

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES)
EXAMINATION – AUGUST 2016

Date :- 5th August 2016

Time :- 1.00 p.m. – 4.00 p.m.

Answer each question in a separate book. Mark A,B or C and the question number.
Answer **two** questions from each part.

Each essay carries equal marks.

PART A - (PHARMACOLOGY (BOOK 'A'))

1.
 - 1.1. What **pharmacokinetic factor** of a drug determines the
 - (a) loading dose prior to an infusion
 - (b) maintenance dose of an infusion
 - (c) dosing interval (15%)
 - 1.2. Explain with illustrations, the change of plasma concentration of a drug with time, when
 - (a) given as a constant infusion (15%)
 - (b) the rate of infusion is doubled (10%)
 - (c) the infusion is discontinued at steady state (20%)
 - 1.3.
 - (a) What is the therapeutic index of a drug? (10%)
 - (b) How do you determine the therapeutic index of a drug? (15%)
 - (c) Explain the clinical value of it with examples. (15%)
2.
 - 2.1. Explain the mechanism of actions of
 - (a) Aspirin (30%)
 - (b) Paracetamol (10%)
 - 2.2. Outline the metabolism of the above drugs. (30%)
 - 2.3. What is the pharmacological basis for the treatment of over dosage of these drugs? (30%)

3. Justify the following statements.

- 3.1. Sevoflurane has a better pharmacological profile than halothane for inhalational induction. (30%)
- 3.2. Rocuronium is an alternative for suxamethonium in rapid sequence induction. (40%)
- 3.3. Intravenous lignocaine is an antiarrhythmic while bupivacaine is arrhythmogenic. (30%)

PART B – PHYSIOLOGY (BOOK 'B')

1.

- 1.1. Define alveolar ventilation and outline its relationship to dead space. (20%)
- 1.2. What are the components of dead space? List the factors affecting above components. (20%)
- 1.3.
- (a) Outline the measurement of alveolar ventilation using exhaled carbon dioxide.
- (b) Draw a graph to demonstrate the effect of alveolar ventilation on alveolar carbon dioxide tension ($PACO_2$) (40%)
- 1.4. Briefly explain the cardiovascular effects of intermittent positive pressure ventilation. (20%)

2.

- 2.1. State the importance of precise H^+ regulation in the body. (20%)
- 2.2. Explain how the body handles the addition of an acid load to its circulation. (30%)
- 2.3. Give the physiological basis for the occurrence of hyperkalaemia in diabetic ketoacidosis. (20%)
- 2.4. Outline how the kidney excretes potassium. (30%)

3.

- 3.1. Draw a labelled diagram of the structure of a liver lobule. (20%)
- 3.2. "All the blood that traverses through the gut, spleen and pancreas flows immediately into the liver by way of the portal vein". Explain the significance of the above statement (35%)
- 3.3. List the clotting factors produced by the liver. (10%)
- 3.4. Outline the mechanisms involved in achieving haemostasis following tissue injury. (35%)

**PART C – PHYSICS, CLINICAL MEASUREMENT AND CLINICAL
CHEMISTRY (BOOK 'C')**

1. Explain the following with regard to ultrasound
 - 1.1. The principles of ultra sound imaging. (40%)
 - 1.2. The frequency effect. (10%)
 - 1.3. The modes (scanning techniques) used in medical imaging. (50%)

2. Indicate the gas law involved and explain how it applies in each of the following situations
 - 2.1. Calibration of a vaporiser (30%)
 - 2.2. Hyperbaric oxygen therapy (35%)
 - 2.3. Calculation of available volume of oxygen in an E cylinder (10 L) with a gauge pressure of 120 bar. (35%)

3.
 - 3.1. Describe the physical principle of a defibrillator. (25%)
 - 3.2. Describe and illustrate graphically the difference between biphasic and monophasic defibrillators. (25%)
 - 3.3. Briefly explain inductance and interference. (25%)
 - 3.4. Outline the measures to prevent diathermy interference in cardiac pace maker function. (25%)