AME:.....

530/3
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ractical
aper 3
.6 BIOLOGY
3 ¼ hours

UGANDA ADVANCED CERTIFICATE OF EDUCATION
UGANDA MUSLIM TEACHER'S ASSOCIATION
BIOLOGY
PRACTICAL
Paper 3
3 hours 15 minutes

INSTRUCTIONS TO CANDIDATES

- *This paper consists of three questions*
- *Answer all questions.*
- *Write the answers in the spaces provided. Additional sheets of paper must NOT 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
1	39	
2	40 not 39	
3	24 not 22	
Total	100	

1. You are provided with freshly killed specimen H. Examine its external features.

(a) Giving reasons, state the class to which specimen H belongs. (03 marks)

Class Amphibia ✓

Reasons accept moist, smooth skin
- soft moist skin with no scales. any 2
- Limbs of digits adapted for movement on land & in water
- Separate head and trunk
- Have no external ears.

03

(b) Lay specimen H on white paper with its dorsal side upper most. Measure the width of anterior end of its head, thorax and the widest region of its abdomen in millimetres. Record your measurements in table 1 below.

State the adaptive value of the measurements to specimen H. (4 ½ marks)

Table I

Part	Width (mm)	Adaptive value of measurements
Anterior end of the head	06-11 ✓	Body tapers anterior end streamlined anterior end to reduce air and water resistance during locomotion ✓
Anterior part of trunk	44-50 ✓	
Widest region of trunk	49-55 ✓	

03½

(c) (i) Open its mouth widely. With your hand touch the tongue and remove the hand. With forceps grip the tip of the tongue and pull. Write your observation and conclusion about the structure of the tongue in table II below. (02 marks)

Table II

Activity	Observation	Conclusion
Touch the tongue and remove the hand	It sticks on the hand ✓	It's sticky ✓
Pull the tongue	It stretches ✓	It's elastic ✓

02

(ii) State the significance of your experimental results to survival of specimen H in its habitat. (02 marks)

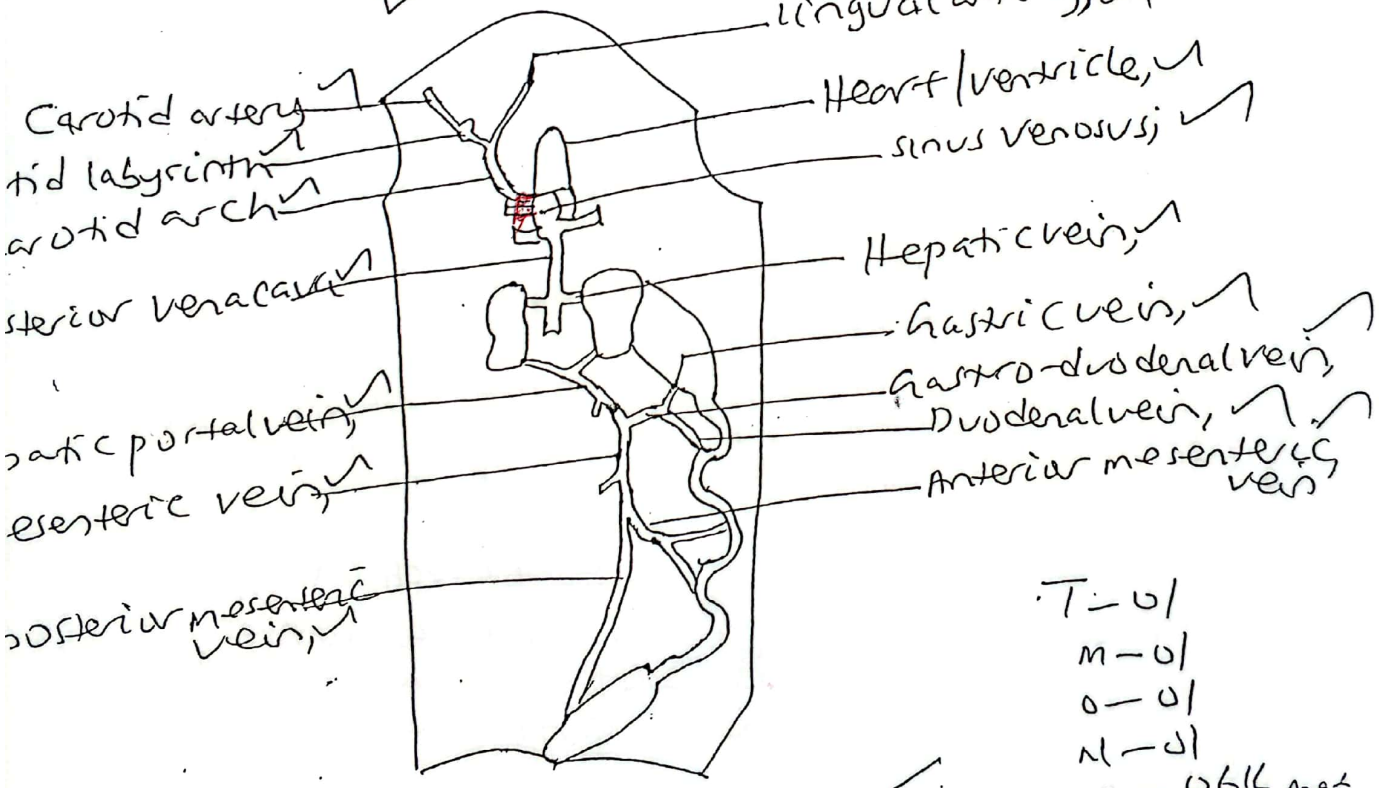
- Tonge is sticky to easily / firmly trap the prey ✓
- Its elastic to easily stretch to trap distant prey ✓

02

(d) Lay specimen H on white board with ventral surface upper most. Dissect specimen H to display blood vessels draining blood from the heart to right side of the head and the main blood vessel with its tributaries associated with the gut.

With the heart in its dorsal view, draw and label your dissection. (19 marks)

-a wing of blood vessels draining blood from the heart to e right side of the head and the main blood vessel and t's tributaries associated with the gut of specimen H ✓



T – 01
M – 01
O – 01
N – 01
D – 06½ marks
L – 06½ marks

18

X1 – X3 ✓

(e) ~~Cut out the pancreas and keep it for number two in a clean mortor.~~ Cut out the gut of specimen H. Stretch the gut on white paper.

(i) Measure and record the length of its mid gut and hind gut in millimetres.

Length of mid gut ..108 – 204.....mmm 02

Length of hind gut ..25 – 35.....mm

(ii) Express the measurements as a ratio of mid gut to hind hut. (01 mark)

midgut : hindgut

108 : 30 02

108 : 30

30 30

3.6 : 1 ~ 4:1

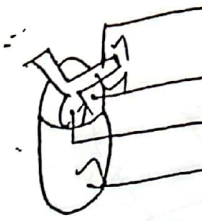
(iii) Relate the ration in d(i) above to the body functioning of specimen H. (02 marks)

The midgut is longer than the hindgut/ fourtimes that of hindgut to the S.A for digestion & absorption of digested food. temporary 02

The hindgut is shorter than midgut to store wastes / undigested food.

(f) Cut out the heart with its main blood vessels. Draw and label the heart from its ventral view with its main vessels draining blood from it. (06 marks)

The drawing of the heart with its main vessels draining blood from it in its ventral view of specimen H.



x1 – x3

T – 01/2
M – 01/2
O – 01/2
N – 01/2
D – 02
L – 02

40

2. You are provided with solution labelled B and an extract from a plant organ labelled C.

(a) Carry out tests indicated in the table below using appropriate reagents provided to find out relative nutrient contents in each. Record your tests, observations and deductions. (17 marks)

TEST		OBSERVATIONS	DEDUCTIONS
Starch To 1cm³ of solution, add 2 drops of iodine solution	B	Milky solution turns black solution blue-black solution	much, starch present
	C	Turbid solution turns to pale brown solution	starch absent
Reducing sugar To 1cm³ of solution in a test tube, add 1cm³ of Benedict's solution and boil	B	milky solution turns pale blue solution remains pale blue solution	Reducing sugar absent
	C	Turbid solution turns pale blue solution, green solution yellow/orange precipitate	much, R.S, present
Proteins To 1cm³ of solution, add dropwise dilute sodium hydroxide solution then a few drops of copper (II) sulphate solution	B	milky/turbid solution turns deep purple solution	much proteins present
	C	turbid solution turns pale purple solution	little proteins present
Vitamin C To 1cm³ of DCPIP in a test tube, add solution dropwise	B	Deep blue solution turns pale blue solution	Vitamin C absent
	C	Deep blue solution turns colourless solution	much, Vitamin C present,

(b) Label the test tubes 1, 2, 3 and 4. In each of the test tubes, add the following contents:-

Test tube 1: 3cm³ of solution B and 2cm³ of extract C

Test tube 2: 2cm³ of solution B and 1cm³ and extract C and 1cm³ of dilute HCl

Test tube 3: 2cm³ of solution B, 1cm³ of extract C and 1cm³ of sodium hydroxide.

Test tube 4: 3cm³ of solution B and 2cm³ of boiled for 3 minutes and cooled extract C.

18

Incubate the contents of the test tubes in the same water bath at a temperature of 35 – 40^{0}C for 1 hour. (Mean while perform other tasks).

After 1 hour,

(i) Carry out tests indicated in table below for only the contents of test tube 1. Record your observations and deductions. (08 marks)

TEST	OBSERVATIONS	DEDUCTIONS
Starch accept colourless solution	Turbid / milky solution turns black solution blue + black solution	much, starch present
Reducing sugar	Turbid solution turns pale blue solution green solution yellow precipitate orange precipitate	much, RS present
Proteins	Turbid solution turns pale purple solution	Trace/ little proteins present
Vitamin C	Deep blue solution turns to colourless solution	much, vitamin C present

(ii) Carry out a protein test on the contents of test tube 2 and 3. Record your observations and deductions in a table below. (04 marks)

TEST	OBSERVATIONS	DEDUCTIONS
2	Turbid solution, turns pale purple solution,	Little, proteins present
3	Turbid solution, turns deep/intense purple solution	much, proteins present,

12

(iii) Carry out only a protein and vitamin tests on the contents of test tube 4. Record your observations and deductions in the table below. (04 marks)

TEST	OBSERVATIONS	DEDUCTIONS
Protein acceptrilly	Colourless/turbid solution, turns deep purple solution, ✓	much proteins present, ✓
Vitamin C	Deep blue solution turns to pink solution/ colourless solution ✓	little/ moth vitamin C present. ✓

04

(c) (i) Basing your results in (a) and (b) (i) on any changes of nutrient contents which occurred. Suggest the nature of chemical constitution in extract C. (02 marks)

An enzyme / active substance / biological catalyst. ✓

(ii) With reasons give one property which was shown by extract C. (02 marks)

specific in action. ✓ catalyses hydrolysis, ✓ .02
of only proteins but not starch. ✓

(iii) By comparing your results in (a) and (b) (i), give the effect of hydrochloric acid and sodium hydroxide solution on the activity of chemical in extract C. (02 marks)

HCl provides suitable medium for the active substance in C, ✓ while NaOH 02
denatures the enzyme in C / provides
unsuitable medium. ✓

(iv) Explain your results in (b((i) and (ii). (04 marks)

C hydrolyses proteins but not starch,
in acidic medium ✓ but not in alkaline
medium. ✓ Boiling destroys partially 04
vitamin C. ✓

13

43

3. You are provided with plant structures labelled C, X, M and G. — Crotalaria — Hibiscus rosa-sinensis — Malvaviscus arboreus — Bougainvillea

(a) (i) Examine the specimens B. M and G and describe their floral arrangement. (06 marks)

Specimen B

- Numerous, sessile, flowers which are crowded closely packed together, at the apex / flattened / expanded, main axis / peduncle, flowers are arranged in circular / ring pattern, with tubular flowers at the centre, ray flowers at periphery, covered by bracts. 02

specimen M

- Numerous, paired, flowers some stalked, alternately, closely attached along the peduncle. 02

Specimen G

Three stalked / sessile flowers whose pedicel fused with midrib of the bract, all attached at apex of the peduncle. 02

(ii) Relate the floral arrangements in (a) (i) above to the functions of specimens B, M and G. (03 marks)

Specimen B

All attached at the apex of the main axis for maximum exposure for increased chances of pollination.

- Are numerous / very many to increase chances of pollination. any 1
- closely attached for increased support.

specimen M

- Are alternately attached along peduncle to increase exposure for increased chances of pollination. 01
- Closely attached for increased support.
- Numerous to increase chances of pollination.

Specimen G – Bougainvillea

- Are all apical for increased exposure to increase chances of pollination. 01
- pedicel fused with bract to increase insect attraction for increase chances of pollination

(b) Outline the differences between androecium of specimens G and B. (03 marks)

Androecium of G	Androecium of B
- Anthers not fused	- Anthers fused ✓1
- Round anthers	- Elongated anthers ✓1
- Longer filaments	- shorter filaments ½

(c) (i) With a microscope under medium power, examine the structure of a pollen grain of each specimen C, X, M, B and G and record their structures in the table below.

Specimen	Structure of a pollen grain	
C	Rod shaped, small, smooth ✓1	01
X	Round, large, spiny	01
M	Round, small, smooth	01
B	Round, spiky, small	01
G	Round, rough, small	

(ii) Write a dichotomous key to identify specimens in the order of C, X, M, B and G basing on structure of a pollen grain table (c) (i) above.

1 a) Rod shaped pollen grains ..... C ✓1
b) Round pollen grains ..... go to 2 ✓1
2 a) larger pollen grain ..... X ✓1
b) smaller pollen grain ..... go to 3 ✓1
3 a) smooth pollen grain ..... M ✓1
b) Rough pollen grain ..... go to 4 ✓1
4 a) spiky pollen grain ..... B ✓1
b) Non-spiky pollen grain ..... G ✓1

04

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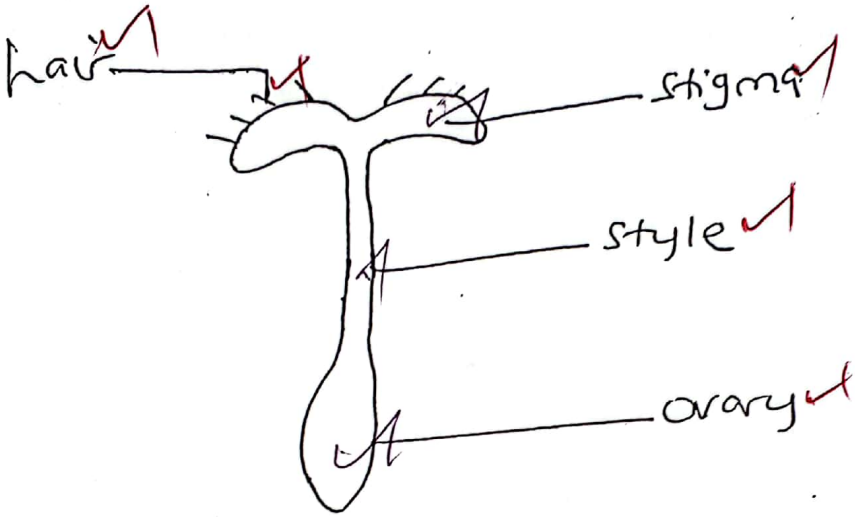
(d) Draw and label the gynoecium of specimen B. (04 marks)

Drawing of gynoecium of specimen B



T – 01/2
N – 01/2
D – 01/2
L – 01/2
04

END