Reg. No. : | | | | | | | | | | |

Question Paper Code: 31672

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Seventh Semester

Instrumentation and Control Engineering

01UIC702 - DIGITAL CONTROL SYSTEM

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What are the merits and demerits of sampled data control systems?
2. What is sampled data control system?
3. State (shanon's) sampling theorem.
4. Explain the terms sampling and sampler.
5. What are the properties of ROC?
6. What is zero order hold?
7. Write the properties of the state transition matrix of discrete time systems.
8. Define Complete state controllability.
9. What is the necessary condition to be satisfied for design using state feedback?
10. What is the necessary condition to be satisfied for design of state observer?

PART - B (5 x 16 = 80 Marks)

11. (a) With neat block diagram explain about configuration of the basic digital control scheme. (16)

Or

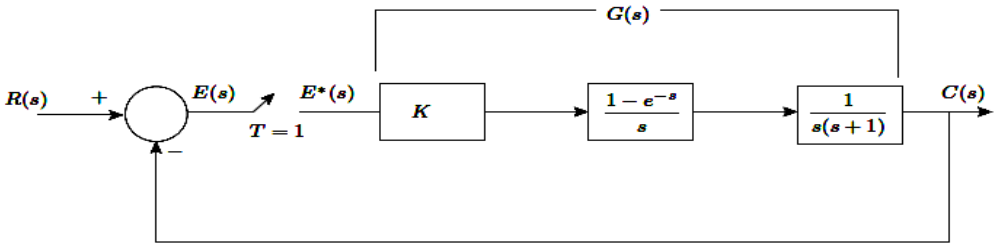
(b) Explain in about Hardware description of temperature control system with suitable block diagram. (16)

12. (a) Discuss in detail about Reconstruction of analog signals. (16)

Or

(b) Elaborate in detail about Ideal sampler process. (16)

13. (a) Determine the closed loop stability of the system shown in below figure when K = 1. (16)



Or

(b) Explain the jury's stability test and also check whether the characteristic equation is stable or not $P(Z)=Z^4-1.2Z^3+0.07Z^2+0.3Z-0.08=0$. (16)

14. (a) Using the Cayley-Hamilton Techniques find e^{At}. $A=\begin{bmatrix}0 & 2\\ 2 & -4\end{bmatrix}$ (16)

Or

(b) Determine the controllability and observability of the system

$$A=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ 0 & -2 & -3\end{bmatrix}\quad B=\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}\quad C=[10 \quad 0 \quad 0]$$ (16)

15. (a) Explain with the help of block diagram digital temperature control system. (16)

Or

(b) Consider the system defined by $X(k+1)=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ -0.5 & -0.2 & 1.1\end{bmatrix}X(k)+\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}u(k)$

Determine the state feedback gain matrix k such that when the control signal is given by u(k) = - kx(k),the closed loop system will exhibit the deadbeat response to any initial state x(0).Give the state variable model of the closed loop system. (16)