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SE-8345

B. E. - III (Sem. V) (Instrumentation & Control) Examination

May / June – 2011

Process Control

Time : **3** Hours] [Total Marks : **100**

Instructions :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 3 (SEM. 5) (INSTRUMENTATION & CONTROL)

Name of the Subject :

☛ Process Control

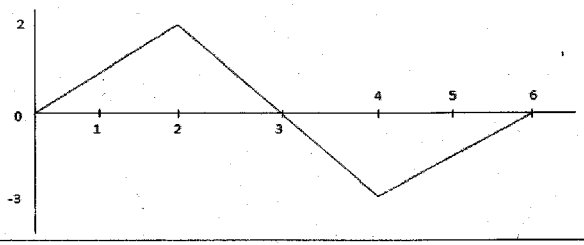
☛ Subject Code No. : 8 3 4 5 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(1) Answers to each section must be written in separate answer books.
(2) Figure to the right indicate maximum marks.
(3) Draw neat figure wherever required.

Q-1	**Answer the short questions.**	
	(i) Define Direct action and Reverse action **(ii) State the importance of DOF** **(iii) Explain Process Lag.** **(iv) Define Rise time and settling time.** **(v) Process Dynamics.**	**(10)**
Q-2(a)	**What is PD control mode? Also describe its characteristic and state its advantages and disadvantages.**	**(6)**
(b)	**Derive the transfer function of two Non-Interacting tank system with linear resistance element.**	**(6)**
	OR	
(b)	**Explain Floating Control mode in detail .**	**(6)**
(c)	**Explain Approximate Linearization method for nonlinear system.**	**(6)**
Q-3(a)	**Draw and explain the Process and Instruments elements of the feedback temperature loop.**	**(8)**
(b)	**State the criteria for selection of controlled variable and manipulated variable for Continuous-Flow Chemical Reactor tank.**	**(6)**
	OR	
(b)	**Explain Modelling Procedure in detail.**	**(6)**

(c)	A PID Controller has Kp=2.0, Kd=2sec and Ki=2.2sec^{-1} Pi(0)=40% plot the output for an Error given in below diagram 	(8)

Q-1	Answer the short questions.	
i.	Give the Design criteria for Feed forward Control Loop.	(2)
ii.	Define the following:- (1) Wild Stream (2) Override Control(Override Controller) (3) Ultimate Period (Pu)	 (1) (2) (2)
iii.	What are the limitations of Bode Method?	(2)
iv	Define Amplitude Ratio with it's Equation	(1)
Q-2(a) Q-5	Explain Feed Forward control system with it's block diagram and explain any one application of Feed Forward control.	(8)
(b) (b1)	Write down any three implementation issue for Feed Forward control system. Write down cascade design criteria.	(3) (3)
	OR	
(b)	Explain Cascade control application in packed-bed chemical reactor with proper diagram.	(6)
(c)	Explain Cascade control system with it's block diagram and explain Cascade control application in JCSTR.	(6)
Q-3(a) Q-6	What is Split-Range control? Explain any one application of it with proper Example.	(8)
(b)	What is override control? Explain any one application of override control with proper Example.	(6)
	OR	
(b)	The process transfer function is given as below. Determine the stability condition by the bode method Gc(s)=Kc Gp(s)= $\frac{0.039}{5s+1}$ Gv(s)=$\frac{1}{0.033s+1}$ Gs(s)= $\frac{1}{0.25s+1}$	(6)
(c)	Find out the PI tuning constant Kp, Ti using Zeigler-Nichols closed loop method for following transfer function: $G_{ol}(s) = \frac{e^{-2s}}{(10s+1)(s+1)(0.1s+1)}$	(6)