Botany 205, 2019
Midterm Sample Questions

Please note that this is not an actual midterm, but a selection of questions that are representative of the kinds of questions that I ask on Bot 205 midterms. I have indicated how many marks each question could be worth so that you can have a sense of the value that each question might have on an exam, and also for the relative level of detail that I am looking for in written response. The number of questions and the total number of marks are very likely to be greater in this document compared to the actual midterm. *As a general guide*, the questions on the midterm add up to about 40-60 marks. The midterm is worth 20% of your final grade.

If you have questions about this material, please do not hesitate to email me (janice.cooke@ualberta.ca), drop by to see me during office hours, or make an appointment to see me.

1. *(7 marks)* Answer the following true / false questions:

a.	The endodermis can be found in the root.	True	/	False
b.	Trichomes have suberin in their cell wall.	True	/	False
c.	Vessel members are the transport cells in phloem.	True	/	False
d.	Root hairs develop from the pericycle	True	/	False
e.	The sieve cells of gymnosperms do not have companion cells	True	/	False
f.	In C3 plants, photosynthesis takes place primarily in the mesophyll cells	True	/	False
g.	Monocot roots have xylem cells arranged in a cross within a central cylinder	True	/	False

2. *(4 marks)* Which of the following statements about bean seeds are correct?

   a. Bean seeds have two cotyledons. True / False

   b. Bean seeds contain significant amounts of protein reserves. True / False

   c. Bean seedlings have hypogeal growth. True / False

   d. In bean seedlings, the epicotyl develops into the mature plant. True / False

3. *(6 marks)* Which of the following cell types can be found in leaves of monocot plants? Please circle the correct answer(s).

   a. Mesophyll

   b. Trichome

   c. Pericycle

   d. Tracheid

   e. Guard cell

   f. Epidermis

4. *(3 marks)* Indicate which of the following participate in the light reactions.

   a. Rubisco True / False

   b. ATP synthase True / False

   c. Plastoquinone True / False

   d. P680 True / False

   e. 3-phosphoglycerate kinase True / False

   f. Cryptochrome True / False

5. *(6 marks)* Which of the following statements are true about CAM photosynthesis?

a.	PEP carboxylase is the enzyme that catalyzes the carbon fixation reaction.	True / False
b.	PEP carboxylase functions mainly at night.	True / False
c.	The plant stores up large amounts of oxaloacetate at, night, which can be metabolized during the day to provide CO_2 to Rubisco.	True / False
d.	CAM photosynthesis can be found in plants like cacti.	True / False
e.	CAM photosynthesis depends on the presence of enlarged bundle sheath cells.	True / False
f.	Plants that have CAM photosynthesis have reduced levels of photorespiration.	True / False

6. *(2 marks)* In decussate phyllotaxy:

   a. Leaves are lined up in a single plane along the stem, i.e. like a feather, and arranged in a staggered pattern along the stem, where one leaf is positioned at a node on one side of the stem, and the next leaf is positioned at a node on the other side of the branch but further up.

   b. Leaves are arranged in pairs at each node along the stem, and each pair is at right angles (90°) relative to the previous pair.

   c. Leaves are arranged in pairs at each node and the pairs of leaves are lined up in a single plane along the stem, i.e. like a feather.

   d. More than two leaves are attached to the stem at each node.

   e. None of the above.

7. *(4 marks)* For each of the following cell types, indicate whether it can be found in roots, stems or leaves, by writing R, S, or L in the space following the word. Note that you will receive 0.5 marks for each correct answer, and a deduction of 0.25 marks for each incorrect answer.

   A. Pericycle _____

   B. Vessels _____

   C. Mesophyll _____

   D. Epidermis _____

8. *(6 marks)* Plants adapted to dry (arid) conditions often show leaf characteristics that enable these plants to withstand these dry conditions and avoid excessive water loss. List ***three*** types of leaf modifications that plants have evolved to cope with these dry conditions, and describe how they act to reduce water loss. As part of this description, indicate whether this modification affects stomatal resistance or boundary layer resistance.

9. *(8 marks)* Match the following terms with their functions or characteristics.

   a. Carotenoid _____

   b. Thylakoid _____

   c. Sclereid _____

   d. Casparian strip _____

   e. Hypodermis _____

   f. Matrix glycan _____

   g. Phelloderm _____

   h. Bulliform cells _____

   A. One of the tissues generated by the cork cambium

   B. Cells in leaves of some monocots that expand and contract to furl or unfurl the leaf blade

   C. A pigment that can absorb excess light energy to prevent plant damage

   D. Cells that separate the vascular cylinder from the rest of the root, selectively allowing passage of materials into the xylem and phloem

   E. A pigment that plays an important role in converting light energy to chemical energy

   F. Contains suberin

   G. Make up microfibrils

   H. Located at the periphery of the root vascular cylinder, and acts as the gate keeper for movement of water and ions into and out of the vascular cylinder

   I. Protective or supportive cells

   J. A carbohydrate component of primary cell walls

   K. Membrane system in chloroplasts

   L. Site of carbon reactions

   M. None of the above

10. (*Total = 12 marks*) Compare and contrast the following terms. Use only three-four concise sentences for each term. Describe two points of similarity between each pair of terms in 1-2 sentences. The next two sentences must be statements that accurately and precisely describe features that distinguish the terms from each other (give *two points each* to provide characteristics that underscore why the terms are different from one another). ***Excess material will NOT be marked***.

    a. (*6 marks*) vascular cambium and apical meristem

    b. *(6 marks)* trichome and root hair

11. *(10 marks)* Define the following terms (two marks each):

A. aquaporin:

B. middle lamella:

C. suberin:

D. microfibril:

E. plasmodesmata**:**

12. (*16 marks, 4marks for the drawing, 1 mark per label, and 1 mark per function*) Draw a cross section of a stem from a eudicot that shows only primary growth, and has discrete vascular bundles. You only need to show detail for one of the vascular bundles. Make sure to label as many structures and cell types as you can. List the functions of each tissue/cell type that you label. For full marks, you should have at least 6 labels, and corresponding functions of the labelled cells/tissues.

13. *(4 marks)* Describe in a stepwise fashion the events that occur at the Photosystem II reaction centre when it accepts a photon from a chlorophyll molecule of the antennae complex. Following these events, what must happen for the reaction centre to be able to accept another photon?

14. A. *(2 marks)* Define adventitious root.

B. *(2 marks)* Which of the following are examples of adventitious roots?

a. Prop roots

b. Lateral roots

c. Pneumatophores

d. Aerial roots

15. *(6 marks)* Describe two types of root modifications that plants have evolved to cope with conditions in which their roots are submerged in water. How do these adaptations help the plant?

16. *(5 marks)* Is this a transverse, radial or tangential section of wood? For full marks, please provide your reasoning.