BOT02A2 - PLANT ANATOMY AND CYTOLOGY
EXAMINATION JUNE 2018

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 (11 mm= 11000 μm)/scale bar value (10 μm) = x1100. (2)

QUESTION 2 **[21]**

2.1. Plant cell (1). Cell wall (1), chloroplasts (1) (3)
2.2. Transmission electron microscope (2)
2.3. **a** – cell wall (1) (7)
b – vacuole (1)
c – chloroplast (1)
d – nucleolus (1)
e – nucleus (chromatin) (1)
f – nuclear envelope (1)
g – mitochondrion (1)

2.4. Give *one* main function of (4)
2.4.1 **c –** photosynthesis (2)
2.4.2 **f** – synthesis of ribosomal RNA (assembly of ribosomes) (2)

2.5. Chlorenchyma (e.g. leaf mesophyll): intercellular spaces, presence of numerous chloroplasts (2)

2.6. E.g. magnification (x 10 000) = cell size in micrograph divded by actual cell diameter. Cell diameter in micrograph = 113 mm (113 000 μm). Therefore, actual cell diameter is 113 000 divided by 10 000 = ca. **11 μm** (4)

QUESTION 3 **[13]**

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) (3)

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 spongy mesophyll (2)
[15]

QUESTION 5 **[11]**

5.1 Transverse (cross-) section (3)

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

5.3. (4)
a – vessels (1)
b – libriform fibers (1)
c – axial parenchyma (1)
d – rays (1)

5.4. Vessels (**a**) – water conduction, ray parenchyma (d)- storage (2)

QUESTION 6 [**11**]

6.1 Stem (1)
6.2 Monocot. Conductive bundles scattered on cross section (not arranged into ring); pith and cortex can not be distinguished. (3)
6.3 (5)
1 - epidermis (1)
2 – vascular (conductive) bundle (1)
3 – (primary) phloem (1)
4 – (primary) xylem (vessels) (1)
5 – ground parenchyma (1)
6.4. Descending transport of assimilates (sugars) (11)

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)

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)