



Sample Exam Questions

Anatomy

Question With the aid of a diagram, label the macroscopic structures seen in a coronal (frontal) section of the kidney.

(10 marks)

Question Describe these structures which are found in the left ventricle of the heart:

- (a) Trabeculae carneae
- (b) Papillary muscle
- (c) Chordae tendineae

(10 marks)

Question (a) Discuss the tissue layers of the heart.

(5 marks)

(b) Discuss the tissue layers of arteries and veins.

(5 marks)

Pathology

Question (a) What is pulmonary hypertension?

(5 marks)

(b) How does acute pulmonary hypertension differ from chronic pulmonary hypertension?

(5 marks)

Question (a) Identify factors due to cardiopulmonary bypass which may cause central nervous system dysfunction.

(5 marks)

(b) Outline measures taken when conducting cardiopulmonary bypass which minimise dysfunctional neurological events.

(5 marks)



Question Enumerate the major acute mechanical complications of myocardial infarction and briefly describe its pathological characteristics.

(10 marks)

Physiology

Question (a) Define the term 'cardiac output'.

(3 marks)

(b) Discuss the factors that control cardiac output.

(7 marks)

Question (a) Describe the common causes of metabolic and respiratory acidosis.

(6 marks)

(b) For each of the two states describe the acute changes in pH, $P_a\text{CO}_2$, bicarbonate and base excess.

(2 marks)

(c) For each of the two states describe the compensatory changes that occur in pH, $P_a\text{CO}_2$, bicarbonate and base excess.

(2 marks)

Question . Outline the mechanism that produces contraction and relaxation of the myocardial cell.

(10 marks)



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Pharmacology

- Question (a) How do you classify antiarrhythmic drugs?
(6 marks)
- (b) What antiarrhythmics are useful in the treatment of ventricular fibrillation?
(2 marks)
- (c) What antiarrhythmics are useful in the treatment of rapid atrial fibrillation?
(2 marks)
- Question Discuss the major groups of diuretics, giving an example from each group.
(10 marks)
- Question (a) What drugs are used to treat hypertension?
(5 marks)
- (b) Briefly describe their mechanism of action.
(5 marks)

Physics & Chemistry

- Question (a) Define Charles' law and Boyle's law and give examples of how they relate to clinical perfusion practice.
(6 marks)
- (b) Using the above laws, calculate the pressure in a cylinder of oxygen which is warmed from 20°C to 40°C if it starts with a pressure of 5000 kilopascals.
(4 marks)



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Question. In artificial pacemakers define:

- (a) pulse duration (2 marks)
- (b) threshold (2 marks)
- (c) VVI (3 marks)
- (d) DDD (3 marks)

Question (a) Describe the mechanism of ventricular fibrillation and its self-sustaining nature.

(5 marks)

(b) Describe how ventricular fibrillation may be induced by an external electrical stimulus, detailing the voltage and current required.

(5 marks)

Question Describe the difference in measuring Activated Clotting Time with the Hemotec device and the Hemochron device.

(10 marks)

Perfusion Technology

Question W.Lillehei contributed, for which he is well recognized, a surgical technique termed "cross circulation". Briefly describe the technique and discuss why it is not used today.

(10 marks)



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- Question With regard to ultrafiltration:
- (i) List patient parameters that may influence you to use ultrafiltration.
 - (ii) Describe factors that may influence the rate of ultrafiltrate production.

(10 marks)

Details Of Perfusion Techniques

- Question What is the function of venting during cardiopulmonary bypass (CPB) for coronary artery and aortic valve surgery? Describe the principles underlying the appropriate and effective positioning of vents.

(10 marks)

- Question (a) Discuss the protocol you would adopt in the event of an oxygenator failure.

(7 marks)

- (b) What factors would assist you in determining whether to change out an oxygenator during normothermic CPB?

(3 marks)

Perfusion Equipment

- Question Describe the protocol for setting the occlusion and calibration of a roller pump for use as an arterial pump and for use as a cardiotomy suction pump.

(10 marks)

- Question Briefly outline the value and use of the following filters:

- (a) Prebypass filter
- (b) Arterial filter



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- (c) Leucocyte filter
- (d) Cardiotomy filter
- (e) Venous reservoir filter

(2 marks each)

Question Describe the basic components of a simple ECMO circuit. Explain why components may differ from those used in open heart operations.

(10 marks)

Clinical Application Of Bypass Techniques

Question Outline the advantages and disadvantages of antegrade and retrograde cardioplegia delivery techniques.

(10 marks)

Question Describe sources of arterial emboli and techniques for their removal in a 75-year-old male undergoing aortic valve surgery.

(10 marks)

Question (a) Differentiate between veno-arterial and veno-venous extracorporeal membrane oxygenation (ECMO) thereby indicating the purpose of each mode of support.

(6 marks)

(b) What are the common complications associated with long term support with ECMO?

(4 marks)

Support Of Cardiac Operating Theatre Procedures

Question (a) If five electrodes are applied to your patient to monitor ECG during



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cardiac surgery, where are they positioned?

(3 marks)

(b) What leads of the ECG can be monitored by the orientation of the electrodes you have described?

(3 marks)

(c) What are the possible causes of interference in the ECG trace and how can the risk of interference be minimised?

(4 marks)

Question Pressure monitoring may be affected by overshoot or damping. Describe and state the factors that can lead to:

(a) overshoot

(5 marks)

(b) damping

(5 marks)