



FACULTY OF SCIENCE

DEPARTMENT OF ZOOLOGY

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| MODULE | PHS 2B01 – CONTROL SYSTEMS |
| CAMPUS | APK |
| EXAM | NOVEMBER |

DATE: 19/11/2016

SESSION: 08:30

ASSESSOR(S):

DR JC Van Dyk

INTERNAL MODERATOR:

Prof GM Wagenaar

DURATION: 2 HOURS

MARKS: 100

NUMBER OF PAGES: 3

INSTRUCTIONS: Answer all the questions.

SECTION A

QUESTION 1

Explain the role of the hormones secreted by the medulla region of the adrenal gland in the General Adaptation Syndrome (GAS). (8)

QUESTION 2

Mary is experiencing the following symptoms: a dry mouth, thirst, decreased urination, a dry skin, headache, constipation and low blood pressure. Her doctor diagnose her with mild to moderate dehydration:

2.1 Explain how the amount of ADH released by Mary's posterior pituitary gland would change in this condition. (2)

2.2. Discuss how Mary's body would regulate the **low** blood pressure by referring to the hormones produced and secreted by the kidneys. (10)

QUESTION 3

Thyroid hormones are able to change the metabolic activity of target cells. Discuss this statement by referring to the steps and processes involved when Triiodothyronine crosses the plasma membrane of a target cell and binds to intracellular receptors. (10)

Subtotal /30

SECTION B

QUESTION 1

An action potential is a result of a change in the resting membrane potential of a nerve cell following a graded potential that is large enough to reach threshold value:

1.1. Discuss how the resting membrane potential of a cell is maintained with reference to the electrochemical gradients that exist for sodium and potassium and the selective permeability of the plasma membrane. (10)

1.2. Compare the characteristics of a graded potential with that of an action potential. (7)

QUESTION 2

Explain presynaptic inhibition using GABA as an example. (5)

QUESTION 3

Interneurons in the CNS are organized into neuronal pools. Explain reverberation with the aid of a drawing. (4)

QUESTION 4

While making breakfast, Sophie touches a hot stove plate by mistake. A reflex results that allows her to immediately remove her hand from the stimulus. Explain in detail the physiology behind this polysynaptic reflex. (10)

QUESTION 5

Explain the process of olfactory reception following the binding of an odorant to a receptor protein. (6)

QUESTION 6

Vision and eye movements are controlled by different cranial nerves. Discuss this statement by referring to the specific cranial nerves involved including information on the type, function, origin and destination of the nerves. (10)

QUESTION 7

Touch, pressure, pain and temperature sensations are all delivered to the primary sensory cortex via the spinothalamic pathway. Discuss this statement by explaining the exact route the action potentials for these different sensations will follow to ultimately reach the cortex of the cerebrum. (10)

QUESTION 8

List the various effects in the body associated with parasympathetic activation. (8)

Subtotal /70

