

HBS3APB extended response questions November 2007.

Students were advised to spend approximately 20 minutes per question, or 100 minutes in total for Section B (refer to the 'General exam information').

Note that the teaching in this unit has changed from 2007. In 2008 there will not be questions on ion channels, elasticity of the thorax, or anatomy.

Topics which span a two week block of lectures are usually assessed by an extended response question, however, in 2008, there will be an extended response questions for topics which are covered in less lecture time, for example cardiovascular physiology.

A breakdown of questions, general topic area and staff member responsible will be made available in 1-2 weeks. A wide choice of questions will be offered, however.

SECTION B

ANSWER ANY FIVE (5) OF THE FOLLOWING NINE (9) QUESTIONS

Note that questions 8 and 9 offer you internal choice from which you may choose ONE alternative only.

**PLEASE START EACH ANSWER ON A NEW PAGE
EACH QUESTION IS WORTH 10 MARKS**

1. Describe, preferably through annotated diagrams (a) the sub-units and (b) the conceptual parts of a voltage-gated ion channel (of your choosing) in a ventricular myocyte. Where possible, describe the parts of the ion channel that correspond to the conceptual parts. Explain how the ion channel you have selected contributes to the action potential.
2. Discuss the possible harmful effects that could be caused by hypertension.
3. Describe therapeutic approaches for the treatment of hypertension. Your answer should include major drug groups and their mechanisms of action.
4. Explain preferably through a diagram of three balloons in a box, and associated graphs, the effects of (a) differences in compliance and (b) differences in airways resistance, on alveolar ventilation.
5. Discuss the complications of chronic bronchitis.

Questions 6 to 9 follow on the next page.

SECTION B (continued)

6. By way of a flow diagram, discuss mechanisms that bring plasma calcium concentrations back towards normal when an individual is hypocalcaemic (i.e. has low plasma calcium levels).
7. Describe the roles of articular cartilage in synovial joints and relate these to the organization of the extracellular matrix of healthy and osteoarthritic cartilage.

Either

- 8A. Define each of the following muscle roles: prime mover, antagonist, synergist and fixator. State the type of muscle contraction occurring in a muscle when it performs each of these roles. Give an example of an everyday activity when biceps brachii acts in each of the roles defined above.

Or

- 8B. Define what is meant by a linear envelope EMG signal. Include in your answer the two main EMG processing steps required to obtain a linear envelope signal. Discuss advantages for using a linear envelope signal. Finally, draw a linear envelope EMG signal, highlighting onset, peak amplitude, offset and duration of the EMG signal.

Either

- 9A. Describe features of the fetal blood and cardiovascular and respiratory system function that adapt the fetus to life *in utero*. Explain the changes which normally occur in the perinatal period, and especially at birth, to ensure that the neonate is adapted to post-natal life.

Or

- 9B. Discuss factors which should be taken into account in the decision to use a drug during pregnancy and during breastfeeding.

END OF THE EXAMINATION