1.8 VENTILATION

Ventilation is the movement of air within a building and between the building and the outdoor. The removal of all vitiated air from a building and its replacement with fresh air is known as ventilation.

Factors Affecting Ventilation

Following factors affect the ventilation from the view point of comfort to the persons and therefore should be considered carefully:

1. Air changes
2. Humidity
3. Quality of air
4. Temperature
5. Use of building.

Types of ventilation

i)Natural ventilation

ii)Mechanical or artificial ventilation

PRINCIPLES OF NATURAL VENTILATION

1.Natural ventilation

Natural ventilation is the process of supplying air to and removing air from an indoor space using mechanical systems.

- The location, size and type of windows play a great role in imparting natural ventilation to the room
- The efficiency of roof ventilators depends on their location, wind direction and height of building.
- The window ventilation with a combination of radiator, deflector and exhaust can give better results.
- The radiators are situated below the still level of the windows and they extend for the full length of the window.
- The exhaust duct is provided near the ceiling of the opposite wall.
- The windows open from bottom and the deflectors may be of curved vanes.

• The velocity of wind creates pressure differences between inside & outside surfaces of a room.

• The rate of air change in a room mainly depends on the designing of the opening, location of inlet and outlet and the difference in temperature between the inside and outside air.

• The natural ventilation when inlets are at the bottom and roof ventilator is at the top.

• Cross ventilation is used to indicate the position of outlets just opposite to inlets

Natural ventilation depends on the direction of wind and it is very difficult to control the entry of air containing smoke, dust. To keep control over the quantity, velocity and temperature of the incoming air is also not very easy.
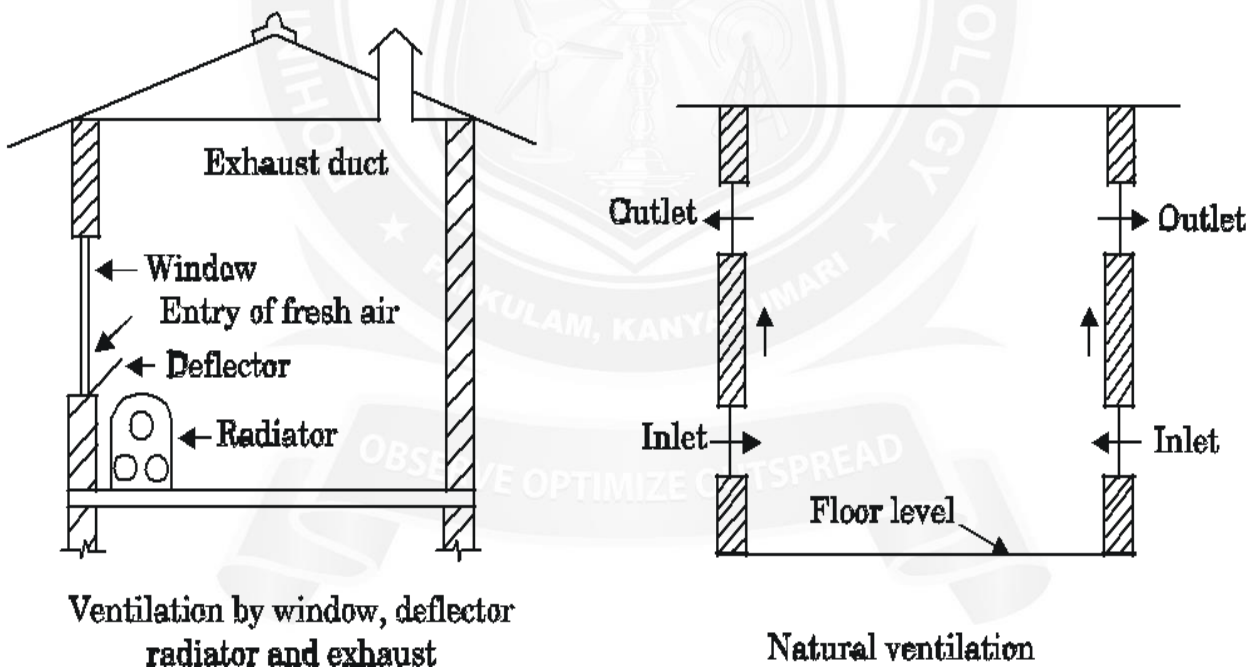
Figure: 1.8.1 a) Ventilation by window, deflector radiator and exhaust

b) Natural ventilation

2.Mechanical or Artificial ventilation

Mechanical arrangement is adopted to provide enough ventilation to the room. There are five methods of the mechanical ventilation

- Exhaust system
- Supply system
- Combination of exhaust and supply system
- Plenum process
- Air-conditioning

VENTILATION MEASUREMENTS

Natural or passive ventilation occurs because of wind and thermal forces which produce a flow of outdoor air through the various openings in a building. The flow of outdoor air through operable windows, doors, and other controllable openings can be effectively used for both temperature and contaminant control. Temperature control by natural ventilation conserves energy and is particularly effective in mild climates. The arrangement, location, and control of ventilating openings can be designed to take into consideration the driving forces of wind and temperature.

The types of openings include:

Windows, doors, and skylights,roof ventilators.Specially designed inlet or outlet openings

Determining and Designing of Ventilation

Natural Ventilation

This is difficult to measure as it varies from time to time. The amount of outside air through windows and other openings depends on the direction and velocity of wind outside (wind action) and/or convection effects arising from temperature or vapour pressure differences (or both) between inside and outside of the building (stack effect)

Stack Effect

Ventilation due to convection effects arising from temperature difference between inside and outside. Natural ventilation by stack effect occurs when air inside a building is at a different temperature than air outside. Thus in heated buildings or in buildings where in hot processes are carried on and in ordinary buildings during summer nights and during pre-monsoon period, the inside temperatures higher than that of outside, cool outside air will tend to enter through openings at low level and warm air will tend to leave through openings at high level.