

Total No. of Questions :6]

SEAT No. :

P 265

[Total No. of Pages :2

Oct./ BE/ Insem. - 583

B.E. (Chemical)

CHEMICAL REACTION ENGINEERING - II

(2015 Pattern) (Semester-I) (409342)

Time : 1 Hour]

[Max. Marks :30

Instructions to the candidates:

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data if necessary.*

Q1) a) Derive a relation between conversion and fractional time for the case of Ash Diffusion controlling when particles react as per Shrinking Core Model. **[8]**

b) Explain the principle of Progressive conversion model **[2]**

OR

Q2) Solids of unchanging size of radius $R = 0.3$ mm were reacted with gas in a steady flow, bench scale fluidized bed reactor. The results obtained were: $F_0 = 10$ gm/sec, $W = 1000$ gm, $\bar{X}_B = 0.75$. The reaction step is rate controlling. Design a commercial sized fluidized bed reactor to treat 3.5 metric tonnes/h of solid feed of size $R = 0.3$ mm to 98% conversion. **[10]**

Q3) a) With a neat figure explain the cases A and B for the kinetic regimes in Fluid-fluid reactions **[7]**

b) Explain the concept of reactive distillation **[3]**

OR

P.T.O.

Q4) The concentration of an undesirable impurity A in air is to be reduced from 0.1% to 0.02% by reaction with a solution containing the reactant B at a concentration of 32 mol/m³. The reaction is $A(g) + B(l) \rightarrow \text{products}$. Find the height of tower required for countercurrent operations. For the packing used: $K_{Ag}a = 32,000 \text{ mol/hr.m}^3.\text{atm}$, $k_{Al}a = 0.1 \text{ hr}^{-1}$, $H_A = 1.25 \times 10^{-4} \text{ atm. m}^3/\text{mol}$, $L = 7 \times 10^5 \text{ mol/hr.m}^2$, $G = 1 \times 10^5 \text{ mol/hr.m}^2$, $C_T = 56,000 \text{ mol/m}^3$. **[10]**

Q5) a) Describe the nitrogen desorption method for determining the pore size distribution. **[7]**

b) what are the typical characteristics of a catalyst? **[3]**

OR

Q6) a) what is catalyst poisoning? Give the various reasons which cause poisoning **[7]**

b) Differentiate between global rate and intrinsic rate **[3]**