**FORM FOUR**

**BIOLOGY MARKING SCHEME**

1. a) state the function of the following parts of hind brain

i) Cerebellum (1mk)

* **responsible for coordinating impulses, posture and balance, motor coordination and muscle tone**

ii) Medulla oblongata. (1mk)

* **controls involuntary body activities i.e. heartbeat, blood pressure breathing rate, coughing and sneezing**

1. i. A person was found to pass out large volumes of dilute urine frequently. Name the;

a) Disease the person was suffering from (1mk)

* **diabetes inspidus**

b) Hormone that was deficient (1mk)

* **ADH**

3. The diagram below shows a type of a nerve cell. Study and answer the questions that follow

A.i.identify the type of nerve cell shown above 1mk

**Sensory neurone**

ii. Give reasons for your answer in a (i) above

**Unipolar**

B.name parts labeled Q and G 2mks

**Q-cell body**

**G-myelin sheath**

c. name the other types of nerve cells 2mks

**Motor neurone**

**Relay neurone**

iii.on the diagram using an arrow indicate the direction of the nerve impulse 1mk

3. The equation below shows an oxidation reaction of food substances.

C51H98O6 + 145O2 ------- X CO2 + 98 H2O + energy

a) What do you understand by the term respiratory quotient? (2mark)

b) Determine respiratory quotient of the oxidation of food substance. (2marks)

**RQ= 0.7**

c) Identify the food substances. (1mark)

**Lipids**

1. a) Study the photograph below showing a certain trait in man
2. Identify the trait exhibited in the photograph above. (1 mark)
3. **Hairy pinna**
4. The trait you have identified in (d) (i) above is **sex linked**. In which chromosome is it contained. (1 mark)

**Y -chromosome**

1. Name any other sex linked trait in man. (1 mark)

**Premature baldness**

**Colourblindness**

**Haemophilia**

1. The man in the photograph married a woman. Use a genetic cross to predict the offspring of the above marriage. Let **YH** represent the gene for the trait above. (5 marks)
2. Below are photographs of **Venus flytrap** (an insectivorous plant). Study them and answer the questions that follow.

(i) Name one major nutrient that is **deficient** in the soil where the above plant grows. (1mk)

**Nitrogen**

(ii) Name the type of response shown by plate **C** (1mk)

**Haptonasty**

(iii) **Describe** how the above plant **traps** the insect (4mks)

**When the sensitive hairs are touched by a landing insect, the mid-rib cells lose water rapidly losing their turgor. This causes the trap to spring inwards hence closing the leaf with spines interlocking.**

6 a) **Explain the various types of tropism in plants**

**Phototropism**

* growth movements of plant shoots in response to unilateral sources of light
* the tip of the shoots produce auxins down the shoot
* light causes auxins to migrate to outer side/darker side causing growth on the side away from light hence growth curvature towards source of light roots are negatively phototrophic

**Geotropism**

* response of roots/parts of a plant to the direction of force of gravity
* auxins grow towards the direction of force of gravity causing positive geotropism in roots while shoot grows away from force of gravity (negatively geotrophic)

**Thigmotropism/Haptotropism**

* growth response of plant when in contact with an object
* contact with support causes migration of auxins to outer side causing faster growth on the side away from contact surface
* this causes tendrils/stem to twin around a support

**Hydrotropism**

* growth movement of roots in response to unilateral source of water/moisture
* the root grows towards the source of water/ positively hydrotropic while leaves are negatively hydrotropic

**Chemotropism**

* growth movement of parts of plant to unilateral source of chemicals
* the chemicals form a gradient between two regions e.g. pollen tube growing towards the ovary through the style

b) **Discuss the various kinds of evidence for evolution**

1. **Fossils**

* fossils are remains of organisms preserved in naturally occurring materials for many years
* they give evidence of types of plants/animals that existed at certain geological age/long ago/millions of years ago
* gives evidence of morphological/anatomical/structural changes that have taken place over a long period of time e.g. human skull, leg of horse

1. **Comparative anatomy**

* gives evidence of relationship among organisms/gives evidence of a common ancestry of a group of organisms
* organisms have similar structures/organs performing the same function e.g. digestive system/ urinary system/nervous system/vestigial structures and vertebrate heart
* **Divergence** where the basic structural form is modified to serve different functions e.g. vertebrate forelimb/beak structure in birds/birds feet/parts of a flower. These are called homologous structures
* **homologous structures** have a common embryonic origin but are modified to perform different functions e.g. the pentadactyl limb
* **adaptive radiation** is a situation where organism have a homologous structure with common embryonic origin which is modified to perform different functions to adapt organisms to different ecological niches/habitats e.g. beaks of Darwinian finches(birds)
* **Convergence** is where different structures are modified to perform a similar function e.g. wings of birds and insects/eyes of humans and octopuses. These are called analogous structures
* **Vestigial structures** are greatly reduced in size and have ceased to function e.g. human appendix/caecium/coccyx in humans, wings of kiwi (flightless bird), presence of hind limb pad in python, halters in insects, human hair nictitating membrane in human eye, human ear muscle, pelvic girdle in whale and third digit of wing of bird.

1. **Comparative embryology**

* some embryos of different animals appear very similar thus showing relationship and possibility of a common ancestry
* different classes of vertebrates larvae of Annelida and Mollusca are similar (tocophere)

1. **Comparative serology/physiology**

* these show biochemical and immunological comparisons of blood groups/components to show immunological similarities of tissues therefore showing relatedness of different organisms
* e.g. antigen antibody reactions, human blood groups/Rh factor reveal some phylogenic relationship among organisms/common ancestry

1. **Geographical distribution**

* organisms differ in various geographical regions
* present continents are thought to have been a large land mass joined together/pangea/Eurasia/Gondwanaland
* present continents drifted apart from one land mass/continental drift
* as a result of continental drift isolation of organisms occurred bring about different patterns of evolution
* organisms in each continent evolved along different lines hence emergence of new species/divergence/convergence

**Examples**

* llama, jaguar, panther in S. America

1. **Cell biology (cytology)**

* structures and functioning of cells are similar
* occurrence of organelles e.g. mitochondria in all cells/both plant and animal cells
* these point at a common ancestry

(10mks)