VESP Vision

To be the centre of excellence in the field of technical education.

Program Code:-Common to all 1st semester

Course Name:-Basic Science(Physics)

Course Code : - 22102

Course coordinator: Mrs. Deepa Gupte

Date: 12/09/2020

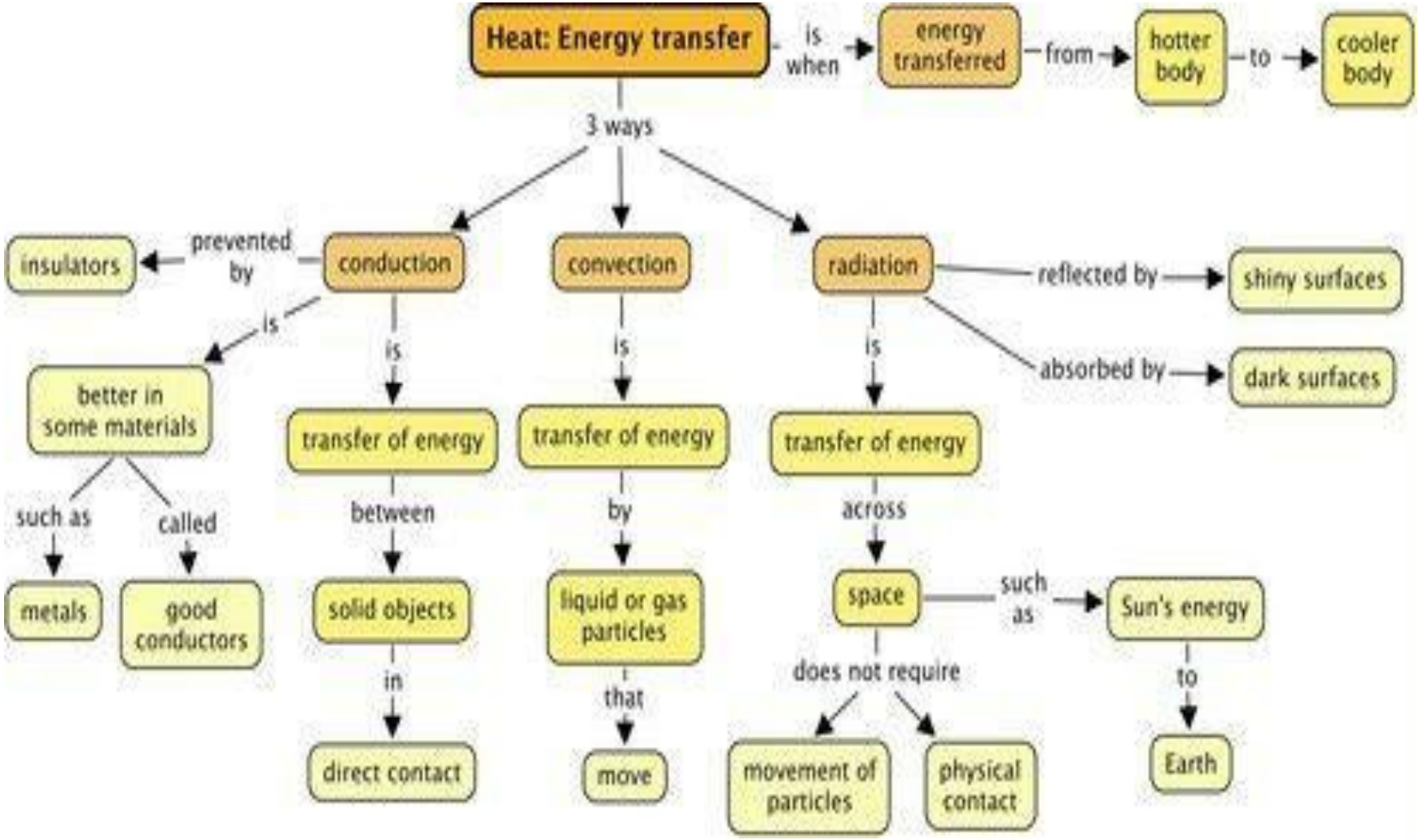
Unit No:3

Unit Name: Heat and Optics

Unit Outcomes(UO3d)Describe the properties of given good and bad conductors of heat ..

Learning Outcome (LO4) :Students will be able to describe the modes of transfer of heat and explain good and bad conductors of heat.

Concept Map


Heat: Energy transfer
is when
energy transferred
from
hotter body
to
cooler body
3 ways
conduction
convection
radiation
insulators
prevented by
is
better in some materials
such as
metals
called
good conductors
is
transfer of energy
between
solid objects
in
direct contact
is
transfer of energy
by
liquid or gas particles
that
move
is
transfer of energy
across
space
does not require
movement of particles
physical contact
reflected by
shiny surfaces
absorbed by
dark surfaces
such as
Sun's energy
to
Earth

Learning Objective/ Key learning

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- Students will be able describe the properties of given good and bad conductors.
- Students will be able to Students will be able to describe the modes of transfer of heat and explain good and bad conductors of heat.

Good conductor

Good conductor:-The material which allow heat to pass through them are called good conductor of heat.

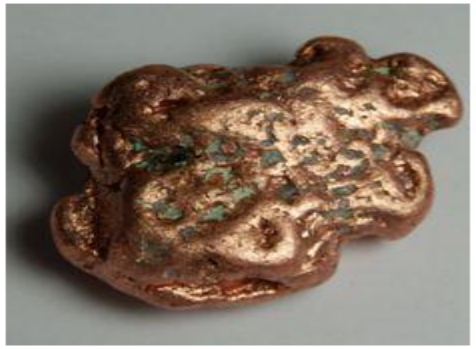
e.g. all metals are good conductors

Good conductor

Examples of conductors of heat:

Aluminum

Copper



Silver

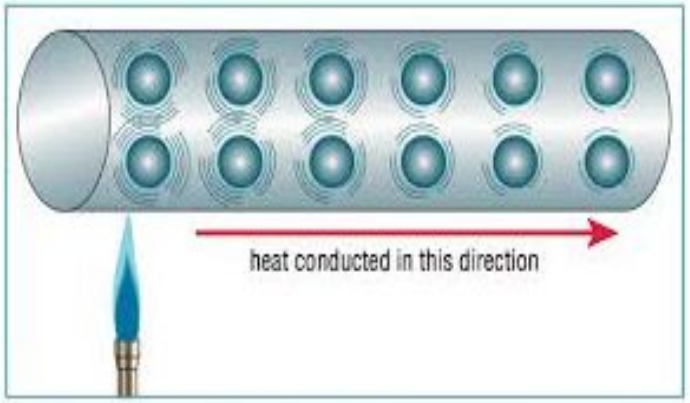
Bad conductor

Bad conductor:-The material which do not allow heat to pass through them are called bad conductors of heat

Bad conductor

Conduction

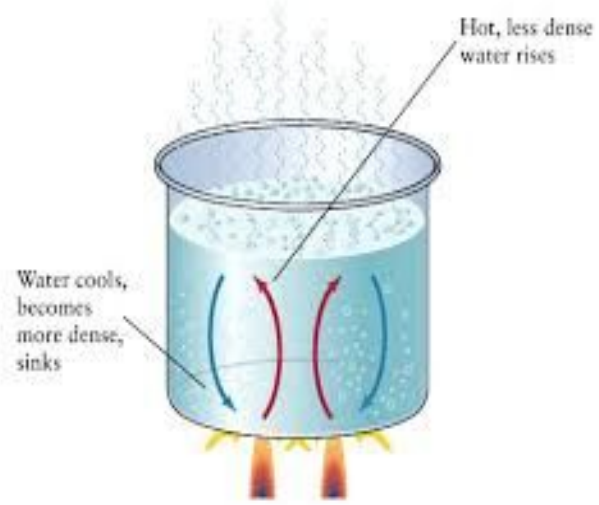
- **Conduction:-It is the mode of transmission of heat in which heat is transfer from high temperature to low temperature without migration of particle.**



Conduction—vibrations pass along from particle to particle away from the heat source.

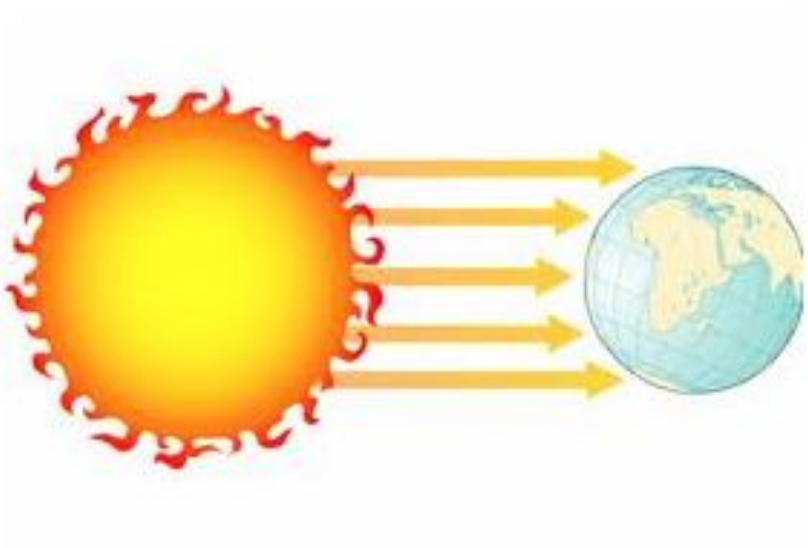
Convection

- Convection:-It is the mode of transmission of heat in which heat is transfer from high temperature to low temperature with migration of particle



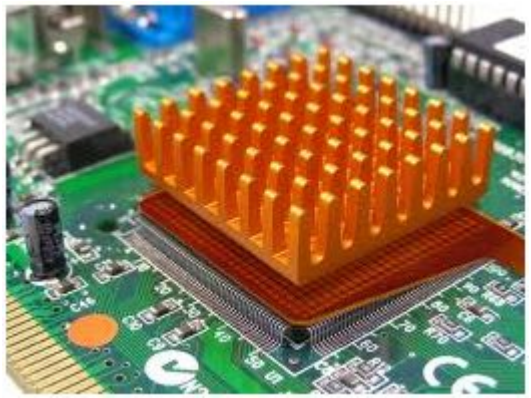
Radiation

- Radiation:-It is the mode of transmission of heat in the form of electromagnetic waves from a body at high temperature to a body at low temperature without heating the intervening medium



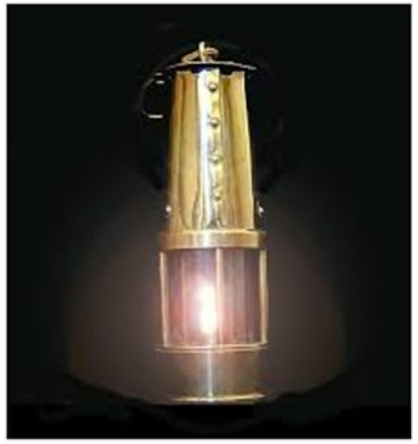
Applications of conduction

1.Good conducting material is used as a heat sink in electronic circuits.
2.Condenser coil in a refrigerator is ideally made up of copper.
3.Cooling of electrical machines by blowing hydrogen gas through machines cools machine speedily.



Applications of conduction

4.Davy's safety lamp. .'

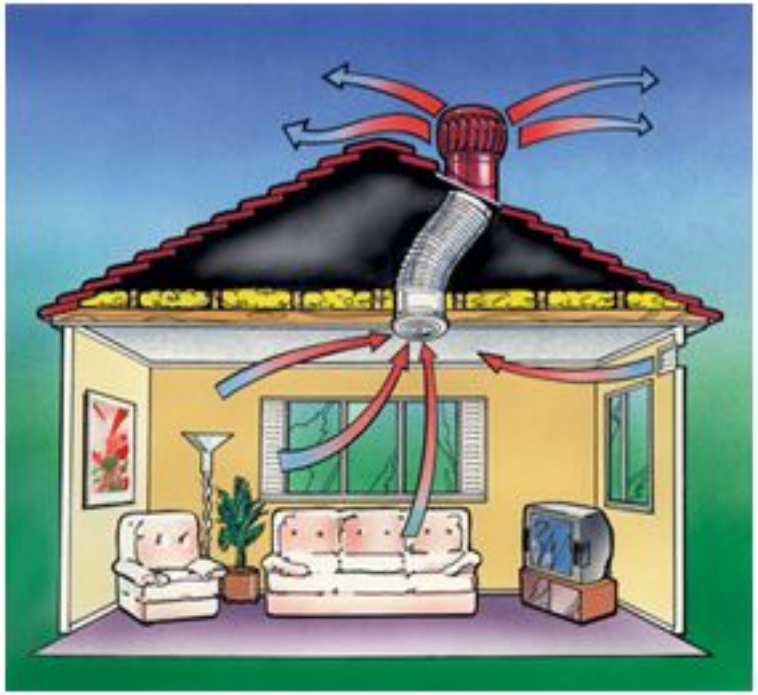


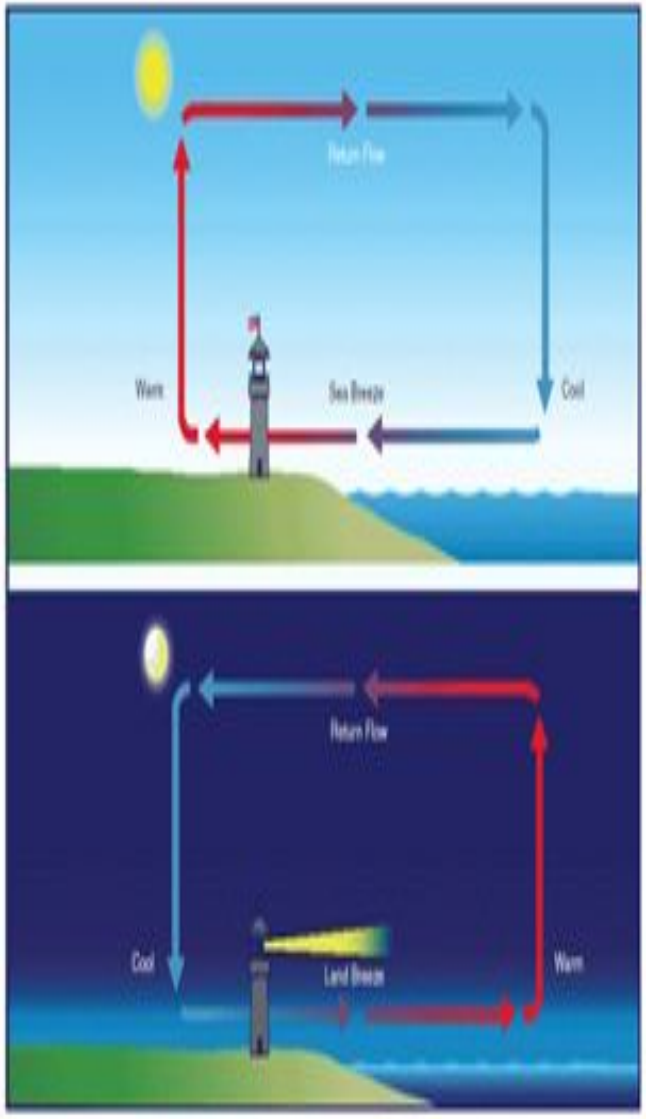
5.Spiral tube covering the coil of electric heater is made of good conductor.

Applications of convection

1. Room ventilation
2. Formation of trade winds
3. Formation of sea breeze and land breeze.
4. Gas filling coiled electric lamp.
5. Cooling system in automobile engines.

Applications of convection

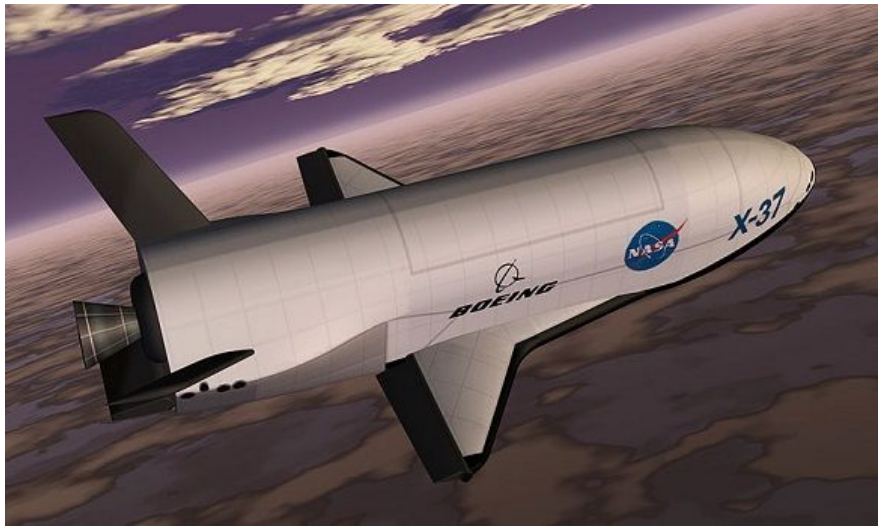




Applications of Radiation

1.Summer and Winter clothes
2.Blackened bottom utensils
3.Thermos flask
4.Bonefire or Electric lamp
5.Greenhouses
6.Plant growth

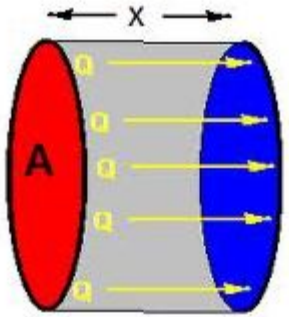
Applications of Radiation

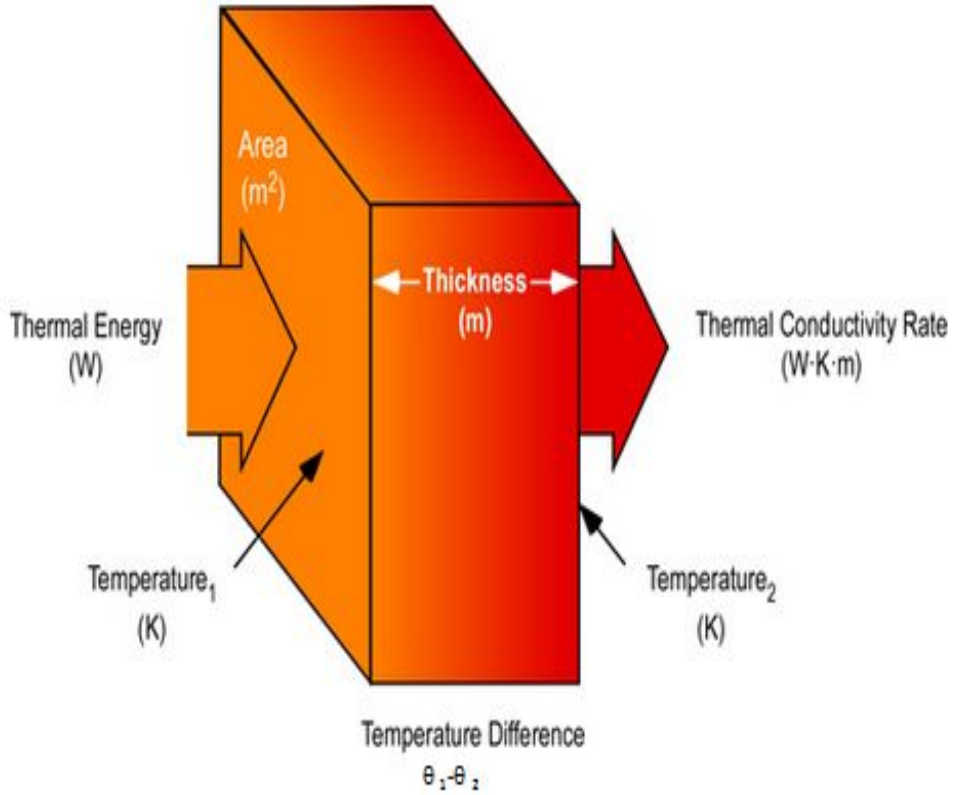


Thermal conductivity and coefficient of thermal conductivity:-

Suppose bar of metal of cross sectional area A, consider two planes in the bar
The amount of heat flows is directly proportional to
1.Cross-sectional area ‘A’ of rod.
2.Temperature difference.time ‘t’ in which heat flow
And inversely proportional to
1.distance(thickness) between them ‘d’

Thermal conductivity





Thermal conductivity

$Q \alpha A$
$Q \alpha (\theta 1 - \theta 2)$
$Q \alpha t$
$Q \alpha 1/d$
$Q \alpha A(\theta 1 - \theta 2)t/d$
$Q = KA(\theta 1 - \theta 2)t/d$
K-coefficient of thermal conductivity
When
A=1,
$\theta 1 - \theta 2 = 1, t = 1, d = 1$
$Q = K$

Thermal conductivity

Coefficient of thermal conductivity(K):-It is defined as the amount of heat conducted in one second,for unit temperature difference through unit cross-sectional area of an element material of unit thickness.

$K=Qd/A(\theta 1-\theta 2)t$

CGS unit of =cal cm/cm^2 ^{0} c sec=cal /cm°c sec

MKS -Kcal /m°c sec

SI unit:- J/m K sec=watt/m k