Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA ENGINEERING – SEMESTER – 4 • EXAMINATION – SUMMER 2014

Subject Code: 3341701   **Date: 23/05/2014**

Subject Name: Control Instrumentation System

**Time: 10:30 am – 1:00 pm**   **Total Marks: 70**

Instructions:
1. **Attempt all five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Each question carry equal marks (14 marks)**

Q.1 (a) Define the following.   **07**
1. Plant
2. Process
3. System
4. Control system
5. Servo system
6. Open loop control system
7. Closed loop control system.

(b) Explain closed loop system with block diagram and example.   **07**

Q.2 (a) Compare open loop and closed loop system.   **07**

(b) Define Transfer Function. Derive Transfer Function for simple one tank and   **07**
two tank level system.

OR

(b) Derive transfer function C(s)/R(s) of signal flow graph given in following fig.   **07**
using Mason's gain formula.
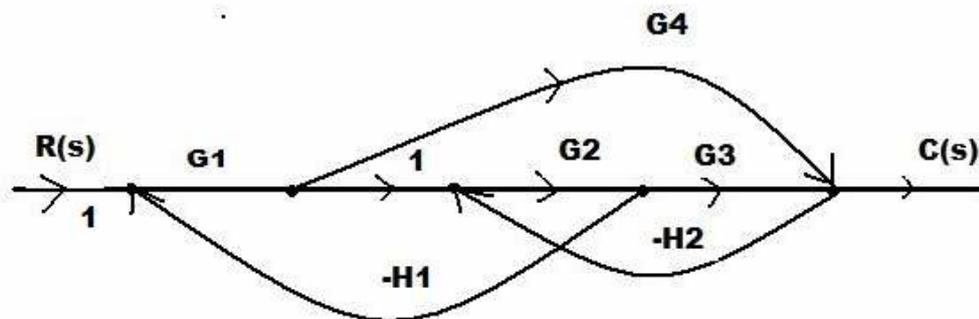
Q.3 (a) List rules for block diagram reduction technique.   **07**

(b) Explain time response of 1st order system with unit step input.   **07**

OR

Q.3 (a) Draw time response curve of second order control system for step input and   **07**
define the following terms.
1. Delay time
2. Rise time
3. Peak time
4. Settling time
5. Steady state error.

(b) Explain steady state error & error constants.   **07**

Q.4 (a) Explain construction rules for root locus technique. **07**

(b) The characteristics equation for control system is given by $S^3 + (K + 0.5) S^2 + 4KS + 50 = 0$, determine range of K for which system is stable using Routh Hurwitz criteria. **07**

OR

Q. 4 (a) Write short note on Nyquist stability criterion. **07**

(b) Describe standard test signal used for control system. **07**

Q.5 (a) Write short note on Bode plot. **07**

(b) Compare various modes of control action. **07**

OR

Q.5 (a) Sketch output for various modes of control action for step changes only. **07**

(b) Define the following. **07**
1. process equation
2. process load
3. process lag
4. self regulation
5. measurement lag
6. control lag
7. transportation lag

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