

Proposed guide @

Uganda Advanced Certificate of Education

Biology (Practicals)

Examinations -2024

S6 Paper 3

3 Hours 15 minutes

Instructions:

- ✓ *This paper consists of three questions*
- ✓ *Answer all the three questions*
- ✓ *Answers must be written in the spaces provided*

Table for official use

Question	Mark	Examiners Sign
1	<i>40</i>	
2	<i>30</i>	
3	<i>30</i>	
Total	<i>100</i>	

1. You are provided with specimen T which is freshly killed.

(a). With reasons from the body of the specimen, identify the sex of the specimen (03 marks)

Sex male / female ✓ 01

Reasons ✓

Reasons male; slender body; Viscerals; skin underlying the throat is white; Large swollen rough back; Warty patches on the inside of the first (preaxial) finger (fore limb/trump) called nuptial pad; Female; Broad abdomen; Creamy white/white grey/pale coloured skin underlying the throat. 02

(i). Describe how structural features found in anterior region enable the specimen to survive in a habitat (05 marks)

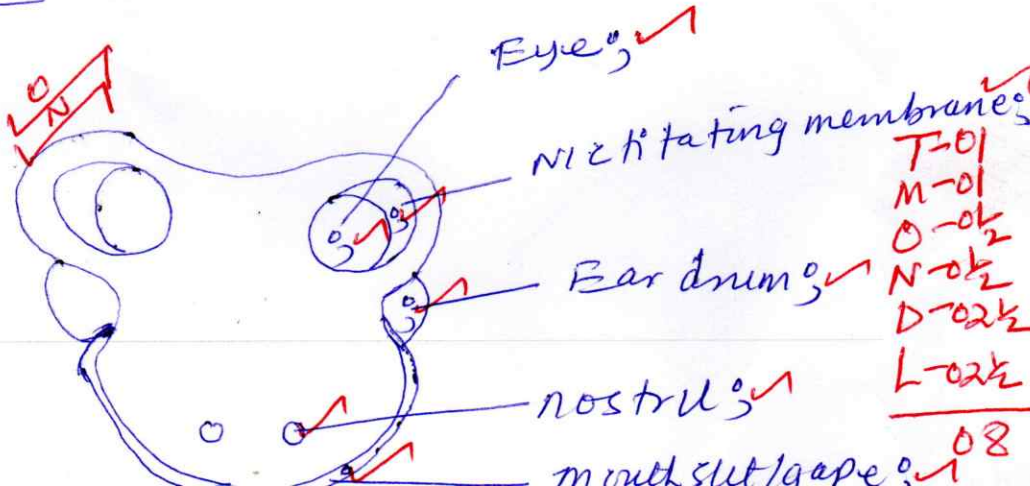
shallow ear drum increases SA for reception of sound waves

- Flat ear drum to give streamlined shape for ease swimming
- wide opening of mouth / wide gape to easily trap / consume / ingest large prey
- circular ear drum; to increase surface area for receiving maximum sound waves
- open nostrils at the tip of snout to ease passage of respiratory gases / air / smell on land
- Large / protruding eyes for wide field of view
- Large ear drum to increase SA for sensitivity / receiving maximum sound waves
- Thin ear drum for increased sensitivity / vibration
- movable nictitating membrane on the eye to easily clean the eye / protect the eye from mechanical damage while submerged in water

(any 05)

(ii). Draw and label anterior view of the head (08 marks)

A drawing showing anterior view of the head of specimen T ✓



- Eye ✓
- nictitating membrane ✓
- Ear drum ✓
- nostril ✓
- mouth slit/gape ✓

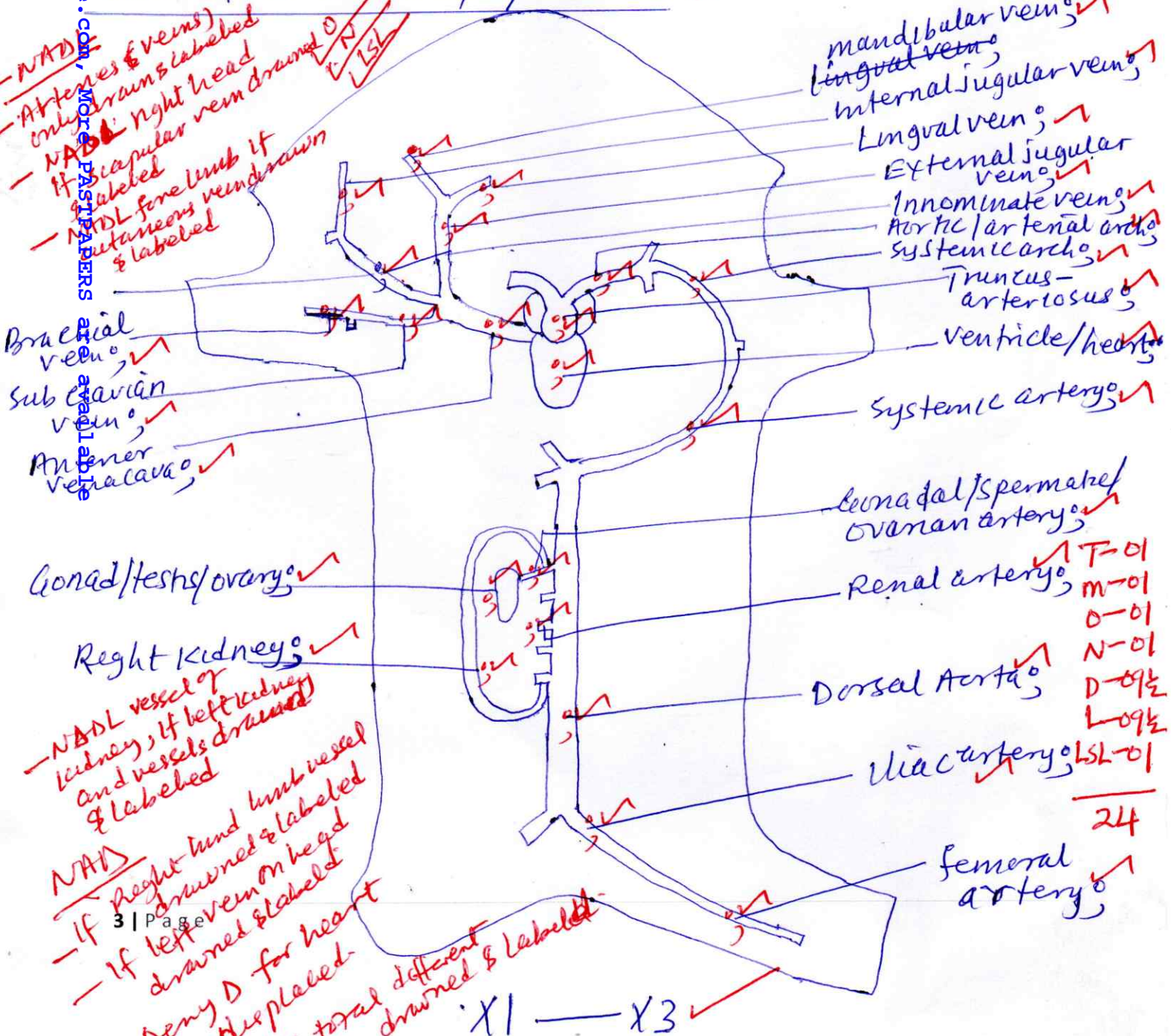
T-01
M-01
O-02
N-02
D-02½
L-02½
08

LSL - left side of hind limb

- (c). Dissect the specimen to display;
- (i). The route of blood vessels from the right side of the head and right fore-limb to the heart undisplaced and,
 - (ii). The route of blood vessels that take blood to the urinogenital system and left hind limb

Draw and label your dissections in C(i) and C(ii) as one drawing (24 marks)

A drawing showing the route of blood vessels from the right side of the head, right fore-limb to the heart undisplaced and blood vessels that take blood to the urinogenital system and left hind limb of specimen

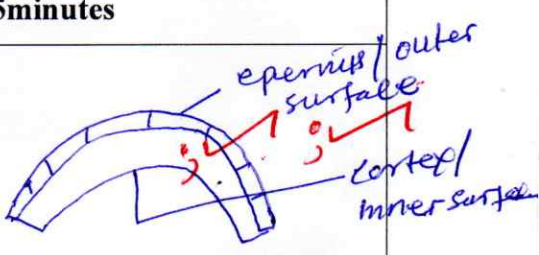
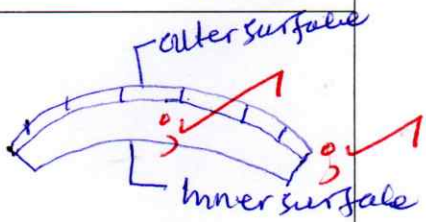
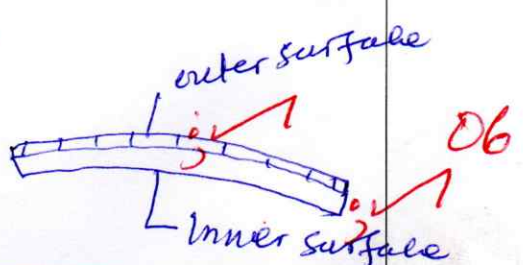


2.(a). You are provided with specimen R and sucrose solutions of different concentrations labeled A, B, C, D and E. You are to carry out tests on the specimen using the solutions.

Label 5 petric dishes as A, B, C, D and E and put 10cm^3 of the corresponding solution in each. Cut two pieces/strips of stem from specimen P, each measuring 3cm long preferably from the same internode or from internodes next to each other. Cut each piece longitudinally into four equal species. Put a piece into each petric dish containing the sucrose solution and leave for 45 minutes.

After 45 minutes, observe the pieces of stem from the solution, measure the distance (d/mm) between the two bend ends of each strip/piece, when the strip bend inward, record the difference distance as **negative valve**, **positive valve** when the strip bends outwards and **zero** when the strip does not bend. Draw the shape of each strip/piece in **table 1** and on each drawing, label the outer and inner surfaces. (10 marks).

Table 1

Strip of stem from solution	Difference in distance between the two bends/mm	Shape of stem after 45minutes
A	-4 to -6 ⁰ ✓	
B	-2 to -3 ⁰ ✓	
C	-1 to -2 ⁰ ✓	

- note the trend for the differences in distance and how changes

- curvature drawing @ 1/2
- correct label for drawing @ 1/2

D	0° ✓	
E	+4 to +6° ✓	

(b)(i). Plot a suitable graph to represent distance between two bend of each strip in different solutions (07 marks)

Graph work = 07

(ii). Explain the behavior of each strip/piece in each of the solution (10 marks)

A strip in solution A had the highest curvature with epidermis outwards. The highest negative difference in distance between the two bends/ends because implying that the solution A was the most hypertonic / most concentrated / lowest osmotic potential / lowest solute potential / lowest water potential as compared to the cell sap of the strip/cortex. The cortex / inner surface lost most water molecules to the solution by osmosis; hence the cortex cell shrinks making it to bend inwards. Strip in solution E curved most with the cortex outward and epidermis inwards and has the highest positive difference in distance between two ends of the bend implying that solution E has the least concentration / hypotonic / very dilute / highest osmotic potential.

(c) (i). Arrange the sucrose solutions starting from the most concentrated (01 marks)

A > B > C > D > E ✓ 01

highest water potential as compared to the cell sap of the cortex; cortex cells absorbed most water molecules by osmosis from the solution causing the cortex cell to become turgid / expands leading to highest positive curvature.

A strip in solution C remained straight / almost straight / curved slightly implying there was no net movement.

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(To be fastened together with other answers to paper)

UACE

Candidate's Name

Random No.

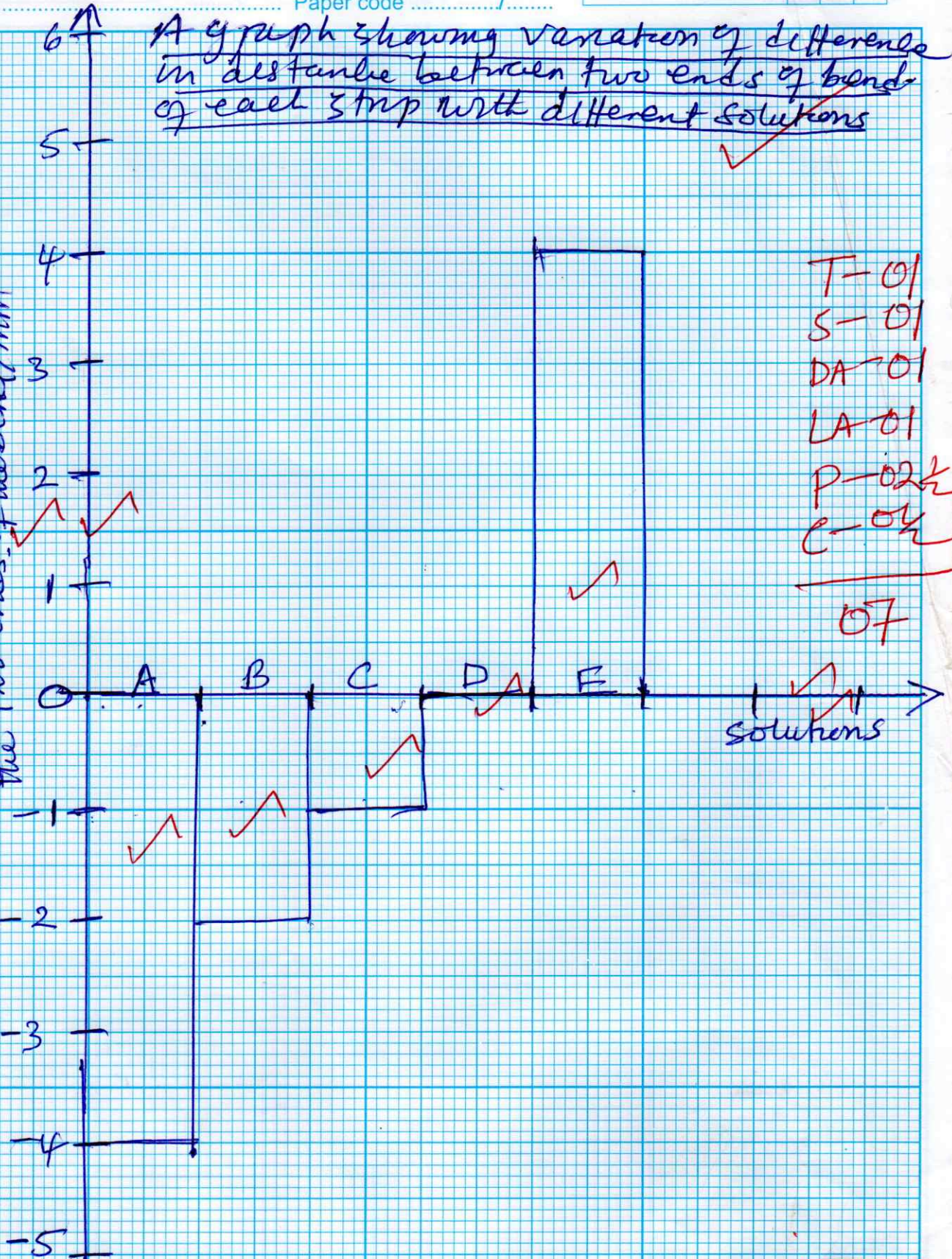
Signature

Personal Number

Subject Name Paper code

A graph showing variation of difference in distance between two ends of bends of each strip with different solutions

Difference in distance between the two ends of the bend/mm



T-01
S-01
DA-01
LA-01
P-02½
C-04

07

07

(c) (i). Arrange the sucrose solutions starting from the most concentrated (01 marks)

.....
.....

(ii). Explain how the observed physical conditions of a strip placed in solution E has more advantage than other strips (02 marks)

E has large / swollen / turgid inner surface / cortex, it can stand firm to offer support to plant parts; causes lamina to be flat to absorb maximum sunlight for photosynthesis; Open flowers for pollination, open stomata for passage of gases and remove excess water molecules.

30

02

3. You are provided with specimen F and G

(a). Classify the specimens and give reasons for your classification as indicated in table 2 below (06 marks)

Table 2

Specimen	Taxon	Reasons
F	Kingdom	...plantae ✓ - Green pigment ✓ - Differentiate into root, stem & leaves ✓
	Phylum	Angiospermophyta ✓ - flower ✓ - ovary ✓
	Class	monocotyledoneal ✓ - parallel venation in lamina ✓ - flower with 3 petals; long, narrow lamina ✓ <i>any 03</i>
G	Kingdom	...protista ✓ - single celled ✓ - numerous identical cells ✓
	Phylum	Chlorophyta / Heterokontophyta ✓ - Filamentous ✓ - spiral chloroplast ✓ - septate ✓ - cell joined end to end ✓
	Class	Chlorophyceae ✓ - green pigment ✓ - numerous pyrenoids ✓

(b). peel a thin layer of F, mount in a drop of water on a glass slide and examine under medium power of a microscope. At the same time remove one thin thread of G, mount on a glass slide and examine it under medium power of a microscope.

(i). state the observable structural differences between one cell of G and F under medium power of a microscope (04 marks)

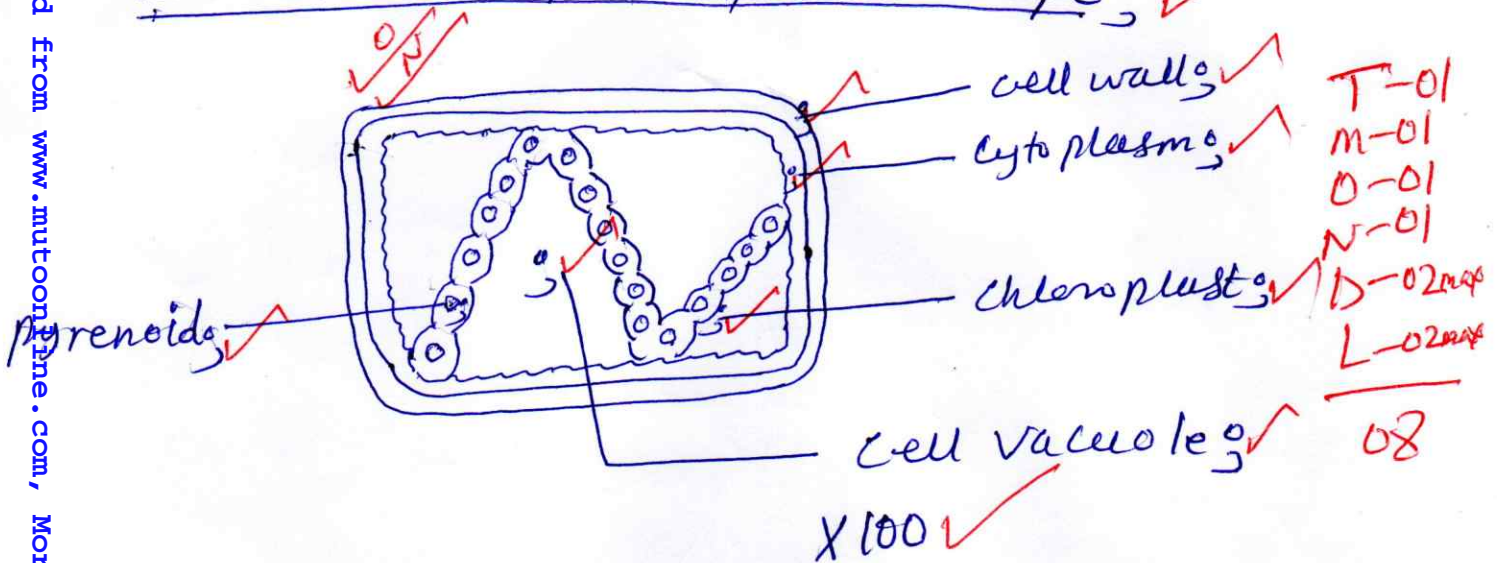
Specimen G	Specimen F
- spiral chloroplast ✓	- flat chloroplast ✓
- numerous pyrenoid ✓	- no pyrenoid ✓
- filamentous body ✓	- hexagonal/polygonal body ✓
- thin cytoplasm ✓	- large cytoplasm ✓
- septate filament ✓	- non septated ✓
- very large vacuoles ✓	- small vacuoles ✓
- 1 identical cells ✓	- numerous identical cells ✓

06

any 04

(ii). Draw and label one cell of G observed under medium power of a microscope (08 marks)

A drawing one cell of specimen G observed under medium power of a microscope;



(c).(i). Describe how specimen G is adapted in its habitat (06 marks)

- Long filament to increase surface area for absorbing maximum sunlight for photosynthesis;
- for exchange of large amount of gases;
- Septate filament for easy fragmentation/asexual reproduction/increased flexibility;
- Filamentous to make it light for easy floating on water;
- Numerous pyrenoids to store large amounts of food;
- Thick cell wall for increased/extra protection;
- Green pigment to trap maximum sunlight for photosynthesis;
- Smooth/moist to easily avoid desiccation;

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(ii). Explain the ecological importances of specimen G in an environment (04 marks)

- They are primary producers in fresh water ecosystem, providing food for aquatic organisms.
- They release oxygen during photosynthesis into water, which is used by aerobes in water.
- The process of photosynthesis utilizes carbon dioxide thereby reducing the level of carbon dioxide in atmosphere.
- They pollute water bodies by blocking light / prevent light penetration hence reducing transparency and photosynthesis in deeper layers of water.

(d). State any two advantages exhibited by specimen F over specimen G in an environment

(02 marks).

- F. differentiated into roots; stems and leaves / flowers; can survive in different habitats; while G is not differentiated and restricted to live in water to avoid dissection.
- F is well tolerant to pollution; while G only survive in unpolluted fresh water.

30mef

06