Unit 2 - Week 0: Prerequisite

Assignment 0

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

Due on 2020-01-26, 23:59 IST.

1) In case of one dimensional heat conduction in a medium with constant properties, T is the temperature at position x, at time t. Then $\frac{\partial T}{\partial t}$ is proportional to *1 point*

(a) $\frac{T}{x}$

(b) $\frac{\partial T}{\partial x}$

(c) $\frac{\partial^2 T}{\partial t \partial x}$

(d) $\frac{\partial^2 T}{\partial x^2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) $\frac{\partial^2 T}{\partial x^2}$

2) One dimensional unsteady heat transfer equation for a sphere with heat generation at the rate of 'q' can be written as *1 point*

(a) $\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial T}{\partial r}\right)+\frac{q}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$

(b) $\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial T}{\partial r}\right)+\frac{q}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$

(c) $\frac{\partial^2 T}{\partial r^2}+\frac{q}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$

(d) $\frac{\partial^2}{\partial r^2}(rT)+\frac{q}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) $\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial T}{\partial r}\right)+\frac{q}{k}=\frac{1}{\alpha}\frac{\partial T}{\partial t}$

3) Reynolds number represents the ratio of *1 point*

(a) pressure force to inertia force
(b) viscous force to pressure force
(c) inertia force to viscous force
(d) inertia force to gravity force

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c) inertia force to viscous force

4) For two-dimensional irrotational and incompressible flows *1 point*

(a) both potential and stream functions satisfy the Laplace equation
(b) potential function must satisfy the Laplace equation but the stream function need not
(c) stream function must satisfy the Laplace equation but the potential function need not
(d) neither the stream function nor the potential function need to satisfy the Laplace equation

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) both potential and stream functions satisfy the Laplace equation

5) The velocity components in the x and y directions of a two dimensional potential flow are u and v, respectively. Then $\partial u/\partial x$ is equal to *1 point*

(a) $\partial v/\partial x$

(b) $-\partial v/\partial x$

(c) $\partial v/\partial y$

(d) $-\partial v/\partial y$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) $-\partial v/\partial y$

6) For the continuity equation given by $\nabla \cdot \vec{V} = 0$ to be valid, where $\vec{V}$ is the velocity vector, which one of the following is a necessary condition? *1 point*

(a) steady flow
(b) irrotational flow
(c) inviscid flow
(d) incompressible flow

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) incompressible flow

7) The two-dimensional flow with velocity $\vec{v} = (x + 2y + 2)\,\hat{i} + (4 - y)\,\hat{j}$ *1 point*

(a) compressible and irrotational
(b) compressible and not irrotational
(c) incompressible and irrotational
(d) incompressible and not irrotational

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) incompressible and not irrotational

8) The partial differential equation $\frac{\partial^2\phi}{\partial x^2}+\frac{\partial^2\phi}{\partial y^2}+\frac{\partial\phi}{\partial x}+\frac{\partial\phi}{\partial y}=0$ has *1 point*

(a) degree 1 order 2
(b) degree 1 order 1
(c) degree 2 order 1
(d) degree 2 order 2

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) degree 1 order 2

9) The Blasius equation, $\frac{d^3 f}{d\eta^3}+\frac{f}{2}\frac{d^2 f}{d\eta^2}=0$, is a *1 point*

(a) second order nonlinear ordinary differential equation
(b) third order nonlinear ordinary differential equation
(c) third order linear ordinary differential equation
(d) mixed order nonlinear ordinary differential equation

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) third order nonlinear ordinary differential equation

10) The solution of the differential equation $\frac{d^2u}{dx^2}-k\frac{du}{dx}=0$, where k is a constant, subjected to the boundary condition $u(0) = 0$ and $u(L) = U$ is *1 point*

(a) $u = U\frac{x}{L}$

(b) $u = U\left(\frac{1-e^{kx}}{1-e^{kL}}\right)$

(c) $u = U\left(\frac{1-e^{-kx}}{1-e^{-kL}}\right)$

(d) $u = U\left(\frac{1+e^{kx}}{1+e^{kL}}\right)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) $u = U\left(\frac{1-e^{kx}}{1-e^{kL}}\right)$