# IC Engines

**I. C. Engines:** An Internal combustion engine more probably called as IC Engine, is a heat engine which converts heat energy released by the combustion of fuel taking place inside the engine cylinder into mechanical work. It has advantages such as high efficiency, light weight, compactness, easy starting, adaptability, suitability for mobile applications, comparatively lower initial cost has made its use as a prime mover.

**Classification of IC Engines:**

i. Nature of Thermodynamic cycle as:

1. Otto Cycle engine. 2. Diesel engine. 3. Dual combustion cycle engine.

ii. Type of Fuel used as:

1. Petrol Engine 2. Diesel engine. 3. Gas engine. 4. Bi-fuel engine.

iii. Number of strokes as:

1. Four stroke engine. 2. Two stroke engine.

iv. Method of ignition as:

1. Spark ignition engine, known as S.I engine.

2. Compression ignition engine, known as C.I. Engine.

v. Number of cylinders as:

1. Single cylinder engine. 2. Multi cylinder engine.

vi. Position of Cylinder as:

1. Horizontal engine. 2. Vertical engine. 3. V- engine. 4. Opposed cylinder engine.

5. Radial engine.

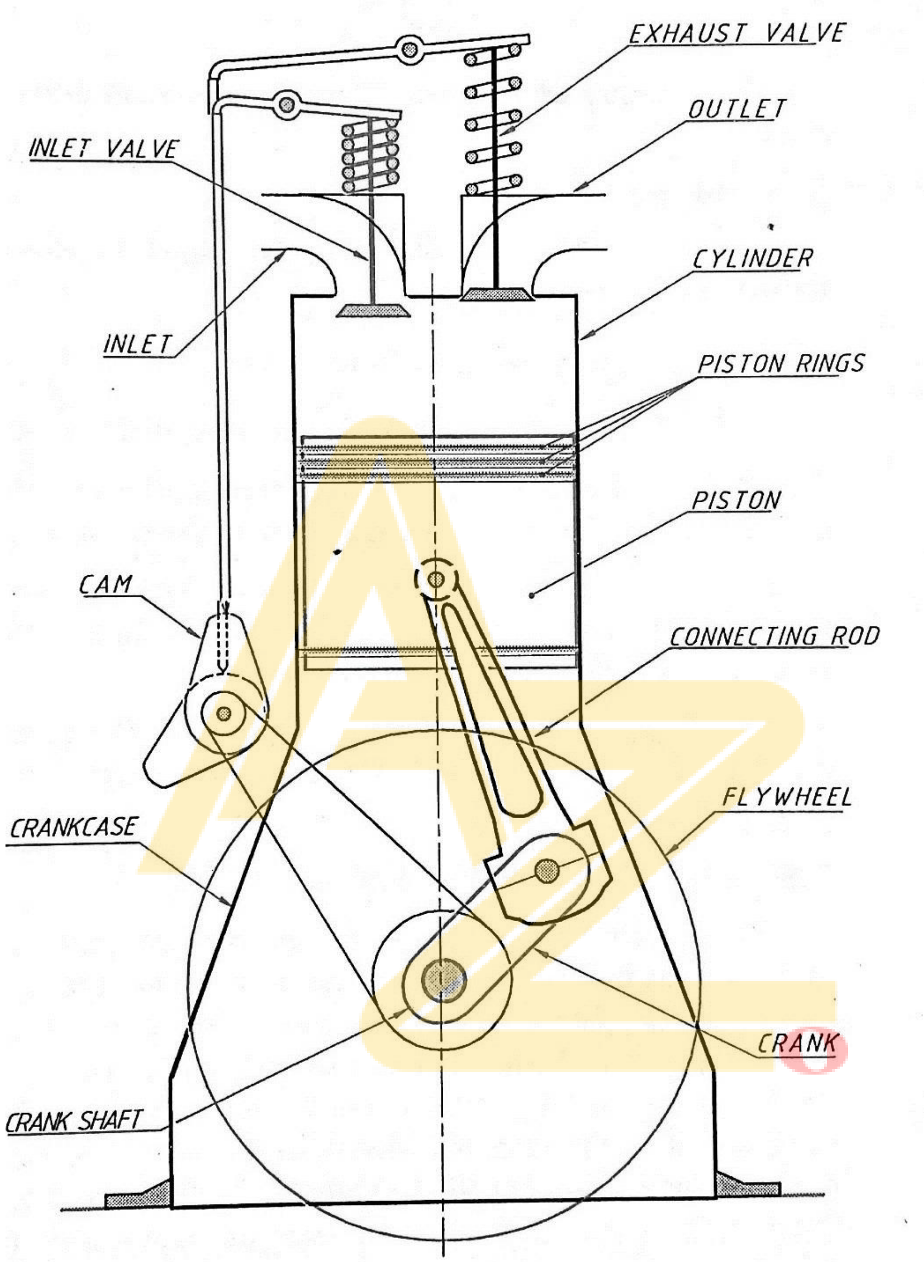
vii. Method of cooling as:

1. Air cooled engine. 2. Water cooled engine.

**Parts of I.C. Engines:**

1. **Cylinder:** The heart of the engine is the cylinder in which the fuel is burnt and the power is developed. The inside diameter is called bore. To prevent the wearing of cylinder block, a sleeve will be fitted tightly in the cylinder. The piston reciprocates inside the cylinder.
2. **Piston:** The piston is a close fitting hollow cylindrical plunger moving to-and-fro in the cylinder. The

power developed by the combustion of the fuel is transmitted by the piston to the crankshaft through the connecting rod.




Parts of I.C.Engine

3. **Piston rings:** The piston rings are the metallic rings inserted into the circumferential grooves provided at the top end of the piston. These rings maintain a gas-tight joint between the piston and the cylinder while the piston is reciprocating in the cylinder. They also help in conducting the heat from the piston to the cylinder.

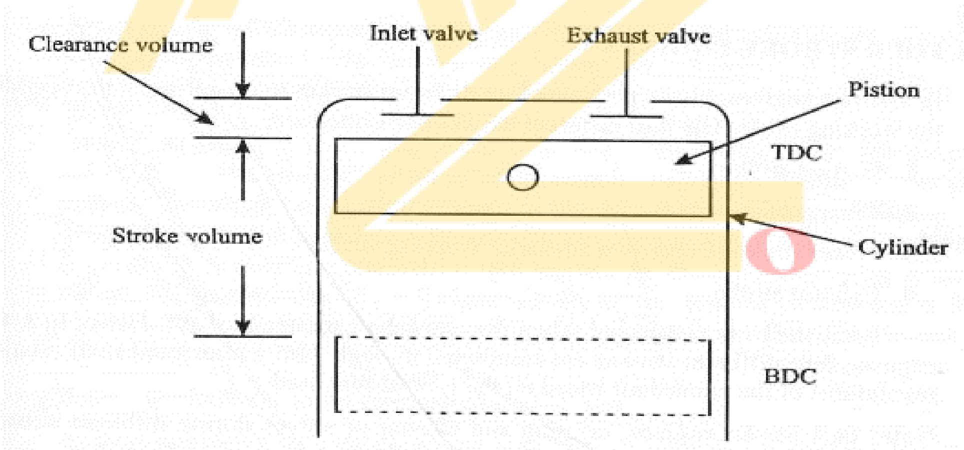
4. **Connecting rod:** It is a link that connects the piston and the crankshaft by means of pin joints. It converts the rectilinear motion of the piston into rotary motion of the crankshaft.

5. **Crank and crankshaft:** The crank is lever that is connected to the end of the connecting rod by a pin joint with its other end rigidly connected to a shaft called crankshaft. It rotates about the axis of the crankshaft and causes the connecting rod to oscillate.

6. **Crank case:** It is the lower part of the engine serving as an enclosure for the crankshaft and also sump for the lubricating oil.

7. **Valves:** The valves are the devices which controls the flow of the intake and the exhaust gas to and from the cylinder. They are also called poppet valves. These valves are operated by means of cams driven by crankshaft through a timing gear and chain.
8. **Fly wheel:** It is a heavy wheel mounted on the crankshaft of the engine to maintain uniform rotation of the crankshaft.

**I.C. Engine Terminology:**




1. **Stroke:** It is the distance travelled by the piston from the cover end to the crank end or from crank end to the cover end. It is denoted by L.

2. **Bore:** It is the diameter of the cylinder or outer diameter of the piston. It is denoted by D.

3. **Top dead centre (TDC) or cover end:** It is the extreme position of the piston, when the piston is near cylinder head.

4. **Bottom dead centre (BDC) or crank end:** It is the extreme position of the piston, when the piston is near the crankshaft end.

5. **Swept volume ($V_S$):** It is the volume covered by the piston when the piston moves from TDC to BDC. It is denoted by $V_S$ and is given by,

$$V_S = \frac{\pi D^2}{4}$$

6. **Clearance volume ($V_C$):** It is the volume occupied by the charge at the end of compression stroke when the piston is at TDC.

7. **Compression ratio (C.R):** It is the ratio of total volume of the cylinder to the clearance volume. i.e., CR or r = Total volume/clearance volume.

$$r = \frac{V_T}{V_C} = \frac{V_S + V_C}{V_C}$$

8. **Piston speed:** The total linear distance travelled by the piston per unit time is called piston speed. It is expressed in m/min and is given by,

Piston speed = *2LN m/min*

L = length of stroke in *m*

N = speed of the engine in *rpm*.

**Two - Stroke Engine:**

A 2 stroke engine performs only TWO strokes to complete one cycle. Crankshaft makes only one revolution to complete the cycle. The power is developed in every revolution of the crankshaft. Based on the type of fuel used they are classified as **2-Stroke Petrol** engine and **2 Stroke Diesel** Engine.

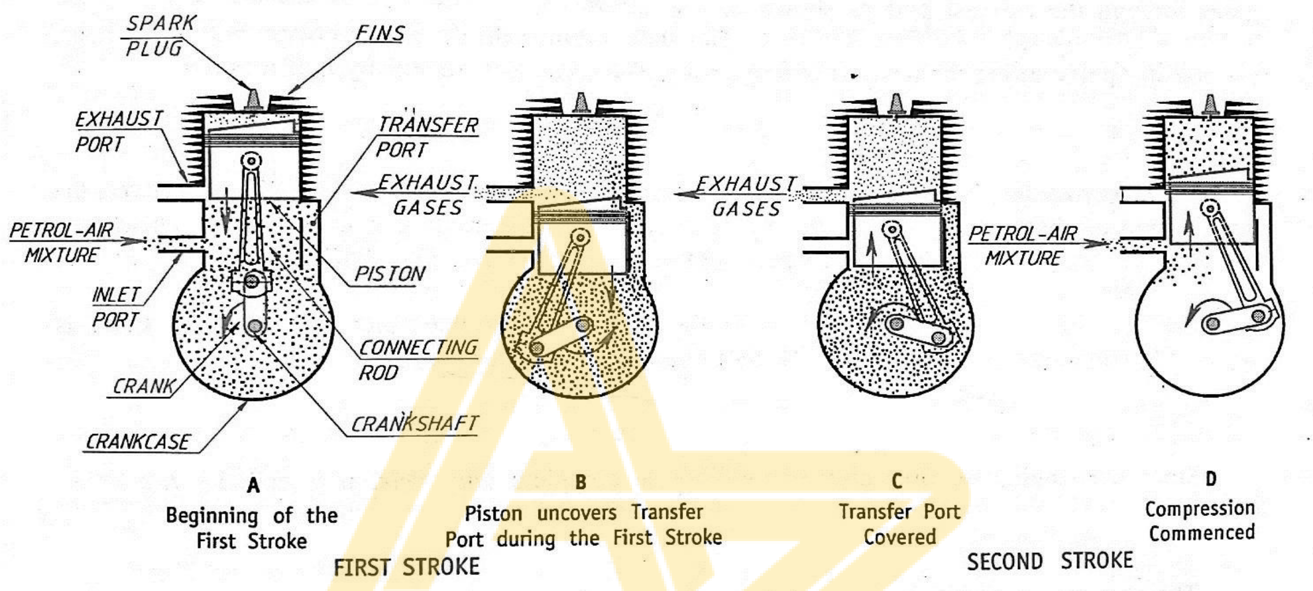
**Two-Stroke Petrol Engine:**

Inlet port – admits fresh air-fuel mixture (charge) into the crankcase.

Transfer port – transfers the charge from the crankcase into the cylinder.

Exhaust port – discharges the burnt gases from the cylinder.

These ports are opened and closed by the reciprocating piston. The connecting rod and the crank convert the reciprocating motion of the piston into the rotary motion of the crankshaft.



Two Stroke Petrol Engine

FIRST STROKE:

- Piston moves from TDC to BDC. The spark plug ignites the compressed petrol and air mixture (charge). The hot gases are released during combustion increasing the pressure in the cylinder which forces the piston downwards. The piston moves downwards performing the power stroke until the top of the piston uncovers the exhaust port. The burnt gases escape through the exhaust port. As the piston descends it covers the inlet port and uncovers the transfer port and charge flows from crankcase into the cylinder.

- This charge entering the cylinder drives out the remaining burnt gases through the exhaust port and the process is called *scavenging.* This process continues till the piston covers both exhaust & transfer port during the next ascending stroke. The crankshaft rotates by half rotation.

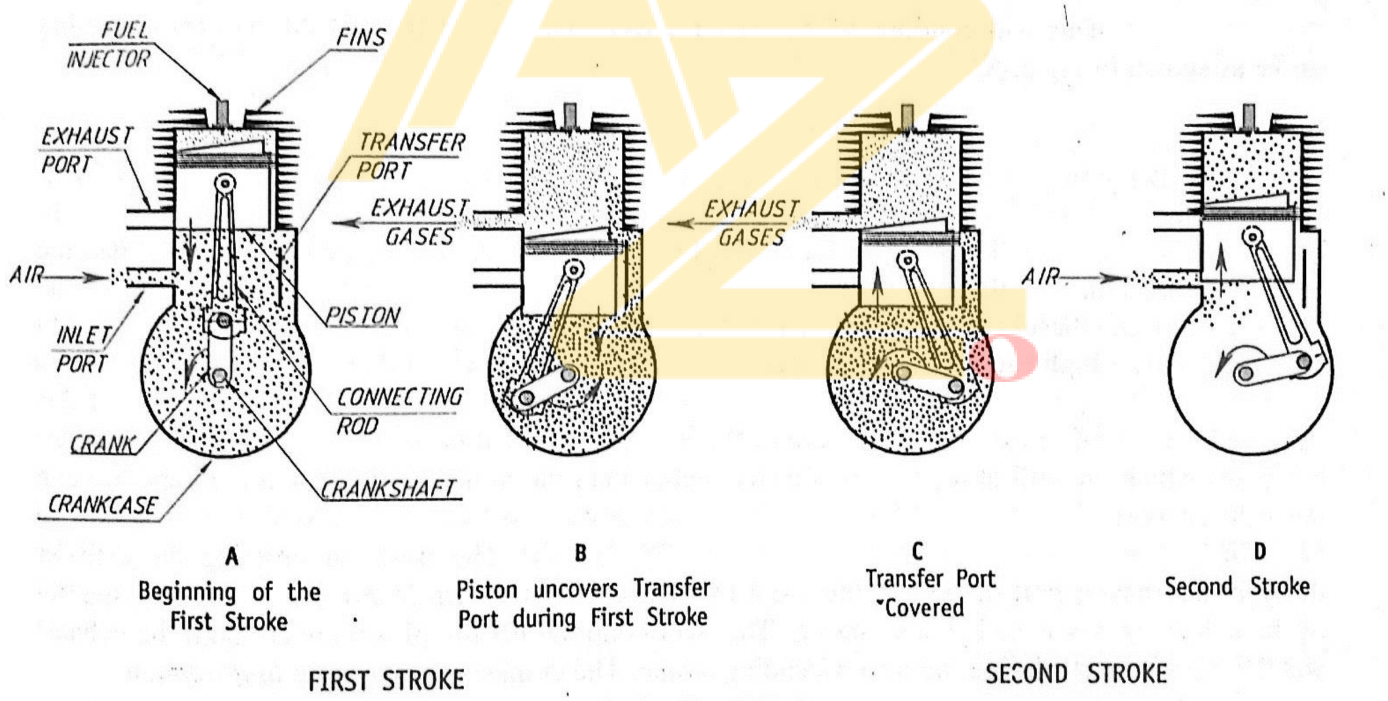
SECOND STROKE:

- Piston moves from BDC to TDC. As the piston ascends, it covers the transfer port and the supply of charge to the cylinder is cut-off. Further upward movement covers exhaust port and compression of the charge begins. In the mean time, inlet port opens and fresh charge enters the crankcase. Further ascend of piston will compress the charge in the cylinder. The compression ratio ranges from 7:1 to 11:1. After piston reaches TDC first stroke repeats again. The crank rotates by half rotation.

**2-STROKE DIESEL ENGINE:**

- Inlet port – admits fresh air into the crankcase.
- Transfer port – transfers the air from the crankcase into the cylinder.
- Exhaust port – discharges the burnt gases from the cylinder.

These ports are opened and closed by the reciprocating piston. The connecting rod and the crank convert the reciprocating motion of the piston into the rotary motion of the crankshaft.




Two Stroke Diesel Engine

FIRST STROKE:

- Piston moves from cover TDC to BDC. The injector injects a metered quantity of the diesel oil into the cylinder as a fine spray. The high temperature of compressed air ignites the injected diesel oil. The hot gases are released during combustion increasing the pressure in the cylinder which forces the piston downwards. The piston moves downwards performing the power stroke until the top of the piston uncovers the exhaust port. The burnt gases escape through the exhaust port.

- As the piston descends it covers the inlet port and uncovers the transfer port and air flows from crankcase into the cylinder. This air entering the cylinder drives out the remaining burnt gases through the exhaust port and the process is called *scavenging.* This process is continued till the piston covers both exhaust & transfer port during the next ascending stroke. The crankshaft rotates by half rotation.

SECOND STROKE:

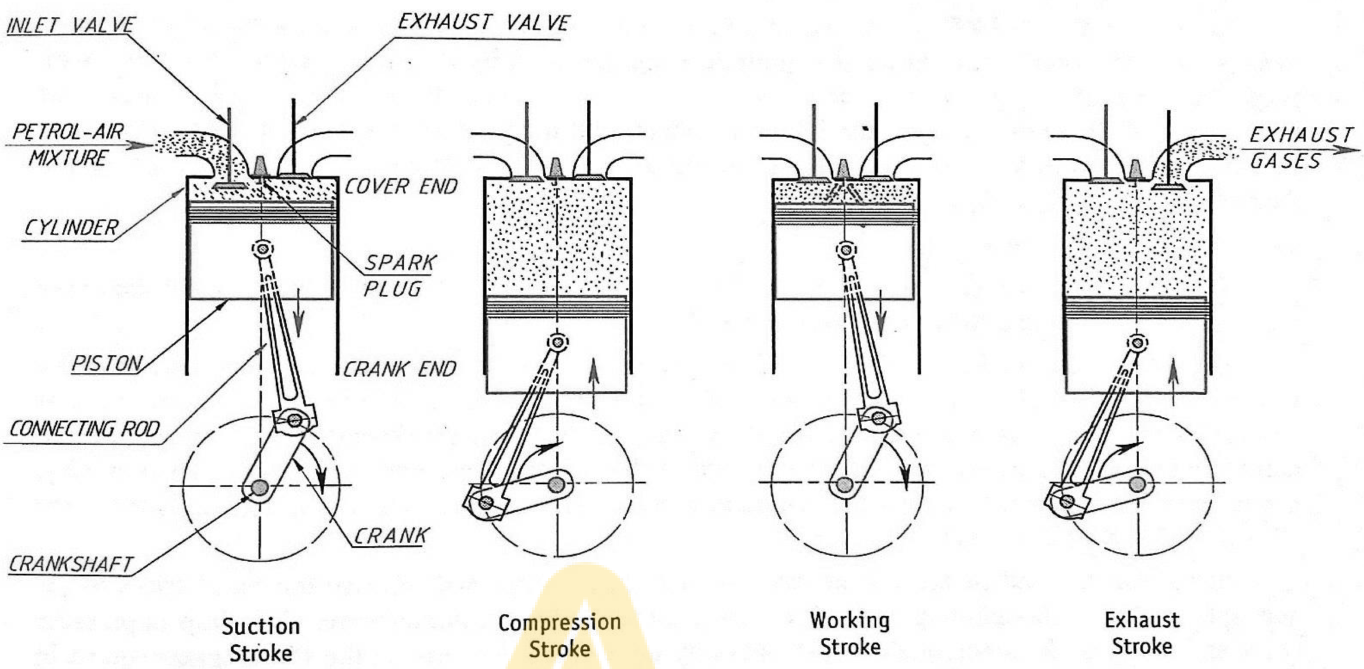
- Piston moves from BDC to cover end TDC. As the piston ascends, it covers the transfer port and the supply of air is cut-off. Further upward movement covers exhaust port and compression of the air begins. In the mean time, inlet port opens and fresh air enters the crankcase. Further ascend of piston will compress the petrol and air mixture in the cylinder. The compression ratio ranges from 20:1 to 22:1. After piston reaches cover end first stroke repeats again. The crank rotates by half rotation.

**4-STROKE PETROL ENGINE: (S. I. Engine)**

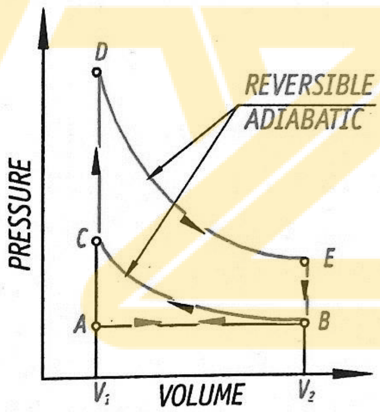
Petrol engines works on the principle of theoretical Otto cycle, also known as **constant volume cycle.** It consists of cylinder, piston, connecting rod, crank, crankshaft, inlet valve, exhaust valve and spark plug. The spark plug fitted at the top of the cylinder initiates the ignition of the petrol, hence the name spark ignition engine.

1. SUCTION STROKE:

- During this stroke the piston moves from TDC to BDC. The inlet valve is open and exhaust valve is closed. The crankshaft rotates by half a rotation. As the piston moves downwards, suction is created in the cylinder, as a result, fresh air-petrol mixture is drawn into the cylinder through the inlet valve. At the end of this stroke, the piston is in BDC, the cylinder is filled with air-petrol mixture and inlet valve closes. Horizontal line AB on the P-V diagram.




Four Stroke Petrol Engine




Theoretical Otto Cycle

2. COMPRESSION STROKE:

• During this stroke the piston moves from BDC to TDC. Both the inlet valve and exhaust valves are closed. The crankshaft rotates by half a rotation. As the piston moves upwards, the fuel mixture in the cylinder will be compressed. The ratio of compression ratio in petrol engines ranges from 7:1 to 11:1, represented by the BC curve in the P-V diagram. When the piston reaches TDC, the spark plug ignites the fuel mixture. Since the spark plug ignites the fuel (air-petrol), this type of engine is also called as spark ignition or S.I Engine. The combustion of fuel takes place increasing the pressure at constant volume, represented by the line CD in the P-V diagram.

3. WORKING OR POWER STROKE:

- During this stroke the piston moves from TDC to BDC. Both the inlet valve and exhaust valves are closed. The crankshaft rotates by half a rotation. The high pressure of the burnt gases forces the piston downwards performing power stroke. The linear motion of the piston is converted to rotary motion of the crankshaft by connecting rod and crank. It is represented by curve on DE on PV diagram. At the end of the stroke, the piston is in BDC, the exhaust valve opens which release the burnt gases to the atmosphere. This will bring pressure in the cylinder to atmospheric at constant volume, represented by the line EB in the P-V diagram.

4. EXHAUST STROKE:

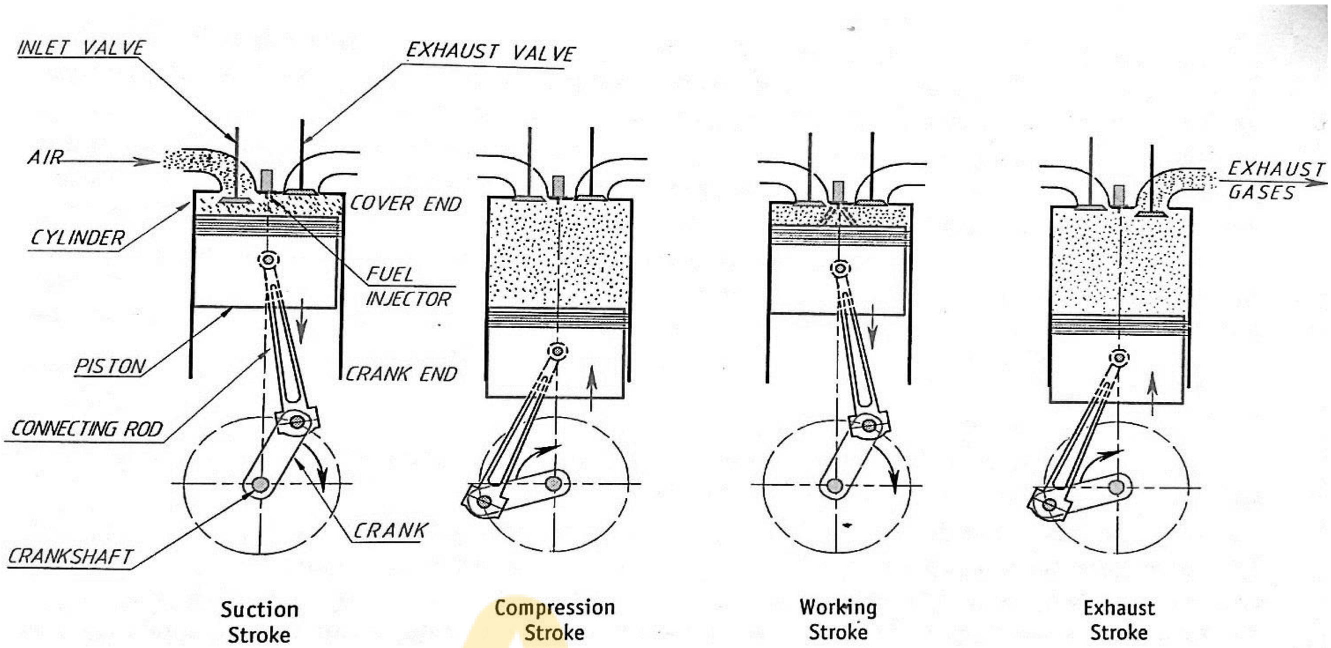
- During this stroke the piston moves from BDC to TDC. The inlet valve is closed and exhaust valve is open. The crankshaft rotates by half a rotation. As the piston moves towards the TDC, the burnt gases will be expelled out through the exhaust valve. Line BA on the P-V diagram. When the piston reaches the TDC, the exhaust valve closes and this completes the cycle.

**4 STROKE DIESEL ENGINE: (C. I. Engine)**

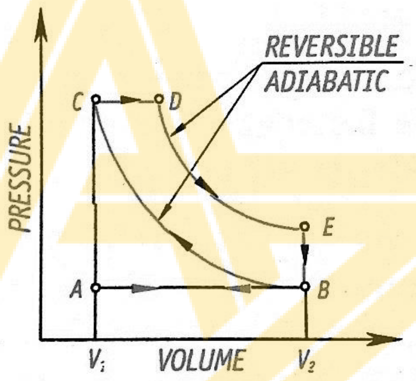
Diesel engines works on the principle of theoretical Diesel cycle, also known as **constant pressure cycle**. It consists of cylinder, piston, connecting rod, crank, crankshaft, inlet valve, and exhaust valve and fuel injector. The fuel injector fitted at the top of the cylinder supplies the measured quantity of diesel at high pressure.

1. SUCTION STROKE:

- During this stroke the piston moves from TDC to BDC. The inlet valve is open and exhaust valve is closed. The crankshaft rotates by half a rotation. As the piston moves downwards, suction is created in the cylinder, as a result, fresh air is drawn into the cylinder through the inlet valve. At the end of this stroke, the piston is in BDC, the cylinder is filled with air and inlet valve closes. Horizontal line AB on the P-V diagram.




Four–Stroke Diesel Engine




Theoretical Diesel Cycle

2. COMPRESSION STROKE:

• During this stroke the piston moves from BDC to TDC. Both the inlet valve and exhaust valves are closed. The crankshaft rotates by half a rotation. As the piston moves upwards, the air in the cylinder will be compressed. The ratio of compression ratio in diesel engines ranges from 16:1 to 22:1, represented the BC curve in the P-V diagram. As the air gets compressed its pressure and temperature increases and attains a temperature greater than the ignition temperature of diesel. Diesel is sprayed into the cylinder through the fuel injector. The high temperature of the air ignites the diesel as soon as it is sprayed and undergoes combustion at constant pressure. Line CD on the P-V diagram. Since the compresses air ignites the diesel, this type of engine is also called as compression ignition or C.I Engine.

3. WORKING OR POWER STROKE:

• During this stroke the piston moves from TDC to BDC. Both the inlet valve and exhaust valves are closed. The crankshaft rotates by half a rotation. The high pressure of the burnt gases forces the piston downwards performing power stroke. The linear motion of the piston is converted to rotary motion of the crankshaft by connecting rod and crank. It is represented by curve DE on PV diagram. At the end of the stroke, the piston is in BDC, the exhaust valve opens which release the burnt gases to the atmosphere. This will bring pressure in the cylinder to atmospheric at constant volume, represented by the line EB in the P-V diagram.

4. EXHAUST STROKE:

• During this stroke the piston moves from BDC to TDC. The inlet valve is closed and exhaust valve is open. The crankshaft rotates by half a rotation. As the piston moves towards the TDC, the burnt gases will be expelled out through the exhaust valve. Line BA on the P-V diagram. When the piston reaches the TDC, the exhaust valve closes and this completes the cycle.

In 4 stroke engine, the 4 strokes constitute one cycle, hence the name 4 stroke cycle engine. The crankshaft makes two revolutions to complete one cycle. The power is developed in every alternate revolution of the crankshaft. 4 Stroke diesel engines produce higher power than 4 Stroke petrol engines.

## COMPARISON OF 4 STROKE AND 2 STROKE ENGINE

| PRINCIPLE | 4 STROKE | 2 STROKE |
|---|---|---|
| **1. Number of strokes per cycle** | Four | Two |
| **2. Uses** | Cars, trucks, tractors, jeeps, buses, | Mopeds, scooters, motor cycles, etc., |
| **3. Power Developed** | In every alternate revolution of the | In e v e r y revolution of the crankshaft |
| **4. Flywheel** | Heavy | Light |
| **5. Admission of charge** | Directly to the engine cylinder | First to the crankcase & then transferred to the engine cylinder |
| **6. Exhaust gases** | Driven through the outlet during exhaust stroke | Driven out by scavenging operation |
| **7. Valves** | Opened & closed by mechanical valves | Opened & closed by piston |
| **8. Noise** | Less | High |
| **9.Lubricating oil consumption** | Less | More |
| **10. Fuel consumption** | Less | More |
| **11. Mechanical efficiency** | Low | High |

**COMPARISON OF PETROL AND DIESEL ENGINE:**

| PRINCIPLE | PETROL | DIESEL |
|---|---|---|
| **1. Cycle of operation** | Otto cycle (constant volume) | Diesel cycle (constant pressure) |
| **2. Fuel used** | Petrol | Diesel |
| **3. Admission of fuel** | During suction stroke | At the end of compression |
| **4. Charge drawn during** | Air and petrol mixture | Only air |
| **5. Compression ratio** | 7:1 to 12:1 | 16:1 to 22:1 |
| **6. Type of ignition** | Spark ignition | Compression or auto |
| **7. Uses** | Scooter, motor cycle, car, etc., | Trucks, tractors, buses, etc., |
| **8. Engine speed** | High about 7000rpm | Low from 500 to 3000rpm |
| **9. Power output capacity** | Less | More |
| **10. Thermal efficiency** | Less | High |
| **11. Noise & vibration** | Almost nil | High |
| **12. Weight of the engine** | Less | High |
| **13. Initial cost** | Less | More |
| **14. Operating cost** | High | Less |
| **15. Maintenance cost** | Less | Slightly higher |
| **16. Starting of the engine** | Easily started | Difficult to start in cold |
| **17. Exhaust gas pollution** | More | Less |

# Performance of IC Engines

1. **Mean effective pressure (MEP):**

The mean effective is defined as mean or average pressure acting on a piston throughout the power stroke. It is also the average pressure developed inside the engine cylinder of an IC engine. It is expressed in Bar. ( 1 bar = 105 N/m2) pressure of an engine.

The mean effective pressure of an engine is obtained diagram. The indicator diagram is the P –V diagram for one cycle at that load, drawn with the help of an indicator fitted on the engine.

$$P_m = \frac{s*a}{l} \text{ N/ m}^2$$

a = Area of the actual indicator diagram, $cm^2$

l = Base width of the indicator diagram, cm

s = Spring value of the spring used in the indicator, N/ $m^2$/cm

2. **Indicated Power:**

Indicated power is defined as the total power developed inside the engine cylinder due to combustion of fuel. It denoted by IP and is expressed in kW.

$$\text{I.P.} = \frac{P_m LANk}{60*2*1000} \quad \text{For 4 Stroke}$$

$$\text{I.P.} = \frac{P_m LANk}{60*1000} \quad \text{For 2 Stroke}$$

$P_m$ = Mean effective pressure

L= Length of stroke, m

A = Area of cross section of the cylinder, $m^2$

N = RPM of crankshaft

K = Number of cylinders

3. ***Brake Power:***

The net power available at the crank shaft of the engine for performing useful work is called brake power. It is denoted by BP and expressed in kW.

$$\text{B.P.} = \frac{2\pi NT}{60**1000}$$

T = Torque

4. **Friction power =** Indicated power – Brake power**.**

5. **Mechanical Efficiency:**

It is the efficiency of the moving parts of mechanism transmitting the indicated power to the crankshaft. Therefore it is *defined as the ratio of the brake power and the indicated power*. It is expressed in percentage.

$$\eta_{mech} = \frac{\text{Brake Power}}{\text{Indicated Power}} * 100$$

**6. Thermal Efficiency:**

It is the efficiency of the conversion of the heat energy produced by the actual combustion of the fuel into the power output of the engine. Therefore it is defined as the ratio of power developed by the engine by the fuel in the same interval of time. It is expressed in percentage.

$$\eta_{Thermal} = \frac{\text{Power Output}}{\text{Heat Supplied}} * 100$$

**7. Brake thermal efficiency**

Is defined as the ratio of the brake power to the heat supplied by the fuel. It is expressed in percentage.

$$\eta_{BThermal} = \frac{\text{Brake Power}}{CV * m_f} * 100$$

$m_f$ = Mass of the fuel supplied, Kg/s

CV = Calorific Value of the fuel, KJ/Kg

**8. Indicated thermal efficiency**

Is defined as the ratio of brake power to the heat supplied by the fuel. It is expressed in percentage.

$$\eta_{IThermal} = \frac{\text{Indicated Power}}{CV * m_f} * 100$$

**9. Specific fuel consumption:**

SFC is defined as the amount of fuel consumed by an engine for one unit of energy that is produced. SFC is used to express the fuel efficiency of an IC engine .it measures the amount of fuel required to provide a given power for a given period. It is expressed in kg/MJ or kg/kW – hr.

## REFRIGERATION AND AIRCONDITIONING

**Refrigeration:** It is defined as a method of reducing temperature of a system below that of the surroundings and maintaining it at the lower temperature by continuously abstracting the heat from it.

**Refrigerant:** The medium or working substance that continuously extracts heat from the space within the refrigerator which is to be kept cool at temperature less than atmospheric by rejecting heat to atmosphere is called refrigerant.

**Refrigeration concepts:**

1. Heat flows from a system at higher temperature to a system at lower temperature.
2. Fluids absorb heat, change from liquid phase to vapor phase and condenses back to liquid while by giving off heat.
3. The boiling and freezing temperatures of fluid depends on its pressure.
4. Heat can flow from a system at lower temperature to a system at higher temperature only with the aid of external work.

**Refrigerating effect:** The rate at which the heat is absorbed in a cycle from the interior space to be cooled is called refrigerating effect.

**Unit of refrigeration:** The capacity of refrigeration system is expressed in **tons of refrigeration**.

A ton of refrigeration is defined as the quantity of heat absorbed in order to form one ton of ice in 24hours from water at $0^0$C.

In S.I System

1 ton of refrigeration = 210 kJ/min

= 3.5 Kw

**Coefficient of performance:** The coefficient of performance (COP) of a refrigeration system is defined as the ratio of the refrigerating effect (heat absorbed or removed) to the work supplied.

If Q = Heat absorbed or Removed, kW

W = Work supplied, kW

Then, COP = $^{Q}/_{W}$

**Ice making capacity**

The capacity of a Refrigerating system to make ice beginning from water (at water temperature) to solid ice. It is usually specified by kg/hr.

**Relative COP**

It is defined as the ratio of Actual COP to the Theoretical COP of a refrigerator.

**Relative COP = Actual COP/Theoretical COP**

**Refrigerants commonly used:**

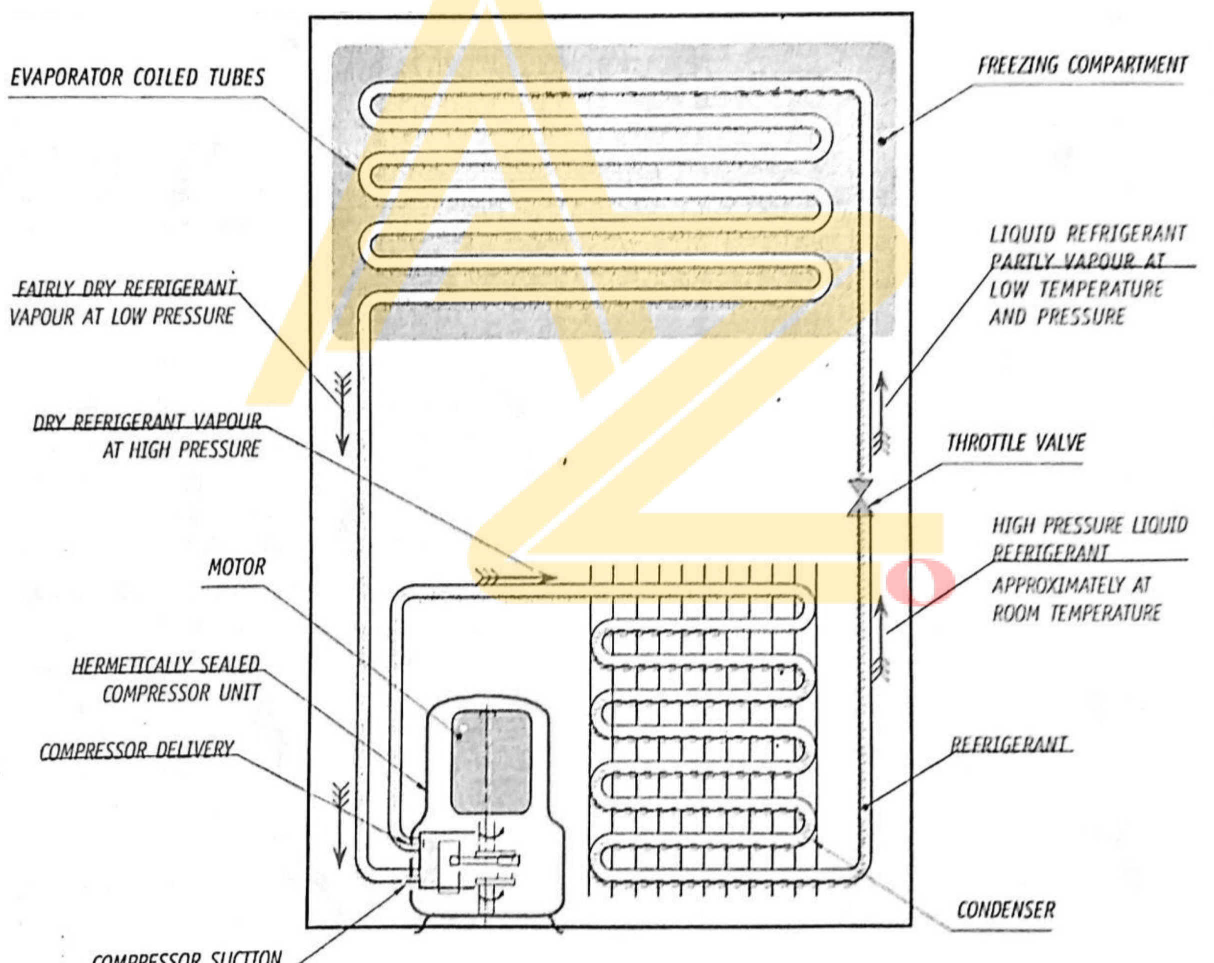
1. Ammonia – in vapor absorption refrigerator.
2. Carbon dioxide – in marine refrigerators.
3. Sulphur dioxide – in household refrigerators.
4. Methyl chloride – in small scale & domestic refrigerators.
5. Freon – 12 (**Dichlorodifluoromethane**) – in domestic vapor compression refrigerators.
6. Freon – 22 (**difluoromonochloromethane**) – in air conditioners.

**Properties of a good refrigerant:**

- Must have low boiling point.
- Must have low freezing point.
- Evaporator & condenser pressure should be slightly above the atmospheric pressure.
- Latent heat of evaporation must be very high.
- Specific volume must be very low.

- Toxicity - should be non-toxic.
- Flammability - should not be flammable.
- Corrosiveness - should be non-corrosive.
- COP must be high.
- Odour - must be odourless.
- Leakage should be easily detectable.

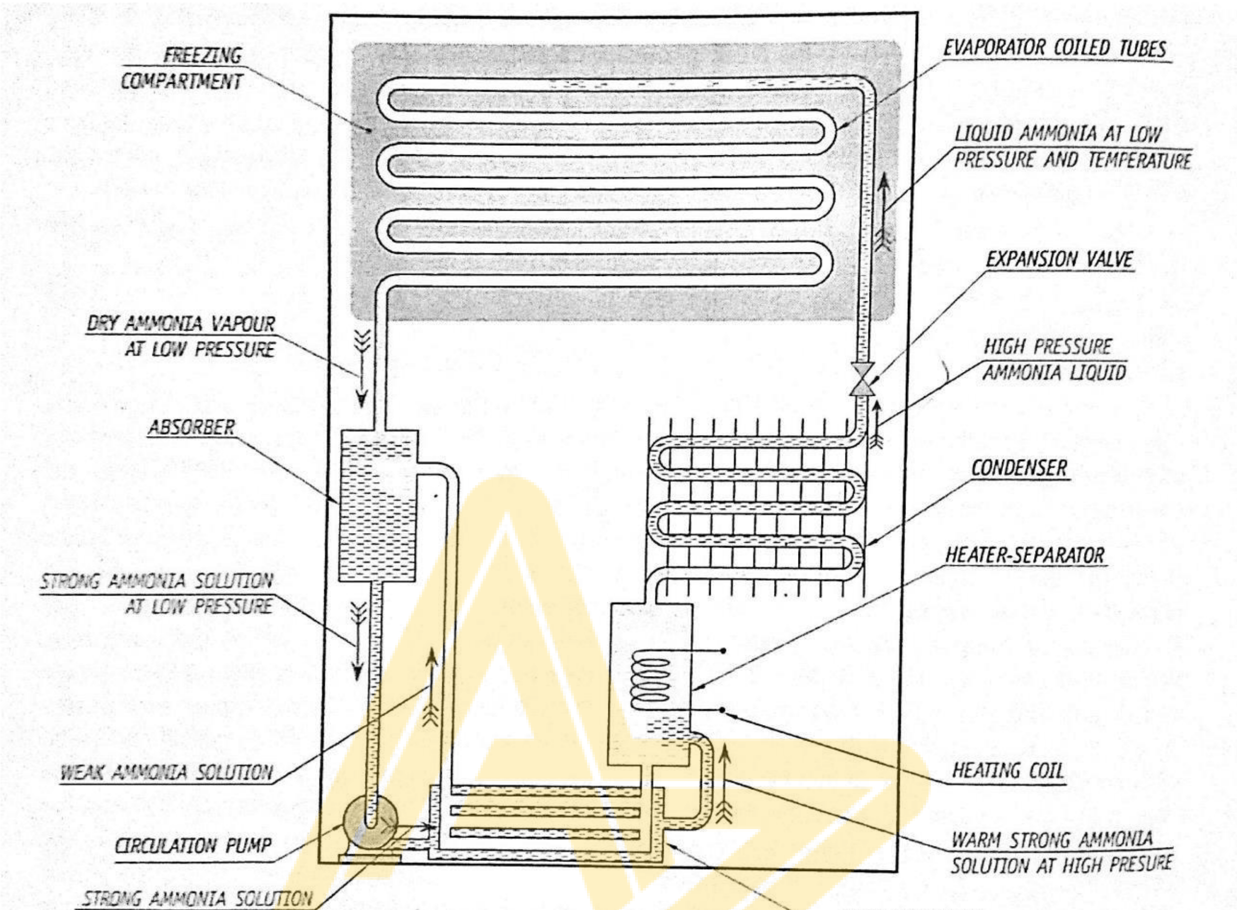
**VAPOUR COMPRESSION REFRIGERATOR**




Vapour Compression Refrigerator

- It mainly consists of a compressor, a throttle valve, a condenser and an evaporator made of coiled tubes installed in the freezing compartment of the refrigerator.
- The refrigerant at low pressure and temperature passing in the evaporator coiled tubes absorbs heat from the contents in the freezing compartment and evaporates.
- This lowers the temperature of freezing compartment.
- The vapour refrigerant at low pressure from evaporator is drawn by the compressor which compresses it to high pressure.
- This increase in pressure increases the saturation temperature of the refrigerant higher than the temperature of the cooling medium (atmospheric air) in the condenser so that vapour can reject heat in the condenser.
- In the condenser it gives off its latent heat to the atmosphere air and condenses to liquid.
- The high pressure liquid refrigerant now flows to the throttle valve in which it expands to a low pressure.
- Temperature reduces to -10°C and vapour will be wet.
- This wet vapour now passes to the evaporator coils where it absorbs heat from the surrounding and the cycle repeats.
- Thus heat is continuously removed from the contents of the refrigerator in the evaporator and rejected in the condenser to the atmospheric air.
- This will keep the contents of the refrigerator at lower temperature.
- The most commonly used refrigerant in vapour compression refrigerator is dichlorodifluoromethane popularly known as Freon 12.

## VAPOR ABSORPTION REFRIGERATION SYSTEM



Vapour Absorption Refrigerator

- This refrigerator mainly consists of an absorber, a circulating pump, heat exchanger, generator, condenser, expansion valve and evaporating coiled tubes.
- Low pressure ammonia vapor is dissolved in the cold water contained in the absorber, which will produce a strong ammonia solution.
- The strong ammonia solution from absorber is pumped to heat exchanger where it is warmed by the warm weak ammonia solution flowing back from the heat separator.
- The warm high pressure ammonia solution now passes to the heat separator where it is heated by heating coils.

- The heating will drive out the ammonia vapor from it. Now the solution in heat separator becomes weak and flows back to the heat exchanger where it warms up the strong ammonia solution passing through it.
- The high pressure ammonia vapor from heat separator now passes to a condenser, where it rejects heat and is condensed. (liquid)
- The high pressure ammonia liquid is now expanded to low pressure and low temperature in the throttle valve.
- The low pressure condensed ammonia liquid at low temperature is passed onto the evaporator coils provided in the freezing compartment, where it absorbs the heat and evaporates.
- The low pressure ammonia vapor from freezing compartment is passed again to the absorber and the cycle repeats.

**Comparison Between Vapor Compression and Vapor Absorption Systems:**

| **Principle** | **Vapor compression** | **Vapor absorption** |
|---|---|---|
| Working method | Refrigerant vapor is compressed | Refrigerant vapor is absorbed and heated |
| Type of energy supplied | Mechanical | Heat |
| Work or energy supplied | To compress refrigerant | To run the pump |
| COP | Higher | Relatively low & remains same |
| Capacity | Up to 1000 tons | Above 1000 tons |
| Noise | More | Almost quiet |
| Refrigerant | Freon-12 | Ammonia |

| | | |
|---|---|---|
| Leakage problem | Chances are more | No leakage |
| Maintenance | High | Less |
| Operating cost | High | Less |

**AIR CONDITIONING:**

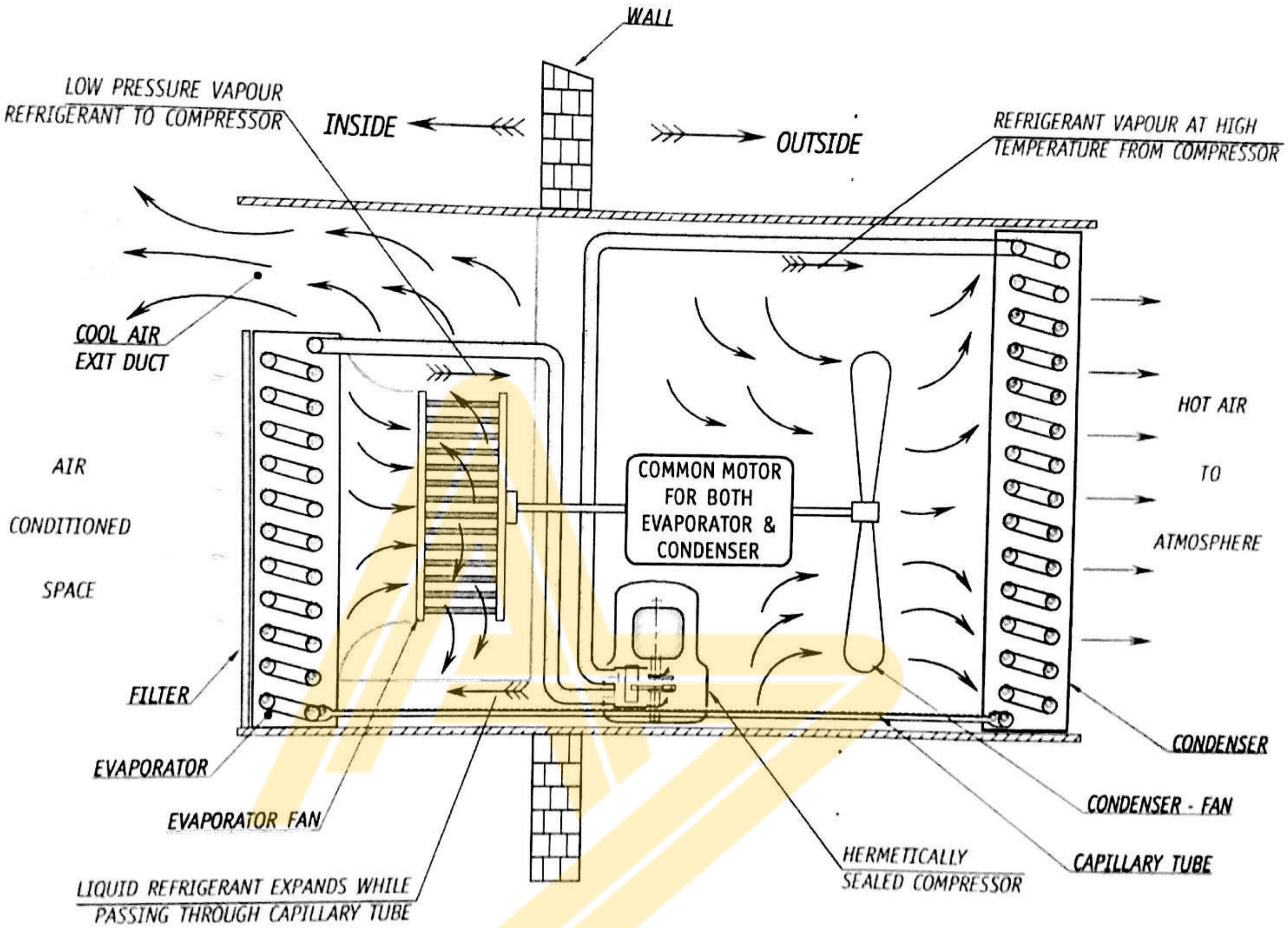
Providing a cool congenial indoor atmosphere by cooling, humidifying, or dehumidifying, cleaning and recirculating the surrounding air is called air conditioning. The artificial cooling of air and conditioning it to provide maximum comfort to human beings is called comfort air conditioning.

The artificial cooling of air and conditioning it to provide a controlled atmosphere required in some engineering, manufacturing and processing is called industrial air conditioning.

**ROOM AIR CONDITIONER AND PRINCIPLES OF AIR CONDITIONING:**

An air conditioner continuously draws 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.

It mainly consists of an evaporator, condenser, compressor, two fans one each for evaporator and condenser units usually driven by the single motor, capillary, etc. It is generally mounted on a window sill such that the evaporator unit is inside the room and the condenser part projecting outside the building.




Air Conditioner

- The high pressure, high temperature liquid refrigerant from the condenser is passed to the evaporator coils through the capillary tube where it undergoes expansion.
- The refrigerant in evaporator coils absorbs heat from the air passing over it from the interior and evaporates.
- The high temperature evaporated refrigerant is compressed to high pressure by a compressor and delivered to the condenser, where it is cooled or condensed to liquid by giving off the heat to the atmospheric air passing over it.
- The cooled high pressure refrigerant now passes through the capillary tube where it undergoes expansion and again re-circulated to repeat the cycle continuously

**ABSOLUTE HUMIDITY**: It is defined as ratio of water vapour contained in a given volume of air.

**SPECIFIC HUMIDITY:** It is defined as the ratio of weight of water vapour to the total weight of air.

**RELATIVE HUMIDITY:** It is defined as the ratio of the actual vapour content of the air to the vapour content of the air at the same temperature when saturated with water vapour.