FORM TWOBIOLOGY 231/1 2019
TERM 2 EXAMMARKING SCHEME

1.
a) Provide living organisms with food nutrients for various life processes in the body;
b) Separate and removes waste products of metabolism to avoid poisoning if left to accumulate;

2.
- Stores dissolved chemicals like salts and sugars creating osmotic pressure;
- Maintains the shape of a cell-osmotic pressure brings about movement of water into and out of the cell by osmosis;

3.
a. Mitochondria;
b. Chloroplast;

4.
i. Root hair (cell);
ii. D- Cell wall;
iii. E- Cell sap/ sap vacuole;

5.
a) Contributes to magnification of the image and brings it to focus;
b) Regulates or adjusts or controls the amount of light passing through the condenser to illuminate the specimen;

6.

$$\text{Length of one cell} = \frac{\textbf{diameter of field of view}(\mu m)}{\textbf{no.of cells}}$$

$$= \frac{6000\ \mu m}{55}; = 109.09 = 109.09\ \mu m;$$

7.
a) Diffusion is the movement of particles of molecules from a highly concentrated region to a lowly concentrated region; while osmosis is the movement of solvent molecules from a lowly concentrated solution to a highly concentrated solution across a semi permeable membrane;

N/B two marks are tied (can only score both or zero).

b)
i. Visking tubing will become swollen / bigger or increased in size.
i. Sucrose solution is hypertonic compared to the water in the beaker(or water is hypotonic compared to sucrose in the beaker); Water moves from the beaker into visking tubing by osmosis across semi permeable visking tubing; making visking tubing swell or increase in size.

8.
- Large surface area to volume ratio;
- Thin membrane;
- High concentration gradient;

- Small sized molecules;
- Higher temperature;

9.

i. It is an animal cell that loses water by osmosis and shrinks when placed in hypertonic solution to cytoplasm;
ii. It is a plant cell that loses water by osmosis, become flabby or shrink when placed in a hypertonic solution to their cytoplasm;

10. autotrophism is a mode of nutrition whereby the living organisms manufacture their own food whereas heterotrophism is the mode of nutrition where living organisms consume food materials from bodies of others

11.

a) Photosynthesis;
b) Pigment-chlorophyll;
Function-traps sunlight energy;
c)
-Palisade mesophyll cells;
-Spongy mesophyll cells;
-Guard cells;

12.

- light intensity
- Carbon IV oxide concentration
- Temperature
- Water

13.

- Soluble in water;
- Sweet testing ;
- Crystallisable;

14.

- Have chisel shaped incisors teeth to capture the pray;
- Have curved conical canines to tear the flesh from the prey;
- Have carnassial teeth for slicing flesh and crushing bones;
- Have well developed leg muscle thus fast movement;
- Have strong jaws to grasp the prey;

15.

a) Breaks down large food particles to small particles thus increasing surface area for enzyme action;
b)
- Contains mucus that lubricates food;
- Contain water, a solvent that dissolves food; contains salivary amylase enzyme (ptyalin) which breaks down starch to form maltose;

16.

a. Y-Hepatic portal vein;
Z-Mesentric artery;

b.
-Some glucose was converted to glycogen /fat in liver;
-Some glucose was oxidized in the liver to release energy;

17.
a) Active transport is the process by which substances move across the cell membrane and against a concentration gradient by use of energy;

b)
- Increase in oxygen concentration;
- Increase in glucose concentration;
- Increase in temperature towards optimum for best working of the respiratory enzymes/ optimum temperature;
- Optimum PH (for best working of the respiratory enzymes);

18.

a.
- To collect only the number of specimen needed to avoid wastage;
- Not to destroy the natural habitat of the specimens;
- Dangerous / injurious specimens to be handled with care as stinging insects or plants can sting or injure a person; a pair of forceps or hand gloves should be used for protection;
- Do not harm/injure the specimen during the collection exercise; to avoid distorting the features of the specimen.
- live specimens should be returned to their habitats whenever possible ; to maintain ecological balance
- Highly mobile animals to be immobilized using suitable chemical substance e.g. chloroform, tetrachloromethane or ethoxyethane;

b.
i. Used for sucking small animals from rock surfaces or barks of trees e.g. ants and termites;
ii. Used for catching flying insects' e.g. bees;
iii. For immobilizing highly mobile specimen;
iv. Used for catching small crawling animals that are dangerous or can sting;

19.
a) P-emulsification;
b) X-bile juice
c) Bile juice is produced in the liver;
d) -surface area of digestion will be reduced hence less digestion/reduced;absorption process would be reduced;

20.
- Epithelial tissue;
- Skeletal tissue;
- Blood tissue;

- Connective tissue;

(Mark first two)

21. Graph

a.

- Plotting-(2mks)
- Scale-(2mks)
- Axis-(1mk)
- Curve-(1mk)

N/B

- It should be a smooth curve to score
- No extrapolation
- Must have origin to score scale marks
- If the scale is wrong, the plotting and curves are wrong too.(any scale)

b. $33^{o}C$ ($\pm$ 0.5) and $51.5^{o}C$ ($\pm$ 0.5)

c.

i. As temperature is increased rate of reaction is increased; and more products are formed; per unit time because enzymes become more active catalysing the rate of reaction;

ii. As temperature increase rate of reaction decreases; and less products are formed;(per unit time) because enzymes become denatured;(by high temperatures above $40^{o}c$), hence cannot act on substrate;

d.

- Increase in enzyme and substrate concentration;
- use of co-factors and co-enzymes;

e.

i. Pepsin, rennin;

ii. Wall of stomach has gastric gland whose cells produce gastric juice which contain hydrochloric acid;

f.

i. Duodenum;

ii. Bile juice and sodium hydrogen carbonate in pancreatic juice;

22. How water moves from the soil to the leaves of a tree. (20mks)

Water exists as a thin film in the soil between soil particles; the concentration of the cell sap is greater than that of the surrounding solution in the soil; thus drawing water molecules across the cell wall and cell membrane into the root hair cells ;(by osmosis;) water is drawn into the root hair cell where it dilutes the cell sap; making it less concentrated than that in the adjacent cells; water moves from the root hairs into the cortex cells, by osmosis; Water molecule moves across the endodermis by osmosis; into the xylem vessels of the root. Root xylem then conduct water up

into the xylem (vessels) of the stem; into xylem of leaves; Water is pushed / rises up the stem by root pressure; (in the xylem vessels) water also would rise by capillary; cohesion and adhesive forces; Water moves as a continuous uninterrupted water column; in the xylem (vessel) up the stem to the leaves; As water vaporizes from the spongy mesophyll cells; their cells sap becomes more concentrated; than adjacent cells; and water flows into the cells from other surroundings cells; which in turn take in water from xylem vessels within the leaf veins; This creates a pull/suction force i.e. transpiration pull that pulls a stream of water from xylem vessel in the stem and roots; the transpiration pull maintains continuous column of water from the roots into the leaves; i.e. transpiration stream;

23.

a.

- The small intestine functions i.e. final stage of digestion takes place here and so does the absorption of soluble products of digestion.
- Long to provide a large surface area for absorption of digested food;
- Narrow so as to bring digested food into close contact with the walls of ileum; for absorption;
- Highly folded/coiled, to slow down the movement of digested food to allow enough time; for digestion and absorption and also to increase the surface area;
- Inner surface of ileum has large numbers of villi and micro-villi which increases the surface area for absorption of end products of digestion; The wall of the ileum is thin/thin epithelium, which is one cell thick to reduce the distance over which digested food has to diffuse;(into the blood);
- Villus /villi are highly vasculerised/ have a rich supply of blood/rich network of blood capillaries into which amino acids, glucose, vitamins diffuse into and this helps to maintain a steep concentration gradient;
- Villi have lacteals for absorption of fatty acids and glycerol; and channel them to lymphatic system;
- Cells of ileum have large numbers of mitochondria to release energy that aids active transport of materials across the epithelium;
- have intestinal glands that secrete intestinal juice that complete digestion process since they contain various enzymes like maltase, sucrose, peptidase, lipase to complete digestion of glucose, proteins and lipids respectively;
- Presence of goblet cells that secrete mucus to allow for smooth movement of food and also to protect walls of ileum from action of protein digesting enzymes;

b.

- Highly; raises internal temperatures of the leaf which in turn increases latent heat of vaporization; enhancing evaporation from the leaves; this increases rate of transpiration;
- Low humidity; the saturation deficit between the leaves and the atmosphere is high; due to high saturation deficit water vapour diffuses faster hence increased rate of transpiration;
- Wind; carries away water vapour as fast as it diffuses out of the leaves; hence water vapour does not accumulate. This raises diffusion gradient between the inside and outside of the leaf, thereby increasing the rate of transpiration;

- High light intensity; light intensity increases the rate of photosynthesis where sugar is formed, sugar is osmotically active causing stomata to open, hence water vapour diffuses out; at a higher rate; thereby increasing the rate of transpiration;
- Low atmospheric pressure; this reduces weight of gases acting on the leaves, causing a lot of evaporation from the leaves; this leads to high rate of transpiration;