Introduction to Air-Conditioning Processes

As mentioned earlier, the term "Air-Conditioning" when properly used, now means the total control of temperature, moisture in the air, supply of outside air for ventilation, filtration of airborne particles, and air movement in the occupied space. There are seven main processes required to achieve full air conditioning and they are listed and explained below:

1. **Heating**—the process of adding thermal energy (heat) to the conditioned space for the purposes of raising or maintaining the temperature of the space.
2. **Cooling**—the process of removing thermal energy (heat) from the conditioned space for the purposes of lowering or maintaining the temperature of the space.
3. **Humidifying**—the process of adding water vapor (moisture) to the air in the conditioned space for the purposes of raising or maintaining the moisture content of the air.
4. **Dehumidifying**—the process of removing water vapor (moisture) from the air in the conditioned space for the purposes of lowering or maintaining the moisture content of the air.
5. **Cleaning**—the process of removing particulates and biological contaminants from the air delivered to the conditioned space for the purposes of improving or maintaining the air quality.
6. **Ventilating**—the process of exchanging air between the outdoors and the conditioned space for the purposes of diluting the gaseous contaminants in the air and improving or maintaining air quality, composition and freshness. Ventilation can be achieved either through natural ventilation or mechanical ventilation. Natural ventilation is driven by natural draft, like when you open a window. Mechanical ventilation can be achieved by using fans to draw air in from outside or by fans that exhaust air from the space to outside.
7. **Air Movement**—the process of circulating and mixing air through conditioned spaces in the building for the purposes of achieving the proper ventilation and facilitating the thermal energy transfer.

The requirements and importance of the seven processes varies. In a climate that stays warm all year, heating may not be required at all. Conversely, in a cold climate the periods of heat in the summer may be so infrequent as to make cooling unnecessary. In a dry desert climate, dehumidification may be redundant, and in a hot, humid climate dehumidification may be the most important design aspect of the air-conditioning system.