

Name: Index Number.....

Signature

P530/1

BIOLOGY

Paper 1

July. / Aug: 2022

2 ½ hours



MMM JOINT MOCK EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY

(THEORY)

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of two sections A and B.

Answer all questions in both sections

SECTION A

Consists of 40 questions. Write answers to this section in the boxes provided.

SECTION B

Consists of 6 questions Write answers to this section in the space provided.

No additional sheets of paper should be inserted in this booklet.

For Examiners' Use Only

Section	Marks	Examiner's signature & No.
A: 1 - 40		
B: 41		
42		
43		
44		
45		
46		
Total		

SECTION A (40 MARKS)

Write the letter to the correct answer in the corresponding box
Each question in this section carries one mark

1. The cell membrane components that mainly increase its flexibility are:
A. Glycoproteins and glycolipids
B. Cholesterol Molecules
C. Phospholipids Molecules
D. Protein Molecules

2. Which one of the following is correct about organisms in an ecosystem?
A. Some exist in isolation
B. Every organism can be independent
C. All organisms interacts with each other
D. Each organism has a different source of food

3. Which one of the following is the function of the glycoprotein and glycolipids on the surface of the cell membrane?
A. To increase the absorbing surface area
B. To provide receptor site for recognition of stimuli
C. To provide site for various reaction pathways
D. To separate the contents of the cell from the surrounding environment.

4. Which one of the following does not belong to the same group as the rest
A. Gastropoda
B. Cephalopoda
C. Pelecopoda
D. Diplopoda

5. Which one of the following pairs of substances consists the Matrix of hyaline cartilage.
A. Chondrin and chondroblasts
B. Ground substance and Fibroblasts
C. Elastic fibres and chondroblasts
D. Chondrin and collagen fibres

6. The component of the water potential which is due to the presence of solute molecules is called
- A. Turgor potential
 - B. Osmotic pressure
 - C. Osmotic potential
 - D. Turgor pressure
7. The type of bond formed when the amino group of one acid reacts with the carboxyl group of another is ;
- A. peptide bond
 - B. glyconsidi Link
 - C. an ionic bond
 - D. hydrogen bond
8. During which mitotic phase(s) are duplicated chromosomes present?
- A. All except telophase
 - B. Prophase and anaphase
 - C. All except anaphase and telophase
 - D. Only during metaphase at the metaphase plate
9. A male with under developed testes and some breasts development is most likely to be having
- A. Down's syndrome
 - B. Jacob's syndrome
 - C. Turner's syndrome
 - D. Klinefelter's syndrome
10. Which one of the following organisms illustrates that not all active animals require that the circulatory system transport gases?
- A. Mammals
 - B. Insects
 - C. Fish
 - D. Birds
11. Which one of the features below is common to both the digestive and respiratory tract in humans?
- A. Gullet
 - B. External nares
 - C. Epiglottis
 - D. Diaphragm

12. Carbon dioxide is carried in the plasma in form of

- A. Carboxyhaemoglobin
- B. Bicarbonate
- C. Carbamino hemoglobin
- D. Combined with carbonic anhydrase

13. The NADPH and ATP from the light reactions are used to

- A. Cause electron to move along their pathways
- B. Cause RUBP carboxylase to fix carbon dioxide
- C. Reform the photosystem
- D. Convert phosphoglyceric acid to phosphogyceraldehyde.

14. Which one of the following statements is not true of the electron transport chain?

The electron transport chain

- A. Is located on the cristae
- B. Produces more NADH than any Metabolic pathway.
- C. Contains cytochrome Molecules
- D. Ends when oxygen accepts electrons

15. Which of these correctly describes the distribution of ions on either side of an axon when it is not conducting an impulse?

- A. Na⁺ outside and K⁺ inside
- B. K⁺ outside and Na⁺ inside
- C. Charge protein outside, Na⁺ and K⁺ Inside
- D. Na⁺ and K⁺ outside and water only inside

16. During inhalation, the contraction of the diaphragm and intercostal muscles causes the thoracic cavity's volume to

- A. Decrease and pressure to increase
- B. Increase and pressure to decrease
- C. Increase and pressure to increase
- D. Decrease and pressure to decrease

17. The counter current flow in bony fish achieves a high level of gas exchange because it

- A. Increase the concentration gradient
- B. Decreases the distance
- C. It increases the spread at which water flows over the gills
- D. Maintains a high concentration gradients

18. Which of these is a behavioral method of birth control?

- A. Oitus interruptus
- B. Contraception
- C. Abortion
- D. Use of condoms

19. The least ecologically damaging method of controlling the spread of Malaria is by .

- A. Spraying swamps with DDT
- B. Draining swamps where mosquitoes breed
- C. Spraying oil over swamps
- D. Introducing Fish to the swamps where mosquitoes breed.

20. Which of the following is the best sequence explaining the succession of plants in a xerosere?

- A. Moss → lichen → herb → shrub
- B. Shrub → moss → herb → lichen
- C. Lichen → moss → herb → shrub
- D. Lichen → moss → shrub → herb

21. Which of the following glands is found in the sub mucosa of the alimentary canal?

- A. Salivary gland
- B. Brunner's gland
- C. Gastric gland
- D. Crypts of lieberkuhn.

22. Evolution can occur without natural selection by the process of

- A. Convergence
- B. Genetic drift
- C. Adaptation
- D. Divergence

23. Which of these is the most efficient method of minimizing water loss in a terrestrial animals

- A. Burrowing in the desert frog
- B. Waxy chitinous exoskeletons in insects
- C. Humidity seeking behavior in woodlouse
- D. Thick fur in Kangaroos

24. A plant cell has a solute potential of -1240 KPa and a pressure potential of 350KPa
What is the water potential of the cell?

- A. 1590KPa
- C. 890KPa

B. 1590KPa

D. -890 KPa

25. Which of the following statements is true about auxin activity.

- A. Low auxin concentration inhibits root growth
- B. Low auxin concentration promotes stem growth
- C. High auxin concentration promotes root growth
- D. High auxin concentration promotes shoot growth

26. Given that 4% of the members of a population of pea plants are short (a recessive character) What is the frequency of both the recessive allele and dominant allele respectively

- A. 02 and 0.8
- C. 0.04 and 0.64
- B. 0.8 and 0.2
- D. 0.04 and 0.32

27. Which of the following best describes the term imprinting

- A. Learning that occurs during a critical period in young animals
- B. Learning that requires a sign stimulus to trigger its start
- C. Innate behavior that requires practice to perfect
- D. Innate behavior that does not require practice to perfect

28. Ultrafiltration occurs through slits of adjacent specialized cells of Bowman's capsule called

- A. Kupffer cells
- B. Macrophages
- C. Leydig cells
- D. Podocytes

29. Which one of the following are the primary meristems of a plant stem.

- A. Apical meristem, vascular cambium, cork cambium
- B. Epidermis , apical cambium, vascular cambium
- C. Vascular cambium, protoderm , and procambium
- D. Ground meristem, protoderm, and procambium

30. The spore- bearing structure that gives rise to a female gametophyte in seed plant is called a

- A. Microphyll
- C. Microsporangium
- B. Sporophyll
- D. Megasporangium

31. What hormone is secreted by the placenta during early stages of pregnancy and delays degeneration of the corpus luteum

A. Progesterone C. Oestrogen
B. Chronic gonadotropin D. Human planeta lactogen

32. During excretion in insects , the following enters the malpighian tubule passively

A. Salts and water
B. Uric acid and water
C. Carbon dioxide and water
D. Potassium and sodium ions

33. The inert conversion between phytochromes P_r to P_{fr} can be facilitated by subjecting the plant to a

A. Flash of red light
B. Flash of far red light
C. Long period of darkness
D. Short period of darkness

34. The equation below summaries the complete aerobic respiration of oleic acid, a fatty acid found is Olive oil.

$$2\text{C}_{18}\text{H}_{34}\text{O}_2 + 3\text{O}_2 \longrightarrow 36\text{CO}_2 + 3\text{H}_2\text{O}$$

From this information the respiratory quotient (RQ) for the aerobic respiration of oleic acid is

A. 0.9 C. 0.7
B. 1.2 D. 1.4

35. In a mammalian endotherm, body temperature is maintained constant

A. At the skin surface
B. At the extremities
C. Inside the internal organs
D. Between the hairs

36. The term alkaline tide refers to

A. The massive exodus of carbonate ions from the oxyntic cell into the surrounding capillaries
B. The dissociation of carbonic acid into hydrogen carbonate ($\text{HC}\bar{\text{O}}_3^-$) and hydrogen (H^+) Ions
C. The massive exodus of hydrogen carbonate ions from the oxyntic cell into the surrounding capillaries
D. The massive exodus of carbonate ions from the capillaries into the oxyntic cells

37. Which of these form the boundary of the efficiency range during temperature regulations?

- A. lower lethal and upper lethal temperature
- B. Lower lethal and high critical temperature
- C. Lower critical and higher critical temperatures
- D. Higher critical and upper lethal temperature

38. In the alternation of generation during the lifecycle of a fern

- A. The gametophyte supports the sporophyte
- B. The sporophyte supports the gametophyte
- C. The gametophyte and sporophyte are independent
- D. The gametophyte is the most prominent generation

39. Which of the following assumptions is not true about the mark capture – mark method of population estimation

- A. There is no birth or death in the sampling period
- B. Every marked animals has the same probability of surviving the sampling period
- C. The population is sampled basing on its marked status
- D. The marked individuals become freely mixed in the population

40. The percentage of thymine molecule present in a DNA molecule containing 1000 bases of which 200 are guanine is

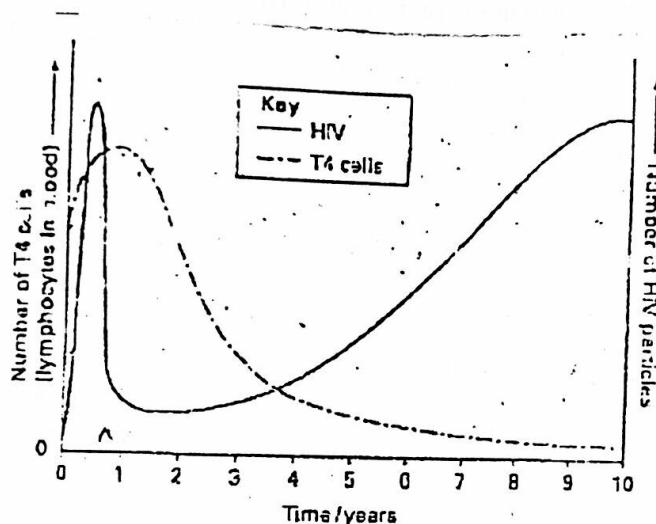
- A. 20%
- B. 30%
- C. 40%
- D. 60%

41. SECTION B (60 MARKS)

Write answers in the spaces provided

42. The graph in the figure below shows the development of an infection with Human immune deficiency virus (HIV) over a period of 10 years and its effects on the number of T4 cells

Study it carefully and answer the questions that follow.



- a) i) Compare the changes in the number of T4 cells and HIV particles in blood over the period of 10 years (4 marks)

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- b) Explain the differences between the number of T4 cells and number of HIV particles in blood over the period of one year.

- i) 0-6 month (3 marks)

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ii) 6 months – 1 year (3 marks)

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c) State **two** reasons why antibiotics are not effective against viral diseases like AIDS (2 marks)

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43. a) what is meant by the following terms as applied in Ecology

i) Ecosystem (1 mark)

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ii) Food chain (1 mark)

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iii) Food web (1 mark)

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b) The figure below represent pyramid of biomass and pyramid of number of organisms in the same ecosystem. (Each pyramid is not drawn to scale)

Figure 2

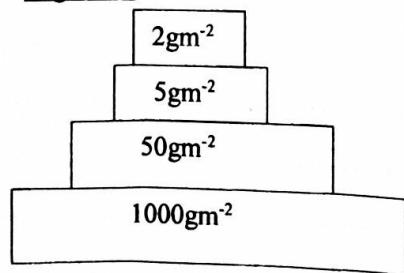
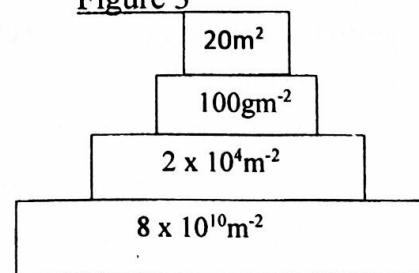


Figure 3



- i) Explain why the relationship between the various trophic levels are different while comparing the pyramid of biomass and pyramid of numbers (2 marks)
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- ii) Suggest the kind of pyramid that could be constructed to give additional information about the four trophic level? (1 mark)
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- iii) Explain why it is not possible to have more than four trophic levels in each of the pyramid shown in figure 2 and figure 3 above? (3 marks)
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- c) Why is it better to use food webs rather than food chains while studying energy flow in an ecosystem (1 mark)
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44. a) What is meant by water stress in relation to plants? (1 mark)
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- b) What are the effects of water stress in green plants (4 marks)
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c) Outline the structural adaptations of the xylem for long distance transport of water and mineral salts *(5 marks)*

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45. Giving examples in each case, distinguish between coenzymes and prosthetic group *(4 marks)*

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b) Describe the working of an enzyme using the induced fit hypothesis *(3 marks)*

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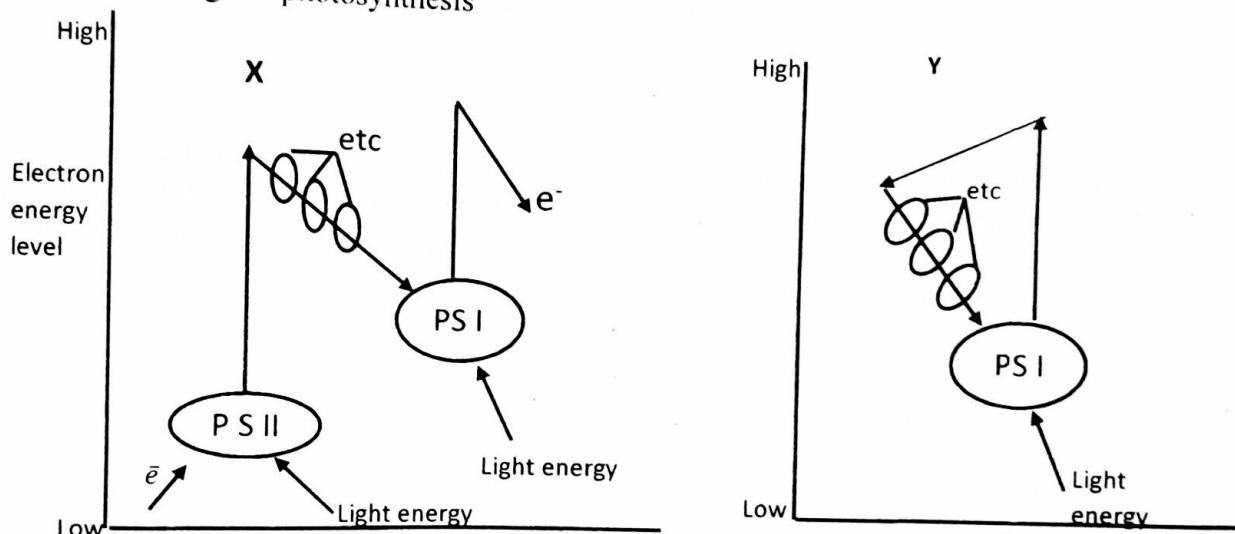
c) Outline any three differences between lock and key and induced fit hypothesis of enzyme action *(3 marks)*

i)

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- ii)
- iii)
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46. Figure 5 below shows the flow of electrons in photophosphorylation during light dependent stage of photosynthesis



a) Identify with a reason the type of photophosphorylation labelled X and Y in figure 5 above
i) X

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Reason

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ii) Y

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Reason

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b) Describe the role of light in phosphorylation *(5 marks)*

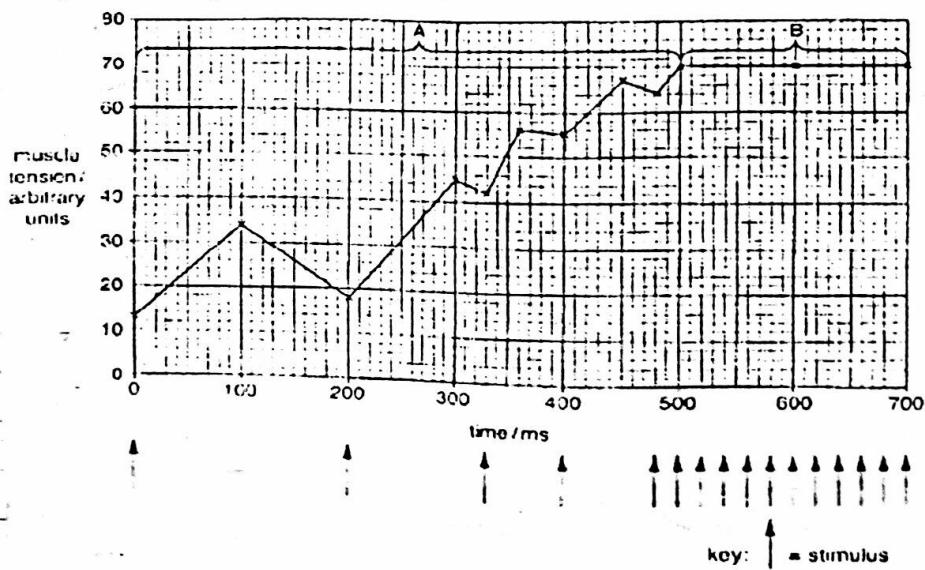
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- c) Give three differences between photophosphorylation and oxidative phosphorylation (3 marks)

47. In an investigation, striated muscle tissue from a mammal was electrically stimulated over a period of 700 milliseconds. The tension generated by the muscle was measured during the investigation and the results are shown in the figure below. Study it carefully and answer the questions that follow.



- a) Describe the effect of electrical stimulation of the muscle on the tension in;
 i) Region A (2 marks)

ii) Region B *(1 mark)*

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b) i) suggest a reason for the behavior of the muscle in region B *(1 mark)*

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ii) Some toxins such as those released by the tetanus bacterium also cause the effect shown in region B.

suggest why these toxins may be fetal *(5 marks)*

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c) What property of a striated muscle is demonstrated in figure 6 above? *(1 mark)*

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END