Title: Verification Bernoulli's Theorem.

Aim: To study flow through a variable duct area.

Objectives: To verify experimentally Bernoulli's principle.

Theory:

When an incompressible fluid flowing through closed conduit is may be subjected to various forces, which cause charge of velocity, acceleration and energies involved. The major forces involved are pressure may changes or due to change of cross section velocity of fluid may change. But through there is change of velocity, pressure also changes accordingly. In other words it velocity energy of fluid is raised, its pressure will drops, i.e. total energy of fluid is constant at any two points in path of flow. The theorem is known as Bernoulli's theorem. Hence when applied to study irrigational flow of incompressible fluids.

$P\backslash W + V^2/2g+z = C$

P = pressure

V = velocity at point.

Z= potential head from datum.

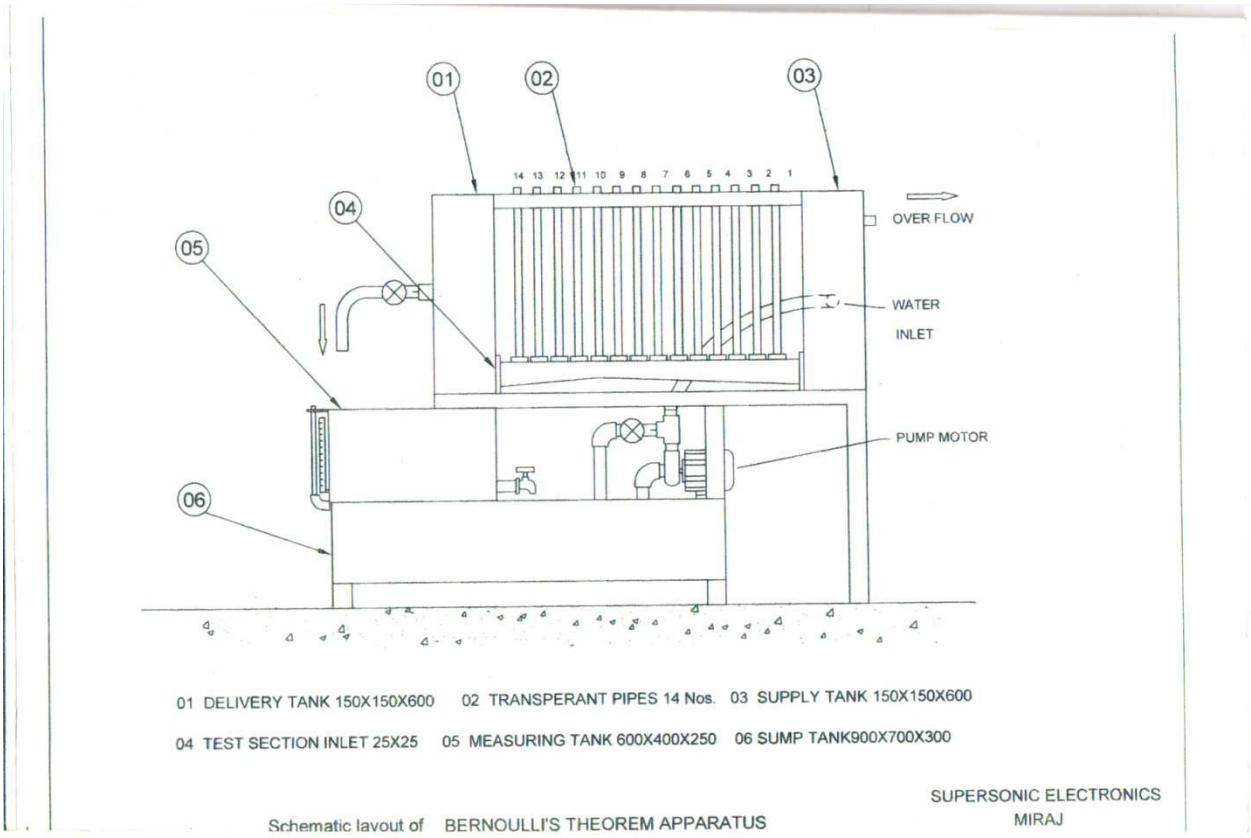
Apparatus:

The apparatus consist of a rectangular flow channel. Which is venturi type along the length flow area at inlet is maximum and it goes on reducing towards outlet. Water is fed to flow. Channel through a supply tank. Outlet is directly collected in measuring tank.

Experimental procedure:

1. Connect the water pipe to inlet valve.
2. Reduce flow by inlet gate valve, so that there is only a small size rise of water in last pressure tapping.
3. Allow levels to stabilize and note down heads.
4. Close outlet valve of measuring tank and measure time is rise water level by 10cm.
5. Now repeat procedure by changing discharge and note drop of head towards outlet for each observation.

Experimental Setup Diagram:-



Observation table :

Piezometer No.	Pipe Area cm^2	Rise of water level h(cm)	H_t in cm	H_t +h Pressure head in (cm)	Measuring tank Height (cm)	Time (sec)	Q	Velocity Q/A	Velocity head $V^2/2g$	Total head
1										
2										
3										
4										
5										

Note:

Practically value of ‘c’ goes on reducing slightly towards outlet due to various factors which are not considered eg. Friction, turbulence etc...

PLOT THE GRAPHS:

1. Pressure Head v/s Piezometer No.
2. Kinetic Head v/s Piezometer No.
3. Total Head v/s Piezometer No.

Conclusion:

1. As value of ‘c’ is fairly constant, total energy of flow is same over the entire length.
2. As velocity of flow increases, pressure head drops.
3. Bernoulli’s equation i.e.

   $P/W + V^2/2G + Z = C$ is verified.

Precaution:

1. Note down head readings after level has been stabilized.
2. After noting discharge drain measuring tank.\after completion of experiment, drain all the water from the equipment.
3. After the completion of the experiment drain all the water from the equipment.