

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3153618****Date:29/01/2021****Subject Name:Process Instrumentation Dynamics & Control****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		<b>MARKS</b>
<b>Q.1</b>	(a) Explain the term: (i) Manipulated variable (ii) Controlled variable	<b>03</b>
	(b) Write the mathematical representation of unit impulse function and derive its Laplace transform	<b>04</b>
	(c) Derive transfer function of mixing process with assumption.	<b>07</b>
<b>Q.2</b>	(a) State and prove final value theorem.	<b>03</b>
	(b) Write down the type of second order system	<b>04</b>
	(c) Explain the selection criteria for controllers.	<b>07</b>
<b>Q.3</b>	(a) Explain the term: (i) Transfer function (ii) Deviation variable	<b>03</b>
	(b) Differentiate Servo problem and regulator problem.	<b>04</b>
	(c) Mention the procedure steps of Routh test used to check the stability of a control system	<b>07</b>
<b>Q.4</b>	(a) Enlist the assumption involved in mercury thermometer system.	<b>03</b>
	(b) Mention the following terms relating to control system (i) set point tracking (ii) disturbance rejection	<b>04</b>
	(c) Find the stability of system using routh stability criteria having characteristic equation: $s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$	<b>07</b>
<b>Q.5</b>	(a) Differentiate between P-Controller and On-Off Controller.	<b>03</b>
	(b) Derive the step response of an underdamped second order system	<b>04</b>
	(c) With neat sketch explain principle, working and function of radiation pyrometer.	<b>07</b>
<b>Q.6</b>	(a) Derive transfer function of PI-Controller.	<b>03</b>
	(b) A Control system is subjected to a step change of magnitude 10. The transfer function of control system is expressed as $G(s) = \frac{6}{0.9s^2 + 0.3s + 10}$ Calculate overshoot, Decay ration, ultimate value of response, maximum value of response	<b>04</b>
	(c) Explain working and construction of bimetallic thermometers.	<b>07</b>
<b>Q.7</b>	(a) How stability is mentioned for linear systems?	<b>03</b>
	(b) With a neat figure explain the construction and working of Pneumatic Control Valve?	<b>04</b>
	(c) Describe the working of any one vacuum measuring instrument with a neat sketch.	<b>07</b>

- Q.8** (a) Comment of stability of having Laplace transform  $\frac{1}{s^2+4s+4}$  **03**
- (b) Explain the component of control system **04**
- (c) Describe bubbler system for liquid level measurement with neat sketch. **07**

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