Examination Period 3: 2017/18

SLS100618N

Module Title Introduction to Physiology
Level Four
Time Allowed Two hours

Instructions to students:

- Enter your student number **not** your name on all answer books.
- Answer **all** questions from **Section A** on the examination paper.
- Answer **one** question from **Section B** in a separate answer book.
- Where a question is in parts the weightings are indicated.
- Insert your student number in the space below:

  **Student Number** ..................................

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<table>
<thead>
<tr>
<th>No. of Pages</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Questions</td>
<td>12</td>
</tr>
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</table>
Section A

Answer all questions in this section on the examination paper.

1. Complete the missing labels on the diagrams

A. ________________________  (1 mark for each correct answer)
B. ________________________
C. ________________________
D. ________________________
E. ________________________
F. ________________________
G. ________________________
2.  
   a. What is the sarcoplasmic reticulum?  
      (1 mark)

   b. What is the function of the sarcoplasmic reticulum?  
      (2 marks)

3. Briefly describe a motor unit.  
   (2 marks)

4. Explain the following terms:  
   (2 marks each)
   a. FEV1

   b. Tidal volume

   c. Oxyhaemoglobin
5. Which of the following statements concerning respiration and respiratory function are true or false?

(1 mark for each correct answer)

a. During inspiration the diaphragm contracts.  
   True / False

b. During expiration the internal intercostal muscles contract.  
   True / False

c. Boyle’s law states that the total pressure of a mixture of gases equals the sum of the partial pressures of the individual gases in the mixture.  
   True / False

d. Dalton’s law describes the relationship between the pressure (P) and the volume (V) of a gas at constant temperature.  
   True / False

e. Surfactant lowers the surface tension at the air/liquid interface within the alveoli of the lung.  
   True / False
6. With reference to the Action potential, explain the following:

a. After-hyperpolarisation  
   (3 marks)

b. Absolute refractory period  
   (3 marks)

c. Relative refractory period  
   (3 marks)
7. The diagram below shows the mechanical phases of the cardiac cycle:

Use this diagram as a guide to help complete the table below. For each phase of the cardiac cycle, what state are the atrioventricular and semilunar valves in (open or closed)?

<table>
<thead>
<tr>
<th>Phase</th>
<th>AV valves</th>
<th>Semilunar valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrial contraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isovolumetric contraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventricular ejection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isovolumic relaxation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventricular filling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Which of the following statements concerning the blood are true or false?
   (1 mark for each correct answer)

   a. Blood is a connective tissue.  
      True / False

   b. The lifespan of a RBC is 100 days.  
      True / False

   c. Erythropoietin is secreted by the kidney.  
      True / False

   d. The Haematocrit is a measure of the % of total blood volume.  
      True / False

   e. Haematopoietic stem cells are primarily found in bone marrow.  
      True / False
9. Complete the following sentences by inserting the missing words from the list below.

(1 mark each)

Note: not all the words are used and some could be used more than once.

One of the most important functions of the ____________ is to regulate the balance between ____________ input and output – a reflection of the pivotal role sodium plays in fluid and electrolyte balance, and body ____________.

Dietary intake of sodium ranges between 50–300 mmol/day. Apart from variable amounts lost in ____________, the major pathway for sodium excretion is through the ____________ that adjust the loss to keep the body in sodium ____________.

Sodium is prevented from accumulating in cells through the action of the Na⁺/K⁺-ATPase pump – there is a much higher concentration of Na⁺ in the ____________ compartment. The inverse is true of ____________.

<table>
<thead>
<tr>
<th>Absorption</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excretion</td>
<td>Extracellular</td>
</tr>
<tr>
<td>Homeostasis</td>
<td>Intracellular</td>
</tr>
<tr>
<td>Kidneys</td>
<td>Potassium</td>
</tr>
<tr>
<td>Sodium</td>
<td>Sweat</td>
</tr>
<tr>
<td>Surplus</td>
<td>Urine</td>
</tr>
</tbody>
</table>

End of Section A
Section B follows overleaf
Section B

Answer one out of three questions in the answer books provided.

10. Compare and contrast cardiac muscle, smooth muscle and skeletal muscle. How does the structure of these tissues relate to their function?  
(50 marks)

11. Explain the cellular and neurological processes that occur at a neuromuscular junction.  
(50 marks)

12. Using one example, describe how a hormone is produced and how they interact with their target cell, to cause their effects.  
(50 marks)

End of Section B
End of Paper