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POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES)
EXAMINATION – MARCH 2019

Date :- 29th March 2019 **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 and C.
Each question carries equal marks.

PART A – PHARMACOLOGY

1.

1.1.

1.1.1. Define volume of distribution. (5%)

1.1.2. What are the drug related factors which affect volume of distribution? (15%)

1.1.3. How would you calculate volume of distribution of an intravenous drug with a single compartment model? (5%)

1.2. Explain how following conditions affect volume of distribution. (20%)

1.2.1. old age

1.2.2. liver dysfunction

1.3. Outline the metabolism of the following drugs (15%)

1.3.1. pethidine

1.3.2. pancuronium

1.4. Explain how renal failure affects the clearance of (15%)

1.4.1. pethidine

1.4.2. pancuronium

1.5. Explain the effects of pharmacogenetic variations with regard to metabolism of (25%)

1.5.1. Codeine

1.5.2. suxamethonium

Contd..../2-

2.

2.1. Define the following in relation to inhalational anaesthetic agents. (10%)

2.1.1. Blood gas partition coefficient

2.1.2. MAC -BAR

2.2. Enumerate the factors that will determine the partial pressure of inhaled sevoflurane in the brain. (15%)

2.3. How does desflurane differ from isoflurane with regard to the following? (25%)

2.3.1. Speed of induction

2.3.2. Potency

2.3.3. Metabolism

2.4. What pharmacokinetic features of the following drugs make them suitable for TIVA (total intravenous anaesthesia)? (30%)

2.4.1. Propofol

2.4.2. Remifentanil

2.5. "Etomidate is the agent of choice for rapid sequence induction in the emergency department". Justify this statement. (20%)

3. Explain with reasons

3.1. Glycopyrrolate has a better pharmacological profile than atropine as an antimuscarinic agent. (25%)

3.2. Dexmedetomidine is a better alternative than midazolam for sedation in the intensive care unit. (25%)

3.3. Hartmann's solution is better than normal saline in treating severe dehydration. (20%)

3.4. Low molecular weight heparin is better than unfractionated heparin in preventing deep vein thrombosis. (30%)

Contd..../3-

PART B – PHYSIOLOGY

1.

1.1. Outline with an illustration, the autonomic innervation of the heart. (10%)

1.2.

1.2.1. Describe the effects of autonomic activity on the heart. (25%)

1.2.2. Illustrate the effects of autonomic activity on the cardiac function curve. (20%)

1.3. Outline the effects of the following conditions on heart function indicating the changes that can be seen in the ECG. (45%)

1.3.1. Hyperkalaemia

1.3.2. Hypokalaemia

1.3.3. Hypercalcaemia

2.

2.1.

2.1.1. Briefly describe the blood supply to the kidneys in relation to its structure. (10%)

2.1.2. How does the difference in blood flow to different parts of the nephron relate to its function? (20%)

2.2.

2.2.1. Outline the forces that determine fluid movement across the capillary membrane. (15%)

2.2.2. What is the new concept introduced to explain the above? (5%)

2.3. Explain with illustrations how fluid filtration differs in the:

2.3.1. glomerular capillaries (25%)

2.3.2. pulmonary capillaries (25%)

3. "Mean PO_2 in foetal blood after oxygenation is about 30 mmHg".

3.1. Describe how the foetus has adapted to obtain sufficient oxygen for survival using a graphical illustration where necessary. (50%)

3.2. Briefly explain excretion of CO_2 in the foetus. (10%)

3.3. Outline the changes occurring in the respiratory system after birth. (40%)

Contd...../4-

PART C – PHYSICS, CLINICAL MEASUREMENT AND CLINICAL CHEMISTRY

1.

1.1. Briefly describe the principle of spectrophotometric oximetry. (30%)

1.2. How is the above method incorporated in pulse oximeter? (30%)

1.3. Explain the factors affecting accuracy and reliability of pulse oximetry reading. (30%)

1.4. What information can be obtained from jugular bulb oximetry? (10%)

2.

2.1. Draw a labeled diagram of an assembled invasive arterial blood pressure monitoring system. (20%)

2.2. Briefly describe the function of each of its components. (15%)

2.3. Explain the essential features of the following in relation to physical principles (35%)

2.3.1. arterial catheter

2.3.2. pressure transducer

2.4.

2.4.1. What is damping? (10%)

2.4.2. Explain over damping, optimum damping and under damping. (10%)

2.4.3. State the changes that occur to systolic, diastolic and mean blood pressure in the above situations. (10%)

3. Write short notes on

3.1. Bispectral Index (BIS) monitoring (30%)

3.2. Doppler principle and its usage in clinical practice. (40%)

3.3. Meta-analysis. (30%)