

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES)
EXAMINATION – AUGUST 2020

Date:- 14th August 2020

Time:- 9.30 a.m. – 12.30 p.m.

ESSAY PAPER

Answer each question in a separate book.

Answer two (02) questions from each part, marked A, B, C.

Each question carries equal marks.

PART A – PHARMACOLOGY

1.
 - 1.1. Define the steady state plasma concentration of a drug. (10%)
 - 1.2. Explain with illustrations, the changes in plasma concentration of a drug with time, when administered as
 - 1.2.1. a single intravenous dose (15%)
 - 1.2.2. intermittent boluses at its half-life (15%)
 - 1.3. Outline briefly the pharmacological factors which affect the steady state plasma concentration of a drug given as an intravenous infusion. (30%)
 - 1.4. Explain briefly the pharmacodynamic effects of propofol. (30%)

Contd...../2-

2.
 - 2.1.
 - 2.1.1. Explain the mechanism of action of following drugs
 - (a) morphine (15%)
 - (b) tramadol (10%)
 - 2.1.2. State the metabolism of above (a) and (b). (15%)
 - 2.1.3. List the side effects of intrathecal morphine. (10%)
 - 2.1.4. State the pharmacological basis of opioid tolerance. (10%)
 - 2.2. Outline the benefits and limitations of ketamine. (40%)
3.
 - 3.1. Outline the mechanism of action and clinical uses of
 - 3.1.1. Phenylephrine (15%)
 - 3.1.2. Glyceryl trinitrate (25%)
 - 3.2.
 - 3.2.1. What are the indications for intravenous $MgSO_4$? (10%)
 - 3.2.2. Explain briefly the pharmacological basis for its use. (20%)
 - 3.3. Compare the mechanism of action of omeprazole and famotidine in stress ulcer prophylaxis. (30%)

Contd...../3-

PART B - PHYSIOLOGY

1.
 - 1.1. Briefly explain the distribution of blood flow in the upright lung. (30%)
 - 1.2. Describe the physiological basis for the differences in blood flow in the different zones of the lung. (40%)
 - 1.3. "PCO₂ of the blood returning from the upper part of the lung is lower than the PCO₂ of the blood returning from the lower part of the lung."
Explain the physiological basis for the above with the aid of a diagram. (30%)
2.
 - 2.1. Define myocardial contractility. (10%)
 - 2.2. Using a diagram briefly explain the pressure-volume relationship of the left ventricle. (25%)
 - 2.3. Indicate on the above diagram, the effect of increased contractility on
 - 2.3.1. End systolic volume (10%)
 - 2.3.2. End diastolic volume (10%)
 - 2.4. What are the factors that affect the myocardial oxygen supply and demand? (45%)
3.
 - 3.1. Outline the factors contributing to the resting membrane potential of nerves. (25%)
 - 3.2. Describe the events which occur during an action potential in a nerve. (35%)
 - 3.3. Using a labelled diagram explain the events that occur when an impulse reaches the neuromuscular junction. (40%)

Contd...../4-

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

1.
 - 1.1. What is a capacitor? (15%)
 - 1.2. List the factors which improve the performance of a capacitor. (25%)
 - 1.3. Describe the principles of the defibrillator with illustrations during
 - 1.3.1. charging
 - 1.3.2. discharging (40%)
 - 1.4. Explain the difference between monophasic and biphasic modes. (20%)

2.
 - 2.1. Define specific heat capacity. (10%)
 - 2.2. List the methods available for measurement of temperature. (20%)
 - 2.3. Write the physical principle of the cryo-probe. (30%)
 - 2.4. Explain the functioning of the vacuum insulated evaporator. (40%)

3. Write short notes on:
 - 3.1. Wheatstone Bridge circuit with a clinical application. (40%)
 - 3.2. Venturi principle with a clinical application. (30%)
 - 3.3. Physical principle of forming Entonox (Poynting effect). (30%)