The Hong Kong College of Anaesthesiologists

Intermediate Fellowship Examination

Written Paper in Physiology

27 February 2026 (Friday)

09:00 - 11:00 hours

Instructions:

a. There are twelve 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 determinants of coronary blood flow. (60%)**

   Explain how increases in myocardial oxygen demand are met by changes in coronary blood flow. (40%)

2. **Draw a labelled spirometry tracing for a healthy adult (70 kg) performing normal breathing followed by maximal inspiration and maximal expiration. Name all lung volumes and capacities shown, with typical values in ml/kg. (60%)**

   Outline the changes in these lung volumes/capacities in a term pregnant woman, including direction and approximate magnitude of change where known. (40%)

3. **Please use a diagram to illustrate the neural pathways involved in vomiting (33%) and describe in detail the sequence of events during vomiting (67%).**

4. **Explain the hormonal mechanisms involved in glucose metabolism and fluid balance when a healthy adult is fasted for 24 hours.**

5. **Describe the physiology of sleep with particular reference to the stages, EEG characteristics and comparison to general anaesthesia.**

6. **Describe the principles of**
   (1) countercurrent multiplication and exchange in the kidney (70%),
   (2) countercurrent heat exchange mechanism functions in the upper airway (30%)

7. **Describe four physiological functions of calcium ion. (40%)**

   Outline the regulation of plasma calcium, including the process of calcium absorption, excretion and the hormonal mechanisms involved. (60%)

8. **Outline the immunological mechanisms involved in an acute haemolytic transfusion reaction. (60%)**

   List four key clinical or laboratory features that help distinguish an acute haemolytic transfusion reaction from: (40%)
   a) Febrile non-haemolytic transfusion reaction
   b) Anaphylactic transfusion reaction

9. **Compare and describe the characteristics of human skeletal muscle with cardiac muscle in terms of anatomical and electrical properties.**

10. **Describe the roles and state the specific physiological changes induced by Human Chorionic Gonadotropin (hCG), Oestrogen and Progesterone in maintaining pregnancy.**

11. **Outline the differences between laminar and turbulent flow. (70%)**

    Explain the type(s) of flow present when the rotameter is used to measure gas flow at different flow rates. (30%)

12. **Describe and explain the cardiovascular changes in a healthy adult during aerobic exercise.**

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