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BIEEE-009

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B.Tech. ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

December, 2012

BIEEE-009 : DIGITAL CONTROL SYSTEM DESIGN

Time : 3 hours *Maximum Marks : 70*

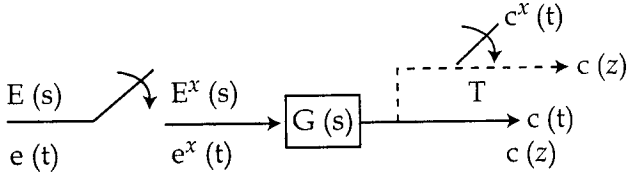
Note : *(i) Attempt **any seven** questions.*

*(ii) Each question carry **equal** mark.*

1. Explain the sample and hold operation. Also define the fundamental parameter of sample and hold device. 10

2. Obtain the mathematical model and frequency domain characteristics of First Order Hold (FOH) circuit. 10

3. Consider the system shown in figure 10



has the transfer function $G(s) = \frac{1}{(s + a)}$

where 'a' constant. The input to the system is a unit step function. $e(t) = u_s(t)$. Evaluate the output of the system by modified Z - transform method.

4. What is the Jury's stability criterion ? Check stability by Jury's stability criterion. $2z^4+7z^3+10z^2+4z+1 = 0$ **10**

5. Consider a process with the transfer function $G(s) = K/s(s+2)$ which proceded by a Zero Order Hold (ZOH) (T=0.2 sec) has the discrete time transfer function. Plot the root locus. **10**

6. Draw the state diagram of given equation : **10**

$x^\circ_1(t) = a_{11}x_1(t) + a_{12}x_2(t) + b_1u(t)$

$x^\circ_2(t) = a_{21}x_1(t) + a_{22}x_2(t) + b_2u(t)$

$y(t) = c_1x_1(t) + c_2x_2(t)$

7. Define the Cayley - Hamilton theorem. Evaluate the state transition matrix of given system. $x^\circ = Ax$. Where **10**

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 0 & 1 & 0 \\ 1 & 0 & 3 \end{bmatrix}; x(0) = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

8. Draw and obtain Jordon canonical form of given transfer function : **10**

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

9. How to design the controller by the pole placement method using state feedback for SISO System ? **10**

10. A state equation of a digital control system $x(k+1) = Ax(k) + Bu(k)$. Obtain the state transison matrix $\phi(k)$ where : **10**

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}$$