Assignment 3

The due date for submitting this assignment is Thursday, October 22, 2023.

1. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

2. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

3. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

4. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

5. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

6. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

7. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.

8. A horizontal rigid tank with a square cross-section of side length 4 m and wall thickness 0.1 m contains water at a temperature of 20°C. A thin-walled metal cylinder is inserted into the tank, such that it is completely submerged. The cylinder has a height of 1 m and a base area of 0.5 m². The cylinder is initially at a temperature of 30°C and is then heated to 70°C. The specific heat capacity of water is 4180 J/kg°C, and the specific heat capacity of the metal is 500 J/kg°C. The thermal conductivity of the metal is 120 W/m°C. Determine the temperature of the water after the heat is transferred.