

NATIONAL EXAMINATIONS COUNCIL  
P.O.BOX 3817 KIGALI

**Biology III**

**002**

**09<sup>th</sup> Nov 2002      8.30am-11.30am**

**ORDINARY LEVEL NATIONAL EXAMINATION 2002/2003**

**SUBJECT            : BIOLOGY III**

**LEVEL              : TRONC COMMUN**

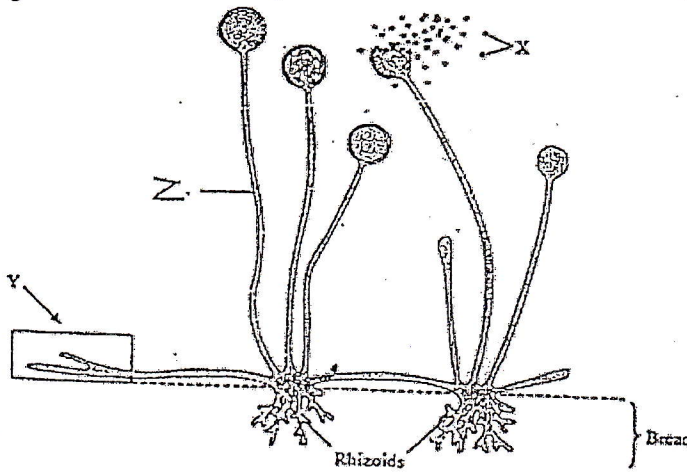
**TIME                : 3 HOURS**

**INSTRUCTIONS:**

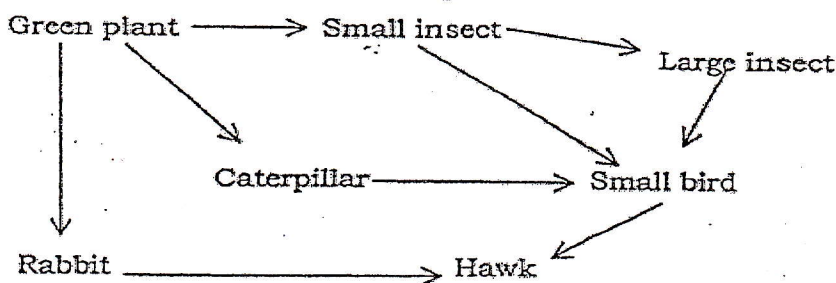
- This paper consists of **THREE** Sections A, B and C.
- Answer **ALL** the questions in section A.      **(55 marks)**
- Answer **THREE** questions in section B.      **(30 marks)**
- Answer only **ONE** question in section C.      **(15 marks)**

**SECTION A: /55 MARKS**  
**Answer ALL questions in this section**

1. (a) Write AIDS in full. (1 mark)
- (b) What is the difference between AIDS and HIV? (2 marks)
2. The diagram below shows part of the structure of a fungus growing on a piece of bread.



- (i) Name structures labeled X.....
- Z.....
- (ii) When the fungus is feeding, the tips of hyphae labeled Y release enzymes. Explain why? (2 marks)
3. Give the differences between a butterfly and a moth. (3 marks)
4. What are the main stages of an incomplete metamorphosis? (3 marks)
5. Give at least three functions of blood. (3 marks)
6. (a) Sports men are normally given glucose and not sucrose after exercise. Explain why? (2 marks)
- (b) What are the products of glucose oxidation? (1½ marks)
7. (a) Describe three ways in which plant cells are different from animal cells. (1½ marks)
- (b) Name the structures that are common to both animal and plant cells. (3 marks)
8. Name the excretory organs and their respective waste products. (4 marks)
9. What are the functions of the skin? (3 marks)
10. Which hormones are produced by the pancreas gland? What is the function of these hormones? (4 marks)
11. (a) What is the initial organism in any food chain? Explain your answer. (2 marks)
- (b) Study the food web below.



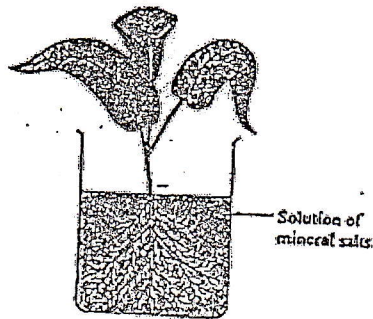
- (i) Which organisms are: - primary consumers  
- Secondary consumers.

(2 marks)

- (ii) What would happen if small insects died?

(2 marks)

12. Plants need water which often has mineral salts dissolved in it.



- (a) What do plants make from the following minerals?

(i) Nitrates

(2 marks)

(ii) Magnesium

(2 marks)

- (b) Give two reasons why water is important to plants.

- (c) (i) In which vessels does water travel through the plants?

(1 mark)

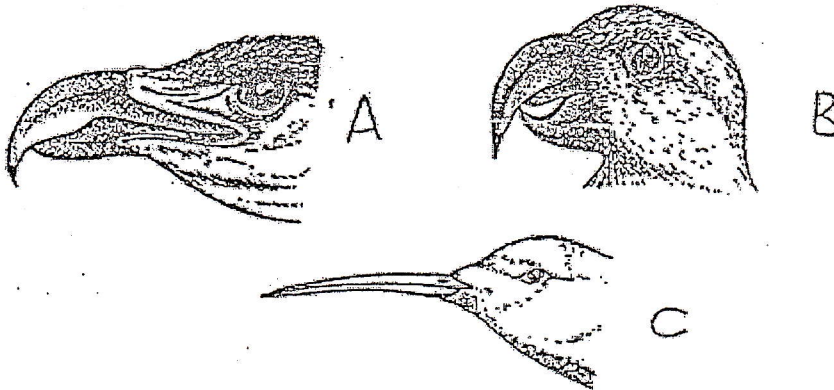
- (ii) In which vessel does sugar travel through the plant?

(1 mark)

13. What are the main classes of phylum Arthropoda?

(3 marks)

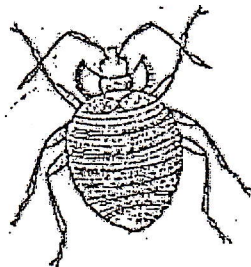
14. Study the beaks of birds below.



Suggest the feeding habits of these birds. Explain your answer.

(3 marks)

15. The organism below belongs to class insect a.



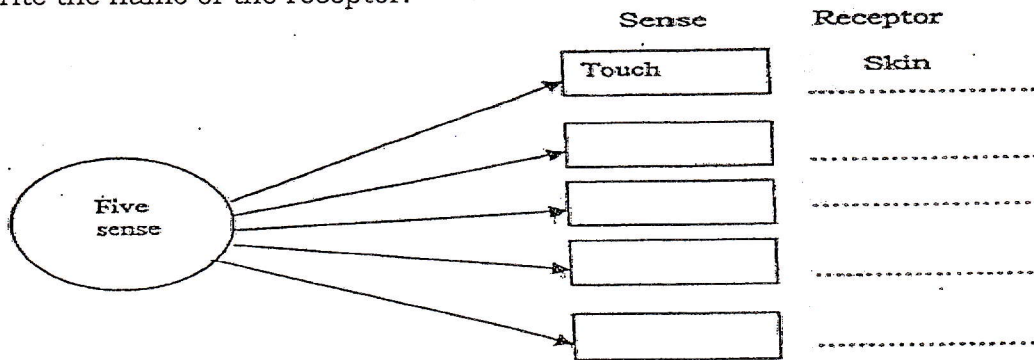
Suggest reasons why?

(3 marks)

**SECTION B: /30 Marks**

**Answer only THREE questions in this section**

16. (a) Humans have a number of senses, for example touch, senses are detected by receptors for example skin detects touch. In the box below write the names of other senses. By each box write the name of the receptor.

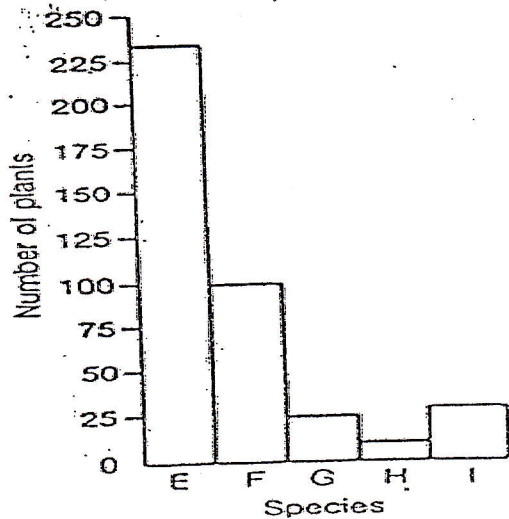


- (b) When your hand is touched, the information is passed to your brain. Describe how the information gets from your skin to your brain. (2 marks)
17. (a) Name the organs in which mitosis occurs in mammals and flowering plants. (2 marks)
- (b) What is the importance of mitosis to living organisms? (2 marks)
- (c) In a breeding experiment with garden peas, a sample of plants with white flowers and breed true was crossed with a sample of plants which produce red flowers and breed true. When the seeds produced were grown, all the resulting F1 generation produced red flowers.
- (i) Why were no white flowers produced by plants belonging to the F1 generation? (2 marks)
- (ii) Using electric symbols, explain what would result from interbreeding the F1 generation? (4 marks)
18. (a) What is an enzyme? (1 mark)
- (b) Describe the characteristics of enzymes. (3 marks)
- (c) What part is played by enzymes in germination of maize? (6 marks)
19. (a) Give 2 examples of micro organisms. (2 marks)
- (b) Describe the importance of micro organisms to man. (8 marks)
20. Malaria is a killer disease in Africa especially south of the Sahara.
- (i) What causes malaria? (2 marks)
- (ii) Suggest possible methods you would use to eradicate malaria in your village. (5 marks)
- (iii) What steps has the government of Rwanda taken to reduce the infection of malaria? (3 marks)

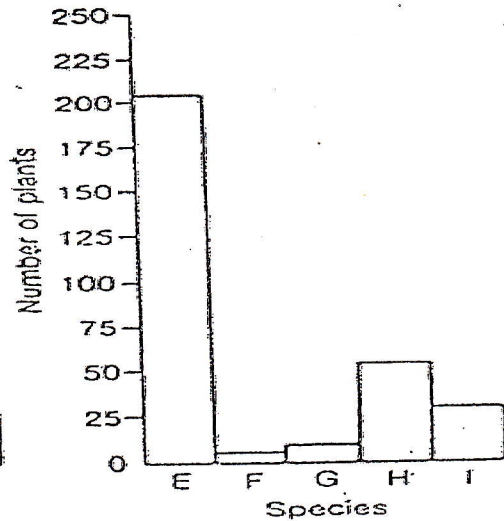
**SECTION C: /15 Marks (This section is compulsory)**

21. (a) A group of students studied two areas of grassland. One lightly trampled and the other heavily trampled. The histograms below show the numbers of plants of five different species found in random samples taken within each region.

**Histogram 1  
Lightly Trampled Region**

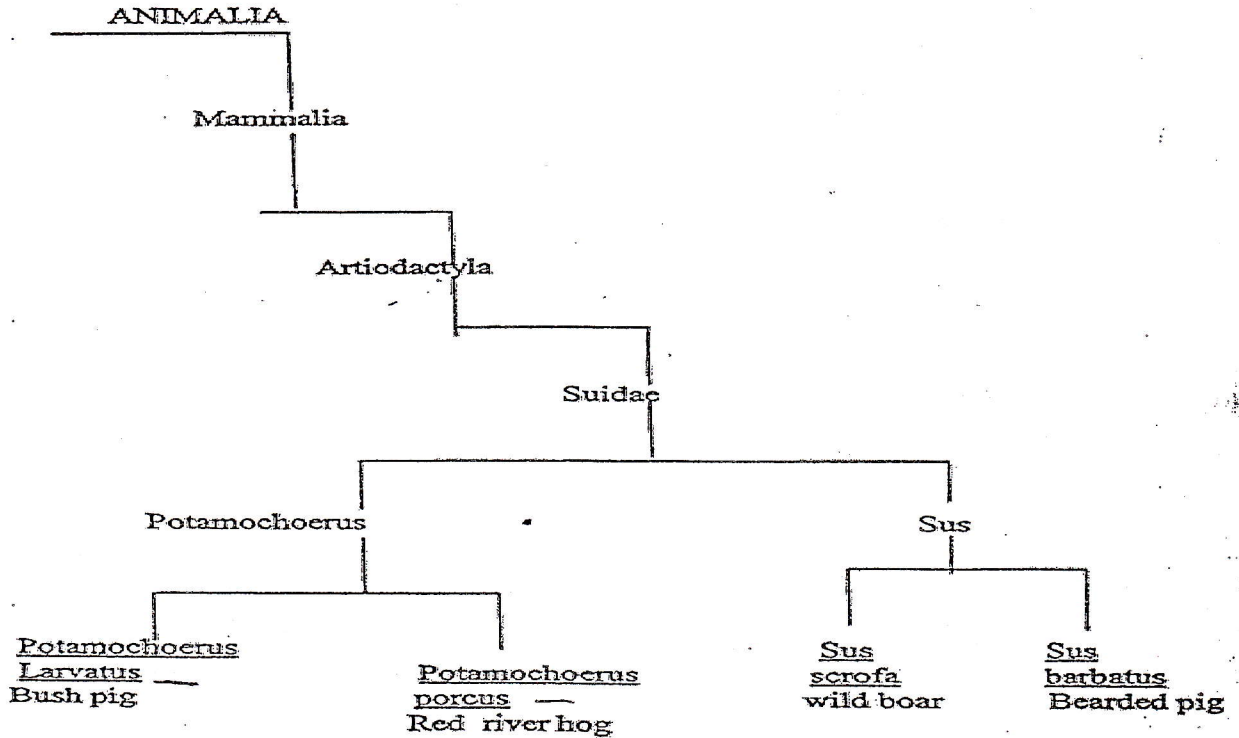


**Histogram 2  
Heavily Trampled Region**



- (i) How many species of E were found in each region? (2 marks)
  - (ii) What is the effect of increases trampling on species G and H? (2 marks)
  - (iii) Which species are most affected by trampling? (2 marks)
  - (iv) Which species are least affected by trampling? (2 marks)
- (b) The following organisms were found on an abandoned farm.
- Green plants
  - Hawks
  - Lizards
  - Grasshoppers and
  - Snakes
- (i) Construct a pyramid of numbers to show their relationship. (4 marks)
  - (ii) Which organism(s) are:
    - Tertiary consumers
    - Top carnivores
    - Herbivores(3 marks)

(c) The diagram below shows how four species of pig are classified.



- i) To which class do these pigs belong? (1 mark)
- ii) To which family does the red river hog belong? (1 mark)
- iii) To which genus does the bearded pig belong? (1 mark)
- iv) Give the species name of bush pig. (1 mark)

END

**ANSWERS FOR BIOLOGY III 2002-2003**

**SECTION A**

**Answer to Question 1.**

- (a) Acquired Immune Deficiency Syndrome
- (b) AIDS is the disease that is caused by HIV while HIV is the virus that causes AIDS.

**Answer to Question 2**

- (i) X refers to spores. Z - sporangiophore
- (ii) They release enzymes which digest food and then absorb the broken down food  
(Extracellular digestion)

**Answer to Question 3**

Differences between butterfly and a moth

Butterfly	Moth
Active during the day	Active at night
Has bright colours	Has dull colours
Wings rest together and upright	Wings rest at their sides
Has straight and cubed antennae	Has feathered or pointed antennae
Has a thin body	Has a thick body

**Answer to Question 4**

Egg - Nymph - adult

**Answer to Question 5**

Blood transports gases throughout the body, It protects the body from germs, It transports hormones and other chemicals around the body.

**Answer to Question 6**

- (a) This is because glucose is smaller than sucrose and can easily dissolve into the body to form energy.  
 (b) Carbon dioxide, water and energy

**Answer to Question 7**

(a) differences between plant and animal cells

Animal cell	Plant cell
Lacks a large cell vacuole	Has a large cell vacuole
Lacks a cell wall	Has a cell wall
Has an irregular shape	Has a regular shape
Lacks chloroplasts	Has chloroplasts

(b) Both has the following: cell membrane, mitochondria, nucleus, golgi apparatus

**Answer to Question 8**

Organs and their products

Organ	Product
Skin	Sweat
Lungs	carbon dioxide
Kidneys	Urea
Malpighian tubules	Uric acid

**Answer to Question 9**

Functions of the skin include:

It helps to regulate the body temperature, It contains the receptor cells for touch, It protects the body from mechanical damage

**Answer to Question 10**

Insulin which lowers the levels of blood glucose  
 Glucagon which increases the levels of blood glucose

**Answer to Question 11**

- (a) Producer e.g. grass. Because it has to convert solar energy into chemical energy for other organisms to consume.  
 (b) (i) - Primary consumer - (small insect, caterpillar, and rabbit)  
 - Secondary consumer - (smaller bird, and large insect)  
 (ii) All large insects would perish and die also. Also the numbers of small birds would decrease greatly.

**Answer to Question 12**

- (a) (i) Proteins and leaves  
 (ii) Chlorophyll  
 (b) it is used in photosynthesis.  
 It is also used to cool the plant during hot days.

- (c) (i) Xylem vessels  
(ii) Phloem

**Answer to Question 13**

Class Arachnida, Class Crustacea, Class Diplopoda, Class Chilopoda and Class Insecta

**Answer to Question 14**

A - is a carnivore, B is a nut eater, and C is a nectar feeder

**Answer to Question 15**

It has got three pairs of legs, It has three main body parts, It has a pair of antennae

**SECTION B**

**Answer to Question 16**

- |           |          |
|-----------|----------|
| (a) Sense | Receptor |
| Sight     | Eye      |
| Smell     | Nose     |
| Hearing   | Ear      |
| Taste     | Tongue   |

(b) When touched, the receptor cells in the skin detect the stimulus and send an impulse via the sensory neuron. The sensory neuron then informs the intermediate neuron found in the spinal cord. The impulse is then transmitted to the brain.

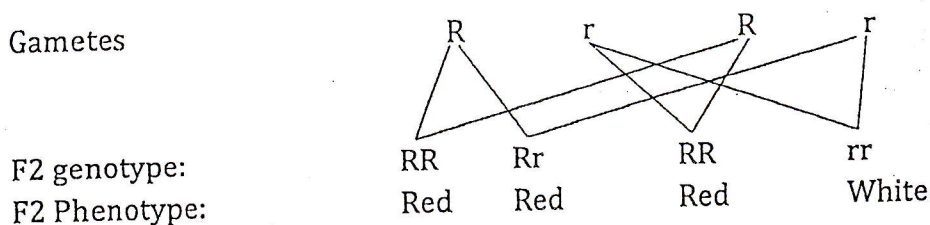
**Answer to Question 17**

- (a) In all body cells except the gametes.  
(b) It helps to the organism to grow, It also helps in repair of damaged cells.  
(c) (i) It is because the allele for red flowers is dominant over the allele for white flowers.  
(ii) Let R represent the allele for red flowers

Let r represent the allele for white flowers

Parental phenotype: Red X Red  
Parental genotype: Rr Rr

Gametes



**Answer to Question 18**

- (a) This is an organic compound protein in nature that speeds up chemical reactions in the body.  
(b) - They catalyze reversible reactions.  
- They are protein in nature. They are globular proteins.  
- They work best at optimum temperatures. When the temperatures are too high, they get denatured and if too low, their rate is slowed down.  
- They work best at particular pH.  
- They are highly specific



(c) Enzymes break down the stored food into smaller and easily used food. In so doing, they speed up the process of making new structures within the plant hence germination. E.g. convert starch to glucose which is used to make energy, proteins are broken down to form amino acids which are used for growth.

**Answer to Question 19**

- (a) This is an organic compound protein in nature that speeds up chemical reactions in the body.
- (b) - They are used in the bakery industry to make bread.  
 - They are used to make cheese and yoghurt.  
 - They cause diseases to man and sometimes leading to death,  
 - They are used for research purposes and microbiologists get paid.  
 - Some are used in making of medicine e.g. penicillin.  
 - Some like bacteria have been used to make useful products like insulin.  
 - Some help man to improve on soil fertility through fixing nitrogen in the soil.

**Answer to Question 20**

(i) Plasmodium

- (ii) - Through removing of stagnant water  
 - Through encouraging people to close their windows and doors early.  
 - Spreading the mosquitoes with insecticides.  
 - Encouraging people to complete medication  
 - Through burning and clearing of bushes  
 - Encouraging people to sleep under mosquito nets

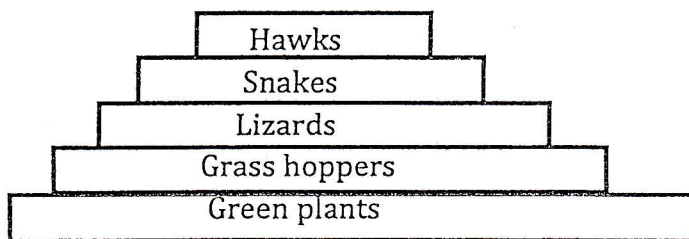
- (iii) - It has distributed free mosquito nets to the public.  
 - It has educated the masses about the dangers of malaria.  
 - It has provided medicine to the public.

**SECTION C**

**Answer to Question 21**

- (a) (i) In the lighter region = 238  
 In the heavier region = 205
- (ii) Trampling causes a decrease in the species of G while in H, it causes an increase.
- (iii) specie F
- (iv) it is H which is least affected.

(b) (i)



(ii) *Tertiary consumers*  
 - Snakes

*Top carnivores*  
 - Hawks

*Herbivores*  
 - Grasshoppers

- (c) (i) Artidactyla  
 (ii) Potamochoerus  
 (iii) Sus  
 (iv) Larvatus

**END**