

P530/2

BIOLOGY

Paper 2

JUL./AUG.2019

2 ½ hours

TOPICAL EXAMINATIONS

Uganda Advanced Certificate of Education

GASEOUS EXCHANGE

BIOLOGY

(THEORY)

Paper 2

2 Hours 30 minutes.

INSTRUCTION TO CANDIDATES:

*-This paper consists of section **A** and **B***

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

-Candidates are advised to read carefully, organise their answers and present them logically, illustrating with well labelled diagrams wherever necessary

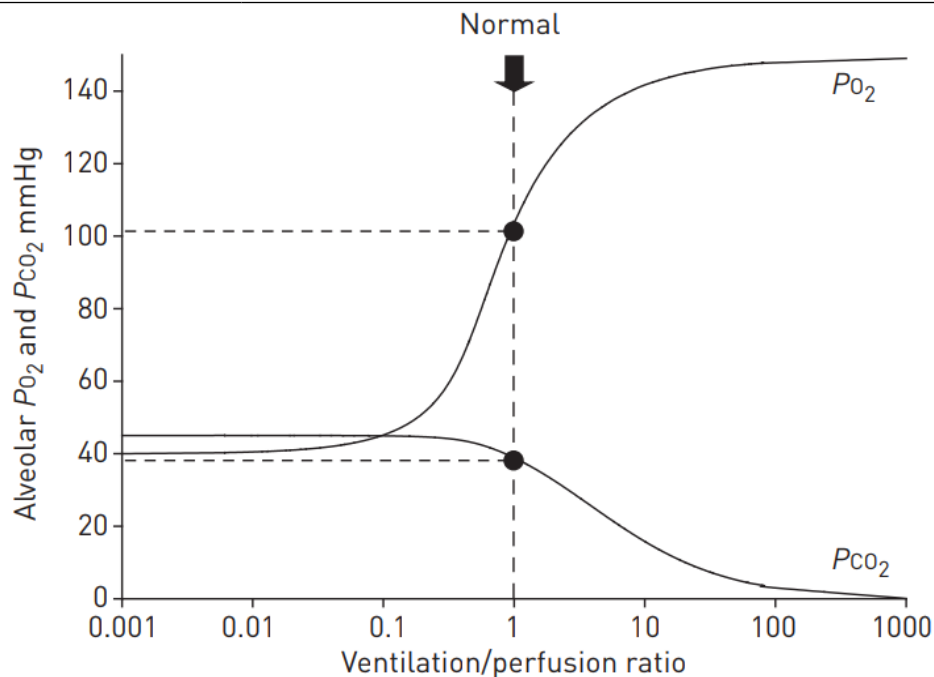
SECTION A.(40 MARKS)

Question one

a). The structure of the lung has evolved to meet the gas exchange needs of the human body, however the lung infections/ injury that may result into obstruction of airways may affect the diffusion and saturation of oxygen into blood.

Figure 1 below shows alveolar oxygen and carbon dioxide partial pressure (P_{O_2} and P_{CO_2}) in homogeneous regions having alveolar ventilation/ perfusion ratio indicated on the abscissa. At normal ventilation/ perfusion ratio of about 1, P_{O_2} is about **100mmHg** and P_{CO_2} is about **40mmHg**.

Ventilation	An active mechanism which draws over and expels respiratory gases away from the gaseous exchange surfaces.
Perfusion	Mechanism by which a substance is introduced into blood to reach a given body organ or tissue.
Homogeneous regions	E.g. alveoli in lungs and blood; (regions with equal amounts of oxygen concentration)
Abscissa	Values on the horizontal axis (X-axis)



- Compare the effect of ventilation/ perfusion ratio on alveolar P_{O_2} and P_{CO_2} (10marks)
- Explain the observations in (i) above. (10marks)

- b) Outline the factors that control the breathing rate (4 marks)
- c) i) how is breathing controlled in man (10 marks)
- ii) Describe the process of inspiration in man (8 marks)
- d) Explain the effect of altitude on breathing rate (8 marks)

SECTION B. (60 MARKS)

Question two

- a) (i) Discuss the factors that affect the rate of diffusion at a respiratory surface (6 marks)
- (ii) How are the conditions for efficient gaseous exchange fulfilled in mammalian lungs? (8 marks)
- b) The diameter of capillaries is smaller than the diameter of the red blood cells passing through them. How is this relationship help in gaseous exchange in the lung? (6 marks)

Question three

Explain

- a) The need for special respiratory surfaces and transport system pigments in higher animals (10 marks)
- b) How gaseous exchange occur adequately in higher plants without transport system pigments (10 marks)

Question four

- a) What are the qualities of respiratory system? (4 marks)
- b) How is each of the following organisms adapted for efficient gaseous exchange?
- (i) An insect (7 marks)
- (ii) A terrestrial flowering plant (6 marks)
- (iii) An amoeba (3 marks)

Question five

- a) What is meant by the term lung ventilation? (3 marks)
- b) Describe the lung ventilation and heart beat can be increased or lowered (17 marks)

Question six

Describe the process of gaseous exchange in terrestrial plants (20 marks)

END