Reg. No.						
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# Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



# V SEMESTER B.TECH (CHEMICAL ENGINEERING) END SEMESTER EXAMINATIONS, MAY 2016

## SUBJECT: PROCESS DESIGN OF CHEMICAL EQUIPMENTS [CHE 301]

### **REVISED CREDIT SYSTEM**

Time: 3 Hours

MAX. MARKS: 100

#### Instructions to Candidates:

- Answer ANY ONE FULL question.
- Missing data may be suitable assumed.

1A.	80000 kgs/hr of distilled water is to be cooled from 34 °C to 29.5 °C in a STHE. Raw water at 24 °C is available for cooling purpose. Design a suitable exchanger, choosing appropriate tube arrangement. Check the exchanger for pressure drop and fouling.										85	
1B.	Explain in detail as to how the Economic pipe diameter is calculated using Genereaux method?										15	
2A.	A gas mixture co a packed absorpt required. The to column. Partial pressure of SO <sub>2</sub> (mm Hg) (Wt. of SO <sub>2</sub> ) /(100 wt. of water)	nsisting tion tow wer ope 1.2 0.05	3 of 8 %         yer. Therates         3.2         0.1	% SO <sub>2</sub> b ne feed isothern 5.8 0.15	y volur rate of mally a 8.5 0.2	ne and gas is t 20 °C 14.1 0.3	rest dry 5000 k 2 and 1 26 0.5	<ul> <li>air is gs/hr</li> <li>atm.</li> <li>39</li> <li>0.7</li> </ul>	to be s and 95 <sup>o</sup> pressu 59 1.0	crubbed % recov re. Des 92 1.5	with water in very of SO <sub>2</sub> is ign a suitable	100
	Packing material: 38mm Ceramic Intalox saddlesLiquid density = $1000 \text{ kg/m}^3$										m <sup>3</sup>	
	Gas viscosity = $0.018 \text{ cP}$							Liquid viscosity = $1 \text{ cP}$				
	Gas diffusivity $D_g = 0.14*10^{-4} \text{ m}^2/\text{s}$ [Liquid diffusivity $D_l = 1.7*10^{-9} \text{ m}^2/\text{s}$ ]										$^{*}10^{-9} \text{ m}^{2}/\text{s}$	
	$\sigma$ of solution and water = /2.8 dyne/cm											
	Important INFORMATION to be incorporated:											
	• $(L_m'/G_m')$	$)_{\rm op} = 1.2$	.5(L <sub>m</sub> '/	Gm')mir	1							