

## Unit 3 - Week 1: Review Concepts of Fluid Mechanics and Thermodynamics

## Course outline

How does an NPTEL online course work?

## Week 0: Prerequisite

## Week 1: Review Concepts of Fluid Mechanics and Thermodynamics

Lec 1: Review Concepts of Fluid Mechanics and Thermodynamics - I

Lec 2: Review Concepts of Fluid Mechanics and Thermodynamics - II

Lec 3: Review Concepts of Fluid Mechanics and Thermodynamics - III

 Quiz : Assignment 1

Feedback form

Lecture Notes\_ Week 1

Sample Solution - Assignment 1

## Week 2: Wave Propagation in Compressible Medium

## Week 3: Quasi-One Dimensional Isentropic Flow

## Week 4: Normal Shock Waves

## Week 5: Expansion Waves and Oblique Shocks

## Week 6: Interaction of Shocks and Expansion Waves

## Week 7: Compressible Flow with Friction and Heat Transfer

## Week 8: Measurement Diagnostics and Experimental Facilities for Compressible Flow

## Live Session

## Text Transcripts

## Practice Questions for Examination

## Assignment 1

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

**Due on 2020-09-30, 23:59 IST.**

- 1) The fluid is defined as a substance in which the 2 points
- (A) stress is proportional to strain  
 (B) strain rate is proportional to stress  
 (C) strain is proportional to stress  
 (D) stress is proportional to strain rate

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(D) stress is proportional to strain rate

- 2) The generic expression of a flow field satisfying the continuity equation is represented as,  $\nabla \cdot (\rho \vec{V}) = 0$ . Identify the CORRECT statement. 2 points
- (A) The flow field is steady and uniform.  
 (B) The flow field is compressible.  
 (C) The flow field is steady.  
 (D) The flow field is incompressible.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(B) The flow field is compressible.

- 3) A velocity field is represented as,  $\vec{V} = (4 + xy + 2t)\hat{i} + 6x^3\hat{j} + (3xt^2 + z)\hat{k}$ . The expression for acceleration at (2, 4, -4) and time  $t = 3$  is, 2 points
- (A)  $\vec{a} = 1296\hat{i} + 170\hat{j} + 572\hat{k}$   
  
(B)  $\vec{a} = 170\hat{i} + 1296\hat{j} + 572\hat{k}$   
  
(C)  $\vec{a} = 572\hat{i} + 170\hat{j} + 1296\hat{k}$   
 (D) None of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(B)  $\vec{a} = 170\hat{i} + 1296\hat{j} + 572\hat{k}$

- 4) A solid rubber ball has its volume reduced by 15% when subjected to uniform stress of 15 k N/m<sup>2</sup>. The bulk modulus (in N/m<sup>2</sup>) for rubber is, 2 points
- (A) 10<sup>5</sup>  
 (B) - 10<sup>6</sup>  
 (C) 10<sup>-5</sup>  
 (D) 10<sup>3</sup>

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(A) 10<sup>5</sup>

- 5) The properties that bears the relation to movement of mass, momentum and heat for a fluid, are called as, 2 points
- (A) thermodynamic properties  
 (B) kinematic properties  
 (C) transport properties  
 (D) dynamic properties

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(C) transport properties

- 6) The Pascal's law is applicable to the liquid, which is \_\_\_\_\_. 2 points
- (A) incompressible  
 (B) compressible  
 (C) Both A & B  
 (D) None of these

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(A) incompressible

- 7) The ratio of the densities of oxygen and nitrogen is 20:18. The speed of sound in nitrogen gas at 21°C is equal to speed of sound in oxygen at certain temperature. The temperature (in K) in oxygen gas is \_\_\_\_\_.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 325.00,328.00

2 points

- 8) The property of fluid viscosity decreases with the increase in temperature for a liquid and increases with the increase in temperature of a gas. 2 points
- (A) True  
 (B) False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(A) True

For Question 9 and 10 use the following:

Argon gas (characteristics gas constant 208 J/kg-K and specific heat ratio 1.67) flows through a tube with initial pressure and density conditions as, 1.7 MPa and 18 kg/m<sup>3</sup>, respectively. The final pressure and temperature are measured as, 248 kPa and 400 K, respectively.

- 9) The change in enthalpy (in J/kg) for argon is \_\_\_\_\_.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) -28500,-27500

2 points

- 10) The change in entropy (J/kg-K) for argon is \_\_\_\_\_.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 333,336

2 points