

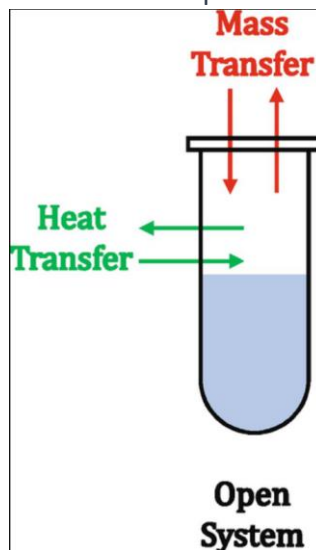
Assignment 1 (Introduction and Basic Concepts)

1. Define a thermodynamic system. Differentiate (by drawing) between open system, closed system and an isolated system.

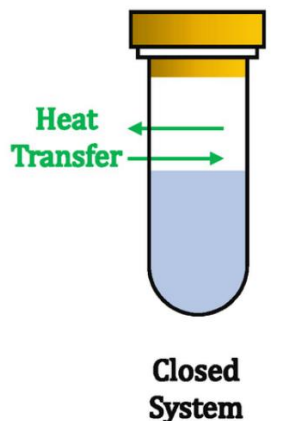
A thermodynamic system is a defined portion of matter or a region in space that is being studied and analysed in thermodynamics. A thermodynamic system can be defined in many ways, such as by its boundaries, its contents, or the processes that occur within it.

A thermodynamic system can be defined as open, closed, or isolated depending on how it interacts with its surroundings.

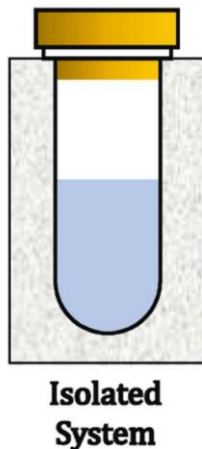
- An open system can exchange both matter and energy with its surroundings. A common example of an open system is a heat exchanger.



- A closed system can exchange energy but not matter with its surroundings. A common example of a closed system is a sealed container.



- An isolated system cannot exchange matter or energy with its surroundings. It is completely sealed and can only interact with itself.



2. **What is the different between intensive and extensive properties? list some properties of a thermodynamic system and state to which type they belong.**

Intensive properties are properties of a thermodynamic system that do not depend on the amount of substance present, such as temperature, pressure, and density.

Extensive properties are properties of a thermodynamic system that do depend on the amount of substance present, such as mass, volume, and internal energy.

Some examples of thermodynamic properties and their type are:

- Temperature: Intensive
- Pressure: Intensive
- Volume: Extensive
- Mass: Extensive
- Internal energy: Extensive

3. **Explain the Quasi-equilibrium process? What is its importance in engineering?**

A Quasi equilibrium process is a process in which the system is not in true thermodynamic equilibrium but is considered to be in equilibrium for a specific purpose. In other words, it is a process in which the system is not in a state of maximum entropy, but the changes in the system are slow enough that the system can be considered to be in equilibrium for practical purposes. Quasi equilibrium process is important in engineering because it allows for the simplification of complex systems and the prediction of the behaviour of systems that are not in true equilibrium.

4. **Define the isothermal, isobaric, and isochoric processes.**

The isothermal process is a process that occurs at a constant temperature. The isobaric process is a process that occurs at a constant pressure. The isochoric process is a process that occurs at a constant volume.

5. **Explain the Zeroth law of thermodynamic?**

The Zeroth law of thermodynamics states that if two systems are in thermal equilibrium with a third system, then they are in thermal equilibrium with each other. It is used as the foundation for the definition of temperature and establishes a reference for temperature measurement. The Zeroth law allows for the comparison of temperatures of different bodies, and it is essential for the understanding of the first, second, and third laws of thermodynamics. It is obvious to us today, but a hundred years ago when the concept of 'temperature' was still new this was a law of thermodynamics that was fundamental.