BOT02A10 PLANT ANATOMY AND CYTOLOGY
JUNE 2016

MEMORANDUM

Total: 100

QUESTION 1 [**9]**

1.1. Scanning electron microscope (1)
1.2. One of the advantages (large samples, showing 3D-structure); low resolution and only surface view as an disadvantages (2)
1.3. Stoma (2)
1.4. Guard cells (2)
1.5 Magnification = length of scale bar (12 mm= 12000 μm)/scale bar value (10 μm) = 1200. (2)

QUESTION 2 **[21]**
Study the micrograph of a cell (Fig. B)

2.1. Plant cell (1). Cell wall (1), chloroplasts (1) (3)
2.2. Transmission electron microscope (1)
2.3. **a** – intercellular space (1) (8)
b – vacuole (1)
c – nuclear envelope (1)
d – nucleus (euchromatin) (1)
e – nucleolus (1)
f – chloroplast (1)
g – mitochondrion (1)
h – cell wall (1)

2.4. Give *one* main function of (3)
2.4.1 **e –** synthesis of ribosomal RNA (assembly of ribosomes) (1)
2.4.2 **f** – photosynthesis (1)
2.4.2 **g –** producing energy (synthesis of ATP) (1)

2.5. Chlorenchyma (e.g. leaf mesophyll): intercellular spaces, presence of chloroplasts, no large vacuoles (2)

2.6. E.g. magnification (x 10 000) = cell diameter in micrograph divded by actual cell diameter. Cell diameter in micrograph = ca. 10 cm (100 000 μm). Therefore, actual cell diameter is 100 000 divided by 10 000 = **10 μm** (4)

QUESTION 3 **[13]**

Study microphoto (Figure C) of a portion of a cell with a complete plastid and then answer the following questions relating to it.

3.1 Transmission electron microscope (1)

3.2. Advantage: high resolution. Disadvantages: only dead specimens can be studied, time-consuming preparation of samples (2)

3.3.1 Etioplast (prolamellar bodies), and chloroplast (grana) (4)
3.3.2 E.g. potatos turn green when exposed on light (2)

3.4. E.g. double membrane, small ribosomes, circular DNA (2)
3.5. Ca. 2,5 µm. Use scale bar to measure. (2)

QUESTION 4 **[15]**

4.1 C3. There is no Kranz anatomy (conspicuous bundle sheaths and mesophyll cells forming a whreath-like structure) (2)

4.2 Bundle sheath extension, conductive bundle, xylem, phloem, palisade mesophyll, spongy mesophyll, stoma are correctly labeled. (7)

4.3 Adaxial (upper) side and abaxial (lower) side of the leaf are correctly labeled. Adaxial side of leaf can be recognized by the presence of palisade mesophyll or by the postion of xylem in conductive bundle. (4)

4.4 Shade leaf: prominent palisade mesophyll (2)
[15]

QUESTION 5 **[11]**

5.1 Transverse (cross-) section (1)

5.2 Dicotyledon. Presence of vessels in wood. Monocotyledons do not form wood. (2)

5.3. Vessels, rays, (libriform) fibers, axial parenchyma are correctly labeled (4)

5.4. Vessels – water conduction, libriform fibers – support, axial parenchyma and ray parenchyma - storage (4)

QUESTION 6 [**9**]

6.1.1 - 15
6.1.2 - 4
6.1.3 - 23
6.1.4 - 18
(4)
6.2. 0,3 mm. Use scale bar. (3)

6.3. Secondary phloem rays . (2)

QUESTION 7 [**9**]

7.1 Microtubules are thicker than microfilaments, have tubular strcture, consist of tubulin. Microfilaments are thiner, solid, made of actin (2)

7.2. Secondary cell wall (2)

7.3. Double fertilization in angiosperms (1)

7.4. Parenchyma cells have even and thin primary walls, they are not responsible for support. Cellenchyma cells have uneven and (or) thick primary cells, their function is support (2)

7.5. Shoot apical meristem: corpus-tunica structure, formation of lateral (leaf) primordia, zone of cell divisions and zone of elongation are not distinctive, no analogs of root cap. Root apical meristem: no corpus-tunica structure, no promordia, zone of cell divisions is distinctive from the zone of elongation, root cap. (2)

QUESTION 8 [**10]**

8.1. Diagrams (a) – (d) represent various seeds. For each of these diagrams, write down the number of the label line pointing to

8.1.1 - **4, 11, 15, 21**

8.1.2 – **1, 6, -, 18**. (8)

8.2 Hypogeal; cotyledons are not lifted above ground (2)

QUESTION 9 **[3]**

9.1. Anther (1)

9.2. Periderm (1)

9.3. Gametophyte (1)