

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – JULY 2006

SUBJECT: PAPER I: BASIC SCIENCES AS APPLIED TO ANAESTHESIOLOGY

Monday, July 03, 2006

Time: 3 Hrs.

Max. Marks: 100

Be brief in your answers; padding your answers will not get you any extra credit.

Illustrate your answer with clearly labeled diagrams where appropriate.

1. With the help of diagrams, describe the anatomy of the coronary circulation. What are the electrocardiographic changes seen in a patient with significant coronary heart disease?
(6+4 = 10 marks)
2. Explain the concept of the *shunt fraction*. State and derive the mathematical equation for estimation of the shunt fraction.
(5+5 = 10 marks)
3. Describe with the aid of diagrams the progressive electrocardiographic features of hypokalaemia and hyperkalaemia.
(5+5 = 10 marks)
4. Describe the location of the α -adrenergic, β -adrenergic and dopaminergic receptors. What are the physiologic effects of stimulation or blockade of each of these receptors?
(5+5 = 10 marks)
5. Compare and contrast diazepam and midazolam in the following respects: physical and chemical characteristics, volume of distribution, metabolism, distribution half life and elimination half life.
(5+5 = 10 marks)
6. Compare the cardiovascular actions of the following drugs: *diethyl ether and halothane, pancuronium and vecuronium, thiopentone and ketamine, morphine and pentazocine, nitroglycerine and sodium nitroprusside*.
(2+2+2+2+2 = 10 marks)
7. Describe the physical principles used in the measurement of body temperature in the operation theatre and the intensive care unit.
(10 marks)
8. State Boyle's law, Charles's law, Avogadro's law and Dalton's law of partial pressure. Which of these laws is used in the calculation of amount of nitrous oxide remaining in a cylinder, and how?
(6+4 = 10 marks)
9. Describe with diagrams the anatomy of the typical intercostal nerve.
(10 marks)
10. Describe with the help of diagrams the anatomy of the tracheobronchial tree. What positions are employed in the preoperative postural drainage of the posterior segment of the left upper lobe and the apical segment of the right lower lobe?
(6+4 = 10 marks)



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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – JULY 2006**SUBJECT: PAPER II: CLINICAL ANAESTHESIOLOGY I**

Tuesday, July 04, 2006

Time: 3 Hrs.

Max. Marks: 100

Be brief in your answers; padding your answers will not get you any extra credit.**Illustrate your answer with clearly labeled diagrams where appropriate.**

1. A 28-year old lady with 26 weeks of gestation is scheduled for elective appendicectomy. Discuss your plan of anaesthetic management.
(10 marks)
2. A primigravida presents with significant haemorrhage following vaginal delivery. The obstetrician suspects retained placenta and schedules her for emergency manual removal of retained placenta. What are the anaesthetic problems and how will you manage this patient?
(4+6 = 10 marks)
3. With the help of a diagram, discuss the pain pathways that subserve labour pains. Outline the plan for labour analgesia in a 23-year old primigravida in early labour.
(6+4 = 10 marks)
4. What are the factors that influence the occurrence of postdural puncture headache (PDPH) following a spinal anaesthetic? Briefly outline the treatment modalities for PDPH.
(5+5 = 10 marks)
5. What are the nerves blocked in a 3-in-1 block? Describe the technique of giving a 3-in-1 block and mention the complications.
(3+7 = 10 marks)
6. Briefly discuss the possible mechanism of action of local anaesthetic agents. What are the methods to modify the action of local anaesthetic agents?
(5+5 = 10 marks)
7. Design a patient controlled analgesia plan for a 40-year old man belonging to ASA Physical Status I who has undergone radical nephrectomy.
(10 marks)
8. Classify antihypertensive agents. What are the complications you expect during anaesthesia in patients who are on long-term antihypertensive treatment either with beta-blockers or with calcium channel blockers.
(4+6 = 10 marks)
9. Classify the tests used in investigating a patient with abnormal bleeding. How will you interpret abnormalities in the test results?
(4+6 = 10 marks)
10. What are the problems associated with laser surgery of the upper airway? Briefly describe how you will circumvent these problems.
(4+6 = 10 marks)



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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – JULY 2006

SUBJECT: PAPER III: CLINICAL ANAESTHESIOLOGY II

Wednesday, July 05, 2006

Time: 3 Hrs.

Max. Marks: 100

✍ **Be brief in your answers, padding your answers will not get you any extra credit.**

✍ **Illustrate your answer with clearly labeled diagram where appropriate.**

1. Enumerate the parameters to be checked before initiating cardiopulmonary bypass(CPB). How do you maintain and monitor anticoagulation during CPB? What are the causes of inadequate anticoagulation and how can these be overcome?
(4+3+3 = 10 marks)
2. Discuss the anaesthetic management of a 4-year old child with tetralogy of Fallot with frequent hypercyanotic spells and on oral propranolol therapy scheduled for elective dental extraction.
(10 marks)
3. Enumerate the differential diagnosis of intraoperative “bronchospasm” under general anaesthesia. Describe the steps of management of such a situation.
(4+6 = 10 marks)
4. Briefly describe the surgical positions adopted in neurosurgery and the anaesthetic problems associated with each of these positions.
(10 marks)
5. Discuss the anaesthetic management and postoperative case of a 25-year male with cervical spine fracture and paraplegia scheduled for posterior stabilization and fusion.
(10 marks)
6. Discuss preoperative evaluation, preparation, choice of anaesthetic technique and fluid management in a patient with chronic renal failure scheduled for internal fixation of tibia.
(3+3+2+2 = 10 marks)
7. Enumerate the types of tracheoesophageal fistula in a newborn. Discuss the perioperative management of a 2-day old neonate scheduled for repair of tracheoesophageal fistula.
(2+8 = 10 marks)
8. Briefly discuss the preoperative evaluation, preparation, anaesthetic management and postoperative care of a 2-year old child scheduled for emergency laparotomy for suspected intussusception.
(2+1+5+2 = 10 marks)
9. List the benefits of regional anaesthesia for day care surgery. Enumerate the commonly used drugs and techniques for regional anaesthesia in day care surgery. Describe the criteria to be satisfied before discharging a patient following day care surgery.
(3+3+4 = 10 marks)
10. Enumerate the harmful effects of chronic exposure to anaesthetic agents. Describe in brief any one of the scavenging systems used in anaesthetic breathing circuits.
(4+6 = 10 marks)



MANIPAL ACADEMY OF HIGHER EDUCATION

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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – JULY 2006 SUBJECT: PAPER IV: REANIMATOLOGY & CRITICAL CARE MEDICINE, MANAGEMENT OF CHRONIC PAIN STATES AND MISCELLANEOUS ANAESTHESIOLOGY-RELATED TOPICS

Thursday, July 06, 2006

Time: 3 Hrs.

Max. Marks: 100

- ✗ **Be brief in your answers; padding your answers will not get you any extra credit.**
- ✗ **Illustrate your answer with clearly labeled diagrams where appropriate.**
1. Write the steps of basic life support and give the algorithm for management of cardiac asystole.
(5+5 = 10 marks)
 2. Describe the clinical criteria and ancillary tests used for differentiating brain death from cerebral death.
(10 marks)
 3. What is “triage”? Describe the complications that can occur following a blunt chest injury and how these complications are managed.
(3+7 = 10 marks)
 4. Describe in detail the technique of isovolaemic haemodilution in a 20-year old patient weighing 50kg (haematocrit of 0.38) scheduled for corrective surgery for thoracolumbar scoliosis.
(10 marks)
 5. Discuss the pathophysiology and ventilatory management of acute lung injury. Describe the meaning of the terms *best PEEP* and *optimal PEEP*.
(8+2 = 10 marks)
 6. Discuss the role of dopamine and nitroglycerine in critically ill patients with reference to indications, mechanism of action, dosage and side effects.
(5+5 = 10 marks)
 7. Discuss the clinical features, diagnosis and management of organophosphorous compound poisoning.
(10 marks)
 8. What is meant by the term *sympathetically maintained pain*? Briefly outline the causes and management of causalgia.
(2+8 = 10 marks)
 9. Differentiate between the terms *difficult airway* and *compromised airway*. Mention the indications for and briefly describe the procedure of retrograde intubation.
(4+6 = 10 marks)
 10. Describe with examples the meaning of the terms *mean*, *median*, *mode* and *standard deviation*.
(2+2+2+4 = 10 marks)



MANIPAL ACADEMY OF HIGHER EDUCATION

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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – DECEMBER 2006**SUBJECT: PAPER I: BASIC SCIENCES AS APPLIED TO ANAESTHESIOLOGY**

Monday, December 04, 2006

Time: 3 Hrs.

Max. Marks: 100

- ✍ **Be brief in your answers; padding your answers will not get you any extra credit.**
- ✍ **Illustrate your answer with clearly labeled diagrams where appropriate.**

1. With reference to the action potential of cardiac muscle, explain the meaning and significance of the terms *absolute refractory period* and *relative refractory period*.

(10 marks)

2. With reference to the pulmonary alveoli, explain the meaning and significance of the term *time constant*. Describe the effect of each of the following manoeuvres on lung inflation (in each case, assume that the other parameters remain unaltered): doubling airway resistance, halving compliance, doubling inflation pressure.

(4+(2×3) = 10 marks)

3. Describe the acid-base derangement that may be expected in a patient with methanol intoxication (following ingestion of adulterated liquor). Give an account of the treatment of methanol intoxication, explaining the physiologic/biochemical rationale for each therapeutic measure.

(3+7 = 10 marks)

4. Discuss the metabolic and immunological mechanisms and genetic susceptibility that have been implicated in halothane-associated hepatitis.

(10 marks)

5. With reference to the inhaled anaesthetics, explain the meaning of the terms: *tension*, *solubility* and *concentration*. Explain why the induction of anaesthesia is more rapid with the less soluble agents than with the more soluble agents.

(2+2+2+4 = 10 marks)

6. With reference to pharmacologic agents used in anaesthesia and giving appropriate examples, classify drug interactions.

(10 marks)

7. Enumerate the factors that affect the shape of the arterial pressure waveform and the accuracy of the values of the systolic and diastolic blood pressures (obtained by connecting an indwelling arterial cannula to a pressure transducer connected in turn to an appropriate monitor) and narrate the procedure that you would follow to minimize the impact of these factors.

(4+6 = 10 marks)

8. With the help of an appropriate diagram, explain why, when a large minute volume and a relatively low fresh gas flow are used with controlled ventilation in the *Mapleson D* system, even small changes in the fresh gas flow will cause large changes in the arterial carbon dioxide tension.

(10 marks)

9. Explain the anatomical basis of producing regional anaesthesia of the upper airway prior to conventional laryngoscopy and tracheal intubation in the awake patient.

(10 marks)

10. With the help of a diagram, describe the anatomical landmarks that you would identify before the cannulation of the right subclavian vein by the infraclavicular approach. Name the most important complication of this procedure. Describe the point at which you would insert the needle and the direction in which you will point the needle and explain the rationale behind it.

(5+1+4 = 10 marks)

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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – DECEMBER 2006**SUBJECT: PAPER II: CLINICAL ANAESTHESIOLOGY I**

Tuesday, December 05, 2006

Time: 3 Hrs.

Max. Marks: 100

- ✗ **Be brief in your answers; padding your answers will not get you any extra credit.**
- ✗ **Illustrate your answer with clearly labeled diagrams where appropriate.**

1. Describe the phenomenon of aortocaval compression from the time it appears till the termination of pregnancy. Discuss its importance to the anaesthesiologist.
(5+5 = 10 marks)
2. Discuss the anaesthetic implications of the administration of magnesium sulphate to a parturient with pre-eclampsia.
(10 marks)
3. A twenty-three-year-old ASA I primigravida is scheduled for the excision biopsy of a breast lump at eight weeks of gestation. Discuss the anaesthetic considerations.
(10 marks)
4. Discuss the current consensus on the subject of the use of neuraxial block(spinal/epidural anaesthesia) in each of the following situations:
 - i) preoperative anticoagulation or thrombolytic therapy,
 - ii) preoperative low-dose heparin therapy,
 - iii) preoperative(chronic) low-dose aspirin therapy,
 - iv) perioperative administration of heparin,
 - v) postoperative administration of anticoagulants.
(2×5 = 10 marks)
5. Describe the technique of performance of an intercostal nerve block. Enumerate the indications for and potential hazards of the performance of multiple, bilateral intercostal nerve blocks.
(6+4 = 10 marks)
6. Compare and contrast the local anaesthetic solutions currently being used in the world for producing epidural analgesia/anaesthesia in the following respects: concentration(s) typically used in epidural blockade, speed of onset of neural blockade, duration of neural blockade and the main clinical situation(s) in which the drug is preferred to most of the others.
(2+2+2+4 = 10 marks)

7. Describe the current status of intrathecal/epidural administration of clonidine in postoperative pain relief.

(10 marks)

8. You are called to see a 64-year-old, 48-kg patient in the emergency room. He is conscious and oriented. He has a blood pressure of 240/170 mmHg, but there is no history/evidence of angina/cardiac failure/pulmonary disease/renal disease. He has been receiving oral clonidine 150 μ g every eight hours and oral atenolol 50mg every twelve hours for two weeks. Outline your role in the immediate management of this patient.

(10 marks)

9. An 80-year old man whose activity is restricted by his age is scheduled for elective inguinal herniorrhaphy. List the preoperative investigations that are required in view of his age. Discuss the anaesthetic implications of the age-related changes in the respiratory and nervous systems that are likely to be preset in this patient.

(5+5 = 10 marks)

10. Discuss the anaesthetic considerations in middle ear surgery and tympanoplasty.

(10 marks)

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MD (ANAESTHESIOLOGY) DEGREE EXAMINATION – DECEMBER 2006**SUBJECT: PAPER III: CLINICAL ANAESTHESIOLOGY II**

Wednesday, December 06, 2006

Time: 3 Hrs.

Max. Marks: 100

- ✂ **Be brief in your answers, padding your answers will not get you any extra credit.**
- ✂ **Illustrate your answer with clearly labeled diagram where appropriate.**

1. During an open-heart procedure, the surgeon is ready to place the patient on cardiopulmonary bypass. Describe your immediate pre-bypass checklist and on-bypass checklist.
(5+5 = 10 marks)
2. A 65-year-old man has an implanted demand pacemaker (of the VVI type) in the right pectoral region for third-degree atrioventricular block. Discuss how you would evaluate pacemaker function in the preoperative period. Enumerate the precautions that are necessary to ensure uninterrupted pacemaker function perioperatively.
(4+6 = 10 marks)
3. A 28-year-old woman diagnosed to have myasthenia gravis is on treatment for the past 8 years with oral pyridostigmine (900 mg/day). Discuss your anaesthetic management (including preoperative evaluation and optimization of drug therapy) for this patient scheduled for transsternal thymectomy. Outline your plan for postoperative care of this patient.
(7+3 = 10 marks)
4. A 62-year-old lady is scheduled for clipping of an anterior communicating artery aneurysm 12 days after aneurysm rupture. On examination, she is drowsy and confused and has right-sided hemiparesis(grade III power). Discuss the preoperative preparation and intraoperative management of this patient in whom the surgeon plans to use temporary clips during aneurysm dissection.
(4+6 = 10 marks)
5. A 55-year-old woman with rheumatoid arthritis, on medical treatment for thirty years with salicylates, diclofenac sodium and corticosteroids, is scheduled for an elective arthrodesis of the right wrist. Giving reasons for each choice/decision, present your plan for optimal perioperative management.

(10 marks)

6. A 55-year-old man with carcinoma of the bladder is posted for a radical cystectomy and urinary diversion. Describe your plan for the perioperative management of this patient with special emphasis on intraoperative monitoring and postoperative pain relief.

(10 marks)

7. With reference to *omphalocele* (exomphalos) and *gastroschisis*, enumerate

- i) the differences in the clinical pictures and the implications of these differences on preoperative evaluation and preparation,
- ii) the problems associated with a “tight” closure of the abdomen and the surgical alternatives available and
- iii) the parameters that should be monitored during the closure of the defect.

(5+2+3 = 10 marks)

8. A three-year-old, 11-kg child scheduled for an elective inguinal herniotomy the next day is seen by you in the pre-anaesthetic clinic and found to have a “runny nose”, but no fever; the lungs are “clear” on auscultation. Define your approach to this problem; give reasons for each decision.

(10 marks)

9. Outline your plan of management in each of the following situations:

- i) a 44-year-old woman who develops severe postoperative shivering following cholecystectomy and
- ii) a 55-year-old man with pre-existing coronary artery disease who develops a 3-mm ST-segment depression associated with hypotension(90/60 mmHg) and hour after an inguinal hernia repair under spinal anaesthesia.

(5+5 = 10 marks)

10. Giving reasons, name your choice of method for effectively sterilizing each of the following list of equipment: the Bain breathing system, anaesthesia ventilator, laryngeal mask airway, manual resuscitator and circle absorber.

(2×5 = 10 marks)



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MANAGEMENT OF CHRONIC PAIN STATES AND MISCELLANEOUS
ANAESTHESIOLOGY-RELATED TOPICS**

Thursday, December 07, 2006

Time: 3 Hrs.

Max. Marks: 100

✍ **Be brief in your answers; padding your answers will not get you any extra credit.**

✍ **Illustrate your answer with clearly labeled diagrams where appropriate.**

1. Compare and contrast the various routes that can be used for administration of drugs (including modification of dosage or method of administration, if any) in cardiopulmonary resuscitation.

(10 marks)

2. Enumerate the important pharmacodynamic effects of tricyclic antidepressants that account for their cardiotoxic effects. Describe the special features of treatment of an adult victim of tricyclic antidepressant overdose, with particular reference to the management of a cardiac arrest in such a patient.

(4+6 = 10 marks)

3. Present your plan for providing anaesthesia/analgesia for the extrication of a young adult who is conscious but whose left lower limb is entrapped in an automobile at the site of an accident.

(10 marks)

4. Describe how the oxygen affinity of the bovine haemoglobin molecule differs from that of the human haemoglobin molecule. Discuss the current status of the use of stroma-free solutions of bovine haemoglobin as blood substitutes.

(3+7 = 10 marks)

5. Explain the meanings of the terms *cycling* and *limiting*. Describe the cycling mechanisms used in modern ventilators.

(2+2+6 = 10 marks)

6. Explain the meaning of the term inodilator(also called inodilator). Indicate the clinical situations in which an inodilator is indicated and explain the rationale for its use in this situation.

(3+7 = 10 marks)

7. With reference to the management of a 6-month-old infant requiring mechanical ventilation for several days in the intensive care unit, suggest a protocol for management of the artificial airway. (10 marks)
8. Describe the differences between nociceptive pain and neuropathic pain. Give two examples of neuropathic pain. Outline the treatment of neuropathic pain. (3+2+5 = 10 marks)
9. Describe your plan for extubation of the trachea of an adult male in whom tracheal intubation was achieved after multiple attempts due to a grade III laryngoscopic view. (10 marks)
10. Explain the difference between *population* and *sample*. Describe the methods by which investigator bias can be avoided while drawing up a sample for a prospective, controlled clinical investigation. (4+6 = 10 marks)

