Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2017**

**Subject Code: 2171710 Date: 15/11/2017**

**Subject Name: Process Dynamics and Control**

**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.**

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | How similarity states can be used in modeling of processes? | **03** |
| | **(b)** | What are shrinking and swelling effects in boiler? Explain it. | **04** |
| | **(c)** | Discuss different design aspects for waste water treatment plant. | **07** |
| **Q.2** | **(a)** | Explain dynamic behavior of first order linear system. | **03** |
| | **(b)** | Compare two and three element level control for boiler. | **04** |
| | **(c)** | Explain dynamic response of heat exchanger to change in steam temperature. | **07** |
| | | **OR** | |
| | **(c)** | Discuss different control schemes for heat exchanger. | **07** |
| **Q.3** | **(a)** | Explain burner management system for boilers. | **03** |
| | **(b)** | Discuss different factors governing the conduct of reaction in chemical reactor. | **04** |
| | **(c)** | What is end point detection? Explain end point detection for continuous and batch reactor. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain pH control for chemical reactors in brief. | **03** |
| | **(b)** | Explain mass and energy balance for distillation column. | **04** |
| | **(c)** | Discuss the effects of lag in flow rates on dynamic behavior of distillation column. | **07** |
| **Q.4** | **(a)** | Explain column pressure control in distillation column. | **03** |
| | **(b)** | Describe overhead composition control in distillation column. | **04** |
| | **(c)** | Discuss the roll of pumps and compressors in development of waste water treatment plant. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is inverse response? Explain with reference to boiler. | **03** |
| | **(b)** | Describe bottom composition control in distillation column. | **04** |
| | **(c)** | Explain the unit operations of fertilizer industry with suitable process flow diagram. | **07** |
| **Q.5** | **(a)** | Write a brief note on countercurrent exchangers. | **03** |
| | **(b)** | Explain steam temperature and pressure control for boiler. | **04** |
| | **(c)** | Explain the unit operations of sugar industry with suitable process flow diagram. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Describe feedforward control of feed water in boiler. | **03** |
| | **(b)** | Compare different system identification methods. | **04** |
| | **(c)** | What is system identification? Explain with reference to cement industry. | **07** |

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