

# Mech 261 – Thermo 1

Assignment 3 (Questions are from 5 or your textbook.)

## Question 1

5-71 A spring-loaded piston-cylinder device contains 1 kg of carbon dioxide. This system is heated from 100 kPa and 25°C to 1000 kPa and 300°C. Determine the total heat transfer to and work produced by this system.

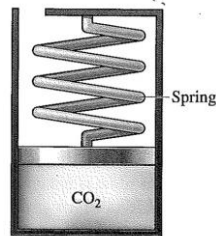


FIGURE P5-71

## Question 2

5-77 Air is contained in a cylinder device fitted with a piston-cylinder. The piston initially rests on a set of stops, and a pressure of 300 kPa is required to move the piston. Initially, the air is at 100 kPa and 27°C and occupies a volume of 0.4 m<sup>3</sup>. Determine the amount of heat transferred to the air, in kJ, while increasing the temperature to 1200 K. Assume air has constant specific heats evaluated at 300 K. *Answer: 340 kJ*

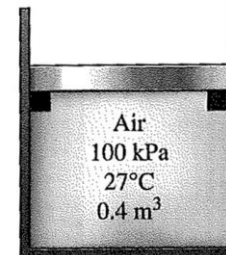


FIGURE P5-77

## Question 3

5-72 Air is contained in a variable-load piston-cylinder device equipped with a paddle wheel. Initially, air is at 500 kPa and 27°C. The paddle wheel is now turned by an external electric motor until 50 kJ/kg of work has been transferred to air. During this process, heat is transferred to maintain a constant air temperature while allowing the gas volume to triple. Calculate the required amount of heat transfer, in kJ/kg. *Answer: 44.6 kJ/kg*