Name: .....

Signature: ..... School: .....

P530/1
BIOLOGY
(Theory)
Paper 1
July / Aug. 2022
2 ½ hours

UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

Uganda Advanced Certificate of Education

BIOLOGY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **ALL** *questions in both sections A and B.*

SECTION A

Write answers to this section in the boxes provided.

SECTION B

Write answers to this section in the spaces provided.

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

For Examiners 'Use Only		
Section	**Marks**	**Examiner's Signature & Number**
A:1-40		
B: 41		
42		
43		
44		
45		
46		
Total		

SECTION A (40 MARKS)

1. Which one of the following is the main respiratory process in red blood cells?
   A. Alcoholic fermentation
   B. Oxidative phosphorylation
   C. Lactic acid fermentation
   D. Glycolysis

2. Figure **1** represents the osmotic pressure of two adjacent plant cells A and B.

A	B
Ψ cell = -0.4	Ψ cell = -0.8
Ψ_P = 0.8	Ψ_P = 0.4
Ψ_s = -1.2	Ψ_s = -1.2

   In which direction will water move by osmosis?
   A. Both directions until equilibrium is established.
   B. Both directions even when equilibrium is established
   C. From A to B until equilibrium is established
   D. From B to A until equilibrium is established

3. A cell is treated with a chemical that inhibits the action of cholinesterase enzyme. Which one of the following is likely to result from this treatment?
   A. Rapid impulse transmission
   B. Continous impulse transmission
   C. Ceastion of impuse transmission
   D. Summation of individual generator potentials

4. Which one of the following parts of the nephron contribute most to the survival of the desert frog?
   A. Bowman's capsule
   B. Proximal convoluted tubule
   C. Glomerulus
   D. Loop of Henle

5. If the sequence of bases on a messenger RNA molecule is AUGACU, how many amino acids does it code for?
   A. 6
   B. 2
   C. 4
   D. 3

6. Which one of the following forms of reproduction may promote survival of a species?
   A. Multiple fission
   B. Conjugation
   C. Budding
   D. Fragmentation

7. Which one of the following explains why the number of mitochondria per gram of liver varies in mammals of different sizes? They have different;
   A. Nutrient requirements
   B. Body temperature
   C. Ventilation rate
   D. Metabolic rates

8. Which one of the following organisms is most affected by the excessive use of pesticides?
   A. Carnivores
   B. Herbivores
   C. Parasites
   D. Producers

9. Which one of the following features of a bony fish makes it more adapted for swimming than a cartilagenous fish?
   A. Strong endoskeleton
   B. Possession of swim bladder
   C. Having a streamlined body shape
   D. Highly coordinated neuromuscular activity

10. When a gamete with non – disjunction is fertilized, the resulting condition is called;
   A. Translocation
   B. Duplication
   C. Polyploidy
   D. Inversion

11. Which one of the following the least effect of competition among organisms of population for a similar limited resource?
   A. Range restriction
   B. Aggression towards each other
   C. Extinction
   D. Co-existence

12. Which one of the following is the first product of photosynthesis?
    A. Ribose sugar
    B. Ribulose
    C. Phosphoglyceric acid
    D. Phosphoglyceraldehyde

13. Which one of the following enables the two strands of DNA to easily separate during replication?
    A. Closeness of nitrogenous base pairs
    B. Presence of weak hydrogen bonds between base pairs.
    C. Presence of weak hydrogen bonds between phosphate and sugar
    D. Helical nature of the nucleotides

14. The effect of increased body temperature on the oxygen dissociation curve for haemoglobin in mammals is to;
    A. Lower haemoglobin's affinity for oxygen
    B. Increase haemoglobins affinity for oxygen
    C. Shift the oxygen dissociation curve to the left
    D. Increase on the levels of carbon dioxide in the blood.

15. Which one of these factors is most likely to change the gene pool of a small isolated population?
    A. Natural selection
    B. Non random mating
    C. Mutation
    D. Chance

16. Figure 2 shows the effect of change in a light condition on the rate of water loss from a plant shoot.

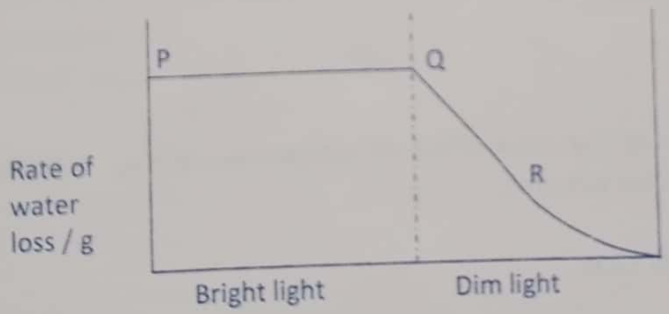

Fig. 2

From the figure, one would conclude that;

A. There a few open stomata at point P
B. Some salts are lost from thc plant at point R
C. Number of open stomata begin to reduce from point **Q**
D. There is a high level of a baisic acid in the leaves between point P and Q

7. Which one of the following substances are not transported by the circulatory system of mammals?

A. Glucose and oxygen
B. ATP and amylase
C. Carbon dioxide and urea
D. Adrenaline and amylase

18. Which one of the following is not caused by seasonal change in migratory birds?

A. Plumage colouration
B. Feeding behavior
C. Reproductive behavior
D. Hormonal changes

19. Which one of the following is not a role of the larval stage in animal development?

A. Dispersal
B. Asexual reproduction
C. Feeding
D. Sexual reproduction

20. Which one of the following factors maintains phenotypic stabililty within a population

A. Gene mutation
B. Geographical isolation
C. Stabilizing selection
D. Genetic drift

21. Figure 3 shows a structure from a plant tissue.

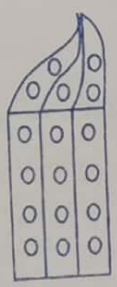

Fig.3

Which one of the following is correct about the tissue from which this structure is formed?

A. It is a simple plant tissue
B. Has unevenly thickened cell wall
C. Transports only mineral salts
D. Has a mechanical role in the plant

22. A lizard has a higher secondary productivity than a rat of equivalent size because the lizard;

A. Needs to control its body temperature
B. Eats relatively little food than a rat
C. Has a low metabolic rate
D. Feeds mainly on energy rich food substances

23. When a pyruvate loses a carbon dioxide molecule in plants; it becomes;

A. Acetylco enzym A
B. Ethanol
C. Lactate
D. Ethanal

24. Which one of the following events occurs at interphase of mitosis?

A. Synthesis of DNA
B. Separation of homologue's
C. Synthesis of nucleic acids
D. Constriction of the cell membrane

25. Which one of the following statements explains why a humming bird hibernates only at night? It,

A. Has a high metabolic rate
B. Feeds on nectar from flowers which it only accesses at night
C. Has a relatively large surface area to volume ratio encouraging faster heat loss
D. Has a relatively low food consumption which can not sustain the high levels of metabolism

26. Which one of the following forces are not experienced by the bones of a tetrapod during its locomotion?

A. Compressional forces
B. Tension forces
C. Shearing forces
D. Expansion forces

27. Which one of the following processes is not likely to lower the oxygen levels of river stream?
    A. Ammonification
    B. Nitrogen fixation
    C. Nitrification
    D. Denitrification

28. Which one of the following hormones would be released by a plant in response to water stress?
    A. Ethane
    B. Abscisic acid
    C. Gibberellins
    D. Auxins

29. The role of variation in a population is to;
    A. Promote gene flow
    B. Promote hybrid vigour
    C. Allow the population grow fast
    D. Allow natural selection to operate

30. Which one of the following is the final destination of electrical impulses initiated by the pace maker in the heart?
    A. Sino atrial node
    B. Base of ventricles
    C. Atrioventricular node
    D. Apex of ventricles

31. Which one of the following features is shared by annelids and arthropods?
    A. Exoskeleton
    B. Jointed body form
    C. Metameric segmentation
    D. Chitineous cuticle

32. At the synapse, increased permeability of the post synaptic membrane to chloride ions may cause;
    A. Hyperpolarisation of the membrane
    B. Depolarization of the membrane
    C. Polarization of the membrane
    D. Excitation of the membrane

33. Which property of water makes it a suitable component of the earth worm's skeleton?
    A. High surface tension
    B. High density
    C. Low viscosity
    D. Incompressibility

34. Colour blindness is a sex linked trait caused by a recessive gene. When a woman heterozygous for the trait is married to a normal man, what would be the probability of this couple producing a normal child?
    A. 0%
    B. 25%
    C. 50%
    D. 75%

35. Which one of the following will least affect the genepool?
    A. Mutation
    B. Genetic drift
    C. Crossing over
    D. Natural selection

36. When a predator avoids eating a brightly coloured prey, the behavior displayed is called;
    A. Insight learning
    B. Associative learning
    C. Exploratory learning
    D. Conditioning

37. In the mammalian eye, rods have a reduced visual activity than cones because the latter;
    A. Densely packed at the periphery of the retina
    B. Do not show synaptic convergence
    C. Are less sensitive to light
    D. Are highly concentrated at the blind spot

38. A partially closed ductus arteriosus in an individual causes;
    A. Shortage of oxygen to the tissues
    B. High blood pressure
    C. Heart attack
    D. Anaemia

39. Which one of the following is a component of enzymes?
A. Globulin
B. Keratin
C. Elastin
D. Collagen

40. Which one of the following activities may not contribute to global warming?
A. Use of pesticides
B. Deforestation
C. Burning of coal
D. Use of CFCs

SECTION B (60 MARKS)

41. Figure 4. Shows the effect of sewage discharge on the concentration of dissolve oxygen and ammonium ions of a river at increasing distance downstream.

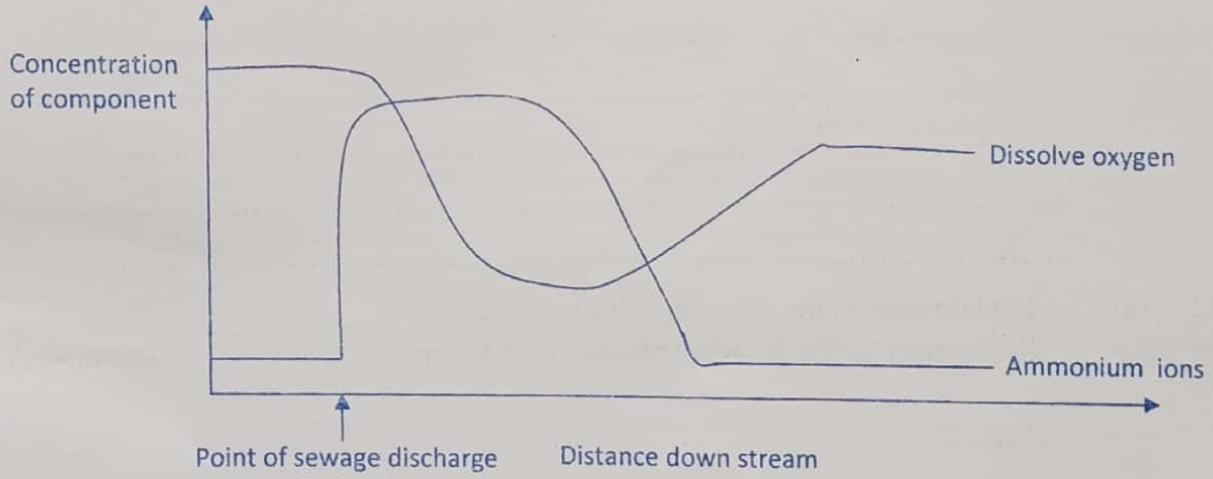

Fig. 4

(a) Explain the changes in the concentration of ammonium ions downstream from the point of sewage discharge. (03 marks)

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(b) Explain why the concentration of dissolved oxygen decreases initially and later increases again, downstream. (04 marks)

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(c) Explain why the effects shown on the figure are more severe at night than during day time. (03 marks)

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42. (a) Explain each of the following observations;

(i) Fresh water fishes die when placed in sea water. (03 marks)

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(ii) Spider crab dies when placed in fresh waters. (03 marks)

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(b) Halophytes are plants that live in salt marshes.

(i) Explain why it is necessary for halophytes to have osmo-regulatory mechanisms. (02 marks)

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(ii) Suggest how halophytes are adapted for living in salt marshes. (02 marks)

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43. (a) Distinguish between apical and lateral meristems. (02 marks)

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(b) How do each of the following tissues bring about growth in higher plants? (04 marks)

(i) Apical meristem.

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(ii) Vascular cambium. (04 marks)

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44. (a) Give three characteristics of chromosomes in diploid cells. (03 marks)

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(b) Figure **5** shows a stage of cell division.

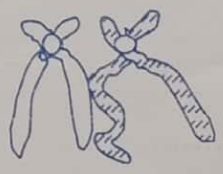

Fig. 4

(i) Giving a reason, identify the stage of cell division. (03 marks)

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(ii) From the figure, explain how the behavior of chromosomes contributes to genetic variation.
(04 marks)

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45. Figure 6 shows the oxygen dissociation curves for two species of aquatic animals A and B. A lives at the bottom of the sea where there is plenty of decaying organic matter while B lives in the surface waters of the sea.

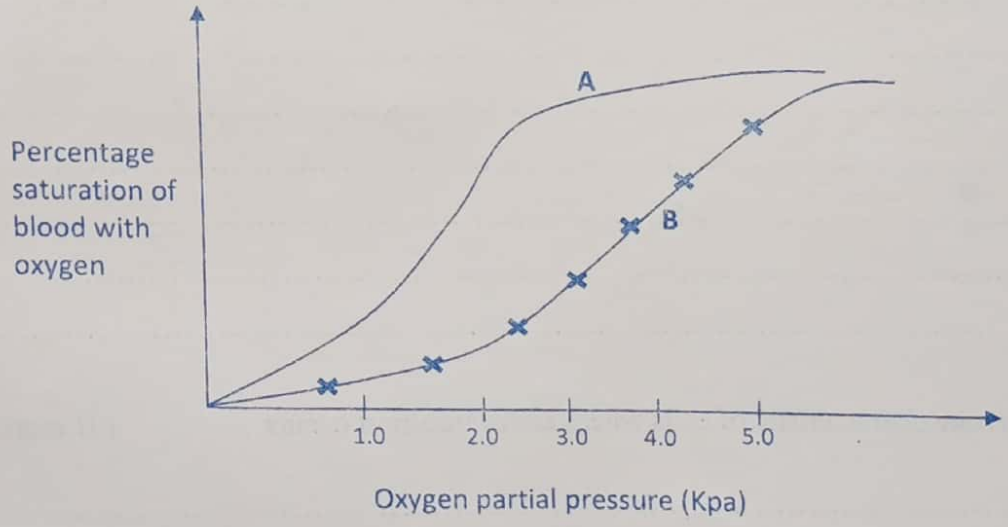

Fig. 2

(a) From the figure, state two differences in the behavior of haemoglobin of the two animals.
(02 marks)

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(b) Explain the advantages of the position of the dissociation curve for each animal in its habitat.

(i) Animal **A.** (04 marks)

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(ii) Animal **B** (4 marks)

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46. (a) Give **one** characteristic of cells where active transport occurs. (01 mark)

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(b) How does active transport occur across the plasma membrane? (05 marks)

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(c) Explain the role of each of the following processes in cells.

(i) Exocytosis (02 marks)

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(ii) Endocytosis (02 marks)

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END