Assignment 4

Due on 2020-10-14, 23:09 IST.

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) Stress acting along a direction due to the movement of the fluid in a direction
   Stress acting along a direction due to the movement of the fluid in a direction
   Stress due to component y of x
   Stress acting along a direction due to the movement of the fluid in a direction

   No, the answer is incorrect
   Source: 1
   Accepted Answer: Stress acting along a direction due to the movement of the fluid in a direction

   1 point

2) Navier's law of viscosity, given a relationship between
   shear stress and shear rate
   concentration gradient and mass flux
   volume and density
   momentum and mass flux

   No, the answer is incorrect
   Source: 2
   Accepted Answer: Shear stress and shear rate

   1 point

3) The fluid that does not flow until a certain minimum shear stress, s0, is applied is
   Newtonian fluid
   Bingham plastic
   Power law
   Dilatant

   No, the answer is correct
   Source: 3
   Accepted Answer: Bingham plastic

   1 point

4) A fluid in a pipe is characterized by a Reynolds number of 1000. Identify the type of flow.

   Turbulent
   Laminar
   Transition
   cannot be determined

   No, the answer is incorrect
   Source: 4
   Accepted Answer: Laminar

   1 point

5) In the presence of external forces, the rate of change of momentum in the direction of motion is
   dependent on all the external forces
   dependent on forces in the direction of motion
   dependent on forces perpendicular to the direction of motion
   independent of any external forces

   No, the answer is incorrect
   Source: 5
   Accepted Answer: Dependent on forces in the direction of motion

   1 point

6) Equation of continuity for momentum transfer is given by

   \[ \frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{v}) = 0 \]
   \[ \nabla \cdot (\rho \mathbf{v}) = \frac{\partial (\rho \mathbf{v})}{\partial x} + \frac{\partial (\rho \mathbf{v})}{\partial y} + \frac{\partial (\rho \mathbf{v})}{\partial z} = 0 \]

   No, the answer is incorrect
   Source: 6
   Accepted Answer: \[ \frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{v}) = 0 \]

   1 point

7) For a flow in a falling film of fluid over an inclined surface, which is influenced only by gravitational forces from outside, the shear stress distribution is governed by

   \[ \tau_{xy} = \frac{\partial \mathbf{v_y}}{\partial x} \]
   \[ \tau_{xy} \text{ is independent of } x \]
   \[ \tau_{xy} \text{ is independent of gravitational force} \]
   \[ \tau_{xy} = \text{constant} \]

   No, the answer is incorrect
   Source: 7
   Accepted Answer: \[ \frac{\partial \mathbf{v_y}}{\partial x} \]

   1 point

8) The rate of change of momentum per unit volume is given by the net external forces

   \[ \frac{\partial \rho}{\partial t} + \nabla \cdot (\rho \mathbf{v}) = \frac{\partial \mathbf{F}}{\partial t} + \nabla \cdot (\rho \mathbf{v} \mathbf{v}) + \nabla \cdot (\tau \mathbf{n}) \]

   Here, the term \( \nabla \cdot (\tau \mathbf{n}) \) represents
   \[ \text{Rate of change of momentum by connected per unit volume} \]
   \[ \text{Rate of change of momentum by viscous effects per unit volume} \]
   \[ \text{Pressure force as the density per unit volume} \]
   \[ \text{Gravitational force as the density per unit volume} \]

   No, the answer is incorrect
   Source: 8
   Accepted Answer: \[ \frac{\partial \mathbf{F}}{\partial t} + \nabla \cdot (\rho \mathbf{v} \mathbf{v}) + \nabla \cdot (\tau \mathbf{n}) \]

   1 point

9) Which of the following is the Navier-Stokes equation for Newtonian fluid?

   \[ \frac{\partial \mathbf{v}}{\partial t} + \nabla \cdot (\mathbf{v} \mathbf{v}) = \nabla \cdot (\mathbf{v} \mathbf{v}) + \nabla \cdot (\tau \mathbf{n}) \]
   \[ \nabla \cdot (\rho \mathbf{v}) = 0 \]

   No, the answer is incorrect
   Source: 9
   Accepted Answer: \[ \frac{\partial \mathbf{v}}{\partial t} + \nabla \cdot (\mathbf{v} \mathbf{v}) = \nabla \cdot (\mathbf{v} \mathbf{v}) + \nabla \cdot (\tau \mathbf{n}) \]

   1 point

10) Which of the following statements is true in flow in a falling film of fluid over an inclined surface?

    \[ \text{velocity of the fluid at the liquid-gas interface is the maximum} \]
    \[ \text{velocity of the fluid at the liquid-solid interface is the minimum} \]
    \[ \text{shear stress at the gas-liquid interface is the maximum} \]
    \[ \text{shear stress at the gas-liquid interface is the minimum} \]

    No, the answer is incorrect
    Source: 10
    Accepted Answer: \[ \text{velocity of the fluid at the liquid-gas interface is the maximum} \]

    1 point