

Fluids Questions

Correct answers are given in **bold**

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/m³ 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 8.6×10^{-2} 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 1.3kg/m³ and a velocity of 4m/s. The area of the intake is 10 cm². What is the mass flow rate?

(a) 5.2×10^{-3} kg/s
(b) 5.2×10^{-1} kg/s
(c) 5.2 kg/s
(d) 5.2×10^2 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**

6. If the pipe in question 5 is inclined at 45° what is the flow rate?

- (a) 1.2 m/s
- (b) 2.4 m/s
- (c) 4.7 m/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