PVP 17

Code: 17**EEPC2T5B**

I M.Tech - II Semester - Regular Examinations - AUGUST 2018

DIGITAL CONTROL SYSTEMS
(POWER SYSTEM & CONTROL)

Duration: 3 hours Max Marks: 60

Answer the following questions.

1. a) Obtain the z transform of the following functions 8 M

i) $x(t) = \begin{cases} t, & 0 \le t \\ 0, & t < 0 \end{cases}$

ii) $x(t) = \begin{cases} \cos wt, & 0 \le t \\ 0, & t < 0 \end{cases}$

b) Draw the Block Diagram of Digital Control System and explain it. 7 M

(OR)

2. a) Explain the mapping between s-plane and z-plane. 7 M

b) Find the inverse Z-transform for 8 M

i) $F(z) = \dfrac{z-4}{(z-1)(z-2)^2}$

ii) $F(z) = \dfrac{z}{(z^2 - z + 0.5)}$

3. Consider the discrete time unity-feedback control system, whose open loop pulse transfer function is given by

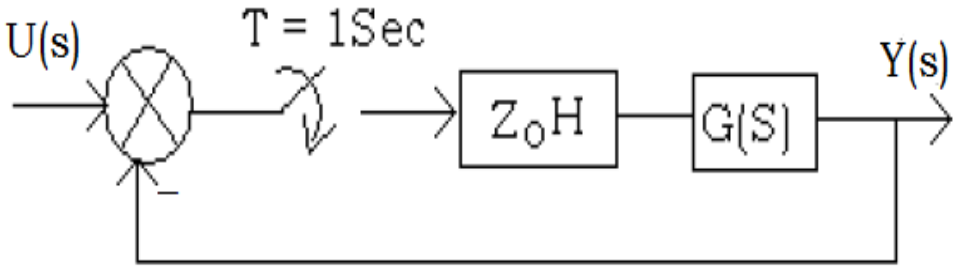
$$G(z) = \frac{K(0.3679Z + 0.2642)}{(Z - 0.3679)(Z - 1)}$$

Determine the range of gain K for stability by using the Jury's Stability Test. 15 M

(OR)

4. a) Explain Duality between controllability and observability. 5 M

b) Obtain the state space representation of the following system. The sampling period is 1 sec and $G(s) = \frac{1}{s(s+1)}$ 10 M



5. Explain the procedure steps for the full-order and minimum order state observer. 15 M

(OR)

6. A discrete time system is described by the state model

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \\ x_3(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -2 & -1 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \\ x_3(k) \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \mathrm{r(k)}$$

Design a state feedback controller which will place the closed loop poles at Z=-0.5$\pm$ j0.5 and Z=0. Verify the result by applying Ackermann's formula. 15 M

7. Explain the single board controllers with custom designed chips. 15 M

(OR)

8. Discus in detail about the components of TMS320 DSP and its supporting tools. 15 M