Assignment 5

The due date for submitting this assignment has passed.

As per your records, you have not submitted this assignment.

Due on: 2023-03-04, 23:59:59 GMT

3. (2 points) Draw the load on the piston. Include all forces acting on the piston and label them appropriately.

4. (2 points) Using the given data, calculate the force required to move the piston. Show all calculations and units.

5. (2 points) The force acting on the piston is known. Using the given data, determine the pressure inside the cylinder. Show all calculations and units.

6. (2 points) A fluid with a viscosity of \( \eta \) is flowing through a pipe of diameter \( D \) and length \( L \). Using the given formula and data, calculate the friction force acting on the fluid. Show all calculations and units.

7. (2 points) A heat exchanger is designed to transfer heat from one fluid to another. Using the given data, calculate the temperature difference between the two fluids. Show all calculations and units.

8. (2 points) A centrifugal pump is used to transfer a fluid from one point to another. Using the given data, calculate the head developed by the pump. Show all calculations and units.

9. (2 points) A refrigeration cycle is being analyzed. Using the given data, calculate the coefficient of performance (COP) of the refrigerator. Show all calculations and units.

10. (2 points) A turbine is using a steam with a given enthalpy and pressure. Using the given data, calculate the work output of the turbine. Show all calculations and units.

11. (2 points) A compressible fluid is being compressed in a piston-cylinder arrangement. Using the given data, calculate the final pressure and temperature of the fluid. Show all calculations and units.

12. (2 points) A pressure vessel is being designed to withstand a certain pressure. Using the given data, calculate the thickness of the vessel wall required to withstand the pressure. Show all calculations and units.

13. (2 points) A heat transfer process is being analyzed. Using the given data, calculate the heat transfer rate between two different fluid streams. Show all calculations and units.

14. (2 points) A heat exchanger is being designed for a specific application. Using the given data, calculate the required heat transfer area of the exchanger. Show all calculations and units.

15. (2 points) A chemical reaction is occurring in a reactor. Using the given data, calculate the reaction rate. Show all calculations and units.

16. (2 points) A distillation column is being designed to separate a mixture of components. Using the given data, calculate the number of theoretical plates required for the column. Show all calculations and units.

17. (2 points) A fluid is being heated in a heating tank. Using the given data, calculate the required heating power. Show all calculations and units.

18. (2 points) A chemical reaction is occurring in a reactor. Using the given data, calculate the reaction rate. Show all calculations and units.

19. (2 points) A heat exchanger is being designed for a specific application. Using the given data, calculate the required heat transfer area of the exchanger. Show all calculations and units.

20. (2 points) A pressure vessel is being designed to withstand a certain pressure. Using the given data, calculate the thickness of the vessel wall required to withstand the pressure. Show all calculations and units.

21. (2 points) A heat transfer process is being analyzed. Using the given data, calculate the heat transfer rate between two different fluid streams. Show all calculations and units.