Assignment 2  
The due date for submitting this assignment has passed.

1. Inside a tube of iron and 188°C constant wall temperature tube, air flowing at a mean velocity of 1.3 m/s. At 99°C developed region mean temperature is 1 point temperature is measured at 87°C, determine the following, the temperature of the air at 100°C. Table properties of air in this temperature are as follows; TR = 188 - 98°C, vo = 1.208 km/h, v = 18°C, k = 0.0203 W/mK (K) and CP = 1004.61 KJ/kg, Pr = 0.707. Evaluate the Reynolds number.

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

3. Determine the convective heat transfer coefficients in W/m²K. For Question no. 1, up to 2nd decimal place.

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

5. What is the total rate of heat transfer in W for Question no. 1? Calculate heat transfer rate as q = 

6. Water enters inside a circular duct of 15 cm diameter and 5 m (z) length at a temperature of 30°C. The duct is wrapped with an-end electric heater which maintains the duct surface at constant temperature of 80°C. Flow is assumed to be hydrodynamically fully developed before it enters the heated section of the duct. Derive the following, neglecting the axial conduction between heated and unheated portion of the tube: mass flow rate of water is 0.5 kg/s, Use Dittus & Brown correlation to calculate the heat transfer coefficient.

7. What will be the nature of the velocity profile?

8. The mean velocity in the tube is 1.3 m/s, what will be the change in exit temperature of water?

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

10. In Question number 6, the mean flow rate is increased to 0.15 kg/s, the mean temperature of water is increased by 3°C, what will be the change in exit temperature of water?