

Quiz 1

Paper B

30 minutes; 10 points

- Fill your name, roll no., and section no. above.
- Circle the correct answer among the four choices given.
- 2.5 marks for a correct answer. *Negative marking:* One point will be deducted per wrong answer.
- Use $g = 9.8\text{ m/s}^2$, Density of water = 1000 kg/m^3 .

1. Which of the following statements are TRUE:

- P. A streamline is parallel to the local velocity vector in the fluid.
- Q. Path lines and streak lines could be different in an unsteady flow.
- R. Streak lines are produced by instantaneously injecting a dye at a point, and observing its consequent evolution.
- S. Stream lines and streak lines could be different in a steady flow.

- (a) P and Q (b) P and S (c) Q and S (d) Q and R

2. Given the Eulerian velocity field

$$\mathbf{v} = 2xz\mathbf{i} + 5t\mathbf{j} + ty\mathbf{k}$$

the acceleration of the material particle that is present at $x = 1, y = 1, z = -1$ at $t = 2$ is :

- (a) $8\mathbf{i} - 5\mathbf{j} - 21\mathbf{k}$ (b) $8\mathbf{i} + 5\mathbf{j} + 21\mathbf{k}$ (c) $8\mathbf{i} - 5\mathbf{j} + 21\mathbf{k}$ (d) $8\mathbf{i} + 5\mathbf{j} + 41\mathbf{k}$.

3. For the system shown in figure 1, both the tank and the tube are open to the atmosphere (here, s.g. denotes specific gravity of the liquid). If $\theta = 30^\circ$, and the length of the liquid in the inclined tube $L = 2\text{ m}$, then the height H of the water in the tank is:

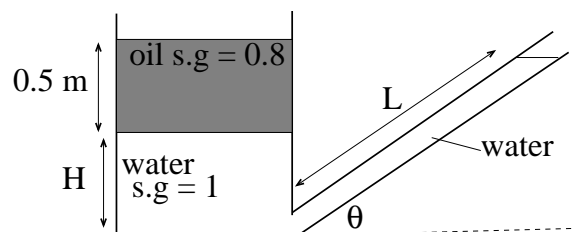


Figure 1: **Problem 3**

- (a) 2.4 m (b) 1.2 m (c) 1.8 m (d) 0.6 m

4. For the system shown in figure 2, the Gate B is 50 cm high, 60 cm wide (into the paper), and is hinged at the top. There is a rigid stopper that prevents the gate to move into the water. The gage pressure p_{gage} in the air chamber below which the gate will open to the air chamber is:
- (a) 8.98 kPa (b) 35.94 kPa (c) 17.97 kPa (d) 10 kPa

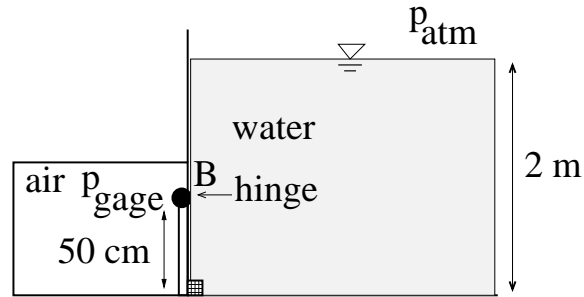


Figure 2: **Problem 4**