

First law of thermodynamics

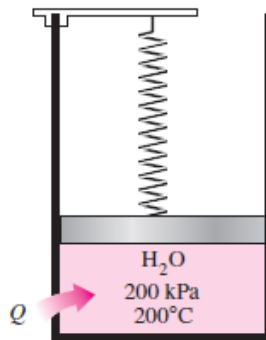
the report must contain the following items:

- 1- Types of the systems in detail.
- 2- Application of first law of thermodynamics for open system
- 3- Comparison between open and closed systems
- 4- Case study
- 5- Discussion of the results
- 6- Conclusions
- 7- References

Case study

Choose one of the following cases

- 1- A piston–cylinder device initially contains steam at 200 kPa, 200°C, and 0.5 m³. At this state, a linear spring is touching the piston but exerts no force on it. Heat is now slowly transferred to the steam, causing the pressure and the volume to rise to 500 kPa and 0.6 m³, respectively. Show the process on a P-v diagram with respect to saturation lines and determine (a) the final temperature, (b) the work done by the steam, and (c) the total heat transferred.



- 2- An adiabatic air compressor is to be powered by a direct-coupled adiabatic steam turbine that is also driving a generator. Steam enters the turbine at 12.5 MPa and 500°C at a rate of 25 kg/s and exits at 10 kPa and a quality of 0.92. Air enters the compressor at 98 kPa and 295 K at a rate of 10 kg/s and exits at 1 MPa and 620 K. Determine the net power delivered to the generator by the turbine.

