

**POSTGRADUATE INSTITUTE OF MEDICINE**  
**UNIVERSITY OF COLOMBO**

**MD (ANAESTHESIOLOGY) PART I B**  
**(BASIC SCIENCES) EXAMINATION**  
**AUGUST 2018**

Date: 10<sup>th</sup> August 2018

Time: 1.00 p.m. – 4.00 p.m.

**ESSAY PAPER**

**Answer each question in a separate book.**

**Answer two questions from each part, marked A, B, C.**

**Each question carries equal marks.**

**PART A – PHARMACOLOGY**

1.
  - 1.1. Classify drugs that act on opioid receptors according to their intrinsic activity with an example for each. (5%)
  - 1.2. State the mechanism of action at receptor level of (30%)
    - 1.2.1. Morphine
    - 1.2.2. Tramadol
  - 1.3. Explain with reasons the difference in the onset of action, duration and elimination half-life of the following drugs when given as an intravenous bolus. (20%)
    - 1.3.1. Fentanyl
    - 1.3.2. Morphine
  - 1.4. Outline the metabolism of (25%)
    - 1.4.1. Fentanyl
    - 1.4.2. Morphine
  - 1.5. List the following regarding administration of tramadol (20%)
    - 1.5.1. side effects
    - 1.5.2. cautions

2.
  - 2.1. An intravenous agent is administered as a bolus dose followed by an infusion for 2 hours.  
What pharmacological factors would determine its brain concentration **at the time of the bolus injection**? (15%)
  - 2.2.
    - 2.2.1. Define context sensitive half time (CSHT). (5%)
    - 2.2.2. Briefly describe the factors which affect CSHT (30%)
  - 2.3. Describe the mechanisms of drug transfer across the placenta with examples. (20%)
  - 2.4. State how the following drugs affect the fetus. (30%)
    - 2.4.1. Lignocaine
    - 2.4.2. Atracurium
    - 2.4.3. Ephedrine
3. Explain the following
  - 3.1. Mode of action and side effects of metformin in diabetes mellitus (30%)
  - 3.2. Pharmacological basis of the use of rivaroxaban in deep vein thrombosis (25%)
  - 3.3. Cough as a side effect with use of enalapril (20%)
  - 3.4. Lorazepam is not a preferable sedative in intensive care (25%)

## PART B – PHYSIOLOGY

1.
  - 1.1 List the forms in which CO<sub>2</sub> is carried in blood. (10%)
  - 1.2 Briefly explain
    - 1.2.1. Chloride shift (15%)
    - 1.2.2. Haldane effect (15%)
  - 1.3.
    - 1.3.1. Draw and label the CO<sub>2</sub> dissociation curve (25%)
    - 1.3.2. State how it differs from the oxygen dissociation curve (10%)
  - 1.4. Outline the effects of hypercapnoea on the cardiovascular system (25%)
2.
  - 2.1. Describe with illustrations, the mechanisms by which cerebral blood flow is regulated (40%)
  - 2.2. Briefly explain the physiological effects of the following on raised intracranial pressure (ICP)
    - 2.2.1. hyperventilation (15%)
    - 2.2.2. hypothermia (15%)
  - 2.3. Describe the physiological basis of the following in raised ICP
    - 2.3.1. Cushing's reflex (15%)
    - 2.3.2. Pupillary response to light (15%)

3.

- 3.1. Classify the types of hormones giving two examples for each (15%)
- 3.2. Outline the mechanism of action of above types of hormones at cellular level (30%)
- 3.3. Explain the synthesis and release of thyroid hormones (35%)
- 3.4. List the functions of thyroid hormones (20%)

**PART C – PHYSICS, CLINICAL MEASUREMENT AND  
CLINICAL CHEMISTRY**

1.
  - 1.1. Define
    - 1.1.1. Saturated vapour pressure (SVP) (05%)
    - 1.1.2. Critical temperature (05%)
  - 1.2. Illustrate how the SVP of an inhalational agent changes with temperature (10%)
  - 1.3. Describe the methods used to achieve SVP in a plenum vaporizer. (25%)
  - 1.4. Describe the methods used to maintain constant vapour output with varying temperature. (25%)
  - 1.5. What features are included to minimize the effects of back flow into the vaporizer? (10%)
  - 1.6. How does the TEC 6 vaporizer differ from other vaporizers? (20%)
2.
  - 2.1. Draw and label a normal capnograph. (05%)
  - 2.2. Describe the physical principle and the components of an end tidal CO<sub>2</sub> analyser (45%)
  - 2.3 Explain the sources of error with the above method. (20%)
  - 2.4. Briefly explain the methods used to minimize these errors. (20%)
  - 2.5. Enumerate five (5) clinical situations diagnosed by capnography giving Illustrations. (10%)
3. Write short notes on
  - 3.1. Physical principle of a pressure regulator. (35%)
  - 3.2. Isolated (floating) patient circuits. (35%)
  - 3.3. Anaesthesia suction system. (30%)