# SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35**

**An Autonomous Institution**

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Redesigning Common Minds & Business Towards Excellence

Build an Entrepreneurial Mindset Through Our Design Thinking FrameWork

## DEPARTMENT OF MECHANICAL ENGINEERING

# Modes of Heat Transfer

**K.Prakash/Mech/SNSCT**

# Modes of Heat Transfer

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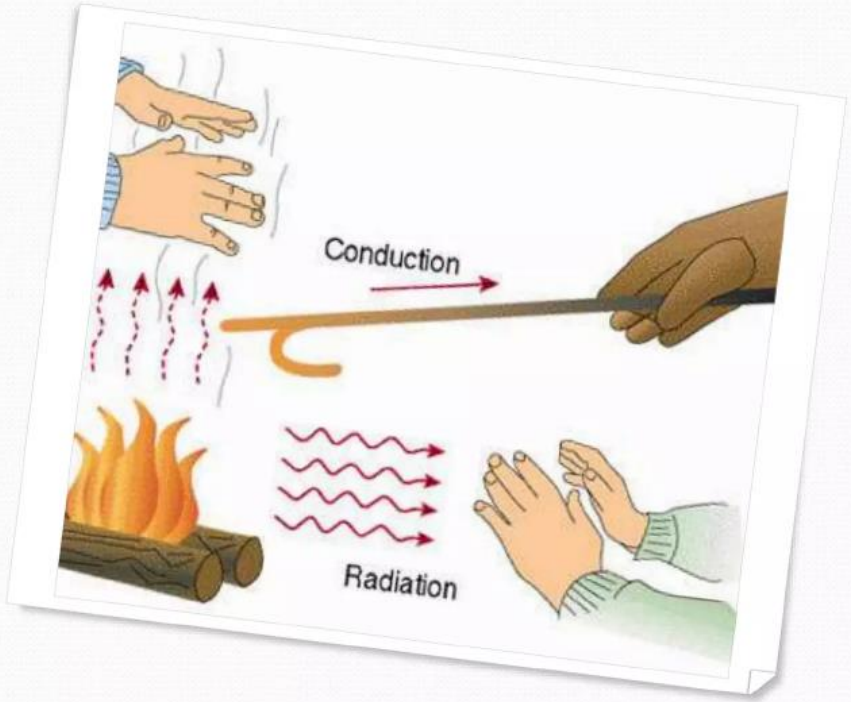
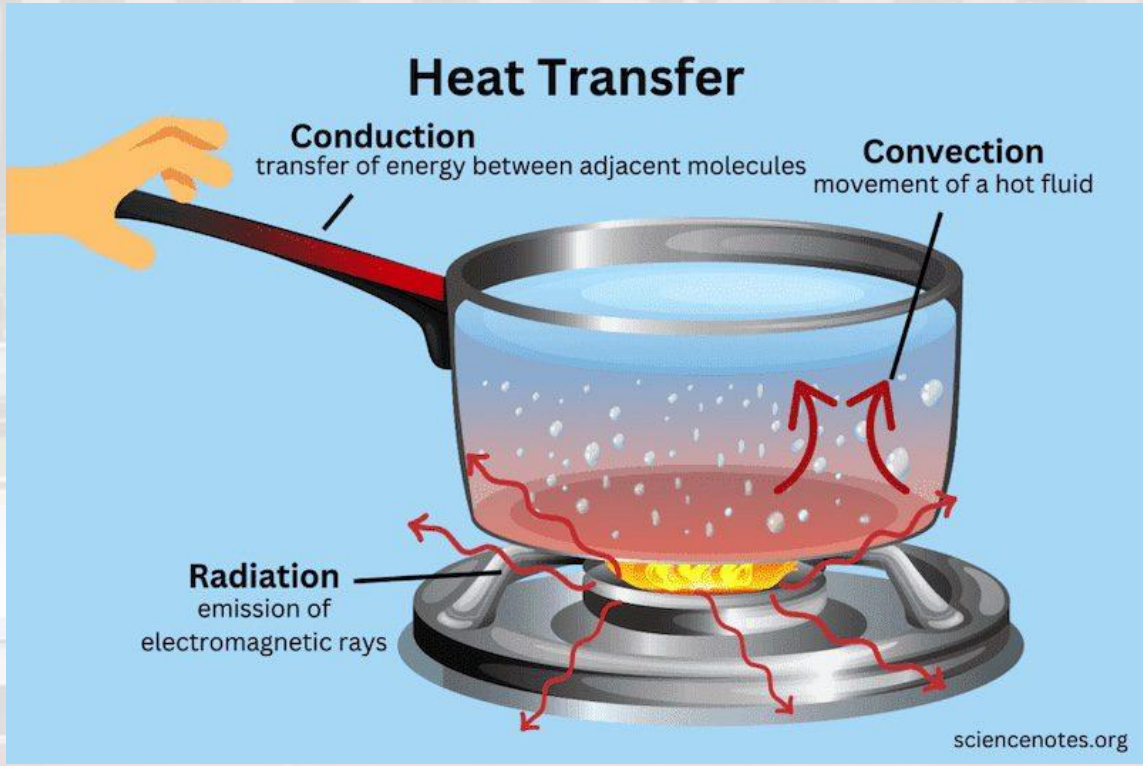
Modes

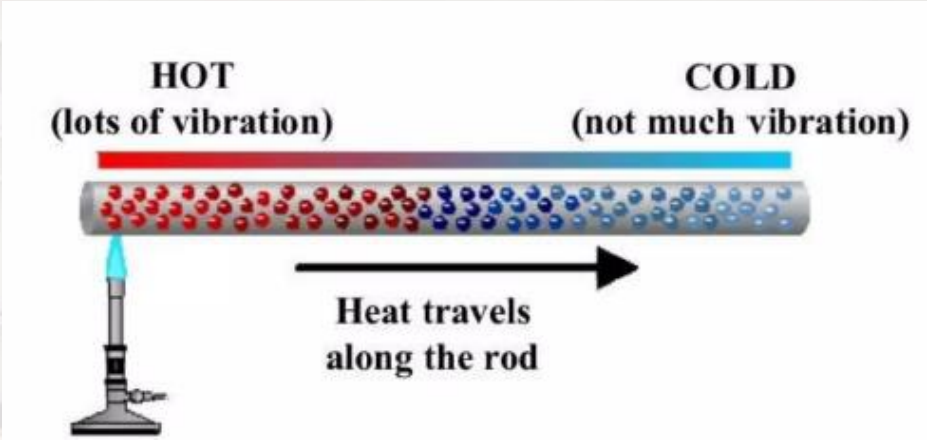
Conduction
Convection
Radiation

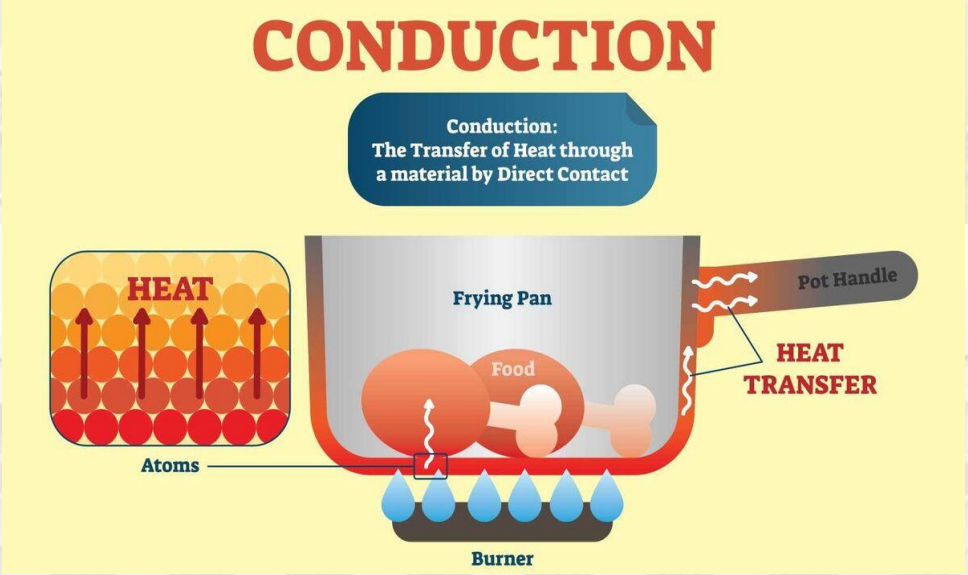


# CONDUCTION

- Conduction heat transfer is the process of transferring thermal energy between two objects that are in direct contact.
- It occurs when heat moves from a hotter region to a colder region
- It happens within solid, liquid, or gas mediums, or between different mediums that touch each other



# CONDUCTION

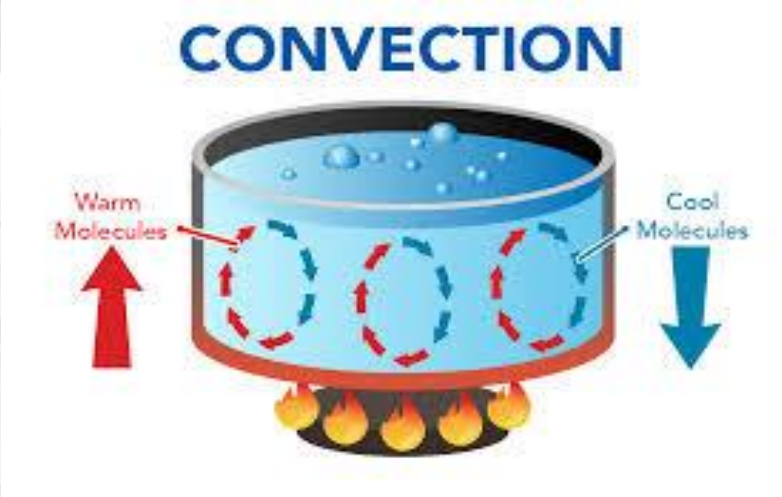
- Conduction is  mode of heat transfer that requires a medium
- It takes all three states of matter.
- Dominant in Solids
- Heat energy transfers from one place to another through molecular vibrations in solids.
- These vibrations travels in form of heat waves of very high frequency.

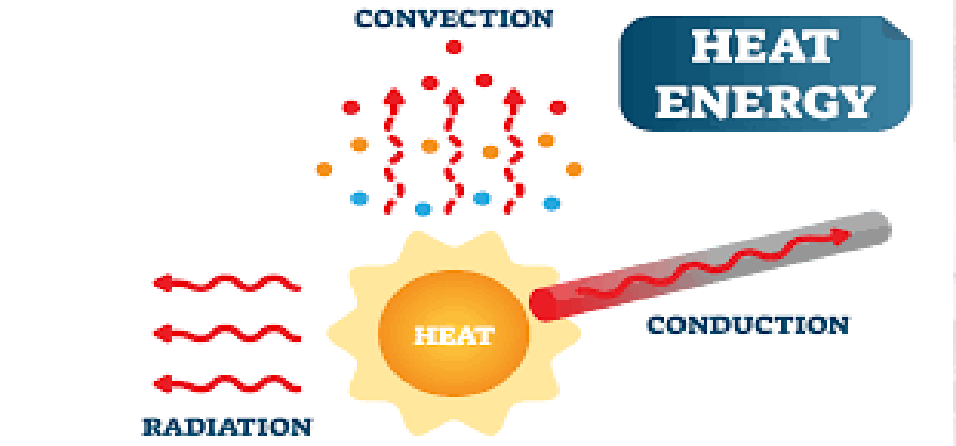
# Good & Bad Conductors of Heat

| Good conductors | Poor conductors (insulators) |
|---|---|
| Silver | Vacuum |
| Copper | Air |
| Aluminum | Styrofoam |
| Brass | Body fat |
| Iron | Cork |
| Lead | Water |
| Stainless Steel | Glass |

# CONVECTION

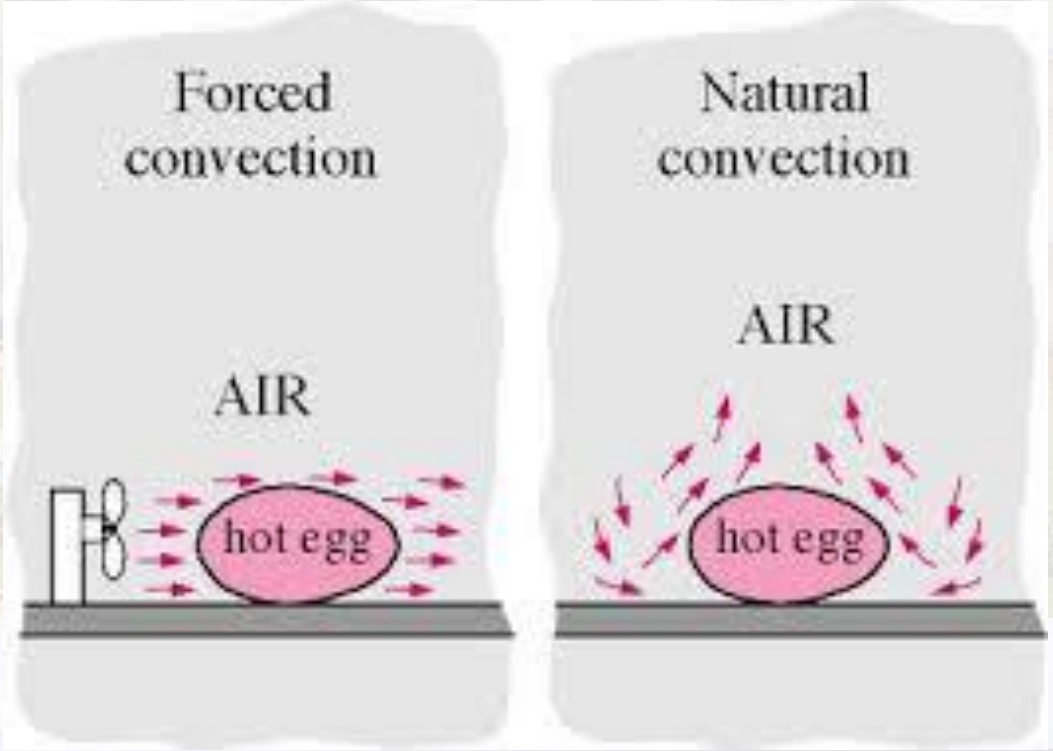
- Convection is a process of heat transfer that occurs through the movement of fluids (liquids or gases) due to density variations caused by temperature gradients.
- It plays a crucial role in various natural phenomena and engineering applications.



# CONVECTION

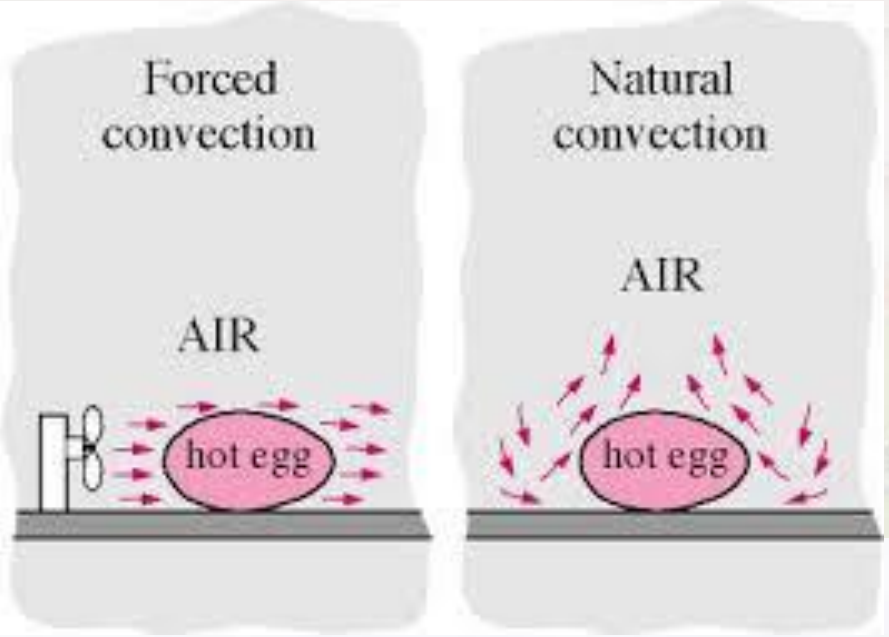
- **Natural convection:** This occurs when a fluid is heated, it becomes less dense and rises, while cooler, denser fluid sinks.
- This movement creates a circulating flow pattern known as convection currents.
- Natural convection is observed in phenomena such as the movement of air in a room heated by a radiator or the circulation of water in a pot placed on a stove.



# CONVECTION

**Forced convection:**

Convection occurs when a fluid is forced to move by an external means, such as a fan, pump, or wind.




Forced convection is commonly used in various engineering applications,

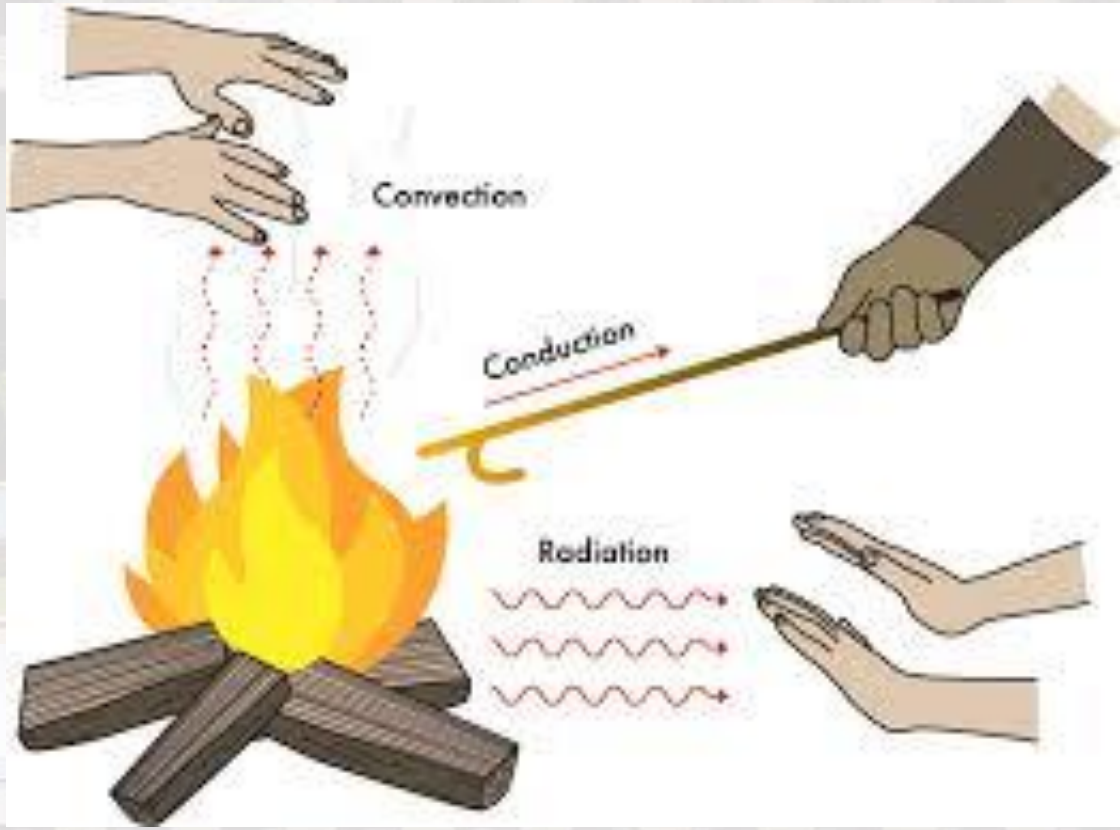
Cooling systems of electronic devices,

Heating and ventilation systems of buildings,

Industrial processes like chemical reactors and heat exchangers.

# RADIATION

- Radiation heat transfer is the process of heat energy being transferred through space by electromagnetic radiation.
- Electromagnetic radiation is made up of waves with different frequencies, which is the number of times an event occurs within a set time.



# RADIATION

- The heat transfer by radiation involves the emission, absorption, and transmission of electromagnetic waves, typically in the infrared region of the electromagnetic spectrum.
- All objects with a temperature above absolute zero (-273.15°C or 0 Kelvin) emit electromagnetic radiation.
- The intensity and spectrum of the emitted radiation depend on the temperature and properties of the object's surface.

# RADIATION

- Key characteristics of radiation heat transfer include:

1. **Emissivity:** This is a measure of how efficiently an object emits radiation compared to a blackbody (a theoretical object that absorbs all incident radiation). Emissivity varies depending on the material and surface properties of an object.

2. **Absorptivity:** This refers to the ability of an object to absorb incoming radiation. It is related to the object's emissivity and depends on factors such as surface texture and material composition.

3. **Transmissivity:** Some materials allow radiation to pass through them without being absorbed. Transmissivity refers to the ability of a material to transmit radiation.

Thank you