

Master copy 28/02/2020

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES)**  
**EXAMINATION – FEBRUARY/MARCH 2020**

**Date :- 28<sup>th</sup> February 2020**

**Time:- 1.00 p.m. – 4.00 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. Explain with an illustration, the pharmacokinetic principle of a three compartment model in drug delivery. (30%)
  - 1.2. How does this correspond to the delivery of total intravenous anaesthesia (TIVA)? (20%)
  - 1.3. Explain “effect-site drug concentration” in relation to an intravenous induction agent. (10%)
  - 1.4. What are the benefits of TIVA over inhalational anaesthetic agents? (20%)
  - 1.5. Briefly explain, the suitability of remifentanil as an agent or co-agent in TIVA. (20%)

Contd..../2-

2.
  - 2.1. Explain the mode of action of following drugs (20%)
    - 2.1.1. Suxamethonium
    - 2.1.2. Rocuronium
  - 2.2. "Rocuronium is a better drug than suxamethonium for rapid sequence induction of anaesthesia". Justify this statement. (30%)
  - 2.3. Explain the changes in the pharmacological effects of suxamethonium and rocuronium in
    - 2.3.1. liver failure (20%)
    - 2.3.2. renal failure (15%)
  - 2.4. Explain the pharmacological basis for using dantrolene in the management of malignant hyperthermia. (15%)
3.
  - 3.1.
    - 3.1.1. Outline the antiarrhythmic effect of amiodarone. (10%)
    - 3.1.2. List the indications of its use. (05%)
    - 3.1.3. Outline the adverse effects you may encounter when administering this drug. (10%)
  - 3.2. Explain the pharmacological basis of using the following drugs,
    - 3.2.1. Ranitidine for stress ulcer prophylaxis. (20%)
    - 3.2.2. Labetalol for reduction of blood pressure. (20%)
    - 3.2.3. Spironolactone in heart failure. (20%)
  - 3.3. List the side effects of the drugs mentioned in 3.2. (15%)

Contd..../3-

**PART B – PHYSIOLOGY**

1. A 23 year old healthy adult male suffers severe bleeding leading to hypotension following trauma.
  - 1.1. Illustrate in a graph the sequence of the compensatory responses that occur in the above patient to restore the circulation. (30%)
  - 1.2. Briefly explain the mechanisms of the three (03) major responses that will be activated within seconds, according to the illustration above. (30%)
  - 1.3. Briefly describe the physiological basis for metabolic acidosis in haemorrhagic shock. (30%)
  - 1.4. Enumerate the reactions that will take place to achieve haemostasis in this patient, using the cell based model. (10%)
  
2.
  - 2.1. Draw a graph indicating lung volumes and capacities. (15%)
  - 2.2. Describe with an illustration the physiological changes that occur in functional residual capacity (FRC) and closing volume (CV) with advancing age. (25%)
  - 2.3.
    - 2.3.1. What values are obtained using a spirometer to assess lung function? Briefly describe each. (20%)
    - 2.3.2. Briefly explain with a diagram, changes that can be observed in a spirometry tracing with (40%)
      - (a) restrictive lung disease
      - (b) obstructive lung disease
  
3.
  - 3.1. Describe the liver blood flow. (30%)
  - 3.2. Explain the physiological basis for the development of the following conditions in liver dysfunction.
    - 3.2.1. Jaundice (30%)
    - 3.2.2. Encephalopathy (20%)
    - 3.2.3. Ascites (20%)

Contd...../4-

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

1.
  - 1.1. Explain how a plenum vaporizer functions based on physical principles. (20%)
  - 1.2. What factors would affect its accuracy? (25%)
  - 1.3. Explain how above factors are dealt with to achieve optimum performance. (35%)
  - 1.4. Briefly state how the desflurane vaporizer differs from the isoflurane vaporizer. (20%)
  
2.
  - 2.1. What are the features of an ion-selective electrode? (15%)
  - 2.2. Draw a diagram of a plasma pH measuring system. (20%)
  - 2.3. Explain how a value for pH is obtained with the above system. (50%)
  - 2.4. How do you interpret the pH in relation to patient's temperature? (15%)
  
3. Write short notes on:
  - 3.1. Sources of error in direct arterial pressure monitoring. (40%)
  - 3.2. Heat and Moisture Exchanger (HME). (30%)
  - 3.3. Hypothesis testing. (30%)