(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2289452 Roll No.

B.TECH.

Regular Theory Examination, (Odd Sem-VII) 2016,17

CONTROL SYSTEM - II

Time : 3 Hours *Max. Marks : 100*

SECTION - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)

a) Define Characteristic Equation.

b) Obtain the z-transform of function whose Laplace transform is given by $F(s) = 1/(s+a)^2$

c) Map the following S plane values into Z plane for T = 1 & 0.1

i) S = -0.5+j0.5

ii) S = -2

d) Explain the effect of Quantization Error in an ADC.

e) What are application and limitation of z transform.

f) Find out the mathematical model of ZOH.

g) Explain working of weighted resistor type DAC in brief.

h) What is controllable canonical form in state space representation?

i) Write the properties of state transition matrix.

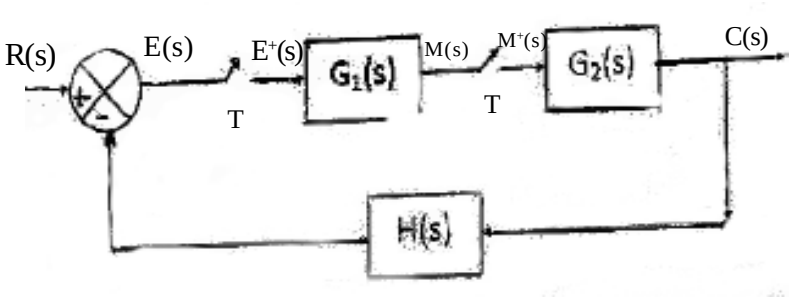
j) Describe the causal and non causal systems.

SECTION - B

2. Attempt any five parts from this section. (5×10=50)

a) What is Digital control system? Discuss advantages and disadvantages of Digital control system.

b) Obtain the closed loop Pulse transfer function $\frac{C(z)}{R(z)}$ for the following.



c) obtain the z-transform of function whose Laplace transform is given by $F(s) = \frac{5}{s(s^2+4)}$

d) Explain modified Z-transform method in detail. Find the modified Z-transform of function F(t) = $\mathrm{Cos}(\omega t)$

e) Discuss Liaponov stability criteria for Linear and Nonlinear System.

f) Determine the discrete time state model of the following continuous time system (with sampling time = 1)

C(s)/R(s)=1/s(s+2)

g) Consider a linear system described by the equations.

$A = [1 \quad 2 \quad 0; 3 \quad -1 \quad 1; 0 \quad 2 \quad 0]$;

$B = [2; \quad 1; \quad 1]; C = [0 \quad 0 \quad 1]$

The model is observable. Design a state observer for eigen values -4; -3+-j1

h) A discrete data control system is described by the state equation.

$X(k+1) = AX(k) + Bu(k); \; y(k) = CX(k) + Du(k)$

Where $A = [0 \quad 1 \quad 0; 0 \quad 0 \quad 1; -24 \quad -26 \quad -9]$;

$B = [0; \quad 0; \quad 1]; C = [2 \quad 1 \quad 0]$. Find whether system is controllable and observable.

i) Explain finite state regulator problem and obtain the structure of optimal feedback control system from solution of linear state regulator problem.

SECTION - C

Note: Attempt any two questions from this section. **(2×15=30)**

3. Write a short note on need of microprocessor as controller. Describe microprocessor based position control system in detail.

4. Explain the following terms.

a) Cayley Hamilton Theorem.

b) Multirate System.

5. a) Explain state observers.

b) Explain Stochastic optimal process.

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