ME 201
Thermodynamics

Homework #9 Due Monday, October 13, 2014

1. One component in a household refrigerator is the compressor where refrigerant 12 enters as saturated vapor at -24°F and is isentropically compressed to 29 psia. Determine the work required in kJ/kg and the exit temperature (in °C) of the refrigerant.

2. To keep the petroleum flowing in the Alaskan pipeline, it must be heated periodically. What is the heat transfer rate required at a heating station to heat petroleum at constant pressure flowing at 30 kg/s from 0°C to 100°C?

3. Consider a rigid tank of volume 2 m³ containing saturated liquid refrigerant-12 at 20°C. The tank is connected to an ideal turbine and as the refrigerant leaves the tanks it flashes to saturated vapor. If the tank is maintained at 20°C and the turbine exit pressure is 100 kPa, how much work will be produced when two thirds of the initial mass has been used?