Unit 4 - Week 3

Assignment 3

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

Due on 2020-03-18, 23:59 IST.

1) Inside a tube of 1cm and 130 °C constant wall temperature tube, air is flowing at a mean velocity of 1.5 m/s. At fully developed region mean temperature is measured as 35 °C. Determine the following, if the exit temperature of the air is 105 °C. Take properties of air at bulk mean temperature as, T_m= (35+105)/2 = 70 °C as, ρ=1.0287 kg/m^3, v=19.9 × 10^{-6}m^2/s, k=0.02922 W/(mK) and C_p= 1008.7 J/Kg-K, Pr = 0.707.
Evaluate the Reynold's number

1 point

- 254.84
- 1423.1
- 602.51
- 753.77

No, the answer is incorrect.
Score: 0
Accepted Answers:
753.77

2) What will be the Nusselt's number for the Question no. 1?

1 point

- 3.66
- 4.36
- 5.78
- 8

No, the answer is incorrect.
Score: 0
Accepted Answers:
3.66

3) Determine the convective heat transfer coefficient in W/m^{2}K for Question no. 1 up to 2nd decimal place

1 point

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 10.6,10.8

4) Calculate the length of the tube in cm for Question no. 1 up to 1st decimal place.

1 point

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 48.3,48.9

5) What is the total rate of heat transfer in W for Question no. 1?
Calculate heat transfer rate as, Q = h×A_s×(LMTD)
Here, LMTD = Log Mean Temperature Difference

1 point

- 12.3
- 9.79
- 8.56
- 6.37

No, the answer is incorrect.
Score: 0
Accepted Answers:
8.56

6) Water enters inside a circular duct of 10 cm diameter and 5 m (L) length at a temperature of 20 °C. The duct is wrapped with and electric resistance heater which maintains the duct surface at constant temperature of 60 °C. Flow is assumed to be hydrodynamically fully developed before it enters the heated section of the duct. Determine following, neglecting the axial conduction between heated and unheated portion of the tube if mass flow rate of water is 0.1 kg/s. Use Edwards et al. (1979) correlation to calculate the heat transfer coefficient:

1 point

$$Nu = 3.66 + \frac{0.065\left(\frac{D}{L}\right)Re\,Pr}{1+0.04\left[\left(\frac{D}{L}\right)Re\,Pr\right]^{2/3}}$$

Use following properties of water: ρ = 997 kg/m^3, μ = 855×10^{-6} N-s/m^2, k = 0.613 W/m-K, Pr = 5.83.
What will be the nature of the velocity profile?

- Linear velocity
- Uniform velocity
- Parabolic velocity
- Power law velocity

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

7) Calculate the Nusselt number for Question no. 6 up to 2nd decimal place

1 point

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 8.65,8.75

8) What will be the exit temperature of the water in °C for Question number 6?

Hint

1 point

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 27.1,27.4

9) In Question number 6 the mass flow rate is in increased to 0.15 kg/s what will be the change in exit temperature of water?

2 points

- Increase by 2.32 °C
- Increases by 1.51 °C
- Decrease by 1.51 °C
- Decrease by 2.32 °C

No, the answer is incorrect.
Score: 0
Accepted Answers:
Decrease by 1.51 °C