

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION
MARCH 2015

Date : 16th March 2015

Time : 1.00 p.m. – 4.00 p.m.

ESSAY PAPER

Answer each part in a separate book, marked A, B and C.

Answer two questions from each part.

Each essay carries equal marks.

PART A – PHARMACOLOGY (BOOK ‘A’)

1.
 - 1.1. Define
 - (a) Terminal half life (20%)
 - (b) Context sensitive half time
 - 1.2. Describe with illustrations the changes in plasma concentration of a drug when administered as
 - (a) a single bolus dose
 - (b) intermittent bolus doses
 - (c) continuous infusion without a loading dose (60%)
 - 1.3. Explain briefly how a steady state of plasma concentration of a drug is achieved rapidly. (20%)
2.
 - 2.1. Define
 - (a) blood:gas partition coefficient
 - (b) minimum alveolar concentration (MAC) (20%)
 - 2.2. Describe the clinical significance of above (a) and (b). (40%)
 - 2.3. Compare the clinical effect of blood:gas partition coefficient of halothane, isoflurane and sevoflurane using an illustration. (40%)

- 3.
- 3.1. What is a positive inotrope ? (15%)
- 3.2. Explain the mechanism of inotropic action of the following
- (a) Adrenaline (60%)
- (b) Milrinone
- (c) Digoxin
- 3.3. Explain the benefits and drawbacks of using dobutamine in the treatment of cardiogenic shock. (25%)

PART B – PHYSIOLOGY (BOOK ‘B’)

1.

1.1

- (a) Define V/Q ratio of the lung, giving its numerical value. (10%)
- (b) How does V/Q ratio vary in different regions of the lung in the upright position? (20%)

1.2

- (a) Draw a graph to show how the regional changes of V/Q ratio affects PaO_2 and $PaCO_2$ (20%)
- (b) How would the changes of V/Q ratios from normal to abnormal affect $PaCO_2$ and PaO_2 ? Explain your answer with illustrations. (50%)

2.

2.1 What is the normal coronary blood flow of a healthy adult at rest ? (5 %)

2.2 List the factors that affect myocardial oxygen supply and demand (25%)

2.3 Describe how the coronary blood flow is maintained and adjusted to meet the demands under normal physiological conditions. (70%)

3.

3.1. Define the stress response to surgery. (10%)

3.2. Briefly describe the endocrine response to surgery and its metabolic sequelae. (90%)

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

1.
 - 1.1. List the components of an intra-arterial blood pressure monitoring system? (20%)
 - 1.2. Outline the physical principle and the factors which affect the accuracy of this system mentioned in 1.1 (80%)
2.
 - 2.1. What factors determine the effects of electrocution? (25%)
 - 2.2. Outline the methods used to minimise electrocution in an operating theatre. (75%)
3. Briefly describe the physical principles of the following and mention its use/s.
 - 3.1. Modern paramagnetic analyser (40%)
 - 3.2. Bourdon gauge (30%)
 - 3.3. Severinghaus electrode (30%)

POSTGRADUATE INSTITUTE OF MEDICINE
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MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION
AUGUST 2015

Date : 10th August 2015

Time : 1.00 p.m. – 4.00 p.m.

Answer each part in a separate book, marked A, B ,C.

Answer two questions from each part.

Each essay carries equal marks.

PART A – PHARMACOLOGY (BOOK 'A')

1.
 - 1.1. Describe the structural changes required to convert barbituric acid to an intravenous induction agent. (30%)
 - 1.2. Outline the structural changes that occur in
 - (a) Thiopentone (10%)
 - (b) Midazolam (10%)when given intravenously.
State the clinical relevance. (20%)
 - 1.3. Describe the metabolism of the drugs mentioned in 1.2. (30%)
2.
 - 2.1. Describe the changes in pharmacokinetics expected in
 - (a) old age (35%)
 - (b) renal dysfunction (35%)
 - 2.2. State the modifications required when using morphine in renal dysfunction. Explain with reasons. (30%)
3.
 - 3.1. Classify anticholine-esterases giving examples. (15%)
 - 3.2. Describe the mechanism of action of neostigmine at the neuromuscular junction. (35%)
 - 3.3. Explain how other pharmacological agents alter the action of non depolarizing muscle relaxants? (50%)

PART B – PHYSIOLOGY (BOOK 'B')

1.
 - 1.1. Explain the systolic and diastolic functions of the heart. (30%)
 - 1.2. Draw a graph to show the left ventricular dynamic pressure volume relationship (25%)
 - 1.3. Describe with appropriate graphs the changes that occur to the above Mentioned (1.2) relationship with increasing.
 - (a) preload (15%)
 - (b) contractility (15%)
 - (c) afterload (15%)
2.
 - 2.1. List the functions of the placenta. (30%)
 - 2.2. Describe the factors that affect oxygenation of the fetus. (70%)
3.
 - 3.1.
 - (a) Draw a diagram to illustrate the cellular mechanism of hydrochloric acid formation in the stomach. (20%)
 - (b) Describe the mechanism (60%)
 - 3.2. List the other substances secreted in the stomach indicating the relevant cells (20%)

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

1.
 - 1.1. What is an exponential process ? (20%)
 - 1.2. Describe exponential decay (20%)
 - 1.3. Mention two instruments which exhibit exponential decay characteristic ? (10%)
 - 1.4. Describe the physical principles of the two instruments you mentioned in 1.3 (50%)

2.
 - 2.1. Describe the physical principles of transoesophageal Doppler ultrasonography in the measurement of cardiac output. (50%)
 - 2.2. Outline the advantages and disadvantages of this method (30%)
 - 2.3. List the other methods available to measure cardiac output (20%)

3. Write short notes
 - 3.1. Temperature compensation in the modern TEC vaporizer (30%)
 - 3.2. Skewed distribution (35%)
 - 3.3. Hot water bath humidifier (35%)