Unit 6 - Week 4

Assignment 4

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

Due on 2020-10-14, 23:59 IST.

1) Shear stress τ_{yx} represents *1 point*

- Stress acting along x direction due to the movement of the fluid in y direction
- Stress acting along y direction due to the movement of the fluid in x direction
- Stress due to component y on x
- Stress acting along z direction due to the movement of the fluid in y direction

No, the answer is incorrect.
Score: 0
Accepted Answers:
Stress acting along y direction due to the movement of the fluid in x direction

2) Newton's law of viscosity gives a relationship between *1 point*

- shear stress and shear rate
- concentration gradient and mass flux
- volume and density
- momentum and mass flux

No, the answer is incorrect.
Score: 0
Accepted Answers:
shear stress and shear rate

3) The fluid that does not flow until a certain minimum shear stress, τ_0, is applied is *1 point*

- Newtonian fluid
- Bingham plastic
- Pseudoplastic
- Dilatant

No, the answer is incorrect.
Score: 0
Accepted Answers:
Bingham plastic

4) A fluid flow in a pipe is characterised by a Reynolds number of 1800. Identify the type of flow. *1 point*

- Turbulent
- Laminar
- Transition
- cannot be determined

No, the answer is incorrect.
Score: 0
Accepted Answers:
Laminar

5) In the presence of external forces, the rate of change of momentum in the direction of motion is *1 point*

- dependent on all the external forces
- dependent on forces in the direction of motion
- dependent on forces perpendicular to the direction of motion
- not dependent on any external forces

No, the answer is incorrect.
Score: 0
Accepted Answers:
dependent on forces in the direction of motion

6) Equation of continuity for momentum transfer is given by *1 point*

- $\frac{Dp}{Dt} = 0$
- $\frac{Dp}{Dv} = -\rho(\vec{\nabla}.\vec{v})$
- $\frac{Dp}{Dt} = -\rho(\vec{\nabla}.\vec{v})$
- $\frac{Dv}{Dx} = -\rho(\vec{\nabla}.\vec{v})$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{Dp}{Dt} = -\rho(\vec{\nabla}.\vec{v})$

7) For a flow in a falling film of fluid over an inclined surface, which is influenced only by gravitational forces from exterior, the shear stress distribution is given by *1 point*

- $\tau_{yx} = \rho\ g\ cos\beta$
- τ_{yx} *is independent of* x
- τ_{yx} *is independent of gravitational force*
- $\tau_{yx} = \rho\ g\ x\ cos\beta$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\tau_{yx} = \rho\ g\ x\ cos\beta$

8) The rate of change in momentum per unit volume is given by the vectorial equation *1 point*

$$\frac{\partial(\rho\vec{v})}{\partial t} = -[\vec{\nabla}.\rho\vec{v}\vec{v}] - [\vec{\nabla}.\tilde{\tau}] - [\vec{\nabla}.\rho] + [\rho\vec{g}].$$

Here, the term $[\vec{\nabla}.\tilde{\tau}]$ represents:

- Rate of gain in momentum by convection per unit volume
- Rate of gain in momentum by viscous effects per unit volume
- Pressure force on the element per unit volume
- Gravitational force on the element per unit volume

No, the answer is incorrect.
Score: 0
Accepted Answers:
Rate of gain in momentum by viscous effects per unit volume

9) Which of the following is the Navier-Stokes equation for Newtonian fluid? *1 point*

- $\frac{\partial(\rho\vec{v})}{\partial t} = -[\vec{\nabla}.\rho\vec{v}\vec{v}] - [\vec{\nabla}.\tilde{\tau}] - [\vec{\nabla}.\rho] + [\rho\vec{g}]$
- $\rho\frac{D(\vec{v})}{Dt} = [\mu\nabla^2\vec{v}] - [\vec{\nabla}\rho] + [\rho\vec{g}]$
- $\vec{\nabla}.\vec{v} = 0$
- $\frac{Dp}{Dt} = -\rho(\vec{\nabla}.\vec{v})$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\rho\frac{D(\vec{v})}{Dt} = [\mu\nabla^2\vec{v}] - [\vec{\nabla}\rho] + [\rho\vec{g}]$

10) Which of the following statement/s is true in flow in a falling film of fluid over an inclined surface? *1 point*

- velocity of the fluid at the liquid-gas interface is the maximum
- velocity of the fluid at the liquid-solid interface is the maximum
- shear stress at the gas-liquid interface is the minimum
- shear stress at the gas-liquid interface is the maximum

No, the answer is incorrect.
Score: 0
Accepted Answers:
velocity of the fluid at the liquid-gas interface is the maximum
shear stress at the gas-liquid interface is the minimum