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B.Tech. Seventh Semester (Polymer (Plastic) Technology) (CGS)

## 11135 : Polymer Reaction Engineering : 7 PP 02

| P. I<br>Tin | Pages : 2<br>ne : Thre | 2<br>ee Hour                | AW - 33<br>* 0 2 5 8 * Max. Marks  | <b>AW - 3384</b><br>Max. Marks : 80 |  |
|-------------|------------------------|-----------------------------|--|-------------------------------------|--|
|             | Notes                  | s: 1.<br>2.                 | Answer three question from Section A and three question from Section B.<br>Due credit will be given to neatness and adequate dimensions.   |                                     |  |
|             |                        | 3.<br>4.<br>5.              | Assume suitable data wherever necessary.<br>Diagrams and chemical equations should be given wherever necessary.<br>Illustrate your answer necessary with the beln of neat sketches.  |                                     |  |
|             |                        | 6.<br>7.                    | Discuss the reaction, mechanism wherever necessary.<br>Cell phones are not permitted.  |                                     |  |
|             |                        | 8.                          | Use of pen Blue/Black ink/refill only for writing the answer book.<br>SECTION – A  |                                     |  |
| 1.          | a)                     | Derive                      | the performance equation of adiabatic batch reactor.   | 7                                   |  |
|             | b)                     | Discus                      | s the classification of chemical reaction on the basis of various parameters.  | 7                                   |  |
|             |                        |                             | OR   |                                     |  |
| 2.          | a)                     | Compa<br>of flow<br>product | re steady state flow type tubular reactor with mixed flow reactor (CFSTR) in terms<br>pattern, conversion, concentration, rate and molecular weight distribution of<br>t formed.   | 9                                   |  |
|             | b)                     | Why pl<br>reactor           | us flow reactor [P.F.R.] is more efficient than [C.F.S.T.R.] constant flow stir tank?  | 5                                   |  |
| 3.          | a)                     | Discus                      | s solution polymerisation technique compare it with bulk polymerisation.   | 7                                   |  |
|             | b)                     | What d<br>emulsio           | o you mean by CMC? Explain in detail the role and mechanism of emulsifier in on polymerisation technique.  | 6                                   |  |
|             |                        |                             | OR   |                                     |  |
| 4.          | a 8                    | Discuss<br>emulsio          | s emulsion polymerisation technique in detail. State the merits and demerits of on polymerisation technique.   | 13                                  |  |
| 5.          |                        | Discuss<br>Derive<br>polyme | s smith and Ewart theory for kinetics of emulsion polymerisation with assumption.<br>basic equation of this theory. Apply case in which the number of free radicals per<br>r particle are less than one, consider the case of high diffusion rate. | 13                                  |  |
|             |                        |                             | OR   |                                     |  |
| 6.          |                        | What a<br>with the          | re the various stages of an ideal emulsion polymerisation technique? Discuss in brief<br>e help of neat schematic diagrams.  | 13                                  |  |

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## www.FirstRanker.com SECTION – B

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|     |     | SECTION – B   |    |
|-----|-----|---|----|
| 7.  | .a) | Name the functional groups present in case of polyester preparation using condensation polymerisation process.  | 6  |
|     | b)  | How choice of reactor effect on average molecular weight and molecular weight distribution of polymer formed in case of condensation polymerisation?      | 7  |
|     |     | OR  |    |
| 8.  | a)  | How would you control average molecular weight and molecular weight distribution of polymer formed in condensation polymerisation?                        | 7  |
|     | b)  | Compare condensation polymerisation with radical polymerisation.  | 6  |
| 9.  |     | How will you determine rate of polymerisation and rate constant by using dilatometer? Describe it's working principle with the help of schematic diagram. | 14 |
|     |     | OR  |    |
| 10. | a)  | How choice of reactor effect on average molecular weight and molecular weight distribution of polymer formed in case of radical polymerisation?           | 7  |
|     | b)  | How would you control average molecular weight of polymer formed using increase in  | 7  |

- b) How would you control average molecular weight of polymer formed using increase in temperature method in case of free radical polymerisation?
- Discuss in brief the following cleaning methods used in large polymerisation reactors.
  Manual Cleaning
  - ii) Mechanical cleaning
  - iii) Chemical Cleaning

## OR

| 12. | a) | Discuss agitation used in large polymerisation reactor.   |   |
|-----|----|---|---|
|     | b) | How would you prepare polystyrene using commercial (German Tower) process?<br>Discuss with the help of neat sketch. | 7 |

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