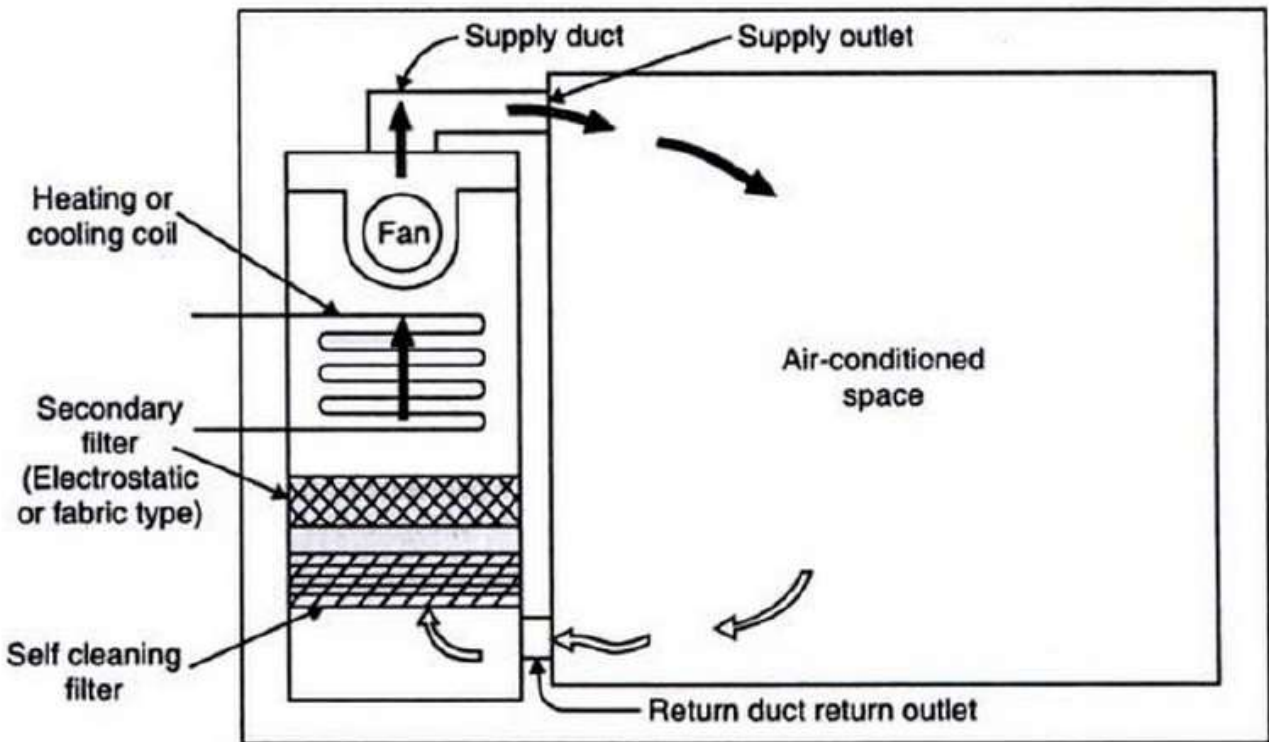


## 2.3 AIR-CONDITIONING

Nowadays the air conditioning system is widely used in both domestic and commercial environments. Air cooling or air conditioning is the process of removing heat and moisture from inside the occupied space, to improve the comfort of occupants. This process is most commonly used to achieve a more comfortable interior environment, typically for humans. The definition of air-conditioning is, A system for controlling the humidity, ventilation and temperature in a building or vehicle, typically to maintain a cool atmosphere in warm conditions. While air conditioners can differ from model to model, they are available in any range from small units that can cool a small bedroom to massive units installed on the roof of office towers that can cool an entire building.



**Figure 2.3.1 Air-conditioning cycle**

[Source: "Utilisation of Electrical Power" by R. K. Rajput, Page: 174]

### Equipment Used in an Air Conditioning System

Following are the main equipment or parts used in an air conditioning system:

1. **Circulation fan:** The main function of this fan is to move air to and from the room.
2. **Air conditioning unit:** It is a unit, which consists of cooling and dehumidifying processes for summer air conditioning or heating and humidification processes for winter air conditioning.

3. **Supply duct:** it directs the conditioned air from the circulating fan to the space to be air-conditioned at the proper point.
4. **Supply outlets:** these are the grills, which distribute the conditioned air evenly in the room.
5. **Return outlets:** these are the openings in a room surface which allow the room air to enter the return duct.
6. **Filters:** The main function of the filters is to remove dust, "dirt and other harmful bacteria's form the air.

### **Air Conditioner Working Principle**

An air conditioner continuously draws the air from an indoor space to be cooled, cools it by the refrigeration principles and discharges back into the same indoor space that needs to be cooled. This continuous cyclic process of drawl, cooling and recalculation of the cooled air keep the indoor space cool at the required lower temperature needed for comfort cooling or industrial cooling purpose. When you switch the air conditioner on, the thermostat control sends 120V of alternating current to the compressor and the fan motor. The compressor act as a pump compressing the refrigerant in gas form into the condenser coils. Located the back of the unit. Where the gas is condensed into a hot liquid. The condenser coils dissipate the heat as the liquid travels through them. Once the liquid refrigerant has passed through the condenser coils and the capillary tube where it undergoes expansion. The liquid refrigerant passes through the evaporator coils. it travels to the evaporator coils located near the front of the unit. As the refrigerant liquid enters these coils it expands into a gas which makes the coils cold. The gas flows through the coils to a suction line, attached to the compressor converts the gas back into a liquid and the cooling cycle continues. At the same time, the fan motor rotates a blower wheel which draws in air to be cooled by the evaporator coils before recirculating it back into the room. It also operates the condenser fan blade which blows outside air through the condenser coils to cool them. The air temperature is regulated by the thermostat control depending on the model. The control may be a thermostat switch and sensing bulb assembly or electronic control board that works with a sensor. The sensing bulb or electronic sensor is clipped to the front of the evaporator coils to monitor the temperature of the air entering the coils. Once the room has sufficiently cooled the thermostat control shuts off the

voltage to the compressor. Some models which use event can operate the fan motor only to draw in cool air at night. However, when the appliance is actively cooling the air the vent must be closed for the system to work properly. A slinger ring on the condenser fan blade picks up collected water at the bottom and sprays it on to the condenser coils to help the coils dissipate the heat. To prevent the water from dripping into the room the appliance should be tilted back slightly when they installed.

