

Fluids Questions

1. Calculate the total horizontal force acting on a dam 10m wide filled to a depth of 6m. Assume that the density of water is 1000 kg/m^3 and that the gravitational constant, $g=9.81$.
 - (a) 1.77kN
 - (b) 3.54kN
 - (c) 1.77MN
 - (d) 3.54MN
2. A Pitot tube placed in a pipe records a height of 10cm of water. What is the velocity in the pipe?
 - (a) 1.4 m/s
 - (b) 1.0 m/s
 - (c) 2.5 m/s
 - (d) 14 m/s
3. Oil of specific gravity 0.73 with dynamic viscosity $8.6 \times 10^{-2} \text{ kg/ms}$ is pumped through a 25mm diameter pipe at a velocity of 3m/s. The Reynolds number is:
 - (a) 637
 - (b) 793
 - (c) 6370
 - (d) 7930
4. Air entering a compressor has a density of 1.3 kg/m^3 and a velocity of 4m/s. The area of the intake is 10 cm^2 . What is the mass flow rate?
 - (a) $5.2 \times 10^{-3} \text{ kg/s}$
 - (b) $5.2 \times 10^{-1} \text{ kg/s}$
 - (c) 5.2 kg/s
 - (d) $5.2 \times 10^2 \text{ kg/s}$
5. Water is supplied from a header tank 10m above the water discharge point through a vertical pipe with internal diameter of 5cm. If the friction factor is 0.008, calculate the flow rate ignoring separation losses.
 - (a) 2.2 m/s
 - (b) 3.3 m/s
 - (c) 4.4 m/s
 - (d) 5.5 m/s

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6. If the pipe in question 5 is inclined at 45° what is the flow rate?
- (a) 1.2 m²/s
 - (b) 2.4 m/s
 - (c) 4.7m/s
 - (d) 6.3 m/s
7. A jet of water flows smoothly on to a curved vane which turns it through 60° . The initial jet is 50mm in diameter and the velocity (which is uniform) is 36 m/s. As a result of friction, the velocity of the water leaving the surface is 30 m/s. Neglecting gravity effects calculate the force on the vane.
- (a) 699 N
 - (b) 799 N
 - (c) 899 N
 - (d) 999 N
8. Water flows through a horizontal nozzle of 5mm diameter at 10 m/s. Calculate the force required to keep the nozzle attached to a 5cm diameter pipe.
- (a) 96.2 N
 - (b) 962 N
 - (c) 9.62 kN
 - (d) 96.2 kN