

FE Thermo Review - Take home Exam

- Air is compressed in a piston-cylinder from 100 kpa, 0.12 m^3 to 650 kpa in a $PV = \text{const.}$ process. Determine the work for the process.
a. -66 kJ b. -10.15 kJ c. -22.5 kJ d. -43.8 kJ
- A chamber containing 2 kg of air is heated at constant volume from 100 kpa, 27 C to 300 kpa. Determine the heat transfer for the process.
a. 863 kJ b. 116 kJ c. 1200 kJ d. 162 kJ
- Steam expands adiabatically in a turbine from 0.4 mpa, 400 C to 35 C, sat. vapor at a flow rate of 30 kg/s. Determine the power produced by the turbine.
a. 7.1 mw b. 21.2 mw c. 16.4 mw d. 25.4 mw
- Determine the efficiency of the previous turbine.
a. 91% b. 54.2% c. 100% d. 83.4 %
- Determine the heat transfer per unit mass required to condense steam at steady flow with $p = \text{const.}$ from 45 C, $x = 0.95$ to 35 C.
a. 1621 kJ/kg b. 2317 kJ/kg c. 2178 kJ/kg d. 1859 kJ/kg
- Air at 100 kpa, 27 C is compressed in an ideal compressor to 600 kpa. Determine the exit temperature of the compressor.
a. 228 C b. 1527 C c. 45 C d. 162 C
- Determine the work per unit mass for the previous problem.
a. -201 kJ/kg b. -135 kJ/kg c. -18 IJ/kg d. -1500 kJ/kg
- Water enters a power plant boiler at 0.4 mpa, 40 C and a flow rate of 150 kg/s and is heated at constant pressure to 500 C. Determine the heat transfer in the boiler.
a. 31 mw b. 444 mw c. 432 mw d. 498 mw
- Water enters a pump at 30 C, 100 kpa and leaves at 700 kpa. Determine the work per unit mass for the pump for a pump efficiency of 70%.
a. 0.86 kJ/kg b. 0.42 kJ/kg c. 1.1 kJ/kg d. 1.6 kJ/kg
- A small gas turbine burns propane, C_3H_8 , with 150 % excess air. How many moles of oxygen, O_2 , are produced in the products per mole of fuel?
a. 2.5 b. 5 c. 7.5 d. 10.5