LSFT0A2

EXAM (UNIT 1-6)

JUNE 2017

TOTAL: 150

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INTERNAL MODERATOR	**Dr A NEL**
DURATION:	**3 HOURS**
TOTAL MARKS:	**150**

NUMBER OF PAGES: 8 PAGES

Please read the following instructions carefully:

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

QUESTION 1 **[18]**

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

1.1 A geneticist took two (2) copies of the same gene coding for the protein Haemoglobin. She added a nucleotide to the one (1) and removed a nucleotide from the other. Which of the following statements would be true for this experiment?

A) The addition of the nucleotide will have the greatest effect on the resulting polypeptide.
B) The removal of the nucleotide will have the greatest effect on the resulting polypeptide.
C) Neither the addition nor the removal will affect the gene.
D) Both the addition and the removal will be detrimental to the gene.

1.2 The genome of a virus consists of _____.

A) DNA
B) RNA
C) DNA and RNA
D) DNA or RNA

1.3 The capsid of a virus consists of _____.

A) protein subunits
B) nucleic acid
C) carbohydrate envelope
D) RNA and lipid

1.4 The two (2) types of immunity in humans are _____.

A) internal and external
B) intrinsic and extrinsic
C) overt and covert
D) innate and acquired

1.5 Another name for innate immunity.

A) Specific immunity.
B) Immunity.
C) Explicit immunity.
D) Non-specific immunity.

1.6 The two (2) types of lymphocytes are _____.

A) platelets and the T-cells
B) platelets and erythrocytes
C) T-cells and erythrocytes
D) B-cells and T-cells

1.7 Which of the following characters is seen in the gymnosperms, but is not seen in other seeded vascular plants?

A) alternation of generation.
B) exposed seeds.
C) sporophyte stage.
D) pollen.

1.8 In angiosperms the,

A) gametophyte is prominent, and the sporophyte is dependent upon the gametophyte.
B) sporophyte is prominent, with the sporophyte and gametophyte living independently.
C) sporophyte is prominent, and the gametophyte is dependent upon the sporophyte.
D) gametophyte is prominent, and the sporophyte stage has disappeared.

1.9 Which of the following is NOT characteristic of a monocot?

A) Leaves with parallel veins.
B) Flower parts usually in threes or multiple of three.
C) Lateral meristems occurring rarely.
D) seed with two (2) cotyledons.

1.10 Which of the following groupings includes the largest number of species?

a. Invertebrates
b. Chordates
c. Insects
d. Vertebrates

1.11 Which of the following animal groups does not have tissues derived from mesoderm?

a. Annelids
b. Amphibians
c. Cnidarians
d. Flatworms

1.12 An adult animal that possesses bilateral symmetry is most certainly also _____.

a. Triploblastic
b. a deuterostome
c. eucoelomate
d. the product of metamorphosis

1.13 All of the following involves active transport across membranes ***except*** _____.

a. the movement of mineral nutrients from the apoplast to the symplast.
b. the movement of sugar from the mesophyll cells into the sieve-tube members in maize.
c. the movement of sugar from one sieve-tube member to the next.
d. the movement of mineral nutrients into cells of the root cortex.

1.14 Which one (1) of these pairs is mismatched?

a. slightly movable joint - vertebrae
b. hinge joint - hip
c. synovial joint - elbow
d. immovable joint – sutures in cranium

1.15 Which of the following statements is correct?

a. Phloem sap is an aqueous solution that is high in glycogen.
b. Phloem sap travels from a sugar sink to a sugar source, a net producer of sugar.
c. Phloem sap travels from a sugar source to a sugar sink, a net producer of sugar.
d. Phloem sap travels from a sugar source to a sugar sink, a net consumer or storer of sugar.

1.16 Which one (1) of the following occurs in the arm when food is brought to the mouth from a plate?

a. Biceps relax and the triceps contract.
b. The bended arms is stretched.
c. Biceps and triceps contract.
d. The angle of the elbow joint becomes smaller.

1.17 The membrane that surrounds bundles of fascicles.

a. Epimysium.
b. Perimysium.
c. Endomysium.
d. Sarcolemma.

1.18 The skeletal system does not _____.

a. produce blood cells
b. store minerals
c. help produce movement
d. produce body heat

QUESTION 2 **[18]**

Give the correct biological term for each of the following statements. ***Only write down the correct term next to the appropriate question number on the answer sheet.***

2.1 Additional protective layer derived from the host cell membrane.
Envelope.
2.2 The subunits that forms the layer protecting the viral nucleic acid.
Capsomeres.
2.3 The product that forms after the viral proteins and viral genome self-assemble.
Virions.
2.4 Artificial passive immunity.
Vaccinations.
2.5 White/yellowish fluid rich in nutrients and antibodies, produced by new mothers after their baby is born.
Colostrum.
2.6 Signaling molecule released to act during inflammation.
Histamine.
2.7 The structure containing megasporangium and megaspore covered by integument.
Ovule.
2.8 Spores developing into either a male or female gametophyte.
Heterospory.
2.9 The type of plants that contains a double integument.
Angiosperms.
2.10 The vein endings through which excess water drops are forced.
Hydathodes
2.11 The organ that stores sugar in a plant.
Sugar sink
2.12. Drops of water that is forced out of the vein endings along the edges of leaves.
Guttation
2.13 The body cavity derived from the mesoderm and endoderm.
Pseudocoelom

2.14 The development of a head.
Cephalization
2.15 The developing digestive tube.
Archenteron
2.16 A hard encasement deposited on the surface of an animal.
Exoskeleton
2.17 The large opening at the base of the skull.
Foramen magnum
2.18 The type of joints found in the hips and shoulders that allows rotating movement of the arms and legs
Ball and socket joint

QUESTION 3 **[12]**

3.1 Viral synthesis.
Host cell producing viral nucleic acids and viral proteins.
3.2 Nitrifying bacteria.
Converts ammonium into nitrates which can be absorbed by plants.
3.3 Pyrogens.
Molecules that will trigger fever as part of the inflammatory response.
3.4 Type of gland where T-lymphocytes mature.
Thymus gland.
3.5 Neutrophils.
Type of white blood cell that will engulf and destroy microbes.
3.6 Eudicots.
Type of plants with netlike veins and vascular tissue in a ring.
3.7 The process whereby diploid structures produce haploid structures.
Meiosis.
3.8 Sapwood.
The outer layers of woody shrubs that transport materials through the xylem.
3.9 Vascular cambium.
A cylinder of meristematic cells (undifferentiated parenchyma) that develops into secondary xylem and phloem during secondary growth.
3.10 Pith.
Ground tissue internal to the vascular tissue.
3.11 Thorax.
Part of the skeleton that consists of sternum, ribs and thoracic vertebrae that will protect the heart and lungs.
3.12 Seven (7) pairs of ribs, directly attached to the sternum.
True ribs.

QUESTION 4 **[18]**

4.1 Describe the structure and common shapes of prokaryotes. (4)

- Prokaryotes (bacteria cells) are very small and do not have membrane bounded organelles (nucleus, mitochondria) √
- Prokaryotic cells have several common shapes:
  - Spherical (cocci / coccus) √
  - Rod-shaped (bacilli / bacillus) √
  - Spiral (Spirillum) √

4.2 What criteria are used to classify a virus? (5)
Any 5:

- Geometry (shape) of the virus.
- Whether they have envelopes.
- The identity of the organism they infect.
- Transmission mode (how they are transported).
- The disease they cause.
- The type of nucleic acid.

4.3 Describe two (2) methods of asexual reproduction methods in prokaryotes. (6)

Budding: √
- Cell's genetic information is duplicated, creating an identical copy or clone of the original cell. √
- As the new cell pinches off or buds from the surface, √
- a **bud scar** is produced. √
- The mother cell is remains, and a √
- new daughter cell is formed. √

Binary fission: √ (6 x ½ = 3)
- Cell replicates its single chromosome. √
- DNA replica attaches to plasma membrane adjacent to the parent molecule. √
- Membrane and cell wall extends across the cell's midsection and √
- divide the parent cell into √
- 2 genetically identical daughter cells. √

QUESTION 5 **[18]**

5.1 Explain in your own words how a new born will be able to receive antibodies. (7)
- In natural passive immunity, antibodies are passed from a mother to a child. √
- Antibodies - transferred through the placenta, √ or colostrum. √
- The antibodies transmitted only last for several weeks, √
- Baby start to build up its own immune system √ and to make its own antibodies. √
- Artificial passive immunity involves the introduction of antibodies through means such as injection – VACCINATIONS. √

5.2 Tabulate five (5) differences between the two (2) types of immune systems present in humans. (14 x ½ = 7)

INNATE IMMUNE SYSTEM √	**ACQUIRED IMMUNE SYSTEM** √
Response is non-specific √	Pathogen and antigen specific response √
Exposure leads to immediate response √	Lag time between exposure and response √
Cell-mediated and humoral components √	Cell-mediated and humoral components √
No immunological memory √	Exposure leads to immunological memory √
Found in nearly all forms of life √	Found only in jawed vertebrates √

5.3 How does antibiotics work? (4)

Bactericidal antibiotic √ → kills the bacteria, interferes with formation of bacterium's cell wall or cell contents. √
Bacteriostatic √ → stops bacteria from multiplying. √

QUESTION 6 **[18]**

6.1 Discuss the life cycle of an angiosperm. You may use bullet points in your answer. (26 x ½ = 13)

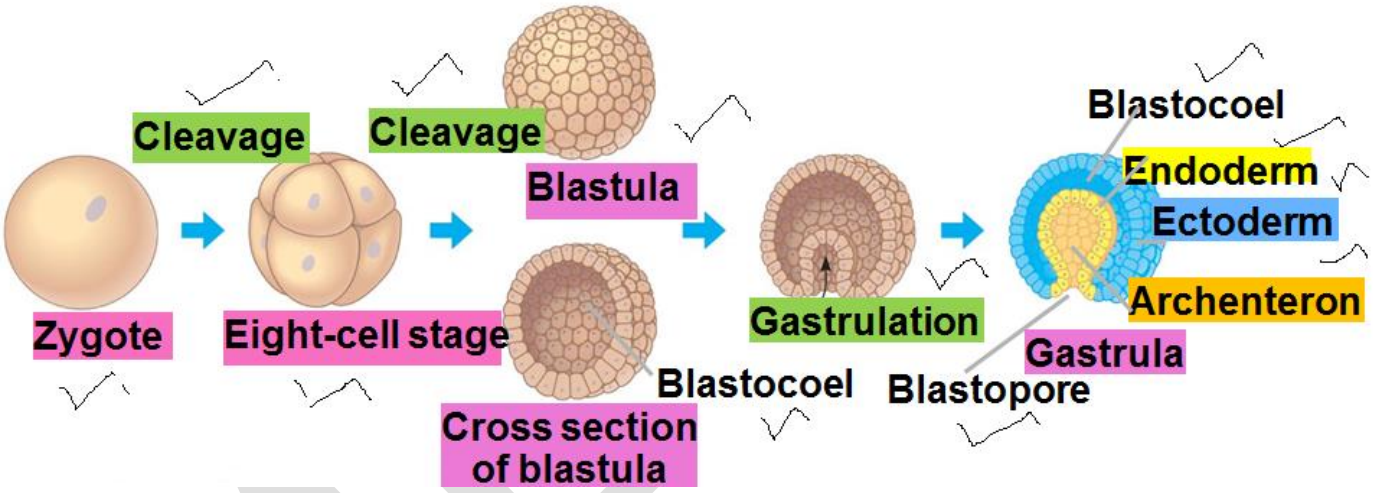
- In mega sporangium √ of each ovule √ → megasporocyte √divides by meiosis √, producing 4 megaspores √. One survives √+ gives rise to a female gametophyte √.
- On the anther √, each microsporangium √ contains microsporocytes √that divide by meiosis √→ producing microspores √.
- A microspore develops into pollen grain √. The generative cell √of gametophyte will divide, forming 2 sperm √. The tube cell √will produce the pollen tube √.
- After pollination, eventually 2 sperm cells are discharged in each ovule √.
- Double fertilization occurs √→ One sperm fertilizes the egg √ = zygote √. The other sperm fertilizes the central cell √ = endosperm (a food supply, 3n) √.
- The zygote develops into embryo √that is packaged along with food into a seed √.
- When a seed germinates → embryo develops into a mature sporophyte √.

6.2 Discuss the five (5) common derived traits of seed plants. (10 x ½ = 5)

1) **Reduced gametophytes:** √
   Develop in walls of spores. √
2) **Heterospory:** √
   Mega sporangium produces megaspores.
   Microsporangium produces microspores. } √
3) **Ovules:** √
   Megasporangium with megaspore and protected by integument. √
4) **Pollen:** √
   Microspores develop into pollen grain containing male gametophyte. √
5) **Seeds:** √
   Protect embryo until conditions are favorable (can remain dormant) and transported across long distances. √

QUESTION 7 **[16]**

7.1 Provide the step by step process that takes place during early embryonic development in animals by using diagrams. (12 x ½ = 6)



7.2 Discuss the following FOUR (4) characteristics which explain body plan in animals. (17 X ½ = 8½)

7.2.1 **Symmetry.**
- Some animals have radial symmetry √
- Some animals have two-sided symmetry is called bilateral symmetry: √
  - Dorsal (top) side & √
  - Ventral (bottom) side √
  - Right & left side √
  - Anterior (head) and Posterior (tail) ends √

7.2.2 **Cephalization.**
- Cephalization → development of a head √

7.2.3 **Tissues.**
- Ectoderm is the germ layer covering the embryo's surface √
- Endoderm is the innermost germ layer and lines the developing digestive tube, called the archenteron √
- Mesoderm: middle layer of some body plans √

- Diploblastic animals have ectoderm & endoderm √
- Triploblastic animals have an ectoderm, endoderm & intervening mesoderm layer. √

7.2.4 **Body cavities.**
- A true body cavity → coelom & derived from mesoderm √ (Coelomates) √
- A pseudocoelom → body cavity derived from mesoderm & endoderm √ (pseudocoelomates) √
- Triploblastic animals → lack body cavity → acoelomates √

7.3 Discuss cleavage taking place in protostomes and deuterostomes. (1½)

Protostome cleavage:
Spriral and determinate: √ already determined what each blastomere will develop into.
Deuterostome cleavage:
Radial and indeterminate: √ each blastomere can develop into a fully formed embryo. √

QUESTION 8 **[16]**

8.1 Water and minerals can travel into the roots using three (3) routes; discuss the transmembrane route in detail. (12 X ½ = 6)

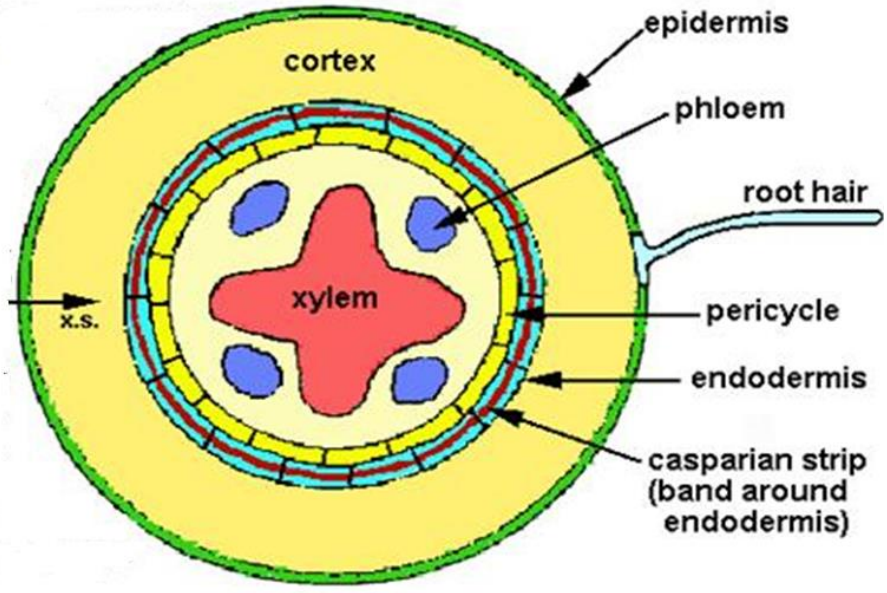
- Water and minerals move from the **soil** (high WP) √ through the **cell wall** √**, plasmamembrane** √ and into the **cytoplasm** √ of the **roothair** √.
- Through the **cell wall, plasma membrane** √ and into the **cytoplasm** of the **cortex cells** √**.**
- Through the **cell wall, plasma membrane** √ and into the **cytoplasm** of the **endodermis**√)
- Through the **cell wall, plasma membrane** √ and into the **cytoplasm** of the **pericycle** √**.**
- Through the **cell wall, plasma membrane** and into the **xylem** √ of the plant.

8.2 The upward movement of water in xylem is made possible by various factors.
8.2.1 Discuss transpiration as one (1) of these factors in detail. (6 x ½ = 3)

- Transpiration is the **loss of water vapour** √ through the **stomata** √ of the leaf.
- The water molecules that evaporate √ from the cells into the **intercellular airspaces** are **replaced** by other water molecules from the leaf xylem √.
- Because the water molecules are **cohesive** √**,** transpiration exerts a **pulling force** √, or tension, that **draws the water column** through the **xylem** to replace the water lost by the stomata.

8.3 Draw and label a cross section through a dicot root. (7)

Heading below the diagram
Any six (6) labels.



QUESTION 9 **[16]**

9.1 List and discuss the six (6) functions of the human skeleton. (12)

- **Support:** √
  Provides the framework which supports the body and maintains its shape. √
- **Movement:** √
  Muscles, bones, and joints provide the principal mechanics for movement. √
- **Protection:** √
  Protects many vital organs (heart, brain). √
- **Blood cell production:** √
  Hematopoiesis → formation of blood cellular components. √
- **Storage:** √
  Store calcium and iron. √
- **Endocrine regulation:** √
  Bone cells release a hormone called osteocalcin, which contributes to the regulation of blood sugar (glucose) and fat deposition. √

9.2 Discuss the structure of a long bone and provide two (2) specific bones as examples. (4)

Long bone consists of a body (diaphysis) √ and two (2) terminal parts (epiphyses). √
Examples: femur, radius, phalanges. √√

TOTAL 150