NAME..... STREAM..... ....

UGANDA ADVANCED CERTIFICATE OF EDUCATION
END OF TERM TWO EXAM, 2024
SENIOR FIVE BIOLOGY
(THEORY)
PAPER ONE
2 HOURS 30 MINS

INSTRUCTIONS TO CANDIDATES:

- *Attempt all questions in section **A** and section **B***
- *Answer **all** the objectives to the spaces provided*

SECTION A (40 MARKS)

1. What is the correct sequence of stages of mitotic cell cycle?

A. $G_{1\rightarrow}\ G_2 \rightarrow$ mitosis $\rightarrow\ S \rightarrow$ Cytokinesis
B. $G_1 \rightarrow G_2 \rightarrow S \rightarrow$ mitosis $\rightarrow$ Cytokinesis
C. $G_1 \rightarrow S \rightarrow G_2 \rightarrow$ mitosis $\rightarrow$ Cytokinesis
D. $S \rightarrow G_1 \rightarrow$ mitosis $\rightarrow G_2 \rightarrow$ Cytokinesis

2. What is the function of companion cell in a phloem tissue?

A. Providing cytoplasmic contact with the sieve tube element for loading.
B. Proving structural support for the sieve tube element.
C. Providing the nucleus for cell division in the phloem
D. Providing the source for assimilates for storage.

3. Which of the following generates the formation of adaptations?

A. Genetic drift
B. Mutation
C. Gene flow
D. Natural selection

4. Angiosperms differ from all other plants because;

A. They produce fruits

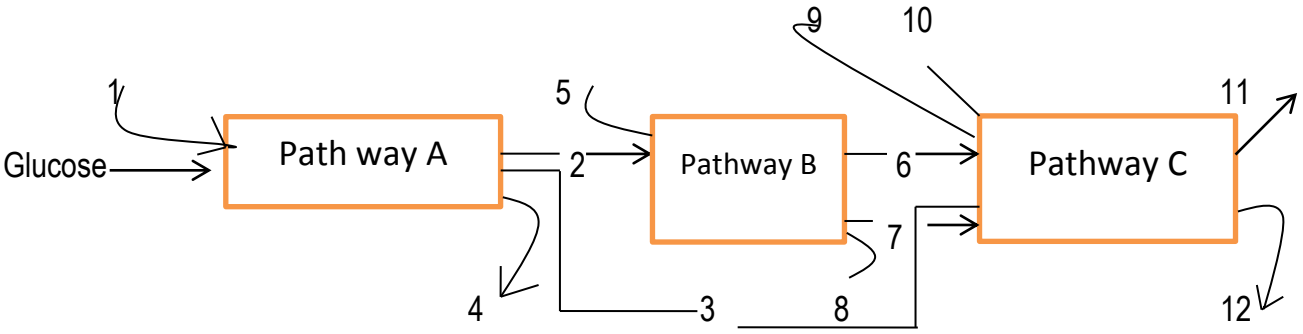
B. They produce pollen tubes
C. The sporophyte generation is dominant
D. They produce wind dispersed pollen

5. Cholesterol is an integral component of the cell surface membrane. Which statement about cholesterol is correct?
A. It allows ions to pass freely through the cell surface membrane.
B. It has hydrophobic and hydrophilic tail
C. It helps to regulate the fluidity of the cell membrane
D. It reduces the mechanical stability of the phospholipid bilayer

6. Chemiosmotic theory describes how ATP is generated from ADP. All of the following states confirm to the principles of the theory except;
A. Hydrogen ions accumulate in the area between the membrane of the cristae and the outer membrane of the mitochondria.
B. A PH gradient is created across the cristae membrane
C. Electrons flowing through the ATP synthose channel protein provide the energy to phosphorylate ADP to ATP
D. A voltage gradient is created across the cristae membrane

7. Which of the following is the main form of photosynthetic product transported through the phloem?
A. Starch
B. Amino acid
C. Sucrose
D. Glucose

8. Diagram below represents the three major biosynthesis pathways in aerobic respiration. Arrows represents net reactants or products.



What compound could be represented by arrows 4, 8 and 12.

A. NADH
B. ATO
C. H_2O
D. $FADH_2$

9. Which of the following cellular structures are common to both prokaryotes and eukaryotes?

A. Nucleoli
B. Ribosomes
C. Chloroplasts
D. Golgi bodies

10. What does not occur in the conversion of glucose to two molecules of pyruvate?

A. Hydrolysis ATP
B. Phosphorylation of ATP
C. Phosphorylation of Glyceraldehyde-3 phosphate
D. Reduction of NAD

11. For which process is the large surface area of the cristae in the mitochondria important?

A. Energy radiation
B. Enzyme reaction
C. Gaseous exchange

D. Protein synthesis

12. Which of the following is not a role of elastic fibre in the gaseous exchange system?
A. Contract to decrease the volume of the alveoli during expiration
B. Recoil to force air out of the alveoli during expiration
C. Stretch to accommodate more air in the alveoli during deep breathing
D. Stretch to increase the surface area of the alveoli for gaseous exchange

13. In which animal cells would golgi apparatus be most abundant?
A. Ciliated epithelia cells
B. Goblet cells
C. Red blood cells
D. Smooth muscle cells

14. What is correct for the cell surface membranes within cells?
A. Both allow intracellular transport
B. Both are established by glycoproteins
C. Both have sites for enzyme attachment
D. Both protect cells from the content of lysosomes

15. Which of the following processes generates genetic variation in bacteria and viruses?
A. Binary fission
B. Fertilization
C. Meiosis
D. Mutation

16. Two species of tortoises live on separate islands. These two species evolved from a common ancestor by allopavic c speciation. The likely order of events in the speciation from first to last would have been;
A. Natural selection, reproductive isolation, geographical isolation
B. Natural selection, geographical isolation, reproductive isolation
C. Geographical isolation, natural selection, reproductive isolation

D. Geographical isolation, reproductive isolation, natural selection

17. Bacterial cells reproduce by;
A. Binary fission only
B. meiosis only
C. Binary fission and mitosis
D. Mitosis and meiosis

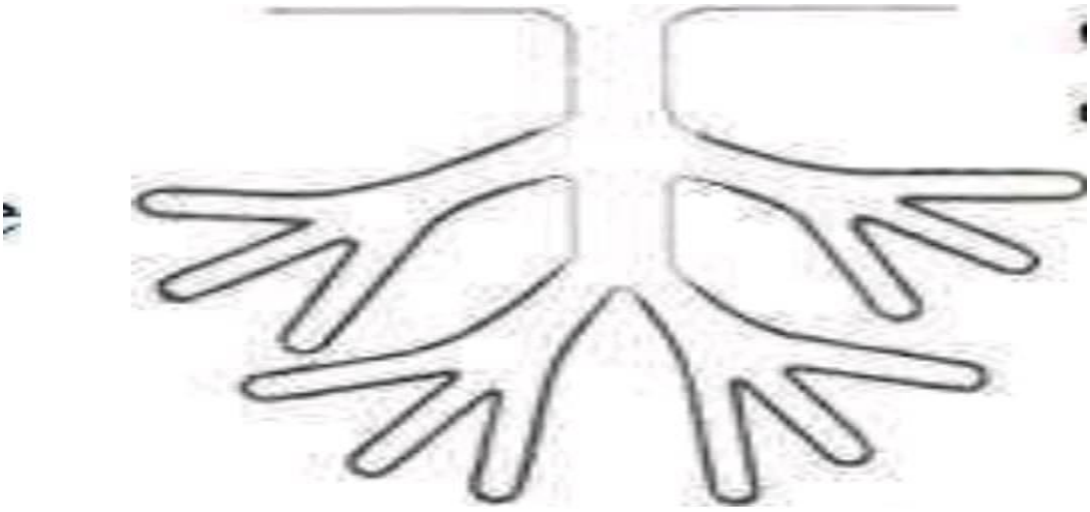
18. The first organisms on the earth were;
A. Eukaryotic and aerobic
B. Prokaryotic and aerobic
C. Eukaryotic and anaerobic
D. Prokaryotic and anaerobic

19. Spirogyara differs from mucor in having ;
A. Uninucleate gamentangia
B. Multinucleate gametes
C. Anisogametes
D. Sexual reproduction

20. Passage of ova through the female reproductive tract is facilitated by;
A. Ciliary movement
B. Amoeboid movement
C. Flagella movement
D. Cyclosis

21. When the cells from a plant root are placed in a solution, they loose water to the solution, Relate to the cells, the solution is;
A. Hypertonic
B. Hypotonic
C. Isotonic
D. Less concentrated

22. Figure below shows a glandular tissue,



In which part of the mammalian body is the tissue likely to be?

A. Skin
B. Mouth
C. Pancreas
D. Small intestines

23. Protists may have?
A. Mitochondria but not ribosomes or cell walls
B. Ribosomes but not mitochondria or cell walls
C. Ribosomes and cell walls but not mitochondria
D. Mitochondria, Ribosomes and cell walls

24. The main structural component of a plant cell is;
A. Amilo petin
B. Glycogen
C. Cellulose
D. Glucose

25. A red pigment is extracted from a marine alga. Which of the following best supports the hypothesis that the pigment is involved in photosynthesis?

A. Has an absorption spectrum similar to that of chlorophyll
B. Is also found in land plants
C. Has a molecular structure similar to that of chlorophyll
D. Has an absorption spectrum similar to the photosynthetic action spectrum for that same marine alga.

26. Which of the following would most easily cross cell's phospholipid membranes?

A. Water
B. Hydrogen ions
C. Potassium ions
D. Sodium ions

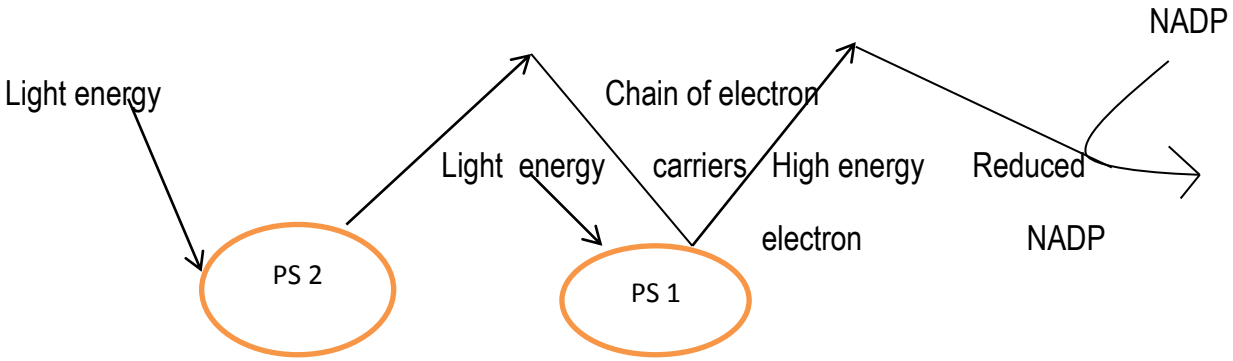
27. Just prior to cell division, the diploid human body cell contains.....chromatids.

A. 23
B. 46
C. 69
D. 92

28. Which cell organelle shows prokaryotic cell structure and has been proposed as providing evidence of endosymbiosis?

A. Golgi apparatus
B. Mitochondrion
C. Nucleolus
D. Ribosome

29. The diagram below shows some of the processes in the light. Dependent stage of photosynthesis.



30. For the light dependent stage, to continue, photo system two (ps2)

A. Electron carriers
B. Reduced NADP
C. Photolysis
D. The formation of ATP

31. If the magnification of a microscope is 50,000 times and diameter of the image viewed is 5mm, the actual diameter of the object is;

A. 1×10^{4}MM
B. 0.01MM
C. 0.1 MM
D. 1.0MM

32. Which statement explains why cell membranes are described as having a fluid mosaic structure?

A. Different types of membranes have different sets of proteins, each with a specific pattern
B. Phospholipids diffuse within their own monolayer with many of the membrane proteins also moving around

C. The fluidity of membrane charges with cholesterol molecules maintaining stability
D. There are different kinds of transport protein scattered within the phospholipid bilayer allowing facilitated diffusion and active transport

33. Which of the following mechanical tissues is most important in providing support in young stems and leaves of plants?
A. Sclerenchyma
B. Collenchyma
C. Parenchyma
D. Tracheid

34. An ulcerated person should avoid taking aspirin because ;
A. It contains highly concentrated acids
B. It inhibits secretion of mucus and bicarbonates
C. It stimulates hydrochloric acid secretion into the stomach
D. It prevents secretion of pepsin and renin

35. Which one of the following epithelial tissues is least specialized?
A. Cabordal epithelial
B. Transitional epithelial
C. Columnar epithelium
D. Squamous epithelium

36. Name the organelles responsible for energy production;
A. Mitochondria
B. Chloroplast
C. Endoplasmic reticulum
D. Nucleus

37. In flowers, the heterozygous conditions of alleles for red petal (R) and white (W) are pink. Which one of the following proportions and color of petals is correct if a pink flowered plant is crossed with a red flowered plant?

A. 3 Red : 1 White
B. 3Red : 1 Pink
C. 1 Pink : 1 Red
D. 1 Pink : 1 White

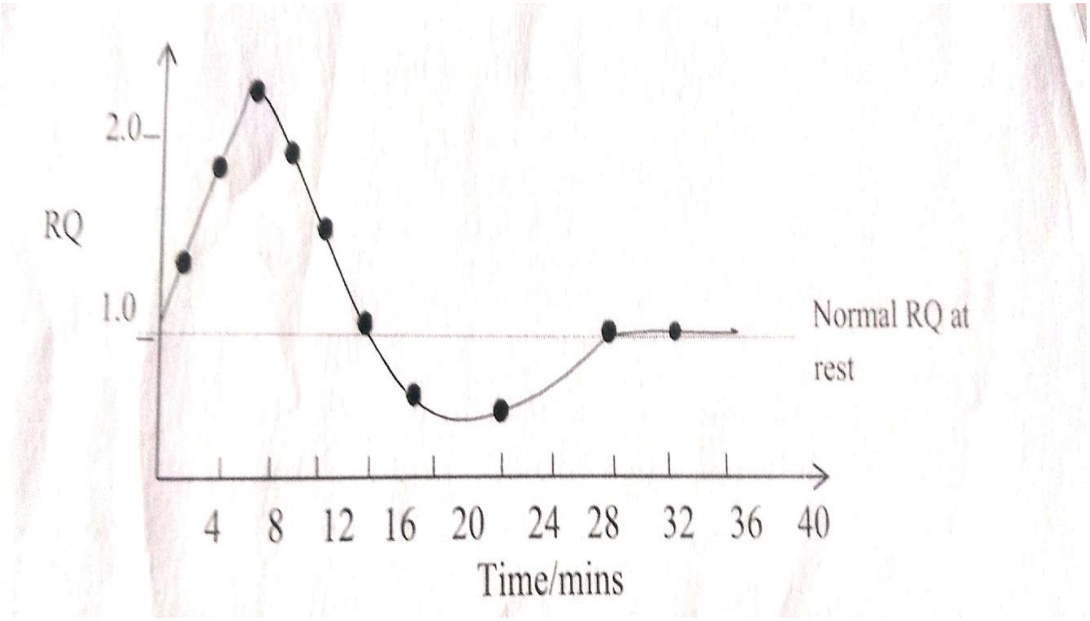
38. Which wave length from light spectrum is mostly absorbed by green plants?
A. Red
B. Green
C. Blue
D. Yellow

39. During water stress, photosynthesis reduces in plant mainly due to;
A. Shortage of carbon dioxide
B. Mineral salts
C. Water
D. Sunlight

40. During which state of mitosis, is the spindle fibres formed and get attached to the chromosomes?
A. Metaphase
B. Anaphase
C. Prophase
D. Telophase

SECTION B

41. An individual was made to undergo a vigorous exercise and his respiratory quotient (RQ) was measured immediately after the exercise for one hour. Figure 5 shows the results of the investigations.



a) What is meant by respiratory quotient?

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b) Explain the;

i) Rise in RQ up to 6th minute. ***(03 marks)***

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ii) Fall in RQ from 6th to 16th minute. ***(04 marks)***

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c) Explain why the RQ falls below the normal RQ of a resting human.

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42. (a) State the differences between a C_3 and a C_4 plant.

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(b) Explain how the structure of C_4 plant adapts them to avoid photo respiration.

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(c) Explain the photosynthetic pathway that operates in plants living in the following areas.

i) Hot dry areas

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ii) High altitude areas

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43. (a) Describe the 5 major forms of a sexual reproduction in organisms.

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(b) Explain the significance of perenating organs to plants.

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44. (a) Explain why meiosis is better phenomenon in variation.

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(b) Describe the effects of the following evolutionary factors on the gene pool.

i) Population overlap.

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ii) Genetic drift.

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iii) Mutations.

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45. (a) State two characteristics of each of the following tissues.

i) Stratified tissue

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ii) Collagen tissue

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(b) Explain the importance of the characteristics of stratified tissue in the epidermis of the mammalian skin.

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(c) Explain how the structures of proteins enables them to form collagen tissue.

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46. (a) Explain why some materials;

i) Diffuse freely across the cell membrane. ***(3 marks)***

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ii) Do not easily diffuse across the cell membrane. ***(3 marks)***

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(b) Distinguish between mitochondria and chloroplast. ***(4 marks)***

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END