FAQ’s

1. Explain the workflow of a Chilled water cycle with a diagram.

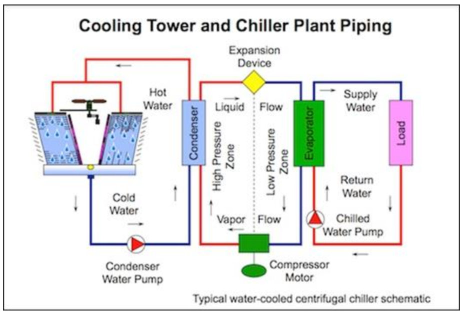
The chiller centralizes three heat exchanging cycles:

- the refrigeration cycle,
- the chilled water process, and
- cooling water process.

The chiller creates chilled water in a centralized building location that can be distributed for water usage and air conditioning purposes. The chiller is an all-in-one system that operates under the vapor compression cycle, using refrigerants as the working fluid. The chilled water loop transports water through the distribution network to supply the air handlers with cooling for air conditioning.

This water first enters a chiller evaporator where the low-pressure refrigerant is sprayed evenly over the surfaces of the tubes that contain the chilled water. The heat transfer process transfers the energy from the water to the refrigerant as the water passes through the evaporator.

After the water has travelled the length of the evaporator, the resulting chilled water is sent to designated destinations. The chilled water is distributed throughout the building via a piping network leading to each tenant space.



2. What are Air handling Units?

An air handler is a sheet metal box that contains a fan and a cooling coil with aluminium fins bonded to the copper tubing to increase the heat transfer area. Most chilled water air handlers contain a section called a mixing box which is a sheet metal section with two openings in it. There is a duct connected to each opening and a damper located within each opening.

The fan runs continuously, drawing a mix of outdoor air and return air through the air filters. The air is then cooled as it passes over cold coils. Chilled water flow to the cooling coil is controlled by a motorized valve. If the space temperature is at or below the setpoint of the thermostat, the motorized valve closes. If the thermostat is not satisfied, the motorized valve opens causing chilled water to flow through the coil.

3. **Describe in detail about Cooling water cycle and the function of cooling towers.**

The second water- based system uses a constant source of water to condense the refrigerant vapour called condenser water. The building maintains a cooling tower that is used to cool the condenser water and pumps that are used to circulate the water. In the vapour compression cycle when the refrigerant runs through the condenser, heat is rejected from the refrigerant to heat a separate flow of water. The heated water is then sent to the cooling tower to be cooled.

The refrigerant remains at the same pressure through the condenser but exits at a lower temperature and then flows through an expansion valve that lowers the pressure of the refrigerant causing it to evaporate. When the refrigerant evaporates, it draws heat from the warmer water in the evaporator, which cools the water. The temperature of the cooling water rises in the condenser as a result of the heat transfer from the condensing refrigerant.

Once the heated water exits the condenser, it is pumped to the cooling towers.

In the cooling tower, the cooling water is sent down the wet deck. Then, air is blown through the wet deck to evaporate a portion of the cooling water. The water that is not evaporated continues to flow down into the cold water basin. Makeup water is added to replace the evaporated water, and all of the fluid is then sent back to a centralized utility plant for reprocessing.

4. **Explain about any two types of Refrigerant control devices.**

Thermostatic expansion valve (TXV) - Maintains a constant evaporator superheat. If the evaporator superheat is high, the valve will open. Superheat ensures that no liquid refrigerant leaves the evaporator.

The capillary tube metering device - Controls refrigerant flow by the pressure drop across it. Diameter and length of the tube determine flow at a given pressure.

Does not maintain evaporator pressure or superheat. No moving parts to wear out.

5. **Explain the working principle of an Electric motor function with a brief description on the parts of the motor.**

A current-carrying coil in a magnetic field experiences a turning effect. When a current-carrying conductor is placed in a magnetic field, there is an interaction between the magnetic field produced by the current and the permanent field, which leads to a force being experienced by the conductor. The magnitude of the force on the conductor depends on the magnitude of the current which it carries. The force is a maximum when the current flows perpendicular to the field and it is zero when it flows parallel to the field.

Parts of the Motor are Armature or rotor, Commutator, Brushes, Axle and Field magnet. The armature is an electromagnet made by coiling thin wire around two or more poles of a metal core. The armature has an axle, and the commutator is attached to the axle. When you run electricity into this electromagnet, it creates a magnetic field in the armature that attracts and repels the magnets in the stator. So the armature spins through 180 degrees. To keep it spinning, you have to change the poles of the electromagnet.

Commutator is simply a pair of plates attached to the axle. These plates provide the two connections for the coil of the electromagnet. Commutator and brushes work together to let current flow to the electromagnet, and also to flip the contacts of the commutator are attached to the axle of the electromagnet, so they spin with the magnet. The brushes are just two pieces of springy metal or carbon that make contact with the contacts of the commutator.