Unit 4 - Week 2

Assignment 2

The basic law of the transmission is a product of
1. Transmission of pressure
2. Transmission of momentum
3. Transmission of jet forces
4. Transmission of force on the force

Task 1

Which one of the following statements is INCORRECT?
1. The total force on the solid body and fluid (contact) on the solid body is the sum of the contact force between the solid body and fluid.
2. The flow force on the solid body is the sum of the contact force between the solid body and fluid.
3. The total force on the solid body is the sum of the contact force between the solid body and fluid.
4. The total force on the solid body is greater than the sum of the contact force between the solid body and fluid.

Task 2

Which one of the following properties is affected by the first law of thermodynamics?
1. Momentum
2. Energy
3. Pressure
4. Density

Task 3

Which one of the following statements is TRUE?
1. The flow force on the solid body is the sum of the contact force between the solid body and fluid.
2. The total force on the solid body is the sum of the contact force between the solid body and fluid.
3. The total force on the solid body is the sum of the contact force between the solid body and fluid.
4. The total force on the solid body is the sum of the contact force between the solid body and fluid.

Task 4

Which one of the following statements is incorrect?
1. The flow force on the solid body is the sum of the contact force between the solid body and fluid.
2. The total force on the solid body is the sum of the contact force between the solid body and fluid.
3. The total force on the solid body is the sum of the contact force between the solid body and fluid.
4. The total force on the solid body is the sum of the contact force between the solid body and fluid.

Task 5

Which one of the following statements is TRUE regarding the transmission?
1. The transmission of pressure is the product of transmission of momentum.
2. The transmission of momentum is the product of transmission of jet forces.
3. The transmission of jet forces is the product of transmission of force on the force.
4. The transmission of force on the force is the product of transmission of jet forces.

Task 6

Consider the equation: $\Delta P = \frac{\Delta V}{V}$

Where $\Delta P$ is the change in pressure, $\Delta V$ is the change in velocity, and $V$ is the initial velocity.

The equation is derived from the momentum equation:

\[ F = \Delta P \times A \]

Where $F$ is the force, $\Delta P$ is the change in pressure, and $A$ is the area.

Determine the value of $\Delta V$ for a given $\Delta P$ and $V$. If $\Delta P = 10$ atm and $V = 20$ m/s, what is $\Delta V$?

$\Delta V = \frac{10}{20} = 0.5$ m/s

Task 7

A constant pressure pump changes the fluid from point A to point B in a pipe. The fluid enters the pump at point A with a velocity of 5 m/s and leaves the pump at point B with a velocity of 10 m/s. Calculate the change in mass flow rate.

Assuming that the pump operates at constant pressure, the mass flow rate is conserved.

\[ \dot{m} = \rho A \dot{V} \]

Where $\rho$ is the density, $A$ is the area, and $\dot{V}$ is the volume flow rate.

Determine the value of $\dot{m}$ for a given $A$ and $\dot{V}$. If $A = 0.1 \text{ m}^2$ and $\dot{V} = 10 \text{ m}^3/\text{s}$, what is $\dot{m}$?

$\dot{m} = \rho \times 0.1 \times 10 = 0.1 \rho \text{ kg/s}$