

Unit 7 - Week 6 : FLUID KINEMATICS

Course outline

How to access the portal

Week 1 : INTRODUCTION

Week 2 : FLUID STATICS

Week 3 : FLUID DYNAMICS

Week 4 : FLUID DYNAMICS

Week 5 : APPLICATIONS OF FLUID STATICS AND DYNAMICS

Week 6 : FLUID KINEMATICS

- Lagrangian and Eulerian Descriptions
- Motion and Deformation of Fluid Elements
- Fluid Kinematics: Problems Solving on Black Board
- Quiz : Assignment 6**
- Feedback form

Week 7 : DIMENSIONAL ANALYSIS

Week 8 : INCOMPRESSIBLE VISCOUS FLOW IN PIPES

Live Session

Assignment 6

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

Due on 2019-10-09, 23:59 IST.

1) The convective acceleration of a fluid particle in the direction of x is

1 point

- a. $\partial u/\partial t$
- b. $u \partial u/\partial x + v \partial u/\partial y + w \partial u/\partial z$
- c. $u \partial u/\partial x + u \partial v/\partial y + u \partial w/\partial z$
- d. $\partial u/\partial t + u \partial u/\partial x + u \partial v/\partial y + u \partial w/\partial z$

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. $u \partial u/\partial x + v \partial u/\partial y + w \partial u/\partial z$

2) For a two- dimensional fluid element in x-y plane, the rotational component is given by

1 point

- a. $\omega_z = 1/2 (\partial v/\partial x + \partial u/\partial y)$
- b. $\omega_z = 1/2 (\partial u/\partial x - \partial v/\partial y)$
- c. $\omega_z = 1/2 (\partial u/\partial x + \partial v/\partial y)$
- d. $\omega_z = 1/2 (\partial v/\partial x - \partial u/\partial y)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
d. $\omega_z = 1/2 (\partial v/\partial x - \partial u/\partial y)$

3) Shear strain rate is given by

1 point

- a. $1/2 (\partial u/\partial x + \partial v/\partial y)$
- b. $1/2 \partial u/\partial x + \partial v/\partial y$
- c. $1/2 (\partial v/\partial x + \partial u/\partial y)$
- d. $1/2 \partial v/\partial x + \partial u/\partial y$

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. $1/2 (\partial v/\partial x + \partial u/\partial y)$

4) Vorticity is given by

1 point

- a. two times the rotation
- b. 1.5 times the rotation
- c. three times the rotation
- d. equal to the rotation

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. two times the rotation

5) Which of the following factors affect the vorticity

1 point

- a. Viscosity
- b. Temperature
- c. Both a and b
- d. None

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Viscosity

6) Study of fluid motion without considering the force causing that motion is known as

1 point

- a. Statics of the fluid flow
- b. Kinematics of the fluid flow
- c. Dynamics of the fluid flow
- d. None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. Kinematics of the fluid flow

7) The approach of identifying or tracking the individual fluid particle by its position, velocity etc and describes as a function of time is

1 point

- a. Eulerian approach
- b. Lagrangian approach
- c. Static approach
- d. None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
b. Lagrangian approach

8) For a steady compressible flow, the continuity equation can take the form

1 point

- a. $A_1 V_1 = A_2 V_2$
- b. $\rho_1 V_1 = \rho_2 V_2$
- c. $\rho_1 A_1 V_1 = \rho_2 A_2 V_2$
- d. $\rho_1 A_1 / V_1 = \rho_2 A_2 / V_2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. $\rho_1 A_1 V_1 = \rho_2 A_2 V_2$

9) The flow in which velocity of a fluid at a particular fixed point change with time

1 point

- a. Unsteady flow
- b. Oscillatory flow
- c. Steady flow
- d. Periodic flow

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Unsteady flow

10) A velocity field is given by $u=-3x$, $v=2y$ and $w=z$. Is the flow steady?

1 point

- a. Yes
- b. No
- c. Cannot Say

No, the answer is incorrect.
Score: 0

Accepted Answers:
a. Yes

11) The velocity vector in a fluid flow is given as $V = 4x^3i - 10x^2y j + 2t k$ Find the Velocity of the fluid particle at (2, 1, 3) at time $t=1$.(write magnitude only).

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 48,54

2 points

12) For the above problem, find acceleration in x direction (write magnitude only).

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 1536

2 points

13) For the velocity field, $V = z i + x j + y k$. Find the material acceleration at vector at $x=1$, $y=4$ and $z=1$.

2 points

- a. $i + j + 4k$
- b. $i + 4j + k$
- c. $4 i + j + k$
- d. $4 i + 4j + k$

No, the answer is incorrect.
Score: 0

Accepted Answers:
c. $4 i + j + k$

14) A velocity field is given by $u=-3x$, $v=2y$ and $w=z$. At $(x, y, z) = (1, 1, 1)$. Find local acceleration. (write answer in S.I. units)

Hint

Yes, the answer is correct.
Score: 2

Accepted Answers:
(Type: Range) -0.1,0.1

2 points

15) For the above question find convective acceleration (Write answer in S.I. Units).

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 9,7,10

2 points