

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: 2:30 Hours

Tuesday, 16 February 2010 p.m.

INSTRUCTIONS

1. This paper consists of nine (9) questions in sections A, B and C.
Answer five (5) questions, choosing at least one (1) question from each section.

3. Each question carries twenty (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).

This paper consists of 4 printed pages.

SECTION A

- Draw a large, well labeled diagram of a chloroplast of higher plants.
 - How is the chloroplast's structure related to its function?
 - What are lysosomes?
 - Briefly elaborate on the roles of lysosomes in organisms.
- Give an account of the features which have made insects the most successful group in the animal Kingdom.

SECTION B

- Figure 1 shows the results of an experiment set to find the effect of Na^+ ions on the production of action potentials in squid axons. The axons were bathed in different concentrations of isotonic sea water.

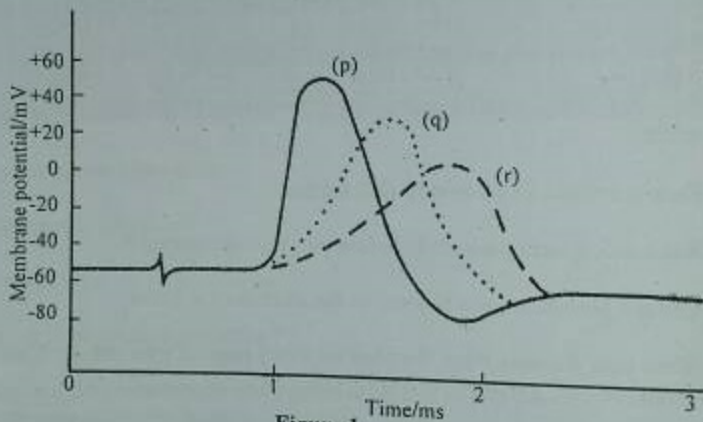


Figure 1

- Which action potentials correspond with axons placed in normal, half or one third sea water?
 - Explain the effect of the different concentrations of sea water on the action potential.
- Describe the ionic changes occurring across an axon membrane during a refractory period.

- (ii) Explain in terms of the resistance of the axoplasm and local circuits, why giant axons conduct impulses at greater velocities than fine axons.
4. (a) Why is it necessary for pepsin to be secreted in an inactive state?
 (b) How is the small intestine (ileum) adapted to its function?
 (c) The leaves of most green plants are well adapted to the process of photosynthesis. Discuss.
5. (a) Define guttation.
 (b) How are xerophytes capable of surviving in their environments?
 (c) Outline the different ways in which endothermic animals respond to cold and hot conditions.
6. Figure 2 shows two solutions which are separated by a partially permeable membrane. Study it carefully and answer the questions that follow.

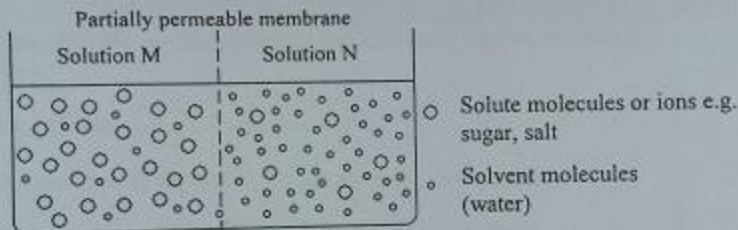


Figure 2

- (a) Which solution has a higher concentration of water molecules?
 (b) Which solution is more concentrated?
 (c) In which direction will osmosis occur?
 (d) Which of the two values of ψ is higher;
 (i) -1000 kPa (ii) -500 kPa
 (e) Which solution has
 (i) higher ψ
 (ii) higher solute potential?
 (f) What is the relationship between ψ_s and ψ of a solution at atmospheric pressure?

7. (a) Give any four (4) differences between meiosis and mitosis.
(b) Explain the significance of meiosis in multicellular organisms.

SECTION C

8. (a) Explain how artificial selection in plants and animals by man supports organic evolution.
(b) How does adaptive radiation bring about speciation?
9. Explain how a quadrat can be used to estimate population size with respect to three aspects of species distribution namely: species density, species frequency and species cover.