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18BT62

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Bioprocess Equipment Design and CAED

Time: 4 hrs.   Max. Marks: 100

Note: 1. Answer any ONE full questions from the following.
2. Use of Perry's chemical Engineer's hand book permitted.
3. Use of IS2825 also permitted.

1   Design 1-2 shell and tube heat exchanger to cool 27.8 kg/s of methyl alcohol from 95°C to 40°C using water as coolant. Water is heated from 25°C to 40°C. Use 16 BWG thickness having outer diameter of 1 inch length of 16 feet arranged on $1\frac{1}{4}$ inch triangular pitch. Take U_d = 340.7 W/m^{2}K.

   a. Design 1-2 shell and tube heat exchanger with all details.   (50 Marks)
   b. Calculate the pressure drop on both of the fluid.   (20 Marks)
   c. Draw the sectional elevation of heat exchanger showing all details.   (20 Marks)
   d. Show the details of tube sheet layout.   (10 Marks)

2   28000 kg/hr pure alcohol vapour at 1 atmospheric pressure is to be condensed using water available at inlet temperature of 25°C and leaving at a temperature of 50°C as cooling media. The water is flowing through the tube with velocity of 1.1 m/sec and are laid on triangular pitch arrangement. The available tubes are $\frac{3}{4}''$ diameter and 18 BWG thick, 4 m long are available having $\frac{15}{16}''$ pitch.

   a. Design the condenser for required size with all details.   (50 Marks)
   b. Calculate the pressure drop for both stream.   (20 Marks)
   c. Draw the sectional elevation of condenser showing all details.   (20 Marks)
   d. Show the details of tube sheet layout.   (10 Marks)

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