University of Waterloo
Department of Civil Engineering
Civ E 265 Materials
Example Questions

Closed Book Allowed Time: Three Hours

A. Define

List four general classifications of material properties?
Define a solid, liquid, gas, adsorbate, and plasma.
What is an elastic/plastc material?
What is hysteresis and explain its meaning with respect to materials?
Define ductility, toughness, and resilience
Define a "dislocation".
What is steel? What is wood? What is cement? What is concrete?
What is polyethylene? What is an elastomer? What is fiberglass?
What is a stress concentration?
What is creep?
What is fatigue?

B. Materials

What are four of the most important factors affecting the strength of concrete?
What are four of the most important factors affecting the strength of wood?
What are four of the most important factors affecting the strength of steel?
How do we manufacture Portland Cement? Lime? Concrete? Iron? Steel?
What molecular arrangement is polyethylene made of? What is a typical strength range?
How is the molecular structure of a thermoset different than that of a thermoplastic?
Explain the difference between thermoplastic and thermoset.
Why are dislocations important to metal behavior?
Describe what occurs within the structure of steel when yielding begins.

C. Applications

Give an example of a situation in which it would make sense to use concrete for a civil engineering use rather than steel? What is the typical range of concrete and steel compression and tension strengths?
Give an example of a situation in which it would make sense to use wood for a civil engineering use rather than concrete? What is a range of wood strengths?
Why are dislocations important to the mechanical properties of steel?
Why is ductility a desirable property for a bridge?
Sketch a neat plot of the expected probability distribution of the failure stress of a material, and the probability distribution of the applied stress.
Why is wood a good material for deck suspended off the ground? Why is it not the best materials for a deck laid on the ground?
What are to of the most important factors of a concrete mix affecting the durability of concrete in service (for a bridge deck for example)