

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
ADVANCED CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION

BIOLOGY 1

(For Both School and Private Candidates)

Thursday, 10th February 2011 a.m.

133/1

Time: 2:30 Hours

INSTRUCTIONS

1. This paper consists of fifteen (15) questions in sections A and B.
2. Answer all questions in section A and two (2) questions from section B.
3. The mark allocation is indicated at the end of each question.
4. Cellular phones are **not** allowed in the examination room.
5. Write your Examination Number on every page of your answer booklet(s).

This paper consists of 6 printed pages.

SECTION A (70 marks)

Answer all questions in this section.

1. (a) Why is it advantageous for cells to be small in size?
 - (b) Draw a large and neat diagram of a chloroplast and label the parts involved in the process it undertakes. (7 marks)
2. (a) State one characteristic of the class to which the wheat plant belongs in reference to each of the following:
 - (i) Leaf morphology
 - (ii) Stem anatomy
 - (iii) Seed morphology
 - (iv) Flowers
 - (v) Root morphology
 - (b) Study the diagrams of the five flowering plants in Figure 1.

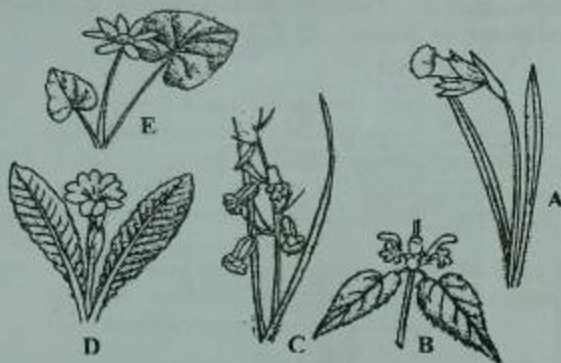


Figure 1

Using the Key provided, identify plants A, B, C, D and E by their common names indicated in the key.

Key for identifying the plants in Figure 1.

- | | | | |
|-----|-----|--|---------------|
| I | (a) | Leaves narrow----- | go to II |
| | (b) | Leaves broad----- | go to III |
| II | (a) | Flowers like bells----- | bluebell |
| | (b) | Flowers like trumpets----- | wild daffodil |
| III | (a) | Top petal overhangs lower petal----- | deadnettle |
| | (b) | Top petal does not overhang lower petal----- | go to IV |

- IV (a) Leaf heart shaped lesser celandine
 (b) Leaf club shaped primrose (8 marks)

3. Describe the structure of the columnar epithelium of the digestive system of man, showing how it is related to its digestive roles. (6 marks)
4. (a) Show the fate of a pyruvate under anaerobic conditions in:
 (i) Plants and micro-organisms
 (ii) Animals and muscle cells.
 (b) Briefly explain three (3) ways in which carbon dioxide is transported in a vertebrate body? (7 marks)
5. (a) In what ways are the chemical compositions of blood and glomerular filtrate similar and yet different?
 (b) List all the blood vessels and organs, in sequence, through which urea must pass to reach the kidney from the liver. (6 marks)
6. The diagram in Figure 2 shows a summary of one hypothesis of transport in the phloem tissue. Study it carefully and answer the questions that follow:

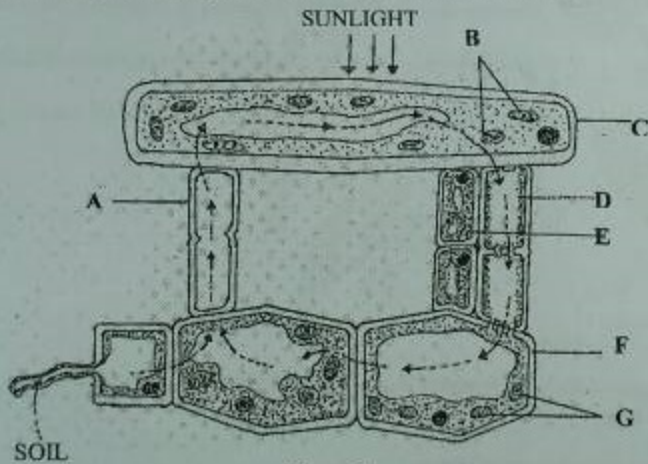


Figure 2

- (a) Name the structures/ cells labelled A, B, C, D, E, F and G.
 (b) What name is given to this hypothesis?
 (c) What technical terms are given to the regions labelled C and F?
 (d) Explain briefly how the hydrostatic pressure gradient is developed.

(7 marks)

7. Some of the events which occur in a synapse after the arrival of an impulse at the pre-synaptic membrane are shown in Figure 3.

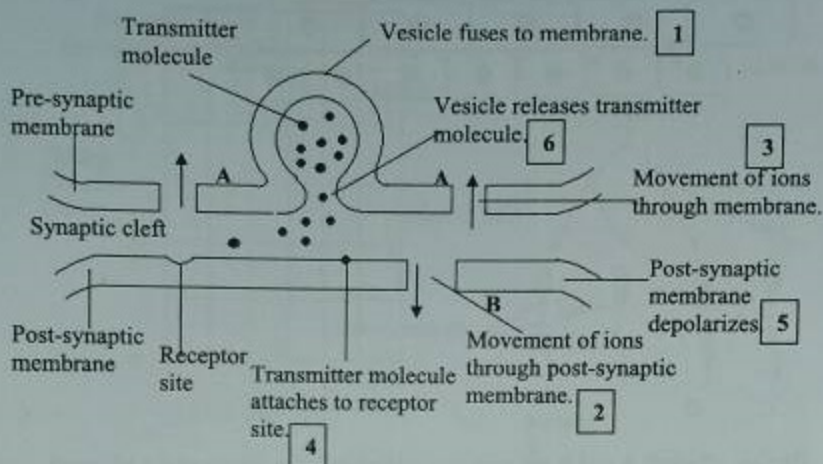


Figure 3

- (a)
- Arrange the events in a correct sequence.
 - Name the ions labelled A and B.
 - Name the process by which transmitter molecules move across the synaptic cleft.
 - Name one transmitter molecule released by synaptic vesicles.
- (b)
- Explain why one impulse arriving at the pre-synaptic membrane fails to produce an action potential in the post synaptic neurone, while several impulses arriving in succession can do so.
 - What name is given to the process described in (b)(i) above?

(7 marks)

8. (a) Explain using appropriate genetical symbols, the possible blood groups of children whose parents are both heterozygous, the father being blood group A and the mother blood group B.

- (b) If the parents have non identical twins, what is the probability that both of the twins will be blood group A?

(8 marks)

9. (a) Briefly explain the shortcoming of Lamarck's Theory of Organic evolution.

- (b) Briefly explain why Darwin came to the conclusion that there is natural selection operating in nature.

(6 marks)

10. Figure 4 shows the process of sperm production in a mammalian testis.

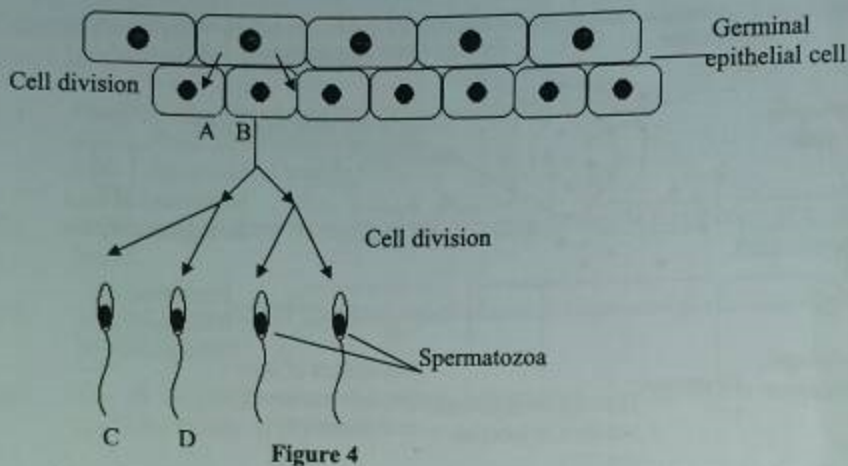


Figure 4

- (a) (i) Explain why cell A and B are genetically identical.
 (ii) How does cell division give rise to cells C and D, which are genetically different from the mother cell?
- (b) With the aid of diagrams briefly describe two events occurring during cell division that lead to genetic variation in offspring.

(8 marks)

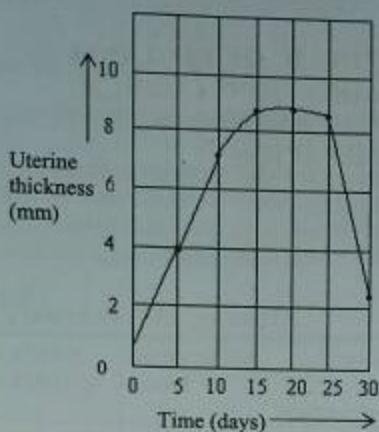
SECTION B (30 marks)

Answer **two (2)** questions from this section.

11. (a) Draw a well labelled diagram of cardiac muscle.
 (b) Identify the features and adaptations of the cardiac muscle to the role it performs. (15 marks)
12. (a) How is sex genetically determined in birds and humans?
 (b) A woman has four sons one of whom is a haemophiliac. Suggest the genotype of the woman and her husband.
 (c) Show whether it is possible for the couple in (b) above to have a haemophiliac daughter. (15 marks)
13. Outline the main adjustments that occur to the heart rate and circulatory system just before, during and after a 100m race. (15 marks)

(15 marks)

14. The graph below shows the thickness of the uterine wall throughout the menstrual cycle.



- (a) From the graph state the day:
- Ovulation is most likely to happen.
 - In which fertilization is most likely to occur, assuming that sperms are present.
 - The corpus luteum starts to break down.
 - Menstruation begins.
- (b) State four (4) protective and two (2) endocrine roles of the placenta. **(15 marks)**
15. (a) Using oat coleoptiles, describe experiments that can be carried out to show that phototropic responses in plants is due to the presence of a chemical found in the root tip which passes down into the growth region.
- (b) Mention the name of the chemical in (a) above? **(15 marks)**