

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015**

**Subject Code: 2151705**

**Date:08/12/ 2015**

**Subject Name: Process Control Systems**

**Time:10:30am to 1:00pm**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Derive mathematical model for liquid level system using two interconnected tanks with suitable diagram. **07**  
(b) What is FOPTD model? Explain it in the context of any higher order system with process reaction curve. **07**

- Q.2** (a) What is degree of freedom? Explain it in the context of CSTR with suitable equations and diagram. **07**  
(b) Explain the concept of control mode. With suitable diagram and equations explain PID controller. **07**

**OR**

- (b) Explain proportional controller with suitable diagram and example of process. **07**

- Q.3** (a) What do you mean by tuning of controller? Explain Z-N method of tuning. **07**  
(b) Explain cascade control scheme with suitable diagram. **07**

**OR**

- Q.3** (a) With suitable diagram explain the control scheme for maintaining proper air to fuel ratio for drum boilers. **07**  
(b) Explain feed forward and feedback control with suitable example and diagram. **07**

- Q.4** (a) Explain the terms 1)Self-Regulation with example 2) Dead Time 3) Offset Error **07**  
(b) Explain the terms 1) Proportional band with example 2) Process load 3) Neutral zone **07**

**OR**

- Q.4** (a) Explain shrinking and swelling concept in the context of drum boiler control. **07**  
(b) What is adaptive control? Explain gain scheduling in the context of adaptive control with suitable diagram. **07**

- Q.5** (a) Level measurement in a sump tank is provided by a transducer scaled at 0.2V/m. A pump is to be turned on by application of +5 V when sump level exceeds 2 m. The pump is to be turned off when the sump level drops to 1.5m. Design a two position controller for this application. Draw suitable diagram too. **07**  
(b) What is discrete time control? Explain ZOH and sampling concept in the concept of discrete time control. **07**

**OR**

- Q.5** (a) What is integral windup? How it can be prevented in process control? **07**  
(b) Explain selective control scheme with suitable diagram. **07**

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