Seat No.:	Enrolment No.

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-V • EXAMINATION - WINTER 2013** 

Su Ti	ibjec me: struct	ct Code: 153501  ct Name: Process Instrumentation, Dynamics and Control  10.30 am - 01.00 pm  Total Marks: 70  ions:  1. Attempt all questions.  2. Make suitable assumptions wherever necessary.  3. Figures to the right indicate full marks.	
Q.1	(a) (b)	<ul> <li>I. What are the configurations of control system?</li> <li>II. Write a short note on classification of process variable.</li> <li>Derive the transfer function for mercury thermometer. List out the assumptions and justify them.</li> </ul>	04 03 07
Q.2	(a) (b)	I. Define: a. Transfer function b. Process Dynamics c. Time constant II. Explain dynamic characteristics for instruments.  A thermometer with time constant 7 seconds and showing steady state temperature 27°C suddenly immersed in an oil bath at 160°C. Find:  (i) Temperature reading on thermometer after 7sec?  (ii) Time required for temperature reading of 100C?  OR	03 04 07
	<b>(b)</b>	What is second order system? Explain the various terms used to describe an underdamped second order response.	07
Q.3	(a)	Define 'Stability' and find the stability of the system using Routh stability criterion having characteristic equation; $S^4 + 8S^3 + 18S^2 + 16S + 5 = 0$	07
	<b>(b)</b>	Derive overall transfer function for two tanks connected in series Interacting system.  OR	07
Q.3	(a) (b)	What is the transfer function of PID controller? Also explain selection criteria for controllers.  Explain DCS in detail with neat figure showing typical module connections.	07 07
Q.4	(a)	Find the single block equivalent by block diagram reduction for following example;  R(s)  G  G  G  G  G  G  G  G  G  G  G  G  G	07
Q.4	(b) (a)	Explain the construction of pneumatic control valve. Also explain valve sizing.  OR  What are the basic functions of process instruments? Also write a short note on Transducers.	07 07
Q.5	(b) (a)	What are Bode diagrams? Explain the graphical rules for Bode diagrams.  List out various level measuring instrument and discuss level measurement in	07 07
	<b>(b)</b>	pressure vessels.  Explain absolute/vacuum pressure measuring instruments in detail.	07

## OR

- Q.5 (a) Classify flow measuring instruments. Also explain the methodology for 07 determination of flow rate with equation for venturi meter.
  - (b) Mention various temperature measurement devices and explain the temperature 07 measurement by thermocouple.

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