

SAMPLE MIDTERM EXAM

WOOD 280 - Wood Anatomy and Identification Mid-term Examination - October xx, 20xx

Instructor: Dr. Simon Ellis
 Time allowed: 50 minutes Name: _____
 Total marks: 100 Student No.: _____

Answer all the questions. The marks allocated for each question are indicated in square brackets. This exam consists of 6 pages; please ensure that you have all the pages.

Note: Please do not be too brief in your answers. A one or two word answer is unlikely to receive full marks in most instances. Try not to leave any answer blank, no answer=no marks! Make sure that you read all parts of the questions. Please phrase your answers in the context of this course. Use appropriate diagrams where they will help your answer.

1. [20 marks]

- [3] (a) The two most important substances produced by the activity of the live crown of a tree that impact the subsequent growth in diameter of the tree are _____ and _____.
- [3] (b) The tissues or structures in the live crown in which each of these substances are produced are _____ and _____ (respectively).
- [2] (c) The tissue or structure in which these substances are transported down the stem of the tree is called _____?
- [4] (d) Explain what effects these substances have on the activity of the vascular cambium and the development of the xylem cells that it produces.

- [5] (e) Considering a softwood tree growing in a temperate region - how do the relative concentrations of these substances found during the active growing season affect the nature of the xylem cells produced in one annual ring in the trunk of that tree?
- [3] (f) If you were to attempt to count the growth rings to determine how old a tree is, at what height of tree should you count the rings? Why? Why would counts at other heights not provide accurate estimates of the age of the tree?

2. [20 marks]

- [12] a) Please name and briefly describe the stages of cell development undergone in the formation of a softwood longitudinal tracheid starting with the cell from which it is formed and ending with a mature functioning cell.
- [8] (b) Please compare and contrast the development of a softwood longitudinal parenchyma cell to that of a softwood longitudinal tracheid with respect to the stages that you should have identified above.

3. [20 marks]

- [4] (a) What are the functions of rays in secondary xylem?
- [4] (b) How is ray spacing maintained at a constant level as a mature tree grows in diameter?
- [12] (b) Describe, using labeled diagrams, three different ways in which we can use the rays found in hardwoods or softwoods to help us in identifying different wood species. You can include features seen using a hand lens and/or features seen under the light microscope. For each feature of rays described please illustrate two examples of different possible appearances of the feature (you do not have to name actual species).

4. [20 marks]

We have discussed the form-function relationship for individual wood cells and their groupings several times in class.

- [4] (a) What are the two main functions performed by wood in the trunk of a living tree (please use more than one or two words to answer this question)?
- [9] (b) For each of these functions please name and describe a cell found in either hardwoods or in softwoods that is primarily responsible for that function and describe how its form is well suited to its function. Please do not be too brief in your answer.
- [2] (c) What are the two lesser functions performed by wood in the trunk of a living tree (again, please provide more than one or two word answers)?
- [5] (d) For each of these functions please name and describe a cell found in either hardwoods or in softwoods that is primarily responsible for that function and describe how its form is well suited to its function. Please do not be too brief in your answer.

5. [20 marks]

- [4] (a) What is the role of sapwood in a living tree? What is the role of heartwood in a living tree?
- [4] (b) Is the sapwood-heartwood boundary in the trunk of a mature tree static or dynamic? Why? (Please do not just say either “it is static because it doesn’t move” or that “it is dynamic because it does move” but explain why it is one or the other).
- [9] (c) Describe in some detail three phenomena that occur as sapwood transitions into heartwood. The phenomena may relate to only hardwoods, to only softwoods or to both hardwoods and softwoods.
- [3] (d) How does each of the phenomena you described in part (c) affect the properties of the heartwood when it is used for industrial purposes?