ENGRD 221: ENGINEERING THERMODYNAMICS

Lecture 15: October 16, 2007

Reading Assignments (from Moran & Shapiro, Sixth Edition): All of chapter 8 including example problems. Sections 9.1 and 9.2.

Particular topics reviewed:

- A review lecture of the ideal Rankine cycle, Rankine cycle with superheat, and Rankine cycle with regeneration
- Attached find the solution to the example discussed in class Particular topics reviewed:
- Gas power cycles
- Actual and ideal cycles, ideal cycles are (only) internally reversible
- $\eta_{\text{real cycle}} < \eta_{\text{ideal cycle}} < \eta_{\text{Carnot cycle}}$
- Idealizations employed in gas power cycles
- Start with the Carnot cycle, review of $P - v$ and $T - s$ diagrams
- Thermal efficiency of actual processes increases with increase in the average temperature heat is supplied to the system or with a decrease in the average temperature at which heat is rejected from the system
- Air-standard assumptions, cold-air-standard assumptions, air-standard cycle
- Nomenclature for reciprocating engines, intake valve, exhaust valve, TDC, BDC, bore, stroke, etc.
- Displacement and clearance volumes, compression ratio
- Indicator diagrams, pressure (P) vs. displacement (V)
- Mean effective pressure
- Single vs. double action engines
- SI (spark-ignition) and CI (compression-ignition) engines
- Actual four-stroke SI engine vs. ideal Otto cycle and their $P - v$ diagrams
- The air-standard Otto cycle, $P - v$ and $T - s$ diagrams
- Thermodynamic analysis for the reversible Otto cycle, thermal efficiency, thermal efficiency as a function of compression ratio, thermal efficiency vs. specific heat ratio