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THERMODYNAMICS 1ST SUMMARY

THERMODYNAMICS I

Thermodynamics is the science relating heat and work with other forms of energy.

Thermodynamics comes from two Greek words, *therme* meaning heat and *dynamis* meaning power, hence thermodynamics was primarily concerned with the conversion of heat to power. Nowadays, it is also related to the conversions between other forms of energy based on the principle of conservation of energy.

You might probably have looked around you and noticed many **systems** such as refrigerators, air conditioners, generators, automobiles, cookers, cooking pots etc, and wondered what is behind their operations and what form of **energy** exchange take place. Thermodynamics is here to explain all of these energy interactions responsible for such operations.

To understand the concept of thermodynamics, it becomes necessary to define some of its basic terms:

System

A system is a region in space containing matter within a specified boundary. System can be either open or closed. An open system exchange matter with its surrounding in addition to heat and work while a closed system exchange only heat and work. An example of an open system is a water tank (water flow being the matter that is exchanged) and that of a closed system is a cooking pot with a lid.

Boundary

A boundary is a surface separating a system from its surroundings. It can be real or imaginary, fixed or moving. A cooking pot has real and fixed boundary, whereas a waterflow has imaginary boundary.

Surrounding

This is the region in space outside the boundaries of a system that may facilitate energy exchange with the system. It is usually taken as the immediate vicinity of the system.

Process

The series of state changes undergone by a system from one equilibrium state to another.

Energy

Energy is the capacity of a substance to produce work.

Heat

It is a form of energy which exists between a system and its surrounding due to temperature difference.

Work

Work is a form of energy which occurs when a force acts over a displacement

Phase

The nature of a substance is referred to as its phase. There are three phases of matter: solid, liquid and gas.

State

The state of a substance are the set of properties which define the system.
For example, air at 4bar, 330k and 0.002m³/kg.

Property

Property is the characteristics of a system that can be measured. Such characteristics include pressure, temperature, specific volume, entropy, etc.

Further reading

1. Engineering Thermodynamics by *Tarik Al-Shemmeri*
2. Thermodynamics: An Engineering Approach by *Yunus A. Çengel* 7th ed.

Summary by:

