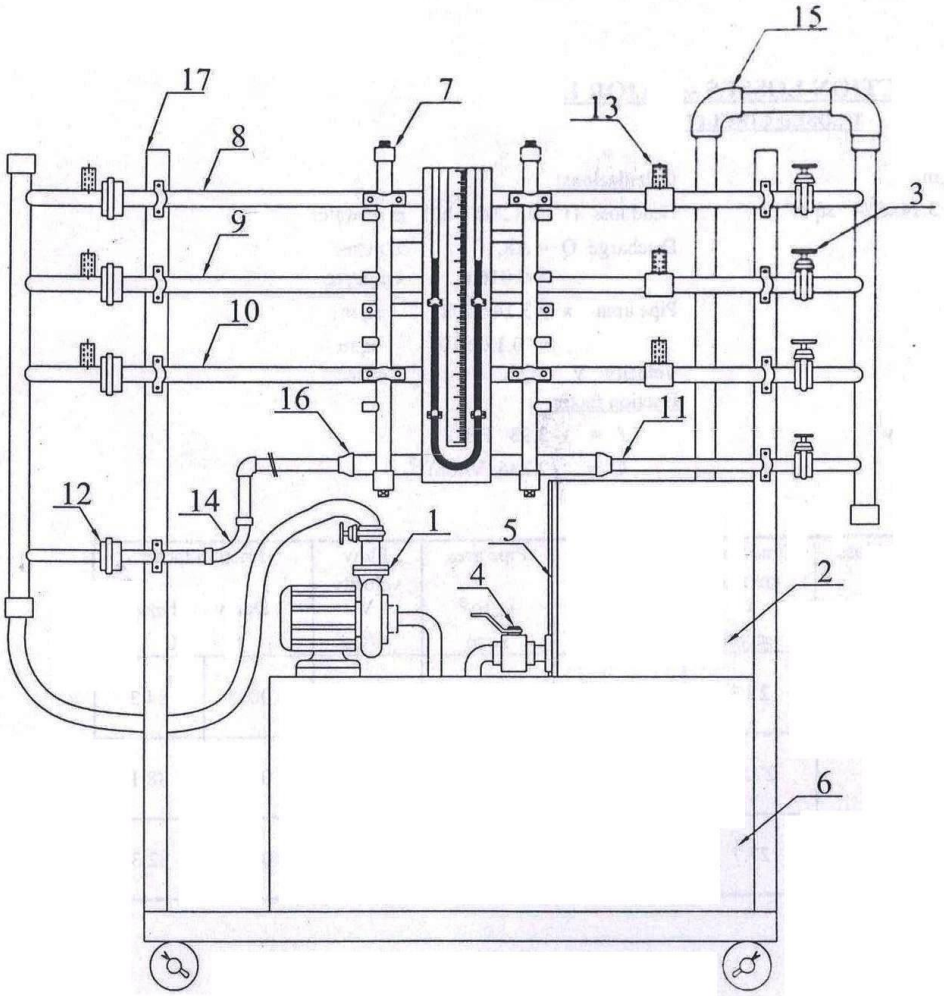

1. Supply pump
2. Sump tank
3. Flow control valve
4. Drain valve
5. Gauge glass
6. Collecting tank
7. Manometer
8. Copper pipe
9. Aluminium pipe
10. Stainless Steel pipe
11. Minor losses pipe
12. M.S Union
13. M.S Coupling
14. Bend
15. Elbow
16. Reducer
17. Support Stand

FRICTION LOSSES TEST RIG

DETERMINATION OF FRICTION FACTOR OF GIVEN SET OF PIPES

AIM:

To find the friction 'f' for the given pipe.

APPARATUS REQUIRED:

1. A pipe provided with inlet and outlet and pressure tapping
2. Differential u-tube manometer
3. Collecting tank with piezometer
4. Stopwatch
5. Scale

FORMULAE:

1. **FRICTION FACTOR (F):**

$$f = 2 \times g \times d \times h_f / l \times v^2 \quad \text{(no unit)}$$

Where,

g = Acceleration due to gravity (m / sec^2)

d = Diameter of the pipe (m)

l = Length of the pipe (m)

v = Velocity of liquid following in the pipe (m / s)

h_f = Loss of head due to friction (m)

$= h_1 \sim h_2$

Where

h_1 = Manometric head in the first limbs

h_2 = Manometric head in the second limbs

2. **ACTUAL DISCHARGE:**

$$Q = A \times h / t \quad (m^3 / sec)$$

Where

A = Area of the collecting tank (m^2)

h = Rise of water for 5 cm (m)

t = Time taken for 5 cm rise (sec)

S.No	Diameter of pipe mm	Manometer readings			Time for 5cm rise of water t sec	Actual discharge $Q_{act} \times 10^{-3}$ m^3 / s	Velocity V m/s	V^2 m^2 / s^2	Friction factor $f \times 10^{-2}$
		$h_1 \times 10^{-2}$	$h_2 \times 10^{-2}$	$h_f = (h1-h2) \times 10^{-2}$					
								Mean f =	

3. VELOCITY:

$$V = Q / a \quad (m / sec)$$

Where

Q = Actual discharge (m^3/ sec)

A = Area of the pipe (m^2)

DESCRIPTION:

When liquid flows through a pipeline it is subjected to frictional resistance. The frictional resistance depends upon the roughness of the pipe. More the roughness of the pipe will be more the frictional resistance. The loss of head between selected lengths of the pipe is observed.

PROCEDURE:

1. The diameter of the pipe is measured and the internal dimensions of the collecting tank and the length of the pipe line is measured
2. Keeping the outlet valve closed and the inlet valve opened
3. The outlet valve is slightly opened and the manometer head on the limbs h_1 and h_2 are noted
4. The above procedure is repeated by gradually increasing the flow rate and then the corresponding readings are noted.

MODEL CALCULATION:

RESULT:

1. The frictional factor ‘f ‘ for given pipe = x 10^{-2} (no unit)
2. The friction factor for given pipe by graphical method = …… x 10^{-2} (no unit)