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

133/2

BIOLOGY 2
(For Both School and Private Candidates)

Time: 2 Hours 30 Minutes ***Friday, March 18, 2005 p.m.***

Instructions

1. This paper consists of ***nine (9)*** questions in sections A, B and C.
2. Answer ***five (5)*** questions choosing at least **one (1)** question from each section.
3. Each question carries 20 marks.
4. Read each question carefully before you start answering it.
5. Cellular phones are ***not*** allowed in the examination room.
6. Write your ***Examination Number*** on every page of your answer booklet(s).

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This paper consists of 6 printed pages.

SECTION A

1. (a) Draw a large diagram of a typical plant cell as seen under the electron microscope showing the cellular structures concerned with:

(i) Cellular respiration.

(ii) Protein synthesis.

(iii) Control of cell division.

(iv) Photosynthesis.

(v) Transportation of substances between two neighbouring cells.

(b) Diagrams A and B in figure 1 below represent two cell organelles as seen under the electron microscope.

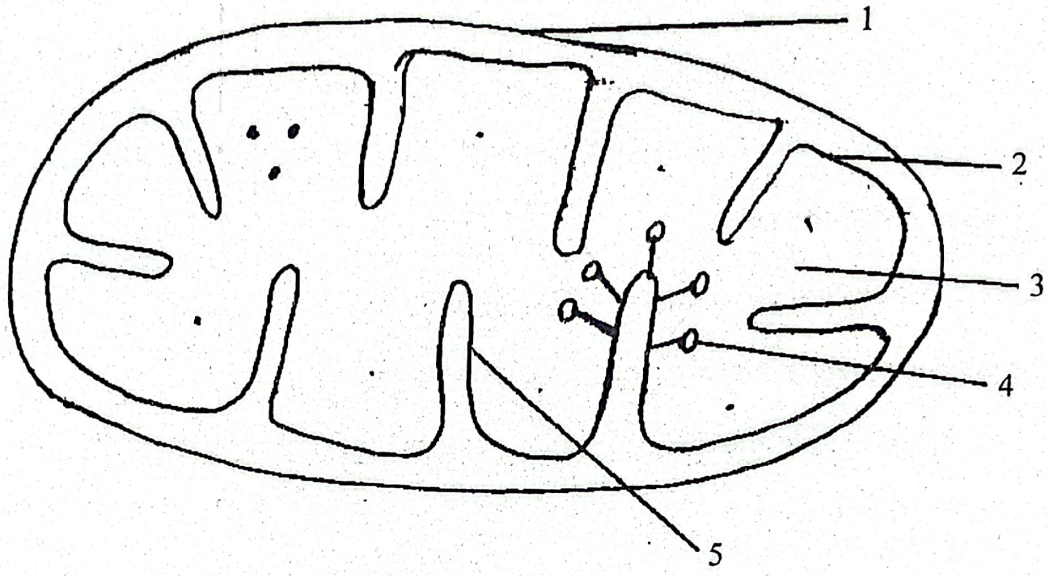


Diagram A

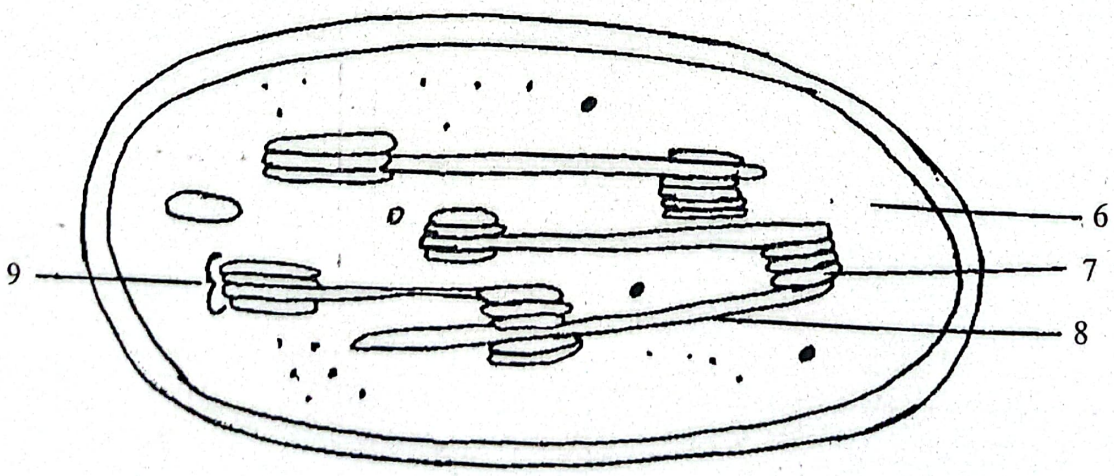


Diagram B

Fig. 1

(i) Identify organelles A and B.

(ii) Name the structures labelled 1, 2, 3, 4, 5, 6, 7, 8, and 9.

(iii) Explain briefly how organelle B is adapted to its function.

2. (a) Observe figure 2 below and answer the questions that follow.

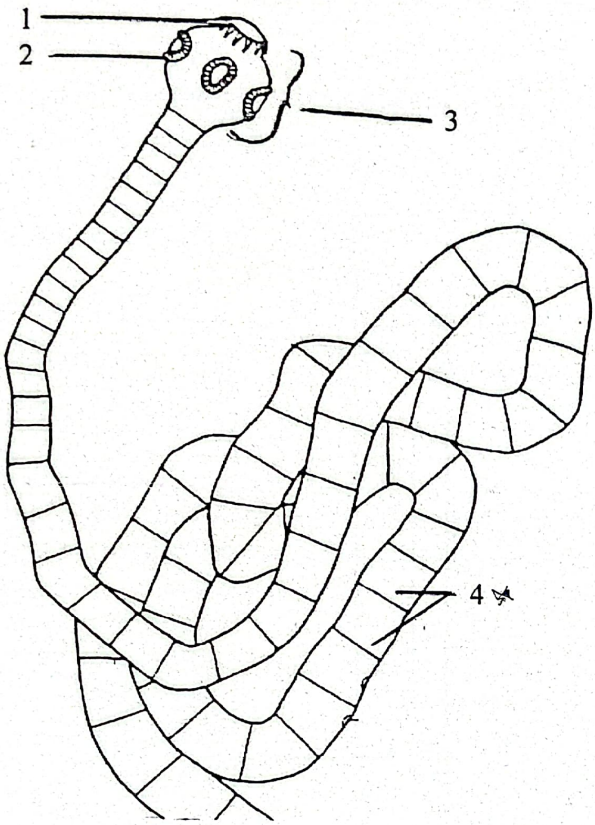


Fig. 2

(i) Identify the organism in figure 2.

(ii) Name the structures labelled 1, 2, 3, and 4.

(iii) How is the organism in figure 2 adapted to its mode of nutrition?

(iv) Outline the general characteristics of the phylum to which this organism belongs.

(b) Account for the argument that viruses are classified as living as well as non-living organisms.

SECTION B

3. (a) Draw and label the mammalian retina.

(b) Explain briefly the roles played by each of the following phyto-hormones.

(i) Cytokinins.

(ii) Abscisic acid (ABA).

(iii) Gibberellins.

4. The human body has an elaborate mechanism to ensure that its water content is kept more or less constant.

Discuss the role of the endocrine system in maintaining water balance in the human body.

5. (a) Define transpiration.

(b) Explain the mechanism involved in stomata opening and closing. (Base your answer on the osmotic pressure difference theory).

6. The diagram below (figure 3) summarises the movement of some substances from the loop of Henle in a nephron of a mammalian kidney.

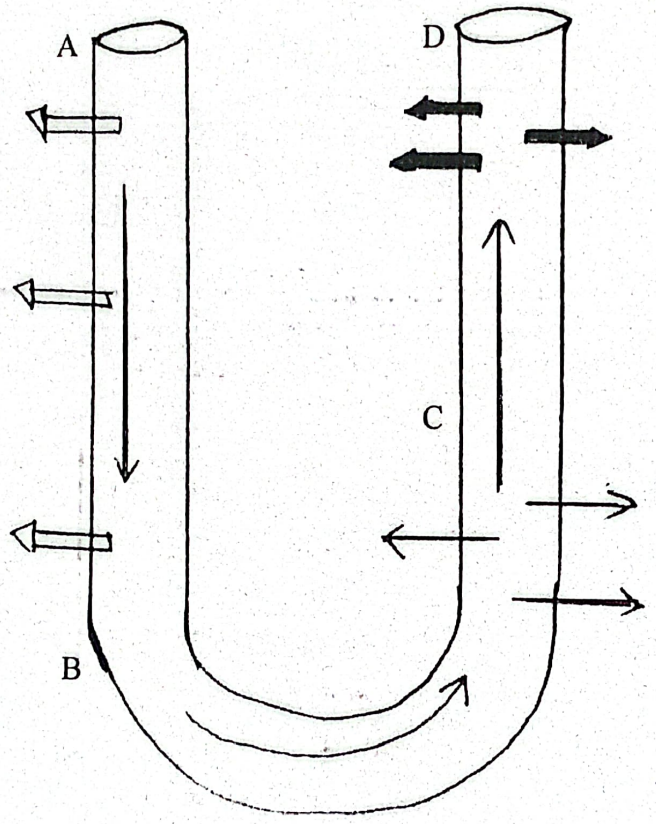


Fig. 3

KEY

Passive movement of sodium chloride.

Passive movement of water.

Active transport of chloride ions.

(a) Explain why there are large numbers of mitochondria in the cells between points C and D.

(b) (i) Explain how the movement of the substances shown on the diagram produces a change in the concentration of the tubule contents between points A and D.

(ii) Describe the role of the collecting duct in producing urine, which is more concentrated than the body fluids.

(c) Small mammals living in deserts produce extremely concentrated urine. How is this related to the kidney structure and function?

7. (a) Describe how the mammalian placenta carries out each of the following functions:

(i) Nourishing the foetus.

(ii) Respiration.

(b) Define Bohr effect.

(c) Carbon monoxide is a fatal poison. Explain.

SECTION C

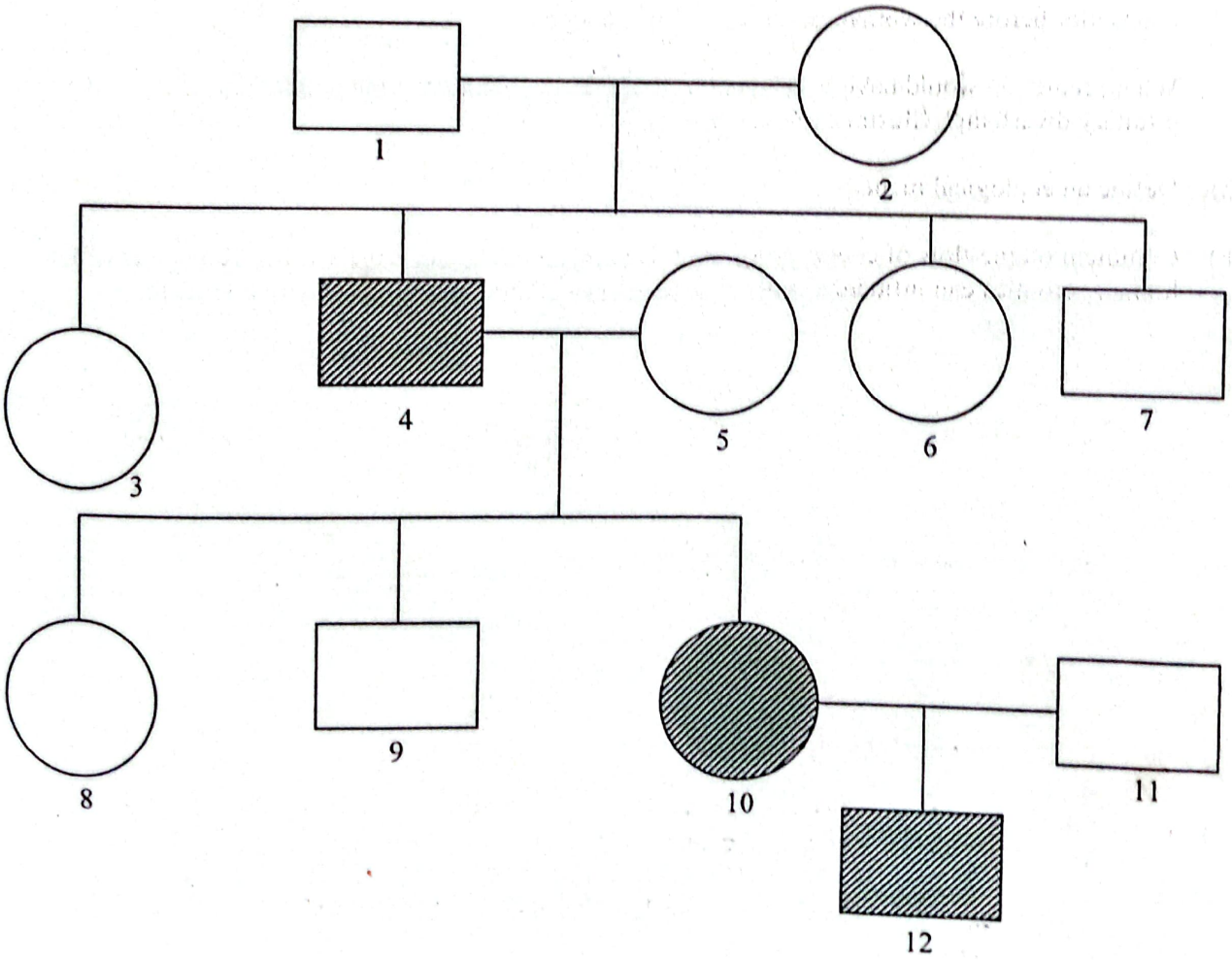
8. (a) What do you understand by

(i) Polyploid

(ii) Sex-linkage

(iii) Point mutation?

(b) Pituitary dwarfism is an inherited condition in humans in which the affected individuals have very short limbs. The allele for pituitary dwarfism is recessive to the allele for normal limbs, and its locus is situated on the x-chromosome. The pedigree below shows part of an affected family.

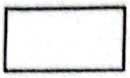


KEY

 Normal female

 Affected female

 Affected male

 Normal male

D = Dominant allele for normal limbs

d = Recessive allele for short limbs.

(i) Identify and explain two pieces of evidence from the pedigree above, which show that the allele for pituitary dwarfism is recessive to the allele for normal limbs.

(ii) Explain why the genotype of individual 10 must be a carrier. Illustrate your answer.

(iii) Explain why the genotype of individual 11 must be normal.

(c) Since the son of individuals 10 and 11 showed pituitary dwarfism, the couple consulted a genetic counsellor before the woman became pregnant again.

What prediction would have been made about the probability of the couple's next child showing pituitary dwarfism? Illustrate your answer.

9. (a) Define an ecological niche.

(b) Comment on the flow of energy through an ecosystem and discuss the various ways in which human activities can influence the flow of energy at all levels in a terrestrial ecosystem.