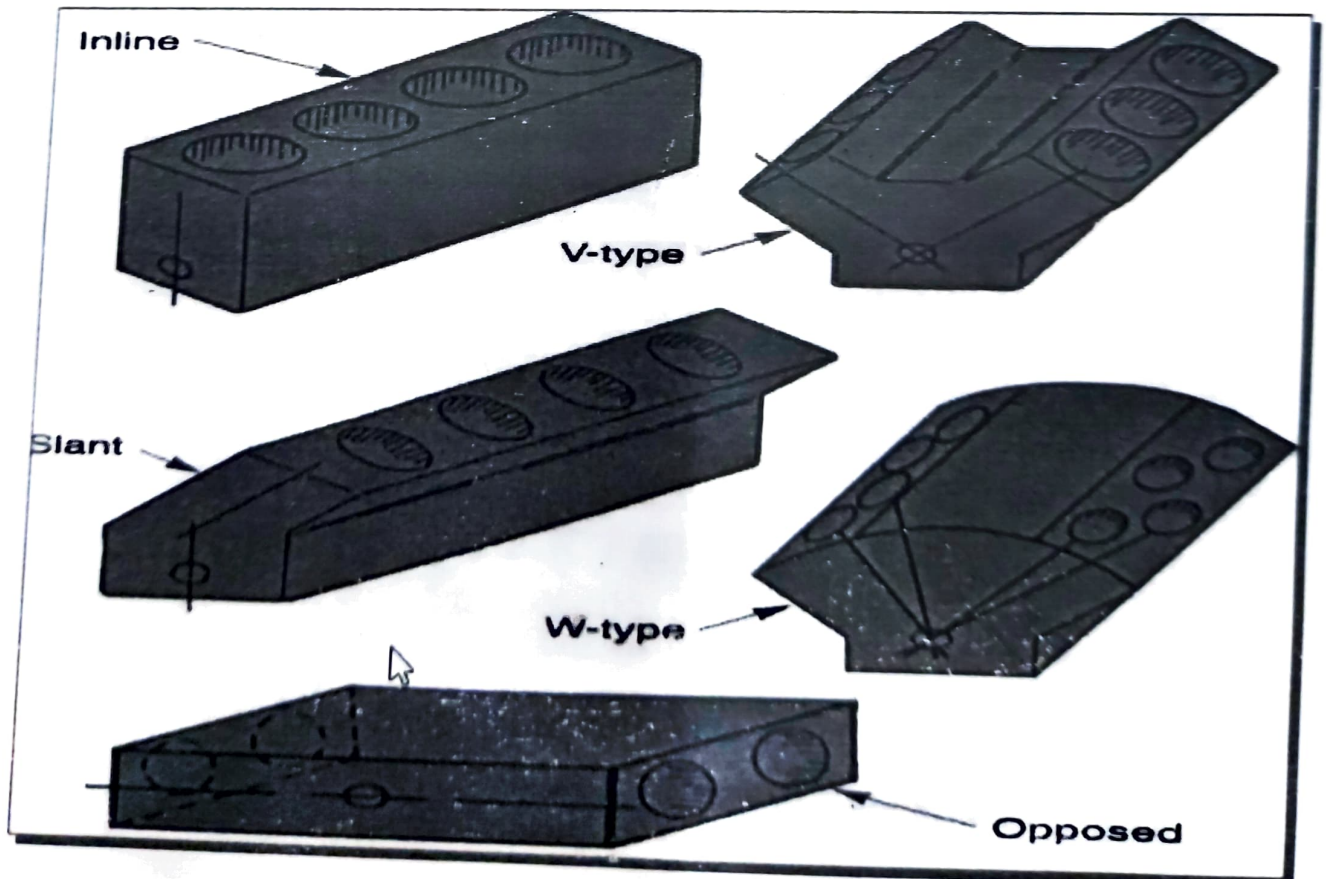


1 Cylinder Arrangement

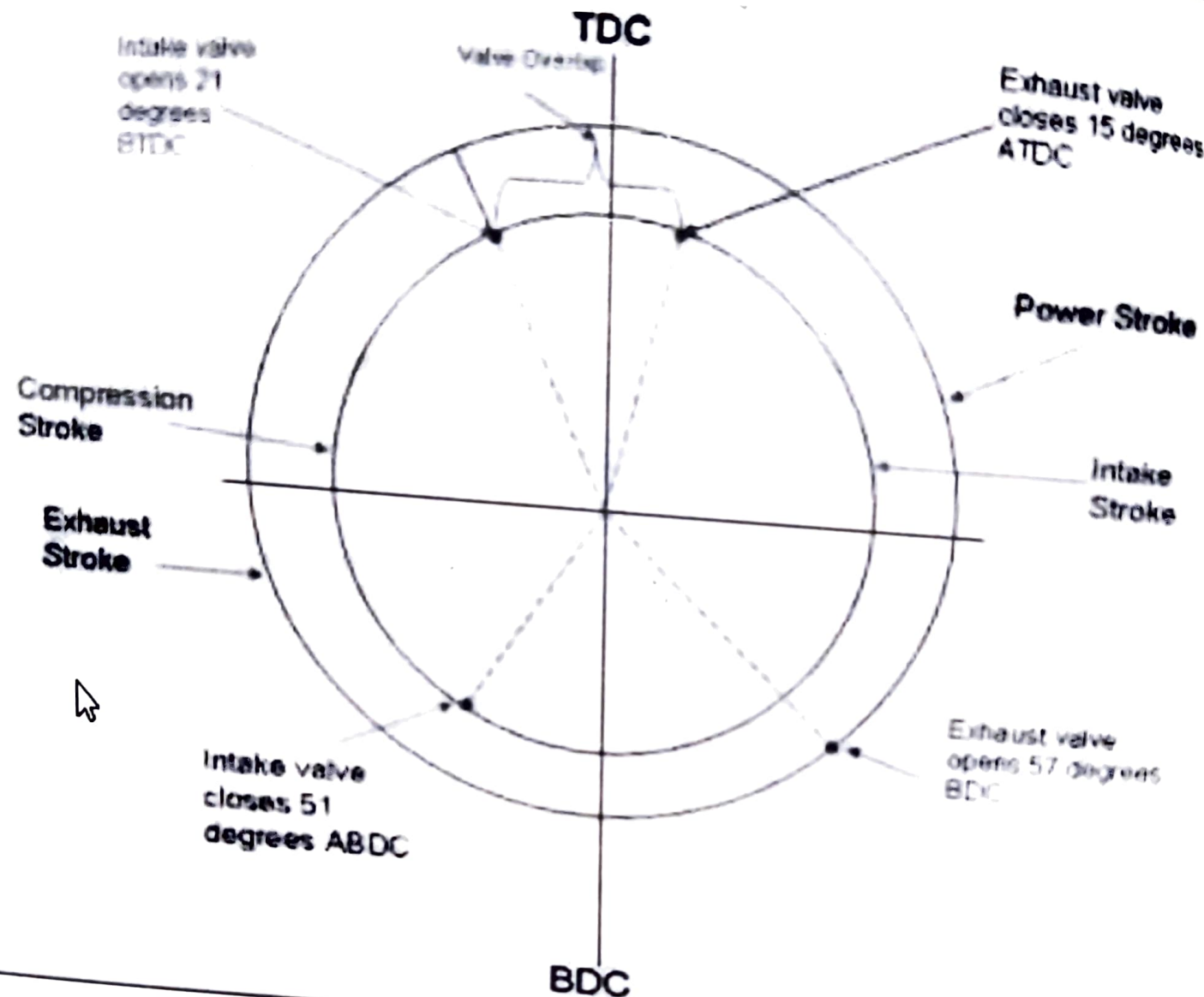
Refers to the position of the cylinders in relation to the crankshaft

There are five basic cylinder arrangements:

- inline
- V-type
- Slant
- W-type
- opposed



Valve Timing Events



Valve timing

- Valve timing is the precise timing of the opening and closing of the valves.
- One way to look at this diagram is to think of these events in terms of the position of the crankshaft and 360 degrees rotation.
- With traditional fixed valve timing, an engine will have a period of *valve overlap* at the end of the exhaust stroke, when both the intake and exhaust valves are open.
- The intake valve is opened BTDC because to give enough time for air-fuel mixture to get into the cylinder.
- The intake valve is allowed open ABDC because to get advantages of inertia created by velocity assists in drawing in the fresh charge.
- The exhaust valve is opened BBDC because the gases inside the cylinder possess a higher pressure even after the expansion stroke. This higher pressure enables it to reduce the work that needs to be done by the engine piston in pushing out these gases.
- The exhaust valve closes ATDC because to give sufficient time for exhaust gas exit through the exhaust valve. If the exhaust valve is closed like in actual timing diagram, a certain amount of exhaust gases will get compressed and remain inside the cylinder and will be carried to the next cycle also.

- A piston is fitted to each cylinder as a face to receive gas pressure and transmit the thrust to the connecting rod.
- It is the prime mover in the engine.
- The main function of piston is to give tight seal to the cylinder through bore and slide freely inside of cylinder.
- Piston should be light and sufficient strong to handle the gas pressure generated by combustion of fuel. So the piston is made by aluminium alloy and sometimes it is made by cast iron because light alloy piston expands more so they need more clearances to the bore.



- Camshaft is used in IC engine to control the opening and closing of valves at proper timing.
- For proper engine output inlet valve should open at the end of exhaust stroke and closed at the end of intake stroke.
- So to regulate its timing, a cam is use which is oval in shape and it exerts a pressure on the valve to open and release to close.
- It is drive by the timing belt which drives by crankshaft. It is placed at the top or at the bottom of cylinder.



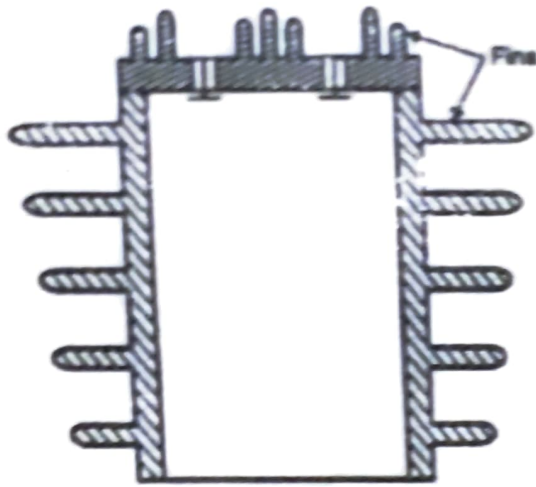


Fig. 6.12. Air cooling.

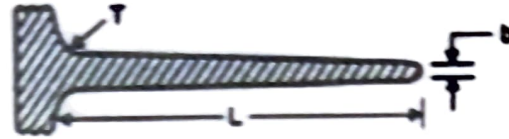


Fig. 6.13. Truncated conical fin.

TYPES of Air Cooling System

1. Natural flow type
2. Forced Convection type

Thermo-syphon system

Radiator

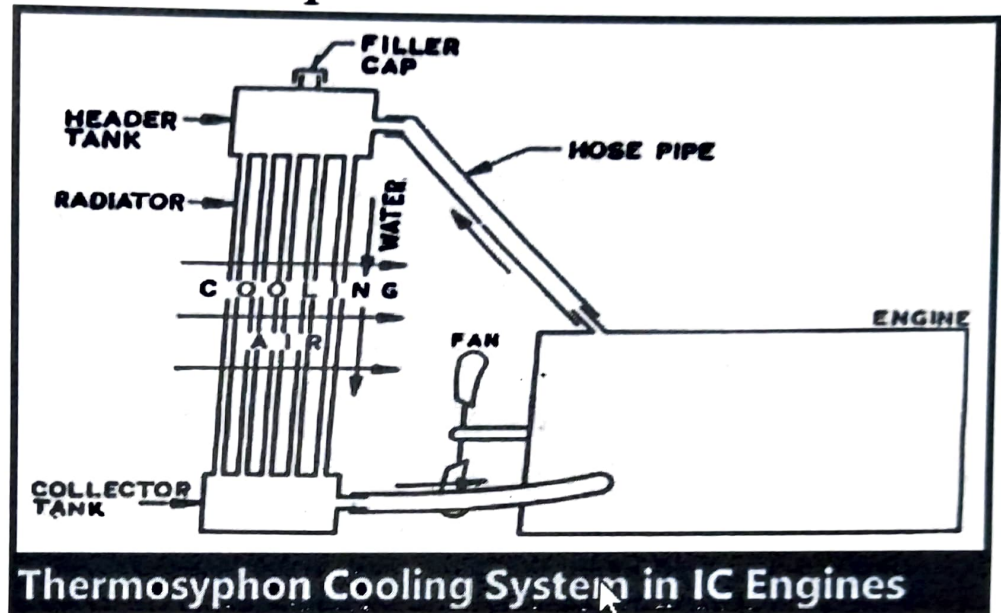
Engine

Filler cap or Pressure cap

water

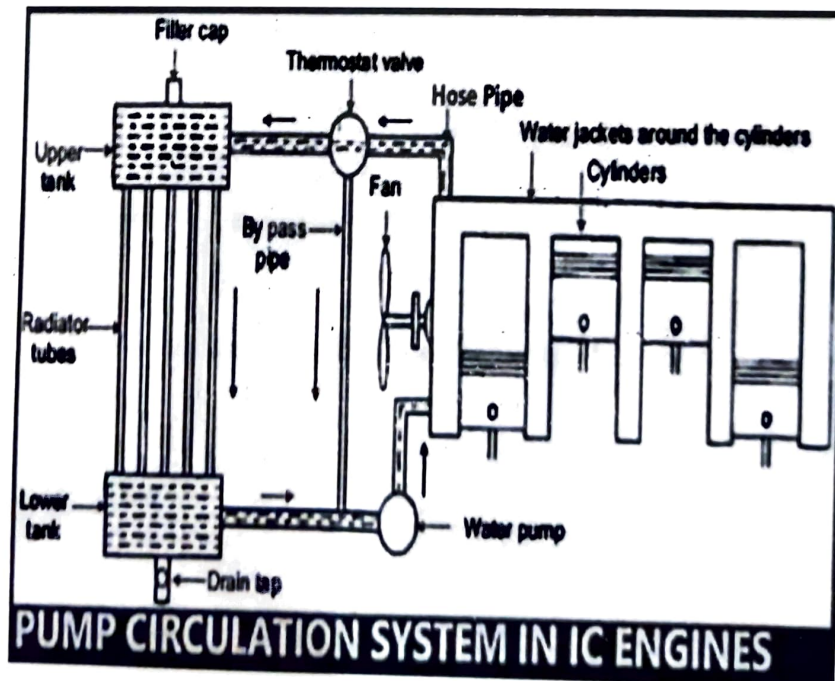
Cooling Fan

Hosepipe



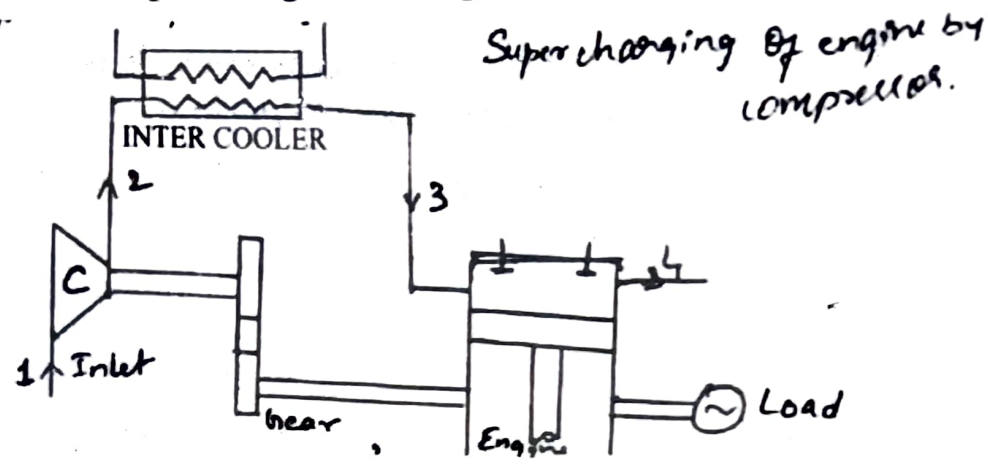
Pump Circulation System

- 1.Engine(with Cylinders)
- 2.Cooling Fan
- 3.Thermostat Valve
- 4.Radiator
- 5.Filler cap(Pressure cap)
- 6.Hose Pipes
- 7.Water Pump

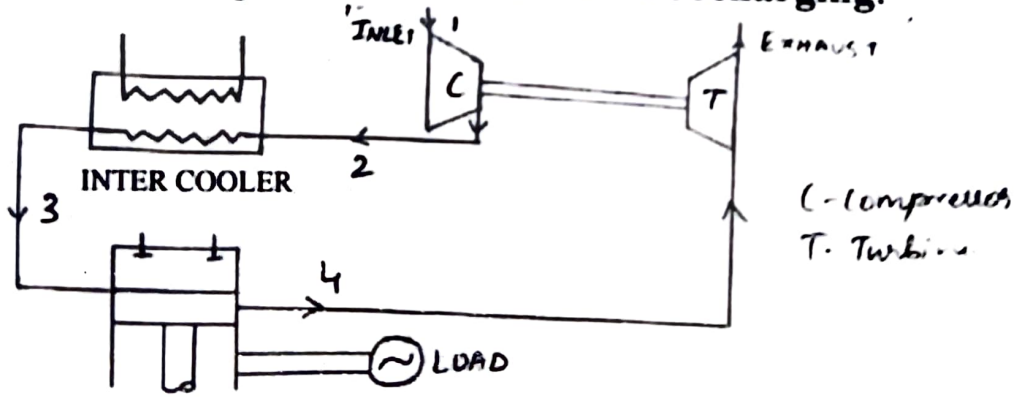


5)

- In the **first arrangement** the engine drives a compressor which is coupled to it by using step up gear.
- A part of power developed by the engine is used to run compressor and compressor supercharges the engine.



- In the **second arrangement** the turbine is coupled to the compressor which is driven by the engine exhaust gases.
- The turbine used is free from engine the power output of the engine is not used to run compressor this is called **turbocharging**.



Supercharging with turbine driven by engine exhaust