

**DEPARTMENT OF LIFE AND CONSUMER SCIENCES**

**ANIMAL AND PLANT DIVERSITY**

**BLG1502**

**SEMESTER 2: ASSIGNMENT 2 MEMORANDUM  
2018**

**QUESTION 1**

- 1.1 Stigma ✓
- 1.2 Haustoria ✓
- 1.3 Karyogamy ✓
- 1.4 Cnidaria ✓
- 1.5 Cephalisation ✓
- 1.6 Coelom/coelomate ✓
- 1.7 Petiole/Leaf stalk ✓
- 1.8 Vascular tissue ✓
- 1.9 Ovaries ✓
- 1.10 Epicotyl ✓

10

[1 x 10=10]

## QUESTION 2

### 2.1 ANY MATCH 1 MARK EACH (3)

	<b>Chitin</b>	<b>Peptidoglycan</b>
<b>Function</b>	Chitin is a structural organic polymer made from glucose monomers.	✓ Peptidoglycan, also known as murein, is a polymer consisting of sugars and amino acids.
<b>Chemical Formula</b>	The chemical formula of chitin is $(C_8H_{13}O_5N)_n$	✓ The chemical formula of Peptidoglycan is $(C_9H_{17}NO_7)$ .
<b>Type of Polymer</b>	Chitin is a polymer of N-acetylglucosamine (derivative of glucose). consists of alternating unbranched residues of $\beta$ -(1,4) glucose.	✓ The sugar component consists of alternating unbranched residues of $\beta$ -(1,4) linked N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM).
<b>Location</b>	Chitin is found mainly in cell walls of fungi, and also in the exoskeleton of arthropods and mollusks.	✓ Peptidoglycan is found mainly in cell walls of most bacteria.
<b>Abundance</b>	Chitin is less abundant polysaccharide than cellulose	✓ Peptidoglycan is less abundant organic compound than cellulose.
<b>Amyl Group</b>	Chitin has an amyl group as a substitution in the glucose molecule.	✓ Peptidoglycan has a five amino acid attached to the N-acetylmuramic acid.
<b>Nitrogen Molecules</b>	Chitin has nitrogen molecules in its structure.	✓ Peptidoglycan does not contain nitrogen in its structure
<b>Hardness and Stability</b>	Chitin is hard and stable than Peptidoglycan.	✓ Peptidoglycan is less hard and stable than chitin.

2.2

1 <sup>1</sup>/<sub>2</sub> MARKS EACH (3)

Nutritional type	Energy Source	Carbon source	Examples
<b>Photoautotrophs</b>	Sunlight ✓	Fix CO <sub>2</sub> ✓	Photosynthetic prokaryotes such as Cyanobacteria, plants, certain protists like algae ✓
<b>Chemoheterotrophic</b>	Organic compounds ✓	Organic compounds ✓	Many prokaryotes such as <i>Clostridium</i> , protists, fungi; animals and some plants ✓

3

2.3 ANY MATCH 2 MARKS (2)

	Gram positive	Gram negative
Stain properties	Retain crystal violet dye and stain blue or purple	Can be decolorized to accept counterstain (safranin) and stain pink or red ✓
Peptidoglycan layer	Thick multi-layered	Thin single-layered ✓
Cell wall	The wall is smooth and 20-30 nm thick.	Cell Wall is wavy and 8-12 nm thick.
Teichoic acids	Present in most species	Absent ✓
Periplasmic Space	Absent	Present ✓
Outer Membrane	Absent	Present ✓
Porins	Absent	Occurs in outer Membrane ✓
Lipopolysaccharide (LPS) Content	Virtually None	High ✓
Lipid and Lipoprotein Content	Low (acid-fast bacteria have lipids linked to peptidoglycan)	High (because of presence of outer membrane) ✓
Mesosomes	Quite Prominent	Less Prominent ✓

2

**2.4 ANY MATCH 2 MARKS EACH (8)**

	<b>Collenchyma</b>	<b>Sclerenchyma</b>
Structure cell wall	Collenchyma cells are elongated cells with irregularly thick cell walls that provide support and structure. ✓	Sclerenchyma cells are generally dead and have thick walls, but two main types occur: fibres and sclereids. ✓
Composition of the cell wall	Collenchyma cell wall is made up of cellulose and pectin. ✓	Sclerenchyma cell wall is made up of waterproofing lignin. ✓
Functions	Providing mechanical support to the plant, resisting bending and stretching by the wind are the major functions of collenchyma. ✓	Providing mechanical support, protection and transportation of water and nutrients are the major functions of sclerenchyma. ✓
Positions in plants.	Collenchyma cells are found in petiole, leaves and young stems, appearing as a continuous ring beneath the epidermis. ✓	Sclerenchyma is found in the mature parts of the plant like herbaceous perennials and woody plants. ✓

8

**2.5 ANY MATCH 1 MARK EACH (8)**

	<b>Bryophytes</b>	<b>Pteridophytes</b>
Definition	Embryophytes that do not possess a true vascular tissue.	✓ Pteridophytes are vascular plants that reproduce via spores.
Habitat	Moist, shady places.	✓ Terrestrial environments.
Alternative Names	Bryophytes are called non-vascular plants.	✓ Pteridophytes are called cryptogams.
Gametophyte/Sporophyte	Gametophyte is dominant.	✓ Sporophyte is dominant.
Sporophyte	Completely depends on the gametophyte	Independent of gametophyte and is autotrophic
Plant Body	Plant body of bryophytes is either leafy or thalloid. True stem and leaves are absent.	✓ Plant body differentiated into roots, stem, and leaves. Plants possess true stem and leaves.
Ploidy	The cells are haploid	✓ The cells are diploid
Vascular Tissue	Vascular tissues absent	✓ Vascular tissues present

Archegonia Neck	The neck is long, containing six vertical rows of cells.	The neck is short, containing four vertical rows of cells. ✓
Antheridium	Antheridium is stalked.	✓ Antheridium is sessile.
Archegonium	Archegonium is commonly exposed.	✓ Archegonium is partially embedded
Phase	Haploid gametophyte phase is longer lived while sporophyte phase is shorter lived.	✓ Diploid sporophyte phase is longer lived while gametophyte phase is shorter lived.
Roots	Roots are absent. Instead, rhizoids occur.	✓ Roots are present.
Examples	Hornworts, liverworts, and mosses are examples for bryophytes.	✓ Ferns, horsetails, spikemosses, club mosses, and quillworts.

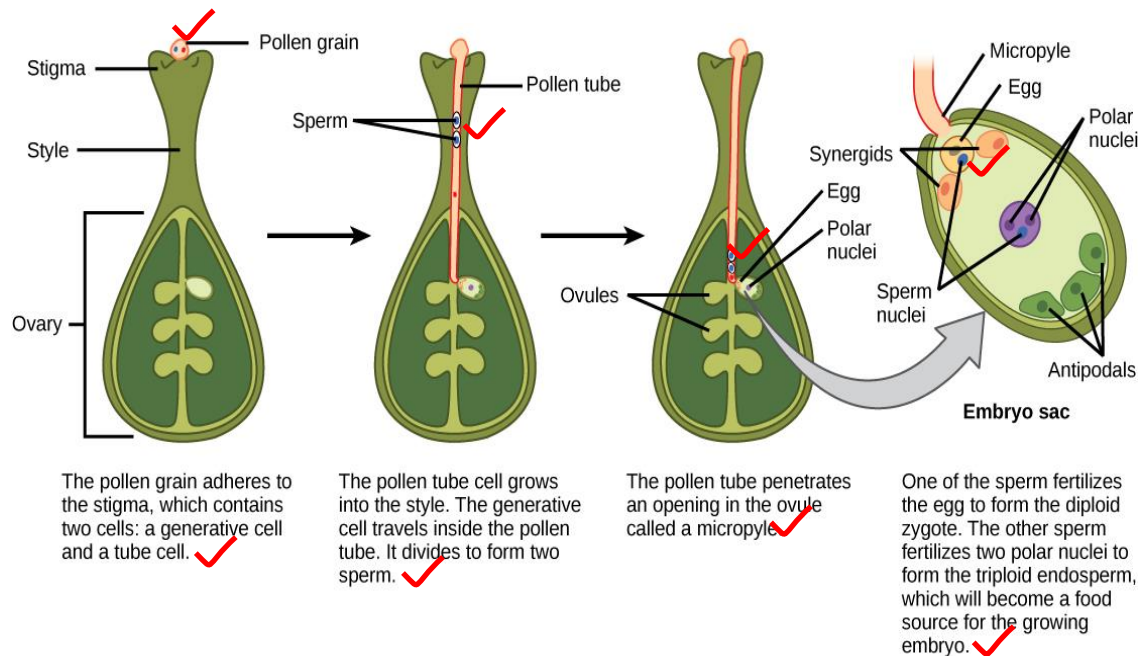
### QUESTION 3

#### 3.1 ANY THREE 2 MARKS EACH (6)

1. Pollination is the process that involve the transfer of pollen grains from the male parts (anther) of a flower to the female part (stigma) of the same or different flowers. Whereas the fertilization is the common process that involve the union of the male gamete (sperm) and female gamete (egg) to form a zygote. ✓
2. Pollination does not involve the formation of the pollen tube, while in fertilization there is the formation of pollen tube which helps in transferring of male gametes up to an egg cell. ✓
3. Pollination is an external mechanism and takes place on an outer part of a flower, while fertilization is an internal mechanism and takes place inside the flowers. ✓
4. Pollination takes place before fertilization, and it is of two types – self-pollination and cross-pollination. Fertilization takes place only after pollination. ✓
5. Pollination occurs in flowering plants only, and fertilization is followed by almost every living plants and living animals present on earth. ✓
6. Pollination requires pollinating agents like wind, insects, animals, etc., whereas in fertilization there is no such requirement apart from the male gamete (sperms) and female gamete (egg). ✓

### 3.2 TWO MARKS FOR EACH DIAGRAM (8)

- Any diagram of double fertilisation
- Direct copy and paste- **4 marks**
- Full description and complete diagram- **8 marks**
- Description only, no diagram- **0 marks**
- Diagram only- **4 marks**
- Wrong diagram- **0 mark**



8

### QUESTION 4

#### 4.1 TWO MARKS EACH (4)

Undernutrition is a condition in which not enough calories are ingested to maintain health. ✓

Malnutrition is having a diet that lacks the correct balance of proteins, carbohydrates, vitamins and minerals. ✓

OR

Undernutrition is the outcome of insufficient food intake and repeated infectious diseases, caused by not having enough food or not eating enough food containing substances necessary for growth and health. ✓

Malnutrition is a condition that results from eating a diet in which one or more nutrients are either not enough or are in excess such that the diet causes health problems. ✓

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4.2 ONE MARK EACH correct organ and enzyme (6)

ORGAN	ENZYME
Mouth ✓	Salivary amylase ✓
Small Intestines ✓	Pancreatic amylase, lactase, sucrase and maltase ✓
Large intestines ✓	Enzymes from intestinal bacteria ✓

6

QUESTION 5

5.1 ANY MATCH 1 MARK (4)

Endocytosis	Pinocytosis
Cell eating	✓ Cell drinking
Large solid particles	✓ Small or liquid particles
Larger vesicles formed	✓ Smaller vesicles formed
Pseudopodia is formed	✓ Invagination is formed
Digestion takes place	✓ No digestion takes place
Specific and receptor mediated	✓ Nonspecific and non-receptor mediated

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5.2 ANY MATCH 1 MARK (4)

Osmosis	Diffusion
Flow of solvent molecules in one direction	✓ Flow of solvent or solute molecules in both directions
The process takes place through a semi-permeable membrane	✓ No such membrane is required
Occurs only with liquids	✓ Occurs both in liquids and gases
Movement over short distances	✓ Movements are over large distances
It is a slow process	✓ It is a fast process
Osmosis can be stoppe3d or reversed by applying additional pressure on the higher concentration side	✓ Cannot be stopped or reversed
Molecules of solvent move from a region of lower concentration to a region of higher concentration	✓ Molecules of solvent or solute move from a region of higher concentration to a region of lower concentration

4

### 5.3.2 (3)

**Osmoregulation** is the process of maintenance of salt and water balance (osmotic balance) across membranes within the body's fluids, which are composed of water plus electrolytes and non-electrolytes. ✓

OR

**Osmoregulation** is the process of regulating water potential in order to keep fluid and electrolyte balance within a cell or organism relative to the surrounding. Osmoregulation is important to organisms to keep a constant, optimal osmotic pressure within the body or cell. ✓

OR

**Osmoregulation** is the maintenance of constant osmotic pressure in the fluids of an organism by the control of water and salt concentrations. ✓

3

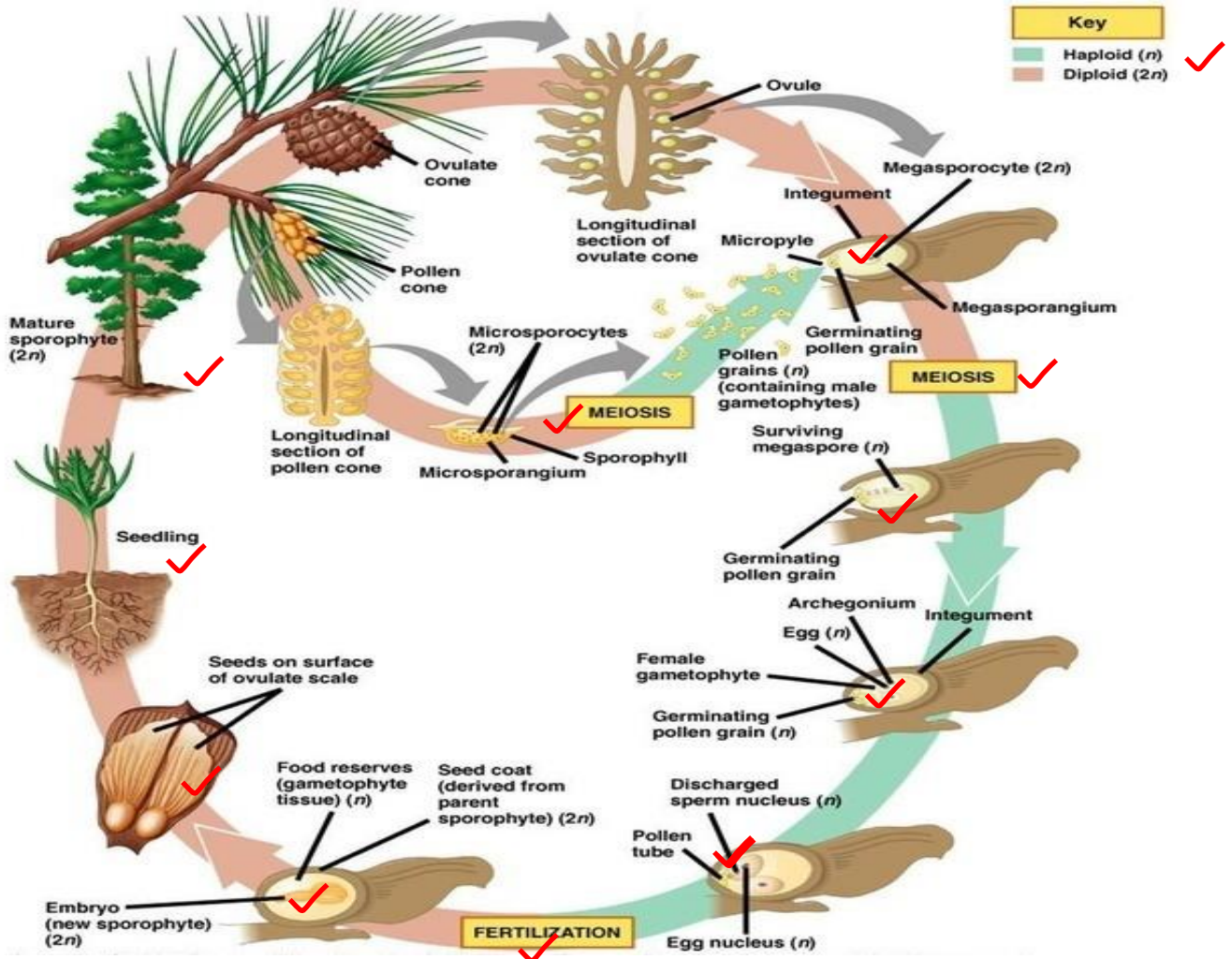
OR

**Osmoregulation** means the physiological processes that an organism uses to maintain water balance; that is, to compensate for water loss, avoid excess water gain, and maintain the proper osmotic concentration (osmolarity) of the body fluids. ✓



**QUESTION 6 (15)**

- Any life cycle of pine in a clockwise direction
- Full description and complete diagram- **15 marks**
- Description only, no diagram- **10 marks**
- Wrong diagram- **0 mark**
- Diagram only, no description- **10 marks**
- Direct copy and paste- **5 marks**



OR

Life Cycle of Pine :

15

1. The sporophyte bears sporangia in cones. Two types of cones are pollen cones and seeds cones. ✓
2. The pollen cones are small and develop near tips of lower branches. ✓

Each scale (a microsporophyll) of a pollen cone possess two or more microsporangia on underside. ✓

3. The sporangia bear microspores (pollen grains) from microspore mother cell after meiosis. ✓
4. Each microspore develops into a microgametophyte (pollen grain). ✓
5. Microgametophyte has two wings and is carried by wind to the seed cone during pollination. ✓
6. Seed cones are larger than pollen cones. They are located near the tip of branch. ✓
7. Each scale/megasporophyll of seed cone has two ovules which lie on upper surface. ✓
8. Each ovule is surrounded by a thick layered integument having an opening at one end. The ovule has the megasporangium within it. ✓
9. The megaspore mother cell in the megasporangium undergoes meiosis division to form four megaspores. Only one of these spores develops into a megagametophyte with two to six archegonia, each containing a single large egg lying near the ovule opening. ✓
10. Pollen grain develops pollen tube that slowly moves towards megagametophyte. Pollen tube discharges 2 non-flagellated sperms. ✓
11. One of these fertilizes an egg in an archegonium while the other degenerates. ✓
12. Fertilization occurs after one year of pollination. After fertilization, ovule matures and becomes the seed. ✓
13. Seed consists of the embryo, reserve food and seed coat. In the fall of second season, seed cone becomes non-woody and hard. It opens to release winged seed. ✓
14. When the seed germinates, the sporophyte embryo develops into a new pine tree and thus the cycle is completed. ✓

## QUESTION 7

7.1 (6)

Definition- **2 marks**

Body temperature explanation- **4 marks.**

**Homeostasis** is the maintenance of internal stability and constancy in living organisms. ✓

When the body gets **too hot**, the heat loss centre in the hypothalamus is stimulated, this leads to reduction in heat production or transfer heat to the body surfaces such as the skin. ✓

When the body feels **too cold**, it is the heat conservation centre of the hypothalamus which is stimulated. Low temperature actually generates heat (thermogenesis), ✓ whilst

others just conserve heat through processes. The body thus has a range of responses available, depending on the internal and external temperatures. ✓

4

7.2 1 MARK, ANY MATCHING 4 BELOW: (4)

Aerobic respiration	Fermentation
1. Occurs in the presence of oxygen	✓ Occurs in the absence of oxygen
2. Complete breakdown of organic food	✓ Organic food incomplete breakdown
3. All hydrogens in the glucose molecule are replaced	✓ All hydrogens in the glucose molecule are not replaced
4. Large amount of energy is released	✓ Small amount of energy is released
5. Carbon dioxide and water as waste products	✓ Produce carbon dioxide and ethanol in plants and lactic acid in animals

4

7.3 ANY FOUR BELOW: (4)

1. **Respiratory**- transport of O<sub>2</sub> to the tissues and removal of CO<sub>2</sub> from tissues. ✓
2. **Excretory**- transport of waste products from tissues to excretory organs for removal from the body. ✓
3. **Nutrition**- transport energy and distribute nutrients from the digestive system to body cells. ✓
4. **Protection/immunity**- fight infections by transporting white blood cells throughout the body. ✓
5. **Regulatory**- essential for water, pH and temperature homeostasis. ✓
6. **Communication**- transport hormones from secretory cells to target organs. ✓
7. Contain **clotting** factors that prevent blood loss. ✓

4

TOTAL: 100 MARKS