Name..... Centre/Index No. .....

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P530/1
BIOLOGY
PAPER 1
July/August 2023
$2^{1}/_{2}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Advanced Certificate of Education
BIOLOGY
(Theory)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of **40** questions in section **A** and **6** questions in section **B.**

Answer **all** questions in both sections **A** and **B**

Section A: Answers to this section must be written in the boxes provided.

Section B: Answers to this section should be written in the spaces provided and not anywhere else.
No additional sheet(s) of paper should be inserted in this booklet.

FOR EXAMINERS' USE ONLY			
SECTION		**MARKS**	**Examiners' initials & No.**
Section A:	1- 40		
Section B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 MARKS)

Write the letter corresponding to the **most** correct answer in the box provided on the right of each question.

1. Monocotyledonous roots differ from dicotyledonous roots because of having
   A. a large cortex.
   B. an endodermis.
   C. central pith.
   D. a stele.

2. Which of these pigments is **not** likely to be found in annelids blood?
   A. Haemoerythrin
   B. Chlonocroucrin
   C. Haemo cyanin
   D. Haemoglobin

3. Which one of the following statements is **not** true during control of breathing in humans?
   A. Cerebral cortex allows voluntary control over breathing.
   B. Vagus nerve carries impulses from the respiratory centre to stretch receptors to stimulate inhalation.
   C. Stretch receptors in the bronchioles and bronchi monitor the amount of lung inflation.
   D. Impulses from chemoreceptors in the aorta and central arteries stimulate the respiratory centre to increase the rate of inhalation.

4. Which of the following is the most important factor that determines how much oxygen is transported by haemoglobin?
   A. level of oxygen in the blood.
   B. level of carbon dioxide in the blood.
   C. temperature of the blood.
   D. level of calcium ions in the blood.

5. Which of the following epithehal tissues is found in the fallopian tube?
   A. Simple columnar ciliated.
   B. Simple columnar.
   C. Simple cuboidal.
   D. Pseudo stratified columnar.

6. Which of these is a short term physiological adaptation by humans to high altitude?
   A. Increased rate of heart beat.
   B. Increased concentration of blood.
   C. Increased red blood cell production.
   D. Increased capillary density.

7. Which one of the following determines the biological role of proteins in cells?
   A. Sequence of amino acids in them.
   B. Pattern of folding of the amino acids.
   C. Other protein molecules with which it is associated.
   D. The three dimensional shape.

8. Which of the following would directly lead to stomatal opening?
   A. K^+ actively pumped into guard cells.
   B. K^+ actively pumped out of guard cells.
   C. Water absorbed by osmosis.
   D. Water lost from the guard cells.

9. Which of the following is the most efficient method of minimizing water loss in terrestrial animals?
   A. Burrowing in desert frog.
   B. Think fur in Kangaroos.
   C. Waxy chitinous exoskeleton in insects.
   D. Humidity seeking behavior in woodlice.

10. Which one of the following is **not** an adaptation for photosynthesis in shade plants?
   A. High chlorophyll content.
   B. Thin leaves.
   C. Low compensation point.
   D. Thick leaves.

11. Which of the organisms below exchange gases through the general body surface?
   A. Earthworm
   B. Amoeba
   C. Hydra
   D. Aquatic Annelids.

12. A homeostatic role played by the gut involves removal of
   A. water.
   B. salt.
   C. undigested food.
   D. bile pigments.

13. In the Calvin cycle energy is required during the
   A. conversation of glycerate phosphate to triose phosphate.
   B. fixation of cabondioxide by ribulose phosphate.
   C. conversion of triose phosphate to ribulose biphosphate.
   D. activation of the enzymes ribulose biphosphate carboxylase.

14. The substance absorbed passively in the proximal convoluted tubule but activity in the distal convoluted tubule is
   A. glucose.
   B. sodium ions.
   C. water.
   D. chloride ions.

15. During mitosis chromosomes
   A. attach to the spindle fibres to contain them within nucleus.
   B. condense to prevent further translation of genes.
   C. reach the poles of cell and begin to uncoil.
   D. replicate to reproduce sufficient DNA to form two new nuclei.

16. Chemicals used to stop tumor growth, work by preventing the DNA double helix from uncoiling and separating. During which stage of the cell cycle would they act?
A. Anaphase.
B. Interphase.
C. Metaphase.
D. Prophase.

17. The cause of resistance to antibiotics in bacteria is
A. genetic mutation.
B. over use of antibiotics.
C. natural selection.
D. patients not finishing a course of antibiotics.

18. If blood pressure falls far below the osmotic pressure of plasma proteins in the kidney:
A. Urine formation stops.
B. Ultrafiltration reduces.
C. Filtration slits widen.
D. Proteins filter through the basement membrane.

19. Which of the following is the general formula for amylose?
A. $(C_5H_{10}O_5)_n$
B. $(C_5H_{10}O_6)_n$
C. $(C_6H_{12}O_6)_n$
D. $(C_6H_{10}O_5)_n$

20. Table 1, below shows the growth measurements by height of a plant.

Days after planting	Height in CM	Growth rate
10	2	2
20	7	5
30	20	13
40	40	20
50	75	35

The relative growth rate at 30 days will be
A. 07
B. 43
C. 65
D. 100

21. Which one of the following organelles contains the cell's genetic material?
A. Golgi apparatus
B. Ribosome
C. Nucleus
D. Mitochondria

22. The organelle which sorts, chemically modifies and packages newly synthesized protein is
A. Golgi complex
B. Rough endoplasmic reticulum.
C. Smooth endoplasmic reticulum.
D. Ribosome.

23. Which one of the following genetic abnormalities does not result from non disjunction?
A. Klinefetter's syndrome,
B. Turner's syndrome
C. Haemophilia
D. Down's syndrome

24. An enzyme increases the speed of a reaction by
A. changing an endergonic reaction to an exergonic one.
B. raising activation energy.
C. lowering activation energy requirements.
D. increasing the concentration of reactants.

25. The water potential of a solution whose pressure potential is 0.3 mpa and solute potential – 0.45 mpa is;
A. +0.75 mpa
B. -0.75 mpa
C. -0.15 mpa
D. +0.16 mpa

26. Haemophilia is a sex linked trait. When a normal man marries a carrier woman for haemophilia, the probability of the couple producing a normal son is;
A. 0%
B. 25%
C. 50%
D. 75%

27. Which one of the following organisms A. B. C or D would require a vascular system?

Organism	Surface area (cm^2)	Volume (cm^3)
A	1	0.25
B	6	3
C	16	10
D	12	8

28. In estimating the population of a weed in an area of 1000 m^2, a 1 m^2 quadrat was thrown 50 times and the total number of weeds counted were 60. What was the estimated population of the weed?
A. 20
B. 300
C. 833
D. 1200

29. Most of the carbon-dioxide is transported in blood
A. in solution.
B. as carbaminohaemoglobin inside red blood cells.
C. as carboxyhaemoglobin inside red blood cells.
D. as hydrogen carbonate ions inside red blood cells.

30. Which of the following components are found both lymph and tissue fluid?
A. Antibodies, Red blood cells, White blood cells.
B. Antibodies, Sodium ion and white blood cells.
C. Red blood cells, sodium ions, white blood cell.
D. Red blood cells, antibodies, sodium ions.

31. Mosses are more vulnerable to air pollution then ferns because they
A. cannot tolerate air pollution.
B. lack a waxy cuticle.
C. are more distributed in industrial areas.
D. lack glands that can store pollutants.

32. Xylem is arranged in bundles around the periphery of the stem to
A. Increase rigidity.
B. Counteract the pull of shoots.
C. Resist compression.
D. Allow increase in girth of the stem.

33. Which one of the following is a type of post –mating reproductive isolation?
A. An embryo is unable to develop further.
B. Males are isolated from females by geographical barriers.
C. External genitalia of females and males prevent mating.
D. Courtship behavior of males does not elicit the proper response is females.

34. Figure 1 below shows the conduction of an action potential when recorded on an oscilloscope.

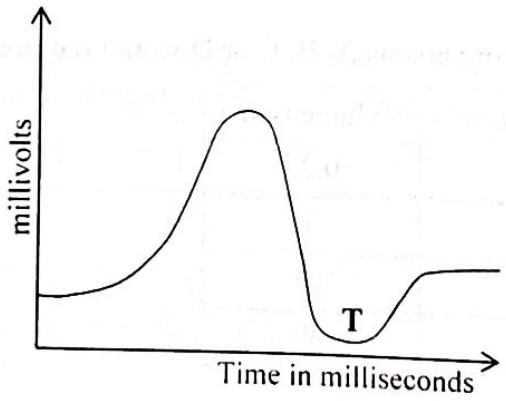


Fig. 1

The membrane at T is said to be
A. resting.
B. depolarized.
C. repolarized.
D. hyperpolarized.

35. During seed germination, the synthesis of hydrolytic enzymes is triggered by the hormone
A. Cytokinins.
B. Gibberellic acid.
C. Ethane.
D. Abscissic acid.

36. The main cause of a clustered population distribution within a habitat is?
A. highly territorial population.
B. concentration of resources in small areas.
C. sexual reproduction.
D. random distribution of resources.

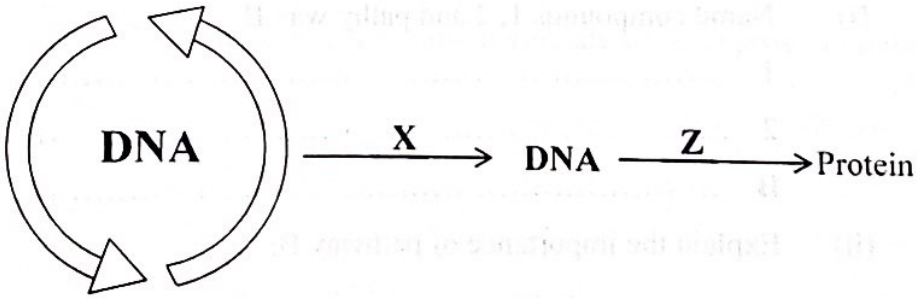
37. Which one of the following is not a phytocrone controlled physiological response in plants?
A. Root branching
B. Seed germination
C. On set of senescence
D. Flowering.

38. Which of these aids sperm penetration into the ovum during the process of fertilization?
A. Enzymes in the acrosome dissolving the jelly coat.
B. Forward pressure of the tail forces it through the vitelline membrane.
C. Chemical attraction by the ovum.
D. Ability to melt its membrane using its nucleic acid.

39. Which of the following effectors can respond to direct stimulation.
A. Electric organs in eels.
B. Pigment cells.
C. Muscles.
D. Glands of the small intestine.

40. Figure 2 below shows some of the stages of protein synthesis.

Fig. 2



The process represented by X is important in
A. recycling of DNA.
B. forming mDNA.
C. forming more DNA.
D. cell division.

SECTION B (60 MARKS)

41. (a) What is meant by the term compensation point? (02 marks)

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(b) Account for the relevance of the leaf anatomical difference between C_4 and C_3 plants. (04 marks)

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(c) Figure 2 below shows interconversions of absorbed food products in a human body. Study it carefully and answer the questions that follow.

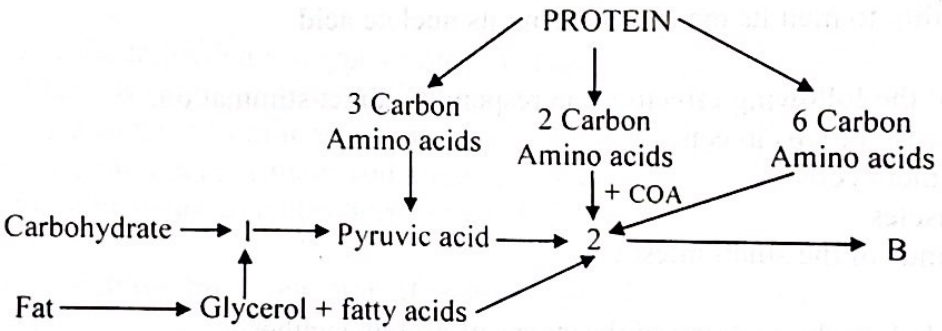

Fig. 2

(i) Name compounds 1, 2 and pathy way B. (01½ marks)

1 .....

2 .....

B .....

(ii) Explain the importance of pathway B. (02½ marks)

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42. (a) Describe the following terms in relation to DNA.

(i) Double helix (03 marks)

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(ii) Semi conservative replication (02 marks)

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(b) Chemical analysis of a sample of DNA extracted from a cell shows that 38% of bazes are adenine. What percentage of the bases is guanine? (02 marks)

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(c) Discuss why linkage does not lead to variation and consequently evolution of new species. (03 marks)

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43. (a) (i) What is an after ripening period? (02 marks)

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(ii) State **four** changes that occur in a seed during after ripening. (04 marks)

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(b) Explain why seeds of certain plants only germinate when exposed to light. (4 marks)

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44. Sickle-cell disease is a prime example of genetic pleitropy, a condition resulting from hereditary haemoglobin defects that occur among people of African descent.

(a) (i) How does the structure of sickle-cell haemoglobin (HbS) differ from normal haemoglobin (HbA). (02 marks)

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(ii) Explain why the erythrocytes of a person suffering from sickle cell anaemia appear curved and pointed at the ends. (02 marks)

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(iii) List any other 2 symptoms exhibited by a person with sickle-cell anaemia. (01 marks)

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(b) (i) Describe the structure of a haemoglobin molecule. (03 marks)

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(ii) Suggest why the affinity of haemoglobin for oxygen increases drastically after combining with oxygen. (02 marks)

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45. (a) (i) Distinguish between water potential and solute potential. (02 marks)

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(b) Figure 4 shows the variation of water potential, solute potential and pressure potential in a plant cell immersed in pure water.
Study the figure and answer the question that follow.

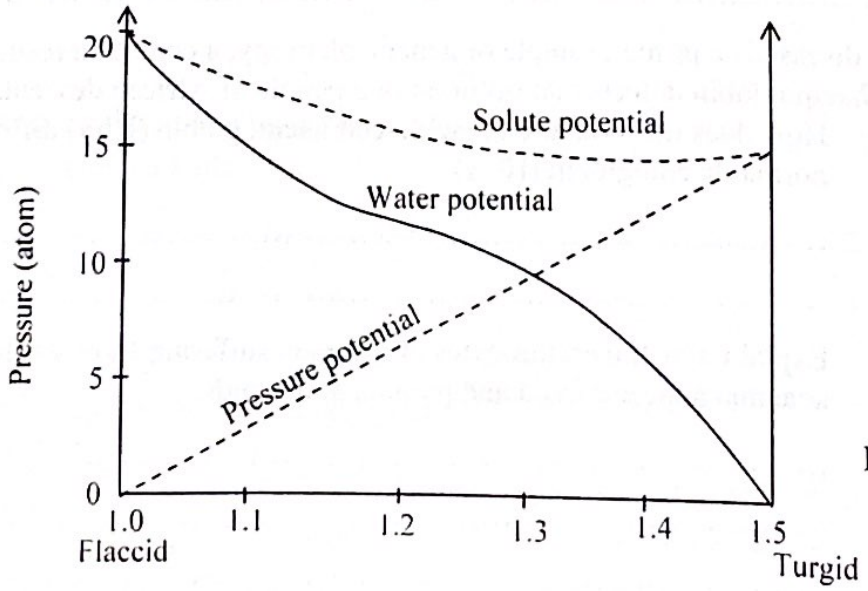

Fig. 4

Describe;

(i) The changes in water potential. (03 marks)

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(ii) The relationship between pressure potential and solute potential. (02 marks)

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(c) Explain the relationship between solute potential and water potential. (03 marks)

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46. (a) What is meant by the term Action potential? (02 marks)

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(b) State the differences between Somatic and Autonomic Nervous system. (04 marks)

Somatic	Autonomic

(c) Explain the following observations.

(i) Parasympathetic nervous division affects target organs more selectively than the sympathetic division. (02 marks)

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(ii) Somatic motor fibers have faster conduction speeds than autonomic post ganglionic nerve fibres. (02 marks)

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END