Q. Code: 195151

Reg. No. | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Seventh Semester

CH16009 – FLUIDIZATION ENGINEERING

(Chemical Engineering)

(Regulation 2016)

Time: Three Hours **Maximum : 100 Marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

		CO	RBT
1.	What is minimum fluidization velocity and its significance?	1	U
2.	Write about spouted bed and its disadvantages.	1	U
3.	Differentiate Geldart A and C particles.	1	U
4.	Write the various types of fluidized behavior based on velocity.	1	R
5.	State Unicore model and its limitation.	2	U
6.	The particle size is reduced to one fourth, what will be the space time? Take all the other parameters constant.	2	AP
7.	What is the time requirement equation in heat transfer of fluidized bed?	2	AP
8.	The dimensionless number which doesn't change in heat and mass transfer equation and the value of Sherwood and Nusselt number in stangnant bed.	2	AP
9.	How single stage fluidization is differ with multistage fluidization?	2	R
10.	Write any two applications of fluidized bed.	1	U

PART B - (5 X16 = 80 Marks)

11.	(a)	Elucidate the various forms of contacting of a batch of solids by fluid.	**(16)**	1	U
		(OR)			
	(b)	Write in detail about fluidization quality, advantages and disadvantages of fluidized bed in industrial applications.	**(16)**	1	R

12.	(a)	Calculate the minimum fluidizing velocity for a bed of large particles. Use the information given for ε_{mf} and $Ø_s$. **Data** *Solids:* ρ_s = 2.93 g/cm^3, dp = 1.5 mm, $Ø_s$ = 0.7, ε_{mf} = 0.54 *Gas:* ρ_g = 0.01 g/cm^3, μ = 0.0003 g/cm · s	**(16)**	**2**	**AP**
		(OR)			
	(b)	Explain in detail about particle classification with neat sketch.	**(16)**	**1**	**U**
13.	(a)	Derive an expression to relate conversion, residence time and space time through shrinking core model in gas solid reactions from shrinking core model.	**(16)**	**1**	**AP**
		(OR)			
	(b)	Elucidate the design equation of catalytic reactors in detail.	**(16)**	**1**	**U**
14.	(a)	A small (250µm) cold copper sphere is dropped into a hot fluidized bed of similar solids. Estimate the time needed for the particle to approach within 15 % of the bed Healing a temperature. (a) Use the whole bed coefficient, Nu_{bed} = 0.045 (b) Use the single-particle coefficient, $\mathbf{Nu_{bed}}$ 180 times the whole bed coefficient *Gas:* ρ_g = 1.2 kg/m^3, μ = 1.8 x 10^{-5}kg/m.s, k_g = 2.6 x10^{-2}W/m-K *Solid:* d_p = 10 $^{-4}$m, ρ_s = 8920 kg/m^3, C_{ps} = 390J/kg.K *Bed:* ε_f = 0.5, u_0 = u_{mf} = 0.1 m/s	**(16)**	**2**	**AP**
		(OR)			
	(b)	Derive the effect of mass transfer in bubbling bed model.	**(16)**	**1**	**U**
15.	(a)	Explain any two case studies related with fluidized bed applications.	**(16)**	**1**	**U**
		(OR)			
	(b)	Elucidate types of cyclone separators and its advantages	**(16)**	**1**	**U**