**BIOLOGY PAPER II – MOKASA I 2020**

**MARKING SCHEME**

1. a) Sickle cell anaemia;

 b) Advantage – Individuals having this trait hardly/rarely suffer from malaria;

Disadvantages – Suffocation due to insufficient supply of oxygen during straneous activity;

 c) Parental phenotypes: sickle cell trait sickle cell anaemia

 Parental genotypes HbA HbA X Hbs Hbs

 Gametes HbA HbA Hbs Hbs

 Fusion

 F1 generation HbAHbs HbAHbs HbsHbs HbsHbs

 Genotypes

 F1 phenotypes: Sickle cell trait Sickle cell anemia

2. a) Division: Bryophyta;

 Reasons: Have developed rhizoids for anchoring & absorbing water;

 They are thalloid;

 Show alternation of generation;

 b) A - Produces spores;

 B – Anchorage and absorption of water and mineral salts;

 c)

|  |  |
| --- | --- |
| Bryophytes  | Flowering plants |
| Antheridia release mobile sperm which swim in water to fertilize the egg in the archegonia | Pollen tubes carrying male gametes grow down the style to ovary, to bring about double fertilization. |
| Male gametes are produced in antheridia while female egg in archegonia | Pollen grains in anthers and eggs are produced in ovary |
| Zygote formed develops into young sporophyte plant which grows upwards while still attached on the female gametophyte plant | The formed zygote develops into a seed in a fruit. |

3. a) Fish were caught, age determined, 2 years old retained; length measured and recorded. This was done repeatedly until a large number were measured.

 The total length divided by number of fish. (4 marks)

b) Lake A has hard water with more calcium necessary for bone formation. Fish in A grow faster and greater bone length than fish in Lake D.

 Lake A has more food which fish eat than Lake D.

c) receives light energy directly from the sun, and energy is lost from one trophic level to the next.

4. a) I Lobule/Alveoli;

 II Lacteferous duct;

 III Lacteferous sinus;

b) When the environment is positive; (e.g. small of baby etc.) the hypothalamus relays; impulses to the pituitary gland; which in turn releases oxytocin hormone;

 Oxytocin hormone causes alveoli to contract forcing milk into ducts which conduct milk to reservoirs;

5. a) Food sample A – Carbohydrates/glucose;

Reason: Quickly broken down/easily oxidized to release energy, water and carbon (IV) oxide;

Food Sample B: Lipid/protein;

Reason: Slowly broken down slowly oxidized to release energy, water and carbon (IV) oxide gas;

 b) Carbon (IV) oxide;

ii) Sugar in fruits or barley seeds; is fermented/broken down anaerobically; to produce ethanol in wines;

6. a)i)

ii) 16.25% salt;

b)i) The salt solution is hypotonic; to the cell sap of the tradescantia, water molecules moved from the solution into the cells by osmosis; making the cells turgid hence increase in size;

ii) The salt solution is hypertonic; to the cell sap of the tradescantia, water molecules moved from the cells into the solution by osmosis; making the cells flaccid to reduce in size;

c) The plants absorb water from the soil by osmosis; the water is transported to cells; the cells become turgidmaking the plant upright;

d )i) Movement of water molecules from a region of low concentration to a region of high across a semi permeable membrane.

ii) Osmosis Diffusion

1. Involves movement of water 1. Involves movement of other substances apart

 From water

1. Should be across a semi 2. It should not be across a semi permeable

Permeable membrane membrane.

7. a) Water; Activation of enzymes to hydrolyze food materials;

 Transport of hydrolyzed food;

 Dissolve the stored food;

 Softens the seed coat to allow for imbibition;

Oxygen: For aerobic respiration to supply energy (for formation of new cells and tissues).

 Optimum/favorable temperature

 Germination enzymes require optimum temperature for maximum activity.

 Low temperature inactivate the enzymes.

 High temperatures beyond optimum denatures/destroy enzymes

 The embryo is also killed at high temperatures.

pH ;change from optimumpH denatures enzymes responsible for germination. Optimum pH activates the enzymes and the rate of germination will be faster.

Light: Light induces the formation of gibberellins which stimulate seed germination by breaking seed dormancy.

It is also a requirement of photosynthesis by the young growing leaves of the developing seedlings.

 b)i) Comparative anatomy

The study of internal structures reveal that certain body structures or organs found in different species of organisms have similar internal structure or plan; eg pentadactyl limbs in vertebrates.

Such similar structures with similar origin but have undergone structural modifications to perform different functions in different organisms are called homologous structures, and the basis of their origin is called divergent evolution.

Some organs have different embryonic origin but perform similar functions hence such organs are called analogous structures, and basis of their origin is called convergent evolution.

Some body parts or structures become vestigial in the course of development and reduce in size due to disuse.

 ii) Geographical distribution

initially organisms occupied one big land mass, drifting of centinents isolated organisms from common ancestry leading to speciation/formation of new species due to adaptive radiation.

8. **Digestive system**

Ingested carbohydrates are digested to glucose in the gut; glucose is absorbed into the bloodstream; raising blood glucose levels; Pancreas secretes insulin; thus stimulates liver cells to convert excess sugar to glycogen, fats and increase rate of respiration; restoring the level to normal; (6marks)

**Transport system**

Capillaries in small intestines join the hepatic portal vein which transports absorbed glucose to the liver directly;

Transport system also transport hormones insulin and glucagon from the pancreas to the liver; transports glycogen from liver to muscles in the body for storage; hepatic vein transport glucose from the liver to other parts of the body for respiration; (4marks)

**Respiratory system**

When level of glucose in blood increases beyond normal, insulin stimulate liver cells; to increase breakdown of excess glucose to water carbon(IV)oxide and energy; hence lowering the concentration of sugar in blood to normal levels ;

When the level of glucose in blood falls below normal, pancreas is stimulated to secrete glucagon hormone; which stimulate liver cells to reduce breakdown /metabolism of glucose into water , carbon(IV)oxide and energy; restoring the amount of glucose in blood to normal.(5marks)

**Nervous system**

The hypothalamus detects levels of blood sugar in blood; sends impulses to the pituitary gland; which generates impulses and sends to the pancreas; to secrete insulin/glucagon; to stimulate liver cells to lower or raise blood sugar; (5marks)

**Hormonal system**

The pancreas as an endocrine gland secretes ;( the following hormones involved in regulation of blood glucose levels)

Insulin stimulates liver cells; (to convert excess glucose to fat or glycogen thus lowering its concentration)

Glucagon stimulates liver cells ;( to carry out activities that release glucose to blood thus increasing its concentration)

Adrenaline hormone; secreted by adrenal glands; increase hydrolysis of glycogen into glucose; and inhibits release of insulin resulting to increase in blood sugar level. (6marks)

**Maximum 20 marks**