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 *2009 February 16 Monday a.m.*

INSTRUCTIONS

1. This paper consists of 9 questions in sections A, B and C.
2. Answer five (5) questions, choosing at least one question from each section.
3. Read each question carefully before you start answering it.
4. All questions carry equal marks.
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

1. (a) Distinguish bacterial cells from trypanosomes on the basis of the following features:

   (i) Size of the cells.

   (ii) Outer boundary material.

   (iii) Locomotive structures.

   (iv) Type of hereditary materials and their location.

   (v) Organelle for respiration.

   (vi) Organelle for synthesis of protein.

   (vii) Organelle for transport of lipids and proteins.

   (viii) Ability to utilize atmospheric nitrogen.

   (b) Draw a large, well-labelled diagram of a typical plant cell as seen under an electron microscope. Underline the labels for structures that differentiate it from a typical animal cell.

2. (a) (i) Define the term 'differentiation'.

   (ii) What is the significance of differentiation in the organisms in which it occurs?

   (b) Describe the structure of a:

   (i) mitochondrion.

   (ii) chloroplast.

   (c) Why are chloroplasts and mitochondria said to be 'cells within cells'?

SECTION B

3. (a) With the aid of a well labelled diagram describe the structure of the membranous labyrinth of the mammalian inner ear.

   (b) What is the significance of the refractory period during the nerve impulse transmission?

4. (a) What are the main features of:

   (i) autotrophic nutrition?
   (ii) heterotrophic nutrition?

(b) The small intestine (ileum and duodenum) receive pancreatic juice and bile from the pancreas and liver respectively. List the components of:

(i) pancreatic juice

(ii) bile .

(c) Describe how the flow of pancreatic juice is controlled.

5. (a) List the ways in which a mammal obtains and loses water.

(b) Analysis of the glomerular filtrate and the urine of a mammal yielded the following mean daily values.

	Glomerular filtrate	Urine
Urea	60 g	35 g
Water	180 dm^3	1.5 dm^3

(i) 150 dm^3 of water is reabsorbed by the proximal convoluted tubules. Calculate the percentage of water from the filtrate that is reabsorbed elsewhere.

(ii) Name other regions of the nephron where further reabsorption of water takes place.

(c) Discuss the causes and symptoms of **three (3)** common disorders of the urinary system in humans.

6. A gynaecologist carried out a post-mortem on a 22-year old woman and noticed that she had ovaries which were of unequal size. The ovaries were analysed and the results showed that they had the following contents.

Larger ovary	Smaller ovary
17,002 follicles	25,000 follicles
4 corpora lutea	5 corpora lutea
12 corpora albicanti	50 corpora albicanti

Most of the follicles were small but 218 were over 100 μm in diameter. Seven follicles contained two oocytes each and 3 % of the oocytes contained two nuclei each. Assuming that each follicle produces a corpus luteum:

(a) (i) at what age did the woman start ovulation? Explain your answer.

(ii) estimate the time in years that ovulation would have continued in that woman.

(iii) how many potential sets of twins could this woman have produced and what type of twins would they be?

(b) Name the process that accounts for the presence of two nuclei in some of the oocytes.

(c) What major change would happen to the fetal circulation if blood pressure was highest in the aorta?

7. (a) Define the term translocation.

(b) Explain the factors that affect the rate of translocation.

SECTION C

8. Discuss the origin of life as postulated by the following theories:

(a) Special creation.

(b) Spontaneous generation.

(c) Cosmozoic origin.

(d) Naturalistic.

9. (a) What is population explosion?

(b) Explain the consequence and control measures of population explosion with reference to human species.