P530/2
BIOLOGY
(Theory)
Paper 2
NOV. 2022
2½ Hours

UACE BIOLOGY

SUCCESS

(THEORY)

Paper 2

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **six** *questions.*

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

Candidates are advised to read the questions ***carefully***, ***organise*** *their answers and present them* ***precisely*** *and* ***logically***, *illustrating with well labelled diagrams where necessary.*

SECTION A (40 MARKS)

1. Figure **1** shows oxygen-haemoglobin dissociation curves indicating the relationship between the partial pressure of oxygen dissolved in blood plasma, oxygen content in blood and percent saturation of haemoglobin with oxygen.
Various blood conditions were considered:
Normal blood – 0% Carboxyhaemoglobin level (0% HbCO);
Carbon monoxide poisoning – 50% Carboxyhaemoglobin level (50% HbCO);
Anaemia patient – (50% reduction in haemoglobin).

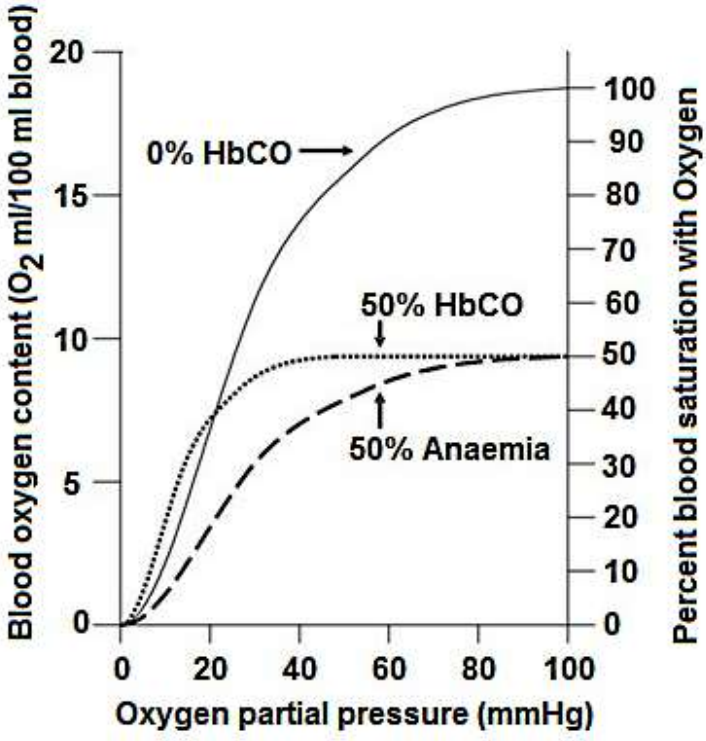

Fig. 1

(a) What is meant by **oxygen-haemoglobin saturation**? (*02 marks*)

(b) Describe the effect of oxygen partial pressure on percent saturation in normal blood. (*05 marks*)

(c) With reference to fig. **1**, compare the patients with carbon monoxide poisoning and those of anaemia. (*08 marks*)

(d) Explain the biological implications of the two physiological conditions on oxygen transport:
(i) 50% Carboxyhaemoglobin (*07 marks*)
(ii) 50% Anaemia (*05 marks*)

(e) How do other physiological factors affect the percent oxygen-haemoglobin? (*10 marks*)

(f) Suggest the common risk factors associated with carbon monoxide poisoning. (*03 marks*)

SECTION B (60 MARKS)

2. (a) How does plasma membrane structure relate to the movement of materials across the cell? (*08 marks*)

(b) Describe the role of cytoskeletal elements and cell organelles in skeletal muscle contraction. (*12 marks*)

3. Describe the contribution of the following adaptations to the evolutionary success of organisms that possess them.

(a) Seeds. (*06 marks*)

(b) Mammalian placenta. (*06 marks*)

(c) C4 metabolism. (*08 marks*)

4. (a) Compare DNA transcription and translation. (*10 marks*)

(b) Describe the steps of synthesising a polypeptide, beginning with the attachment of messenger RNA to ribosomal small subunit. (*10 marks*)

5. (a) For an organism that is heterozygous at two genetic loci on different chromosomes, explain how these alleles are:

(i) Transmitted by mitosis to daughter cells. (*05 marks*)

(ii) Distributed by meiosis to gametes. (*05 marks*)

(b) Show how the behaviour of these two pairs of homologous chromosomes during meiosis provides the physical basis for Mendel's two laws of inheritance. (*10 marks*)

6. (a) Compare life forms of flowering plants and mosses. (*10 marks*)

(b) Explain life strategies in bryophytes for coping with land life. (*10 marks*)

END.