TEE-502 **194** **Printed Pages : 4**

Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | | |

Odd Semester Examination-2016

B.Tech. (Semester-V)

SYSTEM ENGINEERING

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

Note : Attempt **All** questions.

1. Attempt **any four** parts : [5×4=20]

   (a) What is Control System and its advantages?

   (b) What is sampling process and sampling theorem?

   (c) What is Mason gain formula?

   (d) Define Z-Transform.

   (e) Determine the transfer function of the RLC electrical network.

   (f) What is rise time, peak time, maximum overshoot, settling time?

2. Attempt **any four** parts : [5×4=20]

(a) Describe Lyapunov Function.

(b) Explain response of the first order system with unit ramp function.

(c) Define PID controllers.

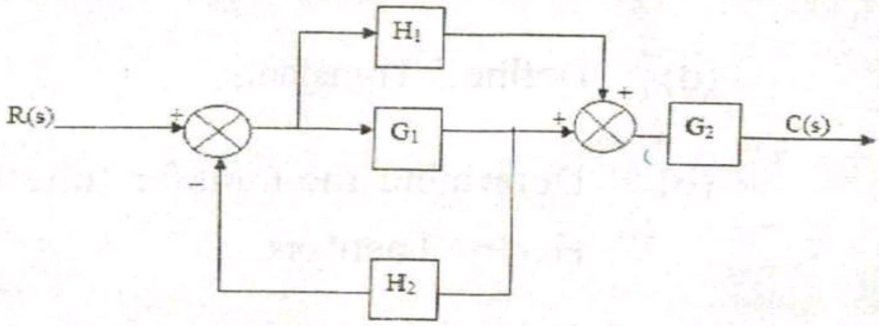
(d) Express by block diagram sampled data control system.

(e) Explain properties of State transition matrix (STM).

(f) Differentiate Open loop and Closed loop system.

3. Attempt **any two** parts : [10×2=20]

(a) Define the ratio C(s)/R(s) following by the Block Diagram.



(b) The open loop transfer function of a unity feedback system is given by:

$$G(s) = \frac{10}{(s+2)(s+5)}$$

Determine the damping ratio, undamped natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input?

(c) The forward path transfer function of a unity feedback control system is given by

$$G(s) = \frac{5(s^2+2s+100)}{s^2(s+5)(s^2+3s+10)}$$

Determine the step, ramp, parabolic error coefficients. Also determine the type of the system.

4. Attempt **any two** parts : [10×2=20]

(a) Find Z-Transform of the following:

(i) Sinwt

(ii) e^{at}

(b) Find the inverse Z Transform and number sequence for the function

$$F(z) = \frac{0.632z}{z^2 - 1.368z + 0.368}$$

Given that sampling time a) T=1 sec by any method.

(c) What is Hold circuit, describe Zero hold circuit and transfer function of zero hold circuit?

5. Attempt **any two** parts : [10×2=20]

(a) Evaluate the STM or e^{At} by series summation method.

$$A=\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

(b) A system characterized by the transfer function

$$\frac{Y(s)}{U(s)}=\frac{2}{s^2+6s^2+11s+6}$$

Find the state and output equation in matrix form and also test the controllability and observability of the system.

(c) (i) Describe different types of non linearties.

(ii) Define stability analysis with describing function.

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