$D_1 = 0.15m$ $D_2 = 0.05m$ $D_3 = 0.1m$ $Q1 = 0.05\ m^3/s$
$p_1 = 400 \times 10^3\ N/m^2$ $p_2 = 395 \times 10^3\ N/m^2$

$$A_1 = \frac{p\ D_1^2}{4} = 0.018\ m^2 \quad A_2 = \frac{p\ D_2^2}{4} = 0.001963\ m^2 \quad A_3 = \frac{p\ D_3^2}{4} = 0.007854\ m^2$$

$$u_1 = \frac{Q_1}{A_1} = 2.829\ m/s$$

CONSERVATION OF ENERGY OF A STREAMLINE FROM (1) TO (2)

$$p_1 + r\frac{u_1^2}{2} = p_2 + r\frac{u_2^2}{2}$$

$$400 \times 10^3 + 998\frac{2.829^2}{2} = 395 \times 10^3 + 998\frac{u_2^2}{2} = 404 \times 10^3$$

$$u_2 = 4.246\ m/s$$

FLOW RATE $Q_2 = A_2 u_2 = 0.008336\ m^3/s$

CONSERVATION OF MASS $Q_3 = Q_1 - Q_2 = 0.042\ m^3/s$ $u_3 = \dfrac{Q_3}{A_3} = 5.305\ m/s$

CONSERVATION OF ENERGY OF A STREAMLINE FROM (1) TO (3)

$$p_1 + r\frac{u_1^2}{2} = p_3 + r\frac{u_3^2}{2}$$

$$400 \times 10^3 + 998\frac{2.829^2}{2} = p_3 + 998\frac{u_3^2}{2} = 404 \times 10^3$$

$$p_3 = 404 \times 10^3 - 998\frac{5.305^2}{2} = 390 \times 10^3\ N/m^2$$

FORCES

Horizontal force = $m\ \Delta u + A\Delta p$ in horizontal direction.
$F_h = \rho Q_1\ (0 - 2.829) + 0.018\ (0 - 400 \times 10^3) = -7.21\ kN$ (To right on diagram)
Vertical force = $m\ \Delta u + A\Delta p$ in vertical direction. There are two calculations.
$F_{v1} = \rho Q_2\ (u_2 - 0) + A_3 p_3 = (998 \times 0.008336 \times 4.246) + (0.001963 \times 390 \times 10^3)$
$F_{v1} = 810.9\ N$ Up
$F_{v2} = \rho Q_3\ (u_3 - 0) + A_3 p_3 = (998 \times 0.042 \times 5.305) + (0.007854 \times 390 \times 10^3)$
$F_{v2} = 3.283 \times 10^3\ N$ Up
Total vertical force = 4.094 KN Up

RESULTANT FORCE = $\{4.094^2 + 7.21^2\}^{1/2} = 8.291\ kN$