

ENGRD 221: ENGINEERING THERMODYNAMICS

Lecture 4: September 4, 2007

Reading Assignments (from Moran & Shapiro, Sixth Edition): Sections 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 3.5 and 3.6. We will return to section 3.6 on lecture 5. Please read the remaining of this chapter in preparation for lecture 5.

Topics covered:

- Cyclic processes
 - Cyclic processes, cycle heat and work
 - Equivalence of heat and work
 - Analysis of energy cycles
 - Thermal reservoir
 - Work producing cycles: The gas turbine cycle, the steam power cycle, etc.
 - Thermal efficiency for work producing cycles
 - Work consuming cycles: Vapor compression refrigeration cycle, heat pumps, etc.
 - Coefficient of performance for work consuming cycles
- Evaluating thermodynamic properties
- p-V-T surfaces, state equations
- Pure substances, phases of a pure substance
- Phase changes for water: Compressed liquid, saturated liquid, saturated vapor, superheated vapor
- Saturation pressure & saturation temperature
- The liquid-vapor saturation curve
- T-v diagram for the heating process of water at constant pressure
- T-v diagram of constant pressure phase-change processes of a pure substance at various pressures
- Supercritical pressures, the critical point
- The compressed liquid region, the saturated liquid/vapor region and the superheated vapor region
- Quality, computing thermodynamic properties in the compressed liquid, water-vapor mixture and superheated vapor regions for water.