(03) MD (Anaesthesiology) Part 1B Examination

01. August 1993
02. August 1995
05. August 1997
07. February 1999
09. February 2000
11. February 2001
13. February 2002
15. February 2003
17. February 2004
19. March 2005
21. March 2006
23. March 2007
02. September 1994
04. August 1996
06. August 1998
08. August 1999
10. August 2000
12. November 2001
14. August 2002
16. August 2003
18. August 2004
20. August 2005
22. August 2006
POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

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

Date: 17th 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 anesthesia.

3. Write short notes on the mode of action at receptor level of the followings:
   (a) Muscle relaxants
   (b) Local anesthetics
   (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.
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: 13th 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.
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: 22nd 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.
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
UNIVERSITY OF COLOMBO

MD (ANESTHESIOLOGY) PART IB EXAMINATION
AUGUST, 1996

Date: 20th 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?
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
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.
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
UNIVERSITY OF COLOMBO

MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION
AUGUST, 1998

Date: 18th 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?
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
MD (ANAESTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION-
FEBRUARY 1999

Date: - 23rd 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
UNIVERSITY OF COLOMBO

MD (ANABSTHESIOLOGY) PART IB (BASIC SCIENCES) EXAMINATION
AUGUST, 1999

Date: 24th 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 anesthesia. 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.
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 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 it's 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 g/dl)
   
   pH - 7.35
   PCO2 - 58 mm Hg
   P02 - 55 mm Hg
   HCO3 - 33.1 mmols/L
   02 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
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 :- 20th 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
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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.15</td>
</tr>
<tr>
<td>pO₂</td>
<td>9.6 kPa (72 mmHg)</td>
</tr>
<tr>
<td>pCO₂</td>
<td>6.1 kPa, (45.75 mmHg)</td>
</tr>
<tr>
<td>Actual HCO₃</td>
<td>15.3 mmol/l</td>
</tr>
<tr>
<td>Base Excess</td>
<td>8.2</td>
</tr>
<tr>
<td>Standard HCO₃</td>
<td>18.8 mmol/l</td>
</tr>
</tbody>
</table>

   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) Oscillotonometery as used in automated blood pressure measurement.
   (b) TECO (Transoesophageal Cardiac Output)
   (c) Triple point of water
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) Remifentanil
   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.
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
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.
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:- 25th 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?
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
Date: 19th 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.
1. Discuss the important physical conditions of a standard catheter transducer system for accurate recording of the arterial blood pressure waveform.


3. Write short notes on:
   a.) SI units.
   b) Regression analysis.
   c) Thermistors
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\textsuperscript{th} 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.
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
Date: 8th 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? Give 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?
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) Piezoelectric effect
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 output.
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
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 (CI)
   - Half life (t½)

   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
& CLINICALCHEMISTRY
(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 – Poisseuille equation and its applications in anaesthetic practice.
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 haemostasis
   Describe briefly the mechanisms of action of the drugs in each group.

3. Compare and contrast halothane and sevoflurane.

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\textsuperscript{th} 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 - RMACOLOGY (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.
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
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?