DEPARTMENT OF LIFE AND CONSUMER SCIENCES

ANIMAL AND PLANT DIVERSITY

BLG1502

SEMESTER I: ASSIGNMENT 2 MEMORANDUM 2018

QUESTION 1 (1x 10)

1.1 Monophyletic / Clade.

1.2 Animalia.

1.3 Horizontal gene transfer.

1.4 Photo-autotrophs.

1.5 Parasitism.

1.6 Euglenids.

1.7 Dinoflagellates.

1.8 Sporopollenin.

1.9 Peristome.

1.10 Cycadophyta.

QUESTION 2 [16]

2.1 **Phylogeny** is the evolutionary history of a species or a taxonomic group of organisms, particularly the differences and similarities among them. Phylogeny is represented by a tree diagram called a phylogenetic tree (family tree). (3)

2.2 **A monophyletic** taxon is one that includes a group of organisms descended from a single ancestor. All the descendants of the most recent ancestor are included in this group of species. (2)

Paraphyletic is a group of organisms that includes an ancestor and some but not all of its descendants. (2)

2.3 **Homology** refers to a similar character emerged from a common ancestry. Homology results from divergent evolution. (1)

Homoplasy refers to a similar character, structure or molecular sequence that does not emerge from a common ancestry. Homoplasy results from convergent evolution. (1)

2.4

Orthologous are homologous genes that are the result of a speciation event. Orthologous genes are diverged after evolution giving rise to different species during speciation, genes generally maintain a similar function to that of the ancestral gene and its function is maintained through speciation event, though variations may arise within the gene after the point in which the species diverged. (2)

Paralogous are homologous genes that are the result of a duplication event. Paralogous genes are genes that diverged within one species. It is a new gene that hold a new function. Genes arising during gene duplication of copy of the gene with a new function, though it is often related to the role of the ancestral gene.

(2)

2.5 Eubacteria, Archaea, and Eukaryotes. (3)

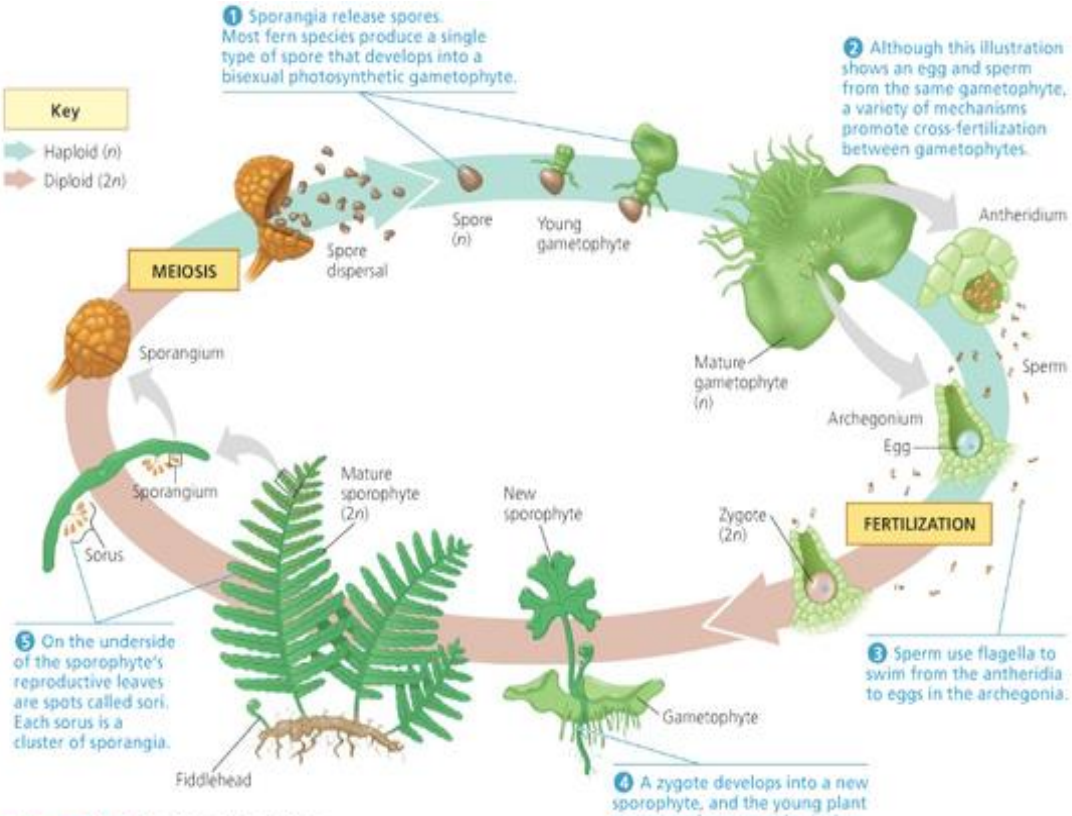
QUESTION 3 [9]

3.1

Abiotic Agents	**Biotic Agents**
Abiotic agents are non-living and refers to the physical and chemical properties of an environment.	Biotic agents are the living or once-living organisms in the ecosystem or environment.
Affect individuals of a species, their population, community, ecosystem and biosphere.	Affect the biome, individuals of a particular species, biosphere or population.
Aren't dependent on biotic factors for survival	Are dependent on abiotic factors for their survival.
Due to changes in the abiotic factors, it may sometimes limit the growth and development of a species or their population	Due to uncertain changes in species, it may bring changes in other species as well.
Do not adapt any changes.	Can adapt the changes, in order to survive.
Abiotic resources are usually obtained from the atmosphere, hydrosphere and lithosphere.	These are obtained from the biosphere and are capable of reproduction.
Examples of abiotic factors are water, air, soil, sunlight, and minerals.	Examples of biotic factors are animals, birds, plants, fungi, and other similar organisms.

QUESTION 4 [15]

(Manual drawing is preferred than copy and paste, if copy and paste (penalty) give 6/15 marks)



▲ **Figure 29.13 The life cycle of a fern.**

WHAT IF? *If the ability to disperse sperm by wind evolved in a fern, how might its life cycle be affected?*

QUESTION 5

ANY FIVE OF THE FOLLOWING (10)

Modified root name	**Function**
Prop roots	They support the tall, top-heavy tree
Storage roots	To store water and food
Strangling aerial roots	To anchor on other trees
Buttress roots	Give architectural support to the trunks of such trees
Pneumatophores	They enable the root system to obtain oxygen
Contractile roots	Pull the plant a little deeper into the soil
Parasitic roots	Penetrate the host plants and withdraw nutrients

QUESTION 6 [9]

Stomata are tiny openings or pores in plant tissue that allow for gas exchange. Stomata are typically found in plant leaves but can also be found in some stems. Specialized cells known as guard cells surround stomata and function to open and close stomatal pores. Stomata allow a plant to take in carbon dioxide, which is needed for photosynthesis. They also help to reduce water loss by closing when conditions are hot or dry. Stomata look like tiny mouths which open and close as they assist in transpiration.

(3)

Guard cells are specialized cells in the epidermis of leaves, stems and other organs that are used to control gas exchange. They are produced in pairs with a gap between them that forms a stomatal pore. The stomatal pores are largest when water is freely available and the guard cells turgid, and closed when water availability is critically low and the guard cells become flaccid. Photosynthesis depends on the diffusion of carbon dioxide from the air through the stomata into the mesophyll tissues. (3)

Petiole is the transition between the stem and the leaf blade called the leaf stalk. The petiole helps conduct energy that the leaves absorb from the sun during photosynthesis to all parts of the plant. It also serves to transport nutrients and water that are absorbed and passed us through the xylem, to the leaf. It is also responsible for the dramatic way deciduous trees lose their leaves during autumn. (3)

QUESTION 7 [14]

7.1 **(ANY SIX) (6)**

Monocotyledons	**Dicotyledons**
Embryo has single cotyledon	Embryo has double cotyledons
Flower parts in multiples of three	Flower parts in multiples of four or five
Major leaf veins are parallel to each other	Major leaf veins are arranged in a meshwork pattern
Stem vascular bundles are scattered randomly	Stem vascular bundles are arranged in ring form scattered randomly
Roots are fibrous root system	Roots are tap root system
Secondary growth is absent	Secondary growth is often present
Usually consist of a hollow stem.	Usually consist of a solid stem

7.2

Innate immunity that is present at birth. It includes certain physical, cellular, and chemical barriers throughout the body. It is **NONSPECIFIC**. Innate immunity refers to nonspecific defence mechanisms that come into play immediately or within hours of an antigen's appearance in the body. These mechanisms include physical barriers such as skin, chemicals in the blood, and immune system cells that attack foreign cells in the body. (2)

Acquired immunity is an immunity that develops in response to antigenic pathogens. It is **HIGHLY SPECIFIC** to the antigen. Specificity is determined by B-cells and T-cells. Immunity obtained either from the development of antibodies in response to exposure to an antigen, as from vaccination or an attack of an infectious disease, or from the transmission of antibodies, as from mother to foetus through the placenta or the injection of antiserum. (2)

OR

Innate immunity (Any 4)

1. Innate immunity includes all the defence elements with which an individual is born.
2. It consists of various types of barriers that prevent the entry of foreign agents.
3. It remains throughout life.
4. Pathogen component nonspecific.
5. Utilises macrophages, neutrophils, natural killer cells and dendritic cells.
6. Active at initial exposure to pathogens.
7. No clonal expansion.
8. Develops within minutes after exposure.
9. Has no memory of pathogen.

Adaptive immunity (Any 4)

1. The immunity which is acquired after the birth is called acquired immunity.
2. It consists of specialised cells (T-cells and B-cells) and antibodies that circulate in the body fluid.
3. It can be short lived or lifelong.
4. Recognizes specific antigen components
5. Employs antibodies and T-lymphocytes
6. Requires initial exposure.
7. Clonal expansion of B and T- lymphocytes.
8. Develops over a period of days.
9 Capable of memorizing.

7.3

Cytokines are cell signalling molecules that aid cell to cell communication in immune responses and stimulate the movement of cells towards sites of inflammation, infection, tumour and trauma. Cytokines effect changes in cellular behaviour that are important in a number of physiological processes, including reproduction, growth, development and injury repair. (2)

Interferons (IFNs) are a group of signalling proteins made and released by host cells in response to the presence of several pathogens, such as viruses, bacteria, parasites, and also tumour cells. Interferons are named for their ability to "interfere" with viral replication by protecting cells from virus infections. (2)

7.4 **ANY TWO OF THE FOLLOWING [2]**

Lysis – Polymerization of specific activated complement components on a foreign cell or enveloped virus leads to the formation of pores. The lipid bilayer of the cell or virus is disrupted. (1)

Activation of inflammation – Several peptides produced by proteolytic cleavage of complement proteins bind to vascular endothelial cells and lymphocytes. These cells then produce cytokines which stimulate inflammation and enhances responses to foreign antigens. (1)

Opsonisation – Certain complement proteins can bind to virions. Phagocytic cells with receptors for these complement proteins can then engulf the virus particles and destroy them. This process is called opsonisation. (1)

Solubilisation of immune complexes – Some virus infections that are not cytopathic – the virus does not kill cells – lead to the accumulation of antibody-virus complexes. When these immune complexes lodge in blood vessels they can cause damage. An example is glomerulonephritis caused by deposition of antibody-antigen complexes in the kidney. Some complement proteins can disrupt these complexes and facilitate their clearance from the circulatory system. (1)

QUESTION 8 (ANY 9 BELOW) [9]

Chondrichithyes	**Osteichthyes**
Mostly marine with a heterocercal tail.	Developed bony fish with homocercal tail.
Endoskeleton cartilaginous.	Endoskeleton bony.
Skin with placoud scale.	Skin with mucous glands, ganoid, cycloid ctenoid scales.
Gills 5-7 pairs without opercula.	Gills 4 pairs with opercula.
No air bladder or lungs.	Swim bladder present.
Cloaca present	Cloaca absent
Large, oily liver for buoyancy	Gas-filled swim bladder for buoyancy
Generally, carnivores with a short intestine.	Generally, omnivores, with a short or long intestine.
The mouth is ventral in position	The mouth is apical in position

The testes are connected with the kidneys. Forward swimming only	The testes are not connected with the kidneys. Both forward and backward swimming
A spiracle usually present.	A spiracle is usually absent.
Internal and external fertilisation	External fertilisation
Jawed fish with paired fins	Teeth fused to jaws

QUESTION 9 [6]

a) Parathyroid gland - secrete **parathyroid** hormone (**parathyrin**). (2)

b) Pineal gland - secrete **melatonin**. (2)

c) Testes- secrete **testosterone**. (Wrong if **ANDROGENS**) (2)

TOTAL: 100 MARKS