Exam 2Ca, Fluid Motion

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Consider a brick that is totally immersed in water. The long edge of the brick is vertical. The pressure on the brick is
   A) greatest on the face with largest area.
   B) the same on all surfaces of the brick.
   C) greatest on the sides of the brick.
   D) greatest on the bottom of the brick.

2) What of the following is a WRONG statement.
   A) When an ice cube floating in a glass of water melts, the water level remains the same.
   B) An ice cube with a piece of cork frozen into it is floating in a glass of water. When the ice melts the water level remains the same.
   C) An ice cube with a steel nut frozen into it is floating in a glass of water. When the ice melts the water level remains the same.
   D) When an ice cube floating in a glass of water melts, the water pressure at the bottom of the glass remains the same.

3) What of the following is a WRONG statement.
   A) The equation $\rho v A$ = const is only valid under the conditions of conservation of mass and incompressibility of the fluid.
   B) A steady flow implies that the velocity does not change in time, but might still change along streamlines.
   C) Positioning of the center of buoyancy of a boat above its center of gravity, when the boat is upright, is not a necessary condition of stability of the boat.
   D) Variation of hydrostatic pressure with the height/depth is proportional to the density of the fluid

4) What of the following is a WRONG statement.
   A) Curved shape of an airplane wing is not essential for the lift.
   B) A Helium filled balloon may be rising or sinking depending on the altitude it is released at.
   C) Airplanes take off into the wind to increase the lift force.
   D) For a pump submerged at the bottom of a deep well, it takes less power to pump water to the surface when the well is half–empty than when the well is full.

5) What of the following is a WRONG statement.
   A) Hydrostatic equilibrium implies that the net force everywhere in the fluid is zero.
   B) A stone placed in a vertical cylinder filled with water and rotating around its axis will eventually be found at the bottom near the wall.
   C) Bernoulli's equation originates from continuity principle for fluids.
   D) A piece of cork placed in a vertical cylinder filled with water and rotating around its axis will eventually be found at the surface near the axis.

6) The air pressure inside of a sealed house is 1.04 atm when a hurricane hits. The hurricane rapidly decreases the external air pressure to 0.87 atm. In what range is the net force (directed outwards) exerted on a square window with a side of 0.8 m in the house?
   A) 1.2×10^4 N – 1.4×10^4 N
   B) 1.0×10^4 N – 1.2×10^4 N
   C) 4×10^4 N – 6×10^4 N
   D) 1×10^5 N – 2×10^5 N

7) A manual hydraulic lift has a 45–cm–diameter piston supporting the load, and it can go up by a maximal height of 90 cm. The maximal load it can support is 500 kg. The manually driven piston has a diameter of 4 cm. What is the force one needs to apply to the manually driven piston to lift the maximal load, if there is no friction.

A) 40 N B) 430 N C) 220 N D) 6 N

8) A venturi is constructed of a pipe with a cross–section area of 98 cm^2 and a throat. Water in the pipe has a pressure of 2 atm and it flows with a velocity of 0.7 m/s. Water in the throat has a pressure 1.6 atm. In what range is the cross–section area of the throat?

A) 5–7 cm^2 B) 7–9 cm^2 C) 11–15 cm^2 D) 1–2 cm^2

Answer Key
Testname: QUIZ1.TST

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) D
2) C
3) A
4) D
5) C
6) B
7) A
8) B