

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER-II • EXAMINATION – SUMMER - 2017**

**Subject Code: 2720301****Date: 26/05/2017****Subject Name: DIGITAL CONTROL****Time: 02:30 PM To 05:00 PM****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) Discuss and compare the One Degree of Freedom Feedback Controller and Two Degrees of Freedom Feedback Controller structure. **07**
- (b) Discuss the Nyquist Plot approach for Digital Control Design. **07**
- Q.2** (a) Discuss the Stability Margins, Internal Stability and Realizability. **07**
- (b) Discuss the Internal Model Principle in detail. **07**
- or**
- (b) Discuss the Algorithm to Solve Aryabhatta's Identity **07**
- Q.3** Discuss the Discretization of PID Controllers in all different framework. Also discuss the implementation of digital PID controller to insure bumpless transfer of manual control to auto mode. **14**
- or**
- Q.3** Discuss the Ziegler–Nichols Method of Tuning in detail. Also discuss the discretization of PID Controller with Filtering and its implementation. **14**
- Q.4** Discuss the design of Pole Placement Controller with Performance Specifications, Implementation of Unstable Controllers, Internal Model Principle for Robustness and need for Redefining Good and Bad Polynomials. **14**
- or**
- Q.4** Discuss the implementation of Anti Windup Controller in 2-DOF framework. Also explain the PID Tuning Through Pole Placement Control. **14**
- Q.5** Discuss the design approach of GPC for ARX Model in detail. Also discuss the approach and modifications needed in GPC algorithm when control horizon and prediction horizon having different sizes. **14**
- or**
- Q.5** Discuss the Pole Placement state feedback controller and Observer design approach in digital domain. Also discuss the separation principle of KALMAN approach to implement state feedback control. **14**

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