GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2723009

Subject Name: Advance Process Control Time: 2:30 pm to 5:00 pm Date: 18/11/ 2016

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) (b)	What is smith predictor? Discuss in brief all features of smith predictor. Determine the inverse z transform of the function $F(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$	07 07
		1 100 1002	
Q.2	(a)	State the difference between feedback and feed forward control system.	07
	(b)	What are the advantages of cascade control system? Discuss the any one application of the following for cascade control system. Cascade control of heat exchanger, distillation column, furnaces.	07
	(b)	Define MIMO control system. Discuss the various aspects to be considered for	07
		the design of efficient control system (MIMO) with example.	
Q.3	(a)	Solve the following differential equation by Laplace transform:	07
		$\frac{d^2x}{dt^2} + 4x = 2e^{-t} \qquad x(0) = x'(0) = 0$	
	(b)	dt^2 The open loop transfer function of the discrete time control system is given as	07
		$GH(s) = \frac{\pi}{s(s+2)}$	
		Take the sampling period $T = 1$ sec. Determine the value of gain of controller for which the system becomes just unstable.	
		OR	
Q.3	(a)	Explain the significance of following inputs for control systems and derive its	07
	(b)	Laplace. (a) Step input (b) Unit pulse input (3) Impulse input	07
Q.4	(b) (a)	Discuss the Root locus diagram in the z-domain. Also explain the stability criterion in z domain	07 07
	(b)	Discuss the phase plane analysis of 2nd order system.	07
	()	OR	01
Q.4	(a)	"Poor process designs leading to control problems" – Explain with examples.	07
~ -	(b)	Discuss the design questions related to a MIMO control system.	07
Q.5	(a)	Explain the structure of feed forward control system with neat sketch. Also	07
	(h)	Explain following terms:	07
		 Sampler switch 2. Sampling period 3. Sampling rate 4. Amplitude ratio Transducer 6. Set point 7. Transfer function 	07
		OR	
05	(a)	Write a brief note on Patie control	07
