

**Biology II**

**012**

**31 Oct. 2013 08.30am - 11.30am**

**REPUBLIC OF RWANDA**



**RWANDA EDUCATION BOARD**

**ADVANCED LEVEL NATIONAL EXAMINATIONS 2013**

**SUBJECT: BIOLOGY**

**PAPER II: THEORY**

**COMBINATIONS: - BIOLOGY-CHEMISTRY-GEOGRAPHY: BCG**

**- MATHEMATICS-CHEMISTRY-BIOLOGY: MCB**

**- PHYSICS-CHEMISTRY-BIOLOGY: PCB**

**DURATION: 3 HOURS**

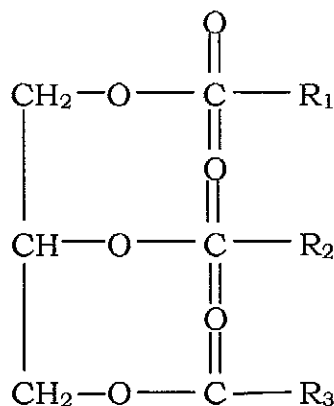
**INSTRUCTIONS:**

1. Don't open this question paper until you are told to do so.
2. This paper consists of **two** sections: **A** and **B**.

- **Section A:** Attempt **all** questions. **(70 marks)**
- **Section B:** Attempt any **three** questions. **(30 marks)**

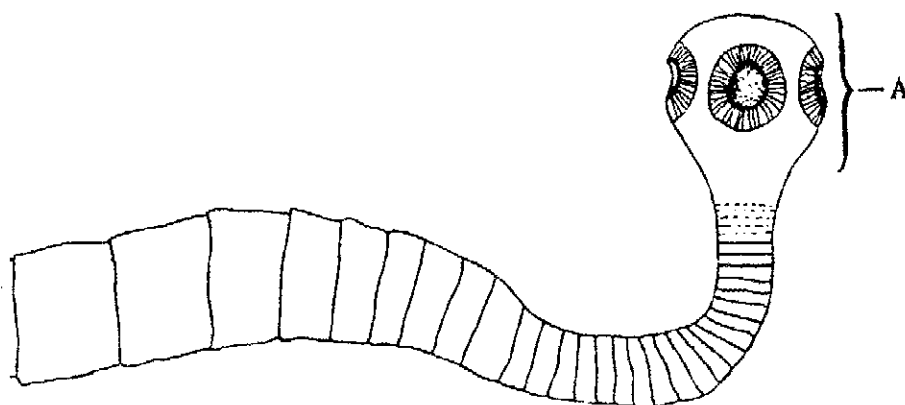
**SECTION A: Attempt all questions in this section. (70 marks)**

1. a) A cell is defined as the structural and functional unit of any living organism. Explain this. **(2 marks)**  
b) Why are cells said to be units of life? **(1 mark)**
2. a) Why would you expect to find abundant rough endoplasmic reticulum in the pancreas? **(2 marks)**  
b) Why do we stain biological sections when observing under a microscope? **(2 marks)**
3. Below is a classification of an earthworm.  
Kingdom: Animal  
Phylum: Annelida  
Class: Oligochaeta  
Order: Terricolae  
Family: Lumbricidae  
Genus: Lumbricus  
Species: Terrestris.  
**(2 marks)**  
Give the scientific name of the earthworm.
4. Give two main differences between diffusion and active transport. **(2 marks)**
5. Look at the diagram of the triglyceride.



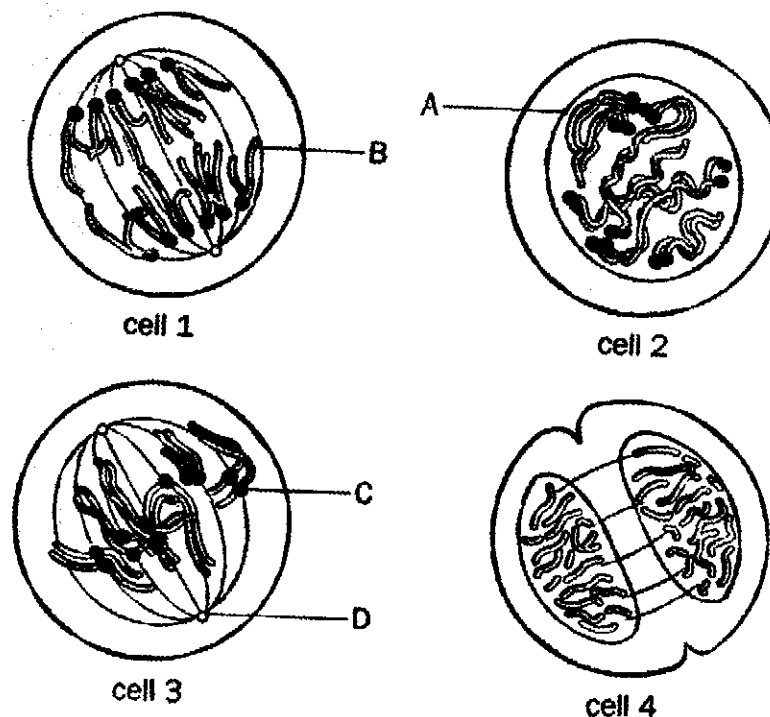
- a) Name the two different types of molecules that make up this triglyceride. **(2 marks)**

- b) Name the bond between these molecules. **(1 mark)**
6. a) Digestive glands secrete enzymes. What initiates these secretions? **(3 marks)**
- b) Digestion is either entirely extracellular or intracellular or both. Give examples of organisms which have:
- i. Extracellular;
  - ii. Intracellular;
  - iii. Both extracellular and intracellular.
- (3 marks)**
7. Explain each of the following statements.
- a) If you stand on your head it is possible to swallow food. **(2 marks)**
- b) Secretion of gastric juice may start before the food reaches the stomach. **(2 marks)**
- c) If the bile duct is blocked, digestion of fats is stopped. **(2 marks)**
8. The diagram below shows a part of the beef tapeworm *taenia saginata*.



- a) Explain the importance of the part labelled A in the life of the tapeworm. **(2 marks)**
- b) Describe how the tapeworm obtains its nutrients. **(2 marks)**
- c) How does the nutrition of rhizopus differ from that of the tapeworm? **(2 marks)**

9. The diagrams below show four animal cells at different stages of mitosis.



- a) Name the structures labelled A, B, C and D. **(4 marks)**
- b) i. Name the stages of division shown by cells 1 and 3. **(2 marks)**  
 ii. Use the numbers of each cell to arrange the stages in the correct sequence of mitosis. **(1 mark)**
- d) How does mitosis maintain genetic stability in an organism? **(1 mark)**
10. a) What physiological events would you expect to follow the injection of a small quantity of glucose into the blood stream of a healthy mammal? **(2 marks)**
- b) What would be the result of injecting glucose into the blood stream of a man whose pancreas has been removed? **(2 marks)**
- c) Algae are not associated with disease like many fungi and bacteria. Explain. **(2 marks)**
11. Explain fully the following biological terms: **(4 marks)**
- a) Double circulation; **(4 marks)**
- b) Double fertilization. **(4 marks)**

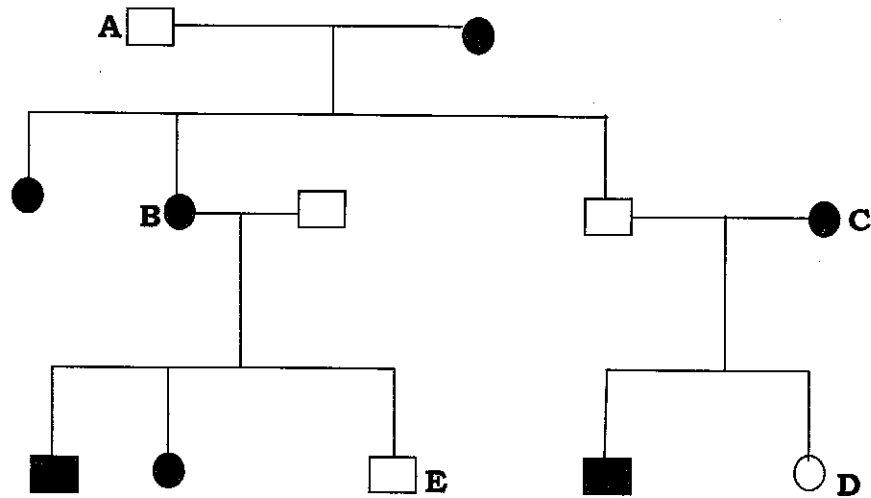
12. Match each level of protein structure with the correct description. **(4 marks)**

<u><b>Protein structure</b></u>	<u><b>Description</b></u>
<b>A.</b> Primary structure	<b>A.</b> The twisting of the amino acid chain into helix held together with hydrogen bonds
<b>B.</b> Secondary structure	<b>B.</b> The association of a number of polypeptide chain
<b>C.</b> Tertiary structure	<b>C.</b> The sequence of amino acids in polypeptide chain.
<b>D.</b> Quaternary structure	<b>D.</b> The folding of the polypeptide into a complex three-dimensional shape.

13. What are the advantages of supplying the pulmonary circulation with blood at a lower pressure than that of the systemic circulation? **(5 marks)**
14. a) Define "Locomotion". **(1 mark)**
- b) What is the basic reason for the fact that animals show locomotion whereas plants do not? **(3 marks)**
15. a) What are mutations? **(1 mark)**
- b) What are causes of mutations? **(2 marks)**

**SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 marks)**

16. a) What is meant by the term homologous chromosomes? **(2 marks)**
- b) State three ways by which meiosis creates genetic variation. **(3 marks)**
- c) Red-green colour blindness is a sex-linked recessive condition. The gene of colour blindness is carried on the X-chromosome. The figure below shows a family tree. Workout the genotype of individuals labelled A —E. **(5 marks)**



**KEY**



Normal Female



Colour blind Female



Normal Male



Colour blind Male

17. a) Define the following biological terms.
- Photosynthesis. **(2 marks)**
  - Tissue respiration. **(2 marks)**
- b) State the differences and similarities between photosynthesis and tissue respiration. **(6 marks)**
18. a) What is variation? Give an example. **(2 marks)**
- b) Give the two types of variation. **(2 marks)**
- c) There are many ways in which humans can vary from each other. For each of these ways indicate whether you think the variation you have mentioned is due to genes or environmental influence or both. **(6 marks)**
19. Write short notes on the ecological aspects of the following: **(10 marks)**
- Conservation.
  - Deforestation.

20. a) Distinguish between Aerobic and Anaerobic respiration. **(10 marks)**
- b) Outline the process of glycolysis.
- c) c) How is energy produced in glycolysis?

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