

NAME

RANDOM/PERSONAL No. / SIGNATURE



553/1

BIOLOGY (Theory)

Paper 1

Thursday 10th August 2023 (Morning)

2 hours 30 minutes

ACHOLI SECONDARY SCHOOLS EXAMINATIONS COMMITTEE

Uganda Certificate of Education

Joint Mock Examinations, 2023

BIOLOGY

(Theory)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- ✓ Answer ALL the questions in sections A and B; and any TWO questions from section C.
- ✓ Answers to section A must be written in the boxes provided against each number.
- ✓ Answers to section B must be written in the spaces provided.
- ✓ Answers to section C must be written on a separate sheet of paper / booklet.

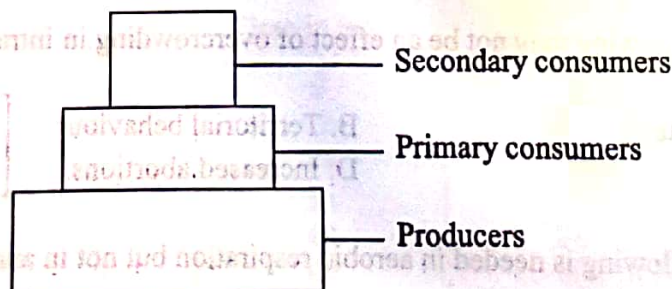
For Examiner's Use Only			Examiner's Name
Questions		Marks	
Section A (1 – 30)			
Section B	Qn:	31	
	Qn:	32	
	Qn:	33	
Section C	Qn:		
	Qn:		
Total			

SECTION A (30 marks)

Answer ALL questions in this section. Write the letter representing the most correct answer to each question, in the box provided.

- Which of the following vitamins is deficient in a person whose gum bleeds?
A. Vitamin C
B. Vitamin D
C. Vitamin E
D. Vitamin K
- Which one of the following occurs during exhalation in a mammal?
A. Diaphragm muscle flattens
B. Volume of the thorax increases
C. External intercostal muscle relax
D. Diaphragm muscle contracts
- A root tip of a bean seedling was marked with black ink at uniform intervals. After 3 days, it was noted that some intervals were longer than others. The conclusion from this is that:
A. The ink accelerated growth in some parts of the root tip.
B. There was no growth in some parts of the root tip.
C. The rate of cell elongation in the different parts of the root tip is not uniform.
D. Cells in the longer intervals differentiated more than those in short intervals.
- Which one of the following is the function of the choroid of the mammalian eye?
A. Absorption of light to prevent total internal reflection.
B. Protects the delicate inner layers of the eye.
C. Transmits sensory impulses from the retina to the brain for interpretation.
D. Provides nutrients and oxygen to the cornea and eye lens.
- An endosperm is formed in plants when the second male nucleus fuses with the:
A. Egg nucleus
B. Antipodal cells
C. Embryo
D. Polar nuclei
- In estimating the population of Nile perch in fish cage, 80 fish were captured, marked and released. After 2 days, 50 fish were captured and out of which 20 were bearded marks. The population of Nile perch in his cage is:
A. 300
B. 400
C. 200
D. 100
- In man, the oestrus cycle is also known as:
A. Heat period
B. Gestation period
C. Menstrual cycle
D. Lactation cycle
- Which one of the following pairs of bones form a ball and socket joint?
A. Humerus and ulna
B. Femur and pelvis
C. Humerus and radius
D. Femur and tibia

9. In flowering plants, a transpiration stream is maintained by:
 A. Diffusion B. Active transport C. Osmosis D. Capillarity ☐
10. The part of a tooth which has living tissue is called:
 A. Enamel B. Cement C. Crown D. Pulp cavity ☐
11. The ratio of the phenotypes when a roan bull and a roan cow are crossed is:
 A. 2 red : 1 roan : 1 white B. 1 red : 2 roan : 1 white
 C. 1 red : 1 white D. 1 red : 1 roan : 2 white ☐
12. The absence of nucleus in a mature erythrocyte is to:
 A. Allow the cell carry more dissolved food substances.
 B. Allow the cell carry more oxygen.
 C. Ease the passage of the cell through capillary linings.
 D. Create more space for antibodies. ☐
13. Which of the following processes increases the amount of nitrogen in the atmosphere?
 A. Denitrification B. Nitrification C. Excretion D. Putrification ☐
14. The following results were obtained during the analysis of a given soil sample.
 Volume of soil used = 100 cm^3
 Volume of water used = 200 cm^3
 Volume of water + Soil after stirring = 276 cm^3
 What was the percentage of air in the soil sample?
 A. 24% B. 92% C. 8% D. 4% ☐
15. Which of the following sets of materials is received by a pregnant mother from the foetus?
 A. Carbon dioxide and glucose
 B. Amino acids and urea
 C. Urea and carbon dioxide
 D. Glucose and amino acids ☐
16. Which one of the following statements correctly describes the situation illustrated in the pyramid of numbers in the figure below?



- ☐ A. There are fewer primary consumers than secondary consumers.
☐ B. Secondary consumers are smaller in size than primary consumers.
☐ C. The producers represent grasses.
☐ D. There are fewer secondary consumers than primary consumers.
17. Which one of the following changes occur in the eye when a person lifts his / her head from reading a book to look at a bird flying in the sky?
A. The ciliary muscle relaxes
B. The radial muscles of the iris contract.
C. The lens becomes thicker.
D. The pupil becomes larger. ☐
18. The membranes P, Q, R and S were found to have average of 3, 4, 12 and 2 mitochondria respectively per cell. Which of the four membranes is likely to allow passage of materials by active transport?
A. P B. Q C. R D. S ☐
19. Which one of the following is not an adaptation of plant leaves for photosynthesis?
A. Possession of chloroplasts.
B. Presence of intercellular spaces.
C. Being hairy.
D. Having a thin lamina. ☐
20. Which one of the following reactions is likely to occur when a person of blood group A donates blood to a person of blood group B?
A. Antibodies a would react with antigens A.
B. Antibodies b would react with antigens B.
C. Antibodies a would react with antigens B.
D. Antibodies b would react with antigens A and B. ☐
21. Which one of the following pairs of nutrients consists of disaccharides only?
A. Glucose and galactose.
B. Fructose and sucrose.
C. Maltose and lactose
D. Sucrose and glucose. ☐
22. Rotation of a fish about its longitudinal axis during swimming is counteracted by:
A. Dorsal and ventral fins.
B. Ventral and pectoral fins.
C. Pectoral and pelvic fins.
D. Pectoral and ventral fins. ☐
23. Which one of the following may not be an effect of overcrowding in intraspecific competition?
A. Failure to copulate
B. Territorial behaviour
C. Eating the young
D. Increased abortions ☐
24. Which one of the following is needed in aerobic respiration but not in anaerobic respiration?
A. Glucose B. Oxygen C. Carbon dioxide D. Enzymes ☐

25. The biological method of pest control involves:
 A. Application of pesticides to kill the pest.
 B. Interruption of the pests breeding cycles.
 C. Destruction of pests' habitats and enemies.
 D. Introduction of the pests' predators.
26. Messages across a synapse is by means of:
 A. Electrical current B. Chemicals C. Impulses D. Mechanical
27. Light from a far object converges at a point behind the retina of the eye. This causes a blurred image. Such a defect is corrected by:
 A. Wearing a diverging lens B. Wearing a converging lens
 C. Wearing a cylindrical lens D. Wearing spectacles
28. A prickly pear is a succulent plant with broad, flat stems having leaves in form of spines. Such a plant is likely to be found in:
 A. Water deficient area B. Water logged area
 C. Hilly area D. Low land
29. The process of meiosis is very important in living organisms during:
 A. Growth of the organism B. Increasing number of body cells
 C. Cell specialisation D. Formation of gametes
30. A patient was diagnosed with prolonged bleeding upon sustaining an injury. Which one of the following vitamins is likely to be lacking in that individual?
 A. Vitamin D B. Vitamin K
 C. Vitamin B₆ D. Vitamin B₁₂

SECTION B (40 marks)

Answer ALL the questions in this section. Answers must be written in the spaces provided.

Question 31:

An experiment was carried out to find the population growth in a culture of paramecium. The temperature was kept constant throughout the experiment. The following table shows the results of the experiment:

Time in hours	Number of paramecium
0	10
12	20
24	55
36	190
48	245
60	260
72	265
84	265

(06 marks)

- (a) Draw a graph to represent the data above.
 (b) During which 12 hour period was the population increase of the paramecia:
 (i) Greatest?

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 (ii) Least?

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 (c) From the graph you have drawn, write down the number of hours the population of paramecia took to increase from:
 (i) 30 to 50

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 (ii) 50 to 100

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 (d) (i) The fast rate of population increase was for a short while. Explain why?

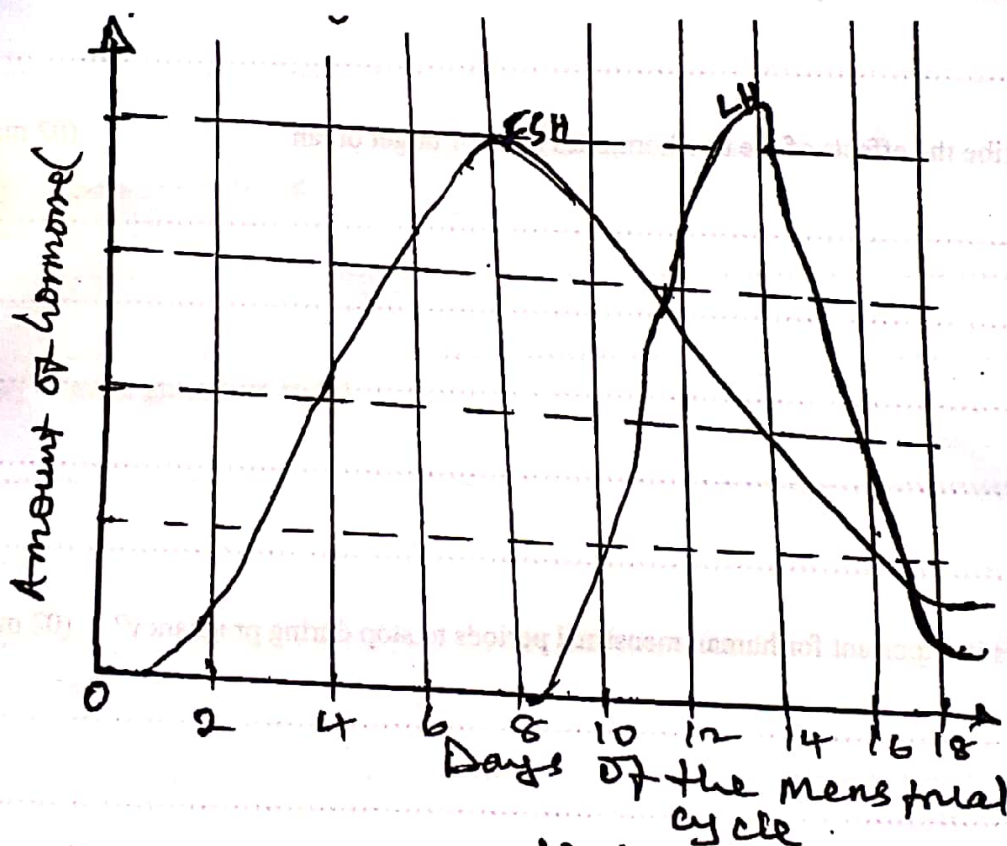
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 (ii) From the shape of your graph, what could be the conclusion regarding the population changes of the paramecia? (04 marks)

- (e) What factors do you think contributed to very slow rate of growth of the paramecia between 48 – 72 hours? (04 marks)

Question 32:

The figure below shows the relative amount of follicle stimulating hormone (FSH) and luteinising hormone (LH) in the blood stream of a woman during the first 18 days of the menstrual cycle.



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- (a) Describe how the amounts of the two hormones change during the period shown. (04 marks)

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- (b) State the organ which:

(i) secretes the two hormones.

(01 mark)

(ii) is affected by the two hormones.

(01 mark)

- (c) Describe the effects of the two hormones on their target organ.

(02 marks)

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- (d) Why is it important for human menstrual periods to stop during pregnancy?

(02 marks)

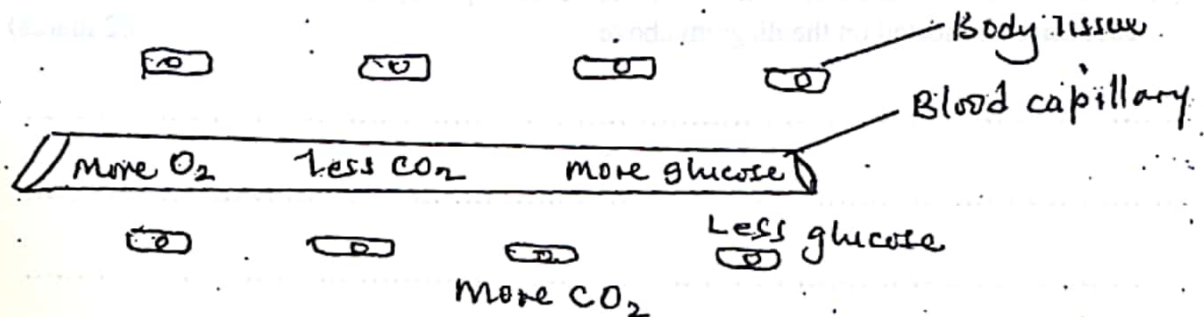
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Question 33:

The diagram below represents blood capillary and the surrounding tissues.



- (a) (i) By use of arrows, show how each substance in the drawing is likely to move between the capillary and the blood on the diagram above. (1½ marks)
- (ii) State the process by which substances move in the direction indicated in the diagram above.

- (b) What is the source of high amounts of the following substances? (03 marks)

(i) more CO₂ in tissues

(ii) more CO₂ in blood.

(iii) more glucose in blood

- (c) Name and give the fate of the substances that move into the: (03 marks)

(i) Tissues

(ii) Blood capillaries

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- (d) Give two structural characteristics of the blood capillary that favour movement of the substances indicated on the diagram above. (02 marks)
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SECTION C (30 marks)

Answer TWO questions from this section. Answers should be written on the answer sheets/booklets provided.

Question 34:

- (a) Giving two examples in each case, explain what is meant by the following terms:

(i) Sporulation (03 marks)

(ii) Binary fission (03 marks)

- (b) State any three differences between conjugation and sporulation.
- (c) During the menstrual cycle in human females, pituitary gland secretes two hormones called gonadotropins. Give the names of the hormones and their effects

Question 35:

- (a) Describe an experiment to show that a leaf exposed to light manufactures starch for the plant.
- (b) How are leaves modified to carry out their different functions?

Question 36:

Describe how xerophytes and halophytes are adapted to the environment.

Question 37:

- (a) Define the term metamorphosis.
- (b) How does growth in animals differ from that in plants?
- (c) Describe the location and function of the apical meristems, lateral buds, the vascular and cork cambium in plant growth and development.

END