



FCA(SA) Part II

## THE COLLEGES OF MEDICINE OF SOUTH AFRICA

Incorporated Association not for gain  
Reg No 1955/000003/08

Final Examination for the Fellowship of the  
College of Anaesthetists of South Africa

19 February 2019



Paper 2

(3 hours)

*All questions are to be answered in the space provided.*

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**CANDIDATE NUMBER.....**

**Questions 1 - 3**

**There are 7 books for this examination, please ensure that the 7 books are handed over to the invigilator for marking.**



**Question 2**

Regarding recovery from anaesthesia according to the SASA 2018 Guidelines

- a) List 5 points anaesthetists must check before a patient can be handed over to the recovery room staff. (5)

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- b) What should the ratio of recovery room nursing staff to patients be? (2)

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- c) When using the modified Aldrete Score to assess patients in recovery, when may patients be discharged from recovery to the ward? (2)

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- d) When may the anaesthetist leave the hospital after administering an anaesthetic to a patient? (1)

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Candidate number: \_\_\_\_\_

**Question 3**

A 30-year-old man has been referred to you by an orthopaedic surgeon for the treatment of chronic pain in his right lower leg since open fixation of a fractured tibia one year ago. X-rays demonstrate good union. The pain is in the entire right lower leg; touching the skin in this area is painful, even far away from the site of operation. The skin of the right lower leg appears atrophic but peripheral pulses are normal. He is reluctant to weight bear as he is concerned this may worsen his condition.

- a) Are the characteristics of this patient's pain consistent with a diagnosis of CRPS? Briefly explain your answer. (3)

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- b) List 3 other symptoms that would support the diagnosis of CRPS. (3)

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- c) List 2 oral drugs commonly used to treat CRPS associated neuropathic pain. (2)

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- d) What advice will you give him regarding weight-bearing on the affected leg? (2)

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[10]

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**Questions 4 - 6**

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**Question 4**

Please explain the process and goals involved in a Clinical Audit that would be used to investigate an increased incidence of unintentional extubation on your multi-disciplinary intensive care unit. Please use diagram/s to describe the processes involved. [10]

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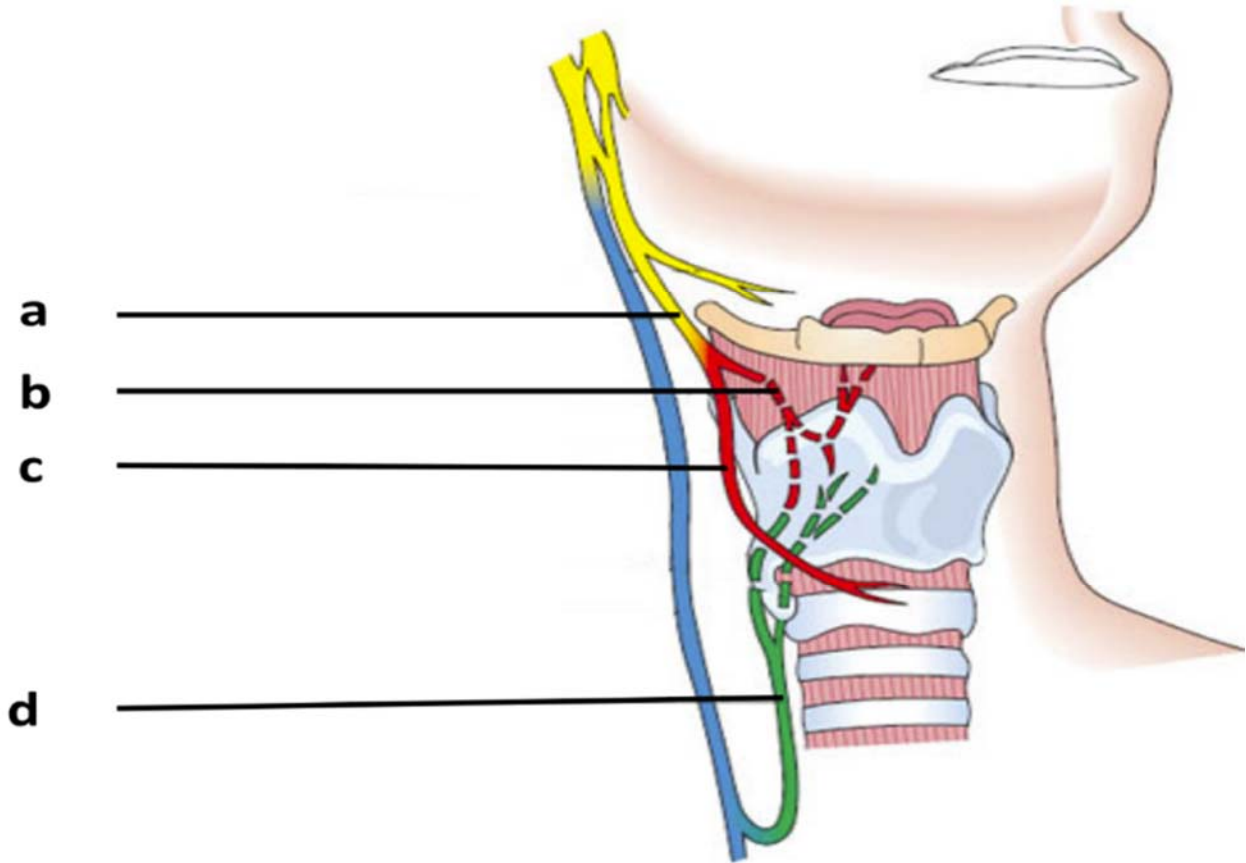
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**Question 5**

With reference to the accompanying diagram



a) Describe the airway innervation by completing the table on the following page. (8)

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**CANDIDATE NUMBER.....**

**Questions 7 - 9**

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**Question 7**

List the challenges of anaesthetizing the morbidly obese patient for caesarean section. [10]

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**Question 8**

A patient with Myasthenia Gravis presents for a thymectomy. Preoperative assessment reveals only mild ocular weakness. She is currently taking 650 mg/day pyridostigmine.

- a) Complete the following table on possible peri-operative crises. (3)

Type of crisis:		
Diagnostic intervention and expected result to identify type of crisis:		
Treatment option for that crisis:		

- b) List your concerns regarding the use of muscle relaxants, their reversal and/or “spontaneous” recovery from them. (4)

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- c) How would you assess readiness for extubation post-operatively? (3)

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[10]

Candidate number: \_\_\_\_\_

**Question 9**

Regarding the American Society of Anesthesiologists ASA Risk Scoring System

- a) List shortcomings thereof. (8)

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- b) Provide 2 suggestions how its reliability to predict patient outcomes can be improved. (2)

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[10]

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**CANDIDATE NUMBER.....**

**Questions 10 - 11**

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**Question 10**

List myocardial protective measures that can be used during cardiac surgery.

[10]

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**Question 11**

Regarding one lung ventilation

- a) List the main causes of hypoxia during one lung ventilation. (5)

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- b) List strategies that can be used to treat hypoxia during one lung ventilation. (5)

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[10]

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**CANDIDATE NUMBER.....**

**Questions 12 - 14**

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**Question 12**

You are requested to write a protocol for the management of patients with traumatic brain injury (TBI). Please tabulate management targets (goals) for each organ system mentioned below, as per the example provided. [10]

System	Management targets or goals
Airway	Example: Intubate if Glasgow Coma Scale $\leq$ 8/15
Respiratory	Any 2 (2)
Cardiovascular	Any 2 (2)
Cerebral	Any 3 (3)
Metabolic	Any 1 (1)
Other	Any 2 (2)

PTO/Page 3 Question 13...

Candidate number: \_\_\_\_\_

**Question 13**

List the advantages and disadvantages of performing an awake craniotomy under either

- a) Sedation only technique. (4)

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- b) General anaesthesia with wake-up technique. (4)

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- c) Write down the loading dose and infusion regimen range when using dexmedetomidine as a single sedation agent for awake craniotomy. (2)

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[10]

Candidate number: \_\_\_\_\_

**Question 14**

The cardiologist has requested your assistance with sedating a very anxious patient who will have a biventricular pacing-defibrillator device inserted in the catheterisation suite. List your main concerns when assessing the patient's suitability for sedation for this procedure. [10]

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**CANDIDATE NUMBER.....**

**Questions 15 - 17**

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**Question 15**

A 5-year-old girl with Down's syndrome (Trisomy 21) is scheduled for dental clearance under general anaesthesia.

- a) List 5 possible anatomical airway abnormalities in Down's syndrome. (5)

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- b) List 4 concerns in Down's syndrome related to other organ systems that may affect airway management. (2)

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- c) List 3 difficulties expected during airway management of this patient and strategies to overcome these, assuming a gas induction. (3)

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[10]

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**Question 16**

A 50-year-old, otherwise healthy male patient is booked for microlaryngoscopic surgery to excise a 9 mm vocal cord polyp. He is totally asymptomatic apart from mild hoarseness. The surgeon asks for maximum access to the airway.

- a) List three appropriate methods of airway management and briefly explain how oxygenation and/or ventilation may be facilitated by each method.

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- b) Tabulate the main advantages and disadvantages of each method.

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[10]

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**Question 17**

Discuss the advantages and limitations of large, multicentre, pragmatic randomised controlled trials (i.e. the large international trials measuring the practical clinical effectiveness of interventions in a relatively undefined sample population) as evidence base in perioperative decision making. [10]

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**CANDIDATE NUMBER.....**

**Questions 18 - 20**

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**Question 18**

Please complete the following table with regard to a paediatric patient that you have been called to review for possible intubation. The patient is in severe respiratory distress. The differential diagnosis is either Croup (Laryngotracheobronchitis, LTB) or epiglottitis. [10]

Item	Croup	Epiglottitis
Incidence	More Common	Much rarer
Infectious agent(s)	Parainfluenza myxoviruses, respiratory syncytial virus, adenovirus	
Age group		2 to 6 years
Level of airway obstruction		Supraglottic structures, epiglottitis
Drooling		
Phonation	Hoarse	
Cough		Muffled
Classic radiology findings	Sign: View: AP neck or CXR	Sign: Thumb sign View:
Immediate Management strategies		Prepare for intubation



**Question 20**

Write short notes on

- a) The pathophysiology of lactic acidosis in Septic Shock. (5)

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- b) The clinical use of lactate in guiding resuscitation from septic shock. (5)

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[10]

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Paper 3

(3 hours)

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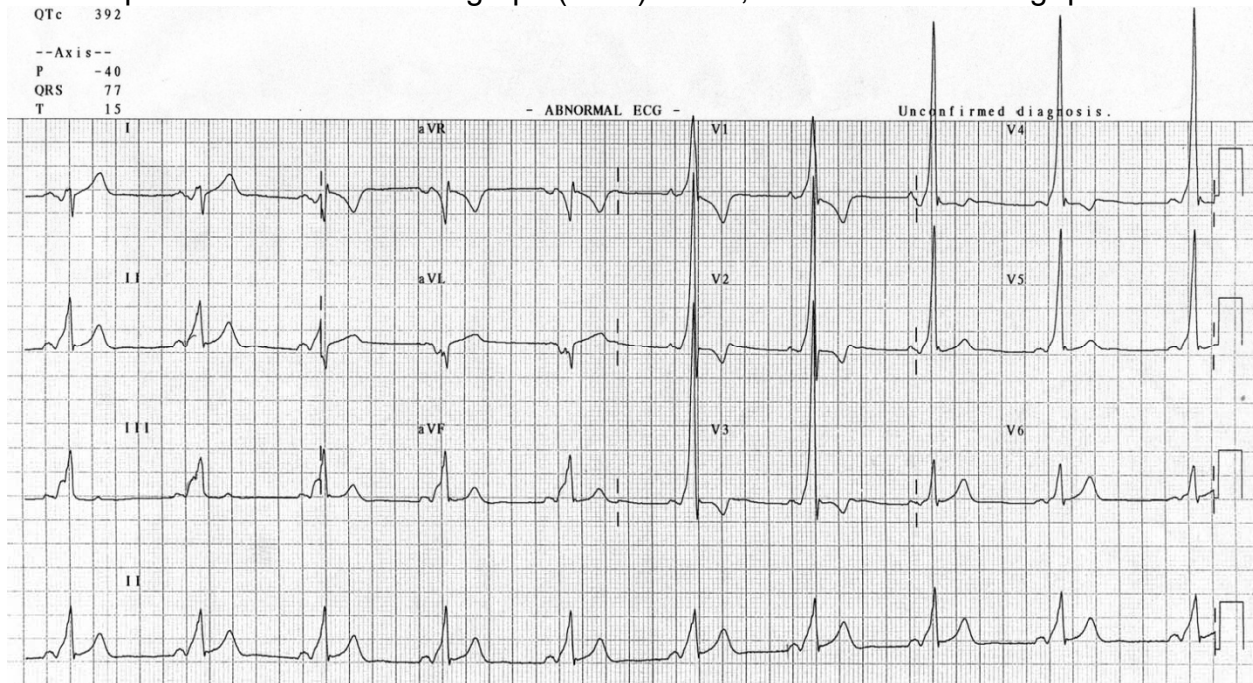
**CANDIDATE NUMBER.....**

**Questions 1 - 2**

**There are 8 books for this examination, please ensure that the 8 books are handed over to the invigilator for marking.**

**Question 1**

With respect to the electrocardiograph (ECG) below, answer the following questions:



a) What is the most obvious diagnosis? (1)

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b) What are the abnormal features of this ECG that support your diagnosis? (3)

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c) What is the main perioperative complication associated with this diagnosis? (1)

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d) What are the treatment options if the patient developed the complication identified in (c) and was acutely hypotensive? (5)

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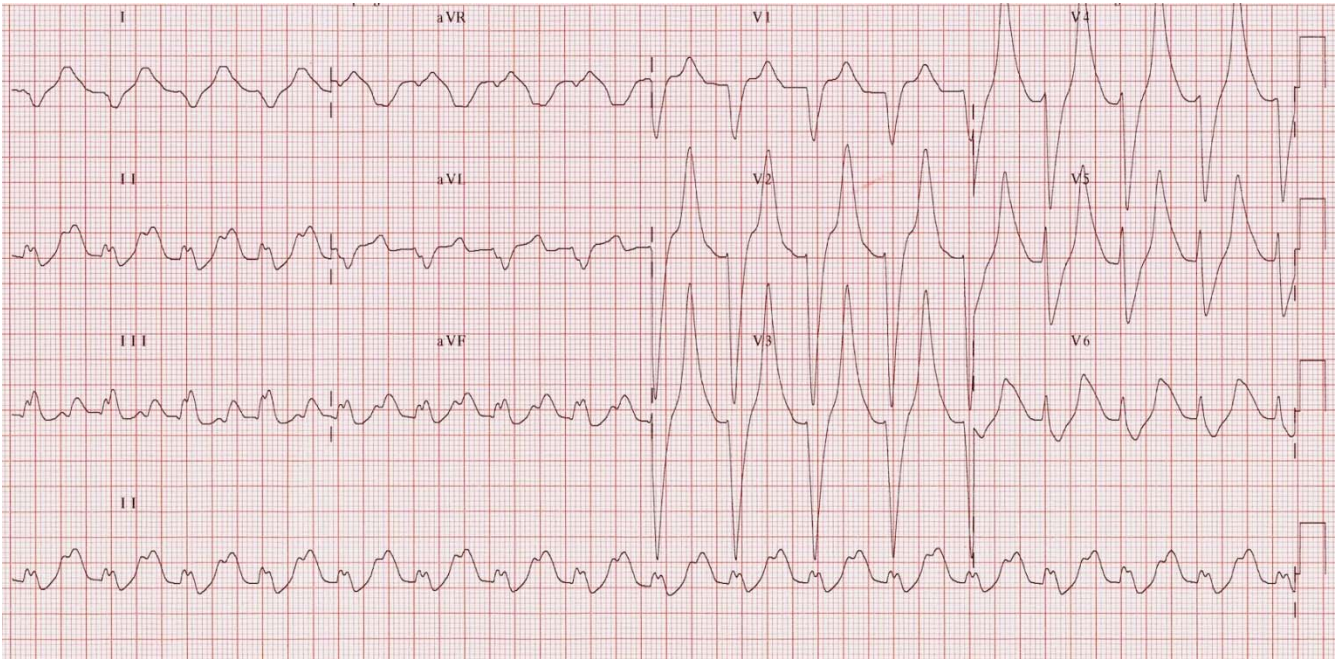
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[10]

**Question 2**

With respect to the electrocardiograph (ECG) below:



a) What are the abnormal features of this ECG? (3)

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b) What is the most likely diagnosis? (1)

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- c) List acute treatment modalities for the above diagnosis (dosages not needed) and explain the rationale for each. (6)

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[10]





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**CANDIDATE NUMBER.....**

**Questions 3 - 4**

**There are 8 books for this examination, please ensure that the 7 books are handed over to the invigilator for marking.**

**Question 3**

The following results are from a patient in your ICU:

Blood gases on 40% O <sub>2</sub> face mask		
	Arterial	Mixed Venous
PO <sub>2</sub> (kPa) (mm Hg)	12.2 (92,7)	3.8 (28.8)
SO <sub>2</sub> (%)	96.3	52.1
PCO <sub>2</sub> (kPa)	6.1 (46.3)	7.2 (54.7)
TCO <sub>2</sub> (mmol/l)	35.1	39.1
pH	7.47	7.44
Base excess/deficit (mmol/l)	9.5	12.1
Hb (g/dl)	13.6	13.6
Haemodynamic parameters		
	Systemic arterial	Pulmonary arterial
BP systolic (mm Hg)	119	37
Diastolic (mm Hg)	81	25
Mean (mm Hg)	94	30
PAWP (mm Hg)	16	
CVP (mm Hg)	12	
Heart rate BPM	124	
Cardiac output (l/min)	3.3	

Using the above results, calculate the following. Please show all calculations and also units.

a) CaO<sub>2</sub> (Arterial oxygen content). (3)

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b) CvO<sub>2</sub> (Venous oxygen content). (3)

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c)  $C_cO_2$  (End capillary oxygen content). (3)

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d) Shunt fraction. (4)

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[13]

**Question 4**

With regard to the results in Question 3 above, please calculate the following. Show all calculations and units.

e)  $\dot{V}O_2$  (Oxygen consumption per minute). (3)

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f)  $\dot{D}O_2$  (Oxygen delivery per minute). (2)

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g) SVR (Systemic vascular resistance). (2)

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[7]

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**CANDIDATE NUMBER.....**

**Questions 5 - 7**

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**Question 5**

A 35-year-old female patient is booked for a unilateral laparoscopic adrenalectomy. She is a known hypertensive for one year, poorly controlled on 2 agents. Urea & electrolytes, blood gases on room air are as follows:

	<i>Patient values</i>	<i>Reference</i>
Na <sup>+</sup>	149 mmol/L	135-145 mmol/L
K <sup>+</sup>	2.4 mmol/L	3.5-5 mmol/L
Cl <sup>-</sup>	105 mmol/L	96-106 mmol/L
Urea	5.0 mmol/L	2.5-6.7 mmol/L
Creatinine	80 mmol/L	70-150 mmol/L
pH	7.49	
PaO <sub>2</sub>	95 mmHg (12.67 kPa)	
PaCO <sub>2</sub>	29 mmHg (3.87 kPa)	
HCO <sub>3</sub> <sup>-</sup>	28 mmol/L	
BE	+4 mmol/L	
Lactate	0.8 mmol/L	
Hb	13 g/dL	
SaO <sub>2</sub>	97%	

- a) What is the most likely diagnosis? (1)

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- b) Give 2 reasons to justify your answer. (2)

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- c) What is the most likely reason that this patient is having an adrenalectomy? (1)

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d) Briefly state what needs to be done to optimise this patient's medical condition pre-operatively. (3)

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e) List 3 intra-operative concerns for this specific procedure. (3)

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[10]

**Question 6**

You decide to perform an interscalene brachial plexus block for a patient.



a) Label the structures marked; A, C, F & E in the above ultrasound image. (4)

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b) Would surgery on the clavicle be covered by this block? (1)

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Candidate number: \_\_\_\_\_



c) List 5 complications of an interscalene brachial plexus block. (5)

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[10]

**Question 7**

A 40-year-old male patient presents for an elective Roux-en-Y gastric bypass procedure.

- On examination: Height: 180 cm Mass: 130 kg Waist: 120 cm
- NIBP: 150/105 mmHg.
- Fasting Blood glucose: 6.7 mmol/L
- HbA1c: 7.5 %
- Lipogram and liver function tests are as in the tables below

Test	Result	Reference
s-Cholesterol	7.5 mmol/L	<5 mmol/L
s-LDL Cholesterol	4 mmol/L	< 3 mmol/L
s-HDL Cholesterol	0.8 mmol/L	> 1.2 mmol/L
s-Non HDL Cholesterol	6.8 mmol/L	<3.8 mmol/L
s- Chol/HDL ratio	9.4	< 4.1
s-Triglyceride	5 mmol/L	< 1.7 mmol/L

Test	Result	Reference
Bilirubin	6 µmol/L	5-17 µmol/L
Alkaline phosphatase	120 U/L	35-130 U/L
Aspartate transaminase (AST)	45 U/L	5-40 U/L
Alanine transaminase (ALT)	55 U/L	5-40 U/L
Gamma-glutamyl transpeptidase	40 U/L	10-48 U/L
Albumin	45 g/L	35-50 g/L
AST : ALT ratio	0.8 : 1.0	
International normalised ratio	1.0	0.8 - 1.2

- a) What is the most likely clinical diagnosis based on his clinical picture and special investigations? (1)

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- b) Give 2 reasons for your answer. (2)

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- c) Give 3 other systemic illnesses relevant to anaesthesia which a patient with this clinical picture, may also have. (3)

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- d) List 2 potential perioperative complications relevant to this patient. (2)

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- e) What is the most likely cause of the abnormal liver function tests & what special investigation will be helpful in confirming this? (2)

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[10]



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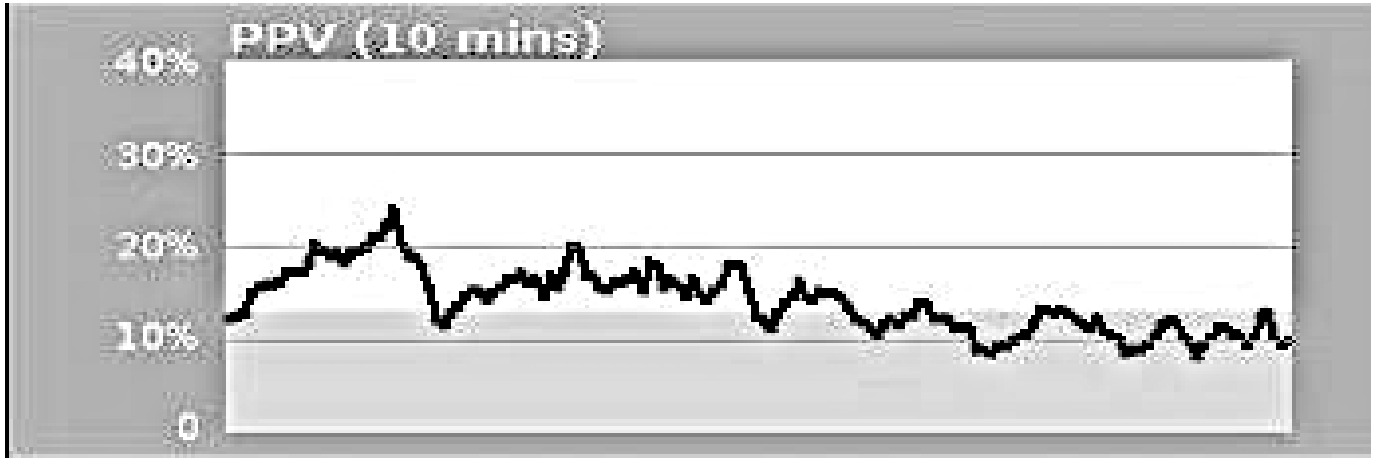
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**Questions 8 - 10**

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**Question 8**

The above diagram represents PPV trend over a period of 10 minutes.

a) What does PPV stand for? (1)

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b) Briefly explain the physiological mechanisms underlying PPV. (4)

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c) Briefly explain the likely reasons why PPV is decreasing in this patient. (2)

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d) What criteria must be met for measured PPV to be considered accurate? (3)

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[10]

**Question 9**

During precipitous labour, a healthy 21-year-old multiparous woman became pale, distressed, disorientated and suffered a cardiac arrest. Approximately one hour after successful resuscitation, abnormal vaginal bleeding and bleeding from venipuncture sites were noticed. Rotational thromboelastography was performed from the beginning of the resuscitation and was initially unrecordable. At +61 minutes and +124 minutes after the cardiac arrest it showed the following:

	ROTEM (+61min)	ROTEM (+124 min)
FIBTEM: A5 (mm)	Not recordable	2
EXTEM: clotting time (seconds)	781	126

**Normal values: FIBTEM A5 >12mm EXTEM clotting time <75s**

a) What is the differential diagnosis? (2)

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b) What would the echocardiograph likely show in this case? (3)

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c) What would be the expected PT, APTT and serum fibrinogen results? (3)

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- d) What therapy was instituted between the ROTEM (+61 min) and ROTEM (+124 min) results?  
(2)

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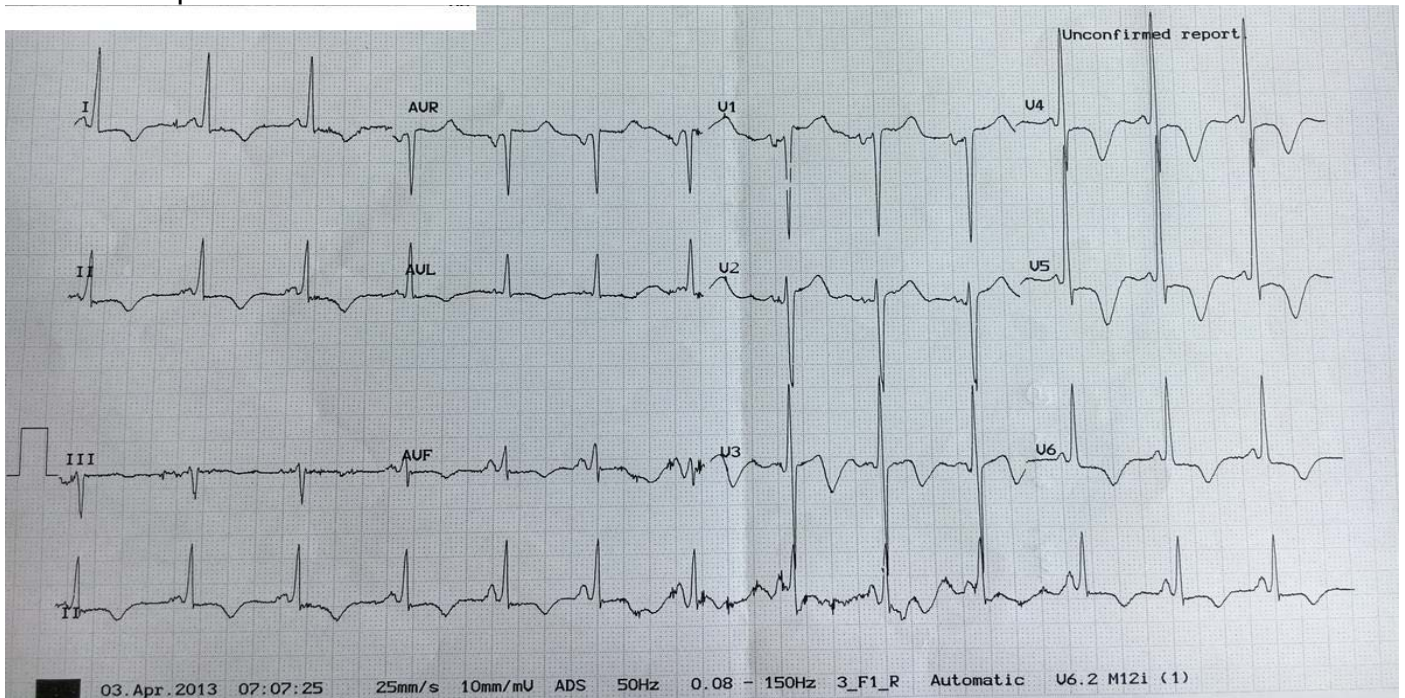
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[10]



**Question 10**

A 23-year-old woman presents at 32 weeks gestational age with headache, visual disturbances and abdominal pain. Her blood pressure is 210/135 mmHg and her heart rate is 75 beats per minute. She has 3+ proteinuria. Her ECG is shown.



- a) Identify the abnormalities on this EKG. (2)

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- b) List 4 echocardiographic findings that may be associated with this clinical and ECG picture. (2)

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Paper 3

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**CANDIDATE NUMBER.....**

**Questions 11 - 13**

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**Question 11**

A 4-week-old boy presents with a 4-day history of vomiting. On examination he shows signs of dehydration. An arterial blood gas done shows the following:

- pH 7.53, PaCO<sub>2</sub> 6 kPa (45 mmHg), PaO<sub>2</sub> 9.5 kPa (71.25 mmHg)
- Bicarbonate 34 mmol/l, Base excess 4.8 mmol/l
- Sodium 135 mmol/l, Potassium 3.0 mmol/l, Chloride 93 mmol/l, Urea 6.2 mmol/l

a) What is your interpretation of this blood gas? (4)

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b) What is the most likely diagnosis? (1)

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c) Briefly describe the pathophysiology of this condition. (3)

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d) Calculate the anion gap. (2)

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[10]

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b) Comment on the reversibility demonstrated in these lung functions. What are the possible explanations for this in the light of his recent exacerbations? (2)

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Regarding proposed surgery in this patient

c) What would you add to this patient's treatment regimen? (3)

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d) He refuses spinal anaesthetic. What would your intra-operative ventilation strategy be? (2)

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[10]

**Question 13**

A 4-year-old child presents with a 3-day history of persistent coughing, wheezing and dyspnoea. On examination the child has a temperature of 37.2 °C, a heart rate of 120 beats per minute and is normotensive. Auscultation reveals a mild expiratory wheeze over the right chest only and a respiratory rate of 25 breaths per minute. Peripheral saturation monitor measurement is 90%. The chest x-ray done is shown below.



- a) What are the most obvious radiological findings? (2)

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- b) What other radiological findings may be present in this condition? (3)

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c) What are your major concerns when managing the airway in this patient? (5)

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Paper 3

(3 hours)

*All questions are to be answered in the space provided.*

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**CANDIDATE NUMBER.....**

**Questions 14 - 16**

**There are 8 books for this examination, please ensure that the 8 books are handed over to the invigilator for marking.**

**Question 14**

A 22-year-old ASA I female patient for minor surgery develops laryngeal spasm which you manage successfully. 15 minutes after arrival in recovery, the staff call you as she is tachypnoeic, is coughing up small amounts of bloody froth and desaturating despite supplemental 40% facemask oxygen.

a) You draw a blood gas immediately when you arrive in recovery: what do you expect partial pressures of oxygen and carbon dioxide, and pH to be? Explain why these values are so. (3)

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b) Explain the pathophysiological mechanisms underlying negative pressure pulmonary oedema. (4)

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c) What are the three most important steps for managing a patient with negative pressure pulmonary oedema? (3)

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[10]

**Question 15**

An elderly man is admitted to your hospital after a fall that resulted in him developing subarachnoid haemorrhage (SAH). His family reports that he had very recently experienced increased urination and excessive thirst. He is confused with the following test results.

Serum Sodium 106 mmol/L
Serum osmolality 220mOsm/L
Urine osmolality 468 mOsm/L
Urine sodium 115 mmol/L

- a) What is the most likely diagnosis? (2)

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- b) Suggest a differential diagnosis for hyponatraemia in this setting. (2)

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- c) What are the distinguishing features between the above diagnoses? (2)

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- d) Explain, using a formula, how you would manage a patient with hyponatraemia. (3)

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e) What is the main complication seen with rapid treatment of this condition? (1)

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**Question 16**

A 78-year-old 60kg known hypertensive and diabetic black female presents and develops atrial fibrillation during cataract surgery under general anesthesia. On day 1 in the ICU, her urine output was 880 ml per 24 hours. Preoperative and postoperative Day 1 results are as follows:

<u>Preoperative</u>	<u>Day 1 in ICU</u>
Na <sup>+</sup> 146 mmol/L	Na <sup>+</sup> 142 mmol/L
K <sup>+</sup> 4.9 mmol/L	K <sup>+</sup> 4.3 mmol/L
Cl 111 mmol/L	Cl 104 mmol/L
Urea 7.9 mmol/L	Urea 12 mmol/L
Creatinine 137 mmol/L	Creatinine 218 mmol/L

- a) Using the provided parameters, classify and grade kidney injury according to any one of the kidney injury criteria by
- Naming your chosen criteria,
  - Classifying/grading this patient, and
  - Showing how your classification/grading was arrived at
- (5)

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b) List limitations of any one of the classifications of kidney injury. (5)

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**CANDIDATE NUMBER.....**

### **Question 17**

**There are 8 books for this examination, please ensure that the 8 books are handed over to the invigilator for marking.**



**Question 17**

With respect to intravenous fluids

- a) List the electrolyte content of the intravenous fluids listed in the table below: (6)

	Na <sup>+</sup> (mmol/l)	K <sup>+</sup> (mmol/l)	Cl <sup>-</sup> (mmol/l)	Mg <sup>2+</sup> (mmol/l)	Ca <sup>2+</sup> (mmol/l)	Glucose (g/l)
Ringer's Lactate						
0.9% NaCl						
5% Maintelyte						

- b) Resuscitation with 0.9% NaCl results in hyperchloremic metabolic acidosis. Explain why this happens and what is the most important potential complication thereof. (4)

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**CANDIDATE NUMBER.....**

**Questions 18 - 19**

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**Question 18**

Regarding meta-analyses and systematic reviews

a) What is the difference between a meta-analysis and a systematic review? (2)

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b) How is the heterogeneity of studies included in a meta-analysis assessed? (2)

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Paper 3

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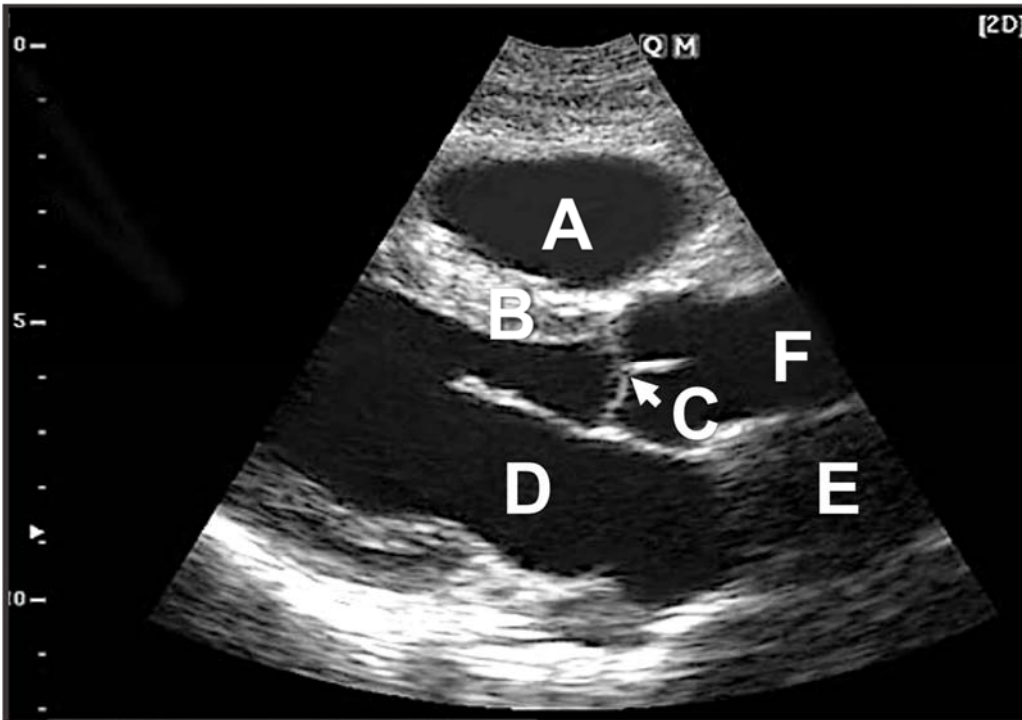
**CANDIDATE NUMBER.....**

### **Question 20**

**There are 8 books for this examination, please ensure that the 8 books are handed over to the invigilator for marking.**

**Question 20**

You use the transthoracic Echo to investigate the cause of hypotension in the ICU.



- a) From the accompanying picture, name the specific view and label from A to F. (4)

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- b) What measurement can you obtain from the above view that is needed in the calculation of cardiac output? (1)

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c) Using the measurements below, supply the formula and calculate cardiac output. (5)

Aorta diameter 2 cm
VTI (Velocity time integral) 14 cm
EF (Ejection Fraction) 68%
heart rate 51 beats per minute

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