## Name……………………………………………………..……………………………….………

## 

**UGANDA ADVANCED CERTIFICATE OF EDUCATION**

***CYTOLOGY AND CELL PHYSIOLOGY***

***TEST***

# **BIOLOGY P530/2**

**Time: 2 hour 30 minutes.**

**Instructions:**

* Question 1 is compulsory
* Attempt only 3 questions in Section B.
* Each questions in Section B should be attempted on a fresh page

|  |  |  |
| --- | --- | --- |
| **For Examiner’s Use Only** | | |
| **Question** | **Marks** | **Examiner’s Signature and Number.** |
| **A:No. 1** |  |  |
| **B:** |  |  |
|  |  |  |
|  |  |  |
| **Total** |  |  |

**SECTION A (40 marks)**

1. The relationship between phosphate ion concentration in the roots and sugar consumption at different oxygen percentage was investigated. The table below shows in {mgcm-3} the concentration of phosphate ions and the rate of sugar consumption {mghr-1} by roots of fleshy uprooted plants when inserted in a bathing buffered solution at different oxygen concentrations and maintained at a temperature between 35 – 400C.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Oxygen concentration (%)** | 0 | 2 | 5 | 10 | 20 | 30 | 50 | 70 |
| **Phosphate ions concentration(mgcm-3)** | 7 | 10 | 21 | 49 | 52 | 51 | 47.7 | 44 |
| **Rate of sugar consumption (mghr-1)** | 14 | 16 | 20 | 27 | 33 | 34 | 35 | 36 |

1. Plot the results in the table graphically so that you can easily interpret the data. (07 marks)
2. From the graph, State the differences and the similarities on the concentration of Phosphate ions in the roots and the rate of sugar consumption with percentage concentration of oxygen. (10marks)
3. Describe the effect of oxygen concentration of potassium ion concentration in the root cells (05 marks)
4. Account for each of the following:

(i) Phosphate ions are present in the root even at zero concentration of oxygen. (03 marks)

(ii) Phosphate ions increases rapidly with increasing oxygen concentration of 20%. (03 marks)

(iii) Phosphate ion concentration begins to fall after the peak at oxygen concentration of 20%. (02 marks)

(iv) Addition of potassium cyanide lowers the concentration of phosphate ions in the roots (03 marks)

(v) The bathing solution was buffered and maintained at temperature between 35 -400C (03 marks)

1. State the roles of phosphate ions in plants. (04 marks)

**SECTION B (60 marks)**

***(Attempt ONLY THREE questions from this section)***

2 (a) Compare between osmosis and active transport (07 marks)

(b) Explain how the structure of the plasma membrane is related to its having a selective permeability property (06 marks)

(c) Describe the process of endocytosis in a named protist (08 marks)

3 (a) Describe the structure of phospholipid bilayer of the membrane (06 marks)

(b) How is the Daniel’s cell model compared with fluid mosaic model of the plasma membrane (08 marks)

(c) With an example for each, state the functions of the single membrane bound organelles within a eukaryotic cell (06 marks)

4 (a) Compare wilting and plasmolysis (06 marks)

(b) Explain how the structures of organisms are modified to increase their surface area for a faster rate of diffusion of materials, giving an example for each (09 marks)

(c) Give a reason why the water potential of sucrose solution is has a negative value (05 marks)

5 (a) Outline the importance of active transport to living organisms (04 marks)

(b) Describe the mechanism of transport of ions across the Sodium-potassium pumps (08 marks)

(c) Account for the effects water stress to the plants (08 marks)

6 (a) Outline the features of the cell theory (04 marks)

(b) Explain the factors that affect the fluid property of the plasma membrane (10 marks)

(c) A eukaryotic cell has both intracellular and extracellular components. State the functions of its extracellular components (06 marks)

**END**