UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF ZOOLOGY

MODULE **ZOO3B01**

CAMPUS **APK**

EXAM **NOVEMBER 2015**

DATE: 6 NOVEMBER 2015 **SESSION 08:30**

ASSESSOR(S) **PROF J JANSE VAN VUREN**

EXTERNAL MODERATOR **PROF P KING**

DURATION 2 HOURS **MARKS 100**

NUMBER OF PAGES: 5 PAGES

INSTRUCTIONS: **Answer all the questions.**

SECTION A **[20]**

Any of the statements in the questions may be correct. Write down the correct statement in each question e.g. 1a, b; 2b, c, d or 3c.

QUESTION 1

a) Negative feedback in control mechanisms is closed-loop regulation.
b) Depolarisation increases the Na-permeability in the membrane.
c) Ligands are electric stimuli.
d) The perineurium is the synaptic membrane.
e) With the increase in nerve fibre diameter is a decrease in the conductance of impulses evident.

QUESTION 2

a) The thyroid gland controls metamorphosis in amphibians.
b) Natriuretic peptide has an unknown function in the brain.
c) Melatonin is the same as melanocyte-stimulating hormone.
d) Delta cells in the pancreas secretes somatostatin that inhibits growth hormone secretion.
e) Aspartic acid causes depolarization of neuron membranes.

QUESTION 3

a) All steroid hormones are derived from cholesterol.
b) The lack of insulin causes juvenile diabetes.
c) Negative feedback in hormone release serves to increase the difference between the output and the desired value.
d) Encephalins are pentapeptides with metabolic functions.
e) Chemical synapses are found in mammals only.

QUESTION 4

a) Sensory neurons convert nerve impulses to environmental stimuli.
b) Chemoreceptors of fish are highly sensitive to amino acids.
c) The determination of the direction of sound is not affected by the intensity thereof.
d) A kinocilium is a true cilium in the lateral line of fish that senses movement.
e) Pit organs in snakes are mechanical receptors.

QUESTION 5

a) Respiration is the process of O_2 uptake and CO_2 release.
b) Relative humidity is low during winter and mucus membranes are negatively affected by it.
c) The solubility of oxygen in water is higher than that of carbon dioxide.
d) Gas exchange across a general body surface is not possible in a moist habitat.
e) An effective respiratory organ requires a large surface area.

QUESTION 6

a) Ram ventilation is important to mammals.
b) Surfactants are phospholipids that prevent the collapse of mammalian lungs.
c) Penquins are well known for feeding their young with crop milk.
d) Gill resistance delays oxygen uptake.
e) The heart rate of a mouse is slower than the heart rate of an elephant.

QUESTION 7

a) Mammalian red blood cells lack nuclei.
b) Body size of mammals does not affect the Bohr-effect.
c) Altitude decreases the partial pressure of oxygen.
d) Vertebrates have a closed circulation system.
e) Flamingos are fluid feeders.

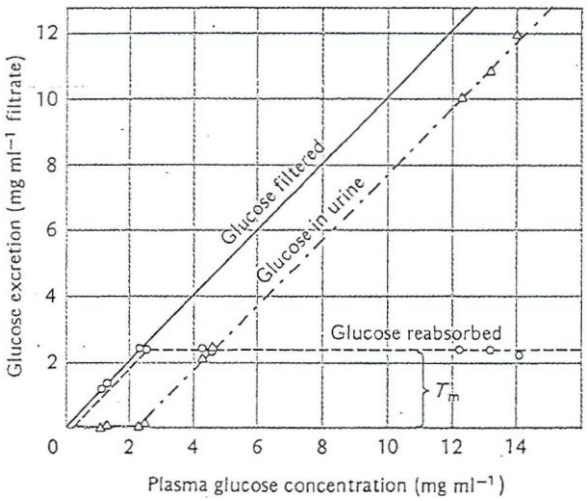
QUESTION 8

a) Intracellular digestion occurs in mammals.
b) Enzymes hydrolyse nutrition components.
c) Pepsin is the precursor of pepsinogen.
d) Proteins are emulsified in the digestive process.
e) Waxes are important in the food chain of marine organisms.

SECTION B **[40]**

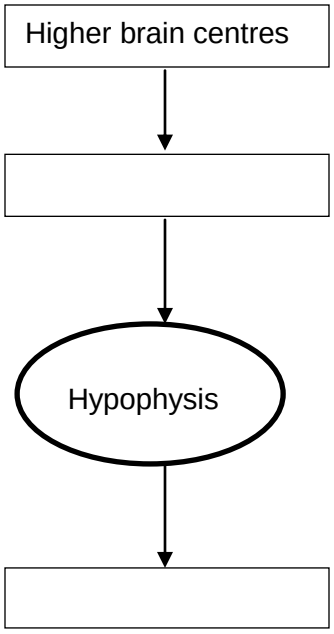
Study the following diagrams/figures and answer the questions.

QUESTION 1 **(10)**



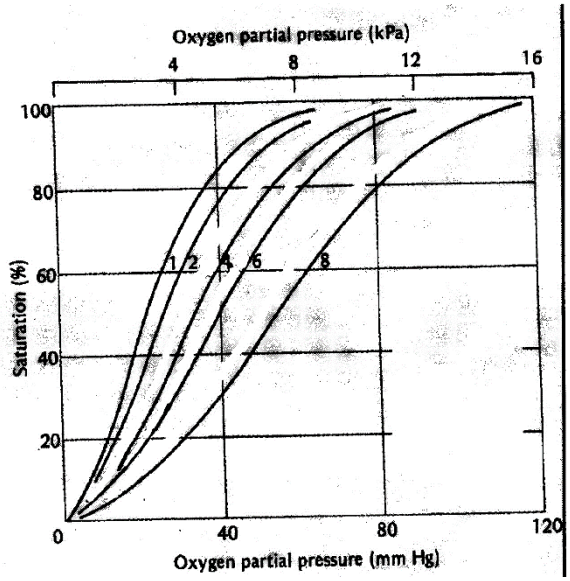
a) Why is all the glucose after ultrafiltration not excreted? (4)
b) Identify the mechanisms responsible for the regulation of substances after ultrafiltration and discuss the importance of their functions? (4)
c) When does tubular reabsorption take place? (2)

QUESTION 2 **(10)**



Use a hormone of your choice and the diagramme above to explain how negative feedback controls the synthesis and release of hormones from the hypophysis.

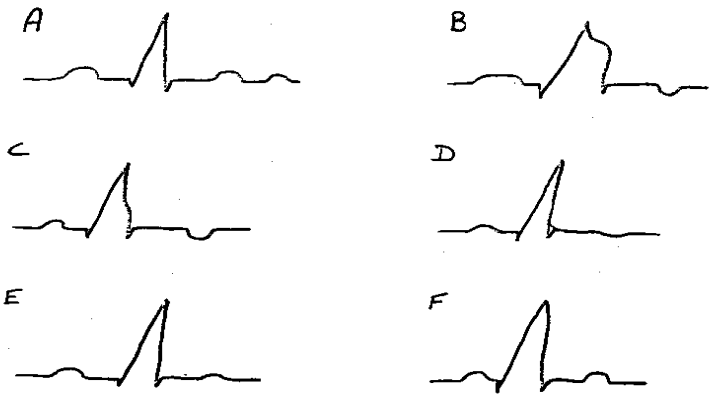
QUESTION 3 **(10)**



The figure above shows oxygen dissociation curves for 5 different animal species (mouse, cat, elephant, horse and sheep). Identify the dissociation curve for each species according to the oxygen affinity of haemoglobin and write explanatory notes on the effect of a decrease in temperature and PCO_2 on each curve.

QUESTION 4 **(10)**

The figure below illustrates changes in the ECG after a heart attack as well as the recovery of the heart afterwards. Discuss the changes in the ECG and the recovery shown in each ECG (a – f) obtained during recuperation



SECTION C **[40]**

QUESTION 1 **(10)**

Briefly describe the mechanisms that aquatic vertebrates use to maintain water and osmotic concentrations.

QUESTION 2 **(10)**

Briefly discuss the role of the pancreas and liver in the enzymatic digestion of food in the small intestine.

QUESTION 3 **(10)**

Explain the sequence of events during the stimulation and contraction of skeletal muscle as described by the sliding filament theory.

QUESTION 4 **(10)**

Write explanatory notes on the generation of an action potential and its conductance in the nerve cell to the axon knob.

TOTAL 100