The Hong Kong College of Anaesthesiologists

Intermediate Fellowship Examination

Written Paper in Physiology

12 July 2019 (Friday)

09:00 - 11:00 hours

Instructions:

a. There are three pre-labelled answer books. Please make sure you answer the questions in the respective answer book.
b. Write your candidate number on the cover of each answer book.
c. Use ink or ball-point pen.
d. Answer ALL questions. They are worth equal marks and you should spend approximately **ten minutes** for each question. For questions with multiple parts, allocation of marks is indicated in the brackets.

1. **Describe the mechanisms of excitation-contraction coupling in skeletal muscle fibers (70%). Outline the physiological basis of tetanic contraction (30%).**

2. **Define functional residual capacity (FRC) and outline the factors affecting it (50%). What are the physiological consequences if FRC is reduced by one liter (50%)?**

3. **Describe the mechanisms of filtration and reabsorption of glucose in the kidney nephron (70%). Outline the physiological consequences of glycosuria (30%).**

4. **Explain the role of baroreceptors in the control of blood pressure.**

5. **Describe the gas exchange and endocrine functions of the placenta.**

6. **Explain the factors that influence the movement of fluid across the capillary membranes in the systemic circulation (60%). How is this process different from the glomerular capillary bed (40%)?**

7. **Define anatomical, alveolar and physiological dead space (30%). Outline the factors affecting dead space (30%). Explain how anatomical dead space can be measured (40%).**

8. **Describe the structure of adult haemoglobin and explain how it is related to the shape of the oxygen dissociation curve (60%). Outline how haemoglobin is broken down and excreted (40%).**

9. **Describe the distribution of magnesium in the body and its homeostasis (50%). What are the physiological functions of magnesium (50%)?**

10. **Outline the anatomy and functions of the anterior and posterior pituitary.**

11. **Discuss the factors affecting the value of end-tidal carbon dioxide recorded in a paralyzed patient receiving mechanical ventilation through a tracheal tube.**

12. **Describe the transmission pathway and outline the neurotransmitters involved in the perception of pain at the site of surgical incision.**

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