Week 8 Assessment 8

The due date for submitting this assignment has passed. Due on 2018-04-04, 23:59 IST.

Submitted assignment (Submitted on 2018-03-26, 05:32)

1) Turbulent flow is characterized by

- Randomness
- Non-linearity
- Diffusivity
- All the above

No, the answer is incorrect.
Score: 0
Accepted Answers: All the above

2) Turbulent eddies are,

- Pattern within a flow field which is correlated over a particular region in space and time
- The identity of structures will be correlated within this region
- Any fluctuating quantity that is correlated in a space of flow
- All the above

No, the answer is incorrect.
Score: 0
Accepted Answers: Pattern within a flow field which is correlated over a particular region in space and time

3) The main objective of boundary layer control is

- Control of flow separation
- Reduction of drag force
- Reduction of lift force
- Both (a) and (b)

No, the answer is incorrect.
Score: 0
Accepted Answers: Both (a) and (b)

4) The smallest hydrodynamic scale in turbulent flow is

- Kolmogorov length scale
- Taylor microscale
- Integral length scale

Score: 0
Accepted Answers: Both (a) and (b)
conservation equation
Lecture 39 Conserved scalar approach for one dimensional flows
Lecture 40 Introduction to turbulent combustion
Quiz : Week 8 Assessment 8
Week 8 Assessment 8 Solutions
Week 8 Feedback

5) Reynolds number estimate for the ratio of the largest to smallest length scales in the flow is approximately,

- \( \text{Re}^{1/4} \)
- \( \text{Re}^{1/2} \)
- \( \text{Re}^{3/4} \)
- \( \text{Re}^{5/4} \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
Kolmogorov length scale

6) Boundary layer theory is/are applicable to,

- Two-dimensional laminar jet flows
- Impulsively started plate
- Thin flat plate on a uniform flow field
- All the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Two-dimensional laminar jet flows

7) Helium at 20°C and low-pressure flow past a thin flat plate of 1m long and 3m wide. The total frictional drag desired is 0.5N. What is the approximate pressure of helium if velocity is 30 m/s,

- 12080.85
- 18020.85
- 16202.75
- 12602.75

No, the answer is incorrect.
Score: 0
Accepted Answers:
18020.85

8) The diffuser with an outlet diameter two times that of pipe is bolted to the pipe through which water enters with a gauge pressure of 75kPa, a velocity of 16 m/s and rate of 0.25 m³/s. Neglect the frictional forces. The force exerted on the bolts due to water flow is

- 2371.87
- 2471.87
- 2571.87
- 2671.87
9) Consider a well-stirred reactor in which the fuel and oxidizer are mixed thoroughly, operating at 1 atm with fuel, oxidizer and a single product species. The reactants consisting of fuel ($Y_F = 0.3$) and oxidizer $Y_{Ox} = 0.7$ at 298 K, flow into the 0.004 m$^3$ reactor at 0.75 kg/s has a heat loss of 1750W. Assume the following simplified thermodynamic properties: $c_p = 1200$J/kg-K (all species), $MW = 28$ kg/kmol (all species), $h_f^0 = -1500$kJ/kg, $h_{f,OX}^0 = 0$, and $h_{f,prod}^0 = -3500$kJ/kg. The fuel and oxidizer mass fractions in the outlet stream are 0.002 and 0.004, respectively. Determine temperature in the reactor.

- 2524.72
- 2822.72
- 3120.72
- 3554.72

10) Determine the residence time for the above question in milliseconds inside the reactor.

- 0.445
- 0.545
- 0.645
- 0.745