**231/2 - BIOLOGY PAPER 2 (THEORY)**

**DECEMBER 2021**

**SUKELLEMO JOINT MOCK EXAMINATION**

**MARKING SCHEME**

1. Below is a diagram showing part of human digestive system.

 

(a)Name the parts labelled B and C. (2mks)

B **Duodenum;**

C **Pancreas;**

b (i)Name the substance produced by the part labelled A. (1mk)

**Bile;**

 (ii) State the functions of the substance named in b(i) above. (1mk)

**Emulsifies fat;**

**Neutralizes acidic chyme**;

c) What is the functional relationship between the part labelled A and the liver (1mk)

**The liver synthesizes bile which is stored in organ A;**

d) The part labelled D is poorly developed in humans. Name the group of mammals in which it is well developed and describe its role. (3mks).

**Herbivores;**

**Contains bacteria which secrete enzyme cellulase; which digests cellulose;**

1. Study the diagram of the mammalian ear and answer the question that follow. 
2. Name the parts labelled X, Y and N. (2mks)

X- **External auditory meatus;**

Y- **Ear ossicles;**

Z**-Eustachian tube;**

1. State how the parts labelled Y are adapted to their functions.

 **They are bony (solid) and small forming a lever system that amplifies and transmits vibrations to the oval window;**

 **They are loosely held by suspensory ligaments which enables them to transmit vibrations;**

 c(i) Besides hearing, state one other function of the ear. (1mk)

 **Maintaining body posture/Balance;**

(ii) Which of the labelled parts is responsible for the function you have stated in c(i) above. (1mk)

**M;**

(d) What would happen if the auditory nerve is completely damaged?

 **Deafness;**

 **Lack of balance;**  Mark any one.

1. In human beings, the allele for a curved thumb (T) is dominant over the allele for a straight thumb (t).

 (a) State the possible genotypes of individuals who have curved thumbs. (2mks)

 **TT; Tt;**

(b).Work out the genotypic and phenotypic ratio of a cross between a heterozygous male and a female with a straight thumb. (5mks)

 Tt X tt **;**

 **;**

t

t

t

T

 **;** phenotypic ratio

 Curved thumb : straight thumb

 Tt Tt tt tt 2 : 2

 Genotypic ratio Tt : tt 1 : 1 **;**

 1:1**;**

1. What is mutation. (1mk)

  **Mutation is a sudden/spontaneous change in the genetic make up of an organism;**

1. The diagram below shows part of a longitudinal section of a young root.

 

1. Name the parts labeled: (2mks)

 B – **Cortex;**

 C- **Endodermis;**

1. State the significance of cell A. (1mk)

 **Absorption of water and mineral salts;**

 (c) Explain how water from the soil reaches tissue D. (4mks)

 **Water is absorbed into the root hair cell by osmosis; due to higher concentration in the root hair cell than in the soil water; water dilutes the cell sap of the root hair cell thus water moves into the adjacent epidermal cells by osmosis; continues and water moves into cortex cells by osmosis, into the endodermis; and eventually into the part D (xylem of the root)**  5mks max 4mks

 (d)State one adaptation of part D to its function. (1mk)

 **- Its walls are lignified to prevent it from collapsing;**

 **-Narrow lumen for capillarity;**

 **-Lack cross walls for continuous flow of water;** Mark 1st one

1. A student obtained a piece of petiole of pumpkin leaf and split it lengthwise into two halves. She placed one of the split in solution A and the other in solution B. After 30 minutes she observed that the split in solution A was firm, rigid and curved outwards while the one in solution B was soft, flabby and curved inwards.

(a) Account for the observations made for split in A and B.

A (3mks)

**Solution A is hypotonic to the cell sap of the cortical cells; The cortical cells gain water by osmosis; and become turgid; Epidermal cells have waterproof cuticle; hence gains little /no water; resulting to the curvature outward**. 5mks max 3mks

 B (3mks)

**Solution B is hypertonic to the cell sap of the cortical ells; The cortical cells lose water by osmosis; and become flaccid; Epidermal cells do not gain water (due to the presence of the cuticle); hence the curvature inwards.** 4mks max 3mks

(c ) State two roles of the process that was being investigated in this experiment. (2mks)

**Absorption of water;**

**Support in herbaceous plants;**

**Feeding in insectivorous plants;**

**Movement of water from cell to cell;**  Mark 1st 2.

1. The data provided below represent the growth of a pollen tube of a certain plant species over a given time.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time in minutes | 0 | 30 | 60 | 90 | 120 | 150  | 180 |
| Growth in millimetres | 0 | 2.6 | 7.6 | 15.6 | 19.8 | 21.4 | 21.8 |

1. Draw a graph of growth of pollen tube against time. (6mks



1. (i) At what intervals was the growth of the pollen tube measured. (1mk)

**30 minutes;**

(ii) At what time was the length of the pollen tube 18mm? (1mk)

**105 minutes;**

**(c)** With reasons describe growth pattern of the pollen tube between:

 (i) 0 to 120 minutes (1mk)

 **Rapid growth;**

 Reason (1mks)

 **Availability of sugars/sucrose/nutrients; hence rapid growth**

1. 120 to 180 minutes (1mk)

  **Slow growth;**

 Reason (1mks)

 **Less nutrients resulting to competition; hence slow growth**

1. Apart from nutrients, state two factors that affects the growth of pollen tube (2mks)

**Temperature;**

**pH;**

1. State two functions of the pollen tube. (2mks)

 -**Secretes enzymes that digest the stigma /style/ovary tissues**

 **-Offer passage for the male nuclei to own and polar nuclei/embryosac;**

(e)Describe what happens when the pollen tube enters the embryo sac. (4mks)

 **Tip of the pollen tube bursts open/tube nucleus disintegrates; One of the male nucleus fuses with the egg cell nucleus; to form a diploid zygote; while the other male nucleus fuses with the polar nuclei; to form a triploid endosperm nucleus;** 5 mks max 4 mks

1. (a) Define the following terms: (3mks)
2. Excretion-**Is the process by which organisms remove metabolic waste from the body;**
3. Egestion-**Removal of undigested/indigestible food materials;**
4. Secretion**-Production of substances by glands that are useful to the body;**

(b) Describe how urea is formed in human body. (7mks)

**Urea is formed from excess amino acids;**

**Excess amino acids are deaminated; in the liver; forming carboxyl group and amino group; the amino group is converted to ammonia; which is toxic Ammonia enters the ornithine cycle where it combines with carbon (IV)oxide; to form urea; which is less toxic**

(c ) Explain the various methods of excretion in plants giving examples of waste product in each case. (10mks)

**Diffusion of gases eg. carbon( IV) oxide; oxygen through the stomata/lenticels;**

**Some wastes are stored in tissues in non toxic forms; eg caffeine; nicotine, quinine**

**Some of these tissues/organs drop off from plants;**

**Some wastes are released by transpiration; through stomata eg water vapour ;**

**Others are released by guttation; through hydathodes eg water;**

**Others are released by exudation; eg latex; gum resins**

11 mks max 10 mks

1. (a) Why is locomotion important to animals? (4mks)

**searching for food/ mates/ shelter;**

**Migration away from unfavourable places;**

**Escape from predators / enemies;**

**Colonization of new areas;**

 **(b**) Explain how a finned fish is adapted to swimming.  **(**16mks)

**Vertebral column consists of a series of vertebrae; held together loosely so that its flexible;**

**Myotomes/ muscles; associated with vertebral column produce movement;**

**The sideways and backwards thrust of the tail and body against water; result in resistance of the water pushing the fish sideways and forwards in a direction opposed to the thrust;**

**Head is inflexible; to maintain the forward thrust;**

**Body streamlined; to reduce resistance;**

**Presence of fins; for forward movement/balance in water;**

**Presence of swim bladder; make fish buoyant;**

**Scales tip towards the back; provide smooth surface to reduce resistance(friction);**

**Body covered with mucus making it slippery; hence reducing friction during movement in water;**

 18 mks max 16 mks