tendency indicates the absence of any driving force
⇒ A system at equilibrium is one at which all
forces are in exact balance.

$$\text{Rate} \propto \frac{\text{Driving Force}}{\text{Resistance}}$$

The point at which the driving force is zero is the point of equilibrium.

REVERSIBLE PROCESS :-

A process is reversible when its direction can be reversed at any time by an infinitesimal change in external condition. eg :- expansion of a gas in a piston cylinder arrangement.
If there is no friction inside the cylinder, then there is no energy expanded or liberated.

$$w = -\int_{V_1}^{V_2} P\,dv \quad \text{(for reversible process)}$$

CAPACITY :-

Heat capacity of the substance is defined as the ability of the substance to store heat.

SPECIFIC HEAT CAPACITY :-

It is defined as the ability of the substance to store heat per unit change in temperature per unit mass. Heat capacity in general, represented by the symbol $C = \frac{dQ}{dT}$. Heat capacity is a path function, it depends on the path.

CONSTANT VOLUME & CONSTANT PRESSURE FOR 1st LAW OF THERMODYNAMICS :-

1st Law of thermodynamics

For a closed system,

22/9/15

4. SECOND LAW OF THERMODYNAMICS

1 STATEMENTS :-

* No apparatus can operate in such a way that it's only effect (in system & surrounding) is to convert, heat absorbed by a system completely into work.
* No process is possible which consists solely in the transfer of heat from one temperature level to higher one.
* It is impossible by a cyclic process to convert the heat absorbed by a system completely into work.

HEAT ENGINE :-

Heat engine is a device or machine that produces work from heat in a cyclic process. e.g. steam power plant.

4 steps in steam power plant :-

* Liquid water approximately at ambient temperature is pumped into the boiler.
* Heat from a fuel is transferred (heat of combustion from a fossil fuel or heat from a nuclear reaction) in the boiler to water converting it into steam at higher temperature and pressure.
* Energy is transferred as shaft work from a steam to the surrounding by a device such as a turbine.
* Exhaust steam from a turbine is condensed by the transfer of heat to cooling water thus

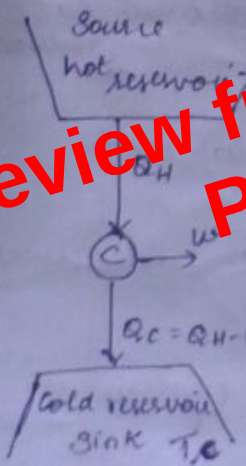
: efficiency usually is 60%.

CARNOT'S ENGINE:-

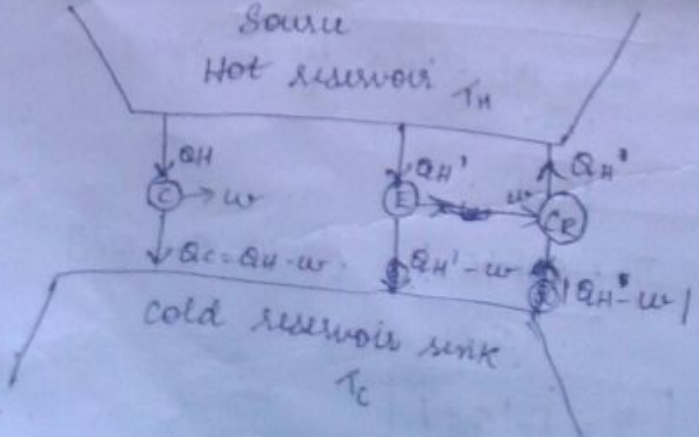
A heat engine operating in a completely reversible manner is called a Carnott's engine. Discovered by N.L.S. Carnott in 1824. A carnott engine operates between two heat reservoir in such a way that all heat absorbed is ~~absorbed~~ absorbed at the constant temperature of the hot reservoir and all heat rejected is at the constant temperature of the cold reservoir. Any reversible engine operating between two reservoir engine is an carnott's engine.

CARNOTT THEOREM:-

Carnott theorem states that, for two given heat reservoirs, no engine can have a higher thermal efficiency than a Carnott engine.



Q_H - heat absorbed
T_H - Temperature in hot reservoir



Efficiency:-

$\eta_C = \frac{|w|}{Q_H}$

$\eta_E = \frac{|w|}{|E_H|}$