Exp. # 1 :- Osborne Reynold's Demonstration

(*) Calculations :-

- $Q_t = \dfrac{V}{t}$ ($m^3/sec.$)
  - V : volume of collected water (m^3)
  - t : Time to collect ($sec.$)

- $Q_t = u A$
  - u : Mean velocity ($m/sec.$)
  - A : Cross-sectional area of pipe
    $= 7.854 * 10^{-5}$ m^2

- $Re = \dfrac{u d}{\nu}$
  - d : Pipe Diameter (10 mm)
  - ν : Kinematic Viscosity ($m^2/sec.$)
    ↓
    From table, Depends on temp.

- $Re < 2000$ → Laminar Flow
- $Re > 4000$ → Turbulent Flow
- $Re > 2000, < 4000$ → Transitional Flow.

Results :-

($\forall$) Collected Volume (m^3)	(t) Time to collect (sec.)	(T) Temp. ($^\circ C$)	(A) Pipe area (m^2)	(d) Pipe diameter (m)

(Q_t) Flow Rate (m^3/sec.)	(u) Mean velocity (m/sec)	(ν) Kinematic Viscosity (m^2/sec.)	(Re) Reynold's Number

Example :-

$\forall = 5 L = 0.005\ m^3$

$t = 380$ sec.

$d = 10$ mm

$\nu = 0.893 \times 10^{-6}\ m^2/sec.$

→

- $Q_t = \frac{\forall}{t} = \frac{0.005}{380} = 1.32 \times 10^{-5}\ m^3/sec.$
- $A = \frac{\pi d^2}{4} = \frac{\pi (10)^2}{4} = 78.54\ mm^2 = 7.85 \times 10^{-5}\ m^2$
- $u = \frac{Q_t}{A} = \frac{1.32 \times 10^{-5}}{7.85 \times 10^{-5}} = 0.168\ m/sec.$
- $Re = \frac{ud}{\nu} = \frac{(0.168)(0.01)}{0.893 \times 10^{-6}}$

$= 1883.01$

Laminar Flow ($Re < 2000$) ←