

Unit 6 - Week 4

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Assignment 4

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

Due on 2019-08-28, 23:59 IST.

- 1) If M, L and T are the mass, length and time dimensions, respectively then what are the dimensions of kinematic viscosity of a fluid? **1 point**
- LT^{-2}
 L^2T^{-1}
 $ML^{-1}T^{-1}$
 $ML^{-2}T^{-2}$
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
 L^2T^{-1}
- 2) Which of the following is a valid radial outward velocity in a cylindrical domain? Assume that there are no other components of velocity. Here, r is the distance along radius and all other terms are constants. **1 point**
- $V_r = 2V_0r/h$
 $V_r = V_0 \times 2hr$
 $V_r = V_0 \times \ln(r/h)$
 $V_r = V^2/h^2$
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
 $V_r = V_0 \times 2hr$
- 3) If the relationship between the shear stress τ and the rate of shear strain $\frac{du}{dy}$ is expressed as $\tau = \mu \left[\frac{du}{dy} \right]^n$ then the fluid with exponent $n > 1$ is known as which one of the following. **1 point**
- Bingham plastic
 Dilatant fluid
 Newtonian fluid
 Pseudo plastic fluid
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Dilatant fluid
- 4) In a two-dimensional flow in x-y plane, if $\frac{du}{dy} = \frac{dv}{dx} = 0$ then the fluid element will undergo **1 point**
- Translation only
 Translation and rotation
 Translation and deformation
 Rotation and deformation
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Translation only
- 5) Which of the following leads to doubling of Reynolds number, keeping all other parameters constant? **1 point**
- Doubling dynamic viscosity
 Doubling kinematic viscosity
 Doubling density
 Doubling of characteristic length
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Doubling density
Doubling of characteristic length
- 6) Consider flow (driven only by pressure gradient) between two fixed parallel horizontal plates . The pressure gradient along the flow direction is **1 point**
- Positive
 Unknown
 Zero
 Negative
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Negative
- 7) Consider a two dimensional planar flow in steady state given by the following expression: $\vec{u} = 2y\hat{i} + 2x\hat{j}$. Determine the pure shear strain rate for this flow. **1 point**
- 1
 2
 0
 8
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
2
- 8) Which of the following is the condition of no slip in the boundary layer flow? Here, U_1 is the velocity in the liquid at the contact with the solid and U_2 is the velocity of the solid at the contact. **1 point**
- $U_1 = 0$
 $U_1 = U_2$
 $U_2 = 0$
 $U_1 \neq U_2$
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
 $U_1 = U_2$
- 9) Which of the following assumptions helps in dropping off the diffusion term of the governing equation for fluid flow? **1 point**
- Newtonian fluid
 Incompressible fluid
 Viscosity is constant
 Inviscid flow
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Inviscid flow
- 10) Fluids that require an increasing shear stress as time increases in order to maintain a constant strain rate are known as **1 point**
- Thixotropic fluids
 Rheopectic fluids
 Pseudoplastic fluids
 Newtonian fluids
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Rheopectic fluids
- 11) A fluid is flowing with a velocity of 0.6 m/s on a smooth plate moving with a velocity of 0.02 m/s in the same direction. The velocity at the interface of the fluid and plate in m/s is **1 point**
- 0.6
 0.02
 0.58
 None of the above
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
0.02
- 12) A Bingham fluid of viscosity $\mu = 10$ Pa s and yield stress $\tau_0 = 10$ kPa is sheared between flat parallel plates separated by a distance 10^{-2} m. The top plate is moving with a velocity of 1 m/s relative to the bottom plate. The shear stress on the plate is? **1 point**
- 10 kPa
 20 kPa
 11 kPa
 40 kPa
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
11 kPa
- 13) The maximum velocity of a one-dimensional incompressible fully developed viscous flow, between two fixed parallel plates, is 9 m/s. The mean velocity of the flow in m/s is **1 point**
- 4
 3
 6
 5
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
6
- 14) An incompressible fluid (kinematic viscosity, $6.4 \times 10^{-7} \text{m}^2/\text{s}$, specific gravity, 0.77) is held between two parallel plates. If the top plate is moved with a velocity of 0.5 m/s while the bottom plate is held stationary. The fluid attains a linear velocity profile in the gap of 0.5 mm between these plates; the shear stress (in Pa) on the surface of top plate is? **1 point**
- 0.493×10^{-3} Pa
 0.493 Pa
 4.93 Pa
 0.493×10^3 Pa
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
0.493 Pa
- 15) For a flow along a smooth inclined plane, which of the following regarding average time spent on the inclined plane (t_{avg}) and the time exposed to ambient gas ($t_{exposed}$)? **1 point**
- $t_{avg} = t_{exposed}$
 $t_{avg} = 1.5t_{exposed}$
 $t_{avg} = 2t_{exposed}$
 $t_{avg} = 1.2t_{exposed}$
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
 $t_{avg} = 1.5t_{exposed}$
- 16) Consider the following assumptions **1 point**
- The fluid is compressible.
 - The fluid is inviscid.
 - The fluid is incompressible.
 - The fluid is viscous.
- The Euler's equation of motion requires assumptions indicated in
- 1 and 2
 2 and 3
 1 and 4
 3 and 4
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
2 and 3
- 17) In a steady flow of a viscous fluid between two stationary parallel plates in the fully developed laminar regime, the shear stress is **1 point**
- Constant across the gap between the plates
 Maximum at the centre and decreases as parabolic towards the plate wall boundary
 Zero at one wall and increases linearly towards the other wall
 Zero at the centre and linear across the gap between the walls
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Zero at the centre and linear across the gap between the walls
- 18) Which one of the following is the characteristic of a fully developed steady laminar flow? **1 point**
- The pressure drop in the flow direction is zero
 The velocity profile changes uniformly normal to the flow direction
 The Reynolds number for the flow is critical
 The velocity profile does not change in the flow direction
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
The velocity profile does not change in the flow direction
- 19) The unidirectional velocity distribution in a steady laminar film flow on a stationary inclined plane due to gravity follows the **1 point**
- Linear profile
 Parabolic profile
 Cubic power profile
 Logarithmic profile
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Parabolic profile
- 20) For a continuity equation given by $\nabla \cdot \vec{u} = 0$ to be valid, where \vec{u} is the velocity vector, which one of the following is a necessary condition? **1 point**
- Steady flow
 Inviscid flow
 Incompressible flow
 Unidirectional flow
- No, the answer is incorrect.**
Score: 0
Accepted Answers:
Incompressible flow