

PUMPS

TOPIC OF THE DAY

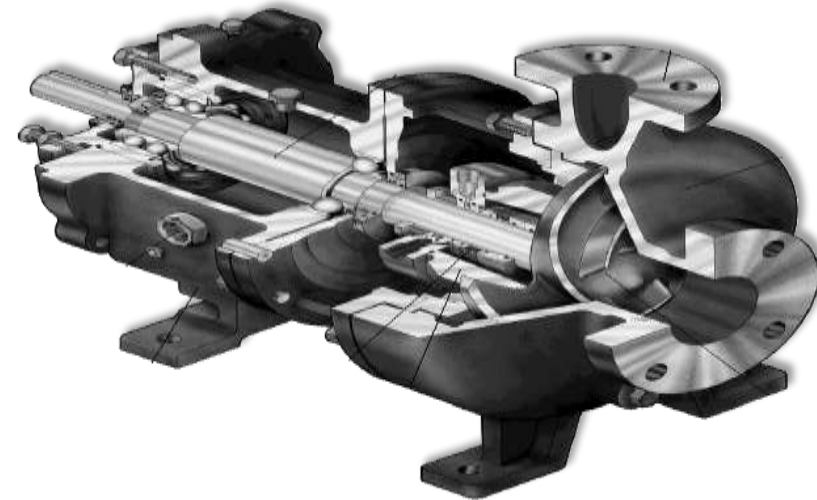




PUMPS

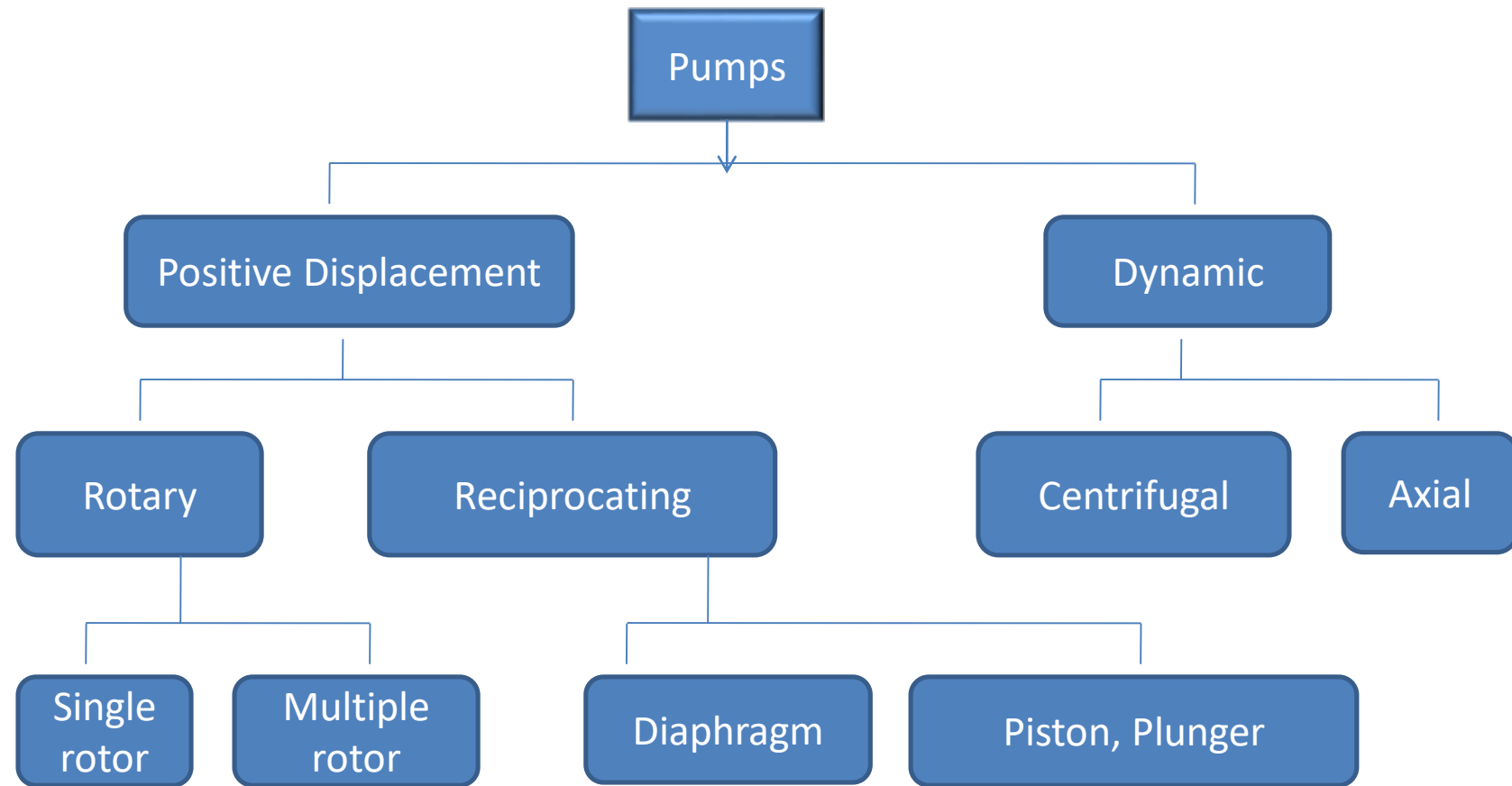
A **pump** is a device used to move fluids, such as **liquids**, **gases** or **slurries**. It increases the mechanical energy of the fluid.

The additional energy can be used to increase
Velocity (flow rate),
Pressure
Elevation





Pump Classification





Positive Displacement Pump

Positive Displacement pumps apply pressure directly to the liquid by a reciprocating piston, or by rotating members.

Uses:

1. can handle shear sensitive liquid.
2. Use for high pressure application
3. Use for variable viscosity applications.

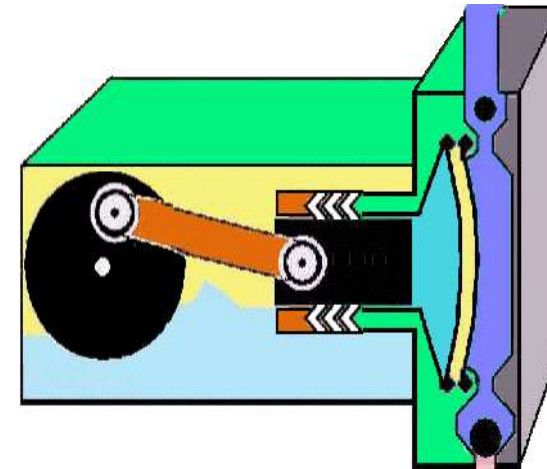
Types-

- **Reciprocating pump**
- **Rotary pump**

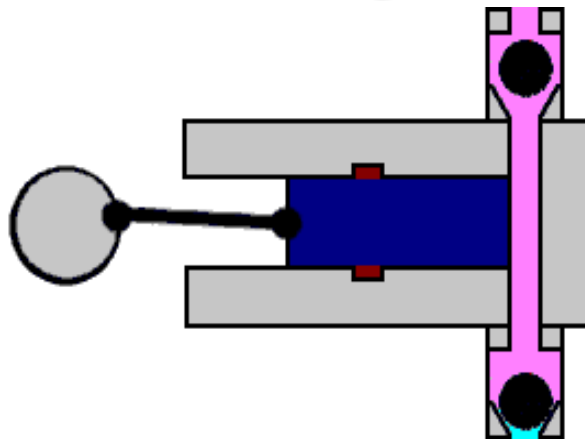
Reciprocating Pump

In Reciprocating pumps, the chamber is a stationary cylinder that contains a piston or plunger.

Piston Pump

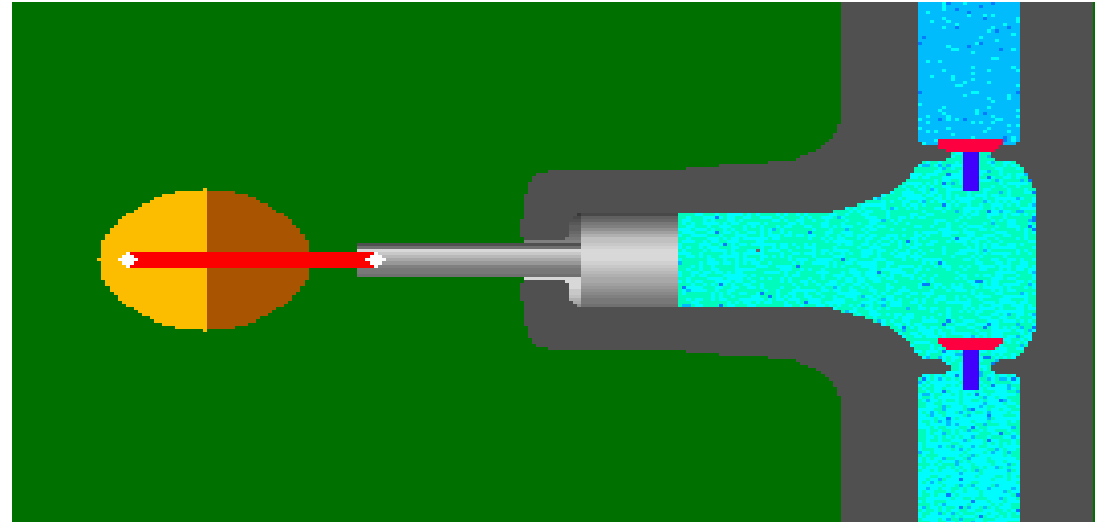


Plunger Pump

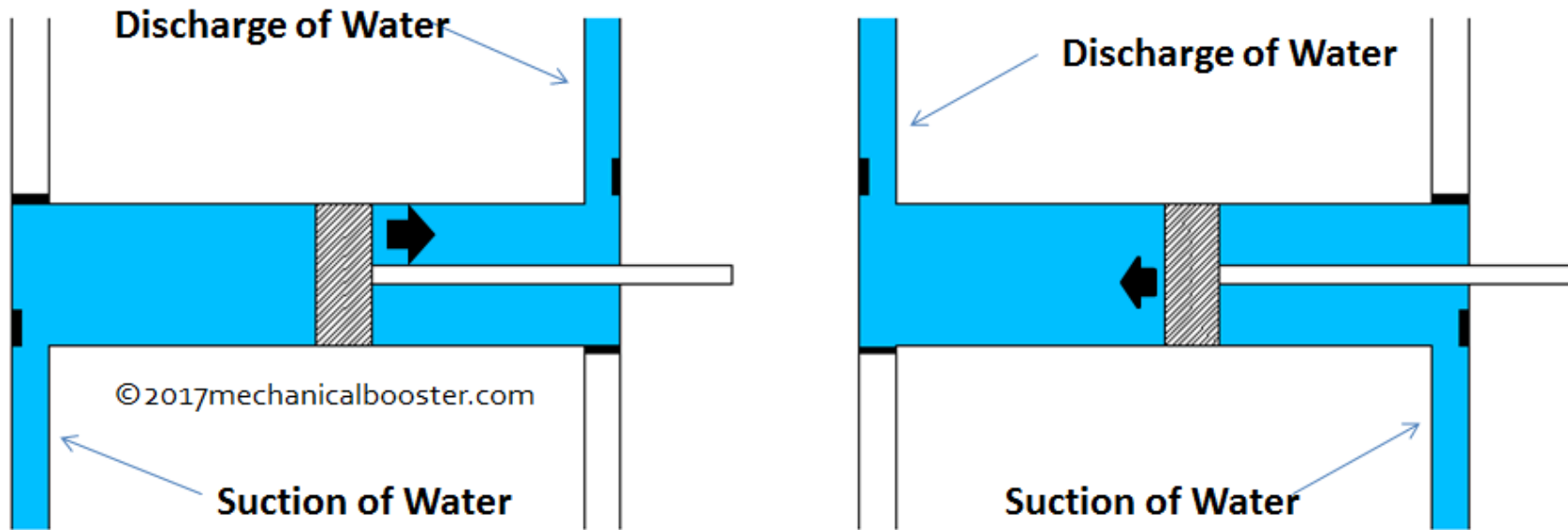




SINGLE ACTING RESIPROCATING PUMP



DOUBLE ACTING RESIPROCATING PUMP



Double Acting Reciprocating Pump

Parts of Reciprocating Pump:

The Parts of Reciprocating Pump are as follows.

- **Water Sump:**
- It is the source of water. From the sump, water is to be transported to the delivery pipes by the usage of the piston.
- **Strainer:**
- It acts as a mesh that can screen all the dirt, dust particles, etc. from the sump. If there is no [strainer](#), then the dirt or dust also enters into the cylinder which can jam the region and affects the working of the pump.
- **Suction Pipe:**
- The main function of the suction pipe is to collect the water from the sump and send it to the cylinder via a suction valve. The suction pipe connects the water sump and the cylinder.

Parts of Reciprocating Pump:

- **Suction Valve:**
- It is a non-return valve which means it can take the fluid from the suction pipe and send it to the cylinder but cannot reverse the water back to it. In the sense, the flow is unidirectional.
- This valve opens only during the suction of fluid and closes when there is a discharge of fluid to outside.
- **Cylinder:**
- It is a hollow cylinder made of cast iron or steel alloy and it consists of the arrangement of piston and piston rod.
- **Piston and Piston rod:**
- For suction, the piston moves back inside the cylinder and for discharging of fluid, the piston moves in the forward direction.
- **Crank and Connecting rod:**
- For rotation, the crank is connected to the power source like engine, motor, etc. whereas the connecting rod acts as an intermediate between the crank and piston for the conversion of rotary motion into linear motion.
- **Delivery Pipe:**
- The function of the delivery pipe is to deliver the water to the desired location from the cylinder.



Assessment -1



1. Reciprocating pump is a _____
- a) Negative displacement pump
 - b) Positive displacement pump
 - c) Diaphragm pump
 - d) Emulsion pump

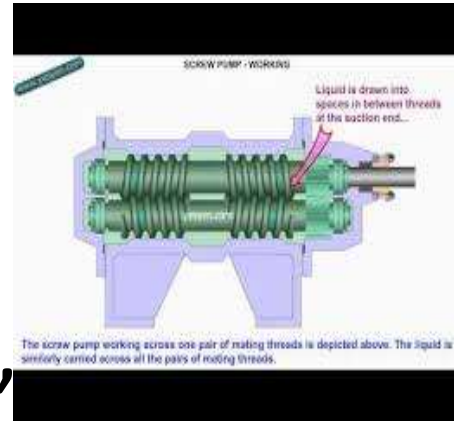
Answer: b

2. Reciprocating pumps operate by drawing _____ into the chamber
- a) Liquid
 - b) Pressure
 - c) Heat
 - d) Electricity

Answer: a

Rotary Pump

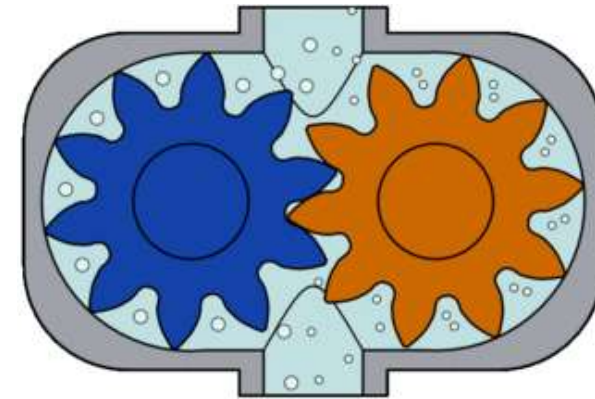
In Rotary pumps, the chamber moves from inlet to discharge and back to the inlet. A wide variety of rotary pumps are available like



SCREW PUMPS

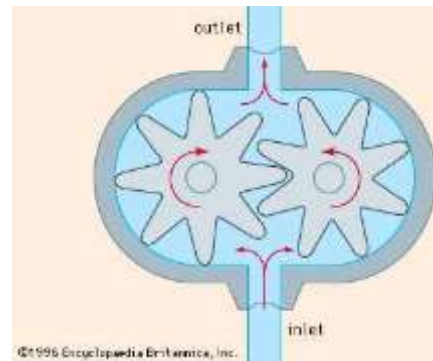


LOBE PUMPS

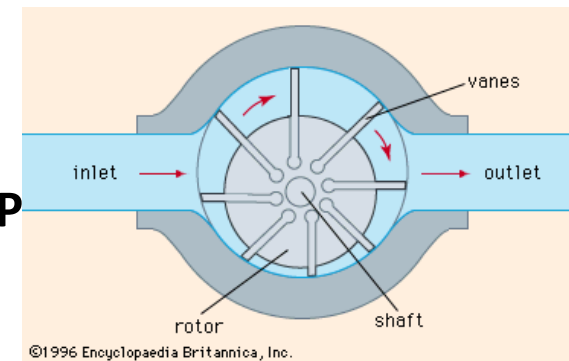


GEAR PUMPS

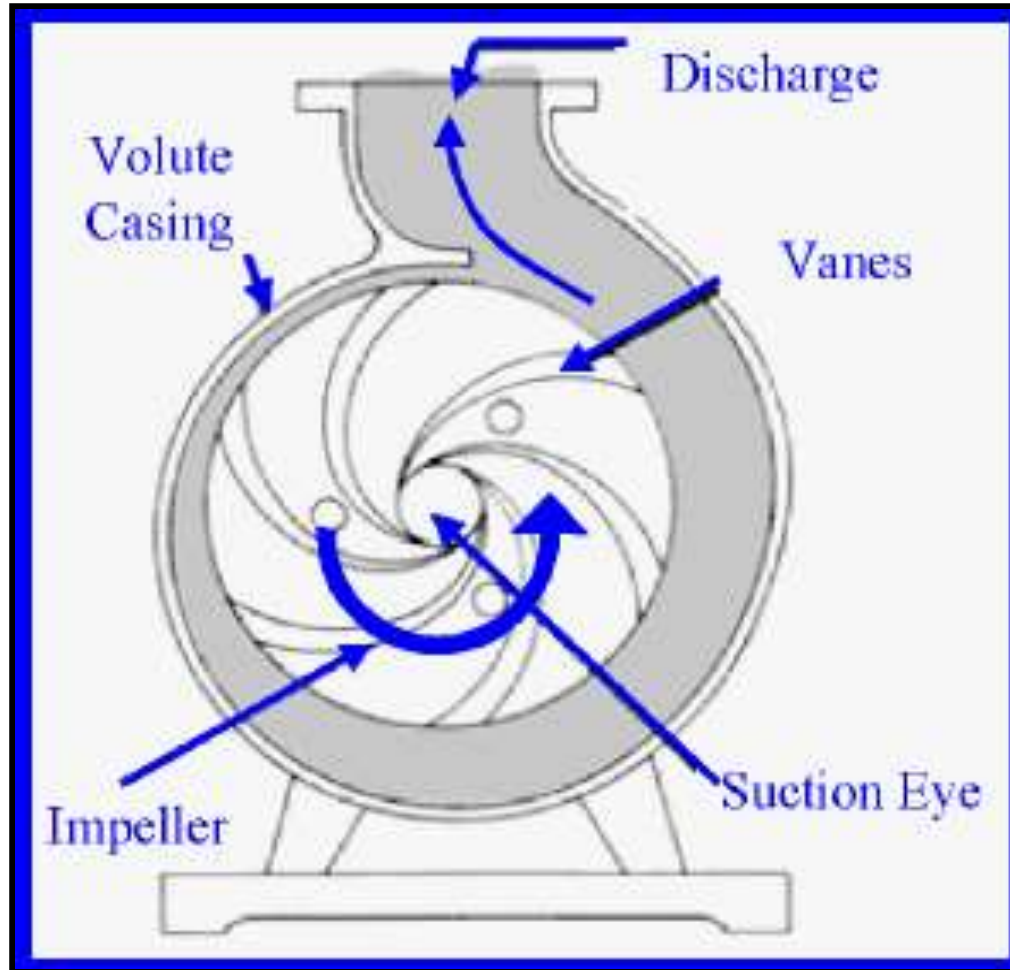
CAM PUMP



VANE PUMP



Centrifugal Pumps



- **Liquid forced into impeller**
- **Vanes pass kinetic energy to liquid: liquid rotates and leaves impeller**
- **Volute casing converts kinetic energy into pressure energy**



Centrifugal Pumps

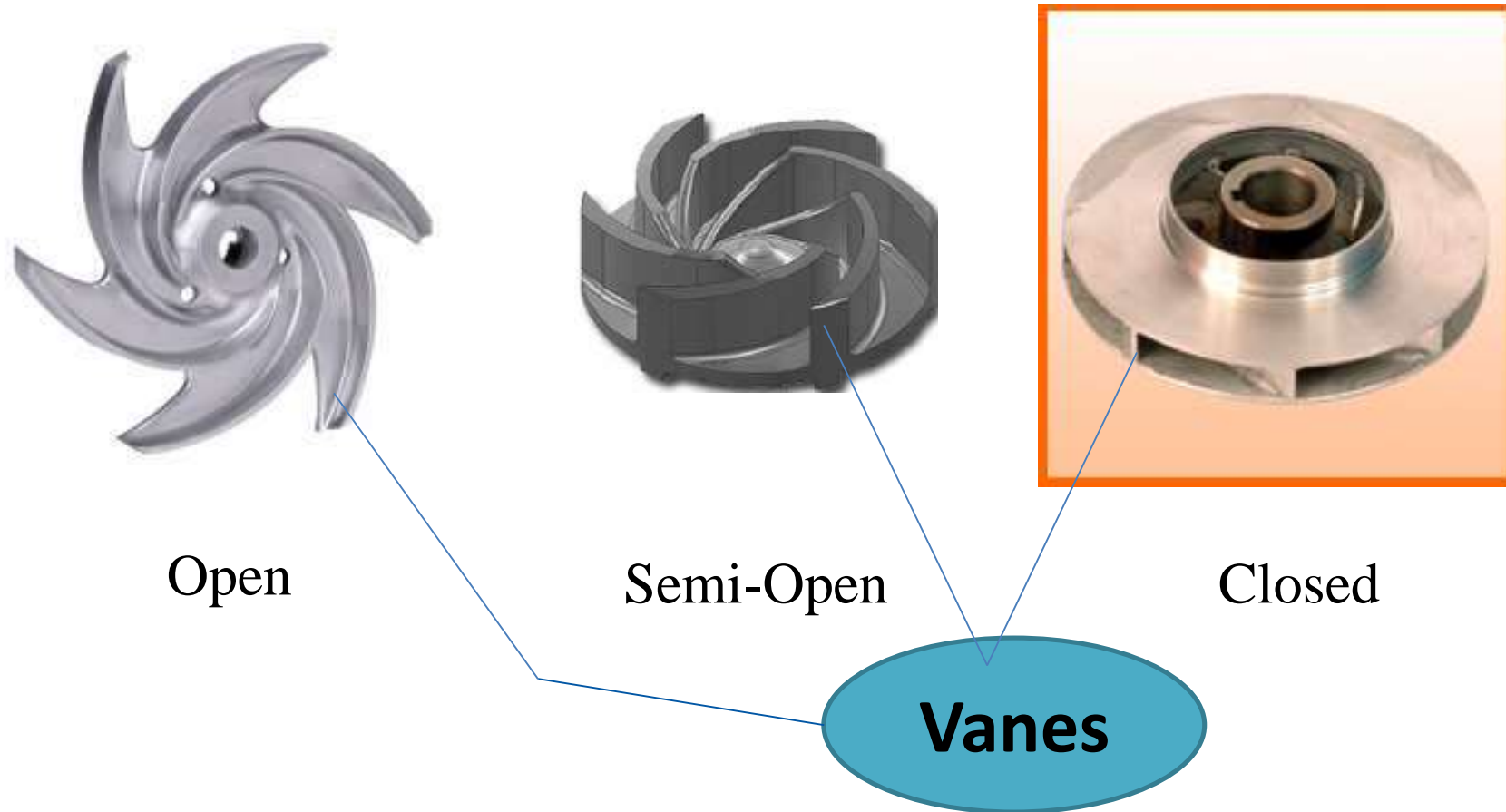


Working of a Centrifugal Pump

- Centrifugal pumps are used to induce flow or raise a liquid from a low level to a high level.
- These pumps work on a very simple mechanism.
- A centrifugal pump converts rotational energy, often from a motor, to energy in a moving fluid.
- The two main parts that are responsible for the conversion of energy are the impeller and the casing.
- The impeller is the rotating part of the pump and the casing is the airtight passage which surrounds the impeller.
- In a centrifugal pump, fluid enters into the casing, falls on the impeller blades at the eye of the impeller, and is whirled tangentially and radially outward until it leaves the impeller into the diffuser part of the casing.
- While passing through the impeller, the fluid is gaining both velocity and pressure.



Centrifugal Pumps



Open

Semi-Open

Closed

Vaness

Impellers

BASIC CIVIL AND MECHANICAL
ENGINEERING/UNIT 3/PUMPS



Assessment-2



1. _____ pump is also called as velocity pump.

- a. Reciprocating
- b. Rotary displacement
- c. Centrifugal
- d. Screw

2. Plunger pumps are used for

- a . Higher pressure
- b. Slurries
- c. Viscous mass
- d. None of these



Thank You