Name: ……Index Number……

Signature ……

P530/1
BIOLOGY
Paper 1
2022
2 ½ hours

MATIGO MOCK EXAMINATIONS
Uganda Advanced Certificate of Education
BIOLOGY
(THEORY)
Paper 1

2 hours 30 minutes

INSTRCUCTIONS TO CANDIDATES:

This paper consists of sections **A** *and* **B**.
Answer ***all*** *questions in both sections*

SECTION A
Write answers to this section in the boxes provided.

SECTION B
Write answers to this section in spaces 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 caries **one** *mark*

1. During gaseous exchange, termination of inspiration is caused by;
   A. Expansion of lungs
   B. Stretch receptors
   C. Afferent nerve
   D. Vagus nerve

2. The most critical factor that pre – occupies land plants is to ensure that they;
   A. Are pollinated
   B. Receive adequate sunlight
   C. Have adequate water
   D. Have carbon dioxide gas

3. Which of the following contributes most to the rate of chemical cycling in an ecosystem?
   A. The rate of primary production
   B. The efficiency of secondary production
   C. The rate of decomposition
   D. The trophic efficiency of ecosystem

4. Very small mammals cannot live at altitudes over 3500 metres on the mountains of Uganda because;
   A. They would lack suitable food materials
   B. They lack sufficient fur to keep them warm
   C. At such high altitude, the oxygen partial pressure is too low
   D. Their surface area to volume ratio is too high

5. Which of the following groups of terrestrial animals conserves body water most efficiently?
   A. Mammals
   B. Insects
   C. Birds
   D. Reptiles

6. Which of the following changes occur when a skeletal muscle contracts?
   A. The dark bands shorten
   B. The light bands shorten
   C. The thin filament's contract
   D. The Z- lines slide further apart

7. Release of milk in a lactating mother is aided by,
   A. Prolactin only
   B. Oxytocin only
   C. Both prolactin and oxytocin
   D. Oestrogen

8. Which of the following is not an adaptation for reducing the rate of heat exchange between an animal and its environment?
   A. Feathers of fur
   B. Vasoconstriction
   C. Non shivering thermogenesis
   D. Countercurrent heat exchanges

9. HIV targets include all of the following except,
   A. Macrophages
   B. Cytotoxic T cell
   C. Helper T cells
   D. Cells bearing CD4

10. A decrease in the pH of human blood caused by exercise would,
   A. Decrease breathing rate
   B. Increase heat rate
   C. Decrease cardiac out put
   D. Decrease CO_2 binding to haemoglobin

11. Which type of cell would probably provide the best opportunity to study lysosomes?
   A. Muscle cell
   B. Nerve cell
   C. Phagocytic white blood cell
   D. Bacterial cell

12. Cyanide binds with at least one of the molecules involved in the production of ATP. Following exposure of a cell to cyanide, most of the cyanide could be expected to be found within the,
    A. Mitochondria
    B. Ribosomes
    C. Peroxisomes
    D. Endoplasmic reticulum

13. The final electron acceptor of the electron transport chain that functions in oxidative phosphorylation is
    A. Oxygen
    B. Water
    C. NAD^+
    D. H^+

14. The high reactions of photosynthesis supply the Calvin cycle with,
    A. CO_2 and ATP
    B. H_2O and NDAPH C.
    C. ATP and NADPH
    D. Light energy

15. Consider this pathway: epinephrine ⟶ G. protein linked ⟶ receptor G. protein ⟶ adenyl cyclase ⟶ cyclic AMP
    Identify the 'second messenger'
    A. Camp
    B. G – protein
    C. Adenyl cyclase
    D. G – Protein linked receptor.

16. A particular cell has half as much DNA as some of the other cells in a mitotically active tissue. The cell in question is most likely in;
    A. G_1 B G_2 C. Prophase D. Anaphase

17. Which of the following is not true of a Codon?
    A. It consists of three nucleotides
    B. It may code for the same amino acid as another Codon does.
    C. It extends from one end of tRNA molecule
    D. It is the basic unit of the genetic code.

18. Which of the following would provide the best information of distinguishing phylogenetic relationship between several species?
    A. The fossil record
    B. Homologous structures
    C. Comparative anatomy
    D. Molecular comparisons of DNA and amino acid sequences

19. In a particular bird species, individuals with average sized wings survive storms more successfully than other birds in the same population with longer and shorter wings. This illustrates,
    A. The founder effect
    B. Stabilizing selection
    C. Directional selection
    D. Disruptive selection

20. Gymnosperms and angiosperms have the following in common except.
    A. Seeds
    B. Pollen
    C. Vascular tissue
    C. Ovaries

21. Which of the following combinations of phylum and description is incorrect?
    A. Nematoda – pseudo coelomate
    B. Coelenterate – radial symmetry
    C. Platyhelminthes – acoelomate
    D. Porifera – coelomate

22. The productivity of a crop declines when the leaves begin to wilt mainly because,
    A. The chlorophyll of wilting leaves begins to decompose
    B. Stomata close, preventing CO_2 from entering the leaf
    C. Photolysis the water splitting step of photosynthesis cannot occur when there is a water deficiency.
    D. An accumulation of CO_2 inhibits the enzymes required for photosynthesis

23. Which of the following does not appear to involve active transport across membranes?
    A. The movement of mineral salts from the apoplast to symplast
    B. The movement of sugar from mesophyll cells into the sieve – tube
    C. The movement of sugar from one sieve – tube to the next
    D. K^+ uptake by guard cells during stomatal opening

24. Which one of the following minerals plays a role in the formation of cell wall and maintenance of membrane structure in plants?
    A. Calcium
    C. Phosphorous
    B. Magnesium
    B. Potassium

25. Which of the following conditions is needed by almost all seeds to break dormancy?
    A. Exposure of light
    B. Imbibition
    C. Abrasion of the seed coat
    D. Exposure to cold temperature

26. Buds and sprouts often form on tree stumps. Which of the following hormones would you except to stimulate their formation?
    A. Auxin
    B. Cytokinins
    C. Abscisic acid
    D. Gibberellins

27. The structural level of a protein least affected by a disruption in hydrogen bonding is the,
    A. Primary level
    B. Secondary level
    C. Tertiary level
    D. Quaternary level

28. Receptor sites for neurotransmitters are located in the,
    A. Tips of axons
    B. Membranes of synaptic vesicles
    C. Post synaptic membrane
    D. Presynaptic membrane

29. The immediate product of meiosis in a plant is a,
    A. Gametophyte
    B. Spore
    C. Gamete
    D. Zygote

30. Which component is not directly involved in the process of translation?
    A. Mrna
    B. DNA
    C. tRNA
    D. Ribosomes

31. In a population in Hardy- Weinberg equilibrium, 16% of the individuals show the recessive trait. What is the frequency of the dominant allele in the population?
    A. 0.36
    B. 0.84
    C. 0.6
    D. 0.4

32. Degeneration of the skin and blood vessels, delayed wound and impaired immunity are symptoms of the deficiency of which one of the following vitamins?
    A. Vitamin A
    B. Vitamin K
    C. Vitamin B_1
    C. Vitamin C

33. An endemic species is,

A. One found in many different geographical areas
B. One found naturally in just one geographical area
C. One found only on islands
D. One that has been introduced to a new geographical area

34. Motor neurons stimulate muscle contraction via the release of,

A. Ca^{2+} B. ATP
C. Acetylcholine D. Hormones

35. Which of the following represents the action of insulin?

A. Increases blood glucose levels by hydrolysis of glycogen
B. Increases blood glucose by stimulating glucagon's production
C. Decreases blood glucose levels by forming glycogen
D. Increase blood glucose levels by promoting cellular uptake of glucose

36. Synapses are excitatory or inhibitory based on,

A. Integration B. Summation
C. Autonomic control D. Saltatorial conduction

37. The first compound of carbon dioxide fixation in C_4 plants is,

A. Pyruvate B. Oxaloacetate
C. Malate D. Phosphoenol pyruvate

38. Least concentrated urine relative to blood plasma is expected in which one of the following animals,

A. Fresh water fish B. Bird
C. Camel D. Human

39. Which of the following does not occur during mitosis?

A. Replication of DNA B. Separation of sister chromatids
C. Spindle formation D. Separation of centromeres

40. Walls of plant cells are largely composed of polysaccharide and proteins that are synthesized,

A. Externally to the plasma membrane
B. In the smooth endoplasmic reticulum
C. In the Golgi – apparatus
D. In both the rough endoplasmic reticulum and Golgi apparatus

SECTION B (60 MARKS)

Write answers in the spaces provided

41. a) Explain the following occurrence;

i) If a mother of blood group O rhesus factor negative is pregnant with a foetus of having rhesus positive blood any group other than O, haemolytic disease of the new born does not arise. *(3 marks)*

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ii) The oxygen dissociation curve of a bird lies to the right of that for humans. *(3 marks)*

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iii) What are the main features of the foetal blood circulation which do not occur in the adult man? *(4 marks)*

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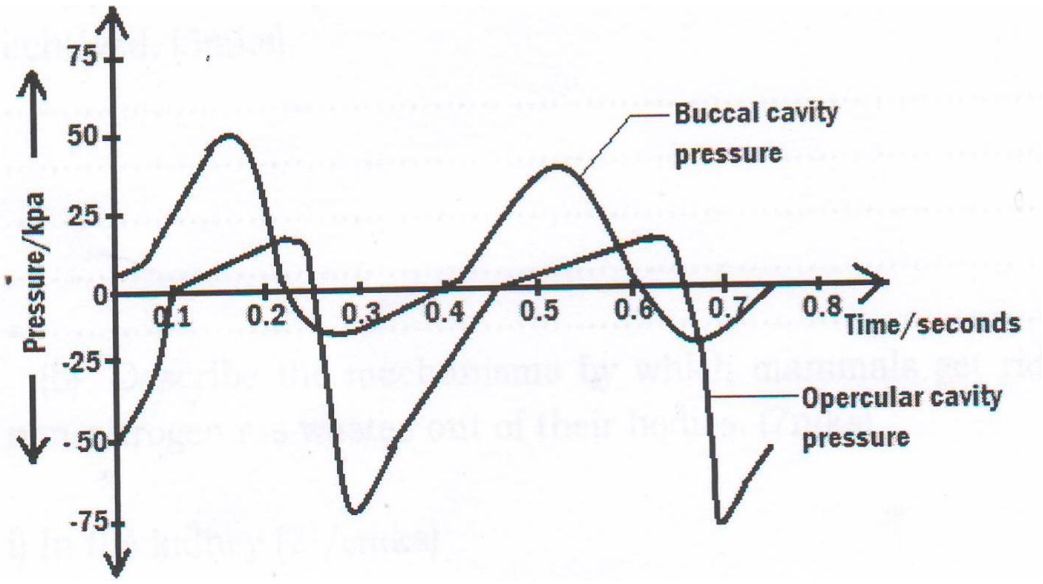
42. The figure below shows the pressure changes in the buccal and opercula cavities of a teleost fish that were obtained using hypodermic tubing connected to a pressure recorder.



Use the above information in the figure to answer the questions that follow

a) Give explanations for the observed pressure changes in the first 0.4 seconds in the Opercular cavity. *(4 marks)*

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b) What is the physiological significance of the observed differences between the pressures in the buccal cavity and the Opercular cavity? *(2 marks)*

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c) Suggest a reason why the gill lamellae would not provide an efficient respiratory surface on land. *(1 mark)*

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d) Give the adaption of gills as gas exchange surfaces in bony fishes. *(3 marks)*

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43. a) How is the process of mechanical osmo – regulation in fresh water Hydrophytes achieved? *(3 marks)*

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b) Describe the mechanism by which mammals get rid of and remove different non – nitrogenous wastes out of their bodies.

i) In the kidney. *(2 ½ marks)*

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ii) In the lungs. *(2 ½ marks)*

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iii) In skin. *(2 marks)*

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44. a) i) What is meant by a resting potential? *(2 marks)*

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ii) How is a resting potential maintained across the membrane of a resting axon? *(4 marks)*

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b) Briefly describe how an impulse arrives and crosses an excitatory and an inhibitory synapse. *(6 marks)*

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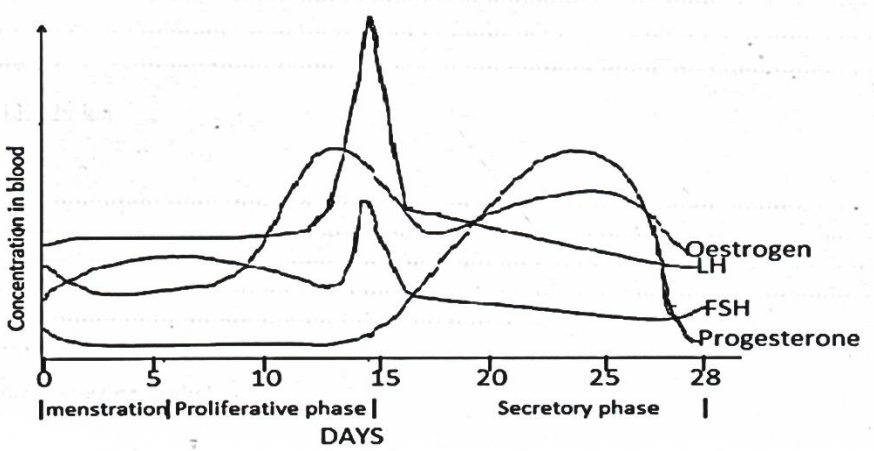
45. The diagram shows changes in hormone concentrations during the menstrual cycle.



a) Name the structures which during the menstrual cycle, secrete:
i) FSH and LH …… *(½ mark)*
ii) Oestrogen …… …. *(½ mark)*
iii) Progesterone ……..… *(½ mark)*

b) Briefly describe the role of the hypothalamus in the control of the menstrual cycle. *(2 marks)*
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c) With reference to the hormonal patterns shown in the graph, describe the main roles of the following hormones in the menstrual cycle:
i) FSH. *(2 marks)*
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ii) Oestrogen. *(2 ½ marks)*
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iii) LH. *(2 marks)*

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iv) Progesterone. *(2 marks)*

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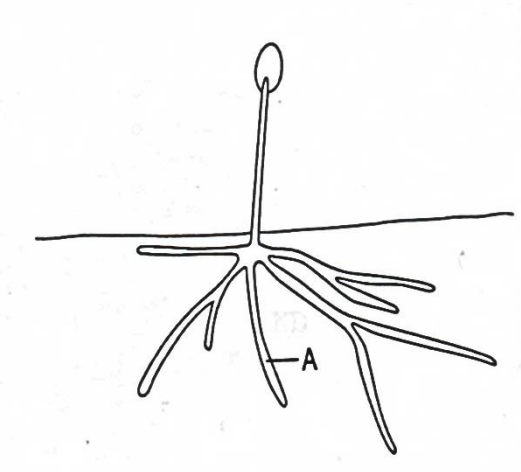
46. The figure blow shows the pin mould *Rhizopus* growing across bread. Study it and use to answer the following questions.



a) Name part labeled A…… … *(1 mark)*

b) How does this fungus obtain its food? *(2 marks)*

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c) Describe the adaptations of part labeled A to its function. *(3 marks)*

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d) What is this mode of nutrition and how does the mode differ from that of a parasite? *(3 marks)*

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e) State the importance of organisms with this mode of nutrition. *(3 marks)*

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END