**TOP EVALUATION EXAMINATION - 2016**

**Biology Combined Paper**

**FORM 2**

**JULY/AUGUST**

**MARKING SCHEME**

1. State three importance of studying Biology. (3 marks)
* *One learns about the functioning of the human body.*
* *One understands the developmental changes that take place in the body.*
* *It contributes immensely to improved life.*
1. State the functions of the following organelles.

a) Lysosomes (1mark)

*Stores (hydro) lytic enzymes/destruction of worn out tissues/cell organelles/pathogens/digested food material;*

b)Golgi apparatus (1 mark)

*Transport of cell secretions;production of lysosomes;processing and packaging of synthesized materials*

*study the cell organelle below and then answer questions that follow.*

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1. Identify the organelle. (1 mark)

*Mitochondrion. Rej mitochondria*

1. Name the parts labeled: (4 marks)

A: *inner membrane*

*B: cristae*

*C: matrix*

*D: outer membrane*

1. (a) What is Taxonomy ? (1 mark)

The *study of the characteristics of organisms for the purpose of classifying them*.

1. Name any three taxonomic groups in plants. (3 marks)
* *Species*
* *Genus*
* *Family*
* Class
* *Division*
* *Kingdom*
1. List the external features used to classify animals. (2 marks)
* *horns*
* *hooves*
* *mammary glands*
* *hair*
* *Shell*
* *spines*
1. (a) State one principle followed during binomial nomenclature. (1 mark)
* *the first (generic) name should begin with a capital letter while the rest are small letters*
* *the two names are printed in italics and if handwritten should be underlined each separately*
1. Give the advantages of using binomial nomenclature . (2 marks)
* *no confusion about which organism is referred to*
* *names are internationally accepted regardless of language*
* *shows evolutionary relationship hence easy to understand*
* *useful in naming many species unlike use of common names*
1. Give two differences between osmosis and diffusion. (2 marks)

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| *Diffusion* | *Osmosis* |
| *- Involves movement of particles of molecules of liquid or gas**- It may be through a membrane or air.**- Not affected by PH changes.* | *- Involves movement of solvent molecules**- It takes place through a semi-permeable membrane.**- Rate affected by pH changes.* |

1. Give the reasons for each of the following steps when preparing a cross-section of a stem or leaf for examination under the microscope. (3 marks)
2. cutting very thin sections

*To allow light to pass through making it easy to observe the tissue*

1. Placing sections in water

*to maintain turgidity hence maintain shape of cell*

*it prevents drying of the section*

1. Staining the sections with iodine before observing.

*To make chloroplasts, starch containing structures, granules or plastids distinct.*

1. Explain the meaning of each of the following. (3 marks)
2. Tissue

*these are cells of a particular type grouped together to perform a certain function*

1. Organ

*an organ is a complex structure with a particular function*

1. Organ system

*organs are grouped together*

1. Name the structures which are present in animal cells but absent in plant cells. (2 marks)
* *Lysosomes*
* *Centrioles*
* *Pinocytic vesicles*
1. A group of form 1 students set up an experiment to investigate a certain physiological process. The set up is as shown in the diagram below.

After some time they observed that the level of sugar had risen.

1. What was the physiological process under investigation? (1 mark)

*Osmosis*

1. Why was there a rise in the level of sugar solution? (2 marks)

*sugar solution is more concentrated than cell sap osmosis;those cells become more concentrated and therefore draw water from neighbouring cells;this process continues until the cells in contact with the water in the container draw it up causing a rise in the level of the sugar solution*

1. Suggest the results that the students would obtain if they repeated the experiment using cooked potato. (1 mark)

*The level of sugar solution will not rise.*

1. Give a reason for your suggestion in (c) above? (2 marks)

*boiling kills/destroys cells making them osmotically inactive*

1. Give the roles of physiological process in (a) above in living organisms. (3 marks)
* *helps to draw water into roots of plants*
* *helps in the passage of water from one living cell to another in the plant*
* *helps to keep plant cells turgid increasing support*
* *Helps in opening and closing of stomata.*
* *Folding of leaves in Mimosa pudica when touched*
* *Feeding in insectivorous plants*
1. Name two salts in bile that aid in emulsification of fats. (2marks)
* *Sodium glycocholate*
* *Sodium tarocholate*
1. The experiment that follows was done to investigate the effect of light intensity on the rate a certain process. Use it to answer questions after it.

 Apparatus and Materials

* lamp e.g. 60 W
* Ruler
* Stop watch
* 400 cm3 beaker as water bath/heat filter
* Thermometer
* Test tube containing dilute sodium hydrogencarbonate solution
* Pondweed



**Procedure**

1. Cut the stem of a bubbling pond weed which has been well illuminated to about 5cm. Place the cut surface upwards in a test tube containing sodium hydrogen carbonate solution.

2. Place the test tube in the beaker of water and note the temperature. The beaker of water acts as a heat filter or heat shield, so its temperature should be checked at intervals to ensure that it is constant throughout the experiment; the water should be renewed if necessary.

4. Darken the laboratory by turning off as many lights as possible.

5. Place lamp 10 cm away from  the beaker. Allow the plant to equilibrate or adjust to the light intensity for 2-3 minutes
When the rate of air bubbles is regular and a adequate (>10 bubbles/minute), place the capillary tube/test tube over the cut tip of the pondweed  and then measure the volume. OR, count the number of bubbles. This should be done for  5 minutes. Repeat twice and obtain an average of the results.

6. Repeat steps 4 and 5, with increasing distances away from the light source e.g. 20 cm, 30 cm, 40 cm and 50 cm. Light intensity is a inversely proportional to  the square of the distance, so as the distance is increased the light intensity decreases.  Note that doubling the distance does not half the intensity, rather quarters it.

7. Record results in a table, then plot a graph of volume of oxygen/minute OR number of bubble/minute against the distance between the lamp and the plant.

Questions

1. Identify the process under investigation. (1 mark)

*Photosynthesis*

1. Explain what happens when the distance between the lamp and the plant decreases. (1 mark)

*The volume of  oxygen (or the rate of bubble production) increases. This indicates that the rate of photosynthesis increases with light intensity.*

1. Why is sodium hydrogen carbonate solution used instead of water? (2 marks)

*Sodium hydrogen carbonate increases carbon dioxide availability, and ensures that carbon dioxide is not a limiting factor for the reaction. Plain water may not contain enough oxygen so that the maximum rate of photosynthesis can occur.*
2. Why was the laboratory darkened? (2 marks)
* *To reduce light from other sources.*
* *to ensure that the light intensity  was mainly due to the lamp.*

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1. How can we prove that oxygen was the gas produced? (2 marks)
*A glowing splint should be placed near the mouth of the test tube, where the gas was collected. If oxygen is present the splint is re-ignited into a flame*.
2. What is the relationship between the light intensity and the rate of the process under investigation at low light intensities? (2 marks)
*At low light intensities, the rate of photosynthesis increases with the intensity; the rate is directly proportional to intensity ( but inversely  proportional to distance)*
3. Identify two factors that may not limit the above experiment. (2 marks)
* *Water*
* *Carbon(IV)Oxide*
1. State the importance of the process under investigation. (2 marks)
* *formation of sugars/glucose which is a source of energy*
* *purification of air(CO2 is used, O2 is released)*
* *storage of energy to be used later in respiration*
* *stores energy in wood, coal, oil to be used later to run industries*
1. (a) Name the two types of lipids. (2 marks)
* *oils*
* *fats*
1. Identify the building blocks of lipids? (2 marks)

*fatty acids and glycerol*

1. State the properties of enzymes. (3 marks)
* *are highly specific in nature*
* *they are not used up during chemical reactions*
* *work within specific range of temperature*
* *work within specific range of pH*
* *enzyme controlled reactions are reversible*
1. Mention the factors that affect enzyme action. (3 marks)
* *temperature*
* *substrate concentration*
* *pH of the medium*
* *enzyme concentration*
* *presence of inhibitors and co-factors*
1. State the similarities between a dicotyledonous and monocotyledonous root. (2 marks)
* *both used for anchorage and absorption of water and mineral salts*
* *both have root hairs, epidermis, pericycle, cortex, endodermis and vascular bundles (xylem and phloem)*
* *both may be used to store food/storage organs*
1. What are the advantages of the closed circulatory system over open circulatory system? (2 marks)
* *Closed system has continuous vessels hence able to generate high pressure*
* *Circulates blood over longer distance*
* *Circulates blood at a faster rate*
* *Efficient transport of nutrients and waste products*
* *Animals are more active*
1. Give the reasons why pressure of blood is greater in the arterioles than I the veins of mammals.

 (2 marks)

* *blood is pumped to the arteries by the heart at high pressure*
* *blood pressure in veins is reduced by capillary resistance*
* *arteries have narrow lumen which maintains high pressure/veins have wide lumen which reduces pressure*
* *arteries have more/thicker muscular walls which generate pressure/veins have less/thinner muscular walls which reduce pressure*
1. Explain why blood flowing in blood vessels does not normally clot. (1 mark)

 *Presence of anticoagulant in blood*

1. Name the structure used for gaseous exchange by plants. (2 marks)
* *stomatal pores/stomata*
* *lenticels*
* *cuticle*
* *pneumatophores*
1. Name the theories suggesting the mechanism of opening and closing of stomata. (2 marks)
* *interconversion of starch and sugar*
* *pH theory*
* *mineral ion concentration*
1. Under what conditions would blood transfusion be necessary in people? (2 marks)
* *during accidents*
* *during surgery in hospitals*
* *bleeding mothers when giving birth*
1. State the role of blood clotting on wounds. (3 marks)
* *prevents blood/body fluids from being lost*
* *conserves water and salts*
* *prevents entry of microorganisms/pathogens*
* *regulates body temperature*
* *enables wound to heal faster*