NAME…….....SIGN……

P530|1

BIOLOGY (THEORY)

Paper 1

NOV. /DEC 2024

2½ hours.

S.5

Uganda Advanced Certificate of Education

BIOLOGY (THEORY)

END OF YEAR 2024

Paper 1

2 hours 30 minutes.

INSTRUCTIONS TO CANDIDATES:

- This paper consists of sections **A** and **B**.
- Answer **all** questions in both sections
- Answers to questions in section **A** should be written in the boxes provided.
- Answers to questions in section **B** should be written in the spaces provided.

FOR EXAMINER'S USE ONLY			
SECTION		MARKS	EXAMINER'S INITIALS
A: 1 – 40			
B:	41		
	42		
	43		
	44		
	45		
	46		
TOTAL			

SECTION A (40 minutes)

Write the **answer** in the box provided against each number.

1. What is the percentage net primary production if the gross primary production of decomposers is 20,000 $KJm^{-2}yr^{-1}$ and respiration is 18,000KJ $m^{-2}yr^{-1}$?

A. 90.0 B. 11.1

C. 20.0 D. 10.0

2. Which one of the following is a fibrous soluble protein?

A. Myosin B. collagen

C. Myoglobin D. Fibrinogen

3. In alteration of generation, the

A. Spores are produced from haploid cells

B. Gametes are produced by mitosis.

C. Gametophyte is asexual stage.

D. Spores are produced by mitosis

4. A plant tissue which is tubular, open-ended, with lignified and thickened walls is called;

A. Tracheid B. Xylem vessel

C. Parenchyma D. sieve tube.

5. Which one of the following shows the correct coding sequence during protein synthesis?

A. DNA → mRNA → tRNA → rRNA → amino acids

B. rRNA → tRNA → mRNA → polypeptide.

C. RNA → mRNA → tRNA → protein

D. DNA → mRNA → rRNA → tRNA → amino acid

6. A quadrat of 0.5 m2 was randomly thrown 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. 88.0 B. 44.0

C. 5.25 D. 11.0

7. Which one of the following statements is true of first cell division of meiosis but untrue of mitosis?

A. The chromosome number is maintained in the daughter cells.

B. Four daughter cells are formed.

C. The chromosome number is doubled in the daughter cells.

D. Homologous chromosomes come together at the equator.

8. Which one of the following water relations is not true about a plasmolysed plant cell?

A. Turgor pressure is zero.

B. Pressure potential is equal to osmotic potential of sap.

C. Pressure potential is zero.

D. Water potential of cell is equal to osmotic potential of sap.

9. 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 landslides.

10. Which one of the following types of epithelia lines the walls of the mammalian alveoli?

A. Columnar epithelium B. Cuboidal epithelium.

C. Stratified epithelium D. Squamous epithelium.

11. Which one of the following would speed up the process of diffusion?

A. Reducing the concentration gradient.

B. Increasing the distance across which diffusion occurs.

C. Increasing the area over which diffusion occurs.

D. Lowering the temperature of the medium.

12. Which of the following does not always form part of a bacterium cell?

A. Cell wall B. Flagellum

C. Cytoplasm D. Ribosomes.

13. Which of the following is true about a population where there is no environmental resistance? The population

A. Grows exponentially. B. Growth decelerates.

C. Remains constant D. Grows slowly.

14. In sexually reproducing organisms, maintenance of a species is achieved at meiosis by;

A. Halving DNA amount. B. Doubling DNA amount.

C. Maintaining DNA amount. D. Increasing DNA amount by fourfold.

15. Which one of the following organelles would be most active at sites where substances move against diffusion gradient?

A. Ribosomes B. Lysosomes

C. Mitochondria D. Golgi bodies.

16. The two strands of DNA easily separate during replication because of the;

A. Helical nature of the nucleotides.

B. The closeness of the base pairs

C. Weak hydrogen bonds between base pairs.

D. The weak hydrogen bonds between phosphate and sugar.

17. In the blood plasma, proteins can at as bases or acids depending on the;

A. Temperature of the medium.

B. Hydrogen ion concentration of the medium.

C. Nature of the proteins

D. Concentration of the solutes in the plasma.

18. Which of the following compounds cannot be hydrolyzed?

A. Glycogen B. Lactose

C. Galactose D. Maltose

19. In which of the following situations would population growth occur? When the number of

A. Births equal the number of deaths

B. Births plus the number of immigrations is less than the number of deaths plus the number of emigrations.

C. Births plus the number of immigrations Is greater than the number of deaths plus the number of emigrations.

D. Deaths plus the number of emigrations is greater than the number of births plus the number of immigrations.

20. Which of the following is the mRNA strand that corresponds to the DNA strand TAGGCT?

A. AUCCGU B. UUCCGU

C. CGAAUC D. UAGGCU

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

A. Gills expose a great surface area for diffusion.

B. Distance across which gases diffuse is reduced.

C. Speed of water is increased.

D. Concentration gradient is maintained.

22. There is a limited biomass at each trophic level in a food chain because at each level, there is progressive

A. Reduction in numbers of organisms. B. Loss of energy

C. Reduction in size of organisms D. Reduction in amount of food.

23. Which one of the following types of epithelia experiences the highest rate of wearing?

A. Stratified B. Columnar

C. Glandular D. ciliated

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

A. 9300kPa B. -9300kPa

C. 500kPa D. -500kPa

25. The air that remains in the lungs after maximum expiration is known as the:

A. Residual air B. Dead air space

C. Vital capacity D. Expiratory reserve volume.

26. Which of the following terms refers to the site of crossing over during meiosis?

A. Synapsis B. Diakinesis

C. Chiasma D. Centromere

27. When the extent of inhibition in an enzyme controlled reaction depends entirely on the concentration of the inhibitor, it indicates that inhibition is:

A. Competitive B. Reversible

C. Irreversible D. Non-competitive

28. Which of the following tissues contributes most in strengthening the stem of a young plant?

A. Xylem B. Collenchyma

C. Sclerenchyma D. Phloem

29. Which of the following processes is involved in the absorption of mineral salts from the soil by a plant?

A. Diffusion B. Osmosis

C. Active transport D. Pinocytosis

30. Which of the following processes occur in the bundle sheath cells?

A. Fixation of carbon dioxide by PEP

B. Formation of pyruvate from malate

C. Regeneration of PEP from pyruvate

D. Formation of malate from oxalate

31. Which one of the following cells is the most vulnerable to HIV?

A. T-Killer cells B. T-Suppressor cells

C. T-Helper cells D. Memory cells

32. Gene mixing during meiosis occurs during

A. Zygotene B. Diplotene

C. Pachytene D. Leptotene

33. A rhesus positive foetus whose mother is rhesus negative may not be born alive because the:

A. Mother's baby produces antigens against foetal antibodies
B. Foetus lacks antibodies against the mother's antigens
C. Mother's red blood cells mix with the foetal blood
D. Mother's body produces antibodies against the foetal antigens

34. When sewage is discharged into a water body, oxygen concentration decreases at from the pint of sewage discharge. Which of these is the correct reason for the trend of oxygen concentration from the point of sewage discharge?

A. Oxygen escapes to the atmosphere
B. Aerobic bacteria use oxygen to oxidize ammonium ions to nitrates
C. Ammonium ions dissolve all the oxygen in the water
D. Aquatic plants cut off oxygen supply to the stream

35. Blood groups in humans is an example of:

A. Incomplete dominance
B. Co-dominance
C. Qualitative inheritance
D. Pleotropy

36. The synthesis and assembly of cell wall components is a function of the:

A. Golgi body
B. microtubules
C. Ribosomes
C. cell membrane

37. During carbon dioxide transport the movement of chloride ions from the plasma into red blood cells is aimed at:

A. Restore its water potential
B. maintain the blood PH
C. Restore electro-neutrality of the cell
D. Maintain a larger diffusion gradient for ions

38. Which one of the following is not true of sieve tubes?

A. They lack nuclei
B. Their end walls are perforated
C. They are metabolically inactive
D. They have their cytoplasm even at maturity

39. Photorespiration does not occur in C_4 plants because they:

A. Use phosphoenol pyruvic acid for fixing carbon dioxide

B. Mainly grow at high altitudes

C. Are more abundant in cold regions

D. Have succulent leaves which lower the internal temperature

40. Which of the following types of epithelial cells is likely to be found in body surfaces where diffusion of materials takes place?

A. Transition B. Squamous

C. Columnar D. Cuboidal

SECTION B. (60 marks)

Attempt **all** questions in this section.

41. (a) What is meant by a *limiting factor*? **[01 marks]**

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(b) Describe a state where Carbon dioxide acts as limiting factor in photosynthesis. **[02 marks]**

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(c) Describe two ways how;

(i) C4 plants are advantageous over C3 plants **[02 marks]**

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(ii) Support is ensured in herbaceous C_3 plants. **[02 marks]**

(ii) Describe how lignification occurs in plants and give its significance. **[03 marks]**

42. (a) Explain;

(i) Why the heart is a myogenic organ **[03 marks]**

(ii) The effect of stimulation of sympathetic nerve on heart beat rate and its significance for survival of the humans. **[03 marks]**

(iii) Why the affinity of haemoglobin for oxygen increases when it's already possess oxygen. .
[03 marks]

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(b) State one way how blood flow in venules is maintained. **[01 mark]**

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43. (a) What is meant by *Eutrophication*. **[01 mark]**

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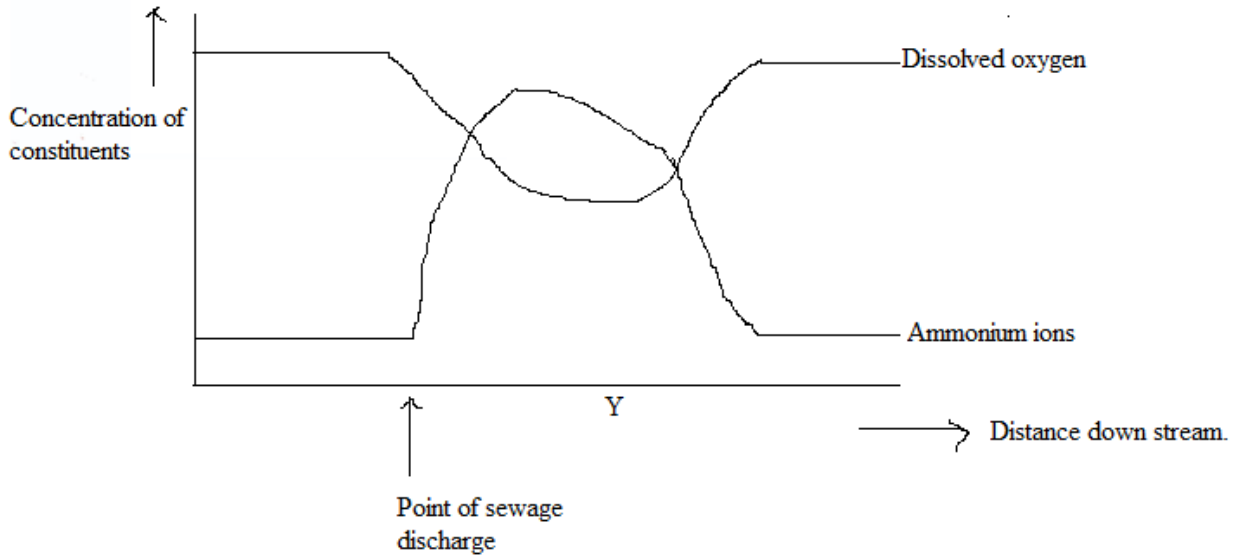
(b) The graph below shows the effect of sewage discharge on some chemical constituent of a river at increasing distance down-stream from the point of sewage discharge.



(i) State two differences in the variations of the concentration of the chemical constituents in the graph above. **[02 marks]**

(ii) Account for the stated differences in (b) (i) above. **[05 marks]**

(c) Explain the effect of sewage on the ecosystem at distance Y downstream. **[02 marks]**

44. (a) Distinguish between a *surfactant* and *respiratory quotient* . **[01 mark]**

(b) (i) State ***three*** roles of surfactant in alveoli of a mammalian lung. **[03 marks]**

(ii) State **two** conditions in organisms under which respiratory quotient is not one. . **[02 marks]**

(c) Describe what happens to the end product of glycolysis in absence of oxygen in plants. **[03 marks]**

45. (a) Explain what is meant by **alternation of generations**? **[01 mark]**

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(b) (i) A moss alternates between two distinct forms limits life cycle, as a gametophyte and sporophyte. Describe how a sporophyte forms a gametophyte **[04 marks]**

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(c). (i) Why is transport across the cellulose cell wall of a moss necessary? . **[03 marks]**

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(ii) How is the structure of cellulose in cell walls of moss related to its functions?

[02 marks]

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46. (a) State;

(i) *Mendel's second law* of dihybrid inheritance. **[01 mark]**

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(ii) When a given gene is called epistatic? **[01 mark]**

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(b) In guinea pigs, there are two alleles for hair colour, black and white and two alleles for hair length, short and long. In a breeding experiment, all the F1 phenotypes produced from a cross between pure breeding short-black haired and pure breeding long-white haired parents had short black hair.

(i) With a reason, state which alleles are dominant? **[02 marks]**

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(ii) Using suitable genetic symbols, determine the expected proportions of the F2 phenotypes. **[06 marks]**

END

WE WISH YOU A BLESSED HOLIDAY

MERRY CHRISTMAS AND HAPPY NEW YEAR IN ADVANCE.