

# ME 201

## Thermodynamics

### Old Exam #2

Directions: Work all three (3) problems. The exam is open notes and open text book. All problems have equal weight.

#### **Problem 1**

A rigid container holds 3 kg of air initially at 50°C. The air is stirred so that its pressure changes from 500 kPa to 2000 kPa. The heat transfer is 200 kJ. Determine the final temperature, the change in internal energy, and the work.

#### **Problem 2**

A desuperheater is an adiabatic mixing tank which produces saturated vapor from a superheated vapor by adding liquid. If superheated steam at 3.5 MPa, 400°C enters at the rate of 0.5 kg/s, and liquid water enters the unit at 3.5 MPa and 40°C, determine the amount of saturated vapor at 3.0 MPa which can be produced. What is the flow rate of liquid water required?

#### **Problem 3**

What temperature must air be at prior to entering an ideal nozzle if an exit velocity of 1200 m/sec is required? The nozzle inlet pressure is 400 kPa, the inlet kinetic energy is negligible, and the outlet pressure is 100 kPa.