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B.TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

ADVANCE CONTROL SYSTEM

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1 Explain the following : **(10×2=20)**

a) Write down properties of STM..
b) Write down a note on Jury stability criterion.
c) Write down different properties of Z-transform.
d) Write about way to find out controllability and observability of a system.
e) What do you mean by Bilinear transformation?
f) What are the sufficient conditions of lyapunov stability
g) Give the advantages and disadvantages of canonical variables.
h) What do you mean by STM? Give its formula
i) Predict the stability of the following system: $F(Z)= 8Z^4 + 4Z^3 + 2Z^2 +4Z$
j) Define Popov's criterion for stability.

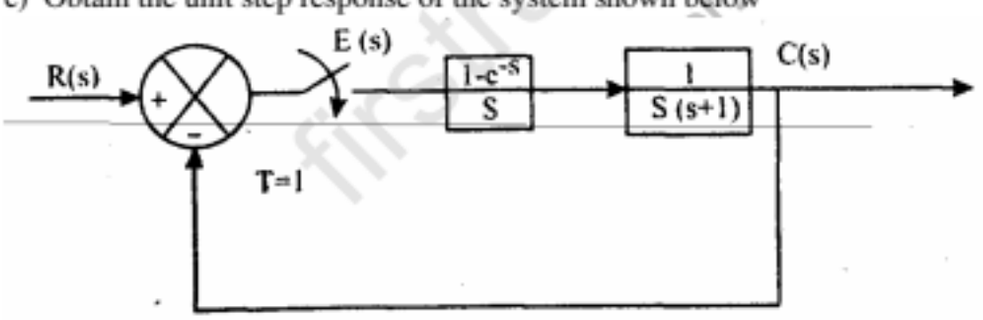
SECTION-B

2 Attempt any five of the following : **(10×5=50)**

a) What are Fuzzy logics? Write an explanatory note on evolution of fuzzy logics.

b) What do you mean by linear quadratic equation and derive Hamilton Jacobi equation.

c) Obtain the unit step response of the system shown below



d) Prove that the solution of state equation is unique.

e) Write the state equations for the system as shown in Figure.1 in which x1, x2 and x3 constitute the state vectors. Determine whether the system is completely controllable or not.

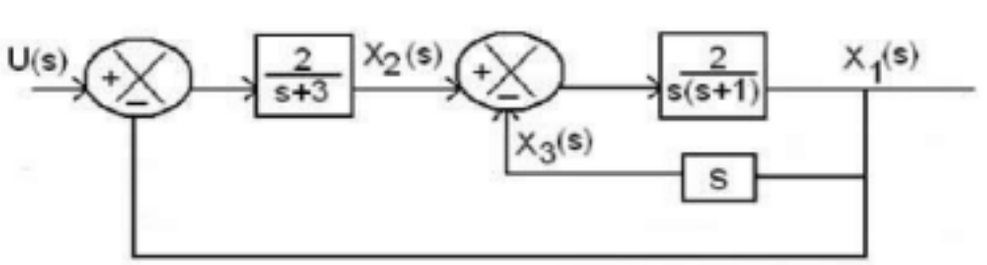


Figure.1

f) Differentiate between the SISO and MISO systems.

g) What is non- linearity and explain different types of non linearities?

h) Derive the describing function of On-off nonlinearity with hysteresis

SECTION C

Attempt any two of the following : (15×2=30)

3 Explain pontryagin's minimum principle and then solve given problem. Consider the linear, constant system

$$\dot{\mathbf{x}} = \mathbf{Ax} + \mathbf{Bu}$$

With u(t) unrestricted .Find u(t) which minimizes trade-off between terminal error and control effort.

4 What are neural networks? Write an explanatory note on evolution of neural networks. Also give difference between Neural and Fuzzy networks.

5 Explain Ricatti equation and give solution for it.