THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

033/1 **BIOLOGY 1**

(For Private Candidates Only)

Time : 3 Hours **ANSWERS** **Year : 2013**

Instructions

1. This paper consists of section A, B and C.
2. Answer **all** questions in section A and B and **one (1)** questions from section C.
3. Communication devices and any unauthorised materials are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).

1. For each of the items (i) – (x), choose the correct answer from among the given alternatives and write its letter beside the item number.

(i) The diseases which is common infection of the respiratory system is

A. Tuberculosis

B. AIDS

C. Malaria

D. Cholera

E. Typhoid

Answer: A. Tuberculosis

(ii) The hormone which controls response for fight or flight in animals is

A. Anti-dulatic

B. Thyroxin

C. Adrenalin

D. Oxytocin

E. Insulin

Answer: C. Adrenalin

(iii) The tiny structures in which gaseous exchange take place in human lungs is known as

A. bronchi

B. bronchioles

C. trachea

D. alveoli

E. alveoli ducts

Answer: D. alveoli

(iv) In arthropods, the possession of one pair of legs per segment is a typical characteristics of which Class?

A. Arachnida

B. Insecta

C. Diplopoda

D. Crustacea

E. Chilopoda

Answer: C. Diplopoda

(v) Which of the following is a major product of aerobic respiration?

A. Oxygen

B. Alcohol

C. Energy

D. Lactic acid

E. Water

Answer: C. Energy

(vi) For an enzyme to work properly in cellular reactions, the optimum temperature in mammals should be

A. 10°C – 20°C

B. 37°C – 40°C

C. 0°C – 10°C

D. 1°C – 2°C

E. 80°C – 100°C

Answer: B. 37°C – 40°C

(vii) A term used in biology to identify the organism that depends on host for food but not shelter is known as

A. parasite

B. endoparasite

C. symbiosis

D. ectoparasite

E. mutualism

Answer: D. ectoparasite

(viii) The reagent used to test for starch in unknown food sample solution is

A. Iodine solution

B. Benedict's solution

C. Sudan III solution

D. Copper sulphate

E. Sodium hydroxide

Answer: A. Iodine solution

(ix) The main function of the cornea in the human eye is to

A. reflect light into the eye

B. refract light from the eye

C. transfer light into the eye

D. refract light into the eye

E. reflect light in the eye

Answer: D. refract light into the eye

(x) The statement which best describe the function of root hairs in plants is

A. translocation of food materials

B. translocation of water and food

C. transportation of water and food

D. absorption of water and food

E. absorbs water and mineral salts

Answer: E. absorbs water and mineral salts

2. Match the responses in List B with the phrases in List A by writing the letter of the correct response from List B beside the item number of List A in your answer booklet.

List A	**List B**
(i) Large, inactive and non-motile unit of reproduction.	F. Egg cell
(ii) Is a small unit capable of transmitting electrical impulses.	C. Nerve cell
(iii) It forms a lining of internal organs and vessels.	M. Epithelial tissue
(iv) Have irregular shape and are loosely packed in leaves to create a large air space.	O. Sponge mesophyll cell
(v) A group of neurones working together.	E. Nerve tissue
(vi) It has no nuclei and their cytoplasm contain haemoglobin.	I. Red blood cell
(vii) It is column shaped and has numerous chloroplasts in the cytoplasm.	N. Palisade mesophyll cell

(viii) Found in plants, and is used for transport of food products.	K. Phloem cell
(ix) Smallest, active and motile unit of reproduction.	A. Sperm cell
(x) Thick walled tube and is used for transportation of water and mineral salt in plants.	J. Xylem cell

3. (a) Briefly explain why do Biologists prefer to use a light microscope in the laboratory rather than using normal eyes?

   Biologists prefer to use a light microscope because it magnifies small objects that cannot be seen with the naked eye, allowing for detailed study of cells and microorganisms. It also provides clearer resolution, making it possible to observe structures and processes in greater detail.

   (b) Draw a well labelled diagram of light microscope.

   Diagram showing eyepiece, objective lens, stage, mirror/light source, coarse adjustment knob, fine adjustment knob, and base.

4. (a) Explain the general and distinctive features of the Kingdom Protoctista.

   Members of Kingdom Protoctista are mostly unicellular but some are multicellular. They are eukaryotic organisms with membrane-bound organelles. They can be autotrophic (like algae) or heterotrophic (like protozoa). They live mostly in aquatic environments and reproduce both sexually and asexually.

   (b) Outline three demerits of natural classification system.

   It relies heavily on observable characteristics, which may be misleading. It does not consider evolutionary relationships among organisms. It groups organisms superficially, leading to incorrect placement of some species.

5. (a) Briefly state four types of trophic levels found in food webs.

   Producers, primary consumers, secondary consumers, and tertiary consumers.

   (b) Give two examples of organisms for each trophic level you named in 5(a).

   Producers – grass, algae.

   Primary consumers – grasshopper, rabbit.

Secondary consumers – frog, lizard.

Tertiary consumers – eagle, lion.

6. (a) Define the term "genetics".

   Genetics is the branch of biology that deals with the study of inheritance and variation of characteristics from parents to offspring.

   (b) In the experiment conducted by Mendel, one pure strain of pea plants had yellow peas and crossed with another pure strain having green peas. Then, their offspring (F1 generation) were self-pollinated. Find out the phenotypic ratio and indicate how it was obtained from this experiment in the first and the second filial generations if yellow colour was dominant over green colour.

   P1 generation: Yellow (YY) × Green (yy) → F1 generation: All Yellow (Yy).

   F1 self-pollination: Yy × Yy → F2 generation: 1 YY : 2 Yy : 1 yy.

   Phenotypic ratio: 3 Yellow : 1 Green.

7. (a) Define the following terms:

   (i) Fertilization – Fertilization is the process by which the male gamete fuses with the female gamete to form a zygote.

   (ii) Ovulation – Ovulation is the release of a mature egg (ovum) from the ovary into the fallopian tube.

   (b) Name two types of twins and explain how they occur.

   Identical twins – occur when a single fertilized egg splits into two embryos.

   Fraternal twins – occur when two separate eggs are fertilized by two different sperm cells.

8. (a) Give the meaning of the term "excretion".

   Excretion is the process by which living organisms remove metabolic waste products from the body.

   (b) (i) List down the types of excretory products in plants.

   Carbon dioxide, oxygen, water vapor, gums, latex, tannins, and resins.

   (ii) In what ways are plant excretory products useful?

   Some provide protection against herbivores, others are used in medicine, and some like oxygen are useful for other organisms.

9. (a) Outline the stages of human post-natal growth and development.

   Infancy – rapid growth, development of muscles and brain.

Childhood – steady growth, development of motor skills.

Adolescence – rapid growth, puberty, development of secondary sexual characteristics.

Adulthood – full maturity, maintenance of body functions.

Old age – decline in body functions and health.

(b) Explain why oxygen, water and optimum temperature are required in the germination of seed?

Oxygen is required for respiration to release energy for growth. Water activates enzymes and softens the seed coat to allow growth. Optimum temperature ensures proper enzyme activity needed for germination.

10. The diagram in Figure 1 is a reflex arch in a human being. Study the diagram and answer the questions that follow:

(a) Name the labelled parts A – F.

A – Receptor

B – Sensory neurone

C – Relay neurone

D – Motor neurone

E – Spinal cord

F – Effector (muscle)

(b) (i) Outline the function of parts B, C and D.

B (Sensory neurone) – transmits impulses from the receptor to the spinal cord.

C (Relay neurone) – transfers impulses within the spinal cord from sensory to motor neurone.

D (Motor neurone) – carries impulses from the spinal cord to the effector.

(ii) If someone touches hot object, what is the response shown by part E?

Part E (spinal cord) sends an impulse through the motor neurone to the effector muscle, causing immediate withdrawal of the hand from the hot object.

11. (a) Describe the functions of the major components of blood.

Red blood cells transport oxygen from the lungs to different body tissues and return carbon dioxide to the lungs for exhalation.

White blood cells defend the body against infections by attacking and destroying pathogens, and by producing antibodies.

Platelets help in the clotting process by forming plugs at the site of injuries to stop excessive bleeding.

Plasma transports nutrients, hormones, waste products, and dissolved gases throughout the body.

(b) Explain how HIV affects the white blood cells of human being.

HIV specifically attacks and destroys T-helper lymphocytes, also known as CD4 cells, which are vital for coordinating the immune response.

The reduction of CD4 cells weakens the immune system, leaving the body vulnerable to infections and opportunistic diseases.

12. Explain six factors that affect the immunity of the body in human being.

Nutrition is important because a poor diet weakens immunity while balanced nutrition enhances the body's defense.

Age affects immunity since infants and elderly people generally have weaker immune systems compared to healthy adults.

Diseases like HIV/AIDS, cancer, and diabetes reduce the effectiveness of the immune system.

Stress affects immunity because prolonged stress weakens the body's resistance to infections.

Genetics also influences immunity since some people inherit stronger or weaker immune responses.

Environment plays a role since exposure to pollutants, unhygienic conditions, and poor sanitation lowers immunity.

13. Describe three traditional methods and five modern methods used in food processing, preservation and storage.

Drying is a traditional method where moisture is removed from food, making it difficult for microorganisms to survive.

Smoking is another traditional method that preserves fish and meat by using smoke, which also adds flavor.

Salting is a traditional preservation method that draws out water from food and microorganisms, preventing spoilage.

Refrigeration is a modern method that slows down microbial activity by keeping food at low temperatures.

Canning is a modern preservation method where food is sealed in airtight containers to prevent microbial growth.

Pasteurization is a modern method where food, especially milk, is heated to a specific temperature to kill harmful microorganisms.

Freezing is a modern method where food is stored at extremely low temperatures, stopping microbial growth and keeping food fresh for long.

Use of chemical preservatives is another modern method where specific chemicals are added to food to inhibit spoilage and extend shelf life.