

# **HEAT TRANSFER BY NEGI SIR**

# Basic Concepts

## Difference b/w Thermodynamics & Heat transfer



1000°C → 25°C

$m = 1000 \text{ kg}, c = 450 \text{ J/kg-K}$

Heat transfer

20°C

$Q = mc \Delta T_{1-2}$

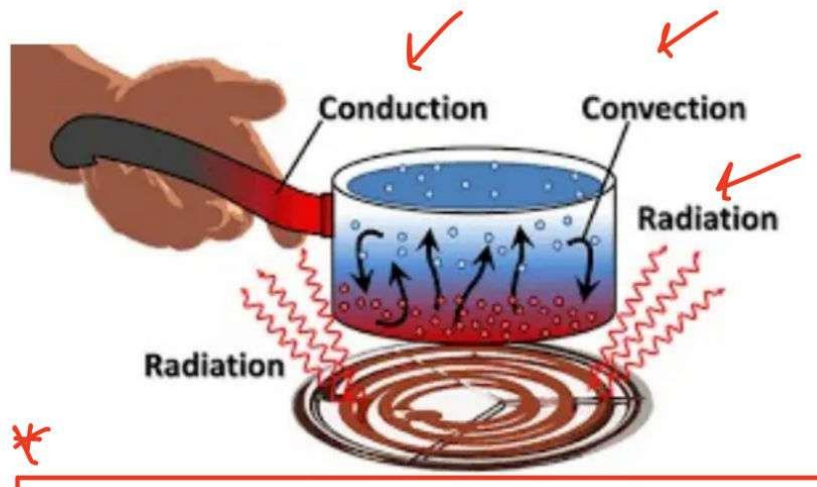
$Q = mc (T_2 - T_1)$

$Q = 1000 \times 450 \times (25 - 1000)$

$Q = -438750 \text{ kJ}$  Rejected/Lost

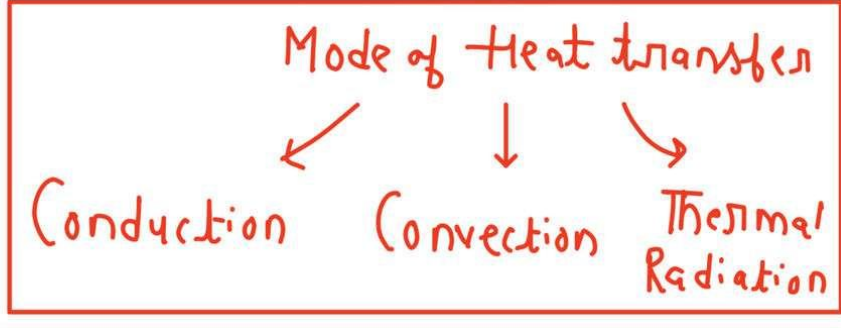
J or kJ

$\dot{Q}$

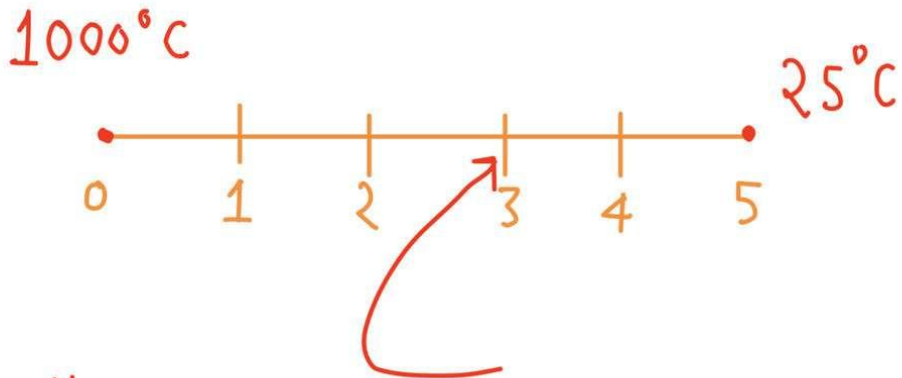


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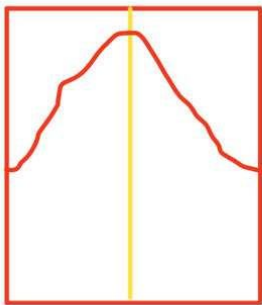
Rate of Heat transfer/  
Heat transfer rate/  
Heat Flow rate



$1000^{\circ}\text{C} \xrightarrow{5\text{hrs}} 25^{\circ}\text{C}$



\* Temperature after certain length of time



\* Temperature Distribution

\* Thermodynamics Subject

Heat transfer ( $Q$ )  $\rightarrow$  J or kJ

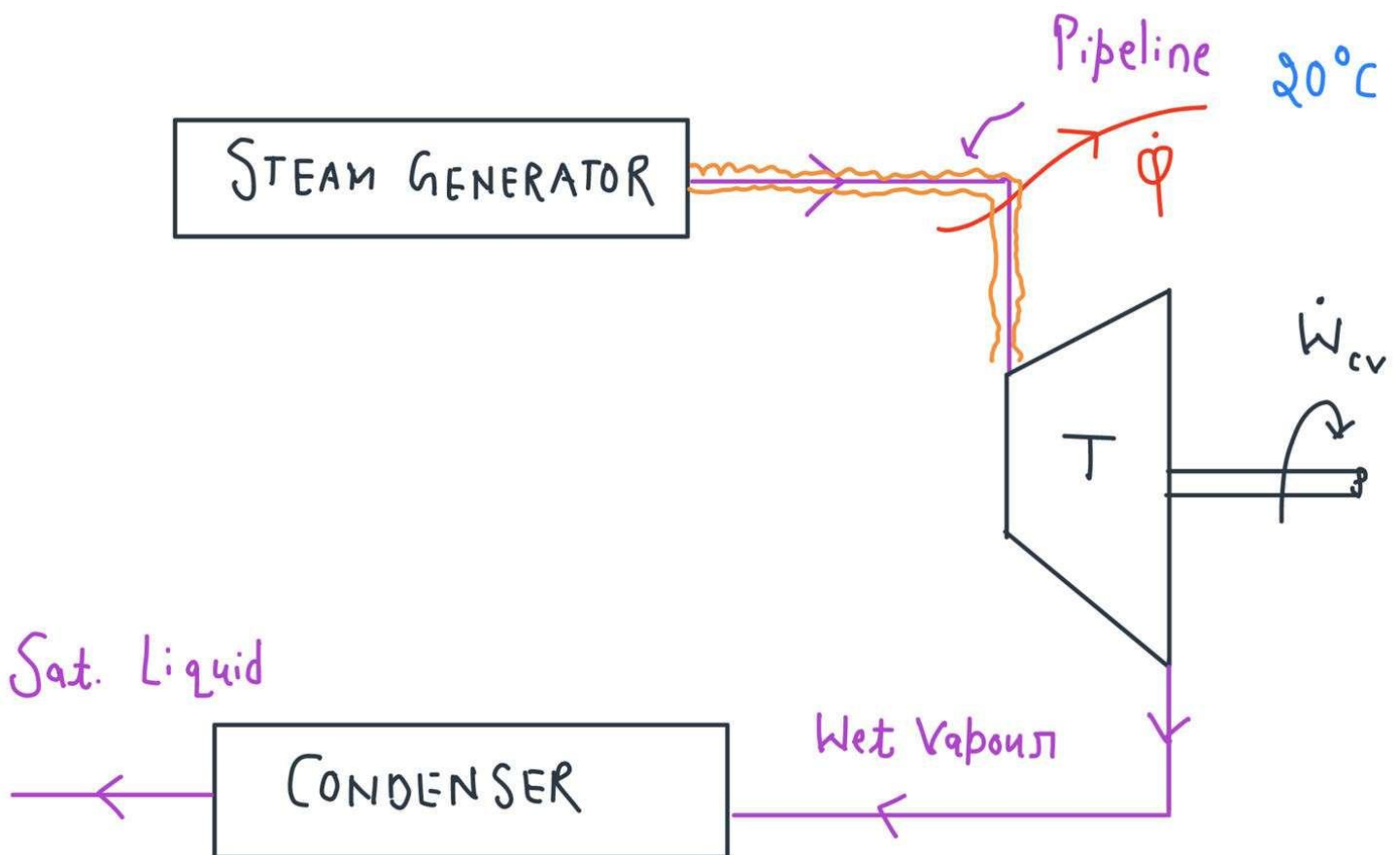
Heat transfer Subject

Rate of heat transfer ( $\dot{Q}$ )  $\rightarrow$  W or kW

- Whenever two systems at **different temperatures** are brought into contact, **heat transfer** takes place.
- Thermodynamics subject deals with the **amount of heat transfer from one equilibrium state to another equilibrium state.**
- Units of heat transfer used in thermodynamics are **Joule (or) Kilojoule.**

Heat transfer subject deals with,

- Rate of heat transfer or heat flow rate
- Mode of heat transfer (conduction, convection, thermal radiation).
- Temperature after certain length of time before the equilibrium is achieved.
- Temperature distribution within the body.
- The units of heat flow rate used in heat transfer subject are Watt (or) Kilowatt.



## Practical applications of heat transfer related to Mechanical engineering



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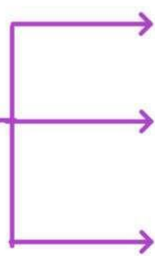
- Calculation of **thickness of insulation**, for the pipes carrying steam from steam generator to steam turbine.
- Designing of **condenser**.
- Designing of **furnaces used for heat treatment processes** such as annealing, normalizing and tempering etc.
- Designing of **cooling fan**, for various transistors mounted over electronic chip.

## Content

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2. Conduction



Cartesian Coordinates

Cylindrical Coordinates

Spherical Coordinates

3. Fins

4. Heat Exchangers