

TIC-601**100**

Printed Pages : 3

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

Roll No.

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B.Tech. (SEM.-VI) Examination 2014-15

DIGITAL CONTROL SYSTEM*Time : 3 Hrs.**Max. Marks :100*

1. Attempt any two of the following : 10 x 2 = 20
- (a) What are the merits and demerits of digital control system?
- (b) Illustrate the discrete data and digital control system with a step motor control system.
- (c) Discuss dead beat digital controller in details.
2. Attempt any two of the following : 10 x 2 = 20
- (a) Define z-transforms. Mention limitations of z-transform.

- (b) Obtain the inverse z-transform of the following functions.

$$(i) \quad F(z) = 10z + \frac{5}{(z-2)(z-0.5)}$$

$$(ii) \quad F(z) = \frac{z(1-e^{-at})}{(z-1)(z-e^{-at})}$$

- (c) Discuss relationship between s-plane and z-plane.

3. Attempt any two of the following : 10 x 2 = 20

- (a) Determine the pulse transfer function of the following transfer function

$$F(s) = \frac{(s+2)}{(s+1)(s+4)}$$

- (b) Solve the following difference equation using z-transform method.

$$c(k+2) - 0.1c(k+1) - 0.2c(k) = r(k+1) + r(k)$$

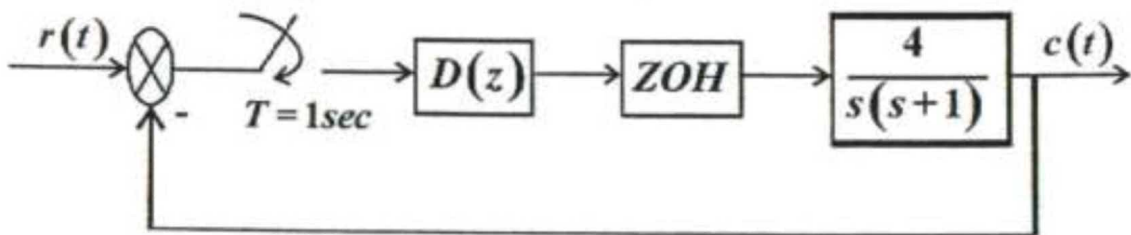
where $r(k) = u_s(k)$ for $k = 0, 1, 2, \dots, c(0) = 0$

and $c(1) = 0$

(c) Discuss Liapunov Stability Analysis Systems with Dead time.

4. Attempt any two of the following : 10 x 2 = 20

(a) A block diagram of a digital control system is show in below figure. Design a PID $D(z)$ to eliminate the steady error due to a step input and simultaneously realizing a good transient response and the ramp error constant $K_v \leq 3$



(b) Explain the pole placement design by state feed back with single input digital control system.

(c) Formulate the first order control system with disturbance $D(s)$ and optimize it for transfer function.

5. Attempt any two of the following : 10 x 2 = 20

(a) Discus Digital quantization in details with advantages of digital control system.

(b) Discuss Microprocessor based Position Control System.

(c) Examine whether the discrete data system

$$\begin{aligned}x(k+1) &= A x(k) + B u(k) \\ y(k) &= C x(k)\end{aligned}$$

Where $A = \begin{bmatrix} 0 & 2 \\ -1 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$, $C = [0 \quad 1]$ is

- (i) State controllable
- (ii) Output controllable
- (iii) Observable