ME 227.3 Thermodynamics I
Department of Mechanical Engineering
Midterm Examination
October 26, 2005

- Time: 1.5 hours
- Total marks: 50
- Calculators allowed.
- Closed book exam.
- Formula sheet supplied.
- This exam contains THREE questions.
- No Walkmans, Discmans, IPODs or similar devices allowed.
- No PDAs or laptops allowed.
- No cell phones allowed.

(10) 1. Define the following terms.

   (a) Adiabatic
   (b) Compressed Liquid
   (c) Critical Point
   (d) Cycle
   (e) Quality

(20) 2. A piston-cylinder device contains air ($R = 286.9\,\mathrm{J/(kg \cdot K)}$) which undergoes three processes to form a cycle. The first process is a constant pressure expansion, the second process occurs at constant volume, and the third process is isothermal at 350 K. The maximum volume during the cycle is 5 times the minimum volume. Calculate the net work (in kJ/kg) for the cycle. Calculate the heat transfer for each process (also in kJ/kg).

(20) 3. Steam enters a turbine at 100 bar, 520^{o}C and a mass flow rate of 5 kg/s. It leaves the turbine at 1 bar and enters a condenser where heat is removed at a rate of 10 MW. It leaves the condenser as a saturated liquid. Determine the power produced by the turbine and the quality at the turbine exit.