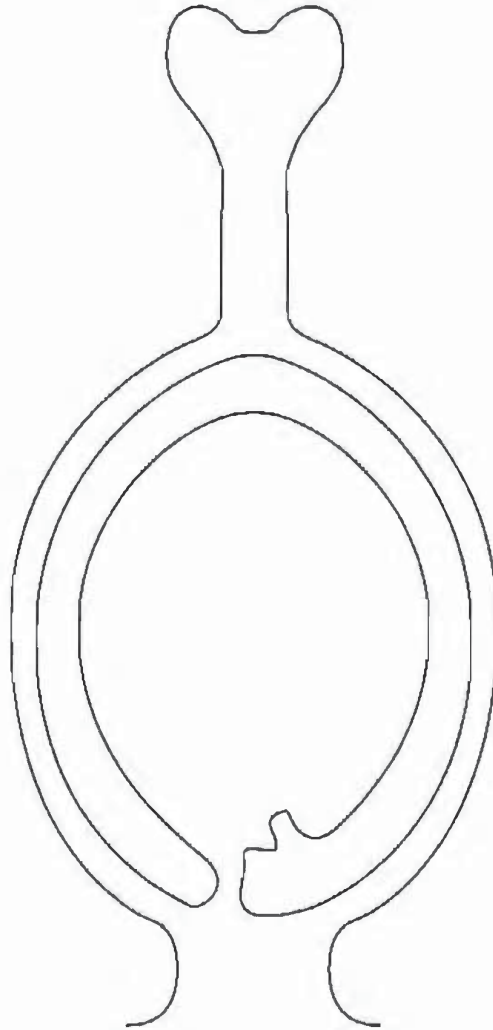


Figure 4. Incomplete LS through a carpel

- (i) Draw on the diagram in Figure 4
- a) the ovule [2 marks]
 - b) the path taken by the germinating pollen grain. [1 mark]
- (ii) On Figure 4, label TWO features of the embryo sac. [2 marks]
- (iii) Identify ONE role for EACH of the features in (ii) above.

[2 marks]

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(b) The pawpaw has male and female flowers which are borne on different plants.

(i) State the term used to describe this reproductive feature.

_____ [1 mark]

(ii) State ONE disadvantage to the plant in having this feature.

_____ [1 mark]

(c) (i) Plants can also be propagated non-sexually. Suggest TWO mechanisms that occur NATURALLY in plants to aid NON-SEXUAL propagation.

_____ [2 marks]

(ii) State ONE advantage of the mechanisms you identified in (c) (i).

_____ [1 mark]

(d) Methods exist for the artificial propagation of plants utilizing small amounts of plant materials. Discuss THREE advantages of these methods over the natural methods of non-sexual propagation.

_____ [3 marks]

Total 15 marks

SECTION B

Answer ALL questions in this section. You must write your answers in the answer booklet provided.

4. (a) According to the endosymbiont theory, mitochondria and chloroplasts are organelles which are thought to have evolved from prokaryotes, and which established symbiotic relationships with eukaryotic cells.
- (i) Describe TWO features of mitochondria and chloroplasts that support the theory that they have evolved from prokaryotic cells. [2 marks]
 - (ii) Define the term 'symbiosis'. [2 marks]
 - (iii) Comment on evidence that supports the theory that a symbiotic relationship existed between eukaryotic cells and chloroplasts and mitochondria. Include in your answer the benefits that BOTH the eukaryotic cells and the symbiont received. [4 marks]
- (b) (i) Define the terms 'tissue' and 'organ'. [2 marks]
- (ii) Use the dicotyledonous root to distinguish between the levels of organization found in tissues and organs. [5 marks]

Total 15 marks

5. (a) According to the biological species concept, a species represents the lowest taxonomic group which is capable of being defined with any degree of precision. While there are several ways in which the term may be defined, most biologists define species in relation to their breeding behaviour.
- (i) State ONE definition of a species in terms of breeding behaviour. [2 marks]
 - (ii) Discuss the limitations of defining a 'species' in terms of breeding. [6 marks]
- (b) (i) With reference to animal populations, outline the process by which a new species may arise from a previously existing one. [4 marks]
- (ii) According to Darwin and Wallace the mechanism for speciation is natural selection. Comment on the basis of this mechanism. [3 marks]

Total 15 marks

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6. (a) (i) State the functions of EACH of the following in oogenesis in humans:
- a) gonadotrophin releasing hormone
 - b) luteinising hormone
 - c) follicle stimulation hormone. [4 marks]
- (ii) Explain how these hormones function in males as compared to females. [3 marks]
- (b) The inhibition of the production of luteinising hormone and follicle stimulating hormone by oestrogen and progesterone is the basis of one contraceptive method in females. Comment on why the same principles CANNOT be applied to develop a male hormonal contraceptive. [4 marks]
- (c) In addition to similarities, differences exist between oogenesis and spermatogenesis. Discuss TWO significant differences with respect to the timing of oogenesis and spermatogenesis. [4 marks]

Total 15 marks

END OF TEST