CBCS SCHEME

USN

18BT62

Sixth Semester B.E. Degree Examination, June/July 2024
Bioprocess Equipment Design and CAED

Time: 4 hrs. Max. Marks: 100

Note : 1. *Answer any ONE full questions.*
2. *Use of Perry hand book is permitted.*

1 2900kg/h of Toluene is cooled from 71°C to 37°C by heating amyl acetate from 30°C to 40°C using 4500mm hairpins exchanger is 2 inch by 1¼ inch IPS concentric pipe with detachable flanges, 180 ° return bend. Annulus are also interconnected with flange joints with a combined dirt factor of 0.0082h m^2 K Cal^{-1}. Calculate number of hairpins, pressure drop on each side. **(50 Marks)**

Draw to scale the exchanger with relevant details. **(50 Marks)**

2 2900kg/h of pure ethanol slightly above atmospheric pressure is to be condensed using water as coolent and is available at 25°C and leaving at 50°C. Calculate the required size of vertical condenser for following data :
Outside diameter of tube = 25.4mm.
Thickness of tube = 2.6mm
Length of tube = 3.3m
Triangular pitch is to be assumed.
Water velocity is 2m/s.
Design the condenser in detail. **(60 Marks)**
Draw to scale the sectional elevation of condenser. **(40 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.