FLOW Measurement ⇒

Types of flow measurement

(I) Inferential type flowmeter
(II) Quantity flowmeter
(III) Mass flowmeter

(I) Inferential flow meter ⇒ Inferential measurement is a human body running fever resulting from a serious sickness or disability.

Types of Inferential flow meter ⇒

(a) Variable head or differential meters
(b) Variable area meters
(c) Magnetic meters
(d) Turbine meters
(e) Target meters
(f) Thermal flow meters
(g) Vordex meters
(h) Ultrasonic flowmeters

(a) Variable head or differential meters ⇒ Variable head flowmeters operate on the principles that a restriction in the pipe of flowing fluid, introduced by orifice plates produces a differential pressure which is proportional to the flow rate.

Flow rate is proportional to the square root of the differential pressure.

$$V = k\sqrt{\frac{2gh}{\rho}}$$

$$Q = kA\sqrt{\frac{2gh}{\rho}}$$

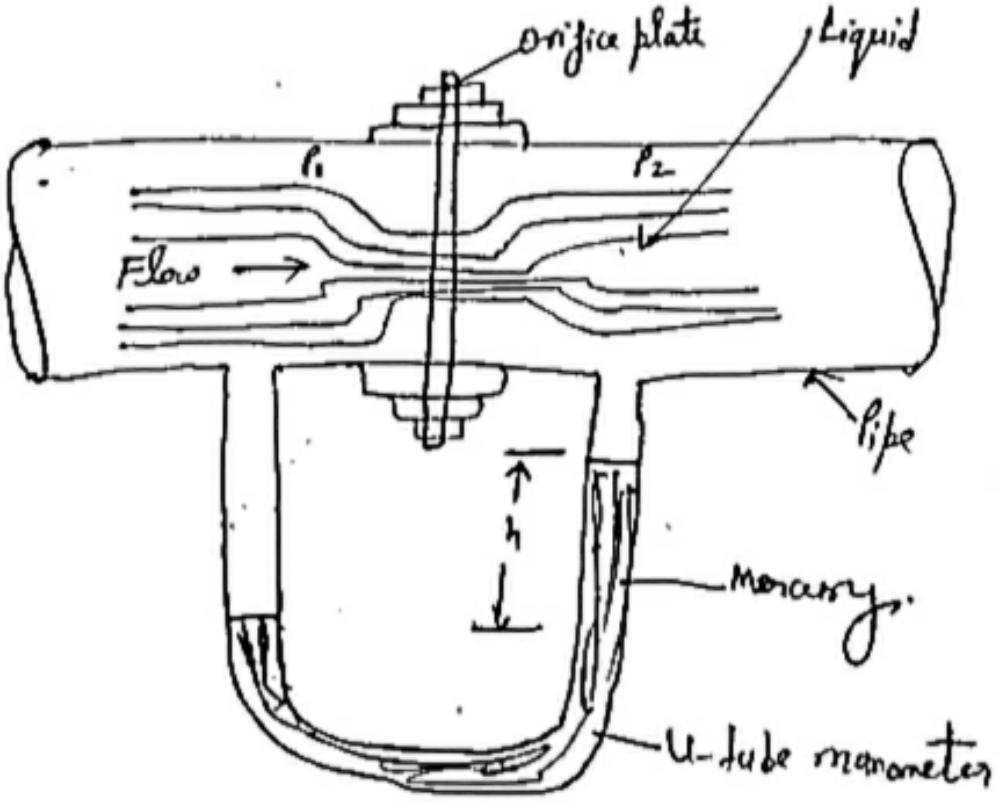
$$W = kA\sqrt{\frac{2gh}{\rho}}$$

$$k = \frac{C}{\sqrt{1-\beta^4}} = \text{a Constant.}$$

where V is velocity of flowing fluid.
A = Crossectional area of pipe.
h = differential pressure.
Q = Volume flow rate.
g = acceleration due to gravity.
W = mass flow rate.
ρ = density of the flowing fluid.

where C = discharge coefficient
β = diameter ratio

$$\beta = \frac{d\ (\text{diameter of restriction element})}{D\ (\text{inside diameter of pipe})}$$



Reynold number ⇒ Reynold number is a very important reference number in the accurate determination of flow. It is used to determine the point at which the flow goes from the viscous to the turbulent stage.

$$R_D = \frac{V D \rho}{\mu}$$

where R_D = Reynolds number
V = average velocity
D = inside pipe diameter
ρ = density of flowing fluid
μ = absolute viscosity

Advantages of Differential flowmeters ⇒

(i) Its cost is low.
(ii) It is accurate
(iii) It is adaptable to any pipe size.
(iv) It is easily control.

Disadvantages ⇒ (i) Low flow rate are not easily measured ⇒
(ii) High permanent loss.

Types of orifice plate ⇒

Concentric orifice plate

Eccentric orifice plate

Segmental orifice plate

Quadrant edge.