Biology I

001

05 Nov 2014 8.30am – 11.30am

Rwanda Education Board

ORDINARY LEVEL NATIONAL EXAMINATIONS, 2014

SUBJECT : **BIOLOGY I**

DURATION : **3 HOURS**

INSTRUCTIONS:

1. Write your name and index number on the answer booklet as written on your registration form.
1. Do not open this paper until you are told to do so.
2. This paper consists of **THREE** Sections **A**, **B** and **C**.

SECTION A: Attempt **all** questions. **(55 marks)**

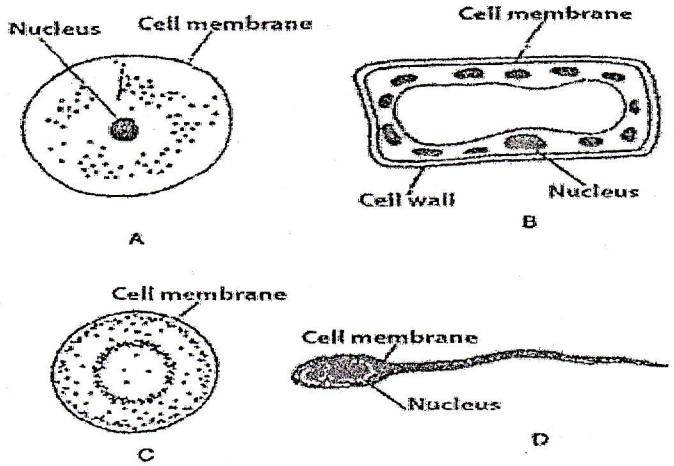
SECTION B: Attempt any **three** questions. **(30 marks)**

SECTION C: This section is **compulsory**. **(15 marks)**

Use only a blue or black pen.

SECTION A: Attempt all questions. (55 marks)

1. The diagram below represents types of cells.



Which of these represents animal cells? Explain your answer. **(3 marks)**

2. Using √ and **X,** indicate the parts of the cell found in a plant and animal cell. The first one has been done for you. **(5 marks)**

PART	PLANT CELL	ANIMAL CELL
Nucleus	√	√
Cell membrane		
Cytoplasm		
Cell wall		
Large vacuole		
Chloroplast		

3. Blood contains plasma, red blood cells, white blood cells and platelets. Give the function of each:

a) Plasma ..... **(1 mark)**
b) Red blood cells ..... **(1 mark)**
c) White blood cells..... **(1 mark)**
d) Platelets..... **(1 mark)**

4. a) Distinguish between saprophytes and parasites. **(2 marks)**

b) (i) Name a common disease in Rwanda caused by protozoa. **(1 mark)**

(ii) Suggest methods that can be used to control the disease you named in b (i). **(3 marks)**

5. What substances are transported by:

a) The vascular systems of a flowering plant? **(2 marks)**
b) The blood system of mammals? **(2 marks)**

6. a) Why is mucus needed to protect the cell lining the gut from protein-digesting enzymes? **(2 marks)**

b) The **pH** in the stomach is very acidic about **pH 2**. Why would it be a problem if the **pH** in the small intestines was 2? **(2 marks)**

7. An experiment was done to investigate effects of bile on lipid digestion. Lipase enzyme and bile were added to a lipid test tube A. Test tube B only had the lipid and lipase enzyme. Explain why:

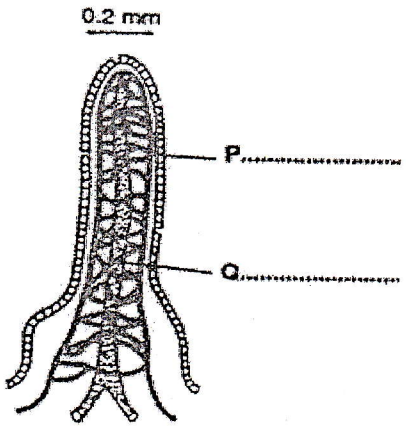
a) The **pH** in test tube A became acidic. **(2 marks)**
b) The reaction in test tube B was very slow. **(1 mark)**

8. Explain why the elimination of water by the kidney may be considered to be both excretion and osmoregulation. **(4 marks)**

9. Why is it more accurate to describe fish as a 'variable-temperatured' animal rather than cold-blooded? **(2 marks)**

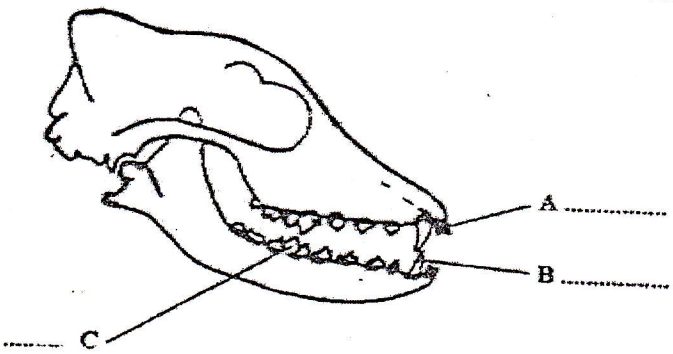
10. a) How is a zygote different from any other cell in the body? **(1 mark)**
b) Why is it difficult to decide whether viruses are living organisms? **(4 marks)**

11. The diagram below shows a villus in longitudinal section from elium of a mammal.



a) Name the parts labeled P and Q. **(2 marks)**
b) What are the functions of P and Q? **(2 marks)**
c) Explain how P is adapted to carry out its functions. **(2 marks)**

12. The diagram below shows the side view of a skull of a carnivore.



Label the teeth A, B and C. **(3 marks)**

13. Choose words from the list to complete the sentences that follow. Each word may be used once or not at all. **(6 marks)**

Cells; Chloroplast; Chromosomes; Genes; Organs; Organisms; Nucleus; Tissues.

Each body cell contains a..... (i) which controls the cell's activities and characteristics. This contains pairs of.....(ii) which are made up of a number of small units of inheritance called.....(iii) A collection of similar cells working together are called.....(iv) These make up .....(v) which work together as systems allowing .....(vi) to survive.

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 marks)

14. Briefly explain how: a) the flow of blood is maintained in a mammal. **(5 marks)**

b) the flow of water is maintained in a flowering plant. **(5 marks)**

15. a) (i) What are hormones? **(1 mark)**

(ii) Where are hormones produced? **(1 mark)**

b) Which hormones are produced by the pancreas? **(2 marks)**

c) Explain how the blood sugar level in blood is controlled. **(5 marks)**

16. a) How is AIDS transmitted from one person to another? **(4 marks)**

b) Suggest all possible methods that can be used to avoid the AIDS virus. **(6 marks)**

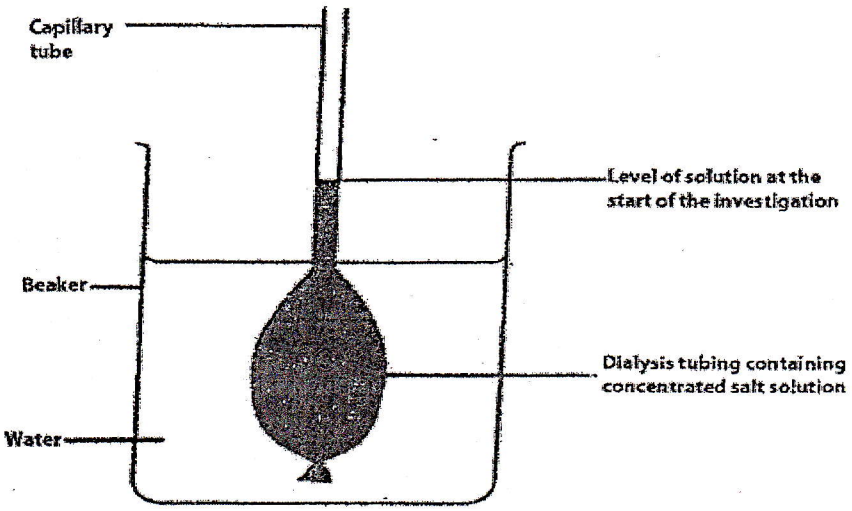
17. Identify the various modes of asexual reproduction in plants and animals. **(10 marks)**

18. a) Define pollination. **(1 mark)**

b) Name the types of pollination and characteristics of each. **(9 marks)**

SECTION C: COMPULSORY. (15 marks)

19. Some students set the experiment below to investigate a biological process.



a) (i) Name the process being investigated. **(1 mark)**

(ii) Define the process named in a(i) above. **(2 marks)**

b) (i) What will happen to the water level in the capillary tube during this investigation? **(1 mark)**

(ii) Explain what has happened in b(i) above. **(5 marks)**

c) Explain fully what happens when both animal and plant cells are put in a beaker containing pure water. **(6 marks)**

END

ANSWERS FOR BIOLOGY III 2014

SECTION A

Answer to Question 1.

A, C and D because they have: - an outer cell membrane, large vacuole, irregular shape, central nucleus

Answer to Question 2.

PART	PLANT CELL	ANIMAL CELL
Nucleus	√	√
Cell membrane	√	√
Cytoplasm	√	√
Cell wall	√	X
Large vacuole	√	X
Chloroplast	√	X

Answer to Question 3.

a) Plasma: - carry dissolved hormones, carry dissolved urea, transport nutrients, transport other blood cells

b) Red blood cells: - transport oxygen, transport carbon dioxide

c) White blood cells: - fight bacteria, production of anti bodies

d) Platelets: for blood clotting to avoid excessive loss of body fluids.

Answer to Question 4.

a) Saprophytes are organisms which feed on dead decaying organic matter while parasites depend on other organisms for both food and shelter or a parasite is an organism which benefits from another (host) causing harm to the host.

b) i) Malaria caused by plasmodium

ii) - sleep under a treated mosquito net, remove stagnant water around houses, spray with insecticide, cut bushes around houses.

Answer to Question 5.

a) xylem – water and mineral salts
phloem – water, sucrose, amino acids.

b) water, blood proteins, glucose, fats, amino acids, salts, vitamins, carbon dioxide, blood cells, oxygen, hormones, waste products.

Answer to Question 6.

a) Because cells are partly made of proteins and would be broken down into digestion and would cause ulcers.

b) This is a wrong PH for the enzymes in the gut because they would be denatured by acidity and would not work or the enzymes of the small intestines work at basic (alkaline) PH.

Answer to Question 7.

a) Lipase breaks down lipids facilitated by bile salts of bile to fatty acids and glycerol. Fatty acids are acidic and lowers the PH.

b) Because there was no bile to emulsify the lipids for easy digestion or because there is no bile to facilitate lipase action.

Answer to Question 8.

Excretion of water is a metabolic product and is removed when in excess and osmoregulation in water is maintained to keep the water potential of blood more or less constant or to maintain water balance, maintain normal blood concentration.

Answer to Question 9.

Its body temperature is the same as or only a few degrees above its surroundings. This makes it very dependent on temperature changes. Or the temperature of the fish changes depending on the surrounding of the environment.

Answer to Question 10.

a) A zygote is a product of fusion of male and female reproductive cells.

b) A virus when outside a cell cannot grow or reproduce. It does not feed, respire or excrete. These are characteristics of living things. It is for these reasons that it is difficult to say its living or not. The only living characteristic it shows is the ability to reproduce when inside a living cell, using materials supplied by the cells.

Answer to Question 11.

a) P – Epithelium (blood capillary network)
Q – Lacteal (Lymphatic vessel)

b) P absorbs amino acids and glucose and glucose/vitamins/mineral salts. Or transport glucose/amino acids /mineral salts. Q absorbs fatty acids and glycerol.

c) The lining of the epithelium is very thin or permeable membrane, extensive capillary network, rich blood supply etc.

Answer to Question 12.

A – incisors, B – Canine, C – Carnassials or molars

Answer to Question 13.

i) nucleus , ii) chromosomes, iii) genes, iv) tissues, v) organs, vi) organisms

SECTION B.

Answer to Question 14.

Maintenance of blood flow in a mammal.

- The automatic stimulation of the pace maker that enables the continuous contraction of the cardiac muscles that allows the pumping of blood out of the heart to the rest of the body parts.
- Difference in ventricular muscles which enables blood to be pumped out of the heart at different pressures depending on the distance to be covered.
- Elasticity of the arteries that allows constrictions which maintains high pressure in arteries.
- Skeletal contractions maintain movement of blood in the veins.
- Thicker walls of arteries which maintain and withstand high pressure of blood.
- Presence of valves in veins and the heart that prevent the back flow of blood.
- Continuous blood supply to the heart muscles by coronary arteries which enables respiration for

energy supply to allow the heart contractions.

b) Transpiration pull, root pressure, capillary force, osmotic pressure, cohesion force, adhesion force.

Answer to Question 15.

a) i) Hormones are organic substances secreted in minute quantities into the blood stream by endocrine glands or specialized nerve cells and regulate the growth or functioning of specific tissue.

ii) Endocrine glands

a) insulin, glucagon

b) - Insulin facilitates conversion of: glucose to glycogen and fats, oxidation to glucose.
- Glucagon : stimulates conversion of: - glycogen to glucose, fats to glucose, amino acids to glucose.
- Insulin decreases blood sugar, glucagon increases blood sugar.

Answer to Question 16.

a) Sexual contact with an infected person, use of hypodermic needles contaminated with infected blood, transfusion of infected blood, homosexual partners with infected people, drug users share needles and syringes, infected mothers can infect the foetus.

b) Use of condoms during sexual intercourse, setting up free needle schemes for those people who inject drugs, screening blood before transfusion, education programs to make people aware of the methods of transmission of the HIV virus and how they can be prevented, abstaining from sexual intercourse, faithfulness, avoid drug use, avoid blood contact during accidents, proper delivery of babies during birth (PMTCT)

Answer to Question 17.

Binary fusion, spore formation, vegetative propagation, natural layering, rhizomes, tubers, cutting fragmentation, budding, grafting, suckers, cloning etc.

Answer to Question 18.

a) Pollination is the transfer of pollen from the stamen to the stigma of a flower.

b) Self pollination, cross pollination.

Characteristics of self pollination:

- Hermophrodite flowers, Anthers and carpels get mature Simultaneously, Anthers are above the stigma, Petals remain closed until pollination takes place, Self compatibility.

Characteristics of cross-pollination:

- Anthers mature before stigma, Self sterility, Stigma mature before anthers

Answer to Question 19.

a) i) Osmosis

ii) It is the movement of water molecules from their highest concentration to the lowest concentration to the lowest concentration through a semi-permeable membrane.

b) i) The water level will rise in the capillary tube.

ii) The solution inside the dialysis tubing exerts osmotic pressure on the water in the beaker and water molecules move from the beaker where there are more water molecules through the dialysis tubing which is acting as a semi-permeable membrane. This will continue until the

salt solution is diluted enough. The water level in the beaker will also fall.

c) Water enters both cells because there are more water molecules in the beaker than there are in the cells. The animal cell will eventually swell until it bursts because its cell membrane cannot resist the internal pressure inside the cell. The plant cell however will not burst because it has a cell wall outside the cell membrane which is strong enough to resist the internal pressure inside the cell.

END