



FACULTY OF SCIENCE

BOTANY AND PLANT BIOTECHNOLOGY DEPARTMENT

LS3BFET/ LSFT0B3

LIFE SCIENCE 3B FET

APK CAMPUS

NOVEMBER EXAM

MEMORANDUM

11 NOVEMBER 2017

DATE:

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SESSION:

8H30-11H30

ASSESSOR:

MS J. WILLIAMSON

INTERNAL MODERATOR:

DR. A. NEL

EXTERNAL MODERATOR:

PROF. J. DE BEER

DURATION/ TYD:

3 HOURS

TOTAL MARKS:

150

NUMBER OF PAGES: 14 PAGES

Please read the following instructions carefully:

1. Answer all the questions in the question paper.
2. Answer ALL of the questions in the test book.
3. Work neatly
4. Read your questions carefully.
5. Good Luck.

QUESTION 1

[15]

Choose the alternative that best completes the statement or answers the question. Only write down the correct letter next to the question number in your answer book.

- 1.1 An action potential will be generated when the sum of all graded potentials reaches _____.
- A. resting potential
B. depolarization
C. **threshold**
D. hyperpolarization
- 1.2 Where is cerebrospinal fluid ("CSF") found in the brain?
- A. within the Pons
B. within the cerebellum
C. **in the ventricles and between the arachnoid and pia mater**
D. in the corpus collosum
- 1.3 What ion enters the axon terminus during an action potential and results in the release of neurotransmitter into the synapse?
- A. **calcium ions**
B. chloride ions
C. sodium ions
D. potassium ions
- 1.4 The structure which connects the eye to the brain like a fiber-optic cable is:
- A. The Retina
B. **The Optic Nerve**
C. The Stroma
D. The Cornea
E. The Endothelium
- 1.5 The change in focal length of an eye lens to focus the image of objects at varying distances is done by the action of _____
- A. pupil
B. **ciliary muscles**
C. retina
D. blind spot
- 1.6 Hypermetropia is rectified by using _____.
- A. **convex lens**
B. concave lens
C. cylindrical lens
D. progressive lens
- 1.7 Where is the tectorial membrane found?

- 1.8 The function of the basilar membrane is to ____
- The brain (just above the cribriform plate)
 - Middle ear
 - Inner ear
 - Outer ear
- 1.9 What portion of the brain has neurons that receive action potentials from chemoreceptor cells in the nose?
- gustatory complex
 - anterior hypothalamus
 - olfactory bulb
 - occipital lobe
 - posterior pituitary
- 1.10 Hormone pathways involved in maintaining homeostasis (such as the TSH pathway) are often characterized by which of the following?
- Negative feedback
 - Positive feedback
 - Local regulators such as prostaglandins
 - Multiple types of receptors
 - G-protein-coupled receptors
- 1.11 Which of the following statements about diabetes mellitus is correct?
- It is characterized by large volumes of dilute urine.
 - It results when the body produces too much glucagon.
 - Type II diabetes requires insulin replacement therapy.
 - Type II diabetes is an autoimmune disorder.
 - Type I diabetes features high blood glucose levels due to insufficient insulin production.
- 1.12 Which of the following is not a product of the anterior pituitary gland?
- Prolactin
 - Thyroid stimulating hormone
 - Thyrotropin-releasing hormone
 - Luteinizing hormone
 - Growth hormone

1.13 Which of these conclusions is supported by the research of both Went and Charles and Francis Darwin on shoot responses to light?

A) When shoots are exposed to light, a chemical substance migrates toward the light.

B) Agar contains a chemical substance that mimics a plant hormone.

C) A chemical substance involved in shoot bending is produced in shoot tips.

D) Once shoot tips have been cut, normal growth cannot be induced.

E) Light stimulates the synthesis of a plant hormone that responds to light.

1.14 The ripening of fruit and the dropping of leaves and fruit are principally controlled by _____

A) auxins

B) cytokinins

C) indole acetic acid

D) ethylene

E) carbon dioxide concentration (in air)

1.15 When growing plants in culture, IAA is used to stimulate cell enlargement. Which plant growth regulator has to now be added to stimulate cell division?

A) ethylene

B) indoleacetic acid

C) gibberellin

D) cytokinin

E) abscisic acid

QUESTION 2

[15]

Give the correct biological term for each of the following definitions. Only write down the correct term next to the appropriate question number in your answer book.

2.1 The type of nervous system, which includes the sympathetic and parasympathetic systems.

Autonomic nervous system

2.2 Part of the human nervous system, which will send an impulse from the brain to the PNS. **Spinal cord**

2.3 Pigment believed to be involved in jet lag. **Melatonin**

2.4 A structure that can detect stimuli outside and inside the body. **Sensory neuron**

2.5 The structures found on front 2/3 of the tongue. **Foliate papillae**

2.6 Uneven formation of the cornea. **Astigmatism**

2.7 The receptor cells responsible for receiving stimuli of rotational movement of the head. **Cristae**

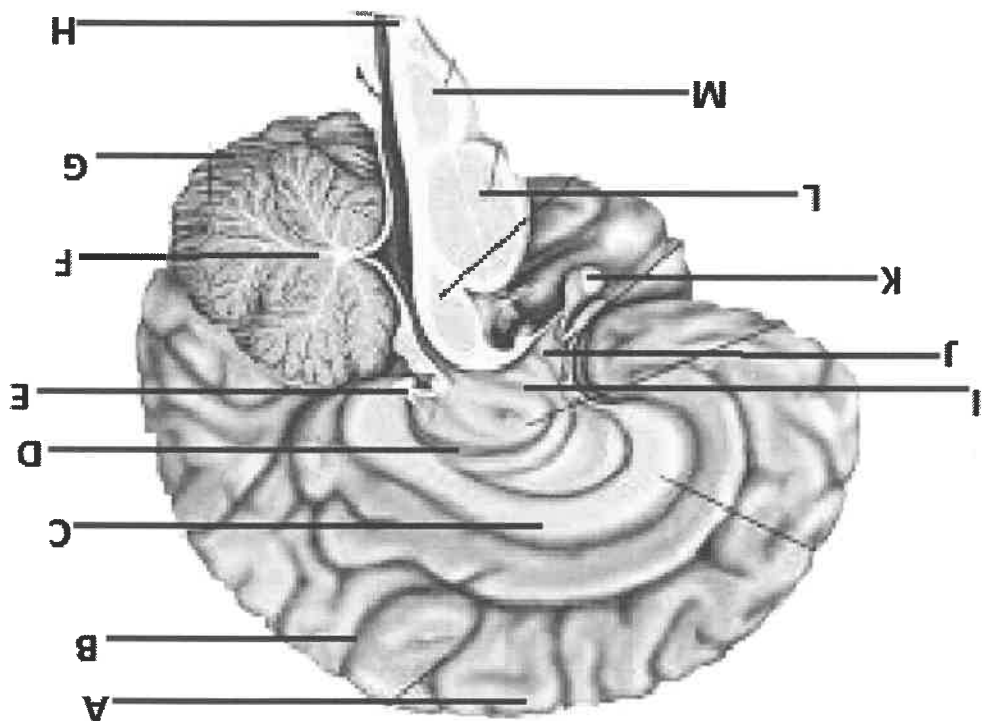
2.8 Part of the human ear responsible for transmitting sound waves to the tympanum. **External auditory canal.**

2.9 The substance filling the middle ear of a human. **Air**

- 2.10 Ductless glands which secrete chemicals into the bloodstream. Endocrine glands
- 2.11 The organic substance which steroids consist of. Fat
- 2.12 The hormone which stimulates the uterus wall to contract during the process of giving birth. Oxytocin
- 2.13 Morphological adaptations of plants like potato's for growing in darkness. Etiolation
- 2.14 Any response resulting in curvature of organs toward or away from a stimulus. Tropism
- 2.15 The hormone involved in root formation. Auxin

QUESTION 3

3.1 Study the diagram below and answer the questions that follow.



3.1.1 Supply the name of functions of:

- a. structure G
- cerebellum
 - Maintain posture and balance.
 - Ensures smooth, coordinated voluntary muscle movement.
- (3 x ½ = 1½)
- b. structure E
- The pineal gland
 - generates cerebrospinal fluid from blood.
 - Secrete melatonin – believed to be involved in jet lag and insomnia.
- (4 x ½ = 2)

- Also starts puberty.
- c. structure L

(5 x ½ = 2½)

- Relay messages/ impulses between the cerebellum and the rest of CNS
- Help Medulla Oblongata to regulate breathing –
- has Pneumotaxic- and
- Apneustic centers

3.1.2 Name structure C. What substance does this structure consist of? (2 x ½ = 1)

- A thick band of axons of neurons

- corpus callosum

3.1.3 Give the name and letter of the structure which: (4 x ½ = 2)

- a. is involved in somatosensory integration. A/B – cerebrum

- b. represents a fold. A – gyrus

- c. regulate blood pressure. M – medulla oblongata

- d. is involved in the integration of emotions and memory. I – thalamus

3.1.4 Give the name and letter of the structure, which protects the person against severe damaged to his/her body after stepping onto a sharp thumbnail. Draw and label a detail schematic

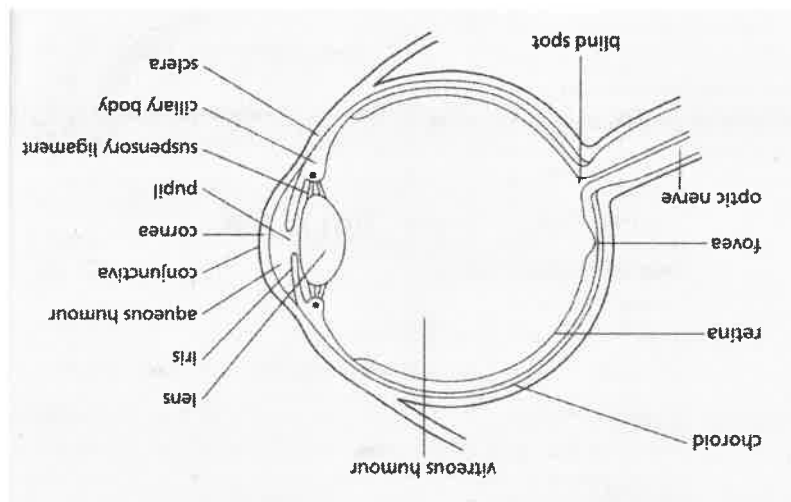
representation on this structure, which clearly shows the process it is involved in. (22 x ½ = 11)

H – Spinal cord

QUESTION 4

[20]

4.1. Draw and label a longitudinal section through the human eye. (16 x ½ = 8)



4.2.1 Where in the human eye do you find the receptor cells? (½)

In the retina

4.2.2 What are these receptors collectively called? (½)

Photoreceptors

4.2.3 Give the specific names of the receptors. (2 x ½ = 1)

Rods and cones

4.2.4 Discuss the structure and functions of the receptors given as answers in question 4.2.3. (10)

- They consist of an outer segment and an inner segment joined by a stalk.
- Visual pigment found in rods, is a deep-purple pigment called Rhodopsin.
- Rods are sensitive to light and are therefore suited for night vision (black and white)
- and peripheral vision.
- Rods found on either side of fovea- the further away from the fovea – the more rods present.
- The cones, are primary located in the fovea centralis, the further away from the fovea the less the cones.
- Activated by bright light
- Cones allow us to detect fine detail and colour.
- Cones contain 3 pigments –B (blue), G (green) and R (red)
- In colour blindness, a person lack certain of these pigments.

QUESTION 5

[20]

5.1 Study the following diagram and answer the questions that follow.



5.1.1 Draw and label a diagram representing the receptor organ, which is stimulated during the activity in the diagram.
(8 x ½ = 4)

5.1.2 Where precisely will you find the receptor organ of question 5.1.1? (3)

In the Utriculus and Saculus of the inner ear.

5.1.3 What stimulus, according to the diagram, triggered this receptor organ? (1)

Gravitational pull

5.2 Describe how a person hears extensively loud sounds without damaging the ears mechanisms. (include all structures and functions of all the structures involved in the hearing process).

(24 x ½ = 12)

- Soundwaves are concentrated in the direction of the external auditory canal by the Pinnae
- The external auditory canal transmits it to the tympanum.
- The tympanum vibrates and changes sound waves into sound vibrations.
- And cause the malleus to vibrate.
- Which cause the incus to vibrate.
- Which cause the stapes to vibrate

- Muscles attached to these ossicles pull tight
- to dampen the some as not to damage the inner ear.
- Which cause the fenestra ovals to vibrate
- Which cause waves in the perilymph of the
- Scala vestibule
- Which cause the Reissner membrane to vibrate
- Causing waves in the scala media
- Causing the basilar membrane to vibrate
- Causing the stereocilia of the sensory haircells of
- The Organ of Corti
- To push against the tectorial membrane of the Organ of Corti
- Which cause an impulse through the
- Sensory hair cells,
- Nerve fibers
- Cochlear nerve
- Towards the temporal lobe of the
- Cerebrum
- For hearing integration

QUESTION 6

6.1 Complete the following table; only write down the correct answer next to the appropriate question number:

Endocrine gland	Hormone	Function of Hormone	Over secretion of the hormone
Pars distalis	6.1.1 ACTH (Adrenocorticotrophic hormone)	6.1.2 Stimulates the adrenal cortex to produce glucocorticoid that is released during stress.	Addison disease
6.1.3 Pars distalis / Anterior pituitary gland	6.1.4 Prolactin	Control milk production in females	-

6.1.5	PTH	6.1.6 PTH corrects a low blood calcium level 6.1.7 PTH promotes the release of calcium by the bones 6.1.8 PTH promotes the reabsorption of calcium from the kidneys 6.1.9 PTH brings about the activation of Vitamin D.		
Parathyroid gland				
6.1.11 Glucagon		6.1.12 Stimulates the liver cells to convert glycogen into glucose for energy production. level is low.		
Pancreas				
6.1.13 Insulin		6.1.14 Insulin stimulates the uptake of glucose by the cells (liver, muscle and adipose) in the liver and muscles it is stored as glycogen. 6.1.15 Fat cells convert it to fat. Therefore insulin lowers the blood sugar level.		
Pancreas				

6.2 Briefly discuss Cushing syndrome. (3)

- Disease caused by excess cortisol in blood
- Because of malfunctioning of the adrenal cortex.
- Causes Sub-cutaneous fat deposits.

6.3 Some hormones work antagonistic of one another. What is meant by antagonistic? Give a suitable example. (4 x ½ = 2)

- Antagonistic – opposite from one another
- PTH and Calcitonin regulate calcium level in the blood.
- PTH – PTH promotes the release of calcium by the bones into the blood

- Calcitonin brings about the deposit of calcium in the bones when the level of calcium in the blood is too high.

QUESTION 7

- 7.1 Explain the acid growth hypothesis. (7) [20]

○ It refers to auxins

○ which stimulates proton pumps

○ in the plasma membrane.

○ The proton pumps lower the pH in the cell wall.

○ activating expansins.

○ enzymes that loosen the wall's fabric.

○ With the cellulose loosened, the cell can elongate.

- 7.2 How do Cytokinins retard the aging of some plant organs? (3)

○ by inhibiting protein breakdown.

○ stimulating RNA and protein synthesis.

○ and mobilizing nutrients from surrounding tissues.

- 7.3 Name and briefly discuss the two (2) of the many effects of ABA. (4)

○ Seed dormancy

■ Seed dormancy ensures that the seed will germinate only in optimal

conditions

■ In some seeds, dormancy is broken when ABA is removed by heavy rain.

light, or prolonged cold.

○ Drought tolerance

■ ABA is the primary internal signal that enables plants to withstand drought

- 7.4 What is apoptosis? (2)

○ The programmed destruction of cells, organs, or whole plants

○ By a burst of the plant hormone ethylene

- 7.5 Name three (3) processes controlled by blue-light photoreceptors. (3)

○ hypocotyl elongation,

○ stomatal opening, and

○ phototropism

- 7.6 Which plant pigment regulates its response to avoid shade? (1)

Phytochromes

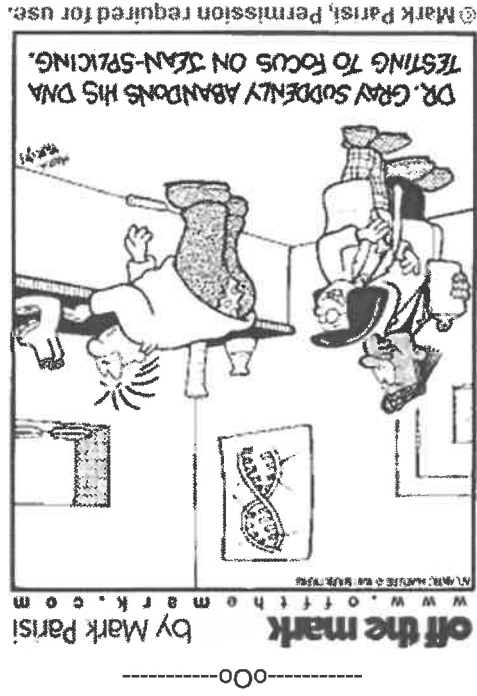
QUESTION 8

- 8.1 Name the chosen theme for your Unit 6. (2) [20]

Appropriate (1) Theme not done in LS1 and LS2(1)

8.2	What are the learning outcomes of your Unit 6? (What should the students know after completion of the unit?)	(10)
8.3	Explain the aim and materials and methods for the practical you have designed for your Unit 6.	(8)

Aim (2) Materials and Methods (6)



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