Unit 5 - Week 4

Assignement 4

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

Due on 2020-02-26, 23:59 IST.

Refer table for Symbols

Symbols

ρ	Density
τ	Flow shear stress
t	Time
x_i	Directions (i=1,2,3)
k	Turbulent kinetic energy
ε	Turbulent dissipation energy
x,y,z	Cartesian space coordinate
p	Pressure
u,v,w	Velocity components in x,y,z direction
$\frac{D}{Dt}$	Substantive or total derivative
μ_t	Turbulent viscosity
S_M	Momentum source term
S_{ij}	Mean components of deformation
τ_{ij}	Viscous stresses
l_m	Mixing length
U	Time average components of velocity (u,v,w)

1) Transition from laminar to turbulent flow is characterized by a dimensionless quantity known as *1 point*

- Reynold Number
- Froude Number
- Weber Number
- None of the above

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

2) The momentum transport due to the motion of the fluid itself in the flow direction is termed as *1 point*

- Convective momentum transfer
- Diffusive momentum transfer
- Viscous momentum transfer
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Convective momentum transfer

3) Newton's viscosity law's states that *1 point*

- Shear stress between adjacent fluid layers is inversely proportional to the velocity gradients between the two layers
- Shear stress between adjacent fluid layers is proportional to the velocity gradients between the two layers
- Shear stress between adjacent fluid layers is equal to the velocity gradients between the two layers
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Shear stress between adjacent fluid layers is proportional to the velocity gradients between the two layers

4) In a Newtonian fluid, the viscous stresses are *1 point*

- Inversely proportional to the rates of deformation
- Equal to the rates of deformation
- Proportional to the rates of deformation
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Proportional to the rates of deformation

5) Dynamic viscosity, μ relates stresses to………. while Second viscosity, λ, relates stresses to the ………………… *1 point*

- Linear deformation and Volumetric deformation
- Volumetric deformation and Linear deformation
- Linear deformation and Volumetric expansion
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Linear deformation and Volumetric deformation

6) According to momentum conservation principle *1 point*

- Rate of increase of momentum of fluid particle=Sum of forces on fluid particle
- Rate of increase of momentum of fluid particle=Work done by forces on fluid particle
- Rate of increase of momentum of fluid particle= Work done by forces on a fluid element
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Rate of increase of momentum of fluid particle=Sum of forces on fluid particle

7) If the volume of tundish is 3.82 m^3 and volumetric flow rate is 0.00337 m^3/s, theoretical residence time of fluid in tundish will be *1 point*

- 1133.53 s
- 1271.23 s
- 1337.56 s
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
1133.53 s

8) X-component of momentum equation is *1 point*

- $\rho\frac{Du}{Dt} = \frac{\partial(\tau_{xx})}{\partial x} + \frac{\partial\tau_{xy}}{\partial y} + \frac{\partial\tau_{xz}}{\partial z} + S_{Mx}$
- $\rho\frac{du}{dt} = \frac{\partial(-p+\tau_{xx})}{\partial x} + \frac{\partial\tau_{xy}}{\partial y} + \frac{\partial\tau_{xz}}{\partial z} + S_{Mx}$
- $\rho\frac{Du}{Dt} = \frac{\partial(-p+\tau_{xx})}{\partial x} + \frac{\partial\tau_{xy}}{\partial y} + \frac{\partial\tau_{xz}}{\partial z} + S_{Mx}$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\rho\frac{Du}{Dt} = \frac{\partial(-p+\tau_{xx})}{\partial x} + \frac{\partial\tau_{xy}}{\partial y} + \frac{\partial\tau_{xz}}{\partial z} + S_{Mx}$

9) Unsteady three-dimension mass conservation equation in a compressible fluid is written as *1 point*

- $\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{dw}{dz} = 0$
- $\frac{\partial\rho}{\partial t} = \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{dw}{dz}$
- $\frac{\partial\rho}{\partial t} + \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{\partial w}{\partial z} = 0$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{\partial\rho}{\partial t} + \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} + \frac{\partial w}{\partial z} = 0$

10) C-curve for n well mixed tanks in a series is given by equation *1 point*
(Where θ is dimensionless time)

- $C = \frac{n^n\theta^{n-1}}{(n-1)!}$
- $C = \frac{n^n\theta^{n-1}e^{-n\theta}}{(n-1)!}$
- $C = \frac{n^n\theta^{n-1}e^{-n\theta}}{n!}$
- None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
$C = \frac{n^n\theta^{n-1}e^{-n\theta}}{(n-1)!}$