GHS **EOT 2** **S. 2**
BIOLOGY 553/1 (THEORY) **AUGUST 2017**
TIME: 2 HOURS

NAME*:* ***MARKING GUIDE***

INSTRUCTIONS

Attempt all the questions in section A and B and C in the spaces provided

ANSWERS TO SECTION A

1 A	***7 C***	***13 A***	***19 C***	***25 B***
2 A	***8 B***	***14 C***	***20 A***	***26 D***
3 B	***9 A***	***15 D***	***21 A***	***27 C***
4 A	***10 B***	***16 A***	***22 B***	***28 C***
5 A	***11 C***	***17 C***	***23 B***	***29 A***
6 A	***12 D***	***18 A***	***24 B***	***30 A***

FOR OFFICIAL USE ONLY

SECTION A	30 marks
SECTION B	**30**
SECTION C	**15**
PRACTICAL	**20**
TOTAL	**65**

SECTION A

1. Which one of the following is the correct order of food movement in the in the gut of a ruminant?
   A. Rumen → recticulum → omasum → abomasum
   B. Recticulum → rumen → abomasum → omasum
   C. Rumen → recticulum → abomasum → omasum
   D. Recticulum → rumen → omasum → abomasum
2. Bryophyllum leaves are modified for?
   A. vegetative propagation
   B. protection of the plant
   C. support
   D. Attaching the plant onto objects
3. Which one of the following groups of animals lives on land and in water?
   A. Fish
   B. Amphibians
   C. Reptiles
   D. Mammals

4. A medium of high pH stops the action of
   A. Pepsin
   B. Lipase
   C. Ptyalin
   D. Maltase
5. Which of the following are seed bearing plants?
   A. spermatophyte
   B. Bryophyta
   C. Phycophyta
   D. Pteridophyta

6. Which of the following parts of a flower are non essential?
   A. calyx and corolla
   B. stamens and carpels
   C. stamens and corolla
   D. carpels and coroll
7. Which of the following are NOT underground stems?
   A. Rhizomes
   B. Tubers
   C. Stolons
   D. Bulb
8. The following is a list of some parts of the alimentary canal: stomach, ileum, colon and oesophagus.
   Which of the following places them in the correct order in which food passes through?

   A. Stomach, ileum, colon, oesophagus.
   B. Oesophagus, stomach, ileum, colon.
   C. Oesophagus, stomach, colon, ileum.
   D. Stomach, colon, oesophagus, ileum.
9. One of the major functions of vitamin C in the human body is
   A. To provide body resistance against diseases.
   B. To provide resistance against blood cells.
   C. To add bulk to food eaten.
   D. To increase the rate of heartbeat.
10. Clay soil is usually water logged due to

   A. too much water
   B. Small pores poor drainage
   C. Higher force of capillarity
   D. Large particles
11. Eating excess proteins at one meal is wasteful because
   A. proteins are body building foods and very little is required to build cells.
   B. excess proteins are only used to repair broken down cells.
   C. excess proteins cannot be stored in the body.
   D. excess proteins are harmful to be circulatory systems.
12. The role of rennin in children during digestion is
   A. Breaking down milk protein into peptides.
   B. mixing the milk protein with digestive enzyme.

C. activating pepsin to digest the milk protein.
D. coagulating milk protein.

13. Which one of the following fruits is an example of a drupe?
    A. Avocado.
    B. Passion
    C. Tomato
    D. Orange
14. A collection of flowers on the same stalk is
    A. a composite
    B. a multiple flower
    C. An inflorescence
    D. a polycarpous pistil
15. Beans are usually included in crop rotation cycle because they
    A. act as cover crop
    B. increase humus content in the soil
    C. improve water retention of the soil
    D. restore nitrogen in the soil
16. Which one of the following is correct about nutrition in a Rhizopus?
    A. Digestion of food occurs outside the organism.
    B. It makes its own food
    C. Digestion of food is intracellular
    D. It does not produce enzymes.
17. The stalk that attaches a seed to the placenta in a fruit is called the?
    A. Pedicel
    B. Petiole.
    C. Funicle.
    D. Style.
18. Termites are able to eat wood because they:
    A. produce cellulase enzyme.
    B. possess strong mandibles.
    C. contain fungi in the gut.
    D. contain cellulose digesting bacteria in the gut.
19. The maize fruit is an example of:-
    A: Schizocarp
    B: Berry
    C: Caryopsis
    D: Drupe
20. Which one of the following contains more chloroplasts in a leaf?
    A. Palisade layer
    B. Spongy layer
    C. Guard cells
    D. Epidermal cells
21. Which of the following minerals is found in almost all foods
    A. Phosphorous
    B. Magnesium
    C. Iron
    D. Iodine
22. What are the products of digestion of lactose sugar?
    A. Glucose only
    B. Glucose and galactose
    C. Fructose and galactose
    D. Fructose and glucose

23. To identify a substance Y, a student performed the following experiment.

Test	Observation
(i) Heated Y with Benedict's Solution	Solution remained blue
(ii) Heated Y with hydrochloric acid, cooled, added sodium hydrogen carbonate, benedict's solution, then heated again.	Solution turned from blue to orange.

From the observations, the most likely food substance in Y is

A. Starch
B. Maltose
C. Sucrose
D. Glucose

24. Which of the following blood vessels transport blood most rich in nutrients?
A. Pulmonary artery
B. Hepatic portal vein
C. Mesentric artery
D. Renal vein

25. A maize grain is both a seed and fruit because it
A. shows hypogeal germination
B. has a fused pericarp and testa
C. shows two attachments or scars.
D. has both endosperm and cotyledon

26. Which one of the following is a characteristic of insects only?
A. Exoskeleton
B. Jointed legs
C. Two pairs of wings
D. Three body divisions

27. Which one of the following organisms carriers out intracellular digestion?
A. Fungi
B. Algae
C. Amoeba
D. Hookworm

28. The following are body secretions:
(i) Amylase
(ii) Trypsin
(iii) Hydrochloric acid
(iv) Pepsin
(v) Rennin

Which of them are contained in gastric juice?

A. (i) and (iii)
B. (ii) and (iv)
C. (iii) and (v)
D. (i) and (ii)

29. Which one of the following substances does not contain nitrogen?
A. Glycerol
B. Amino acids.
C. Amylase
D. Urea.

30. Which one of the following parts of the cell is responsible for energy production

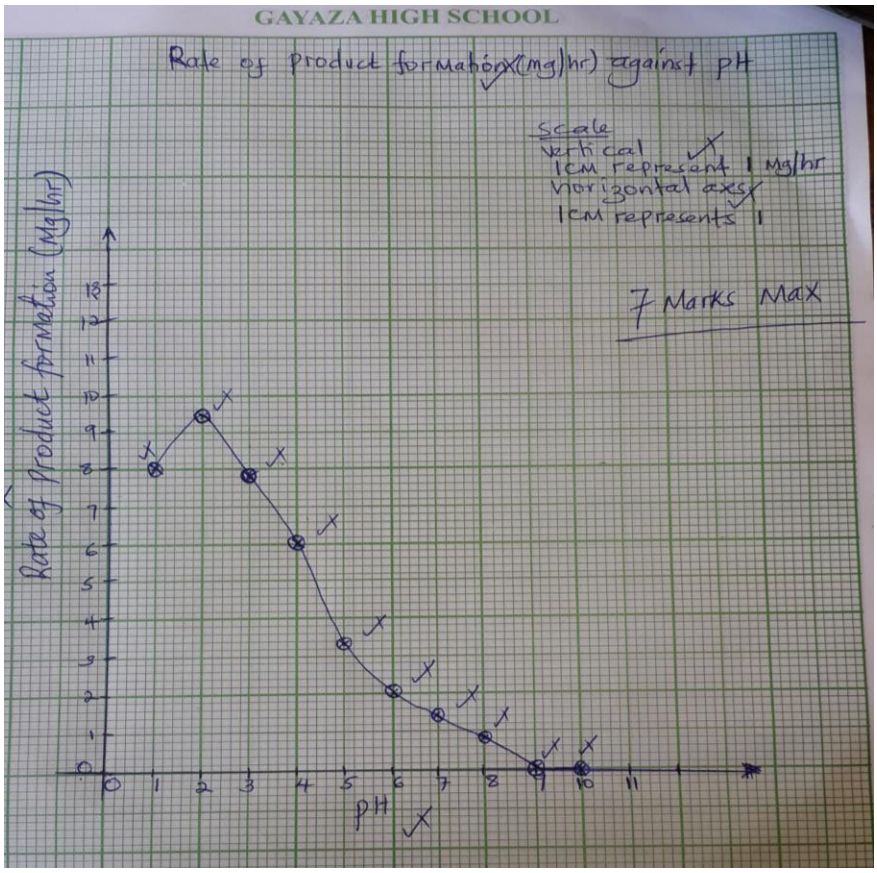
A. Mitochondria
B. Nucleus
C. Chloroplast
D. Cell membra

SECTION B

31. The table below shows the rate of enzyme activity at different pH values

pH	1	2	3	4	5	6	7	8	9	10
Rate of product formation (mg/hr)	8	9.5	7.8	6	3.3	2	1.4	0.8	0	0

a) Using a suitable scale, draw a graph to represent the above information showing the rate of product formation against pH (7 marks)



b) Describe the changes in rate of product formation with increasing pH (4 marks)

- *From pH 1 to 2 the rate of product formation increased rapidly;*
- *From pH 2 to pH 6 the rate of product formation reduced rapidly*
- *From pH 6 to pH 9 the rate of product formation reduced gradually*
- *From pH 9 to pH 10 the rate of product formation was at 0*

c) (i) what is the optimum pH value of this enzyme (1 mark)

pH 2

(ii) Suppose this enzyme is a digestive enzyme, in which part of the alimentary canal would it be active? (1 mark)

Stomach

(iii) Give a reason for your answer in c) (ii) above (2 marks)

Optimum activity is at a low pH of 2 and in the stomach, there is production of HCL which makes the stomach medium low pH

(iv) State the substrate acted upon by the enzyme above and its product (2 marks)

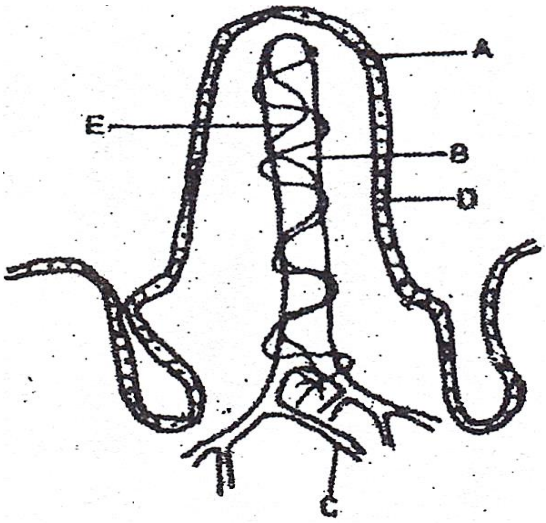
Substrate	**Product**
Pepsin	*Polypeptides*

d) State any other three factors that affect enzyme activity apart from the one mentioned above. (3 marks)

i. *Temperature*
ii. *Concentration of the substrate*
iii. *Presence of activators*
iv. *Presence of inhibitors*
v. *Concentration of the enzyme*

Any three and reject pH

32. **(a)** The diagram in figure 5 shows the structure of a villus.



(a) Label parts marked A, B, C and E. (2 marks)

A. Thin epithelium
B Lacteal
C Lymph vessels
E Blood capillary

(b) What food substance enters (3 marks)

(i) B

Fatty acids and glycerols

(ii) E

Glucose, Amino acids

(c) State two factors which make a villus an effective absorbing structure. (2 marks)

(i) Presence of the lacteal for absorption of fatty acids and glycerol
(ii) Presence of blood capillaries for absorption of glucose and amino acids
(iii) A thin epithelium to reduce distance of substances diffusing

(d) How does the absorbed food in E reach the general circulation? (1 mark)

Once absorbed it is transported in blood by the hepatic portal vein into the liver where it is assimilated before being circulated.

(e) State two nutrients which are absorbed in the gut before reaching the villus. (2 marks)

(i) Vitamins

(ii) mineral salts

Water

Section C (attempt any one question from this section)

33. (a) Define the term digestion (1 mark)

Digestion is the process by which complex food substances; are broken down into simpler soluble compounds that can be absorbed and assimilated (utilized) by the body.

(b) An athlete ate a meal of Posho (starch) and beans (proteins) in preparation for an MTN marathon. Describe the process of chemical digestion of what he ate in

(i) Mouth (3marks)

Chemical digestion in the mouth is carried out by the enzyme salivary amylase (ptyalin); produced from the salivary glands.

Salivary amylase speeds the breakdown of starch; into Maltose.

(iii) Stomach (3 marks)

In the stomach, there is only protein digestion.

Gastric juice is secreted and it contains two enzymes pepsin, renin, hydrochloric acid, mucus and water.

Pepsin acts upon proteins breaking them down into polypeptides.

Pepsin is initially secreted in an inactive form called Pepsinogen which is activated into active pepsin by hydrochloric acid. Pepsin works at low PH i.e. acidic conditions provided by the presence of Hydrochloric acid (HCl).

Renin coagulates milk protein in baby mammals from soluble milk protein caseinogen to an insoluble curd, casein which is then acted upon by pepsin breaking it down to polypeptide.

(iv) Duodenum (5 marks)

In the duodenum, chemical digestion actions come from the liver and the pancreas. The liver produces bile and the pancreas produces pancreatic enzymes.

Enzyme	Food acted upon	Products

Trypsin	Proteins	Peptides and Amino acids
Pancreatic amylase	Starch	Maltose
Pancreatic lipase	Lipids	Fatty acids and glycerol

(c). how is the ileum adapted to its functions of absorption (3 marks)?

- *It is highly coiled/folded providing a large surface area for digestion and absorption of food*
- *long thus providing a large surface area for digestion and absorption of food.*
- *Has a thin layer of cells to reduce the diffusion distance over which soluble food passes through.*
- *They are highly supplied with blood capillaries and lacteals which transport away absorbed food thus maintaining a diffusion gradient.*
- *Have finger-like projections called the villi which increase the surface area for absorption of soluble food.*
- *The villi also have hair like extensions called the micro villi which* ***further*** *increase the surface area for absorption of soluble food products. The villi are the actual sites for absorption of soluble food products.*

Any 3 mentioned

34. Describe an experiment to show that sand soil drains faster than clay soil (15 marks)

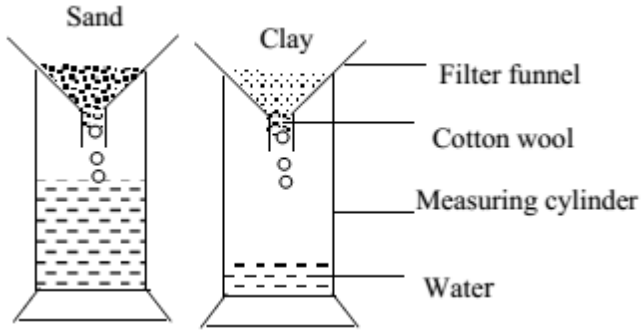
Aim: an experiment to show that sand soil drains faster than clay soil

Apparatus

- filter funnels,
- measuring cylinders,
- filter papers
- Equal volumes of dry sand and dry clay soils,
- Water and
- Beakers

Procedure

- Measure an equal volume of each soil sample.
- Fold filter papers properly and put one in each funnel.
- Then place clay soil in the filter paper in one funnel and the sand in the other funnel.
- Place the funnels with their contents over measuring cylinders and at the same time pour an equal volume of water on each of the soil samples as shown in the diagrams.
- Observe which soil allows water to drain through quickly.
- Allow the set up to stand for some time till water stops draining through the soils.



Observation:

Water passes through sand soil faster than clay soil. So much water is collected in the cylinder with sand soil and less water is collected in the cylinder containing clay soil.

Conclusion:

Sandy soils drains water faster than clay.

PRACTICAL

35. You are provided with specimens' S and T which are from the same mammal
    (a) Identify the specimens giving reasons for your identity (6 marks)

Specimen	Identity	Reasons for identity
S	*Molar tooth*	*Has two roots* *Cusps, ridges*
T	*Incisor tooth*	*One root* *Chisel shaped crown*

(b) State any four structural differences between S and T (3 marks)

S	*T*
has two roots	*Has one root*
Has cusps	*No cusps*
Has ridges	*No ridges*

(c) Using the observable structural differences, state the functions of specimen S and T (4 marks)

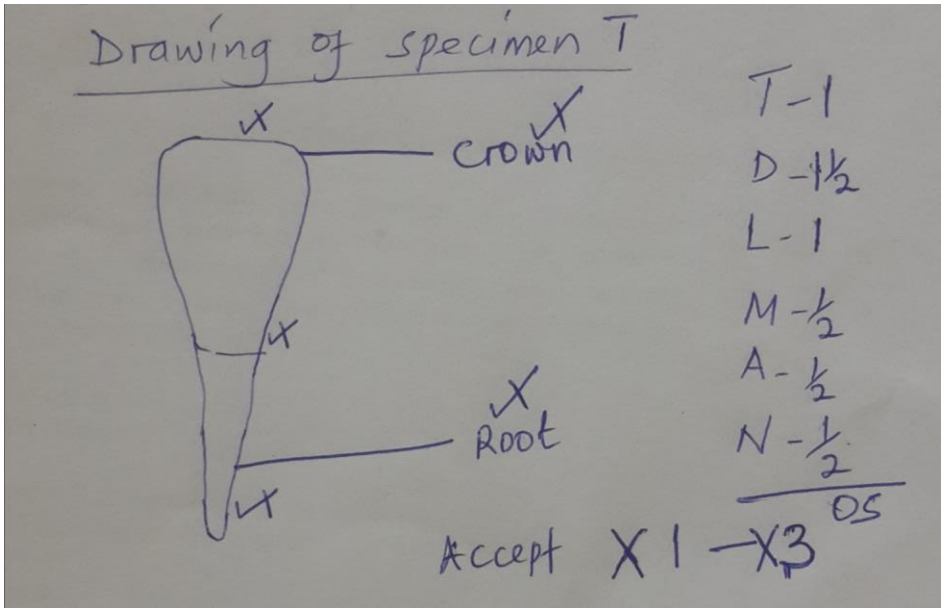
Specimen	Function	Structural features
S	For grinding For crushing	Has ridges
T	For cutting For tearing	Sharp crown

(d) Name two other mammalian teeth apart from S and T (2 marks)

Canines

Premolars

(e) Draw and label specimen T (5 marks)



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