In Session Practice Problems – Thermodynamics (EGN 3343)

January 2024

Hello everyone,

These are some problems that, in my experience, provide students with a wider understanding of the topics covered in the first weeks of classes. I will go over these and other problems during my sessions. I highly recommend that you attend these sessions to solve any doubts.

Disclaimer: There is no guarantee that any of these problems will be included in any exam, so the best way to approach these problems is like practice problems that will help you familiarize yourself with important concepts learned during the semester. Finally, do not use this guide as your ONLY study resource for the exams.

Important Note: All problems and diagrams presented here were extracted from Cengel, Yunus, et al. Thermodynamics: An Engineering Approach. Available from: Yuzu Reader, (9th Edition). McGraw-Hill Higher Education (US), 2018.

2.12 In a hydroelectric power plant, 65 m3/s of water flows from an elevation of 90 m to a turbine, where electric power is generated. The overall efficiency of the turbine–generator is 84 percent. Disregarding frictional losses in piping, estimate the electric power output of this plant.

3–29E One pound-mass of water fills a container whose volume is 2 ft3. The pressure in the container is 100 psia. Calculate the total internal energy and enthalpy in the container.

3–78 A rigid tank whose volume is unknown is divided into two parts by a partition. One side of the tank contains an ideal gas at 927°C. The other side is evacuated and has a volume twice the size of the part containing the gas. The partition is now removed and the gas expands to fill the entire tank. Heat is now transferred to the gas until the pressure equals the initial pressure. Determine the final temperature of the gas.

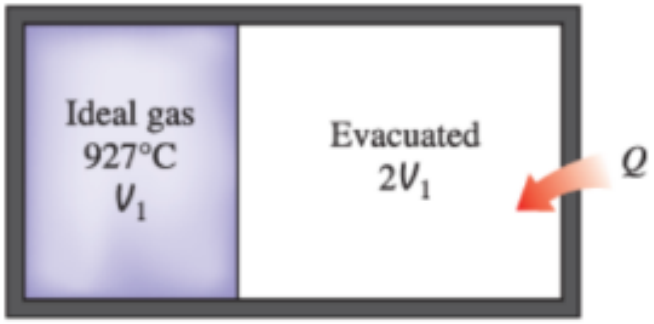

FIGURE P3–78

3–117 One kilogram of R-134a fills a 0.090-m3 rigid container at an initial temperature of -40°C. The container is then heated until the pressure is 280 kPa. Determine the initial pressure and final temperature.

3–121 A 10-kg mass of superheated refrigerant-134a at 1.2 MPa and 70°C is cooled at constant pressure until it exists as a compressed liquid at 20°C. Determine the change in volume and find the change in total internal energy.