NOVEMBER EXAMINATION (UNIT1-6)
NOVEMBER 2018
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Moderator: Dr A Nel
TOTAL 150

QUESTION 1 [18]

Choose the correct term that will best answer the statement. Only write down the correct letter (CAPITAL LETTER) on your answer sheet.

1.1 Deoxygenated blood is pumped to _____.

A. lungs from heart
B. heart from lungs
C. the arteries
D. the veins

1.2 Walls of the left ventricle are thicker than walls of the right ventricle because _____.

A. has to pump the blood to lungs
B. it has to pump blood to the whole body
C. blood reaches this ventricle with extra pressure
D. blood reaches this ventricle in huge amount

1.3 The heart valves do all of the following, EXCEPT: _____.

A. separate the atria and the ventricles
B. keep the blood flowing forward
C. regulate the heart's contractions
D. include the mitral valve and bicuspid valve

1.4 Internally, both kidneys have three (3) distinct regions _____.

A. The cortex, mediastinum, and pelvis
B. The cortex, medulla, and peritoneum
C. The carina, medulla, and pelvis
D. The cortex, medulla, and pelvis

1.5 In human kidneys, the renal pelvis is also called _____.

A. base of ureter
B. base of urinary tract
C. base of urinary bladder
D. base of urethra

1.6 An increase in the permeability of the cells of the collecting tubule to water, is due to

A. a decrease in the production of ADH
B. an increase in the production of ADH
C. an increase in the production of aldosterone
D. an decrease in the concentration of the blood plasma

1.7 Which distribution pattern does territoriality produce?

A. Clumped
B. Random
C. Uniform
D. None of the above.

1.8 The mortality rate of organisms following a type III survivorship curve is _____.

A. fairly constant throughout life
B. higher in post-reproductive years
C. unrelated to age
D. lower after the organisms become established

1.9 Which of the following is not an outcome of high population density?

A. Predators tend to ignore prey that is overabundant.
B. Mortality increase.
C. Toxic waste accumulation.
D. Reproduction reduction.

1.10 Sustainable development will not aim at _____.

A. maximising the present day benefits through increased resource consumption
B. reasonable and equitable distributed level of economic well being that can be perpetuated continually
C. social economic development which optimise the economic and societal benefits available in the present, without spoiling the likely potential for similar benefits in the future
D. development that meets the need of the present without compromising the ability of future generation to meet their own needs

1.11 Electronic waste is the adverse effect of _____.

A. agriculture
B. industry
C. housing
D. mining

1.12 This human activity among the following, causes maximum environmental pollution with regional and global impacts, is _____.

A. urbanization
B. industrialization
C. agriculture
D. mining

1.13 The phenomena where popular belief is that mice occur surprisingly from stored grain, is also referred to as _____.

A. Ontogeny
B. Lamarckism
C. Spontaneous creation
D. Neo Darwinism

1.14 Adaptations that evolve within population confined to one (1) gene pool is known as ____.

A. evolution
B. macro evolution
C. micro evolution
D. speciation

1.15 The fossil record shows evidence of _____.

A. extinction of species
B. changes within groups over time
C. origin of new groups
D. all of the above

1.16 The first use of fire by hominids is associated with _____.

A. Homo habilis
B. Homo erectus
C. Australopithecus afarensis
D. Homo sapiens

1.17 The average brain size of a modern human is _____ cubic centimeters.

A. 1200-1350
B. 800-1000
C. 100-200
D. 1600-1800

1.18 Lucy belonged to which one (1) of the following species?

A. Australopithecus robustus
B. Australopithecus afarensis
C. Australopithecus boisei
D. Australopithecus anamensis

QUESTION 2 [18]

Provide the correct biological term for the following statements.

2.1 The inferior chambers of the human heart.
Ventricles.
2.2 Blood vessels transporting deoxygenated blood away from the heart.
Pulmonary arteries.
2.3 The circuit transporting blood between the heart cells and alveoli.
Pulmonary circuit.
2.4 Type of environment outside the body of a freshwater fish.
Hypo-osmotic environment.
2.5 Type of excretory system used by the grasshopper.
Malpighian tubules.
2.6 The structure within the medulla area in the kidney.
Renal pyramids.
2.7 Influx of new individuals from other areas.
Immigration.
2.8 The study of populations in relation to their environment
Population ecology.
2.9 The pattern of spacing among individuals within boundaries op population.
Dispersion.
2.10 An overland flow / downslope movement of water (thin, continuous film over relatively smooth soil / rock surfaces).
Sheet flow.
2.11 A situation when plants are exposed to intensive feeding for extended periods of time, or without sufficient recovery periods.
Overgrazing.

2.12 The agricultural practice of producing or growing a single crop or plant species over a wide area and for a large number of consecutive years.
Monoculture.
2.13 The drug designed to interfere and cause errors in the manufacture of DNA from the virus.
3TC.
2.14 The type of speciation that takes place in geographically overlapping populations where a reproductive barrier isolates a subset of a population.
Sympatric speciation.
2.15 Gene flow interrupted / reduced when population divided into geographically isolated subpopulations.
Allopatric speciation.
2.16 The study of human origins.
Palaeoanthropology.
2.17 Australopiths which had sturdy skulls and powerful jaws were referred to as _____.
Robust.
2.18 The species that walked fully upright (bipedal), had humanlike hands and teeth and a brain 1/3 of present humans.
Australopithicus afrensis.

QUESTION 3 **[12]**

Provide the correct biological statement for the following terms.

3.1 Gas exchange.
The process when blood is transported into the lungs and off loads carbon dioxide and uploads oxygen.
3.2 Left ventricle.
The most muscular chamber of the heart accepting oxygenated blood from left atrium.
3.3 Renal artery.
Transport impure, oxygenated blood to kidney.
3.4 Aldosterone.
Hormone that controls the reabsorption of salt from the kidneys.
3.5 Density.
The number of individuals per unit area/volume.
3.6 Lag phase.
Growth of population is slow because population base is small and organisms are still adapting to the environment.
3.7 Point source water pollution.
Contaminants that enter a waterway from a single/identifiable source (pipe).
3.8 Biological magnification.
Concentrates toxins at higher trophic levels, where biomass is lower.
3.9 Ozone
Layer of gases that serves as protection against harmful UV radiation from the sun.
3.10 Greenhouse effect
Carbon dioxide, water vapour and other greenhouse gases that reflect infrared radiation back towards Earth.
3.11 *Australopithicus africanus*
"southern ape of Africa", Mr Ples found by Dr Robert Broom in Sterkfontein.

3.12 Bipedal

Waling upright on two (2) legs.

QUESTION 4 [19]

4.1 The human heart functions with two (2) distinct circuits. Explain in detail the flow of blood in the systemic circuit. (9)

- left atrium √
- Blood then flows into left ventricle through √
- bicuspid valve. √
- blood is then pumped through semilunar valve into √
- aorta with takes blood to entire body. √
- deoxygenated blood flow from the body into the right atrium. √
- from right atrium into √
- right ventricle through √
- tricuspid valve √

4.2 What are the typical components of a closed circulatory system? (3)

- Blood vessels (arteries, veins, capillaries).√
- A pumping organ (heart), √
- Blood. √

4.3 What is the difference between systole and diastole? (2)

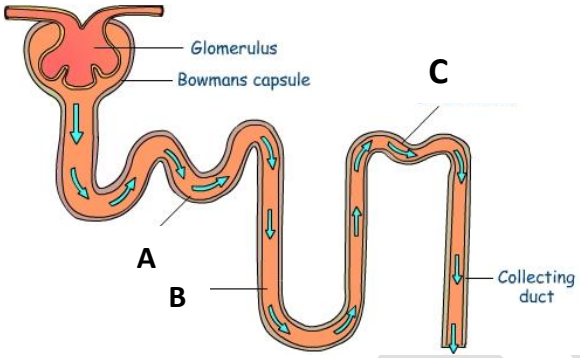
- Systole → the contraction, or pumping, phase.√
- Diastole → the relaxation, or filling, phase.√

4.4 Answer the questions by only writing the correct answer (a-e) next to the appropriate question number. (5)

COLUMN A	ANSWERS	COLUMN B
4.4.1 Venule	F	a) Smallest of the blood vessels.
4.4.2 Artery	G	b) Large vessel carrying lymph from lymph nodes to the blood.
4.4.3 Capillary	A	c) A narrow vessel regulating the flow of blood from an artery into a capillary network.
4.4.4 Vein	D	d) A wide, thin-walled vessel carrying blood back to the heart.
4.4.5 Arteriole	C	e) Filled with pericardial fluid.
		f) A small, thin-walled vessel carrying blood from a capillary network to a vein.
		g) A thick-walled, elastic vessel carrying blood away from the heart.

QUESTION 5 [17]

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



5.1.1 Provide the labels for the letters A-C in the diagram in 5.1. (3)

A. Proximal convoluted tubule.
B. Loop of Henle.
C. Distal convoluted tubule.

5.1.2 Discuss the process that will take place in the area labelled B and C in the diagram in 5.1. (12 x ½ = 6)

- Water, urea, & salts contained within ascending limb of Henle √ eventually pass into
- distal convoluted tubule (DCT).√
- DCT reacts to amount of anti-diuretic hormone (ADH) in blood: √
- The more ADH is present in blood, √
- the more water is re-absorbed into it. √
- Because presence of ADH in blood causes cells of DCT to become more permeable to water, √
- therefore they allow more water to pass from tubular fluid back into blood. √
- This results in more concentrated urine. √
- If level of ADH in blood is reduced √
- then cells in DCT becomes less permeable to water √
- less water is able to pass from tubular fluid back into blood - √
- which results in less concentrated urine. √

5.2 How will the kidneys be able to reabsorb sodium? (4)

- Salt is reabsorbed through hormone Aldosterone √ by means of a
- Sodium pump mechanism. √
- Aldosterone is a hormone that increases the reabsorption of sodium (Na) & water & √
- release (secretion) of potassium (K) in kidneys. √

5.3 How will the kidney be able to maintain homeostasis? (4)

- Excrete metabolic waste such as urea (primary metabolic waste of humans). √
- Maintain the water salt balance in the body. √

- Maintain the acid-base (pH) balance in the body. √
- Secrete hormones. √

QUESTION 6 [16]

6.1 A biologist catches twelve (12) red scorpions from a deserted mine dump in Krugersdorp, paint a non-toxic, white dot on their bodies, and releases them unharmed. A week later, he catches eight (8) red scorpions from the same mine dump, including six (6) with white paint.

6.1.1 Based on the mark-recapture method, estimate the number of red scorpions found in the mine dump area in Krugersdorp.
Show all calculations and equations (5)

$$N = \frac{CM}{R}$$ (1 mark)

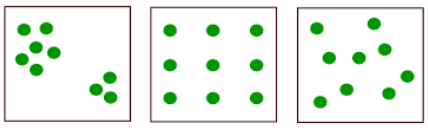
$$N = \frac{CM}{R}$$

$$\frac{8 \times 12}{6}$$ (3 marks)

N = 16 (1 mark)

6.1.2 Suggest another way of marking the red scorpions. (1)
Non- toxic waterproof maker (no tags)

6.2 Make use of diagrams to discuss the different types of dispersion patterns and how the population in each one of the patterns is influenced. (6)



√ √ √

1) Clumped dispersion, individuals aggregate in patches.
   a. may be influenced by resource availability & behaviour. √

2) Uniform dispersion is one in which individuals are evenly distributed.
   a. may be influenced by social interactions such as territoriality√

3) Random dispersion, the position of each individual is independent of other individuals.
   a. It occurs in the absence of strong attractions or repulsions. √

6.4 The population growth in density-dependent populations are affected by many factors. Discuss the following two (2) factors.

6.4.1 Disease. (2)

Population density influence health & survival of organisms √
In dense populations pathogens spread more rapidly. √

6.4.2 Toxic wastes. (2)

Accumulation of toxic wastes contribute to density-dependent regulation of population size. √
Waste increase diseases, deaths, lower birth rates√

QUESTION 7 [17]

7.1 Provide two (2) examples of how the following natural resources can be used for humans:

7.1.1 *Harpagophytum*: (2)

Any 2:

- Used to treat the hardening of the arteries, arthritis, gout, muslce pain, back pain, tendonitis, chest pain, gastrointestinal upset or heart burn, fever, and migraine headaches.

7.1.2 *Hypoxis*: (2)

Any 2:

- Rich in vitamins.
- Boosts energy, improves immune system and helps to prevent virus infections.
- Lowers high blood pressure and blood sugar levels.

7.2 Discuss "overgrazing" as a natural environmental issue:

a) Define the concept of overgrazing. (2)

Overgrazing occurs when plants are exposed to intensive grazing for extended periods √ of time, or without sufficient recovery periods.√

b) Provide two (2) examples of how overgrazing takes place? (2)

- Livestock in poorly managed agricultural applications. √
- Overpopulations of native or non-native wild animals. √

c) Provide three (3) examples of the consequences of "overgrazing". (3)

Any 3:

- Reduces usefulness, productivity and biodiversity of the land and can lead to desertification and erosion.
- Can also lead to the spreading of invasive species and non-native plants and weeds.

7.3 Discuss the following three (3) national environmental issues. (6)

7.3.1 Deposit of toxic substances.

Humans release many toxic substances into environment (Acid mine water) √
Biological magnification √

7.3.2 Introduction of invasive species:

Introduced to new environment by humans. √ Eucalyptus, Port Jackson willow. √

7.3.3 Overexploitation of indigenous resources:

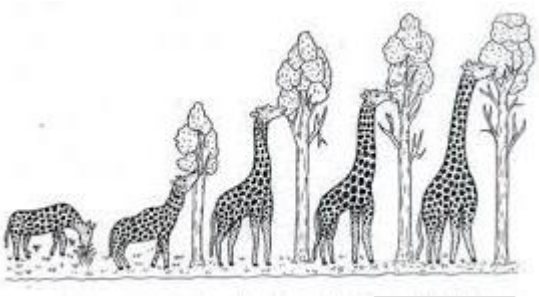
Human harvesting of wild plants /animals √ exceeding ability of populations of species to rebound. √

QUESTION 8 [17]

8.1 Study the following four (4) diagrams and answer the questions that follows.

a) 

b) 

c) 

d) 

8.1.1 Provide a label for the four (4) diagrams that represent the history of different theories of development. (4)

a) Ontogeny. √
b) Spontaneous creation. √
c) Lamarckism. √
d) Neo Darwinism. √

8.1.2 Indicate how each diagram relates to the four (4) different theories of development. (4)

a) Ontogeny: Origen and development from individual embryo to adult. √
b) Spontaneous creation: complex, living organisms produced from non-living matter. Popular belief that mice occur spontaneously from stored grain. √
c) Lamarckism: Species evolve through use & disuse of body parts, inheritance of acquired characteristics. √
d) Neo Darwinism: Darwinism as modified by findings of modern genetics, mutations due to random copying errors in DNA cause variation within population natural selection acts upon these variations. √

8.2 Explain how wild mustard can be seen as an example of artificial selection. (4)

- Selecting and breeding individuals with desired traits. √
- Different vegetables have all been selected from one species of wild mustard. by √
- selecting variations in different parts of the plant, √
- such as cauliflower, kale, Brussel sprouts, cabbage and broccoli. √

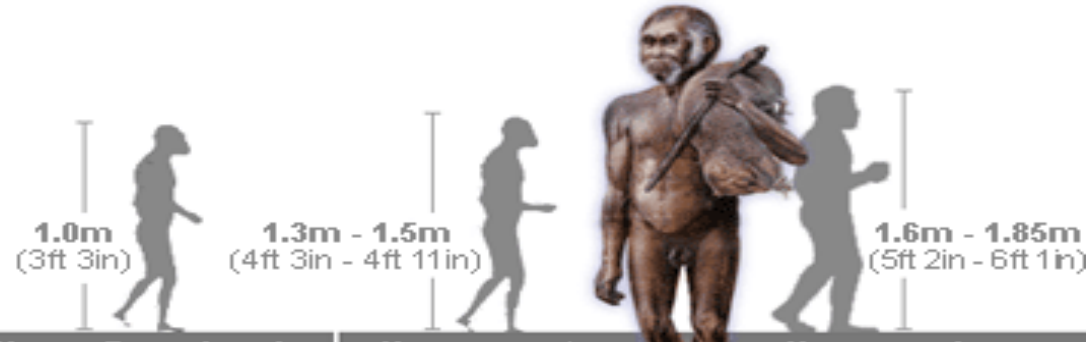
8.3 Discuss HIV as a modern example of natural selection and evolution. (5)

- HIV uses the enzyme reverse transcriptase to make a DNA version of its own RNA genome. √
- The drug 3TC is designed to interfere and cause errors in the manufacture of DNA from the virus. √
- Some individual HIV viruses have a variation that allows them to produce DNA without errors. √
- These viruses have a greater reproductive success. √
- The population of HIV viruses has therefore developed resistance to 3TC √

QUESTION 9 [16]

9.1 Tabulate the following characteristics to compare *Homo floresiensis*, *Homo erectus* and *Homo sapiens.*

a) Brain size
b) Skull (brow ridge)
c) Skeleton size and build
d) When they lived. (12)



	Homo floresiensis	Homo erectus	Homo sapiens
Brain	380 cubic cm	900cc (archaic) to 1100cc (later)	1200cc (archaic) to 1350cc (modern
Skull	Similar to H erectus, though with slightly brow ridge	Flat, thick, large brow ridges	Short, high, small no brow ridges
Skeleton	Similar to H erectus, but smaller, very well pelvis, bipedal stance	Robust, suggesting heavy musculature	More slender slighter build
Lived	Remains date 18,000 years ago, possibly existed 800,000 yrs old	c 1.9m years ago to c 25,000 years ago	c 150,000 years ago to present

9.2 What ancestral Homo species used hunting tools? (1)
Homo neanderthalensis

9.3 What 18,000 year old fossil was found in Indonesia in 2004? (1)
Homo floresiensis

9.4 Name two (2) common misconceptions about early Hominins. (2)

- Thinking of them as chimpanzees
- Imagining human evolution as a ladder leading directly to Homo sapiens