P530/1
BIOLOGY
(THEORY)
Paper 1
August, 2024
2 ½ Hrs

ASSHU BUSHENYI DISTRICT MOCK EXAMINATIONS 2024
UGANDA ADVANCED CERTIFICATE OF EDUCATION
BIOLOGY (THEORY)
PAPER 1
Time: 2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of sections;* A and B.
- *Answer* all *questions in both sections.*
- *Write answers to section* A *in the boxes provided and answers to section* B *in the*
- *Spaces provided.*
- No additional sheets of paper should be inserted in this booklet.

For Examiner's Use Only			
Section	**Question**	**Marks**	**Examiner's Signature & No.**
A	**1-40**		
B	**41**		
	42		
	43		
	44		
	45		
	46		
Total			

SECTION A (04 MARKS)

Write the letter corresponding to the right answer in the box provided. Each question in this section carries **one** *mark*

1. Considering the overall chemical reaction for photosynthesis the number of molecules(or moles) of carbon dioxide required to make 6 molecules of triose sugar would be,
   A. 6
   B. 12
   C. 18
   D. 72

2. The following are properties of water **EXCEPT**?
   A. The hydrogen bonds between water molecules constantly break and reform
   B. Water resists changes in temperature by absorbing or releasing heat
   C. Water is denser as a solid than in its liquid state
   D. The hydrogen bond lattice makes it difficult for non-polar substances to penetrate it

3. Which of the following cell structures does **not** require an immediate source of energy to function?
   A. Central vacuole
   B. Contractile vacuole
   C. Microtubules
   D. Microfilaments

4. Prokaryotes convert food energy to ATP using their
   A. Chromosomes
   B. Cell membrane
   C. Ribosomes
   D. Cell walls

5. The 'mosaic' part of the fluid mosaic model refers to the
   A. Integral protein that are imbedded in the phospholipid bilayer
   B. The membrane proteins most of which float individually in the fluid bilayer
   C. Glycolipids and glycoproteins that give the cells exterior a sugar coating
   D. Phospholipids molecules that vibrates ,flux, spin and move within the bilayer

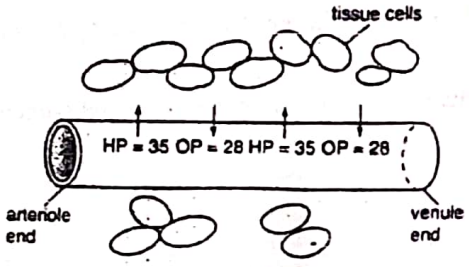
6. The phenomenon in which chance events cause unpredictable changes in allele frequencies is called
   A. genetic flow
   B. genetic drift
   C. inbreeding
   D. polymorphism

7. A population of mice is at Hardy Weinberg equilibrium at a gene locus that controls fur color. The locus has two alleles M and m. A genetic analysis of one population reveals that 60% of its gametes carry the M allele. What percentage of mice contains both the M and m allele?
   A. 60
   B 48
   C 40
   D 36

8. Which of the following represents an example of qualitative phenotypic variation?
   A. the length of peoples toes
   B. the body sizes of pigeons
   C. human ABO blood groups
   D. the birth weights of humans

9. Compared with vertebrates most invertebrates
   A. lead more mobile lives
   B. require higher levels of oxygen
   C. have more complex layers of cells
   D. have slower distribution of blood

10. Figure 1 shows the hydrostatic pressure and osmotic pressure in mm Hg at the arteriole end and vennule end;



Given that the osmotic pressure of the tissue fluid is 3 mmHg and the hydrostatic pressure of the tissue fluid is 0 the net pressure which caused the fluid to move out of the arteriole end in mm Hg is
   A. 7
   B. 10
   C. 31
   D. 63

11. During strenuous exercise a person sweats a lot. The best physiological methods of controlling the person's internal environment would be
   A. drinking a lot of cold water
   B. lowering the metabolic rate
   C. decreasing the level of ADH
   D. taking a bath with very cold water

12. Which one of these processes concerning regulation of blood sugar is incorrect?
   A. the beta islet cells secrete insulin when hyperglycemia occurs
   B. glycogenolysis is the conversion of glucose to insoluble glycogen
   C. glycogenesis is the conversion of stored glycogen to glucose
   D. glycogenolysis is the conversion of glucose to amino acids, fatty acids and glycerol

13. The following structures are found in the heart
   I Bundle of His
   II purkinje tissue
   III atrioventricular node
   IV sinoatrial node

   Which of the following structures shows the correct sequence for impulse conduction in the heart?
   A. III IV I II
   B. III IV II I
   C. IV III I II
   D. IV III II I

14. Which of the following processes involves facilitated diffusion?

I transportation of glucose into cells
II movement of oxygen and carbon dioxide across the alveolar membrane
III diffusion of ATP from the mitochondria
IV movement of sodium ions across the axon membrane during an action potential

A. I,II and IV
B. I,II and III
C. I,III and IV
D. II,III and IV

15. Which of these best describes random mating?

A. When every individual has the same opportunity of mating with another in a population
B. When there is free interbreeding between members of different species
C. When every individual has the same opportunity of mating with another of opposite sex in a population
D. When mating occurs between all members of a species in a breeding season

16. What term describes a group of genetically identical individuals formed asexually from a single individual

A. Cline
B. Clonotype
C. Clone
D. Clonal

17. Features that have a similar origin, state and position regardless of their function in adults are said to be

A. Vestigial
B. Analogous
C. Homologous
D. Heterogeneous

18. Which of the following cells would most probably contain the greatest number of Mitochondria?

A. muscle cell
B. secretory cell
C. nerve cell
D. white blood cells

19. Twenty four hours after liver damage healthy mammal the concentrations of urea and amino acids in the blood would be changed in which of the following ways?

A. Both urea and amino acid levels would have risen
B. Both urea and amino acid levels would have fallen
C. The urea level would have risen while the amino acid level would have fallen
D. The amino acid level would have risen while the urea level would have fallen

20. When formulating his theory of evolution, Charles Darwin considered each of the following except?

A. The ecology of plants and animals
B. Genetic theory
C. The morphology of living organisms
D. The geographical distribution of organisms

21. Figure 2 shows growth changes in body parts of humans with age. The type of growth is:

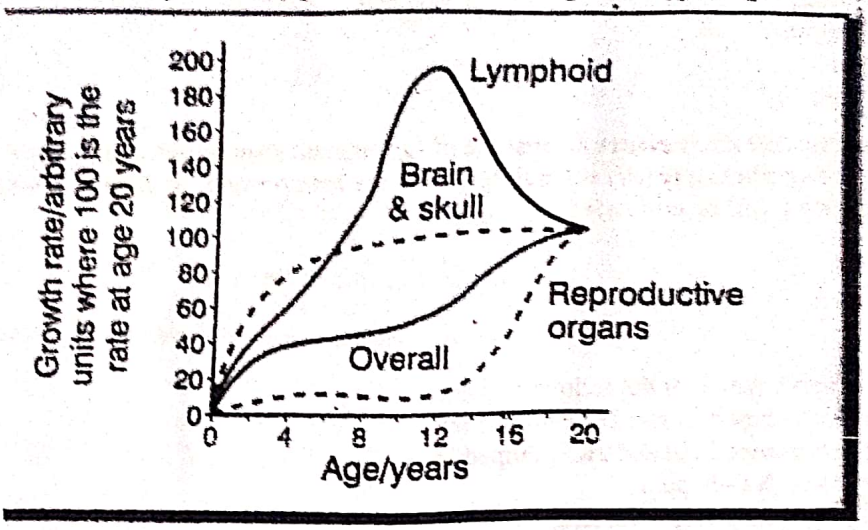


Fig.2

A. Continuous
B. Isomerism
C. Allometric
D. Discontinuous

22. Which of the following changes in hormone levels results in the events that occur in the menstrual cycle at around day 14
A. Sharp rise in FSH level
B. Peak level of LH
C. Falling levels of Oestrogen
D. Low levels of progesterone

23. Which of these explains why myelinated axons of a frog having a diameter of 3μ m conduct impulses at threefold in a cat than in a frog?

A. The frog cannot maintain its body temperature constant while a rat can
B. The frog is an invertebrate while the rat is a vertebrate
C. The rat is larger than the frog
D. The rat lives on land where it is hot

24. Which of these features of the ileum helps to maintain steep concentration gradients for nutrient absorption?

A. Ileum is long increasing surface area
B. Individual cells of ileum lining have microvilli
C. Capillaries are close to the surface
D. Movement of blood carries molecules away.

25. Prior to fertilization the pollen tube grows towards the embryosac aided by
A. Hydrotropism
B. Geotropism
C. Chemotropism
D. Thigmotropism

26. For most of the growing season cells of spirogyra in an aquatic marsh are
    A. Alloploid
    B. Tetraploid
    C. Diploid
    D. Haploid

27. In tigers a recessive allele causes an absence of fur pigmentation resulting in a white tiger and a cross eyed condition. If two phenotypically normal tigers that are heterozygous at this locus are mated what percentage of their offspring will be cross eyed?
    A. 75
    B. 50
    C. 25
    D. 0

28. In resting nerve which of the following is true?
    A. $3Na^+$ are pumped in and $2K^+$ pumped out
    B. $3Na^+$ are pumped out and $2K^+$ pumped in
    C. There is no Na –K pump
    D. The Na-K pump stops working

29. Voluntary muscle coordination is under the control of the part of the brain called
    A. Cerebellum
    B. Medulla oblongata
    C. Hypothalamus
    D. Cerebrum

30. The Krebs cycle occurs in which region of the mitochondria?
    A. Inner membrane
    B. Outer membrane
    C. Intermembranal space
    D. Matrix

31. In a population of red or white flowered plants in Hardy Weinberg equilibrium, the frequency of red flower plants is 91%. What is the frequency of the red allele?
    A. 9%
    B. 30%
    C. 91%
    D. 70%

32. Plant cell organelles that have the potential to divide and produce other organelles of the same kind are
    A. Rough ER
    B. Lysosomes
    C. Plastids
    D. Golgi apparatus

33. The evolution of bilateral symmetry was a necessary precursor to for the evolution of
    A. Tissues
    B. Segmentation
    C. A body cavity
    D. Cephalization

34. Which one of the following correctly describes the change in appearance of a myofibril during skeletal muscle contraction?
    A. I band shortens
    B. H zone increases
    C. Actin filaments shortens
    D. Sarcomere shortens

35. Which of these animal tissues consists of cells of one type only?
A. Connective
B. Epithelial
C. Smooth muscle
D. Phloem

SECTION B (60 MARKS)

Write answers in the spaces provided

41. (a) What is meant by the term osmoconformity in relation to living organisms? (2marks)

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b) Explain how the following fish types differ in their water, salt and nitrogenous waste regulation

(i) Estuarine fish (03 marks)

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marine teleosts (03 marks)

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b) Reptiles and birds excrete nitrogenous wastes in the form of uric acid.
Explain the advantage of excreting uric acid over urea in mammals (02 marks)

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a) What is meant by the term crossing over as applied to gametogenesis? (2marks)

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b) Outline the main stages by which a secondary Oocyte is formed from a primary Oocyte in a human female. (3marks)

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c) Discuss the invents that lead to the ejection of milk from mammary glands of a woman as a sign of perception of the baby. (3marks)

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d) Explain two measures of birth control that aim at stopping the sperm from meeting the ovum. (2marks)

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42. a) Distinguish between cardiac rate and stroke volume as applied to mammals. (1mark)

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b). Following an early morning exercise, the cardiac volume, cardiac output and stroke volumes of the athletes was measured at rest. The table 1, below shows the values recorded as compared with the standard values of a well-trained athlete of the same age;

Table 1.

Stroke volume/units	Heart rate/units	Cardiac output/units
520	78	
517	77	
513	76	
512	74	
510	73	

i) Complete the table 1 above and state units for each parameter measured. (4marks)

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ii) State the relationship between exercise and cardiac rate. (1marks)

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Explain the physiological effect of training to the athlete's general cardiac output. (2marks)

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c). Explain why unloading of hemoglobin at extremes of Oxygen partial pressures is heterogeneous. (3marks)

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a). What is meant by the term reciprocal innervation? (2marks)

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b). Explain the role played by reciprocal innervation in lung ventilation. (4marks)

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c). Describe the role played by Acetyl choline in causing action of effector muscles. (3marks)

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d). Under which circumstances is fatigue caused in a mammal. (1mark)

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43. (a). How is support in non-woody plants ensured? (2marks)

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b). Explain the stages by which woody plant tissues are formed from meristematic tissues. (4marks)

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c). How are meristematic tissues in some plants maintained for future secondary growth? (3marks)

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d). Briefly explain the effect of gibberellins on overall growth. (2marks)

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(a). Explain the fact that protein transcript is coded. (2marks)

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b). Explain the features associated with coding in a protein transcript. (4marks)

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c). Briefly explain two forms of errors that may arise in the codes to proteins in living organisms. (2marks)

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END