**BIOLOGY**

**Paper 2**

**JUNE 2022**

**BUNAMFAN FORM 4 MARKING SCHEME**

1 Study the diagram below and answer the questions that follow

1. Identify the structure (1mks)

**Villus;** (rej. Wrong spp or villi)

1. State the role of the part labelled R (1mk)

**Secrete mucus with an alkaline pH which protects ileum from corrosion by enzymes/serves to neutralize chyme from the stomach;**

c) A student took a meal of lean meat. Briefly describe the digestion of the food substance where this structure is found. (3mks)

**Arrival of chyme in the ileum stimulates secretion of intestinal juice/succus entericus; which mixes with the food; It contains peptidase which breaks down peptides into amino acids;**

 (d)What is the role of the following: enterokinase and cholecystokinin in digestion? (2mk)

**Enterokinase: Activates inactive trypsinogen to active form trypsin;**

 **cholecystokinin:.causes gall bladder to release bile juice into duodenum; stimulates the pancreas to** secrete pancreatic enzymes (reject without terms like stimulate/causes);

 e) State the deficiency disease associated with lack of vitamin B2 (1mk)

**pellagra; (rej wrong spp).**

2 The diagram below shows how gaseous exchange occurs across the gills in fish

1. (i) Name the type of flow shown above (1mk)

**Counter current flow system**

(ii) Explain the advantage of the above flow named in a(i) above. (1 Marks)

**Maintains a steep concentration gradient ensuring efficient gaseous exchange;**

1. If the fish is removed from water it dies immediately. Explain why (2mks)

 **Fish uses dissolved oxygen for gaseous exchange; gill filament epithelium dries up; gill filaments clamp together; surface area for gaseous exchange is reduced; oxygen lacks moist surface for dissolution causing death (due to suffocation)**

c) Explain mechanism of gaseous exchange in frog through the skin (4mks)

**The frog has a thin and moist skin; Oxygen dissolves in the moisture and then diffuses through the skin;. There is a dense network of blood capillaries beneath the skin which transport the diffused gas/oxygen into the body tissues;. Carbon (IV) oxide in the blood diffuses out of the blood capillaries through the moist skin into the surrounding water and air;**

3 a) L1 Hypotonic solution

L2 Hypertonic solution

b) L1 - Inner cells gained water by Osmosis; hence increased in length; epidermal cells did not gain water because they are covered by a water proof cuticle leading to curvature.
 L2 - Inner cells lost water by osmosis; leading to (flaccidity) decrease in length; epidermal cells did not lose water due to waterproof leading to curvature
(c) Absorption of water by the roots;
 Opening and closing of the stomata;

4. a (i) Structural similarity.

- Both show the pent dactyl limb structure; (1mk)

ii) Adaptational difference.

-Human arm has five digits separated into four fingers and an opposable thump for grasping

-The bat wing has five digits which are long and spread apart to support a large membranous wing for flight; (2mks)

b) Different shapes and sizes of beaks in birds;

 Different feet structure in birds; (2mks)

c) Chemical evolution explains the origin of life as having occurred when simple Chemical compounds reacted to form the simplest life forms; organic evolution is the progressive development of complex organisms from simple pre-existing life forms over a long period of time; (2mks)

(d)Paleontology; (1mk)

**5.**

*Parental Genotype R W X R W;*

**R**

**W**

**R**

**W**

**R R**

**R W**

**R W**

**W W**

 *Gametes* ***;***

 *Fertilization*

*;*

 *F2 genotypes*

 *Phenotypic ratio 1 Red : 2 Roan : 1 White;*

 *Rej. 1 : 2 : 1 only*

(b) Work out the genotypic ratio of a cross between F1 offspring and white bull. (3mks)

 *Parental genotypes R W X W W;*

**R**

**W**

**W**

**W**

**R W**

**R W**

**W W**

**W W**

 *Gametes* ***;***

 *F1 Genotype*

*Genotype 2R W : 2W W*

 *Ratio 1RW : 1WW; Rej. Ratio only.*

(c) Comment on the gene(s) controlling the colour of coats in cattle mentioned above. (1mk)

*Gene for red colour coat and white colour coat are codominant/ have equal dominance;*

*a)* **

b) i) 106

ii) 109

c) Shoot A: The tip of the shoot which was removed contained Indole acetic acid (IAA) which causes apical dominance/inhibit growth/development of lateral buds; hence lateral buds sprouted/formed/grew;

Shoot B: The gibberellic acid which was added on the cut promoted the formation of lateral branches on the stem; hence the fast growth of branches on shoot B.

Shoot C: The shoot tip which remained intact contains IAA which inhibits growth/development of lateral buds; hence little change of length of lateral buds;

d) Control experiment;

e) Increase in productivity since more lateral branches are formed;

 f) Promote cell division;

Induce germination in plants;

7. Pollen grains land on to the stigma; and adhere to it as a result of the stigma cells secreting a sticky substance; it absorbs nutrients; and germinates forming a pollen tube; the pollen tube grows down the style to the ovary; deriving nourishment from the surrounding tissues; the pollen tube has tube nucleus at the tip; and generative nucleus immediately behind it; As the tube grows downwards into the ovary the generative nucleus divides mitotically; to give rise to two nuclei; which represent the male gamete; the pollen tube penetrates the ovule/embryo sac through the microphyle/chalaza; after the pollen tube enters the embryo sac, the tube nucleus disintegrates; leaving a clear passage for the entry of the male nucleic (The two male nucleic) then enters the embryo sac; where one fuses with the egg (cell) nucleus to form diploid zygotes; which develops into an embryo; the other male nucleus fuses with the two polar nucleic; to form a triploid nucleus/primary endosperm; nucleus ; which becomes the endosperm; this is called double fertilization. Acc egg cell/ovum Vegetative nucleus/tube nucleus

 **20mks max 15**

b) Integument changes into seed coat/test;

 Zygote into embryo;

 Ovary wall into pericarp;

 Ovary into fruit;

 Ovule into seed;

 Triploid nucleus into endosperm;

 Style dries up/fall of leaving a scar; corolla dries up (falls off); stamen dry up; ( rej degeration/disinergrates) **9mks max 5**

8. - It is muscular/has cardiac muscles; which are myogenic (does not need nervous Stimulation) to pump blood;

- It is supplies by vagus and a sympathetic nerve; which controls the rate of heart beat;

 (Depending on body’s physiological requirements)

- It has tricuspid valves and bicuspid valves; (between atrium and ventricles) which

 Prevent back flow of the blood into the right and left ventricles respectively.

- Present of valve tendons attached to the walls of ventricles and to the atrium

 Ventricular walls; to prevent atria-ventricular valves from due to changes in the

 Pressure in the ventricles;

- Heart is supplied by coronary artery; which supplies food and oxygen to the cardiac

 Muscle for their pumping action; the coronary vein; in heart removes metabolic wastes;

- The heart is enclosed by the pericardium membrane; that secretes a fluid which lubricates it (reducing friction on the walls as it bumps);

- The heart is divided into two by the atria-ventricular septum; that prevent mixing of

Oxygenated blood and deoxygenated blood;

- The left ventricles has a thick muscular wall; to pump blood at higher pressure to the

Distant body issues;

- The outer part of the pericardium has a fatty layer; which act as a shock absorber; keeps the heart in position.

- The Sino Atrial Node (S.A.N) the pacemaker region); which initiate the wave of contraction leading into contraction and relaxation of muscles; the arterial-ventricular

 Node; in the heart spreads out waves of contraction throughout the heart creating the heart beat;