



# **SNS COLLEGE OF TECHNOLOGY**

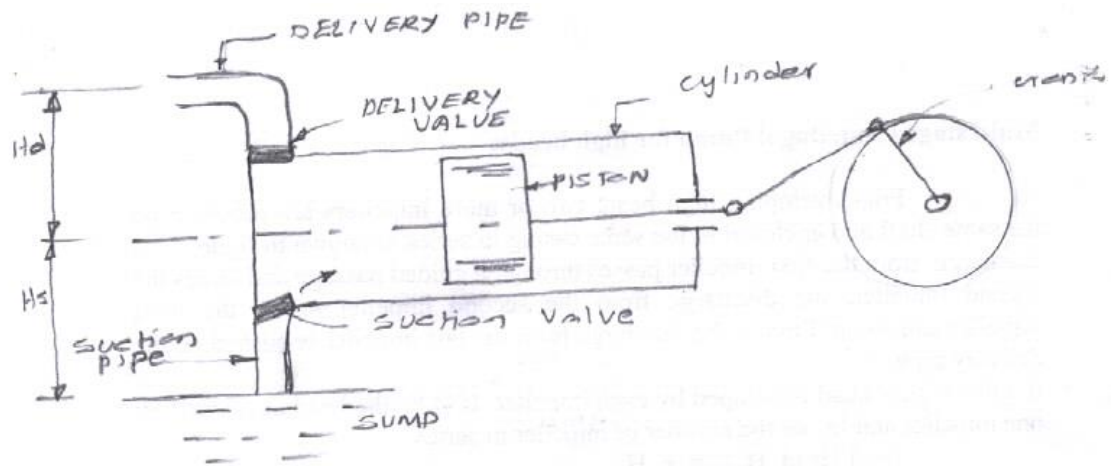
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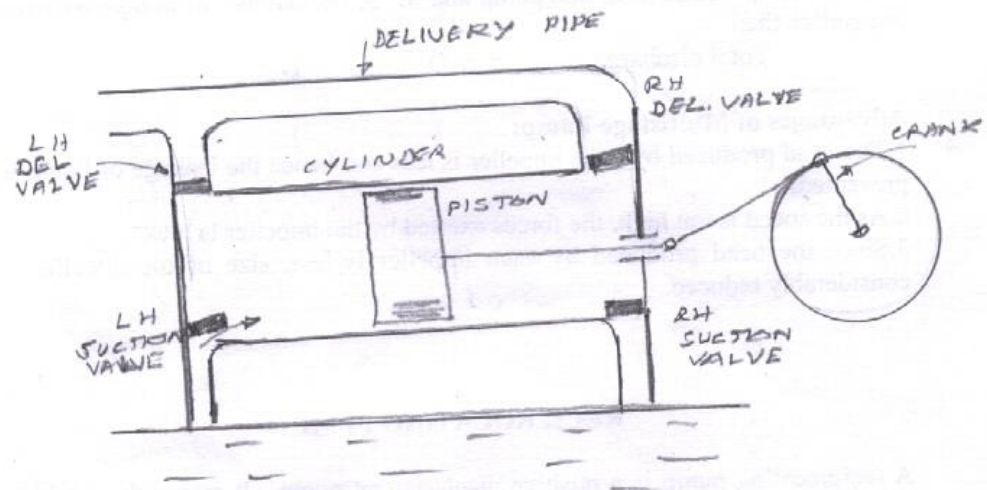


## **Department of Mechanical Engineering**

### **Reciprocating Pump**



SINGLE ACTING  
RECIPROCATING PISTON PUMP



DOUBLE ACTING  
RECIPROCATING PISTON PUMP

### RECIPROCATING PUMP

A reciprocating pump is a positive displacement pump. It means the liquid is first sucked into a cylinder and then displaced or pushed by the reciprocating motion of a piston or a plunger.

It can be obtained by connecting the piston rod to a crank by means of connecting rod. The discharge of these pumps is almost fully dependent on the speed of the pump.

### **Classification of Reciprocating pumps:**

1. According to the water being in contact: Single acting, Double acting.
2. According to the number of cylinders : Single, Double and Triple

### **SINGLE ACTING RECIPROCATING PUMP:**

It consists of 1. A piston or plunger 2. Cylinder 3. Crank and connecting rod mechanism 4. Suction and delivery pipe with non return valve

The figure shows a single acting reciprocating piston pump. It consists of a piston which moves forwards and backwards in a closely fitted cylinder. A piston is a device having shorter length (thickness) as compared to its diameter. The reciprocating movement of the piston is obtained by connecting the piston rod to a crank by means of connecting rod. The crank is rotated by an electric motor. The suction and delivery pipes with suction and delivery valve are connected on one side of the cylinder. The suction and delivery valves are non-return valves i.e., they allow the water to flow in one direction only.

### **Working Principle:**

**Suction stroke:** When the crank starts rotating, the piston or plunger moves and fro in the cylinder. During the suction stroke, the piston or plunger moves from left to right in the cylinder. It creates a partial vacuum in the cylinder. Therefore, the atmospheric pressure acting on the liquid surface forces the liquid to the suction pipe from the sump. By this way , the liquid continuously Enters into the cylinder till the suction stroke is completed.

**Delivery stroke:** During this stroke, the piston or plunger moves from right to left. The liquid is compressed and hence its pressure is increased. Due to the increment of pressure, the suction valve closes and delivery valve opens. Then, the liquid is forced into delivery pipe and is raised to the required height. The liquid is continuously discharged till the delivery stroke is completed.

In a single acting reciprocating pump, the liquid is delivered only during the delivery stroke. There will be no delivery during the suction stroke. Thus there will be one delivery for the two strokes.

### **DOUBLE ACTING RECIPROCATING PUMP:**

The pump is said to be double acting, when the liquid pressure acts on both sides of the piston or plunger. For this, two suction and delivery pipes with non-return valves are provided on each end of the cylinder as shown in figure.

Since both the end of cylinder are closed, the piston is connected to a crank through a cross-head. When the crank shaft rotating, the piston or plunger reciprocates inside the cylinder.

When the plunger or piston moves from the left to right, the following two activities takes place.

1.The partial vacuum is created inside the cylinder on the left side of the piston or plunger. Therefore, the atmospheric pressure acting on the liquid surface forces the liquid into the cylinder through suction pipe, by opening the suction valve 'b' refer figure.

2.The liquid already available on the right side of the piston or plunger is compressed which increases the pressure of liquid. Due to the increment of pressure the suction valve 'd' closes and the delivery valve 'c' opens. Then the liquid is delivered to the delivery pipe through the valve 'v'.

Similarly, when the piston moves from right to left, the above cycle is repeated and the liquid is delivered to the delivery pipe through 'a'. Thus in a double acting reciprocating pump, when there is suction on left side, there will be delivery on the right side. Hence the delivery of a double acting pump is continuous.