



The Hong Kong College of Anaesthesiologists
Intermediate Fellowship Examination
Written Paper in Physiology
11 July 2024 (Thursday)
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. Explain the mechanisms and physiological significance of Frank-Starling law of the heart (40%). Describe the mechanisms underlying the control of heart rate and stroke volume by the sympathetic and parasympathetic stimulation (60%).
2. Discuss the physiological reasons for an increased alveolar-arterial O₂ gradient in a 75-year-old man.
3. Describe how loss of normal renal functions may lead to the various clinical manifestations of renal failure.
4. Explain, with examples, the four mechanisms for the transport of substances across the cell membrane.
5. Describe the cerebral changes due to hyperventilation.
6. Describe the regulation and physiological significance of cortisol secretion.
7. Describe platelets and their roles in hemostasis.
8. Explain the consequences of iron deficiency anaemia.
9. Describe the respiratory changes during passive volume-controlled ventilation of the lung.
10. Using appropriate diagram(s), explain the cardiovascular changes associated with the Valsalva manoeuvre.

- 11. Describe the physiological changes at term pregnancy that may affect cardiopulmonary resuscitation.**

- 12. Describe and explain the use of the Doppler effect to measure velocity of blood flow in ultrasound imaging (50%). Explain how cardiac output can be measured using the Doppler technique during echocardiography. (50%)**

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