

BIOLOGY PAPER 231/1 K.C.S.E 2003

SECTION A (20 MARKS)

Answer all the questions in this section in the spaces provided.

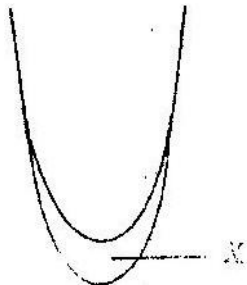
1. A process that occurs in plants is represented by the equation below.
$$\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2 + \text{Energy}$$

(Glucose) (Ethanol) (Carbon dioxide)

 - a) Name the process.
 - b) State the economic importance of the process named in (a) above
2. Name the phylum whose members possess notochord
3. How do the male gamete nuclei reach the ovule after pollen grains land on the stigma?
4. a) Name the bacteria found in root nodules of leguminous plants.
b) What is the role of the bacteria named in (a) above?
5. A bone obtained from a mammal is represented by the diagram below.



- a) Name the bone.
 - b) Which bones articulate with the bone shown in the diagram at the notch?
6. Distinguish between analogous and homologous structures.
Analogous structures –
Homologous structures –
 7. The diagram below represents regions of a root tip.



- a) Name the two regions above X in ascending order
 - b) State the function of the part labeled X
8. State a function of the large intestine in humans
 9. Name the:
 - a) Material that strengthens xylem tissue.
 - b) Tissue that is removed when the bark of a dicotyledonous plant is ringed.
 10. How are leaves of submerged adapted plants for photosynthesis?
 11. Name the causative agent of typhoid.

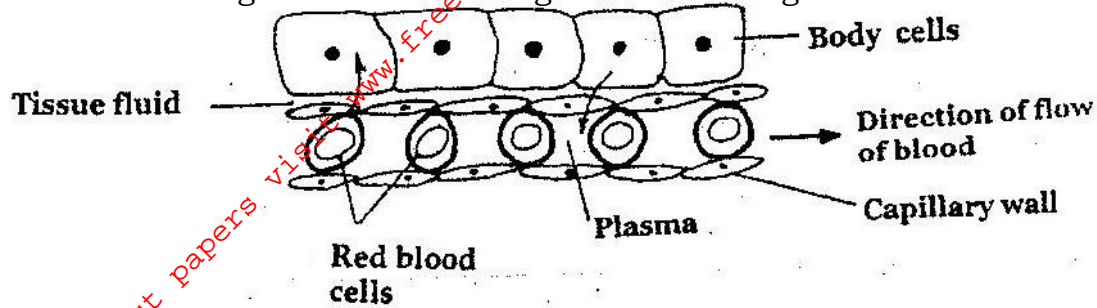
SECTION B (40 MARKS)

Answer all the questions in this section in the spaces provided.

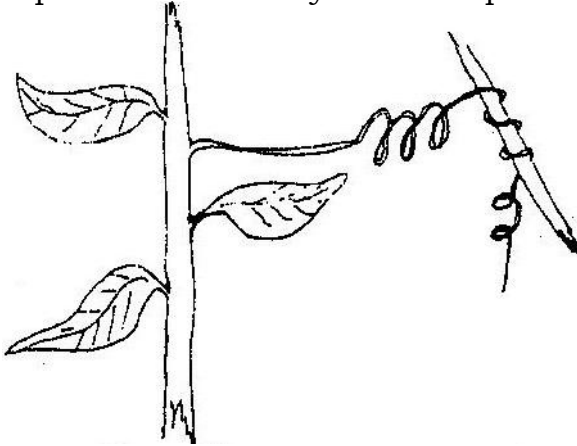
12. a) What is meant by the term sex – linkage?
b) Name two sex – linked traits in humans.
c) In *Drosophila Melanogaster*, the inheritance of eye colour is sex – linked. The gene of red eye is dominant. A cross was made between a

homozygous red – eyed female and a white – eyed male. Work out the phenotypic ratio of F₂ generation. (Use R to represent the gene for red eyes).

13. The diagram below shows gaseous exchange in tissues.



- a) Name the gas that diffuses:
 - i) To the body cells
 - ii) From the body cells
 - b) Which compound dissociates to release the gas named in (a) (i) above?
 - c) i) what is tissue fluid?
ii) What is the importance of tissue fluid?
 - d) Name the blood vessel with the highest concentration of:
 - i) Glucose
 - ii) Carbon dioxide
14. a) Explain how marine fish regulate their osmotic pressure.
b) Explain the role of antidiuretic hormone when there is excess water in the human body.
15. A response exhibited by a certain plant tendril is illustrated below.



- a) i) Name the type of response
ii) Explain how the response named in (a)(i) above occurs
 - b) What is the importance of tactic responses to microscopic plants?
 - c) State four applications of plant hormones in agriculture.
16. a) What is meant by:
- i) Autecology
 - ii) Synecology?
- b) The number and distribution of stomata on three different leaves are shown in the table below:

| Leaf | Number of stomata | |
|------|-------------------|-----------------|
| | Upper epidermis | Lower epidermis |
| A | 300 | |

| | | |
|---|-----|--|
| B | 150 | |
| C | 02 | |

Suggest the possible habitat of the plants from which the leaves were obtained

Leaf

Habitat

A

B

C

(c) State the modifications found in the stomata of leaf C.

SECTION C (40 marks)

Answer question 17 (compulsory) in the spaces provided and either question 18 or 19 in the spaces provided after question 19.

17. Some students used a model to demonstrate the effect of sweating on human body temperature. Two boiling tubes A and B were filled with hot water. The temperature of water in the tubes was taken at the start of the experiment and then at 5 minutes interval. The surface of tube A was continuously wiped with a piece of cotton wool soaked in methylated spirit. The results obtained are shown in the table below.

| Time (minutes) | Temperature °C in tubes | |
|----------------|-------------------------|----|
| | A | B |
| 0 | 80 | 80 |
| 5 | 54 | 67 |
| 10 | 40 | 59 |
| 15 | 29 | 52 |
| 20 | 21 | 47 |
| 25 | 18 | 46 |

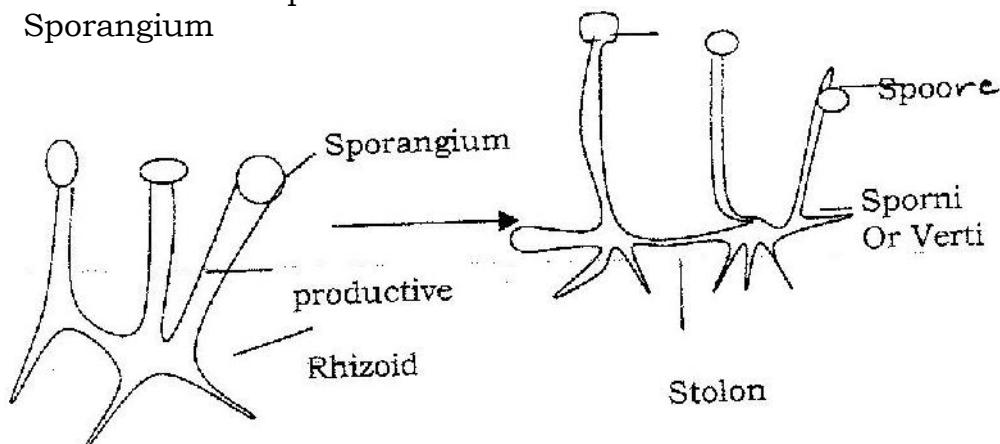
- On the same axes, plot graphs of temperature of water in the tubes against time.
 - At what rate was the water – cooling in tube A?
 - Why was tube B included in the set up?
 - Account for the rate of cooling in tube A.
 - State two processes of heat loss in tube b.
 - What would be the expected results if tube A was insulated?
 - What would the insulation be comparable to in:
 - Bird
 - Mammals?
 - Name the structures in the human body that detect:
 - External temperature changes
 - Internal temperature changes
18. Describe the functions of the various parts of the human eye.
19. Describe how fruits and seeds are suited to their modes of dispersal.

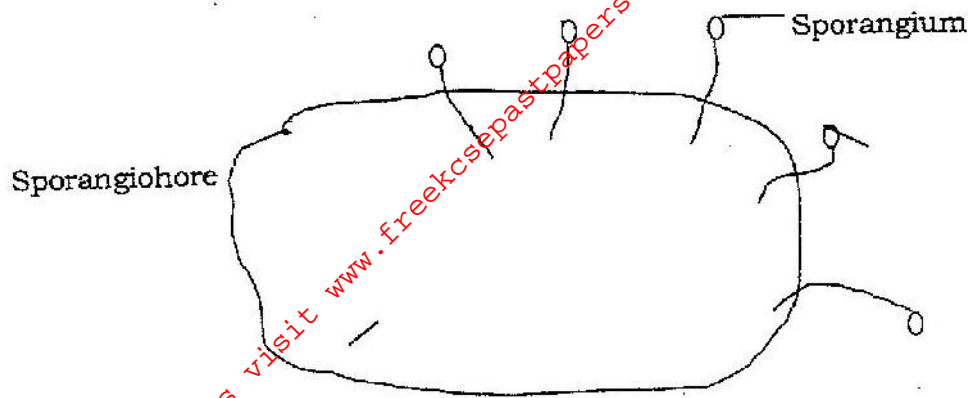
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PRACTICAL MARKING SCHEME

1. You are provided with specimens labelled C, D and a solution labelled L

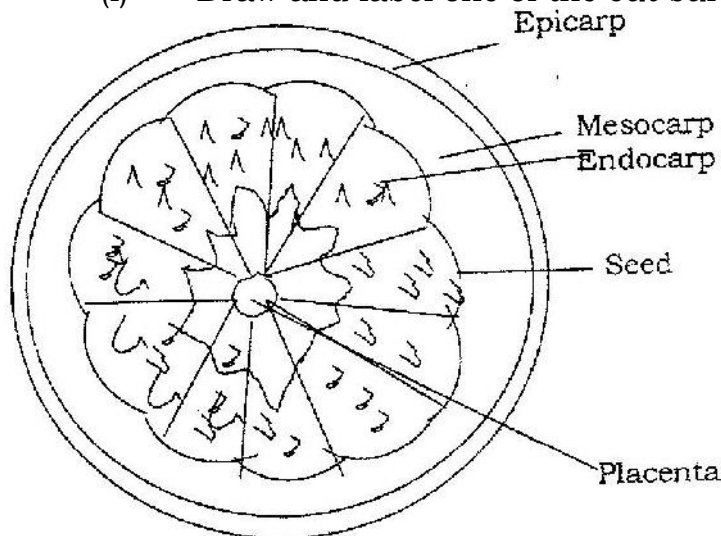
- (a) (i) State the habitat of specimen C
a. Aquatic/ water
- (ii) Name the trophic level occupied by specimen C.
Producer/ first trophic level
- (iii) Give a reason for your answer in (a) (ii) above
It has chlorophyll for photosynthesis
- (b) (i) Place 5cm³ of solution L into a 100ml beaker. Using a straw, blow gently into the solution.
Colour changes to yellow / greenish yellow/orange
- (ii) Give a reason for the observation in (b) (i) above.
Carbon dioxide in exhaled air / exhaled air contains carbon dioxide or carbon dioxide / carbon dioxide in air;
- (c) Place 5cm³ of a solution L into 100ml beaker. Put the forceps, submerge specimen C into one of the 100ml beaker. Put the two beakers in the dark. Leave the set up for at least one hour and observe.
- (i) Record your observation.
Solution in the beaker with spirogyra turns yellow; while the other remained blue or solution in the beaker containing specimen C/spogrya turns yellow / green / greenish yellow;
- (ii) Explain the observation in (c)(i) above.
Spirogyra respire, in the dark producing carbon dioxide; which changes the colour of solution to yellow while the solution in other beaker served as a control;
- (d) Examine specimen D using a hand lens.
Giving a reason, state the division to which the specimen belongs.
Division: Micophyta / mycophyta;
Reason: Non – green / has hyphae / has no chlorophyll.
- (e) What role is played by specimen D in an ecosystem?
Decomposer / causes decay of dead organic matter;
- (f) Draw and label specimen D.
Sporangium





2. You are provided with a specimen labeled E, 0.01% DCPIP and 0.1 Ascorbic acid. Examine specimen E.

- a) (i) What part of the plant is specimen E.
Fruit
- (ii) Give a reason for your answer in (a)(i) above.
- b) Cut a transverse section through specimen E.
- (i) Draw and label one of the cut surfaces.



State the magnification of your drawing?

Mag: range between $X \frac{1}{2}$ to $x 3$ (must be x not x)

- (ii) State the type of placentation of specimen E.
Axial / Axile (accept axile for axial.)
- c) Name the agent of dispersal of specimen E.
Animal; accept man alone as an agent.
- d) State how specimen C is adapted to its mode of dispersal.
Seeds have hard / slimy seed coats / with mucus which prevent indigestion.
Scented to attract animal / dispersal animal;
Succulent to attract / so that it is edible / can be eaten;
- e) i) To 1cm^3 of DCPIP in a test tube, add 0.1% solution of ascorbic acid drop by drop until the colour of DCPIP disappears. Shake the test tube after addition of each drop. Record the number of droplets used.
2 drops; drops from 1 to 4 drops.
Squeeze out the juice from specimen E into a beaker. Filter and discard the residue.

- ii) To another 1cm³ of DCPIP in a test tube add the juice from specimen E drop by drop. Shake the test tube after addition of each drop until the colour of DCPIP disappears. Record the number of drops used?
- iii) From the results obtained in (e) (i) above, calculate the percentage of ascorbic acid in the juice obtained from specimen E.
Show your working
2/8x0.1;025%
Calculation done only if the drops are within the stated range above.
- iv) State two factors that would influence the accuracy of the results.
Size of dropper / size of the drops.
Period of storage of specimen E/ extent/degree of ripening.
Impurities.
- (f) (i) Suggest the expected results if the juice from specimen E was boiled for 30 minutes, cooled and added drop by drop to DCPIP solution.
(ii) Explain the expected results in (f) (i) above.
Boiling/heat destroys Ascorbic acid;

3. You are provided with a specimen labeled B.

- a) i) Name the class to which the specimen belongs
ii) Give two reasons from your answer in (a)(i) above.
- b) What term is used to describe the shape of the specimen?
- c) Stroke the specimen from the :
i) Head to tail. Record your observation
ii) Tail towards the head. Record your observation
iii) What is the significance of your observation in c (i) and (ii) above?
- d) Measure in millimeters the length of the :
i) Specimen from the tip of the mouth to the tip of the tail.
Length _____ cm.
ii) Tail from the anus to the tip of the tail'
length _____ cm
iii) Using the measurements in (d) (i) and (ii) above, calculate the tail power.
- e) Name and draw the fins on the specimen that:
i) Enable the specimen to balance, brake and change direction.
ii) Prevent the fish from rolling and yawing.