**NAME……………………….......………….......................................… CLASS ………………….. ADM. NO ………………….SCHOOL ………………………………………………......……….**

 **SIGN ………..................…………….. DATE** **…………...……………**.

**231/2**

**BIOLOGY**

**(THEORY)**

**PAPER 2**

**NOV-DEC, 2021**

**TIME : 2 HOURS**

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**CEKENAS END OF TERM TWO EXAM-2021**

**FORM FOUR**

***Kenya Certificate of Secondary Education. (K.C.S.E)***

**BIOLOGY**

**(THEORY)**

**PAPER 2**

**TIME : 2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your **name** class, and **index number** in the spaces provided above.
* Answer **ALL** the questions in the spaces provided.
* Answer all questions in Section A.
* In section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.
* ***This paper consist of 9 printed pages.***
* ***Students should check the question paper to ascertain that all the pages are printed as indicated***

***and that no questions are missing.***

**For examiner’s use only**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section** | **Question** | **Maximum score** | **Candidate’s score** |
| **A** | **1** **2****3****4****5** | **8****8****8****8****8** |  |
| **B** | **6****7/8** | **20****20** |  |
|  | **Total score** | **80** |  |

**SECTION A: (40 MARKS)**

**Answer ALL the questions in this Section in the spaces provided**

1. (a) Define the term “ Respiratory Quotient” in cellular respiration. (1mk)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………… (b) The equation below illustrates the breakdown of glucose in a cell and the respective products.

 C6H12O6 + 6O2 🡺 CO2 + 6H2O+ Energy

 Calculate the respiratory quotient in cellular respiration. (2mks)

 (c) List three ways in which anaerobic respiration is useful to our country Kenya. (3mks)

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 (d) State the role of cristae in a mitochondrion (1 mk)

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 (e) State the products of anaerobic respiration in animals (1mk)

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2. The skin, respiratory surfaces and alimentary canal are possible sites through which micro- organisms may gain entry to the human body. For each of these sites describe the mechanisms that prevent the entry of micro-organisms.

 (a) The skin (3 mks)

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 (b) The respiratory system (3mks)

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 (c) The alimentary canal. (2mks)

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3. The results in the table below shows the effect of some conditions on seed germination. In each experiment, all the other environmental conditions were kept constant except one being investigated.

|  |  |  |
| --- | --- | --- |
| Experiment  | Treatment | Percentage Germination |
| I | Seeds placed in tightly closed container with pyrogallic acid. | 0 |
| II | i) Seeds kept on saucer lightii) Seeds kept on saucer in darkness | 9697 |
| III | i) Seeds kept in refrigerator at 40Cii) Seeds kept in an oven at 600Ciii) Seeds kept at 350C | 0.5092 |
| IV | i) Dry seeds in closed containerii) Moist seeds in closed container | 087 |

 a) (i) What was the role of pyrogallic acid in experiment I (1mk)

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 b) Account for the results obtained in Experiment set up III (3mks)

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 c) Name the conditions necessary for germination being investigated by experiment I, III and IV (3mks)

 I……………………………………………………………………………………………………… ……………………………………………………………………………………………………… III…………………………………………………………………………………………………… ……………………………………………………………………………………………………… IV……………………………………………………………………………………………………

4. (a) State three characteristics of a population. (3mks)

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 (b) In a grass field measuring 30m × 20m quadrats of 1m2 were laid at random and grass hoppers counted. The results are shown below.

|  |  |
| --- | --- |
| Quadrat | Number of grasshoppers |
| 1 | 2 |
| 2 | 6 |
| 3 | 4 |

 (i) Calculate the total population of grasshopper in the grass field (4mks) ………………………………………………………………………………………………………………

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 (ii) Name one other method of estimating population in living organism. (1mk)

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5. Foot deformity in human beings is controlled by one pair of mutant gene on the homologous chromosomes, the gene for deformity being dominant. Use letter D to represent the gene for deformity and d the gene for normal foot.

 (a) A marriage between a man with normal foot and a woman with deformity produces offsprings with foot deformity explain. (2mks)

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 (b) Work out the phenotypic ratio of the children from a marriage between one of the daughters and a normal man. (5mks)

 (c) Explain why the condition is extremely rare in the human population. (1mk)

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**SECTION B**

***Answer questions 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8***

6. The table below shows how the quantities of sweat and urine vary with external temperatures.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| External temperature | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 |
| Urine cm3 / hour | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 |
| Sweat cm3 /hour | 5 | 6 | 10 | 15 | 30 | 60 | 120 | 200 |

 (a) Using the same axis draw graphs of quantities of urine and sweat against the external temperature. (7mks)

 (b) At what temperature are the amount of sweat produced and urine produced equal. (1mk)

 (c) Account for the amount of sweat produced as the temperature rises. (3mks)

 (d) Explain the observation made on the amount of urine produced as the temperature rises

 (4mks)

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 (e) Explain how the following help in temperature regulation when it is cold.

 (i) Hair (3mks)

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 (ii) Blood vessels (2mks)

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7. (a) Explain how structural features in plants of dry habitat affect their rate of transpiration. (14mks)

 (b) Explain why the xylem vessels are efficient for transport of water and mineral salts.(6mks)

8. Explain the adaptations of ileum to its functions. (20mks)

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