

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (OLD) EXAMINATION – WINTER 2023

Subject Code:2170501

Date:12-12-2023

Subject Name: Chemical Reaction Engineering - II

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1**
- | | | |
|-----|---|-----------|
| (a) | Define the factors required to formulate contacting patterns | 03 |
| (b) | Describe Progressive Conversion Model (PCM) with appropriate diagram. | 04 |
| (c) | Define E, F and C curve and discuss their inter relationship with schematic diagrams. | 07 |
- Q.2**
- | | | |
|-----|--|-----------|
| (a) | Explain Micro fluid and Macro fluid in detail | 03 |
| (b) | Explain the enhancement factor and Hatta modulus | 04 |
| (c) | Describe all eight cases for mass transfer and reaction for fluid-fluid reactions with neat sketch | 07 |
- OR**
- | | | |
|-----|---|-----------|
| (c) | Derive the rate equation for fluid – fluid reaction in the case of instantaneous irreversible reaction with lower concentration of constituent B. | 07 |
|-----|---|-----------|
- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Describe any three types of non ideality that exists in different types of real reactors | 03 |
| (b) | Discuss dispersion model for representing flow in real vessel | 04 |
| (c) | Describe in detail about slurry reactor kinetics | 07 |
- OR**
- Q.3**
- | | | |
|-----|--|-----------|
| (a) | Describe the physical properties of catalyst. | 03 |
| (b) | Explain | 04 |
| | (i) Catalyst promoters. (ii) Catalyst poisons, | |
| | (iii) Catalyst inhibitors, (iv)Molecular sieves. | |
| (c) | Discuss various industrial catalytic reactors | 07 |
- Q.4**
- | | | |
|-----|---|-----------|
| (a) | Discuss the limitation of Shrinking Core Model | 03 |
| (b) | Write short notes on Tank in series model for the non Ideal Reactor. | 04 |
| (c) | Heterogeneous reaction in which a gas reacts with solid and solid particles remains unchanged in size during reaction. Establish relationship between time and conversion for shrinking core model of unchanging size in case diffusion through ash layer controls. | 07 |

OR

- Q.4** (a) Explain any one method of preparation for catalysts with examples **03**
(b) Discuss surface area and void volume for catalysts **04**
(c) Explain various experimental methods for finding reaction rates for catalyzed reaction **07**
- Q.5** (a) Differentiate between Physical Adsorption and Chemisorption. **03**
(b) Explain the mechanism of solid catalyzed reactions. **04**
(c) Discuss heat effects during solid catalyzed reactions **07**

OR

- Q.5** (a) Describe with neat sketch fluidized bed reactor **03**
(b) State the steps in heterogeneous catalytic reaction with schematic diagram. **04**
(c) Derive the performance equation for plug flow reactor containing porous catalysts. **07**
