B.Tech. SEM -VII (Chemical 2014 Course (CBCS) : SUMMER - 2019

SUBJECT: MULTIPHASE REACTION ENGINEERING

Day : Wednesday
Date : 15/05/2019

S-2019-2789

Time : 02.30 PM TO 05.30 PM
Max. Marks: 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate full marks.
3) Draw a neat and labeled diagram **WHENEVER** necessary.
4) Assume suitable data if necessary.

Q.1 **i)** Enumerate physical significance of multiphase reactors in chemical process industries **(05)**

ii) Classify multiphase reactors and enumerate advantages of bubble column (BC) over mechanically agitated contactor (MAC) **(05)**

OR

Q.1 Enumerate any one multiphase reactor (with neat sketch) with reference to any chemical process. **(10)**

Q.2 Derive following expression for chemical reaction equilibrium: **(10)**

$$\sum_i \nu_i \mu_i = 0$$

OR

Q.2 Derive an expression for gas phase reactions: **(10)**

$$\prod_i (y_i \Phi_i)^{\nu_i} = \left(\frac{P}{P^o}\right)^{-\nu} K$$

Q.3 Derive an expression for power consumption by impeller in MAC **(10)**

OR

Q.3 Write a note on following: **(10)**

(i) BC
(ii) Slurry reactor

Q.4 Write a note on following: **(10)**

(i) Axial dispersion plug flow model
(ii) Tank in series model

OR

Q.4 What are the factors affecting liquid phase mixing in solid liquid fluidized bed (SLFB)? Enumerate any two. **(10)**

Q.5 What are the experimental methods to determine mass transfer coefficient in multiphase reactors? Enumerate any one. **(10)**

OR

(P.T.O.)

Q.5 Write procedure to quantify overall heat transfer coefficient in MAC. Write expressions to determine individual heat transfer coefficients. **(10)**

Q.6 What is the effect of solid particle diameter and density on solid phase hold-up in SLFB. **(10)**

OR

Q.6 What is the effect of superficial gas velocity on gas hold- up in BC? Draw gas hold- up regime transition graph. **(10)**

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