

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

**MD (ANAESTHESIOLOGY) PART I (BASIC SCIENCES) EXAMINATION**  
**AUGUST 1993**

Date: 17<sup>th</sup> August, 1993

Time: 9.00 a.m.-12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss pharmacogenetics in relation to anaesthesia.
2. Describe the mechanisms of action and limitations of antagonists to drugs commonly used in anaesthesia.
3. Write short notes on the mode of action at receptor level of the followings:
  - (a) Muscle relaxants
  - (b) Local anaesthetics
  - (c) Calcium antagonists

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Discuss the factors affecting the regulation and distribution of pulmonary blood flow.
2. What are the physiological consequences of changing from the supine to the upright posture ?
3. "The temperature of the body is regulated almost entirely by nervous feedback mechanisms." Discuss the validity of this statement.

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

1. Describe the features of the ideal vaporizer.  
Naming a vaporizer used in current practice, indicate how it would compare with the ideal.
  
2. Describe the types of instruments available for measuring gas volumes and discuss their relative accuracies.  
What are the various sets of conditions under which gas volumes are conventionally reported.
  
3. Write short notes on:
  - (a) The difference between standard deviation and standard error
  - (b) The venturi principle
  - (c) Critical temperature

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

**MD (ANAESTHESIOLOGY) PART IB EXAMINATION**  
**SEPTEMBER, 1994**

Date: 13<sup>th</sup> September 1994

Time: 9.00 a.m.-12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. List the intra venous vasodilators available for the control of blood pressure. Discuss the pharmacological actions, indications and complications of two of drugs-whose mode of action differ.
2. Discuss the pharmacology of drugs used to increase urine flow.
3. Write short notes on the metabolism of  
Atracurium  
Diazepam  
Halothane

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Outline the possible physiological causes of a low arterial oxygen tension.
2. Discuss the importance of sodium in the regulation of osmolality and volume of the extra cellular fluid.
3. Write short notes on the following:
  - (a) Action potentials of cardiac cells.
  - (b) Regulation of glomerular filtration rate.
  - (c) Carriage of carbon dioxide in the blood.

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

1. Describe the principle of surgical diathermy.  
Naming the potential hazards associated with its use, indicate what steps are taken to minimize them.
2. What are the methods available to monitor inspired oxygen concentration in an anaesthetic mixture ? Give detailed descriptions of two of the methods.
3. Write short notes on three of the following:
  - (a) Thermocouple
  - (b) Central tendency
  - (c) Base excess
  - (d) Isobestic point

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

**MD (ANAESTHESIOLOGY) PART-IB EXAMINATION**  
**AUGUST, 1995**

Date: 22<sup>nd</sup> August 1995

Time: 9.00 a.m. - 12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Compare and contrast d-tubocurarine and atracurium.
2. Give an account of the mode of action, onset, duration of action and side effects of drugs that control gastric acid secretion.
3. Write short notes on
  - (a) Adverse effects of nitrous oxide.
  - (b) The plasma half-life of a drug.
  - (c) The toxicity of Bupivacaine.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Discuss the factors affecting the alveolar partial pressure of carbon dioxide.
2. What is mixed venous blood?  
Outline the factors, which may alter the oxygen content of mixed venous blood giving their normal values.
3. Discuss the contribution of the kidney to the regulation of acid base balance.

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

1. Describe the physical principles underlying the design of a rotameter. What factors may alter rotameter accuracy in clinical practice?
  
2. List the methods available for the estimation of arterial carbon dioxide tension. Describe the physical principles of one method in detail.
  
3. Write short notes on
  - (a) Correlation coefficient
  - (b) Normal distribution
  - (c) Standard bicarbonate

**POSTGRADUATE INSTITUTE OF MEDICINE**  
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**MD (ANESTHESIOLOGY) PART IB EXAMINATION**  
**AUGUST, 1996**

Date: 20<sup>th</sup> August 1996

Time 9.00a.m. - 12.00noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the disadvantages associated with the use of suxamethonium.
2. What factors influence the plasma concentration after an injection of a local anaesthetic ?
3. Write short notes on:
  - (a) Second messengers
  - (b) First pass metabolism
  - (c) Factors affecting passage of drugs across biological membranes.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Discuss the factors affecting physiological deadspace.  
How does an increase in deadspace affect blood gas tensions?
2. Outline the basic mechanisms controlling cardiac output at rest. What factors lead to an increase during severe exercise?
3. Discuss the factors affecting the concentration of serum potassium. What are the adverse effects of hyperkalaemia ?

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

1. Discuss the use of infrared radiation in gas and vapor analysis.
2. Describe the physical principles involved in the pulse oximeter. What is its clinical value in and out of the operating theatre and what are its limitations?
3. Write short notes on:
  - (a) fuel cell
  - (b) train of four
  - (c) statistical significance



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 1997**

Date: 20<sup>th</sup> August 1997

Time: 9.00a.m. -12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Compare and contrast the cardiovascular effects of Halothane Enflurane & Isoflurane
2. Discuss the mode of action of drugs that are used clinically to increase myocardial contractility. Give one example in each group indicating their main side effects.
3. Write short notes on;
  - (a) Renal elimination of drugs
  - (b) Transdermal administration of drugs
  - (c) Volume of distribution of drugs.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Discuss the factors, which give rise to tissue hypoxia, indicating how the arterial and mixed venous values for saturation of Oxygen are affected in each situation.
2. Describe the mechanisms involved in the control of coronary blood flow in a healthy adult. How does strenuous exercise affect myocardial Oxygen supply and demand in such a heart?
3. Discuss the physiological processes causing oliguria in response to hypovolaemic shock.

**PART C**  
**PHYSIC'S CLINICAL MEASUREMENT**  
**& CLINICAL CHEMISTRY**  
**(BOOK 'C')**

1. Describe the different methods of measuring relative humidity.  
List the common methods by which humidity can be increased in the inspired gases and comment on their effectiveness. List the dangers of commonly used humidifiers.
  
2. List the methods available to measure the concentration of volatile anaesthetic agents.  
Describe the principles involved in two of these methods.
  
3. Write short notes on:
  - (a) Laminar and turbulent flow
  - (b) Non-parametric tests
  - (c) Confidence intervals.

**POSTGRADUATE INSTITUTE OF MEDICINE**  
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**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 1998**

Date: 18<sup>th</sup> August 1998

Time : 9.00 a.m. - 12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the mode of action of non-steroidal anti-inflammatory drugs.  
Explain how their undesirable side effects occur.
2. What drugs can be used in the prevention and treatment of bronchospasm?  
Detail their modes of action.
3. Write short notes on
  - (a) Naloxone
  - (b) Ropivacaine
  - (c) Sevoflurane

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Explain the methods of carbon dioxide carriage in blood. What are the physiological effects of an increase in arterial carbon dioxide tension?
2. Discuss the mechanisms of the circulatory changes, which occur during a valsalva manoeuvre.
3. Explain how a nerve impulse is propagated along a nerve fibre.  
How do electrolyte disturbances alter this process ?

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

1. Describe the principles involved in measuring cardiac output, indicating the drawbacks and advantages of each method.
  
2. Explain the physical principles involved in the design of a facemask for oxygen therapy, which will deliver a constant percentage of inspired oxygen.
  
3. Write short notes on -
  - (a) metabolic acidosis
  - (b) pressure transducers
  - (c) oncotic pressure

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION-**  
**FEBRUARY 1999**

Date: - 23<sup>rd</sup> February 1999

Time: - 9.30 a.m. 12.30 p.m.

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Classify, according to their mode of action, the intravenous vasodilators available for the control of blood pressure. Give examples in each case.
2. List the properties of an ideal intravenous induction agent. How do thiopentone sodium and propofol compare with the ideal?
3. Write short notes on
  - (a) Nifedipine
  - (b) Flumezenil
  - (c) Ephedrine

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. This question concerns the functions of the kidney. Explain the following –
  - (a) in the normal kidney albumin does not appear in the urine.
  - (b) During periods of hypotension the medulla suffers ischaemic changes before the cortex.
  - (c) The sodium concentration in the distal convoluted tubule affects the glomerular filtration rate.

2. Describe and explain the cardiovascular and respiratory changes that occur in response to acute hypoxia.
3. Discuss the physiological factors, which determine and control the intracranial pressure.

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

1. Describe the methods available for the measurement of arterial blood pressure. Discuss the advantages and disadvantages of each method.
2. What methods can be used to measure the concentration of a gas in a mixture? Describe in detail a method applicable to carbon dioxide.
3. Write short notes on
  - (a) Exponential functions.
  - (b) Difference between standard deviation and standard error.
  - (c) Type I and Type II errors.

**POSTGRADUATE INSTITUTE OF MEDICINE**  
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**MD (ANABSTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 1999**

Date: 24<sup>th</sup> August 1999

Time: 9.30a.m. - 12.30p.m

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Describe the mechanism of action by which the following groups of drugs exert beneficial effects in angina.
  - (i) Nitrates
  - (ii) Beta Blockers
  - (iii) Calcium antagonists
  
2. Describe the molecular mechanism of action of benzodiazepines. How may the residual effects of these drugs be reversed?
  
3. Write short notes on the following:
  - (i) Isomerism
  - (ii) Alpha2 agonists
  - (iii) Train of four pattern of peripheral nerve stimulation

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the ionic events that occur in the sino-atrial node during one complete cardiac cycle.  
How do these events differ from those in a myocardial muscle cell ?
  
2. Explain the mechanisms by which oliguria occurs following an acute loss of 30% of blood volume.

3. What is meant by the term homeotherm ?  
Explain the mechanisms by which body temperature is maintained in the awake adult.  
How do these mechanisms differ in the neonate ?

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

1. List the methods available to monitor inspired oxygen concentration during anaesthesia.  
Describe two methods giving their relative advantages. Indicate the desirable features of an ideal oxygen analyzer.
2. What methods are available for measurement of tidal volume? Describe the physical principles involved in one of the instruments in common use.  
List the limitations of the instrument you have described.
3. Write short notes on:
- (i) Bourdon gauge
  - (ii) Absolute and relative humidity including methods by which humidity may be measured.
  - (iii) Correlation coefficient.



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**UNIVERSITY OF COLOMBO**

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**FEBRUARY, 2000**

Date: 22<sup>nd</sup> February 2000

Time: 9.30 a.m.- 12.30 p.m.

**ESSAY PAPER**

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

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**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss how the action of non-depolarizing neuromuscular blocking drugs may be modified by other drugs.
2. Discuss the modes of action of heparin and warfarin. Explain briefly, the adverse effects of these drugs.
3. Write short notes on
  - (i) Ondansetron
  - (ii) Metabolism of morphine
  - (iii) Pharmacokinetics of propofol

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Explain the physiological mechanisms involved in the distribution of pulmonary blood flow including its relationship to ventilation.
2. The following are a set of blood gases obtained from a patient breathing room air spontaneously. (Assume that body temperature is 37°C, Hb is 15 gm/dl)

pH - 7.35  
PCO<sub>2</sub> - 58 mm Hg  
PO<sub>2</sub> - 55 mm Hg  
HCO<sub>3</sub> - 33.1 mmols/L  
O<sub>2</sub> Sat - 89%

Discuss the mechanisms leading to the derangement of each parameter.

3. Explain the physiological consequences of ingestion of 100 gms of glucose in a healthy adult.

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

1. Describe the methods available for the measurement of temperature.  
How can such devices be calibrated?
  
2. Describe in detail how you would accurately measure a patient's peak expiratory flow rate.  
What factors may give rise to erroneous readings?
  
3. Write short notes on
  - (i) Type I & Type II errors
  - (ii) Liquid oxygen storage system
  - (iii) pH electrode

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**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 2000**

Date: 22<sup>nd</sup> August, 2000

Time: 9.00 a.m. -12-00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks, which can be awarded for each essay, is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the mechanisms by which drugs exert pharmacological effects.  
Give examples in each case.
2. Describe the factors that affect the rate of uptake of a volatile anaesthetic agent from the alveolus.  
How are these related to the excretion of the agent ?
3. Write short notes on
  - (a) Dose response curves
  - (b) Drug anaphylaxis
  - (c) Bioavailability

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Compare and contrast the respiratory and cardiovascular effects of intermittent positive pressure ventilation with those of spontaneous ventilation.
2. What factors affect the osmolality of plasma? How does the body deal with changes in osmolality ?

3. Discuss the factors affecting the plasma calcium concentration. What are the important consequences of changes in the concentration outside the normal range?

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

1. Describe the features that can be incorporated into the anaesthetic machine to prevent a hypoxic mixture being administered. Briefly state their limitations.
2. Describe the physical properties of a pressure transducer system that help ensure accuracy of measurement.
3. Write short notes on:
  - a) Oncotic pressure
  - b) The Doppler Effect
  - c) The defibrillator.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**FEBRUARY, 2001**

Date :- 20<sup>th</sup> February, 2001

Time :- 9.00 a.m. - 12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Describe how local anaesthetics work at cellular level.  
Describe the factors that affect the onset, potency, duration of action and toxicity of these agents, illustrating your answer with examples of commonly used drugs.
2. Discuss the pharmacological methods available for reducing the systemic blood pressure in a patient suffering from essential hypertension. Indicate their potential interactions with anaesthetic agents.
3. Write Short notes on the mode of action of the following :-
  - (a) GABA<sub>A</sub> receptor agonists
  - (b) Neuraxial opioids
  - (c) Tramadol

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Define the terms preload and afterload, and explain their significance in the control of cardiac output.  
Describe the intrinsic regulation of stroke volume.
2. Describe the physiological changes that occur in an adult living at 10,000 ft. (3000m) above sea level.

3. What are the physiological consequences of infusing one litre of 0.9% saline into a healthy adult ?  
How would these changes differ if one litre of 5% dextrose was infused instead?

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

1. Why is the Boyle's bottle not ideal as a vaporizer ?  
What features could be incorporated to improve its performance ?
2. In what areas of anaesthetic practice is the measurement of gas flow Important ?  
Describe the various devices used, with reference to the underlying physical principles.
3. Write short notes on :
- a. Diathermy
  - b. Damping
  - c. The design of a face mask to deliver oxygen

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**NOVEMBER, 2001**

Date :- 20<sup>th</sup> November, 2001

Time :- 9.00 a.m. - 12.00 noon

**ESSAY PAPFR**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the mechanism of action, uses, side effects and toxicity of anti cholinesterases.
2. Discuss the mechanisms of drug interactions, giving examples of each group.
3. Write short notes on:
  - (a) Nitric oxide
  - (b) Magnesium sulphate
  - (c) Omeprazole

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the various roles of calcium in the body.  
Outline how normal plasma calcium levels are maintained in the body.
2. Discuss the structure and function of haemoglobin and factors that affect its function.  
Where are other oxygen storage sites in the body.  
What is the effect of breathing 100% oxygen on these stores.
3. Discuss the role of the kidney in the control of arterial blood pressure.  
What is the response of the kidney to hypotension ?

**PART\_C**  
**PHYSICS, CLINICAL MEASUREMENT**  
**& CLINICAL CHEMISTRY**  
**(BOOK 'C')**

1. What are the tasks of using electrical equipment in the operating theatre? Describe the methods by which electrical hazards could be minimized in the operating theatre.
2. A patient is reported to have the following results from analysis of an arterial blood gas sample :-

pH	7.15	
pO <sub>2</sub>	9.6 kpa (72 mmHg)	
pCO <sub>2</sub>	6.1 kpa, (45.75mmHg)	Actual HCO <sub>3</sub> 15.3 mmol/l
Base Excess -	8.2	
Standard HCO <sub>3</sub>	18.8 mmol/l	

Briefly explain how these values have been measured.

Explain what "base excess" means, and how you would interpret the above figure. How might you use this value in aiding your clinical management?

3. Write short notes on :
  - (a) Oscillometry as used in automated blood pressure measurement.
  - (b) TECO (Transoesophageal Cardiac Output)
  - (c) Triple point of water



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**FEBRUARY, 2002**

Date: 19<sup>th</sup> February, 2002

Time: 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the mechanism of action and side effects of diuretics.
2. List the properties of the ideal inotrope and discuss how the currently available drugs match this ideal.
3. Write short notes on :
  - a) Remifentanyl
  - b) Aprotinin
  - c) Context-Sensitive Half-Time

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Explain the distribution of ventilation and perfusion in the normal upright lung. How do the differences in V/Q affect alveolar gas tensions ?
2. What are the functions of the liver ?
3. Explain how the body maintains the normal blood pH.

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

1. What are the methods available to measure the oxygen concentration in the anaesthetic circuit ? Describe in detail the principles involved in one of the methods and compare its advantages and disadvantages with the others.
  
2. List the factors that may cause interference of the ECG of a patient undergoing surgery ?  
How can such interference be minimized ?
  
3. Describe the principles of function of a
  - a) rotameter
  - b) galvanometer
  - c) Bourdon pressure gauge

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

**MD (ANAESTHESIOLOGY) PART IB EXAMINATION**  
**AUGUST, 2002**

Date :- 20<sup>th</sup> August, 2002

Time :- 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. What are the therapeutic uses of magnesium and how does it work ?
2. Discuss the mechanisms of action of drugs used in the prevention and treatment of thromboembolic disorders.
3. Write short notes on :
  - (a) Milrinone
  - (b) Alfentanil
  - (c) Sevoflurane

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Discuss the factors which may alter the mixed venous oxygen saturation.
2. Describe the functions of the adrenal gland.
3. Explain how the heart maintains its normal rate and rhythm.

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

1. Describe how gas flow is measured in anaesthesia, with reference to the physical principles.
2. Describe the methods used to humidify inspired gases. Discuss the advantages and disadvantages of each.
3. Write short notes on :
  - (a) correlation coefficient
  - (b) physical principles of pulse oximetry
  - (c) differential amplifiers

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

**MD (ANAESTHESIOLOGY) PART IB EXAMINATION**  
**FEBRUARY, 2003**

Date:- 25<sup>th</sup> February, 2003

Time :- 9.00 a.m. -12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Compare and contrast the cardiovascular and respiratory effects of Halothane, Isoflurane and Sevoflurane.
2. Outline the mechanism of action of antidysrhythmic drugs used to treat supraventricular tachycardia.
3. Write short notes on :
  - (a) volume of distribution
  - (b) clonidine
  - (c) ondansetron

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the factors that affect the arterial oxygen tension. .  
What is the relationship between arterial oxygen tension and arterial oxygen saturation ?
  2. Describe the factors that regulate cerebral blood flow.
  3. Describe the action potential in a nerve fibre.  
How does it differ from that of a cardiac muscle?
- ~

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

1. Describe the physical principles involved in overcoming the problems of flow and temperature dependence in a vaporizer.
2. What is a capacitor ?  
Draw a simple circuit diagram of the defibrillator and explain how it works.
3. Write short notes on
  - (a) The nerve stimulator
  - (b) Pneumotachograph
  - (c) Fourier's Analysis

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

**MD (ANAESTHESIOLOGY) PART IB EXAMINATION**  
**AUGUST, 2003**

Date: 19<sup>th</sup> August 2003

Time: 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible mark which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. What do you understand by the term volume of distribution ? How would you determine this for an intravenous antibiotic ? What other information can be deduced from your methodology ?
2. Compare and contrast the side effect profile of intravenously administered morphine, fentanyl and tramadol.
3. Outline the factors which can affect the duration of non-depolarizing neuromuscular block produced during anaesthesia.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. What are the four main types of hypoxia ?  
Show which components of the oxygen delivery equation these relate to.  
Give examples of how the different types of hypoxia can occur.
2. Discuss how the body regulates its extracellular fluid volume.
3. Discuss the physiological factors which determine coronary blood flow.

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

1. Discuss the important physical conditions of a standard catheter transducer system for accurate recording of the arterial blood pressure waveform.
  
2. Describe piped medical gases and vacuum systems in hospitals. Compare and contrast storage of oxygen and nitrous oxide.
  
3. Write short notes on:
  - a.) SI units.
  
  - b.) Regression analysis.
  
  - c.) Thermistors



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

**MD (ANAESTHESIOLOGY) PART IB EXAMINATION**  
**FEBRUARY, 2004**

Date: 24<sup>th</sup> February, 2004

Time: 9.00 a.m. - 12.00 noon.

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

**Answer two questions from each part.**

**The maximum possible mark which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Discuss the possible intra-cellular processes that may follow a drug receptor interaction.
2. Compare and contrast the side effect profile of intravenously administered Propofol, Etomidate and Ketamine.
3. Write short notes on :
  - a) Laevo bupivacaine
  - b) Amiodarone
  - c) Midazolam

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the physiological changes that occur following rapid loss of 20% blood volume in an adult.
2. Outline the physiological changes in pregnancy.
3. Describe how the body maintains a normal temperature and outline the different mechanisms involved in thermoregulation.

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

1. What methods can be used to monitor the output of Halothane from a vaporiser ? Describe the physical principles underlying **two** of the methods.
  
2.
  - a) What are the different types of display units that are used in Anaesthesia and Intensive Care?
  - b) Describe the physical principles involved in the cathode ray oscilloscope.
  - c) What features of a display unit should be considered when selecting a patient monitor ?
  
3. Write short notes on :
  - a) The principle of the liquid manometer.
  - b) Gas chromatography.
  - c) Normal distribution.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 2004**

Date: 17<sup>th</sup> August, 2004

Time: 9.00 a.m. -12.00 noon

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

**Answer two questions from each part.**

**The maximum possible mark which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Describe the characteristics of the ideal agent for Total Intravenous Anaesthesia. Discuss the pharmacological properties of those agents that are currently in use.
2. Describe the factors affecting Local Anaesthetic toxicity.
3. Describe the characteristics of the various colloids that are available. Discuss their advantages and disadvantages.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the Central Control of Ventilation. Discuss the Reflexes involved.
2. Describe briefly the role of the kidney in controlling the extracellular pH.
3. Describe the presynaptic biochemical and physiological events that are essential for neuromuscular transmission.

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

1. Discuss the importance of Resonant Frequency and damping with regard to accuracy of direct arterial pressure measurement.
  
2. Describe the physical principles involved with capnography. What are the different types of capnograms that may be seen in anaesthetic practice and give reasons for those patterns.
  
3. Explain the physical principles underlying the function of the following:
  - a) the nebulizer
  - b) the cryoprobe
  - c) the thermocouple
  - d) the galvanometer

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH, 2005**

Date: 8<sup>th</sup> March 2005.

Time: 9.00 - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible mark which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. How do drugs work ? Gjve examples of each mechanism.
2. What is an isomer ?  
Classify isomers giving examples and discuss their importance in anaesthetic practice.
3. Write short notes on:
  - (a) Ropivacaine
  - (b) Rocuronium.
  - (c) Dexmedetomidine

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. How does blood clotting occur ? How is it controlled physiologically ?
2. Describe the physiological effects that occur during exercise in a normal healthy adult.
3. How does tissue damage lead to the sensation of pain ?  
What are the physiological mechanisms that tend to reduce pain sensation ?  
What is neurogenic pain ?

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

1. Describe the principles of the polarographic oxygen electrode. How is the oxygen electrode used in transcutaneous oxygen measurement ?
  
2. What is electromagnetic induction? Discuss its uses and its disadvantages in clinical measurement.
  
3. Write short notes on
  - (i) Poynting effect
  - (ii) Bernoulli effect
  - (iii) Seebeck effect
  - (iv) Piezo electric effect

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 2005**

Date :- 23<sup>rd</sup> August, 2005

Time :- 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. How would you classify drug interactions ?  
Give examples of each type.
2. Write short notes on :
  - (a) Context- Sensitive Half-time
  - (b) Cisatracurium
  - (c) Tramadol
3. Discuss the molecular mechanism of action of opioids.  
List the effects including the side effects of opioids at these receptors.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1. Describe the factors affecting intracranial pressure.
2. Describe the physiological mechanisms involved in vomiting.
3. Describe how the sympathetic nervous system affects the cardiac out put.

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

1. Describe what is meant by calibration and why is it important in relation to monitoring equipment.  
Describe how you would calibrate an arterial line transducer system.
  
2. List the characteristics of an ideal peripheral nerve stimulator. How may a peripheral nerve stimulator be used to monitor the neuromuscular transmission in an anaesthetised patient.
  
3. Write short notes on :
  - (a) Anaesthetic gas scavenging systems
  
  - (b) Natural (resonant) frequency



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH, 2006**

Date :- 7<sup>th</sup> March, 2006

Time :- 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. Describe the properties of an ideal neuromuscular blocking drug.  
How close are suxamethonium and vecuronium to this ideal ?
  
2. Regarding pharmacokinetics, define and give the clinical relevance of the following parameters.

volume of distribution (Vd)  
clearance (Cl)  
half life (t<sub>1/2</sub>)

relate these parameters mathematically.

3. Write short notes on :-
  - (a) Sodium nitroprusside (SNP)
  - (b) Ephedrine
  - (c) Atropine

**PART B  
PHYSIOLOGY  
(BOOK 'B')**

1. What steps are involved in excitation contraction coupling from the end plate to the power stroke. Include the ultrastructural organization of skeletal muscle.
2. Describe the endocrine and metabolic response to surgery and anaesthesia.
3. Describe the physiological consequences of intermittent positive pressure ventilation.

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

1. What is humidity ?  
How can humidity be measured ?  
Outline the methods.
2. List the methods available to monitor the concentration of volatile anaesthetic agents during anaesthesia.  
Describe the principles involved in two of these methods and indicate their relative advantages and disadvantages.
3. Write short notes on –
  - (a) LASER
  - (b) Limitations of pulse oximetry.
  - (c) Hagen – Poiseuille equation and its applications in anaesthetic practice.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST, 2006**

Date :- 15<sup>th</sup> August, 2006

Time :- 9.00 a.m. - 12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

**PART A**  
**PHARMACOLOGY**  
**(BOOK 'A')**

1. What is the mode of action of Magnesium ?  
What are its effects ?  
What are its uses ?
2. Classify the drugs which
  - (a) inhibit haemostasis
  - (b) promote haemostasisDescribe **briefly** the mechanisms of action of the drugs in each group.
3. Compare and contrast halothane and sevoflurane.

**PART B**  
**PHYSIOLOGY**  
**(BOOK 'B')**

1.
  - (a) What determines the resting membrane potential of a nerve fibre ?
  - (b) How does an action potential occur ?
  - (c) Describe the synaptic transmission from an upper motor neurone to a lower motor neurone.

2.
  - (a) What information can be gained from spirometry ?
  - (b) Define functional residual capacity.
  - (c) Describe the methods available to measure functional residual capacity.
3. What are the causes of hypercarbia ?  
Describe the physiological changes that occur secondary to hypercarbia.

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

1. Define laminar flow.  
How can you measure flow in clinical practice ?  
Under what conditions does turbulent flow occur ?  
What problems can occur when flow changes from laminar to turbulent ?
2. Describe the principles of diathermy.  
State briefly the risks of diathermy and what precautions can be taken to minimize them ?
3. Describe the physical principles involved in :
  - (a) Pressure regulators
  - (b) Fuel cell
  - (c) heat and moisture exchanger (H.M.E.)

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH, 2007**

Date : 6<sup>th</sup> March 2007

Time: 9.00 a.m. -12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

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

1. Classify anticonvulsant drugs according to mechanism of action. Give examples of anticonvulsants in each class.  
Describe the pharmacology of phenytoin.
2. Discuss the pharmacokinetics and pharmacodynamics of nitrous oxide.
3. Describe briefly the mechanisms of action of drugs which
  - (a) stimulate the uterine smooth muscle.
  - (b) relax the uterine smooth muscle.

**PART B - PHYSIOLOGY (BOOK 'B')**

1. Which structures prevent the passage of proteins from a renal capillary into the Bowman's capsule ?  
What factors influence glomerular filtration ?  
What is freely filtered and what is not ?
2. Describe the different factors which determine the cardiac output.
3. What is a hormone ?  
How may they be classified structurally and give two examples of each ?  
Discuss the structure and physiological actions of insulin.

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

1. How may temperature be measured ?  
Outline the advantages and disadvantages of each method.
  
2. What is ultrasound ?  
How is it produced ?  
How is it used to produce an image ?  
What are the applications in anaesthesia and intensive care ?
  
3. Write short notes on
  - (a) isobestic point
  - (b) triple point of water
  - (c) transcutaneous oxygen electrode

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2007**

Date : 14<sup>th</sup> August 2007

Time : 9.00 a.m. - 12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

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

1. Define bio- availability of a drug.  
What factors influence bio-availability ?
  
2. Compare and contrast the pharmacokinetics and pharmacodynamics of  
Ketamine and Propofol.
  
3. Discuss the mechanism of action, the haemodynamic and side effects of ( a)
  - (a) Milrinone
  - (b) Noradrenaline
  - (c) Dobutamine

**PART B - PHYSIOLOGY (BOOK 'B')**

1. Describe the oxyhaemoglobin dissociation curve in an adult and the factors that  
affect it.  
How and why is the fetal oxyhaemoglobin dissociation curve different from this ?  
How will the oxy haemoglobin dissociation curve be affected in a person  
acclimatized at 4000 meters ?

2. Draw, with labels, the traces of the central venous pressure, aortic pressure and the left ventricular pressure wave forms in relation to the electrocardiogram during one cardiac cycle.  
Outline the factors affecting the left ventricular end diastolic volume.
3. What is the normal serum calcium level ?  
What is the role of calcium in the body ?  
How is calcium metabolized in the body ?

**PART C - PHYSICS. CLINICAL MEASUREMENT & CLINICAL CHEMISTRY**  
**(BOOK 'C')**

1. Draw and label a diagram of a mercury sphygmomanometer.  
Describe any errors in measurement that are caused by :
  - (a) the level at which the sphygmomanometer is placed.
  - (b) the way the mercury column is positioned.
  - (c) an occlusion at the top of the column.

What would a pressure of 100 mmHg read if a water column is used instead of Mercury ?
2. What is a capacitor ?  
Draw a simple diagram and explain how a defibrillator works.  
What recent changes have been made to the wave form the defibrillator delivers and why ?
3. What factors affect the output from a plenum vaporizer ?  
How is a vaporizer temperature compensated?



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

**MD (AESTHESIOLOGY) PART 1B (BASIC SCIENCES) EXAMINATION**  
**MARCH 2008**

Date : 11<sup>th</sup> March 2008

Time: 9.00 a.m. - 12.00 noon

**ESSAY PAPER**

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

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

1. How do drugs interact with receptors? Give examples of each type of interaction.
2. Compare and contrast the non-steroidal anti-inflammatory (NSAID) and opioid drugs.
3.
  - (a) Classify the drugs used in the treatment of diabetes mellitus
  - (b) Describe briefly their mechanisms of action.
  - (c) Give one example in each oral group and mention two contraindications to its use.

**PART B - PHYSIOLOGY (BOOK 'B')**

1. Describe the long term homeostasis of blood pressure.
2. Describe the oxygen cascade.
3. Describe the physiological consequences of starvation.

**PART C - PHYSICS. CLINICAL MEASUREMENT & CLINICAL  
CHEMISTRY (BOOK 'C')**

1.
  - (a) List the characteristics of an ideal oxygen failure warning device.
  - (b) Draw and label such a device.
  - (c) Describe briefly its working principles.
  
2.
  - (a) Discuss the physical principles of pulse oximetry.
  - (b) What are the potential sources of error and limitations of the technique ?
  
3. Write short notes on :
  - (a) Boyle's law
  - (b) Charles' law
  - (c) Dalton's law

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

**MD (AESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION -**  
**AUGUST 2008**

Date : 12<sup>th</sup> August 2008

Time : 9.00 a.m. -12.00 noon

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

**Answer two questions from each part.**

**The maximum possible marks which can be award~d for each essay is the same.**

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

1.
  - (a) What are the characteristics of an ideal inhaled anaesthetic agent ?
  - (b) Describe the factors which influence the uptake of inhalational agents from the lung.
  
2. Describe the
  - (a) mechanisms of action
  - (b) side effectsof drugs currently used to prevent post operative nausea and vomiting.
  
3.
  - (a) What features of a drug make it suitable for continuous infusion ?
  - (b) Assuming first order kinetics, what is the effect of a 50% increase in infusion rate ?
  - (c) What is meant by "context sensitive half time" ?

## **PART B - PHYSIOLOGY (BOOK 'B')**

1.
  - (a) Describe the blood supply of the liver.
  - (b) How is hepatic blood flow regulated ?
  - (c) How may anaesthesia affect this ?
2.
  - (a) What is the role of potassium in the body ?
  - (b) What are the physiological responses to an acute potassium load ?
3.
  - (a) What are the components of dead space ?
  - (b) Describe the factors that influence dead space.
  - (c) How do you measure physiological dead space ?

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

1.
  - (a) List the components required to monitor the ECG signal.
  - (b) Describe the factors which influence the quality of the signal.
2.
  - (a) Describe the physical principles involved in the function of a rotameter.
  - (b) What are the common causes of inaccuracies and how may they be overcome ?
3.
  - (a) Draw a Boyle's bottle and indicate the direction of gas flow.
  - (b) List three disadvantages of the Boyle's bottle as a vaporizer.
  - (d) How may these disadvantages be overcome ?

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH 2009**

Date: 16<sup>th</sup> March 2009

Time: 1.00 p.m. - 4.00 p.m.

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

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

1.     (a)     Give a brief account of an eutectic mixture.  
  
       (b)     Describe how the physicochemical properties of local anaesthetics influence their pharmacokinetics and pharmacodynamics.
  
2.     Describe the modes of action of diuretics.
  
3.     Write Short notes on
  - (a)     Phase I metabolism
  - (b)     GABA<sub>A</sub> receptors
  - (c)     Tachyphylaxis

**PART B - PHYSIOLOGY (BOOK 'B')**

1.     Describe the factors controlling arteriolar smooth muscle tone.
  
2.
  - (a)     What is a buffer ?
  - (b)     Explain the importance of the bicarbonate-carbonic acid buffer.
  - (c)     Describe how the kidney handles excess Hydrogen ions.
  
3.     Describe the physiological responses to normovolaemic anaemia.

**PART C - PHYSICS, CLINICAL MEASUREMENTS &  
CLINICAL CHEMISTRY (BOOK 'C')**

1. Describe the methods available to humidify inspired gases of an intubated patient.

What are the advantages and disadvantages of each method ?

2.
  - (a) Describe qualitative (categorical) and quantitative (numerical) data giving examples.
  - (b) Discuss the measures of variation.
  
3. Write short notes on
  - (a) Microshock and its sources
  - (b) Oxygen concentrator
  - (c) Pneumotachograph

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2009**

Date: 11<sup>th</sup> August 2009

Time: 9.00 a.m.- 12.00 noon.

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

**Answer two questions from each part.**

**The maximum possible marks which can be awarded for each essay is the same.**

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

1. Write short notes on
  - (a) Hepatic microsomal enzymes
  - (b) Renal clearance of drugs
  - (c) Blood : gas partition coefficient
  
2. Compare and contrast the pharmacology of atracurium and vecuronium.
  
3. Describe briefly the mechanisms of action and the side effects of drugs which are used to improve myocardial contractility.

**PART B – PHYSIOLOGY (BOOK 'B')**

1.
  - (a) Define the A-a gradient. What is its normal value ?
  - (b) Describe the factors that produce the A-a gradient.
  
2.
  - (a) Outline the components of the autonomic nervous system.
  - (b) What are the differences between the autonomic and the somatic efferent pathways ?
  - (c) List the functions of the autonomic nervous system.
  - (d) Outline the effects of stimulation of autonomic nerves to the heart.

3. In a normal person the blood glucose concentration is tightly controlled.
- (a) Briefly describe the mechanisms that control blood sugar concentrations.
  - (b) Why are these control mechanisms important ?

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

- 1.
- (a) What is Saturated Vapour Pressure ?
  - (b) Discuss its implications in anaesthesia.
- 2.
- (a) A blood gas estimation typically indicates pH, PCO<sub>2</sub>, PO<sub>2</sub> Standard HCO<sub>3</sub>, Base excess and SaO<sub>2</sub>.  
  
Which parameters result from
    - (i) Direct measurement ?
    - (ii) Calculation ?
  - (b) Describe the physical principle used in one of the directly measured Parameters.
  - (c) List the sources of error in the method you have described.
3. Write short notes on
- (a) Standard error of the mean.
  - (b) Oscillometric blood pressure measurement.
  - (c) Radioactive decay.



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**

**MARCH 2010**

Date : 8<sup>th</sup> March 2010

Time : 1.00 p.m.-4.00 p.m.

**ESSAY PAPER**

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

**Answer two questions from each part.**

**Each essay carries equal marks.**

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

1. Compare and contrast the pharmacology of propofol and ketamine.
2. Write short notes on :
  - (a) Structure activity relationship of neuromuscular blocking drugs.
  - (b) Reversal agents of neuromuscular blockers.
3. Describe **the** mechanisms of action and side effects of drugs commonly used to alter gastric pH and gastric motility.

**PART B - PHYSIOLOGY (BOOK 'B')**

1.
  - (a) Enumerate the types of shock.
  - (b) Define hypovolaemic shock and indicate the main causes.
  - (c) Describe the compensatory physiological changes in the cardiovascular system and kidneys, in hypovolaemic shock.
2.
  - (a) List the functions of the renal tubule. -
  - (b) Describe how the kidneys concentrate urine.

3,

- (a) List the functions of the cell membrane.
- (b) Explain the principles involved in the movement of substances including water across a semipermeable membrane, giving examples.

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

- 1. Discuss the electrical hazards that could occur to a critically ill patient and the staff in an ICU.
  
- 2.
  - (a) Outline the measures taken to prevent rebreathing in breathing systems.
  - (c) Briefly describe the equipment commonly used to monitor rebreathing in anaesthetic practice.
  
- 3. Write short notes on
  - (a) Principle and the uses of the Bimetallic strip.
  - (b) Laminar flow.
  - (c) Parametric and non parametric data.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2010**

Date : 9<sup>th</sup> August 2010

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. Compare and contrast the cardiovascular effects and metabolism of halothane and sevoflurane.
  
2.
  - (a) Describe the properties of an ideal neuromuscular blocking drug.
  - (b) How does suxamethonium and rocuronium compare with the ideal ?
  
3. Describe the mechanism of action and adverse effects of :
  - (a) Morphine
  - (b) Diclofenac sodium

**PART B – PHYSIOLOGY (BOOK ‘B’)**

1. Describe the factors that determine venous return to the heart.  
How is venous return related to cardiac output ?
  
2.
  - (a) Draw a simple diagram to show control of ventilation by feedback loops.
  - (b) Describe how the blood brain barrier influences ventilation.
  - (c) Outline the ventilator response to a fall in arterial oxygen tension.
  
3.
  - (a) Explain the difference between pain and nociception.
  - (b) Describe the mechanisms of pain perception.
  - (c) List three (03) important pain modulatory mechanisms.

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

1.
  - (a) What is specific latent heat ?
  - (b) What happens to specific latent heat at critical temperature ?
  - (c) Describe a situation in which heat loss as specific latent heat is
    - (i) advantageous and
    - (ii) disadvantageous in anaesthetic practice
  
2. Write short notes on the physical principles of the following :
  - (a) Ultrasound.
  - (b) Defibrillator.
  - (c) Magnetic Resonance Imaging.
  
3.
  - (a) What is a transducer ?
  - (b) Outline the principles used when designing a device to view the arterial pressure wave form.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH 2011**

Date : 21<sup>st</sup> March 2011

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. Write short notes on –
  - (a) Bioavailability
  - (b) Context-sensitive half time
  
2.
  - (a) What are the characteristics of an ideal inhalational anaesthetic agent ?
  - (b) Describe the adverse effects of nitrous oxide.
  
3. Compare and contrast the pharmacology of lignocaine and ropivacaine.

**PART B – PHYSIOLOGY (BOOK 'B')**

1.
  - (a) Give the normal range of PaCO<sub>2</sub>
  - (b) Explain the relationship between ventilation and PaCO<sub>2</sub> using appropriate illustrations.
  - (c) Why does hypoventilation produce respiratory acidosis and what effects does it have on oxygenation ?
  
2. A 30 year old male is admitted to Accident and Emergency with a head injury.  
Explain the physiological mechanisms (using illustrations) for raised intra cranial pressure (ICP) in this patient.
  
3.
  - (a) What is a “thermo neutral environment” ?
  - (b) Describe the temperature regulating mechanisms activated by a cold environment.

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

1.
  - (a) Draw a diagram to show the principle of monopolar surgical diathermy.
  - (b) Briefly describe the hazards due to surgical diathermy. .
  - (c) Explain how the above mentioned hazards could be minimized’.

2.

- (a) What is plethysmography ?
- (b) Briefly describe three uses of the above principle.

3. Write short notes on

- (a) Sensitivity and specificity
- (b) Isotopes
- (c) Poynting effect



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2011**

Date : 8<sup>th</sup> August 2011

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.
  - (a) Categorize the different types of adrenergic receptors.
  - (b) Outline the changes that occur at cellular level when an agonist binds with them.
  - (c) List the systemic effects that result from stimulation of these receptors.
  
2. Describe the physico-chemical properties and pharmacokinetics of the following-
  - (a) Thiopentone sodium
  - (b) Midazolam
  - (c) Ketamine
  
3.
  - (a) Describe the mechanism of action and adverse effects of
    - (i) Warfarin
    - (ii) Unfractional heparin
  - (b) What are the advantages of low molecular weight heparin (LMWH) compared to unfractionated heparin ?

**PART B – PHYSIOLOGY (BOOK ‘B’)**

1.
  - (a) Describe the physiological effects that occur when rising from supine to upright position.
  - (b) How are these effects different in the elderly ?
  
2.
  - (a) Outline the factors that determine Glomerular Filtration Rate.
  - (b) Explain the role played by the glomerular capillary membrane in the filtration process.
  - (c) What is the normal physiological response to a reduced Glomerular Filtration Rate ?
  
3. Write a short account on the physiological basis of the following ;
  - (a) Athletes reach “anaerobic threshold” at a higher level of exercise than untrained people.
  - (b) Infusion of insulin in diabetic ketoacidosis is likely to cause hypokalaemia.

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

1.
  - (a) Mention three measurements used to assess the adequacy of oxygenation.
  - (b) Name an instrument used to measure each of the above.
  - (c) Describe in detail one of the instruments which is mentioned in (b).
  
2.
  - (a) What is humidity ?
  - (b) Why is humidity important to the anaesthetist ?
  - (c) Briefly describe the humidifiers that are used in anaesthetic practice.
  
3. Write short notes on
  - (a) Anaesthetic gas scavenging systems
  - (b) Pressure regulators
  - (c) Exponential functions

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH 2012**

Date : 19<sup>th</sup> March 2012

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.
  - (a) Enumerate the different groups of drugs used to relieve acute pain.
  - (b) Describe their mode of action in relation to the pain pathway.
  
2.
  - (a) What are the characteristics of an ideal induction agent used for Total Intravenous Anaesthesia (TIVA) ?
  - (b) How close is propofol to this ideal ?
  
3.
  - (a) Categorize with examples, drugs that are used to rapidly lower the blood pressure.
  - (b) Describe their mode of action and adverse effects.

## **PART B – PHYSIOLOGY (BOOK 'B')**

1.
  - (a) Draw a flow chart to show factors affecting cardiac output.
  - (b) Explain the physiological mechanisms responsible for changes of cardiac output in pregnancy, labour and puerperium.
2.
  - (a) Briefly outline the distribution of body fluids.
  - (b) Explain the changes that occur in the body fluid compartments following infusion of
    - (i) One litre (1L) of 0.9% sodium chloride
    - (ii) One litre (1L) of 5% dextrose
    - (iii) One litre (1L) of colloidover one (1) hour.
3.
  - (a) List the function of calcium in the body.
  - (b) Describe how the plasma calcium level is regulated.

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

1.
  - (a) Outline the factors that distort ECG signals during surgery.
  - (b) Write a method each to overcome the above mentioned factors.
2.
  - (a) Outline the desired characteristics of an ideal nerve stimulator.
  - (b) Briefly describe two quantitative methods used to measure muscle response.
3. Write short notes on –
  - (a) Piezo electric effect.
  - (b) Peak flow meter
  - (c) Variable bypass vapouriser.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2012**

Date : 6<sup>th</sup> August 2012

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. How would you classify drug interactions ?  
Give examples for each type of interaction.
  
2. Write short notes on
  - (a) Remifentanyl
  - (b) Tramadol
  - (c) Naloxone
  
3. Describe the properties of an ideal local anaesthetic agent giving examples.

**PART B – PHYSIOLOGY (BOOK ‘B’)**

1.

- (a) Describe the sequence of events of impulse transmission across the neuromuscular junction.
- (b) Outline the mechanisms by which neuromuscular transmission is affected, giving examples.

2.

- (a) Define hypoxic hypoxia.
- (b) Explain briefly the physiological basis for development of hypoxic hypoxia.
- (c) Describe how the body compensates.

3. Write short notes on

- (a) Blood flow in the intestinal villus and how it is affected in circulatory shock.
- (b) Systemic effects of thyroid hormones.

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

- 1,      What physical properties of a substance change with temperature ?

Describe three (3) methods that utilize the properties you have mentioned to measure body temperature.

2,

- (a)      What are leakage currents ?
- (b)      How would you detect leakage currents ?
- (c)      Describe how you would design an instrument to use on a patient with minimal risks of electrocution.

3.      Write short notes on

- (a)      Rotameter
- (b)      Hot water bath humidifier.
- (c)      Fuel cell



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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH 2013**

Date : 18<sup>th</sup> March 2013

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 MAC and MAC-BAR.
  - 1.2. Describe the factors which affect the uptake of volatile anaesthetic agents from the alveoli.
  
2.
  - 2.1. Describe the factors which prolong the duration of action of neuromuscular blockers.
  - 2.2. Name the groups of drugs available to reverse the action of neuromuscular blockers.  
Describe the mode of action of each group.
  
3.
  - 3.1. Classify the diuretics according to their mode of action giving examples.
  - 3.2. Describe the mechanisms of action and the adverse effects of frusemide and mannitol.

## **PART B – PHYSIOLOGY (BOOK ‘B’)**

1.
  - 1.1 Define mean arterial pressure.
  - 1.2 Explain its significance.
  - 1.3 Describe the mechanisms involved in short term control of blood pressure.
  
2.
  - 2.1 Define a countercurrent system.
  - 2.2 List the countercurrent mechanisms in the kidney.
  - 2.3 Describe with illustrations how the above countercurrent mechanisms operate to produce concentrated urine.
  
3.
  - 3.1 Name four (4) important cations in the body. Indicate their normal serum concentrations.
  - 3.2 List two (2) functions of each cation mentioned in 3.1.
  - 3.3 Outline two (2) main regulatory mechanisms involved in the homeostasis of each cation mentioned in 3.1.
  - 3.4 Give two (2) effects of each cation mentioned in 3.1, when
    - a. significantly low levels (hypo)
    - b. significantly high levels (hyper) , are present in the serum.

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

1.
  - 1.1. Outline the basic components of a monitoring system.
  - 1.2. Briefly mention the essential requirements needed for its optimal function.
  
2.
  - 2.1. What is a capacitor ?
  - 2.2. What factors affect capacitance ?
  - 2.3. What is the SI unit of capacitance ?
  - 2.4. Describe the physical principle of a defibrillator using a circuit diagram.
  
3. Write short notes on,
  - 3.1. Venturi principle
  - 3.2. Critical temperature.
  - 3.3. Principle, properties and components of LASER.

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2013**

Date : 5<sup>th</sup> August 2013

Time : 1.00 p.m. – 4.00 p.m.

**ESSAY PAPER**

**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. What is a receptor / (15%)
  - 1.2. Describe the different mechanisms of receptor activation giving an example for each. (60%)
  - 1.3. Explain briefly how suxamethonium acts on the neuromuscular junction emphasizing the action at the receptor level. (25%)
  
2.
  - 2.1. Classify intravenous induction agents with examples. (20%)
  - 2.2. Describe the cardiovascular and central nervous system effects of the following drugs.
    - A. Propofol (40%)
    - B. Ketamine (40%)
  
3.
  - 3.1. Describe the pharmacodynamics of beta blockers. (60%)
  - 3.2. Briefly describe the pharmacology of labetalol. (40%)

**PART B – PHYSIOLOGY (BOOK ‘B’)**

1.

- 1.1. Briefly describe with an illustration, the sequential changes of partial pressure of oxygen ( $PO_2$ ) when gas moves from atmosphere to cellular mitochondria. (45%)
- 1.2. Explain how the partial pressure of inspired oxygen ( $PIO_2$ ) changes at 5500m (18000ft) above sea level. (10%)
- 1.3. Outline the physiological changes that occur in a person acclimatised to the above altitude. (45%)

2.

- 2.1. What is the normal value of intracranial pressure ? (5%)
- 2.2. List the anatomical factors that contribute to intracranial pressure ? (10%)
- 2.3. Explain using a diagram , how the intracranial pressure changes in a patient who has sustained a head injury. (25%)
- 2.4. Describe with illustrations the factors that control cerebral perfusion pressure. (60%)

3.

- 3.1. Illustrate using a line diagram the control of cortisol secretion by the adrenal cortex. (30%)
- 3.2. Outline the actions of cortisol in the body. (70%)

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

- 1, Outline the mechanisms used in modern vaporizers to maintain an accurate vapor concentration. (100%)
  
- 2,
  - 2.1. What are the measures used to quantify the amount of water vapour content in an operating theatre environment. (20%)
  
  - 2.2. Outline the implications of water vapour in an operating theatre. (80%)
  
3. Write short notes on
  - 3.1. Fuel cell (50%)
  
  - 3.2. Vacuum insulated evaporator (VIE oxygen storage system) (50%)

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**MARCH 2014**

Date : 17<sup>th</sup> March 2014

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. Describe in detail, how morphine produces its analgesic action. (40%).
  - 1.2. Explain the difference in duration of action of morphine and fentanyl. (10%)
  - 1.3. How is duration of action of fentanyl affected by dose ? (10%).
  - 1.4. Explain using a graph, how the analgesic action of morphine varies
    - a) with increasing dose. (20%)
    - b) following a dose of naloxone. (20%)
  
2.
  - 2.1. Compare and contrast the mechanism of action (50%) and the metabolism (40%) of suxamethonium and vecuronium.
  - 2.2. Which properties of suxamethonium make it an ideal agent for rapid sequence induction ? (10%)

3.

3.1. Describe how the following drugs produce their anti-arrhythmic effects.

a) Amiodarone (25%)

b) Digoxin (25%)

3.2. Outline the adverse effects of each of the above drugs. (50%)



**PART B – PHYSIOLOGY (BOOK ‘B’)**

1.
  - 1.1 What is the physiological range of plasma sodium concentration? (5%).
  - 1.2 Outline with an illustration the sodium balance in the body. (15%)
  - 1.3 Describe the role of the sensors in maintaining the normal plasma sodium concentration. (35%)
  - 1.4 Outline how the effectors maintain the normal plasma sodium concentration. (45%)
  
2.
  - 2.1 Describe the distribution of pulmonary blood flow in an upright lung. (45%)
  - 2.2 Briefly explain how pulmonary vascular resistance is calculated (15%).
  - 2.3 Describe with an illustration, the effect of changes in lung volume on pulmonary vascular resistance in a healthy young person. (40%)
  
3.
  - 3.1 What is the normal fasting blood glucose concentration in peripheral venous blood ? (5%)
  - 3.2 List the main factors that determine the blood glucose concentration. (20%)
  - 3.3 Describe the role of hormones including mechanisms of action in regulation of blood glucose. (75%)

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

1.
  - 1.1. What is an ion selective electrode ? (10%).
  - 1.2. Mention three ions measured by a **modern** blood gas machine. (15%)
  - 1.3. Outline the physical principle of a glass pH electrode. (60%)
  - 1.4. List with examples three errors which occur in a blood gas machine.(15%)
  
2.
  - 2.1. What is laminar flow ? (20%)
  - 2.2. What factors influence laminar flow ? (40%)
  - 2.3. Describe the physical principles and uses of a pneumotachograph. (40%)
  
3.
  - 3.1. What are the methods available to monitor blood pressure ? (15%)
  - 3.2. Outline the physical principles of an automated non-invasive blood pressure monitoring device (eg. Dinamap) (50%)
  - 3.3. What are the inaccuracies and limitations of this system ? (35%)

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

**MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION**  
**AUGUST 2014**

Date : 4<sup>th</sup> August 2014

Time : 1.00 p.m. – 4.00 p.m.

**ESSAY PAPER**

**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. Define the plasma concentration of a drug stating its relevance. (20%)
  - 1.2. Explain with an illustration, the changes in plasma concentration with time, of a drug administered as a single intravenous dose. (20%)
  - 1.3. Outline the pharmacological factors that determine the plasma concentration of the above drug at a given time. (40%)
  - 1.4. Briefly state with reasons the modifications needed to the standard induction dose of thiopentone in a patient with, (20%)
    - a) hypoalbuminaemia.
    - b) hypovolaemia.
  
2.
  - 2.1. Describe with illustrations the mechanism of action of local anesthetic agents. (50%)
  - 2.2. Compare the following pharmacological properties of lignocaine and bupivacaine relating them to the clinical effects.
    - a) pK<sub>a</sub> value (15%)
    - b) protein binding (20%)
    - c) lipid solubility (15%)

3.
  - 3.1 Classify antiemetic drugs giving examples. (25%)
  - 3.2 Describe their mechanisms of action. (45%)
  - 3.3 State the side effects of **three** groups of drugs mentioned in 3.1 (30%)

**PART B – PHYSIOLOGY (BOOK ‘B’)**

1.
  - 1.1. List the factors affecting venous return to the heart. (15%)
  - 1.2. Draw a graph to explain the relationship between cardiac output and venous return. (15%)
  - 1.3. Explain how this relationship changes with
    - a) hypovolaemia. (35%)
    - b) exercise (35%)
  
2.
  - 2.1. List the functions of haemoglobin. (10%)
  - 2.2. Draw the oxygen-haemoglobin dissociation curve of a normal adult and give reasons for its shape. (40%)
  - 2.3. Outline the physiological advantages of the shape of the above curve. (25%)
  - 2.4. Explain the significance of P<sub>50</sub>. (25%)
  
- 3,
  - 3.1. Describe with an illustration the mechanism for excretion of H<sup>+</sup> by the proximal convoluted tubule of the kidney. (50%)
  - 3.2. List two (02) important buffers found in the renal tubular fluid. (5%)
  - 3.3. Explain briefly with illustrations how the above buffers control the acidity of urine. (45%)

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

- 1,
  - 1.1. Describe latent heat. (40%)
  - 1.2. Outline the importance of latent heat in anaesthesia. (60%)
  
- 2,
  - 2.1. List three (03) essential features required in an anaesthetic gas analyzing monitor. (15%)
  - 2.2. List the methods available to identify and measure the concentration of inhalational agents. (15%)
  - 2.3. Outline the physical principle of one of the methods mentioned in 2.2 (50%)
  - 2.4. List the advantages and limitations of the method mentioned in 2.3 (20%)
  
3. Write short notes on
  - 3.1. Central tendency. (30%)
  - 3.2. Vitalograph' spirometer. (35%)
  - 3.3. Sine wave. (35%)