

Candidates' Name: Signature:

School;

P530/2

BIOLOGY

Paper 2

July / Aug, 2024

2 ½ hours



EDUCAN EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

BIOLOGY

(THEORY)

Paper 2

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES:

This paper consists of sections; A and B.

*Answer question **one** in section A plus **three** others from section B.*

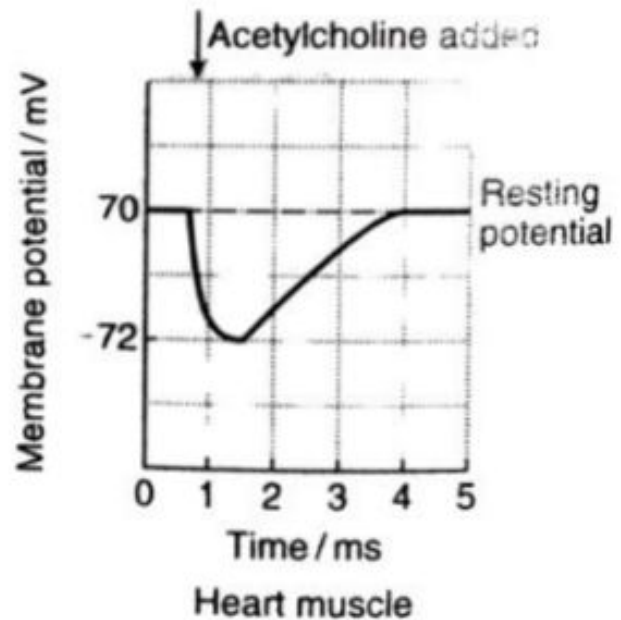
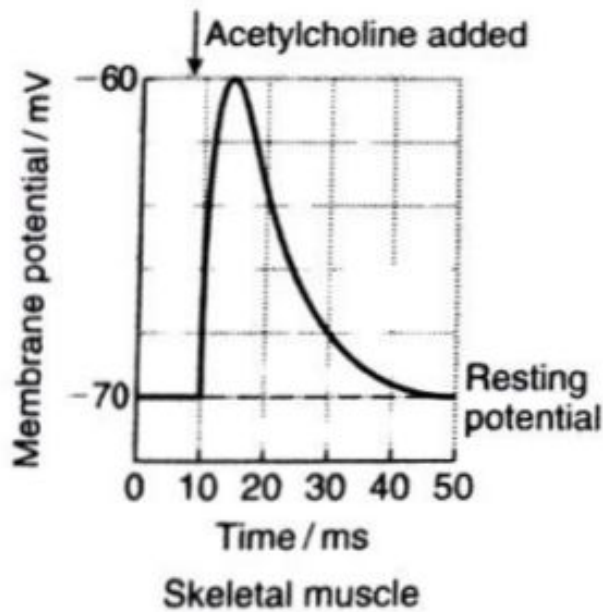
Candidates are advised to read the question carefully, organize their answers and present them

precisely and logically illustrating with well labelled diagrams where necessary.

SECTION A (40 MARKS)

(Compulsory question)

The figures below show the effect of adding acetylcholine to skeletal muscle and heart muscle. Study the figures carefully and answer the questions that follow.



- (a) Describe the changes of the membrane potentials when acetylcholine was added to;
- (i) skeletal muscle. (03 marks)
 - (ii) heart muscle. (03 marks)
- (b) (i) State how the effects of acetylcholine on heart muscle differ from its effects on the skeletal muscle? (02 marks)
- (ii) suggest how the above differences may be related to the functions of the two types of muscles. (04 marks)
- (c) Explain the effect of acetylcholine on;
- (i) skeletal muscle. (10 marks)
 - (ii) heart muscle. (09 marks)
- (d) Why is it important that acetylcholine is rapidly hydrolysed after its work? (03 marks)

- (e) Explain what would happen to the body if the enzyme that hydrolyses acetylcholine was inhibited. (03 marks)
- (f) Outline the importance of synaptic transmission. (03 marks)

SECTION B (60MARKS)

(Attempt only *three* questions from this section)

2. (a) How do Mendel's hypotheses provide evidence for the events that occur during meiosis and fertilization? (05 marks)

(b) A homozygous purple flowered short-stemmed plant was crossed with a homozygous red flowered long-stemmed plant and the F_1 generation had purple flowers and short stems. When F_1 generation was testcrossed with a double homozygous recessive plant, a phenotypic ratio of 1:1:1:1 was obtained.

(i) Using appropriate genetic symbols, show how the above ratio was obtained. (08 marks)

(ii) Suppose the genes for flower colour and stem length are linked, show the phenotypic ratio that would be obtained from selfing the F_1 generation. Explain your answer with reference to the mendelian dihybrid ratio. (07 marks)

3. (a) Compare glycolysis and Krebs's Cycle. (08 marks)

(b) Explain how the products of glycolysis and Krebs's cycle are involved in energy production in presence of oxygen. (12 marks)

4. (a) Describe how the mammalian lung is adapted for gaseous exchange. (08 marks)

(b) With examples, describe how multicellular organisms have solved the problems associated with small surface area to volume ratio. (08 marks)

- (c) Explain why plants do not need to transport respiratory gases in bulk. *(04 marks)*
5. (a) Relate the structure of a rod cell to its function. *(07 marks)*
- (b) With specific examples, classify receptors according to the type of stimulus they detect. *(05 marks)*
- (c) Explain the distribution of thermoreceptors in the human skin. *(08 marks)*
6. (a) What is environmental resistance? *(03 marks)*
- (b) With specific examples, explain how organisms in species rich communities are able to cope with severe competition. *(14marks)*
- (c) How do organisms benefit from competition? *(03 marks)*

END