



KING ABDULAZIZ UNIVERSITY  
FACULTY OF ENGINEERING  
AERONAUTICAL ENGINEERING DEPARTMENT

**AE300: Thermofluids I – Fall 2020**

## Assignment 2 (15 marks)

**Name:**

**ID:**

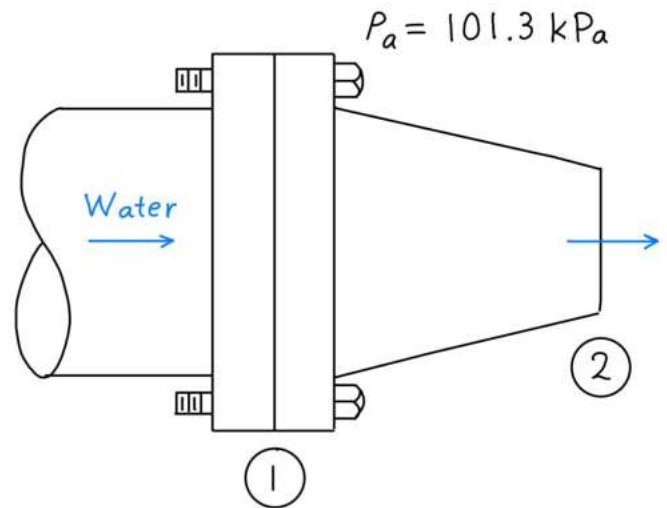
Q1	Approach (3)	Correctness (1.5)	Units (0.5)	Score (5)
Q2	Approach (4)	Correctness (0.75)	Units (0.25)	Score (5)
Q3	Approach (2)	Correctness (1)	Diagram (2)	Score (5)
<b>Total Score</b>				

- **Due date: Thursday 19 Nov**
- **In your solution you should begin with the general relation, state your assumptions if any and show a sketch.**

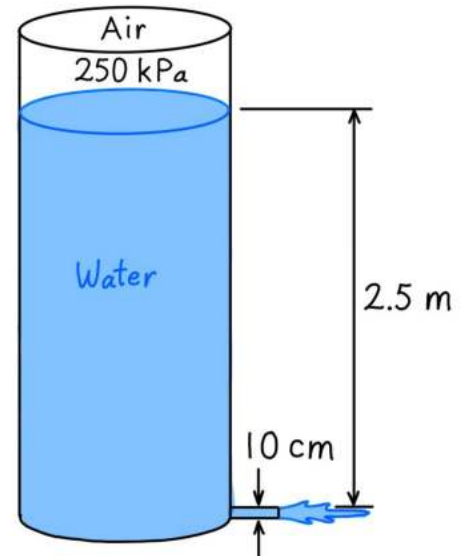
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**Q1.** The horizontal nozzle shown has  $D_1 = 30$  cm and  $D_2 = 15$  cm, with inlet absolute pressure  $P_1 = 262$  kPa and  $V_1 = 17$  m/s. For water ( $\rho = 1000$  kg/m<sup>3</sup>), compute the horizontal force provided by the flange bolts to hold the nozzle fixed. Show the CV



**Q2.** A pressurized tank of water has a 10 cm diameter hole at the bottom, where water discharges to the atmosphere. The water level is 2.5 m above the outlet. The tank air pressure above the water level is 250 kPa (absolute) while the atmospheric pressure is 100 kPa. Neglecting frictional effects, determine the volumetric flow rate of water exiting the tank.



**Q3.** A tank contains water at 100 °C. If the specific volume of the water is 1.672 m<sup>3</sup>/kg determine:

- (a) The state of the water and why
- (b) The pressure

Draw the T-v Diagram showing all information including the values of v, P and T