

Name:.....Index No:.....

530/1  
BIOLOGY PAPER 1  
(Theory)  
MAY 2019  
2 ½ HOURS

KCB DEPARTMENT OF BIOLOGY  
UGANDA ADVANCED CERTIFICATE OF EDUCATION  
MOCK 1 EXAMINATIONS, 2019  
BIOLOGY PAPER ONE  
TIME: 2 HOURS 30 MINUTES

**INSTRUCTIONS**

- Answer ALL the questions.
- Use only the spaces provided for your answer.

**FOR EXAMINER'S USE ONLY**

| <b>QUESTION</b>   | <b>MARKS</b> |
|-------------------|--------------|
| SECTION A: 1 – 40 |              |
| SECTION B: 41     |              |
| 42                |              |
| 43                |              |
| 44                |              |
| 45                |              |

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|--------------|--|
| 46           |  |
| <b>TOTAL</b> |  |

**SECTION A:**

1. In which of the following processes is osmosis least involved?  
A. long distance transport of xylem sap.  
B. swelling of guard cells.  
C. root pressure  
D. water movement between neighbouring cells of the root cortex.
  
2. Which structure is not part of a plant's apoplast?  
A. the lumen of a sieve tube  
B. the cell wall of a mesophyll cell  
C. the cell wall of transfer cell  
D. the cell walls of root hairs
  
3. In the nucleolus, DNA is wrapped around:  
A. ribosomes  
B. polymerase molecules  
C. histones  
D. nucleic acids
  
4. Which of these is a function of blood proteins?  
A. Fighting infection  
B. Aiding in the maintenance of blood pH.  
C. Maintaining osmotic pressure of the blood  
D. all the above.
  
5. Which blood protein becomes the threads of a clot?  
A. Prothrombin  
B. Thrombin  
C. Thromboplastin

- D. Fibrinogen
6. Which one of the following features of red blood cells does not contribute to their absorptive nature of oxygen? They:
- A. possess a thin flexible membrane
  - B. posses a biconcave disc shape
  - C. are filled with haemoglobin
  - D. manufactured at a high rate.
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7. If a man heterozygous for blood group A is married to a woman who is heterozygous for blood group B, what possible blood groups can their children have?
- A. AB only
  - B. A or B only
  - C. A, B, AB or O
  - D. A, B or O
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8. The relationship between cellulose – secreting bacteria and herbivorous mammals is an example of:
- A. autotrophism
  - B. mutualism
  - C. parasitism
  - D. commensalism
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9. An impulse crosses a synapse by means of:
- A. sodium ions
  - B. potassium ions
  - C. calcium ions
  - D. neurotransmitter substance
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10. Which one of the following statements is true only of sympathetic nervous system?
- A. Nerve endings produce noradrenaline
  - B. Preganglionic fibres are short
  - C. Nerve endings produce actelycholine
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- D. Preganglionic fibres are long.
11. During an action potential in a neuron,
- A. Potassium ions diffuse into the axon.
  - B. Sodium ions diffuse out of the axon.
  - C. Sodium ions diffuse into the axon.
  - D. Both the sodium and potassium ions diffuse into the axon.
12. Injection of thyroxine into a laboratory mammal would cause:
- A. oxygen consumption to increase.
  - B. metabolic rate to decrease.
  - C. conversation of glucose into glycogen to increase.
  - D. thyroid gland to become more active.
13. Which of the following ecological effects may not be caused by deforestation?
- A. Species extinction
  - B. Reduction in soil fertility
  - C. Acid rain
  - D. Flooding and land slides
14. Production of hypertonic urine is mainly achieved by:
- A. aldosterone
  - B. adrenaline
  - C. vasopressin
  - D. insulin
15.  $C_4$  photosynthesis is more efficient than  $C_3$  photosynthesis under conditions of
- A. high temperature and high  $CO_2$  concentration
  - B. low temperature and high  $CO_2$  concentration
  - C. high temperature and low  $CO_2$  concentration
  - D. low temperature and low  $CO_2$  concentration.
16. During exercise the pulmonary ventilation rate increases because chemoreceptors defect:
- A. a decrease in the concentration of lactic acid in blood

- B. an increase in the concentration of lactic acid in blood
  - C. an increase in the pH of blood
  - D. an increase in the concentration of carbon dioxide in blood.
17. Columnar epithelium with microvilli is most likely to be found in which one of the following regions?
- A. Colon
  - B. Ileum
  - C. Duodenum
  - D. Stomach
18. Which one of the following oxygen carrying pigments contains copper in its structure?
- A. Myoglobin
  - B. Chlorocruorin
  - C. Haemocyanin
  - D. Haemoerythrin
19. In the gastric glands, the digestive enzymes and hydrochloric acid are produced by the following cells respectively.
- A. Oxyntic cells and peptic cells
  - B. Kupffer cells and oxyntic cells
  - C. Kupffer cells and peptic cells
  - D. peptic cells and oxyntic cells
20. The ability of the heart to contract continuously without fatigue is the consequence of the:
- A. Sino – arterial node
  - B. Atrio – ventricular node
  - C. Purkinje tissue
  - D. Buddle of His
21. The role of NADH + H in aerobic respiration is to:
- A. transfer hydrogen to the electron transport chain.
  - B. reduce intermediates in the Kreb’s cycle
  - C. accept electrons from the electron transport chain.

- D. combine with oxygen to produce water
22. Enzymes which catalyse non – hydrolytic addition or removal of parts of hydrolytic substrate molecules are called:
- A. lyases
  - B. hydrolases
  - C. ligases
  - D. transferases
23. In the mammalian body, regeneration is not possible in:
- A. blood
  - B. skin
  - C. liver
  - D. brain
24. Which one of the following is the world’s most common protein?
- A. Transaminase
  - B. Pepsin
  - C. Ribulose biphosphate carboxylase
  - D. Myosin
25. During excretion in insects, which of the following are reabsorbed in the malpighian tubules?
- A. carbon dioxide and water
  - B.  $K^+$  and  $Na^+$
  - C.  $KHCO_3$  and water
  - D. Uric acid and water
26. Which one of the following conserves body water most efficiently?
- A. Mammals
  - B. Insects
  - C. Birds
  - D. Reptiles
27. One of the main differences between mitosis and meiosis is that:
- A. chromosomes do not move to the equator of the spindle in the latter
  - B. diakinesis does not occur in the former.

- C. zygotene does not occur in the latter
  - D. there is no interphase at all in meiosis.
28. The shark, penguin and whale are all stream lined. This is an example of:
- A. convergent evolution
  - B. divergent evolution
  - C. parallel evolution
  - D. co – evolution
29. During menstruation, blood is shed from the:
- A. corpora lutea
  - B. Graafian follicle
  - C. Corpora albicantes
  - D. endometrium
30. Which one of the following zones in the root provides the force required to penetrate the soil?
- A. Root cup zone
  - B. Zone of cell division
  - C. Zone of cell elongation
  - D. Zone of cell differentiation
31. The phenotype resulting from a cross between red eyed and white eyed flies depends on which fly is red eyed. This means that the gene for eye colour is:
- A. Polygenic
  - B. sex linked
  - C. homogametic
  - D. sex limited
32. Mendel’s law of segregation can be summarized as:
- A. pairs of factors inherited independent of each other.
  - B. the two homologous chromosomes with a pair of genes and end up separately.
  - C. unlike chromosome pair separate at the spindle equatorial region.
  - D. adjacent genes on a chromosome are never found in the same gamete.

33. During interphase of mitosis;
- A. the nuclear membrane breaks up and chromosomes become visible by condensation.
  - B. DNA duplicates and cytoplasmic content doubles.
  - C. the cell decreases in size and chromosomes becomes obscure.
  - D. microtubule spindle forms and nuclear membrane break up.
34. What does not occur during the process of mitosis in most organisms?
- A. Formation of spindle fibres.
  - B. Separation of chromatids
  - C. Pairing of homologous chromosomes
  - D. Disintegration of the nuclear membrane.
35. If the code for an amino acid is ATG on DNA molecule this code on the transfer RNA molecule may be written as:
- A. TAC                      B. UAC                      C. AUG                      D. GUC
36. During deplotene of meiosis
- A. chiasmata are formed
  - B. bivalents replicate
  - C. centromeres duplicate
  - D. the bivalents duplicate
37. The female of the butterfly *Hypolemnas missipus* occur in different colour forms in various shades by white and brown. The phenomenon illustrated here is:
- A. polymorphism
  - B. mimicry
  - C. industrial melanism
  - D. sexual dimorphism
38. The following are different definitions of “true growth” except:
- A. an increase in dry mass.
  - B. an increase in cell number
  - C. an irreversible increase in volume of protoplasm.



D. an increase in volume.

39. The gene pool of a population consists of the:

- A. mutated genes in the population
- B. dominant genes in the population
- C. inheritable genes in the population
- D. recessive genes in the population.

40. After implantation of a zygote in the uterine wall of a human female, which of the following would likely to take place?

- A. Menstruation
- B. Development of ovarian follicles
- C. Continued development of the corpus luteum
- D. Increased oestrogen

**SECTION B (60 Marks)**

41. (a) Explain why identical twins reared apart are very useful in studies of inheritance? (02mks)

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(b) A pure breeding fruit fly with a tan body and long wings was crossed with a mutant having a black body and short wings. The F<sub>1</sub> all had tan bodies and long wings. The F<sub>2</sub> was 75% tan body with long wings and 25% black bodies with short wings.

(i) Suggest an explanation for these results. (02mks)

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(ii) Using genetic symbols show how these results were obtained. (06mks)

42. (a) What is meant by the term organic evolution? (01mks)

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(b) Briefly explain how each of the following can be used to provide evidence for evolution.

(i) Homologous organs. (03mks)

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(ii) Development of vertebrate embryos. (03mks)

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(iii) Industrial melanism (03mks)

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43. The figure below shows changes in polarity in an axon as an impulse passes along the axon.



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                  -60—

(a) What is the state of the axon membrane between :

(i) R and S (01mk)

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(ii) S and T (01mk)

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(b) Describe the movement of ions across the axon membrane between:

(i) R and S? (02mks)

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(ii) S and T? (02mks)

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(iii) T and U? (02mks)

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(c) Why is it difficult to stimulate an axon shortly after it has transmitted an impulse? (02mks)

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44. (a) What is meant by the following terms?

(i) Population density. (02mks)

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(ii) Density dependent population growth. (02mks)

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(iii) Density independent population growth. (02mks)

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(iv) Random distribution of organisms in a habitat.. (02mks)

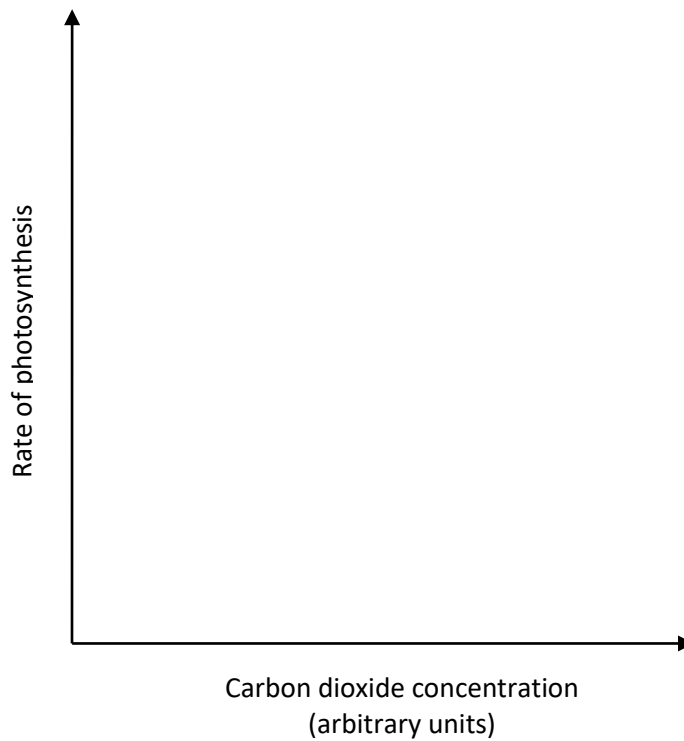
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(b) Other than population density, give two other characteristics of a population. (02mks)

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45. The figure below shows the variation of the rates of photosynthesis of C<sub>4</sub> and C<sub>3</sub> plants with increase in Carbon dioxide concentration in the leaves.



(a) Explain the difference in the rate of photosynthesis of C<sub>4</sub> plants and C<sub>3</sub> plants at carbon dioxide concentration of x – arbitrary units. (02mks)

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(b) (i) Explain how the rate of photosynthesis in both C<sub>4</sub> and C<sub>3</sub> plants would vary during extremely high concentration of carbon dioxide. (03mks)

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(ii) Suggest why it is practically impossible for the carbon dioxide concentration in the leaves to build up to extremely high level. (01mk)

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(c) Suggest with reasons which of the C<sub>3</sub>, C<sub>4</sub> and CAM plants would be severely limited to carryout photosynthesis in:

(i) Cool and wet condition. (02mks)

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(ii) Hot and dry conditions. (02mks)  
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46. (a) Distinguish between osmoconformer and osmoregulator. (02mks)

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(b) How are cortical nephrons different from juxtamedullary nephrons in the following respects?

(i) Functionally (02mks)

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(ii) Structurally (02mks)

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(c) How is density of juxtedullary nephrons related to the type of terrestrial habitat of the animals? (04mks)

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**END**