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Code No: 07A61001 **R07** **Set No. 2**

III B.Tech II Semester Examinations,December 2010
AUTOMATION OF INDUSTRIAL PROCESSES
Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write short notes on the following:
   (a) Optimal control.
   (b) Inferential Control. [8+8]
2. (a) Explain how Analog Process Control loops cab be replaced by digital computer control loops?
   (b) List out the advantages of DDC over conventional analog Controller [8+8]
3. Explain the following:
   (a) Advantages of PLCs.
   (b) Advantages of DCS. [8+8]
4. (a) Given the digital control system
   U(K+1) = A X(K) + B U(K)
   C(K) = D X(K)
   Prove that if pair [A, D] is observable, then the closed loop realized by output feed back U(K) = -G C(K) + r(K) is also observable.
   (b) Describe the relationship among controllability, observability and transfer function. [10+6]
5. (a) What is Dead Beat Algorithm? Explain DB algorithm for a second order system considering Dead time?
   (b) What is the effect of sampling on the response of a closed loop system? How do you select the sampling rate? [10+6]
6. (a) Discuss about different communication protocols associated with Smart Sensors?
   (b) Write the advantages of Smart Sensors. [8+8]
7. Explain in detail the essential components of Adaptive control system. [16]
8. Design a suitable partial static FFC for the system described by $G_p\left(Z^{-1}\right) = \frac{\left(4-Z^{-1}\right)}{(2-Z^{-1})(3-Z^{-1})}$ and $G_v\left(Z^{-1}\right) = \frac{Z^{-1}}{(1.5-Z^{-1})(4-Z^{-1})}$. [16]

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Code No: 07A61001 **R07** **Set No. 4**

III B.Tech II Semester Examinations,December 2010
AUTOMATION OF INDUSTRIAL PROCESSES
Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. What is adaptive control? Why is it needed in process control applications? Explain the concept of adaptive control with a neat block diagram. [16]
2. Explain the concept of Inferential control with a neat block diagram. [16]
3. Write short notes on the following:
   (a) Static feed forward controller.
   (b) Partial static feed forward controller. [8+8]
4. (a) Describe the principle of a 'Smart Transmitter' what and where does it transmit discus some aspects of its developments in recent years?
   (b) Draw a block diagram to show how sensors interact with the automated manufacturing process? Consider your own example. [8+8]
5. Write short notes on the following:
   (a) DCS integration with PLCs.
   (b) DCS integration with computers. [8+8]
6. (a) Write a short notes on
      i. Artificial Intelligence based system.
      ii. Expert system controller.
   (b) Discuss the hierarchy of DCS. [10+6]
7. (a) Design a Dead Beat controller for a process whose transfer function is given by Gp(s)=1/(0.4s+1). Also obtain the equation for nth sampled controller output. (Assume T=0.1 sec)
   (b) Write the properties of state transition matrix both in continuous and discrete time domain. [12+4]
8. (a) Explain ZIEGLER-NICOLS tuning method for controller parameter setting? obtain the values for PID controller mode?
   (b) For a physical system, the process reaction curve is represented by delayed first order response it's transfer is reperesented by
   $G_{PRC} = \frac{0.5e^{-0.25}}{2S+1}$
   Find the controller parameters for P, PI and PID controllers using ZIEFLER-NICOLS tuning method. [8+8]

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Code No: 07A61001 **R07** **Set No. 1**

III B.Tech II Semester Examinations,December 2010
AUTOMATION OF INDUSTRIAL PROCESSES
Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write short notes on the following:
   (a) Smith predictor algorithm.
   (b) Analytical predictor algorithm. [8+8]
2. Write short notes on the following:
   (a) Cascade control.
   (b) Predictive control. [8+8]
3. (a) With neat block diagram, discuss in brief about SCADA.
   (b) Draw the functional block diagram of Computer Control system and explain the importance of each block in it? [8+8]
4. Explain the following feed forward control (FFC) algorithms:
   (a) Dynamic FFC.
   (b) Static FFC. [8+8]
5. Write short notes on:
   (a) Field Bus systems
   (b) Topology of Field Bus [8+8]
6. (a) What is Dahlin's Algorithm? Explain Dahlin's Algorithm for a first order system without delay.
   (b) Give the design steps of discrete controller based on different algorithms. [10+6]
7. (a) What is meant by optimum controller settings? Describe the procedure to controller settings that give minimum ISE.
   (b) How is process reaction curve plotted? How do you use it for controller tuning? What is process reaction curve methods (PRC) of controller tuning. Explain how PRC method can be used to set the parameter of P, PI & PID Controllers? [8+8]
8. With neat sketch discuss the PLC network that is used for communication of plant parameters in a process control environment. [16]

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Electronics And Instrumentation Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is cascade control Scheme? Explain the same with the help of a neat sketch diagram?
   (b) With suitable example, expalin the advantage of cascade control system.[8+8]
2. (a) Discuss about the basic elements of computer controlled process
   (b) List out the various steps involved in design of digital computer control loops. [8+8]
3. (a) A discrete system is having the following transfer function,
   T(Z) = $(Z^2$ +4Z+3)/ $(Z^3$+3Z^2+2Z)
   Obtain the discrete state model and discuss about its controllability and observability
   (b) Give the structure of a self tuning regulator(STR) and explain how the controller parameters are set [8+8]
4. What is a data highway? Discuss the advantage of using fiber optics as a data highway. [6+10]
5. Explain the design procedure of dynamic feed forward controller with an example. [16]
6. (a) What are the limitations of Z transforms? Define modified Z transform and obtain modified Z transform for G(S) = 1/(S+1)
   (b) Write a short notes on Zero order Hold (ZOH) device. Also derive its transfer function. [10+6]
7. (a) Explain how data bus works in a DCS.
   (b) Discuss in brief about Intelligent field bus device (IFD)? [8+8]
8. Draw a block diagram for Smith predictor control system. In each block that involves controller calculations, show the equation solved in the digital implementation. Assume that an adequate process model is of first order with dead time. [16]

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