



UNIVERSITY OF GHANA
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BSC. ENGINEERING

SECOND SEMESTER EXAMINATIONS: 2016/ 2017

DEPARTMENT OF BIOMEDICAL ENGINEERING

BMEN 302: HUMAN BIOLOGY II – PHYSIOLOGY (2 CREDITS)

INSTRUCTIONS:

ANSWER ALL QUESTIONS IN SECTION A AND TWO OTHER QUESTIONS FROM SECTION B (I.E. A TOTAL OF 4 QUESTIONS)

TIME ALLOWED: TWO (2) HOURS

SECTION A:

ANSWER ALL QUESTIONS FROM THIS SECTION

Question 1

- a. What is inflammation? [2 marks]
- b. State five (5) general causes of inflammation. [5 marks]
- c. Outline the five main signs of inflammation and explain the physiological processes which lead to these five signs. [15 marks]
- d. You witness an athlete injure his thigh during a collision with another athlete. The medical personnel who comes to his assistance rubs an ice pack over the affected area. Explain the physiological rationale behind the application of the ice pack. [3 marks]

Question 2

Cystic fibrosis is a disease which is characterized by excessive buildup of thick mucus in various areas of the body. This mucus buildup can block the duct of the pancreas, compromising the efficient production and release of its endocrine and exocrine secretions. What are the possible consequences of this blockage on the following?

- a. Digestion [10 marks]
- b. Glucose metabolism and homeostasis [10 marks]
- c. Development of diabetes [5 marks]

SECTION B: ANSWER ANY TWO (2) QUESTIONS FROM THIS SECTION

Question 3

- a. Explain how the following factors influence pulmonary ventilation.
 - i. Lung compliance [5 marks]
 - ii. Airway resistance [5 marks]
- b. What is the significance of the renin-angiotensin-aldosterone system? [5 marks]
- c. Distinguish between the effects of menopause and andropause on fertility. [4 marks]
- d. What function(s) would likely be lost by a stroke in each of the following regions of the cerebral cortex of the brain:
 - i. Temporal lobe [3 marks]
 - ii. Occipital lobe [3 marks]

Question 4

- a. Mei Ling, a young female adult, had unprotected sex with her boyfriend after a party on Friday evening. On Monday morning, she experiences the sharp midcycle abdominal pain she typically feels when she is ovulating. This causes her to become very worried that she might soon learn she is pregnant. Is Mei Ling right to be worried? Explain? [6 marks]
- b. Briefly outline the sequence of excitation and conduction of electrical signals through the heart. State the significance of the delay in atrioventricular node. [7 marks]
- c. An overweight individual goes to see his physician complaining that despite replacing his previous high fat content diet with low-fat and non-fat food, he is still gaining weight. Briefly discuss two possible reasons for his continuous weight gain despite the change in diet. [8 marks]
- d. People who suffer from kidney disease also tend to suffer from anaemia. Explain the link between kidney disease and anaemia. [4 marks]

Question 5

- a. Retinitis pigmentosa is a disease that causes deterioration of the retinas of the eyes. Describe the possible consequence(s) on the sleep-wake pattern of an individual who suffers from the disease. [5 marks]
- b. Compare and contrast these two disorders: diabetes mellitus and diabetes insipidus. [6 marks]
- c. What is diuresis? Explain how glucose can be a diuretic. [5 marks]
- d. Why is it insufficient to just consider the ABO blood group during blood compatibility matching for blood transfusion? [3 marks]
- e. Saliva has many components which play a variety of different roles. Name three components of saliva and state one specific function each of these named components performs. [6 marks]