

M. TECH. -I (CHEMICAL ENGINEERING) (CBCS – 2015 COURSE)
: WINTER - 2017
SUBJECT: MULTIPHASE REACTORS

Day: **Monday**
Date: **22/01/2018**

W-2017-2799

Time: **11.00 AM TO 02.00 PM**
Max. Marks: **60**

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is allowed.
- 4) Answer to both the sections should be written in the **SEPARATE** answer book.
- 5) Assume suitable data, if necessary.

SECTION - I

Q.1 What is multiphase system? Explain any two industrial multiphase systems. **(10)**

OR

Q.1 Enlist any two industrial three phase systems. Explain any one. **(10)**

Q.2 Derive following equation. **(10)**

$$\ln \frac{K}{K_1} = \frac{-\Delta H^0}{R} \left(\frac{1}{T} - \frac{1}{T_1} \right)$$

State the assumptions made.

OR

Q.2 Elaborate following in context to solid catalytic reaction. **(10)**

- i) Thiele modulus
- ii) External and internal effectiveness factor

Q.3 In mechanically agitated contactor (MAC), derive an expression to determine power consumption in the presence of gas. **(10)**

OR

Q.3 Explain effect of particle size and density, and superficial liquid velocity on hydrodynamics in solid liquid fluidized bed (SLFB) **(10)**

SECTION - II

Q.4 Differentiate between E (t) curve and F (t) curve and derive equation correlating them. **(10)**

OR

Q.4 Explain physical significance of following to study mixing characteristics. **(10)**

- i) Mean residence time
- ii) Variance
- iii) Dispersion number

Q.5 Explain any two experimental methods to determine mass transfer coefficient (MTC) **(10)**

OR

Q.5 In stirred tank reactor, MTC is to be determined for sucrose in water. Elaborate the method to estimate MTC if concentration Vs time data is available. **(10)**

Q.6 Derive Ergun equation to determine pressure drop in SLFB. **(10)**

OR

Q.6 Enlist the steps to be followed to standardize in multiphase system, you like. **(10)**