Name: MARKIN GUIDE ..... Centre/Index No: ...../.....

P530/3
BIOLOGY
PRACTICAL
Paper 3
AUGUST, 2024
3¼hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – AUGUST, 2024

BIOLOGY

PRACTICAL

Paper 3

3¼ hours

INSTRUCTIONS TO CANDIDATES

Answer ALL *questions.*

Answers must be written in the spaces provided.
Additional papers must not be inserted

For Examiner's Use Only

QUESTION	MARKS
1	36
2	39
3	25
TOTAL	100

- mature Rat.

1. You are provided with specimen K which is freshly killed. Study it.

(a) With reference to the location of the structures that cover the body, give the importance of each of a named structure to the animal. (3 marks)

- Scales on the tail; for protection against abbrassion/mechanical damage/ insulation;
- Fur over all the body is thick for insulation/ protection against abbrassion;
- Vibrissae at the snout of mouth; which are stiff long hairs to sense longer distances/ detect change in pressure especially diameter of burrows;

Acc. whiskers

03

(b) Open the mouth wide and examine the roof of the buccal cavity. Explain how each structure is adapted to its function. (3 marks)

- Molar teeth with broad ridged surfaces which increases surface area for crushing food;
- Palate which is ridged for grip of food/ to prevent food particles falling out of mouth;
- Diastema to allow free movement of tongue during rolling of food;

03

only award when structure modification & detail of function are given.

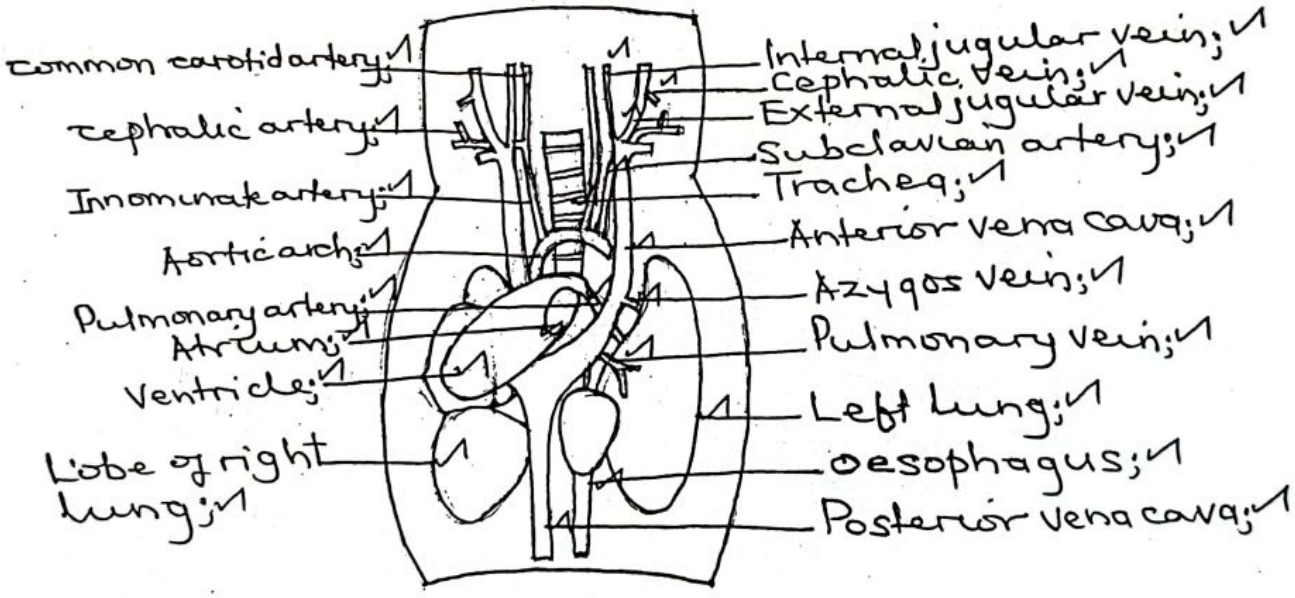
(c) Dissect to open abdomen, thorax and the neck to

(i) display the main blood vessels with the heart displayed to the right within thoracic cavity and the base of neck.

(ii) expose the structures that channel materials and fluids in and out through the thorax.

Make a labelled drawing of your dissection in (i) and (ii) above. (23 marks)

Drawing of the main blood vessels with the heart displaced to the right within thoracic cavity and the neck and structures that channel materials and fluids in and out through the thorax of specimen K;



x05 - 1;

NA - Blood vessels/structures drawn and labelled beyond thoracic cavity and neck region

T-01
M-01
D-01
N-01
D-09½
L-09½

23

(d) Examine the respiratory tract. How is it adapted to its function? (2 marks)

- Tubular to allow free passage of air during breathing ✓
- Has rings of cartilage to overcome changes of pressure during breathing ✓

02

(e) Cut out the stomach and open it longitudinally and discard the inside contents. Examine its structure.

(i) State two differences between the cardiac region and plycloric region. (2 marks)

Cardiac region	Phyloric region
Thin walled (Acc thinner)	Thick walled ✓ (Acc thicker)
Inner surface	Inner surface mor
less/not folded	folded ✓

02

(ii) Explain the role of the differences in e (i) above to the functioning of the stomach. (3 marks)

- Thin walled cardiac region to allow elasticity for food storage ✓
- Thick walled phyloric region whose contractions churn the food ✓
- Inner surface folded increases surface area for enzyme secretions responsible for chemical digestion ✓

03

36

V_2 - 4 cotyledons of big sized testaless bean seeds with plumule & radicel germinated for 4 days

X - 1% starch mixed with 10% egg albumen.

P - 2% vol of H_2O_2

Q - 2M HCl

R - 2M NaOH

V_1 - 4 cotyledons of big sized testaless bean seed with plumule & radicated germinated for 1 day.

2. You are provided with solution P, Q and R which are common laboratory reagents, plant seed cotyledons at different germination stages labeled V_1 and V_2.

Using a knife, cut two cotyledons of V_1 and V_2 separately into small pieces. With aid of a dropper, use small volume of water to put the pieces into test tubes labeled V1 and V_2 respectively. Wash the cut out stomach obtained from question 1 specimen, using a knife divide it into cardiac region and pyloric region and continue to cut each region into small pieces. Obtain pieces ~~equipment~~ Equivalent to those of cotyledons and put cardiac region pieces to test tube labelled W_1 and pyloric region pieces to test tube labelled W_2.

(a) Carry out the following tests on each of the contents in test tubes and after one minute record your comparative observations and deductions in table I below.

Table I (8 marks)

Test	Test Tube	Observation	Deduction
To contents of test tube add 2 cm^3 of solution P	V_1 Seeds germinated 1 day	Many bubbles / slow effervescence; Acc. few bubbles	slow / Rapid; breakdown of Solution P / decomposition of solution P; OR
	V_2 seeds germinated 4 days	Rapid effervescence / froth formation; Acc. very many bubbles.	Rapid; breakdown / decomposition of solution P;
	W_1 Cardiac	Slow; effervescence	Slow; breakdown / decomposition of solution P;
	W_2 Phyloric	Rapid; effervescence / froth formation;	Rapid; breakdown / decomposition of solution P;

08

bean seeds germinated for 4 days

(b) Further cut into small pieces four cotyledons of V_2. Divide into two equal portions and place each into test tubes labelled 1 and 2 with aid of small volume of water.

Carry out tests indicated in Table 2.

Record your observations and deductions

Table 2

(4 marks)

Test	Test Tube	Observation	Deduction
To contents of test tube, add 1 cm^3 of solution Q(HCl) followed by $2cm^3$ of solution P(H_2O_2)	1	No bubble formation; very few bubbles formed/evolved	No breakdown/decomposition of solution P Acc very slow breakdown.
To contents of test tube, add 1 cm^3 solution R(NaOH) followed by $2cm^3$ of solution P	2	Few bubbles evolubled;	slow breakdown/decompsition of solution P;

03

(c) Explain your results in table 1 between

(i) V_1 and V_2

(4 marks)

Both cotyledons had an enzyme/active substance/catalase which catalysed breakdown/decompsition of solution P. Cotyledons of V_2 had spent more duration of germination hence had higher concentration of enzyme resulting into higher rate of breakdown of solution P(H_2O_2). OWTTE

Acc. V_2 was more metabolically active

04 max

(ii) W_1 and W_2 (4 marks)

Both cardiac and pyloric regions had the enzyme/catalase; Pyloric region is more metabolically active than cardiac region; hence had higher concentration of enzyme; resulting into a higher rate of breakdown of solution P/hydrogen peroxide; 04

(d) Explain your results in Table 2. (3 marks)

Both solutions Q and R provided unfavourable/unsuitable medium which denatured/unhibited the enzyme resulting into no catalytic breakdown/reduced breakdown of solution P; 03

(e) Based on your results in Table I, suggest one possible conclusion given the nature of tissues. (2 mark)

Both animal and plant tissues which are metabolically active synthesise the enzyme catalase to breakdown hydrogen peroxide which is metabolic toxic bi-products 02

X – 1% starch + 10% egg albumen

(f) (i) Carry out the following tests to establish the nutrient concentration on solution X provided. Record your tests and observations in Table 3.

Table 3 (6 marks)

Test	Observation
Iodine test To 1cm³ of solution X, add 1/2/3 drops of Iodine solution	Turbid solution turns to blue-black black solution
Buiret test To 1cm³ of solution X, add 1cm³ of NaOH(aq) then add 1/2/3 drops of $CuSO_4$(aq)	Turbid solution turns to deep purple solution

06

(ii) Put into a mortor pieces of remaining stomach, grind into a fine paste using pestle and add 5cm³ of distilled water, stir, leave to stand and decant to obtain extract, label it Z. Label two test tubes (i) and (ii). Put 2 cm³ of solution X in each of the test tube, add 2cm³ of extract Z into each of the test tube. Further add 2cm³ of solution Q into test tube (i) and 2cm³ of solution R into test tube (ii). Incubate the test tubes (i) and (ii) at 35 – 40oc for 30 minutes shaking periodically. After 30 minutes, carry out Iodine test and Biuret test on the test tubes contents, record your observations and deductions on table 4.

Table 4 (6 marks)

Test	Test Tube	Observations	Deductions
Iodine test	(i)	Turbid solution turns to blue-black/black solution;	Much starch present;
	(ii)	Turbid solution turns to blue-black/black solution;	Much starch present;
Biuret test	(i) +2(HCl)	Turbid solution turns to pale purple solution;	Little proteins present;
	(ii) +2(CH3OH)	Turbid solution turns to deep purple solution;	Much proteins present;

06

(iii) Explain your results in Table 3 and Table 4. (3 marks)

Stomach extract had an enzyme/active substance; which catalysed breakdown of proteins; but not starch; Solution Q provided favourable/suitable medium; which activated the enzyme; while solution R provided unfavourable unsuitable medium; which denatured the enzyme;

03 max

39

A — Spirogyra filaments
B — Small piece of Rhizopus/mould with very little soft bread.
C — Short commelina plant stem with few leaves obtained from open terrestrial envi
H — 1·0M clear sucrose solution. 10

3. You are provided with specimen labelled A, B and C and solution H.

(a) Obtain single units of specimen A and B, and place each in a microscope slides observe under medium power of microscope. Compare specimen A and B. (4 marks)

- Both A and B are made up of filaments; ✓
- Filaments of A are septate while those of B are aseptate/non-septate; ✓
- Filaments of A have green pigment while those of B lack green pigment; ✓ Rej.
- A has only one type of filament while B has three; ✓
- A lacks sporangium while B has sporangium; ✓ 04 max

specimen A has pyrenoids while specimen B lacks pyrenoids

(b) Place units of specimen A in solution H in petridish, leave to stand for five minutes. After time duration, place a single unit on slide and observe under medium power of microscope.

Explain your observations on the state of cells. (4 marks)

The cell sap of filament A cells have lower concentration than solution H; ✓ water moves from cells of filaments to solution H by osmosis; ✓ hence cells become plasmolysed; making cell vacuole to reduce in size. ✓ 04 max

(c) With reason, suggest type of reproduction in specimen A. (2 marks)

Fragmentation; ✓ because filaments are septate which are able to break and regenerate; ✓ Rej: asexual reproduction 02

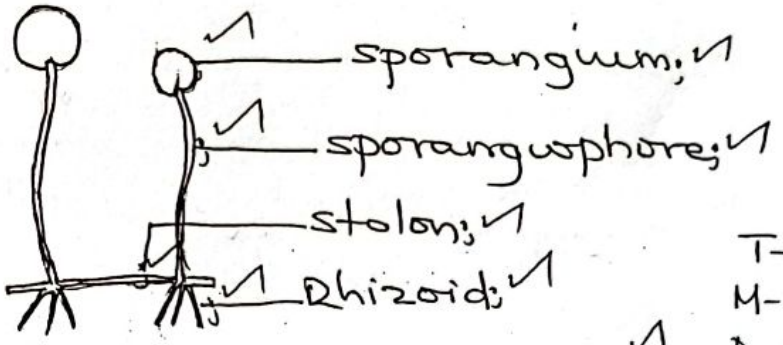
(d) Dust heads of specimen B into a microscope slide and observe under medium power of microscope. State the adaptation to reproduction. (2 marks)

- Sporangia are large to store large quantities of spores which increases chances of reproduction; ✓
- Spore are small and light to be easily blown by wind to colonise new habitats; ✓ 02

(e) As observed under microscope, draw and label two adjacent functional units of specimen B

(5 marks)

Drawing of two adjacent functional units of specimen B; ✓



x40–80; ✓

NAD – one or more than 2 functional units drawn

T-0½
M-0½
D-02
L-02
05

(f) (i) Examine specimen C. With reasons, classify it into class taxonomic group

Class..... Dicotyledoneae; ✓ Rej. wrong spelling (1 mark) 01

Reasons..... Leaf lamina has net veins; ✓ (2 marks)
Rej network venation

Leaf lamina is attached to stem by leaf stalk/petole; ✓ 02

(ii) Obtain this strips from the upper and lower epidermis of one leaf of specimen C and place each on one microscope slide and cover with cover slip with aid of water. Observe under medium power of microscope. State differences between them.

(2 marks)

Upper epidermis	Lower epidermis
Fewer stomata	More stomata; ✓
More hairy	Less hairy; ✓

02

Rej hairly

(iii) Based on the differences, state the habitat of specimen C (1 mark)

open sunny terrestrial habitat;

(iv) State the significance of differences stated in (f) (ii) above. (3 marks)

. Few stomata on upper surface to prevent dessication since its directly exposed to sunlight;

. More stomata on lower surface to enable gaseous exchange since its not directly exposed to sunlight;

. More hairy upper surface to trap moist air to prevent water loss by transpiration/ evaporation; ✓3

25

Turn over

END