23ME702 :REFRIGERATION AND AIR CONDITIONING

UNIT -1

Vapour compressor refrigeration

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- **Introduction to Refrigeration**
- **What is Refrigeration?**
- Refrigeration is the process of removing heat from a low-temperature space and transferring it to a higher-temperature surrounding.
- Used in refrigerators, air conditioners, cold storages, and food preservation.
- The most common refrigeration system is the Vapour Compression Refrigeration System (VCRS).

- **Definition of VCRS**
- **Vapour Compression Refrigeration System**
- A refrigeration system that uses a refrigerant circulating through compression, condensation, expansion, and evaporation processes.
- Operates on the principle of heat absorption and rejection.
- Widely used due to high efficiency and reliability.

- **Main Components of VCRS**
- **Components**
- Compressor
- Condenser
- Expansion Valve (Throttle Valve)
- Evaporator
- Refrigerant
- **Function:** These components work together to produce the refrigeration effect.

- **working Principle of Compressor**
- **Compressor**
- Compresses low-pressure refrigerant vapour.
- Increases pressure and temperature of refrigerant.
- Pumps refrigerant throughout the system.
- Known as the "heart" of the refrigeration system.
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- **Condenser and Expansion Valve**
- **Condenser**
- Rejects heat to surroundings.
- Converts high-pressure vapour into liquid refrigerant.
- **Expansion Valve**
- Reduces refrigerant pressure suddenly.
- Controls refrigerant flow into the evaporator.
- Causes a drop in temperature.

- **Evaporator and Refrigeration Effect**
- **Evaporator**
- Absorbs heat from the refrigerated space.
- Refrigerant evaporates into vapour.
- Produces the cooling effect.
- **Result:** Temperature of the space decreases.

- **Advantages and Applications**
- **Advantages**
- High COP (Coefficient of Performance)
- Compact size
- Reliable operation
- Suitable for a wide range of temperatures

- **VCRS Cycle Diagram**
- **Cycle Processes**
- Compression (1–2)
- Condensation (2–3)
- Expansion (3–4)
- Evaporation (4–1)
- Cycle Flow:
- Evaporator → Compressor → Condenser → Expansion Valve → Evaporator

Thank You..