



# CBCS SCHEME

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18BT62

## Sixth Semester B.E. Degree Examination, June/July 2023 Bioprocess Equipment Design and CAED

Time: 4 hrs.

Max. Marks: 100

- Note: 1. Answer any ONE full question.  
2. Use of Perry's chemical engineering data hand book, IS2825, IS4503 are permitted.*

- 1 Design 1-2 shell and tube heat exchanger to cool 27.8kg/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 1¼ inch triangular pitch. Design 1-2 STHE with all details.  
(Take  $U_d = 340.7 \text{ W/m}^2\text{°C}$ ).
- Calculate the pressure drop on both sides of the fluid. (60 Marks)
  - Draw the sectional elevation of STHE showing all details. (30 Marks)
  - Show the details of tube sheet layout. (10 Marks)

OR

- 2 28,000kg/hr pure alcohol vapour at 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 1.1m/sec and are laid on triangular pitch arrangement. The available tubes are  $\frac{3}{4}$  diameter and 18BWG or SWG thick. 4m long are available and having  $\frac{15}{16}$  pitch.
- Calculate the required size of the condenser with all details. (50 Marks)
  - Calculate the pressure drop on each side of the steam. (10 Marks)
  - Draw the sectional elevation of condenser showing all details. (30 Marks)
  - Show the details of tube sheet layout. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.