**BIOLOGY PAPER 2 MARKING SCHEME**

**1**. (a) (i) State the pH at which the enzyme is most active. *2.5* (1 mark)

 (ii) Name ***one*** enzyme likely to be the one in the figure above and suggest the part of the alimentary canal where it is found. Name - *Pepsin/Rennin;* Location in the alimentary canal - *Stomach.* (2 marks)

 (iii) Name the digestive juice that contains the enzyme. *Gastric juice* (1 mark)

(b) Enzymes work best at optimum temperatures; At very low temperature enzymes are inactivated thus the rate of enzyme reaction decreases;at very high temperatures above optimum enzymes are denatured thus the rate of enzyme reaction decreases (3mks)

(c) Enzyme specificity – a particular enzyme only acts on a specific substrate. (1mk)

**2**.(a)blood

 (b) R – Platelets S - White blood cells T - Red blood cells

 (c) S – Engulf and destroy foreign micro – organism R – Involved in clotting of blood.

 (d) -Biconcave disc to create a large surface area through which oxygen diffuses into cell.

 - Lack nucleus to create more space for packing of haemoglobin

 - Contain haemoglobin which has high affinity for oxygen.

(e) Thrombosis

 Arteriosclerosis

 Hypertension

 Varicose veins

**3**. a) Photosythesis is the process by which plants manufacture food substances from carbon (IV)oxide and water using energy from sunlight. (1mk)

b) Carbon (IV) oxide and water.(2mks)

 c)Temperature

 carbon (IV) oxide

 light intensity .

 Availabilty of water (3mks)

(d) Occurs in the grana of chloroplasts

 The light trapped is used to split water molecules into hydrogen atom and oxygen gas i.e photolysis.

 Some of the light energy is used in the formation of ATP.(3mks)

4. (a) A – Nitrogen fixation; D – Absorption; (2mks)

 (b) Nitrites; (1mk)

 (c) Denitrifying bacteria/Pseudomonas denitrificans/Thiobacillus denitrificans/ Denitrifiers; (1mk)

 (d) (i) Leguminous plants/legumes/e.g. beans, peas, covers, cashew nuts, groundnuts, accassia (accept a correct example). (1mk)

 (ii) Root nodules; rej root Acc. Root tubercles. (1mk)

 (e) Reduction/killing of decomposers; Reduction/killing of nitrogen fixing bacteria; Destruction of leguminous plants/killing of leguminous plants; (2mks)

5. (a) **Division** *Pteridophyta;*

**Reasons:** Leaves are compound with leaflets/Pinna/frond; Presence of sori; Presence of horizontal underground stem/Rhizome (2mks)

b) (i) Sporangia (1mk)

|  |  |
| --- | --- |
| ***Pteridophyta*** | ***Spermatophyta*** |
| fertilization is dependent on water | fertilization is mainly independent of water  |
| Does not produce seeds  | Seed bearing  |

 (ii)(2mks)

(c)Gaseous occurs through the skin, mouth and lungs /Hind limbs are longer and more muscular than the forelimbs. (2mks)

6. (a) Labeling of axis; (1mk) Scale ; (1mk) Curves; (2mks) Plotting points; (2mks) Curve labelling; (1mk)



1. 24ºC;
2. Sweat production increases with increase in temperature; because high temperatures increase the evaporation rate, hence more sweat is converted to water vapour; This uses latent heat of vapourization from the body causing cooling; (3mks)
3. An increase in temperature decreases the amount of urine produced; This is due to increased sweating which raises the osmotic pressure of blood; A lot of water is reabsorbed into blood in the kidney tubules resulting in the production of little, concentrated urine; (3mks)

(e) **Hair** - When hot, the erector pili muscle relax; the hair lies that on the skin surface; to reduce insulation and encourage heat loss; When cold, the erector pili muscles contract; causing hairs to stand and trap a layer of warm air which insulated the body; (3mks)

**Blood vessels** - When cold blood vessel; constrict (vasoconstriction); Less blood flows near skin surface; reducing heat loss by radiation and convection; When hot, blood vessels dilate (vasodilatation); more blood flows on the skin surface; increasing heat loss by radiation and convection thus cooling the body; (3mks)

**Sweat glands** - When hot, sweat is released; it evaporates, taking latent heat of vapourisation from the body; hence cooling it; When cold, sweat glands release less sweat; there is less evaporation; and hence less heat loss; ***Total = (9mks; Max = 6mks)***

7.a)Digestion is the breakdown of complex food sustances(by enzymes) to simpler compounds which can be absorbed.

b)The small intestine has two functions i.e final stage of digestion takes place here and so does absorption of soluble products of digestion.

Is long to provide a large surface area for absorption of digested food.

Is narrow so as to to bring digested food into close contact with the walls of the ileum for easier absorption.

Is highly folded/coiled to slow down the movement of food to allow more time for digestion and absorption and also to increase surface area for digestion and absorption.

Inner surface of the ileum has alarge number of villi and micro villi which increase surface area for absorptionof end products of digestion.

The wall of the ileum is thin/thin epithelium which is one cell thick to reduce distance over which digested foood has to diffuse into the blood.

Villus/villi are highly vascularised/have a rich blood supply/rich network of blood capillaries,into which amino acids,glucose,vitamins etc diffuse into and this helps to maintain a steep concentration gradient.

Villi have lacteal for absorption of fatty acids and glycerol and channels them to lymphatic system.

Cells of the ileum have a large number of mitochondria to release energy that aids in active transport of materials across the epithelium.

Have intestinal glands that secretes intestinal juices that complete digestion process since they contain various enzymes e.g.maltase,sucrase,peptidase,lipase to complete digestion of maltose,sucrose,proteins and lipids respectively.(each point 2mrks).

8. (a) **Adaptations of xerophytes**

* Some have leaves reduced in size / to spine of reduces the surface area for water loss.
* Some xerophytes have photosynthetic stems that take the place of leaves; to reduce the surface area for transpiration;
* Some shed-off leaves during dry season; reduce surface exposed to transpiration;
* Some have thick wax cuticle; which reduces cuticular transpiration;
* Some xerophytes have fleshy / succulent /juicy stems / roots for storage of water;
* Some have sunken stomata; that accumulate moisture / creating low diffusion gradient; thus reducing transpiration rate;
* Most have reduced number of stomata; mostly on the lower leaf surface to reduce the rate of transpiration; The stomata are also small in size to reduce loss of water by transpiration;
* Some show reversed stomatal rhythm (open stomata at night and close during the day) to prevent excessive loss of water by transpiration;
* Some have succulent stem; that stores water; used in dry season;
* Some have long tap roots that extend deep into the soil to absorb water far below.
* Some xerophytes have shallow roots that spread widely / extensively in order to trap water from any little shower of rain;
* Some xerophytes roll their leaves to reduce surface area exposed thus reducing rate of water loss by transpiration;
* Some xerophytes have thorns on their stems / branches / midribs / leaves to protect the plant from predator / browsers / herbivorous animals;
* Some xerophytes have a very short life cycle thus grow fast to use the little rain within a very short time; and produce seeds that can survive the drought.

b) **Adaptations of insect pollinated flowers**

* Large; brightly coloured petals/ bracts; to attract insects; scented; to attract insects.
* Have nectar guides that direct insects into nectaries which secrete nectar;
* Pollen grains rough/ sticky surface; to stick on insects body;
* Special shaped corolla tube; to enable insects to land
* Anthers situated inside the flowers; to ensure that they get into contact with the insect;
* Sticky stigma; for pollen to stick and adhere; ***Total 12 marks = max 10 marks***