NAME: …… STUDENT'S NO……

Uganda Advanced Certificate of Education

END OF TERM I EXAMINATION 2024

S.6 BIOLOGY P530/1

Paper 1 **(**Theory**)**

2 hours 30 minutes

INSTRUCTIONS

- *Answer* **ALL** *questions in section* **A** *and* B.
- *For section* ***A****, write the correct alternative in the boxes provided.*
- *Answers to section B* ***must*** *be written in the spaces provided; answers written elsewhere shall not be marked.*

SECTION A (40 MARKS)

1. The organelle important for cell wall formation in plant cell is
A. chloroplast
B. ribosome
C. Golgi apparatus
D. endoplasmic reticulum

2. In alternation of generation, the
A. spores are produced from diploid cells
B. gametes are produced by mitosis
C. gametophyte is a sexual stage
D. spores are produced by mitosis

3. Which one of the following factors would promote the high rate of photosynthesis in a plant where light is not a limiting factor?
A. 0.10% CO_2 at 20^oC
B. 0.03% CO_2 at 20^oC
C. 0.03% CO_2 at 28^oC
D. 0.10% CO_2 at 28^oC

4. What is the percentage net primary production (NNP) if the gross primary production (GPP) of decomposers is $20,000KJm^{-2}yr^{-1}$ and respiration is $18,000KJ^2yr^{-1}$?
A. 10.0
B. 11.1
C. 20.0
D. 90.0

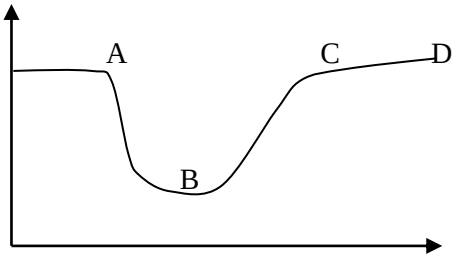
5. The amount of glucose produced in one Calvin cycle is less than expected because
A. the concentration of the enzymes that catalyse the reaction is low
B. very unstable compound forms in one stage and splits immediately
C. some of the 3C sugar formed is used to regenerate the carbon dioxide acceptor

D. the energy required to form glucose has to be obtained from other reactions

6. A quadrat of $0.5m^2$ was randomly thrown at different times in an area and each time, the number of plants obtained was recorded as 2, 5, 8 and 7. What is the population density of the area?

A. 5.25
B. 11.00
C. 44.00
D. 88.00

7. Figure **1** below shows changes in oxygen concentration downstream of a river. At what point of the curve is the BOD highest?



8. The amount of DDT in 200 planktons was measured as 0.04*ppm* and that of small fish as 0.5*ppm*. the DDT bioaccumulated in small fish by

A. 0.02
B. 0.054
C. 0.08
D. 12.50

9. Counter-current flow system is more efficient than parallel flow system because in counter current flow, the

A. gills expose a greater surface area for diffusion
B. distance across which gases diffuse is reduced
C. speed of water is increased
D. concentration gradient is maintained

10. The success of angiosperms on land is greater than that of the conifers due to the

A. possession of seeds
B. possession of flowers
C. development of true roots
D. presence of mechanical tissue

11. What is the pressure potential of a cell whose solute potential is -4900kPa and water potential -4400kPa?

A. 9300kPa
B. -9300kPa
C. 500kPa
D. 500kPa

12. Which of the following structures give rise to lateral roots in higher plants?

A. Cambium
B. Endodermis
C. Pericycle
D. Epidermis

13. Which one of the following conditions would give an **RQ** of less than 1.0?

A. Aerobic oxidation carbohydrates
B. Release of energy from seeds submerged in water
C. Respiration during prolonged starvation
D. Feeding on a fat rich food

14. Which of the following cells produce structures that give strength and toughness to areolar tissue in animals?

A. Fibroblasts
B. Mast cells
C. Fat cells
D. Macrophages

15. The tidal volume of a person whose ventilation rate is $200dm^3$ per minute and who breathes 40 times in the same period is

A. $5dm^3$
B. $160dm^3$
C. $240dm^3$
D. $8000dm^3$

16. The quantity of mineral salts in the soils of tropical rains forests are low because the

A. Standing crop biomass is small.
B. High temperature destroys nutrients.
C. Abundance of decomposers decreased
D. Nutrients are rapidly taken up by many plants.

17. Which one of the following statements is **correct** about the presence of a similar structure of cytochromes in both man and chimpanzee?

A. Evolved at the same time
B. Show divergent evolution
C. Show convergent evolution
D. Evolved at different times

18. Water reliable compounds enter cells less rapidly than lipid soluble molecules because
A. cell membrane contain more phosphate heads projecting outwards
B. components of cell membrane are polar to allow limited entry of water
C. of the hydrocarbon tail component of cell membrane
D. cell membrane contain channel proteins that are impermeable to water

19. Which one of the following types of RNA is directly involved in transcription?
A. *m*RNA
B. *t*RNA
C. *r*RNA
D. *ds*RNA

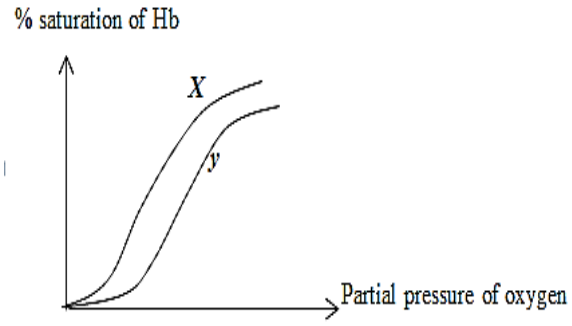
20. The following are adaptation of fresh water fish to conserve water **except**
A. Possession of numerous long glomeruli
B. Extensive reabsorption of salts back into blood
C. Excretion of trimethylamine oxide
D. Active uptake of salts by gills

21. Recombination of linked genes during gamete formation occur by
A. Independent assortment
B. Crossing over
C. Thickening of chromatids
D. Non-disjunction

22. Neo-Darwinism differs from Lamarckism in that in Neo-Darwinism, the
A. environmental pressure is the source of variation
B. variation occurs by chance nutation
C. acquired characteristics are passed onto the offspring.
D. genes are modified by the environment

23. Which one of the following organisms exhibit metameric segmentation?
A. Liver fluke
B. Earth worm
C. Hydra
D. Round worm

24. Figure **2** below shows effect partial pressure of oxygen on oxygen saturation of haemoglobin.



Which one of the following conditions in a mammal would result into shifting of the curve in figure above from position ***y*** to ***x***?

A. Increased strenuous exercise
B. Increased metabolic rate
C. Decreased respiration
D. Cold environmental temperature

25. Which one of the following processes in plants would drastically slow down when soil becomes water lagged?

A. Mineral uptake
B. Rout pressure
C. Capillarity
D. Water uptake by roots

26. Which one of the following is a characteristic of muscles of found in the walls of the alimentary canal?

A. Contract powerfully without fatigue
B. Contract rapidly with fatigue
C. Relax rapidly with fatigue
D. Contract slowly without fatigue

27. In tomato, the glues for stem colour and presence of epidermal hairs are found on different chromosomes. The allele for purple stem ***P*** is dominant to the allele for green ***p*** and the allele for hairy stem ***H*** is dominant to allele for smooth stem ***h***. When across between plants of genotypes ***PpHh*** and ***pphh*** were crossed, 32 offspring were produced. How many these would be expected to be purple with smooth stem?

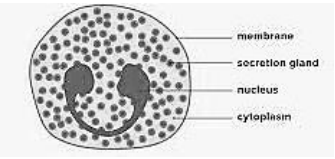
A. 24
B. 16
C. 8
D. 4

28. A light microscope is used to observe two structures that are 2000nm apart. How far apart are the structures when the magnification is changed from X40 to X400?

29. Which on the following is always present in prokaryotic cells?

A. Capsule
B. Pilli
C. Flagella
D. Ribosomes

30. Which one of the following leukocytes is represented by the figure below?



A. Monocyte
B. Basophil
C. Neutrophil
D. Eosinophil

31. Which protein structure maintains the globular shapes of enzymes?

A. Primary
B. Secondary
C. Tertiary
D. Quaternary

32. Which of the statements about polysaccharides can be used to describe both amylopectin and cellulose?

(i) Adjacent glucose molecules are rotated by 180^{o}
(ii) Contain 1, 4-glycosidic bonds
(iii) Polymer of α-glucose

A. (ii) only
B. (iii) only
C. (i) and (ii)
D. (i) and (iii)

33. What is the role of decomposer in the nitrogen cycle? They

A. convert proteins to ammonium compounds
B. fix atmospheric nitrogen
C. oxidise ammonium compounds to nitrites
D. oxidise nitrites

34. A drug that inhibits action of RNA polymerase enzyme will directly inhibit

(i) DNA replication
(ii) Transcription
(iii) ATP Synthesis

A. (i), (ii) and (iii)
B. (i) and (ii)
C. (i) and (iii)
D. (ii) only

35. Facilitated diffusion and active transport both require

A. ATP
B. protein carriers
C. unidirectional movement of solutes
D. lipid soluble solutes

36. The primary cause of clustered population distribution within a habitat is

A. high territorial population
B. uneven distribution of resources
C. even distribution of resources
D. random distribution of resources

37. Which of the following shows a reaction during anaerobic respiration?

A. Pyruvate → Lactate

B. Pyruvate → (ADP, ATP) → lactate

C. Pyruvate → lactate (ATP)

D. Pyruvate → (ATP, ADP)

38. Which one of the following factors **most** determines the amount of oxygen carried by hemoglobin?

A. Level of oxygen blood
B. Level of carbon dioxide in blood
C. Temperature of blood
D. Level of Cl^- ions in blood

39. Which one of the following carbohydrates is osmotically inactive?

A. Glucose
B. Sucrose
C. Cellulose
D. Galactose

40. Which one of the following may **not** be employed by prey to avoid predation?

A. Mimicry
B. Camouflage
C. Production of odors
D. High reproduction rate

SECTION B (60 MARKS)

41. (a) Why is the structure of plasma membrane of a cell

(i) described as partially permeable? (2 marks)

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(ii) modeled as fluid mosaic? (3 marks)

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(b) Explain the advantages of development of membrane-bound organelles in eukaryotic cells (3 marks)

(i) ……

(ii) ……

(iii) ……

(c) State **two** organelles in eukaryotic cells which are **not** membrane-bound (2 marks)

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42. (a) What is **protein denaturation**? (2 marks)

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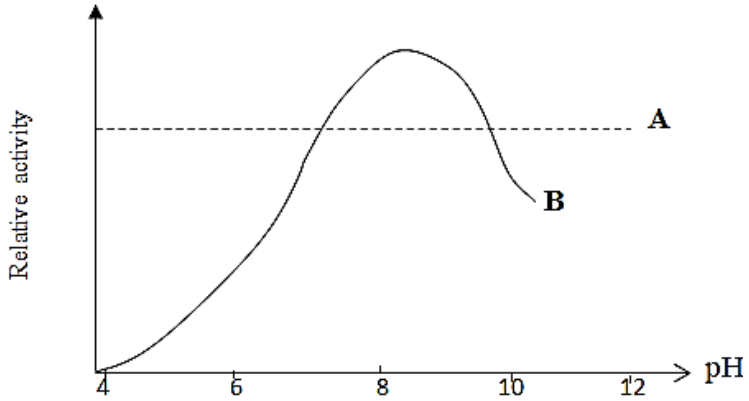
(b) Figure **3** below shows the relationship between pH and the relative activity of two different enzymes, **A** and **B**. Study the figure and answer the questions that follow:



(i) Explain the advantages of enzyme **A** over enzyme **B** (02 marks)

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(ii) From figure, what conclusion can be drawn on the effect of pH on the relative activity of enzyme **B**? (3 marks)

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(iii) How does an inorganic chemical cause denaturing of proteins? (3 marks)

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43. (a)(i) State the difference between mass flow and cytoplasmic streaming (2 marks)

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(ii) State three conditions under which mass flow occurs (3 marks)

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(b) How do the following structures perform their roles in the movement of substances in plants?

(i) Endodermis (3 marks)

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(ii) Plasmodesmata. (2 marks)

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44. (a) Explain the meaning of a **meristem**. (2 marks)

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(b) How is dormancy induced in buds of plants growing in areas that experience variation in day length? (02 marks)

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(c) How does secondary thickening contribute to increase in strength and support in a growing plant? (04 marks)

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(d) Explain the ecological significance of primary growth in plants (2 marks)

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45. (a) State **three** adaptations of Red blood cells for transportation of oxygen (03 marks)

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(b) (i) What is meant by **Bohr effect**? (2 marks)

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(ii) State the significance of Bohr effect during transportation of oxygen (2 marks)

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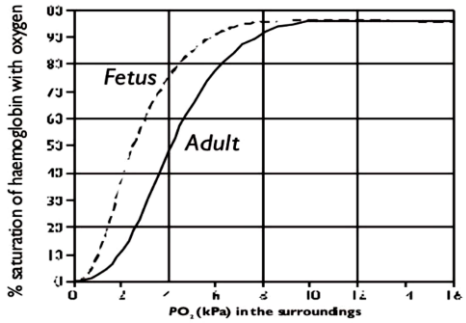
(c) Below is an oxygen dissociation curve for fetus and adult hemoglobin. Study it and answer the questions that follow.



Explain the difference in the positions of dissociation curves for human and lugworm haemoglobin. (3 marks)

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46. (a) What is meant by **gene linkage**? (1 mark)

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(b) In *Drosophila*, the gene for broad abdomen and long wings are dominant over the genes for narrow abdomen and vestigial wings. Pure breed strains of double dominant variety were crossed with a double recessive variety and a test cross was carried out on F1 generation.

(i) Using suitable symbols, work out the expected phenotypic ratio of the test cross of F 1 generation if the genes for abdomen width and length of the wing are linked (6 marks)

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(ii) It was however observed that when the test cross of the F1 generation was carried out, the following results were obtained.

Broad abdomen, long wing =380
Narrow abdomen, vestigial wing =396
Broad abdomen, vestigial wing =14
Narrow abdomen, long wing =10

Calculate the distance in unit between the genes for abdomen width and length of wing (2 marks)

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END