NAME:……SIGN…….

SCHOOL NAME……

Biology
P553/1
Paper 1
2 hours

INITIATIVE OF BIOLOGY TRANSFORMATION

SENIOR THREE EXAMINATION 2023

BIOLOGY THEORY

PAPER 1

2 HOURS

INSTRUCTIONS

- **This paper consists of two section A and B.**
- **Section A is compulsory. Write your answers in the spaces provided**
- **Section B consists of 6 questions. Attempt only four (4) questions from this section.**

FOR EXAMINER'S USE ONLY

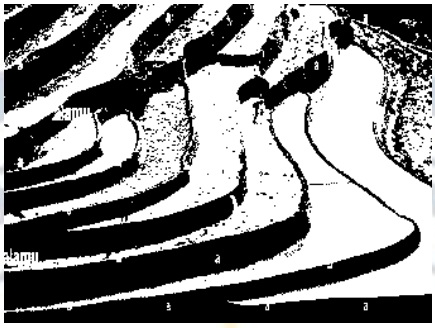
SECTION	MARKS
A: 1 – 12	
B: 13 - 18	
TOTAL	

SECTION A (60MARKS)

Attempt all questions in this section.

Use a neat handwriting to present your answers precisely in the spaces provided.

1. As a result of agricultural development strategies in different parts of Uganda, investments in **Land leveling**, have increased significantly in recent years. Land leveling is done by manual labor coupled with small tractors. Among some of the methods involved in land leveling are shown in the picture below.



a) Describe the meaning of the word **Land Leveling**. (***01mark***)

……

b) Name the method indicated in the picture above. (***01mark***)

……

c) Identify any region in Uganda where this method is mostly used. (***01mark***)

……

d) Describe briefly how the above method is important in soil conservation. (***02marks***)

……

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2. The table below shows the food energy value of a lunch meal in Jinja Modern Secondary School. Read it carefully and use it to answer questions that follow.

Food consumed	Protein (g)	Carbohydrates (g)	Fat (g)
Sausages	9	5	24
Chips	8	70	20
Baked beans	10	20	1
Apple pie	5	60	25
Ice cream	2	20	12
Soft drink	0	30	0

a) Explain whether at this school, students obtain a balanced diet from their meal (***02marks*)**

……

……

……

b) In this meal, which food is the best source of protein? (*$0\frac{1}{2}$marks*)

……

c) Suggest one other food, not consumed here, that is rich in protein. (*$0\frac{1}{2}$marks*)

……

d) Why is protein essential in any diet? (*02marks*)

……

……

……

3. The body of mammals has the circulatory system that plays a variety of functions. This system consists of blood as a transport fluid that contains cells. The diagram below shows the cells found in blood of a mammal

a) On the diagram, point and label the red blood cells and white blood cell. (*01mark*)

b) How do the two cells differ? (*01mark*)

……

……

……

c) State the role of red blood cells in the body. (*01mark*)

……

……

d) When a drop of blood is added to distilled water, the red blood cell eventually swells and bursts. Explain. (***02marks***)

……

……

……

4. Soil is a loose thin layer of the Earth's crust. It is made up of five ingredients namely minerals, organic matter, living organisms, water and air. These components are given by their percentage composition as follows:

Component	**Percentage composition**
Mineral	45
Organic matter	5
Water	20
Air	26
Organisms	4

a) In the space provided below, make a pie chart from the data in the table above. (***02marks***)

b) List two organisms that are present in the soil. (***01mark***)

……

……

c) Mention two uses of organisms in the soil. (***02marks***)

……

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……

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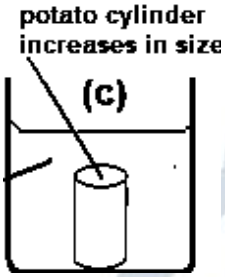
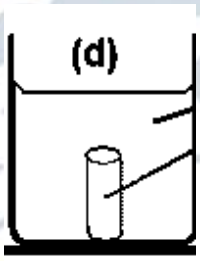
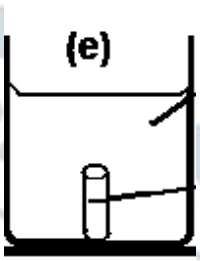
5. A candidate in order to study the process of osmosis has taken 3 potato cubes and put them in 3 different beakers containing 3 different solutions. After 24 hours, in the first beaker the potato cube increased in size, in the second beaker the potato cube decreased in size and in the third beaker, there was no change in the size of the potato cube. The following diagrams show the result of the same experiment.





Potato remains
in the same size



Potato cylinder
shrinks in size

a) Give the technical terms of the solutions used in the beakers C, D and E. (***$1\frac{1}{2}$ marks***)

C:……

D:……

E:……

b) In beaker 3, the size of the potato cube remains the same. Explain the reason in brief. (***$1\frac{1}{2}$marks***)

……

……

……

c) How does a cell wall and a cell membrane differ in their permeability of materials? (***01mark***)

……

……

d) Write the specific features of the root hairs which helps in absorption of water. (***01mark***)

……

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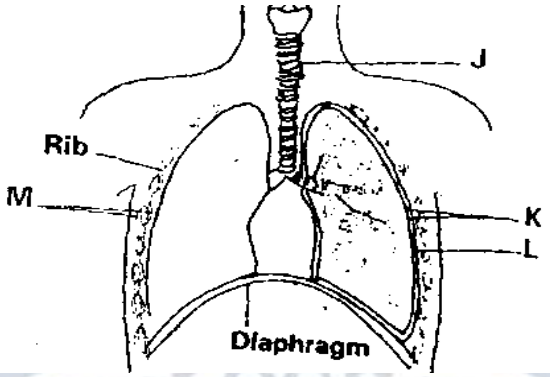
……

……

6. The diagram below represents some gaseous exchange structure in humans. Use it to answer the questions that follow.



a) (i) Identify the system of the body shown in the figure above. $(0\frac{1}{2}marks)$

……

……

(ii) Name the structure labeled K, L and M. $(1\frac{1}{2}\ marks)$

K:……

L:……

M:……

b) In two ways, how is the structure labelled J suited to its functions? $(\mathbf{02}marks)$

……

……

……

……

c) (i) Name the process by which inhaled air moves from the structure labeled L in to blood capillaries. $(0\frac{1}{2}\ marks)$

……

(ii) Give the name of the organism that causes tuberculosis in humans. $(0\frac{1}{2}\ marks)$

……

7. A well-watered plant had one of its leaves covered with tinfoil. After three days, the leaf was detached from the plant, boiled in water, decolourized with ethanol and treated with iodine solution.

a) (i) What was the aim of the experiment. $(\mathbf{01}mark)$

……..

……..

(ii) What was the purpose of the tinfoil in the experiment? $(\mathbf{01}mark)$

……..

……..

b) Some areas of the leaf were stained black with iodine while others stained brown. Explain the results. Name the substance that had caused this black stain.

Explanation (**02*marks***)

……

……

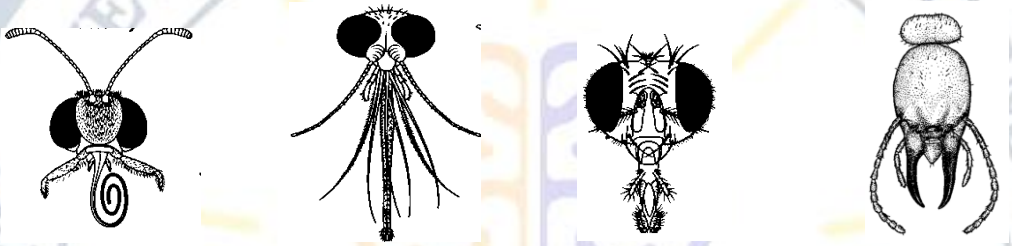
Substance. (**0 $^{1}/_{2}$*marks***)

……

c) Name the substance removed by ethanol. (**0 $^{1}/_{2}$*marks***)

……

8. The figure below shows four heads of different insects. Study them carefully and use them to answer questions that follow.



W X X Z

a) Identify two features that are common to all the above heads of insects. (***01mark***)

……

……

b) Using features present on the above heads, construct a dichotomous key to help the reader to identify the above insects. (***03marks***)

……

……

……

……

……

……

……

……

c) State one adaptation of the head that enable a successful living to the insects. (***01mark***)

……

……

9. The three main classes of foodstuffs are present in a slice of bread and butter. These are digested as they pass along the alimentary canal.

a) Use the information to complete the table below by stating the food class, region where chemical digestion of the food class starts and the products of this chemical digestion. (***03marks***)

Food	Food class	Where digestion begins	Products of digestion
Bread			
Butter			

b) Identify the secretion produced in to the alimentary canal that does not contain enzyme but assists in the digestion of fats. (***$0\frac{1}{2}$ marks***)

……

c) Describe briefly how glucose is used in the body. (***$1\frac{1}{2}$marks***)

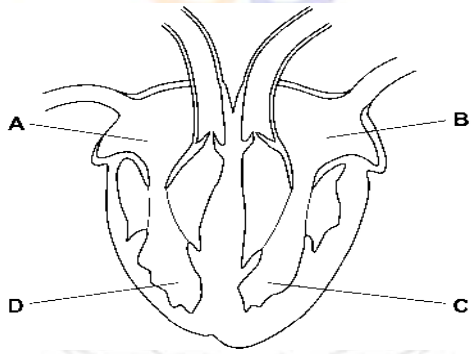
……

……

……

……

10. In man, the structure known to pump blood in the body is the heart. The heart is made up of many parts that enable it to perform this task. You have been given the diagram of the heart below. Use it to answer the questions that follow.



a) (i) Label the parts marked A and C. (***01mark***)

A……

C……

(ii) State two adaptations that enable the heart to perform its function. (***02marks***)

……

……

……

……

b) Outline in **order** of the letters A, B, C and D, the chambers of the heart through which blood passes from the body until when it is pumped in to the body. (***01mark***)

……

……

c) Mention the major cause of circulatory diseases. (***01mark***)

……

……

11. In a test tube kept in a water bath, 0.25cm^3 of a plant enzyme was added to 5.0cm^3 of starch suspension. Drops of this mixture were removed and tested with iodine solution to determine when all the starch had been digested. The experiment was repeated at each of eight different temperatures and the results were as follows.

Temperature (^{O}C)	18	29	37	44	51	56	62	65
Time taken for digestion (min)	17	13	9	6	4	3	13	19

a) Describe how you would test the contents of the tube to show that starch has been digested to a simple reducing sugar. (***02marks***)

……

……

……

b) Explain the relationship between temperature from 51^{o}C to 65^{o}C and time taken for digestion to occur. (***02marks***)

……

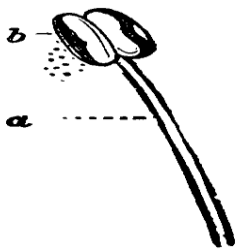
……

……

c) Deduce from the data, the temperature at which the enzymes work the fastest. (***01mark***)

……

12. In flowering plants, the flower possesses parts that occur in concentric layers called **whorls**. These floral whorls are important in the proper functioning of the flower to promote fertilization of the plants. One of the structures in the floral whorls is given in the diagram below. Study it and use it to answer the questions that follow.



a) (i) Name the floral whorl shown in the figure above. (***01mark***)

……

(ii) Label the parts marked a and b on the structure above (***01mark***)

a:……

b:……

b) Differentiate the length of the part labelled **a** of insect pollinated flowers and wind pollinated flowers. How is the different stated helpful in wind pollinated flowers? (***02marks***)

……

……

……

……

c) State the main function of the above structure to the flower. (***01mark***)

……

……

SECTION B (40MARKS)

Attempt only four questions from this section.
All questions have equal marks.

13. Flowering plants are very important organisms to man and his surrounding through ways that are either direct or indirect to man. However, man grows certain plants depending on their good roles to his life. Imagine you were a cassava plant. Write an application letter to the farmer of your village to encourage him grow you. (***10marks***)

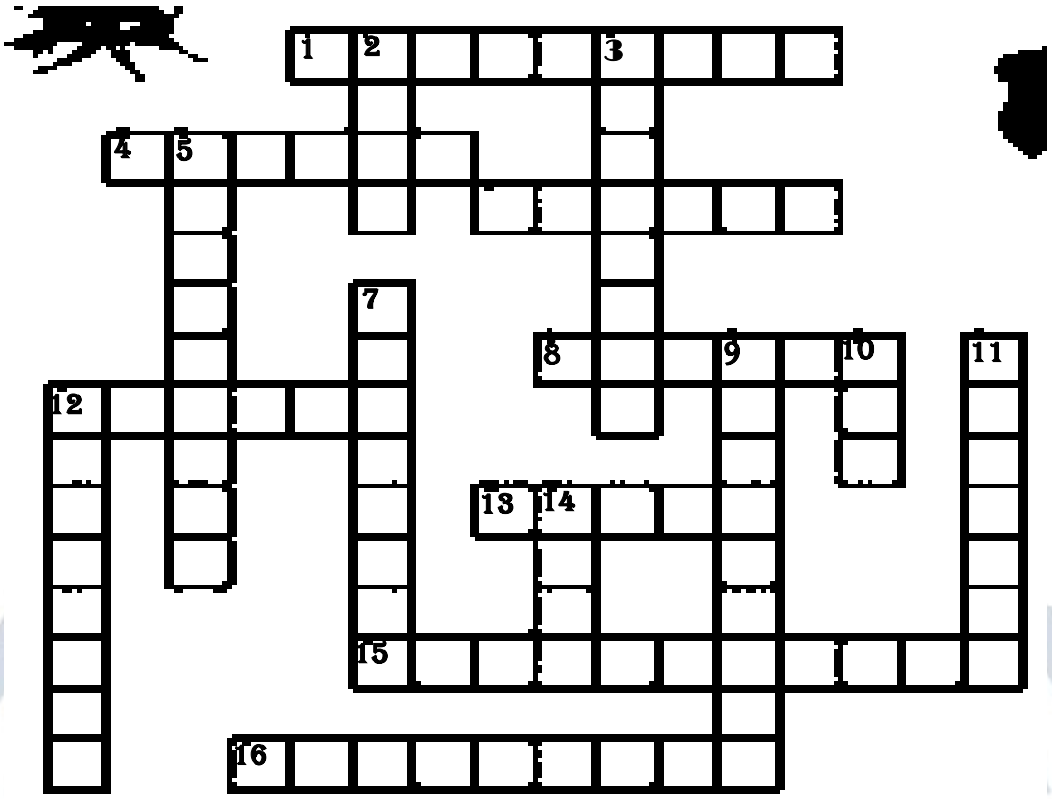
14. The nitrogen cycle is a biogeochemical cycle that shows the interrelationship between organisms and the environment during the recycling of nitrogen in the atmosphere and soil. It involves processes as well as organisms that have roles to play in the process.
A farmer was given the following cards indicating the processes and organisms involved in the nitrogen cycle and asked to sort them in to the nitrogen cycle.

DENITRIFICATION	**Nitrogen fixing bacteria**	**NITROGEN FIXATION**	**Animals**	**Plants**
NITRIFICATION	**ASSIMILATION**	**ATMOSPHERE**	**Nitrifying bacteria**	**PUTRIFICATION**

a) Through arranging the cards and use of arrows, help the farmer to form the nitrogen cycle. (***06marks***)
b) Describe the role of organisms in the nitrogen cycle. (***04marks***)

15. Insects are all related, they share a common ancestor at the base of their family tree. From this ancestor all insects inherited a basic anatomy and body plan. The diversity in form and ultimately function found in insects is a result of changes made in some anatomical structures such as the legs and mouthparts. Complete the puzzle below and use it to learn more about external features and/or the life cycles of insects. (***10marks***)

1



Across

1. Butterfly pupa
4. The middle body segment of an insect.
6. Simple light-sensing organs.
8. The end segment on an insect's leg
12. the exoskeleton of an insect is made of this substance.
13. the largest segment on an insect's leg.
15. a hard covering that protects the body of insects.
16. a feeding structure that butterflies and other insects have.

Down

2. The body segment of an insect that contains the sensory organs.
3. Structures that allow an insect to smell.
5. flying insects have forewings and……
7. Used by chewing insects to grab food.
9. Openings in the exoskeleton where air can flow in to the insect.
10. the number of legs on an insect.
11. the end segment on body of an insect
12. the type of eyes an insect has.
14. females lay these to start the life cycle of an insect

16. a) Plants and other organisms are vital in nature by making food from which other organisms that cannot make their own food depend. Read the following passage and complete it by filling in the spaces provided with an appropriate word. This shall help you understand the concepts of plant nutrition: (***08marks***)

Do you think plants cultivate food? No, they don't. Therefore, they only survive by making their own food in a process called……. In the process, plants make a sugar called …….from simple chemical substances from the atmosphere and ……..……..and as well liberate a gas known as……..

Plants obtain ……..…..from the atmosphere and water from the……, which are directly used in the process of making food. After making the sugars, these sugars can be used to

make other substances like ……..……, ……..……and starch which is stored in special cell structures called……..……for future use by the plant. The gas produced from photosynthesis can be used either during…….……..in the mitochondria of plant cells to produce energy or can be excreted to the environment via the ……..on leaves.

However, not only plants can make their own food, other organisms like ……..……. and bacteria can do the same. Thus these organisms can use the simple materials and energy from their environment to build up food nutrients, a form of nutrition described as…….……..nutrition. Hence, these organisms are called……..…… It is this food from these organisms that all other organisms that cannot make their own food such as……..……and fungi feed on and also get the nutrients required by their body. So plants are very important sources of food to other organisms on land. For this reason also, plants are referred to as…….……because they make their own food and avail it to other organisms.

b) Use the knowledge about the raw materials involved in photosynthesis to explain why you are encouraged to plant trees. (***02marks***)

17. Plants and animals need gases to survive. And in case they need the gases, they breath the air from atmosphere and pick up the required air using special structures. When the gases reach the body of animals and plants, it circulates in the cells of these organisms until when it is used up. So use this brief linkup to answer the following questions.
    a) (i) Explain the meaning of the word breathing. (***02marks***)
    (ii) State the structures that enable plants and animals to pick up gases from the atmosphere. (***02marks***)
    (iii) Name the process through which gases use to enter and leave these organisms. (***01mark***)
    b) One of the structures involved in breathing is the rib cage. Take a deep inside breath and outside breath. As you are doing that, observe and note down what happens to the ribcage when
    (i) Breathing in (***01mark***)
    (ii) Breathing out (***01mark***)
    c) Name the cells in the body of animals that carry gases all over the body. (***01mark***)
    d) Explain the importance of gas exchange to organisms. (***02marks***)

18. Through transpiration, plants are able to get rid of excessive water from their leaves, because water vapour escapes to the atmosphere through certain routes from the plant. However, transpiration affected by some environmental factors that either increase or decrease the rate of transpiration. You are required to identify some factors affecting rate of transpiration.
    a) (i) Outline two routes through which water vapour can escape from the plant. (***01mark***)
    (ii) State the process through which water vapour escapes from the leaves (***01mark***)
    b) (i) Recall and state two conditions that easily dry clothes when we wash and hung our clothes to dry. (***02marks***)
    (ii) How do you think one of the conditions help to dry clothes? (***02marks***)
    c) (i) Using that knowledge from b) above, state two factors that can increase the rate of transpiration. (***02marks***).
    (ii) Explain the importance of transpiration to man. (***02marks***)

END