

53:086 Civil Engineering Materials
Review Materials for Final Examination
The University of Iowa
Spring 2006

During the second half of the course, we've covered (1) bituminous materials; (2) fiber-reinforced plastic composites; and (3) masonry. For each of these topics, you should, at a minimum be familiar with the following:

1. Bituminous materials

- Sources of asphalt and tar
- Aggregate requirements in HMA
- Fundamental ideas of HMA (hot-mix asphalt) mix design
- VTM, VMA, VFA and reasonable design values
- G_{mm} , G_{mb} , and how to measure them.
- Cutbacks and emulsions
- Oxidation of asphalt cement and its effect on mechanical properties
- Common lab tests used to characterize asphalt cements (binders)
- The Voigt and Maxwell models of viscoelasticity and how to compute cyclic response for a given frequency.

2. Structural Fiber Reinforced Plastic Composites

- Common plastics used as matrix
- thermosets versus thermoplastics
- Common structural fiber reinforcement materials
- Why are fibers made with such small diameters?
- Computing the directional stiffnesses/strengths of FRP composites using the rules of mixtures.
- Familiarity with the general strength, stiffness, and mass-density characteristics of FRP composites
- key ideas in fiber-reinforced concrete

3. Masonry

- Characteristics of clay units and concrete units
- Dimensional stability of clay and concrete units
- Efflorescence
- Absorption capacities of clay and concrete units