→ Proposed marking guide [Practical] 0701300439

Candidate's Name: ...Tr. WASSWA ENOCK - 0762867639...

Signature: ...ME...

Random No.					Personal No.		

(Do not write your School/Centre Name or Number anywhere on this booklet.)

P530/3
BIOLOGY
(Practical)
Paper 3
Nov./Dec. 2023
3¼ hours

For teaching and facilitations
Call: 0701300439
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UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY
(PRACTICAL)

Paper 3

3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of **three** *questions.*

Answer **all** *the questions.*

Write the answers in the spaces provided. **No** *additional sheets of paper should be inserted in this booklet.*

You are **not** *allowed to start working within the first* **15 minutes.** *You are advised to use this time to* **read** *through the paper and ensure that you have all the apparatus, chemicals and specimens you require.*

For Examiners' Use Only		
Question	**Marks**	**Examiner's Signature & No**
1		
2		
3		
Total		

Turn Over

Note Practise and follow instructions — RAT

1. You are provided with a freshly killed specimen X.

(a) (i) Giving **three** reasons, state the class to which it belongs. *(04 marks)*

Class ..... Mammalia ✓ ..... reject Mammal reject wrong spelling's

Reasons

..... Has external earlobes / pinnae ✓ .....

..... Body covered by fur ✓ .....

..... Possesses external genitalia like Vaginal opening .....

..... Possession of nipples ✓ .....

..... Any Correct 03 Max 04 .....

.....

(ii) Open the mouth of specimen X and examine the teeth. What special teeth adaptations do you observe? *(04 marks)*

Incisor teeth;

- Sharp incisor teeth for cutting of food ✓
- Curved incisor teeth for easy scooping of teeth
- Long incisor teeth for deep cutting into the food ✓
- Chisel shaped incisors teeth for easy cutting of food

Molar teeth

- Ridged molar surface for easy grinding of food
- Broad top crown of molars provide a large surface area for grinding
- Numerous Molar teeth to increase Surface area for grinding of food

Any Correct 04

Max 04

(iii) View the head of specimen X from the dorsal side and state how the features are suitable for environmental perception. *(05 marks)*

Whiskers;
- Whiskers of varying length to increase chances of sensitivity
- Numerous whiskers increases surface area for sensitivity
- Long whiskers to detect the diameter of the burrows at distance

Ear lobes; Large ear lobes to increase surface area for trapping of sound waves for easy hearing
tunnel shaped earlobes and narrow at the base for easy directing of sound waves into auditory canal

Eyes; Large eyes to increase surface area for wide field of view
Movable eye lids for protection from mechanical damage

Any 05 correct
Max 05

(b) (i) Dissect specimen X to open the abdominal cavity. Carefully disentangle the alimentary canal without causing much bleeding. Ligature the hepatic portal vein to prevent much bleeding. Stretch out the full length of the alimentary canal from the cardiac end of the stomach to the posterior end of the colon.

Measure the length of each portion of the alimentary canal as indicated in table 1, record your results in the table and complete the table.

Table 1 *(06 marks)*

Portion (along outer part)	Length (mm)	Percentage length of each section
stomach	30 - 83 ✓	3.53 ✓
duodenum	80 - 157 ✓	9.42 ✓
ileum	680 - 1080 ✓	80.09 ✓
caecum & appendix	32 - 100 ✓	3.77 ✓
colon	27 - 90 ✓	3.18 ✓
full length	849 - 1510 ✓	100 ✓

Max 06

Mark any value in the range.

(ii) What is the significance of the observed differences in the length and shape of the different portions of the alimentary canal?

Stomach (2 ½ marks)

Short; Curved, C-shaped for temporary storage of food

Shorter for fast passage of food material

Duodenum (02 marks)

Relatively longer, curved to increase surface area for food digestion and storage.

Ileum (02 marks)

- Very long to increase surface area for digestion and absorption of food

Caecum and appendix (02 marks)

- Tapers towards the appendix for temporary storage of food materials

Shorter for fast passage of food materials

Colon (1 ½ marks)

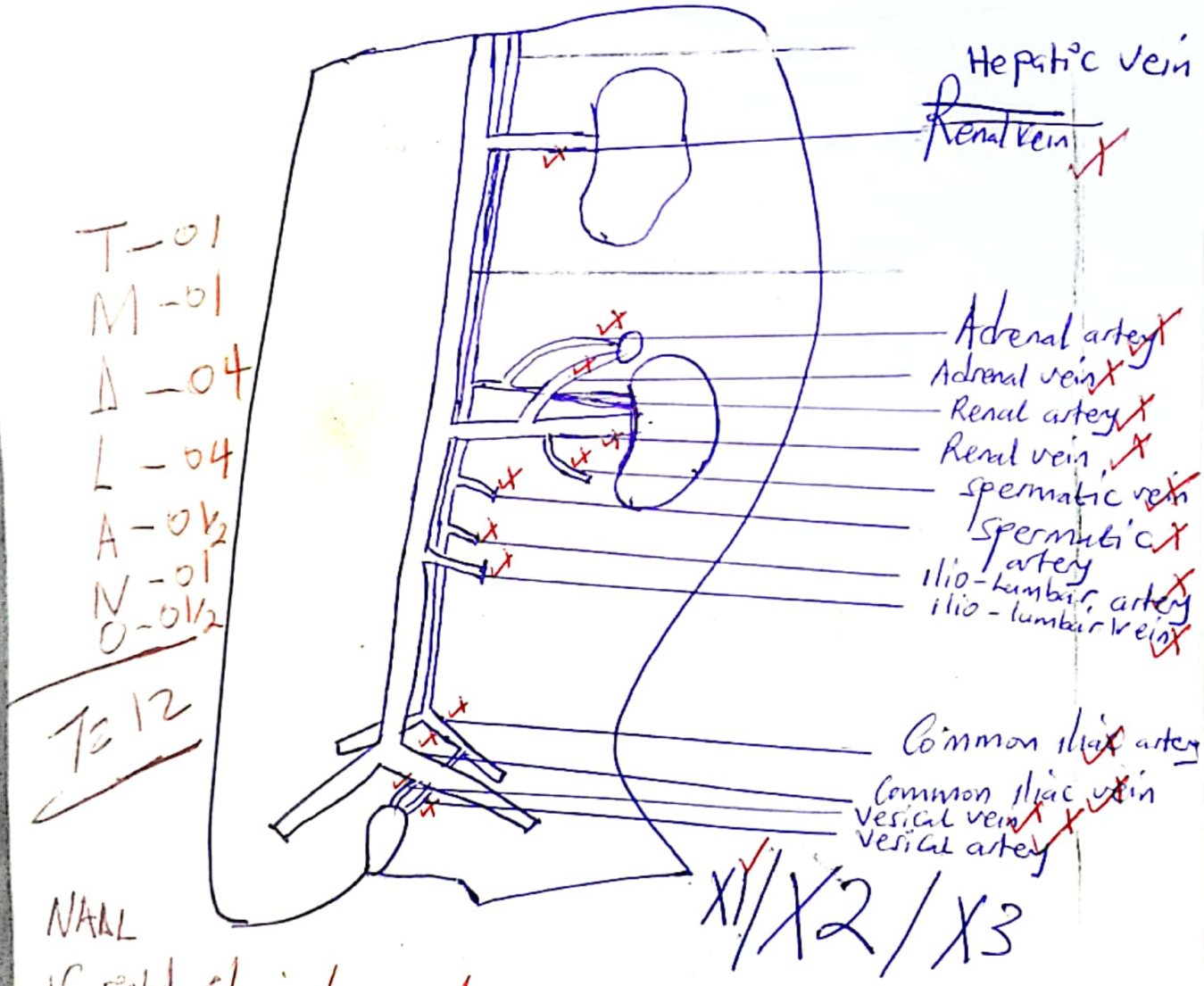
Straightened for temporary storage of undigested food.

Shorter for fast passage and remove of undigested food materials

(c) Proceed with the dissection by removing the unnecessary structures in order to display the major blood vessels of the left side of the abdominal cavity.

Draw and label the major blood vessels displayed. *(12 marks)*

Drawing showing the major blood vessels on the left side of the abdominal Cavity of specimen X



T – 01
M – 01
A – 04
L – 04
A – 01½
V – 01
O – 01½

T = 12

X1 / X2 / X3

NAAL
If right side is drawn and labelled.

Turn Over

TV02 Note: Please Follow instructions, for accuracy — Answers should be precise 2M HCl H_2O_2 2M NaOH Irish potato tissue

2. You are provided with solutions; P, Q, R and specimen S. Solutions P and R provide different pH media.

(a) (i) Label four beakers; A_1, A_2, A_3 and A_4, and prepare their corresponding solutions as shown in table 2.

Table 2

Solution (cm^3)	Volume of solution Q (cm^3)	Volume of water added (cm^3)
A_1	7	7
A_2	4	8
A_3	5	30
A_4	1	11

(ii) Cut a cube from specimen S measuring 3 cm × 3 cm × 3 cm. Chop the cube into smaller pieces and crush them into a paste using a mortar. Add 10 cm^3 of distilled water and decant the extract of specimen S in a petri dish and label it extract S.

(iii) Obtain six test tubes and label them as A_1, A_2, A_3, A_4, A_5 and A_6. Pour 10 cm^3 of the solutions A_1, A_2, A_3 and A_4 into the corresponding test tubes.

(iv) Pour 10 cm^3 of solution A_3 into each of the test tubes A_5 and A_6. Add five drops of solution P to the content of A_5 and five drops of solution R to the content of A_6.

(v) Cut six pieces of filter paper each measuring 0.5 cm × 0.5 cm. Dip the filter papers into extract S and leave them to stay in the extract for five minutes.

(vi) Pick one filter paper from extract S and gently dip it into the solution in test tube A_1, and start the stop clock immediately.

(vii) Record your observations and time taken for the paper to rise to the surface in table 3.

(viii) Repeat procedure (vi) - (vii) using solutions in test tubes; A_2, A_3, A_4, A_5 and A_6.

Table 3 (11 marks)

Test Tube	Content	Observations	Time taken for paper to return to surface (seconds)
A_1	Solution A_1 + filter paper	- Very fast effervescence - filter paper rises very fast	3-15
A_2	Solution A_2 + filter paper	- fast effervescence - filter paper rises fast	4-16
A_3	Solution A_3 + filter paper	- Moderate effervescence - filter paper rises moderately	7-24
A_4	Solution A_4 + filter paper	- slow effervescence - filter paper rises slowly	13-35
A_5	Solution A_3 +P + filter paper	Very slow effervescence/ no effervescence; ~~filter pape~~	Infinity
A_6	Solution A_3 +R + filter paper	Moderately slow effervescence Filter paper rises moderately slowly	10-26

Note
Practically organised
precise answers

Mark 2

(b) Explain the results in the following test tubes.

(i) A_1 (03 marks)

Extract S Contain active substance / enzyme A_1 Contained highest concentration of substrate resulting into production of many chances of collision betwees the enzyme and substrate molecule hence the very high rate of breakdown of the substrate

Mark 03

(ii) A_3 (03 marks)

A_3 Contained moderate concentration of substrate resulting into moderate chances of collision between the enzyme and substrate molecules hence the moderate rate of breakdown / decomposition of the substrate. max 03

(iii) A_4 (03 marks)

A_4 Contained low concentration of substrate resulting into few chances of collision between the enzyme and substrate molecules hence the low rate of breakdown of the substrate. max 03

(iv) A_5 (03 marks)

Contained Very low concentration of substrate

Very low / no enzyme activity because solution P inhibits / provided unsuitable medium for enzyme activity. max 03

(v) A_6 (03 marks)

Moderately slow enzyme activity because solution R provided a slightly favourable medium / suitable medium for enzyme activity max 02

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(c) (i) **Explain the significance of the reactions in the experiment to multicellular organisms.** *(05 marks)*

Hydrogen peroxide is toxic by product of metabolism and decomposition or breakdown into water and oxygen gas by Catalase enzyme, detoxifies it and becomes harmless, thereby protecting the body cells / tissues from its harmful effects

Mark 05

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(ii) **How were errors minimised during the experiment?** *(03 marks)*

- Usage of same size of filter paper to ensure constant concentration of the enzyme
- Using one soaked filter paper per solution to ensure constant concentration of enzyme
- Same duration of soaking the filter paper into extract so that they absorb same concentration of the enzyme
- Cutting the filter paper pieces from the same filter paper to ensure absorption capacity of the enzyme
- Usage of the same volume of the substrate to ensure same enzyme concentration.

Any Correct 03

Mark 03

NB Carefully examination — Mould, Lichen, Whole fern plant

3. You are provided with specimens; E, F and G.

(a) Mount a small portion of specimen E in a drop of water and observe under low power of a light microscope.

(i) Giving two reasons, state the division to which specimen E belongs. *(03 marks)*

Division ..... Zygomycota / Zygomycetes

Reasons ..... Possession of sporangium

..... Sporangiophore with round sporangium

..... Network of branched hyphae

..... Rooting Hyphae / Horizontal hyphae ... max 03

(ii) From your observations, state how the features of specimen E ensures its survival in the habitat. *(04 marks)*

- Numerous rhizoids for easy penetration into substratum for anchorage and food absorption
- Thin rhizoids to reduce diffusion distance for absorption of nutrients
- Long sporangiophore to raise sporangium high for easy spore dispersal to increase chances of propagation.
- Large sporangium to increase surface area for storage of many spores to increase chances of reproduction. max 04

(b) (i) Using a hand lens, examine the upper surface of the pinna of specimen G. Describe the role of the observable structures in the survival of the organism. *(04 marks)*

- Numerous pinnules to increase surface area for absorption of light for photosynthesis
- Numerous veins for increased support
- Numerous hairs to reduce the rate of waterloss
- Numerous sori for storage of numerous spores to increase surface area for storage of spores.

max 03

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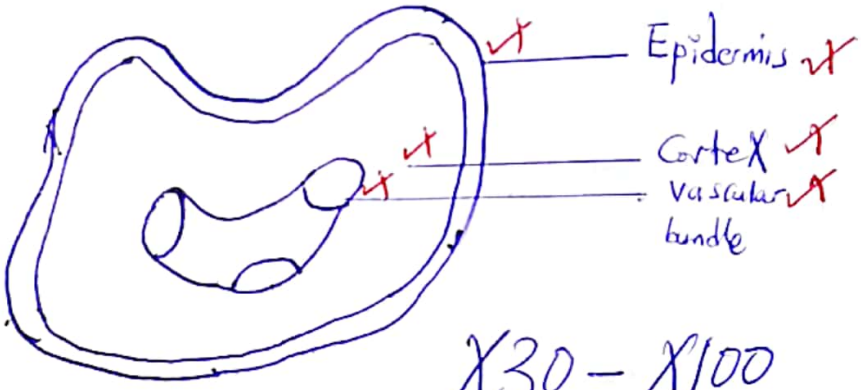
(ii) Cut a thin transverse section of the rachis of specimen G. Observe under low power of a light microscope. Draw and label the tissue plan observed. *(07 marks)*

Drawing of the tissue plan of the transverse section of the rachis of specimen G observed under low power of a microscope.



X30 – X100

T - 01
M - 01
O - 01
N - 01
A = 1.5
L = 1.5

07

Turn Over

(c) Use a hand lens to examine specimen F.

(i) Describe the structure of specimen F. *(04 marks)*

Flattened, thin, broad body; undifferentiated body; branched; irregular shaped; leaf like

max 04

(ii) Explain the ecological significance of specimen F. *(03 marks)*

- Has chlorophyll for sun light absorption for photosynthesis producing food for consumers in the ecosystem.
- The produced oxygen during photosynthesis is used by aerobic organisms
- Reduced Carbondioxide level in the atmosphere hence reducing pollution / global warming

Max 03

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END