# The Hong Kong College of Anaesthesiologists

## Intermediate Fellowship Examination

## Written Paper in Physiology

## 24 July 2020 (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. **Draw the pressure-volume (PV) loop of the normal left ventricle (30%). In a separate diagram, illustrate the changes of the PV loop in a patient with acute systolic heart failure (30%). What are the systemic compensatory mechanisms in cardiogenic shock (40%)?**

2. **Compare the similarities and differences between aerobic and anaerobic respiration.**

3. **Explain the factors affecting oxygen transfer from mother to the fetus.**

4. **Describe the physiological consequences of intravenous infusion of 100 ml 8.4% sodium bicarbonate solution.**

5. **Describe how iron homeostasis is maintained in our body.**

6. **Define closing capacity and outline its clinical significance (50%). Explain how closing capacity can be measured using the nitrogen washout test (50%).**

7. **With the aid of a labelled diagram, describe the structure and function of the juxtaglomerular apparatus (50%). Explain how tubuloglomerular feedback regulates glomerular filtration (50%).**

8. **Outline the composition and production of cerebrospinal fluid.**

9. **Define the term "thermal neutral zone" (20%). What is the thermal neutral zone of a neonate (10%)? How does the maintenance of body temperature in a neonate differ from that in an adult (70%)?**

10. **Describe the physiological effects of thyroid hormone.**

11. **Describe the changes in one unit of donor whole blood after being stored for 28 days at 4°C.**

12. **Explain the respiratory and cardiovascular changes in morbidly obese patients and outline their anaesthetic implications.**

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