

PRIMARY EXAMINATION

**PHYSIOLOGY**

Monday 29 November 2004

Time allowed: Two hours

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INSTRUCTIONS TO CANDIDATES

You must answer two (2) questions from each of Part A and Part B of this paper. If you answer more than two questions in Part A or Part B, only your *first two* answers will be marked.

Each question is of equal value, namely, 25% of the total for the written paper.

Ample time is allowed for your answers, so you should strive to present them in a well-organised manner. Diagrams may be used to illustrate your answers where appropriate.

Allow time at the end of the examination to read your answers *carefully*.

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**Part A** (Answer **TWO (2)** of the following three (3) questions)

**Question 1**

**(30 minutes: 25 marks)**

When a person bites through a piece of brittle food such as a raw carrot, the amount of force applied by the jaw-closing muscles must first increase to a level that is sufficient to force the teeth through the carrot, and then must rapidly decrease to prevent the teeth from coming too forcefully together. Discuss the mechanisms that are responsible for the automatic control of these force changes.

**Question 2**

**(30 minutes: 25 marks)**

Describe how the various parameters of pain are coded in peripheral nerves.

**Question 3**

**(30 minutes: 25 marks)**

Write brief notes on *all* of the following:

- a. The relationship between the metabolic pathways for energy production and the functional properties of the different types of muscle fibres in the masticatory muscles.
- b. The differences between the infant swallow and the normal adult swallow.
- c. the pattern of spread of excitation through the heart in a normal cardiac cycle and its relationship in general terms to the electrocardiogram.

**Part B** (Answer **TWO (2)** of the following three (3) questions)

**Question 4**

**(30 minutes: 25 marks)**

Fat-soluble hormones are transported in the circulation and interact with their target cells in a manner that differs from that of water-soluble hormones. Explain these differences, illustrating your answer with examples of a water-soluble hormone *and* a fat-soluble hormone that control plasma calcium concentration.

**Question 5**

**(30 minutes: 25 marks)**

Write brief notes on *all* of the following:

- (a) the carriage of oxygen by the blood.
- (b) The factors that limit drug absorption from the intestinal tract.
- (c) the buffering properties of saliva and their relationship to salivary flow rate.

**Question 6**

**(30 minutes: 25 marks)**

A 36-year-old female patient presents to your dental clinic with impacted third molar teeth. You decide that these must be extracted under general anaesthesia. You notice that her mucous membranes are pale. On questioning, she reveals that her gums bleed whenever she brushes her teeth, and that she regularly takes aspirin for the control of menstrual pain. Further questioning reveals that she loses “quite a bit of blood” during menstruation each month, and that she is a vegetarian.

What does this clinical picture suggest to you in relation to her general medical health (i.e., what is your differential diagnosis)? How would you deal with the issues arising from this clinical picture that relate to the forthcoming extraction of her teeth?