

**WAKISSHA JOINT MOCK EXAMINATIONS**  
**MARKING GUIDE**  
**Uganda Certificate of Education**  
**UCE August 2019**  
**BIOLOGY 553/1**



**SECTION A**

- |       |                 |       |
|-------|-----------------|-------|
| 1. A  | 11. A           | 21. B |
| 2. C  | 12. C           | 22. C |
| 3. A  | 13. B           | 23. C |
| 4. B  | 14. C <i>ID</i> | 24. B |
| 5. A  | 15. B           | 25. C |
| 6. A  | 16. C <i>ID</i> | 26. B |
| 7. C  | 17. B           | 27. D |
| 8. A  | 18. D           | 28. B |
| 9. B  | 19. D           | 29. C |
| 10. B | 20. C           | 30. C |

**SECTION B**

*Rej-explanation i  
not change in  
glucose*  
~~Rej-explanation  
not rises  
in increased;~~

31. (a) (i)

*Accept: rises  
in increased;*

*Conc* The level of glucose increased; because it is being absorbed into the blood stream; *(rapidly)* ✓

02

*Rej-Explanation  
for wrong description:  
- insulin converts  
glucose to glycogen if  
candidate commits himself.*

*Conc* The level of glucose decreased; because insulin hormone (secreted by the pancreas) facilitated the conversion of glucose to glycogen for storage in liver and muscles; *breakdown metabolism respiration  
energy conversion of glucose to fats* ✓

02

*Conc* The level of glucose increased; because after the level had gone below normal stimulated the secretion of glucagon from pancreas that facilitated the conversion of glycogen to glucose for restoration of the glucose level to normal.) ✓

02

(b) Insulin (hormone); ✓

01

*Accept: wrong spelling if it does not have  
any other biological meaning:*

(c)

(i) Blood glucose level remained constant; because the hormone had not had any effect yet /had not yet acted; ✓ *not yet reached  
on TTE target organ* ✓

02

(ii) Blood glucose level decreased (rapidly); because the insulin hormone caused the conversion of glucose to glycogen, for storage in the liver *uptake metabolism oxidation* ✓ *hormone X* ✓

02

cells and muscles. Also increased the rate of uptake of glucose during respiration.

- (iii) Blood glucose level increased; because the low level of glucose stimulated the release of glucagon to facilitate the conversion of glycogen to glucose; ~~the insulin is used up.~~ 02

- (d) (i) Pancreas; 01

- (ii) Excess glucose in blood  
Blood glucose level would rise above normal; which causes diabetes mellitus; 02

- (iii) Glucagon (hormone); facilitates the conversion of glycogen to glucose and so increases the level of glucose in blood; 02

- ref. effect without the "extreme"  
(a) - Too much glucose in blood tends to cause over production of energy which can burn/ kill the tissues; Cells become dehydrated leading to death 01  
- Too little/ low level of glucose reduces energy production which can lead to death; Cells are much hydrated leading to death/ haemolysed 01

32. (a) (i) A Sensory neurone; Afferent nerve Receptor nerve  
B Motor neurone; Efferent nerve Effector nerve 02

- (ii) State three structures between neurone A and neurone B.

Sensory neurone	Motor neurone
Cell body situated between the axon and dendron.	Cell body situated at the terminal end of the axon; ✓✓
Long dendron	Short Dendron; ✓✓
Short axon	Long axon; ✓✓
Cell body located outside the central nervous system	Cell body located in the central nervous system; ✓✓
Has only one dendron   unipolar	Has numerous dendrons;   multipolar

@ 01 max = 03 marks

- (b) (i) Reflex; 01  
reflex arc. 01 mark

- (ii) Describe the process that resulted in the action.

- When a foot stepped on the thorn, the pain receptors in the skin are stimulated; ✓
  - The pain receptors immediately generate impulses; that are carried by the sensory neurons to the spinal cord; | CNS ✓
  - The impulses are then transmitted from sensory neuron to interneuron; across a synapse; ✓
  - Then impulses are conducted from interneuron to the motor neuron; across another synapse; ✓
  - The impulses leave the spinal cord along the motor neurone to the effectors /thigh muscles; which contract and foot is immediately withdrawn from the thorn; ✓
- (if. biceps/triceps  
Accept extensor/flexor)*
- flexor muscles contract, extensor muscles contract;*
- 04 marks*
- @ 1/2 Max = .03 marks*

10

33. (a) R. Sugar solution of R was more concentrated; hypertonic; to the fluid in the plant tissue R.

*Less H<sub>2</sub>O | High osmotic potential | Low H<sub>2</sub>O potential | Low water potential*

*or strong concn to the fluid in the plant tissue*

*0 | one*

The sugar solution of S was of the same concentration; isotonic; to the fluid in the plant tissue S.

*or same concn | same strength to the fluid in the plant tissue;*

*0 | one*

The sugar solution of T, was more dilute; (hypotonic) to the fluid in the plant tissue T.

*More H<sub>2</sub>O | Low osmotic potential | High water potential*

*less concentrated | weaker soln to the fluid in the plant tissue;*

*0 | one*

(b) This is to prevent loss of moisture; from the petri-dish and gain of moisture into solutions in the petri-dishes from the atmosphere.

*(loss of moisture/evaporation)*

(c) Stalk R had sap of less concentration; than sugar solution in the petri dish; so it lost water; to the sugar solution by osmosis; its cells became plasmolysed; and therefore the curvature inwards; white

10

*bones*

Stalk T had sap more concentrated; than sugar solution in the petri-dish; it gained water; from the sugar solution in (by osmosis); its cells became turgid; and therefore the curvature outward; white

~~R curves inwards; while T curves outwards;~~ ✓ Total 10 Marks

*because in R the sap was less concentrated than sugar solution in petri dish;  
and so lost water to sugar solution by osmosis; while T was more concentrated  
than sugar so water in petri dish and so gained water by osmosis;*

## SECTION C

Answer any two questions from this section.

34. (a) Describe the mechanism of gaseous exchange in a cockroach. (10marks)

➤ Inhalation; abdominal muscles relax; causing increase in volume of the abdomen; ~~and decrease in pressure; it~~ spiracles open; and air ( $O_2$ ) enters the trachea; diffuses along the trachea; until it reaches the thin-walled; and fluid-filled; tubes called tracheoles; ~~oxygen~~ <sup>dissolves</sup> ~~diffuses~~; oxygen diffuses in the fluid; ~~and~~ into the cells; at the end of the tracheal system; tracheoles have thin; permeable walls; which are in contact with the cells; ~~which~~

22 Pts @  
1 more  
2 max  
Max 10 marks

- Continue writing if inform. flows normally;

➤ Exhalation; muscles of abdomen contract; reducing abdominal volume; ~~and increase in pressure; it~~  $CO_2$  diffuses from tracheoles; into the trachea; then to open spiracles; to the outside;

- (b)

- Numerous spiracles; to allow entry of large amounts of  $O_2$  and exit  $CO_2$ ; ~~and~~

② 2  
Many S matching structure & function -  
If among 1st 5  
any is wrong 1st 5 items go for 6th pt.  
Having 5' structure & correct item  
stop at 5th pt.

Spiracles have valves; to keep them open to allow in  $O_2$ ; ~~and~~ close to prevent water loss;

Trachea have rings of chitin; to prevent collapsing when air pressure inside them falls;

Tracheoles are thin-walled; to provide short diffusion distances for respiratory gases ( $CO_2$  and  $O_2$ ); ~~and~~

- Tracheoles divide repeatedly; to increase surface area for absorption of gases; ~~and~~

- Tracheoles are fluid-filled; to dissolve respiratory gases; ~~and~~

- Tracheoles have cuticle; hence are permeable to gases

Total 15 Marks

35. (a) What is parasitism?

Is an association between two organisms ~~of diff. species~~; where one (the parasite) benefits and the other (the host) loses (adversely); ~~suffers harm~~

- (b) Give three effects of Ecto-parasites on their hosts. (3marks)

- Causes anemia
- Destroy animals' skin, fur or wool;

1me @  
max. 3

~~1st three  
effects;~~

- Causes wounds and sores on host's skin, allowing pathogens to enter its body.
- Cause body weakness
- Spread diseases | **death**
- **itching**

(c) Describe how tapeworms are adapted to the parasitic mode of life.

(10marks)

- Respire ~~externally~~ only; to enable live in / No low O<sub>2</sub> concentration;  
- live in unwanted organs; to fit in small areas;  
- Hermaphroditic; to increase repro<sup>n</sup> chances;  
- Have thick layer; to resist digestion by enzymes;  
- Have much mucus layer; to resist digestion;  
- Have long, flattened body; to increase S.A for absorption of food;

- The larvae, cercaria, produces enzymes; which enable them to soften and penetrate the host's skin;
- Adult worms have suckers for attachment, so that they are not dislodged;
- Male carries female ensuring that eggs produced by female are fertilized before being shed into blood vessels.
- Eggs have spines enabling them to bore through the narrow blood vessels to reach the intestines | **high rate of repro<sup>n</sup>**
- Eggs are produced in large numbers; to enhance survival;
- They have a secondary host, the snail to increase survival rate;
- Adult worm in blood produces chemical substances which protect it against the host's defense mechanism
- Cercaria or larvae are encysted and can remain dormant but viable for long period of time until they come into contact with human body
- Feed on host's blood, tissue fluid and cells and have no alimentary canal
- Both larva forms, miracidia and cercaria are able to swim increasing the chances of meeting their host

(maximum 10 marks)  
Give Maximum 10 Marks  
Total = 15Marks

- Regenerates from proglottides of segment; to continue life sexually; asexually
- Undergoes dormancy; to overcome adverse condition;

36 (a)

Describe what is meant by a fertile soil.

(5marks)

A fertile soil is one with good drainage; aeration; with micro and macro-elements; in the right proportions; for plant growth;

in right proportions; for normal plant growth

How are plants involved in soil conservation?

- Provide leaf litter, which provide mulch; prevent soil erosion; conserves moisture; organic matter
- The decomposing plant materials; add nutrients to soil; improve drainage;
- Root nodules (legumes) with nitrogen fixing bacteria; fix nitrogen (into nitrates) aeration
- (hence adding fertility); bind soil particles

- Plant roots maintain soil structure; and hence improve drainage & aeration;

- Organic matter from plants improves soil drainage;

- Cover crops; reduce soil erosion; prevent soil erosion; bind soil particles

- Plants act as windbreakers; prevent soil erosion;

- Plant canopy / OWTTE; reduce impact of rain drops/reduce erosion; reduces sun rays on soil and conserve moisture

Any 5

Burst loss by runoff  
Soil particle

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4  
other pts  
will etc. pts

37. (a) What is photosynthesis?

Photosynthesis is the process by which green plants build up carbohydrates from carbon dioxide and water in the presence of sunlight; (and chlorophyll);

(2 marks)

$\frac{1}{2} @ = 0.2 \text{ mks}$

(b) Describe an experiment to show that light is necessary for photosynthesis.

(8 marks)

$\frac{1}{2}$  Aim: An experiment to show that light is necessary for photosynthesis;  $\checkmark$   
(00 1/2 marks)

#### Materials

- Potted Plant;  $\checkmark$  - Water;  $\checkmark$  - Ethanol;  $\times$  - Iodine solution,  $\checkmark$  + light;  
- Aluminium foil  $\checkmark$  - Source of heat  $\times$  - White tile;  $\checkmark$  - Test tube;  $\checkmark$   
 $\checkmark$  black paper (@  $\frac{1}{2}$  mark Max. 01 1/2 marks)

#### Procedure/method:

- (a) Destarch the plant, by leaving it in darkness for 24 hours;  $\checkmark$  (Accept 24 - 48 hrs)  
(b) Make a stencil from a piece of aluminum foil and attach it to the destarched leaf;  $\checkmark$  ~~Cover leaf with aluminum foil with black piece of paper to prevent light from reaching that part of leaf;~~  
(c) Place the plant in sunlight for four hours;  $\checkmark$  ~~Touch/Remove it~~  $\checkmark$  ~~The other part of leaf be exposed to light as a control;~~  
(d) Destarched a leaf from the plant and remove the stencil from the leaf;  $\checkmark$  ~~Test for starch in the leaf using iodine~~  
(e) Dip the leaf in boiling water for two minutes;

- To kill protoplasm to prevent any further chemical changes;
- To burst any starch grains, so that the cells are permeable to iodine solution;

- (f) Roll up and place it in a test tube containing 70% methylated spirit (ethanol);  
(g) Boil the leaf in ethanol until all the chlorophyll is dissolved out;  
(h) Carefully remove the hardened leaf from ethanol;  
(i) Then dip the leaf into boiling water for one minute to soften it;  
(j) Then spread the leaf flat on a white surface and add drops of iodine over the leaf surface;  
(k) Finally wash leaf in cold water, hold leaf up in the light, and observe;

(@  $\frac{1}{2}$  Max. 04 1/2)

### Observation

- Parts of the leaf that did not receive light turned brown (or yellow); ✓✓
  - Parts of the leaf that received light turned blue-black (or blue); ✗
- (@ ½ mark Max. 01marks)

### Conclusion

- ~~light is necessary for photosynthesis~~
- ~~Starch is present only the parts of the leaf that received light; and so light is necessary for photosynthesis to take place.~~ ½ mark

Overall total = 8marks

- (c) Describe how leaves are adapted to absorption of sunlight energy. (5marks)

~~Any 5 paired  
Structure & function~~

- Leaves are broad and flat; providing a large surface area for absorption of sun light; ✗✓
- Leaves are arranged into a mosaic pattern; (to minimize over lapping) for maximum absorption of light; ✓
- The leaves are thin; providing short distances for rapid penetration of light; ✗
- Cuticle and epidermis are thin and transparent; for rapid penetration of light into leaf; Mesophyll cells have (numerous) chloroplast containing chlorophyll; to trap light energy; ✓
- Palisade cells are closed packed; forming a continuous layer for trapping light; ✗
- Chloroplasts move and arranged alongside the cell wall facing the sunlight; for efficient absorption of light; ✓  
*lack chloroplasts* (@ ½ mark Max. 5marks)
- Epicarp is transparent; for rapid penetration of light;

END