THERMODYNAMICS IN CYCLES

A thermodynamic cycle is a sequence of processes that begins and ends at the same state. Cycles that are repeated periodically play prominent roles in many areas of application e.g. steam circulating through an electrical power plant. There are many important practical applications involving power generation, vehicle propulsion, and refrigeration for which an understanding of thermodynamic cycles is essential.

CYCLE ENERGY BALANCE

The energy balance for any system undergoing a thermodynamic cycle takes the form

Since the system is returned to its initial state after the cycle, there is no net change in it energy. Therefore,

This condition must be satisfied for every thermodynamic cycle

POWER CYCLE

A power cycle delivers a net work transfer of energy to their surroundings during each cycle. The net work output from a power cycle can be expressed mathematically as

Heat transfer of energy into the system from a hot body must be greater than the heat transfer out of the system to be cold body for a power cycle.

The energy supplied by heat transfer to a system undergoing power cycle is normally derived from the combustion fuel, a moderated nuclear reaction or solar radiation.

REFRIGERATION AND HEAT PUMP CYCLES

For cycles of this type Q\_in is transferred from a cold system into the system while Q\_out is discharged from the system into a hot body

This requires a net work input and all quantities are related by the energy balance which for refrigeration and heat pump cycles takes the form

The objective of a refrigeration cycle is to cool a refrigerated space or to maintain the temperature within a dwelling or other building below that of the surrounding

For refrigeration cycle.

Coefficient of Performance is used to measur the performance of a refrigeration cycle

The objective of a heat pump cycle is to maintain the temperature within a dwelling or other building above that of the surrounding.

For heat pump cycle,