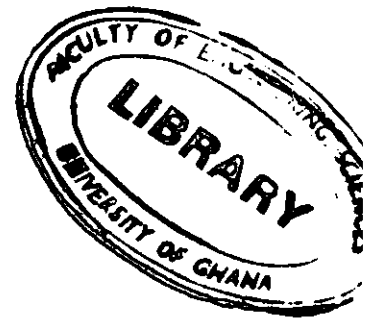


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BSC. ENGINEERING
SECOND SEMESTER EXAMINATIONS: 2015/2016
DEPARTMENT OF BIOMEDICAL ENGINEERING
BMEN 302: HUMAN BIOLOGY II (PHYSIOLOGY) (2 CREDITS)

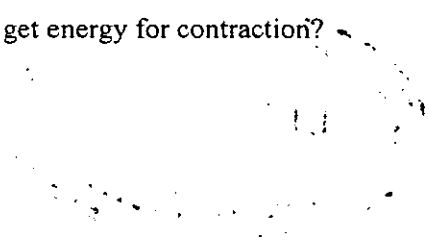
INSTRUCTIONS:
ANSWER ALL QUESTIONS ON THE QUESTION PAPER IN THE SPACE PROVIDED

TIME ALLOWED: TWO (2) HOURS

1. a. Define stroke volume. (2 marks)

- b. If the stroke volume is 70 mL and the heart rate is 80 bpm. What is the cardiac output? (3 marks)

- c. How does the cardiac muscle get energy for contraction? (2 marks)



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- d. The mechanism of stimulation of cardiac muscle is different from that of the skeletal muscles. How do the two types of stimulations differ? (3 marks)

2. a. State the enzymes that are involved in carbohydrate digestion. (4 marks)

- b. What is the mechanism of carbohydrate absorption in the small intestine? (2 marks)

- c. Whole milk or fatty snack consumed before taking in alcohol decrease the rate of intoxication. What mechanism is the fat using to produce this effect? (4 marks)

3. A patient expires into a spirometer for 10 minutes. Her expired volume was 54 litres, her respiration rate was 12 breaths/minute, and her alveolar ventilation was 4.2 L/min during the 10-minute period. What is the patient's lung tidal volume? (10 marks)



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4. A renal clearance study was conducted on a normal, 70-kg man. The plasma PAH (P-aminohippuric acid) concentration was 0.02 mg/mL, urine PAH concentration was 2.64 mg/mL, urine flow rate was 5.0 mL/min, and blood hematocrit ratio was 0.45. If we assume that PAH was essentially cleared from all of the plasma flowing through the kidney (i.e., 100% extraction), what is his renal blood flow? (10 marks)



5. a. List the constituents of kidney stones. (4 marks)
- b. What can a person do to reduce the level of kidney stones concentration? (2 marks)
- c. How does the mechanism in (b) work to reduce the level of kidney stones? (2 marks)
6. You are asked to design an artificial circulatory system. List the physiological components of the system and the materials that can be used to mimic each of these components. (10 marks)

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7. a. What types of stimuli can trigger a rise in cytosolic calcium in smooth muscle fibres? (3 marks)



b. How does shivering help to produce body heat? (2 marks)



c. What is the state of myosin under resting conditions? (2 marks)

d. List the factors responsible for skeletal muscle fatigue. (3 marks)

8. What causes heart murmurs? (10 marks)

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9. Choose any paper that was discussed in class and highlight some of the major findings in the paper pertaining to this course. Provide the title of the paper. (10 marks)

10. State the title and summarize the major findings in a paper other than your choice in Question (9). (10 marks)

