Roll No. .....

23293

M. Tech. 3rd Semester

(Electrical Power Systems) (Elective-III)

Examination – January, 2016

DIGITAL CONTROL SYSTEMS

Paper : MTEPS-301 (i)

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

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Give the advantages and disadvantages of Digital Control System. 5

(b) Draw the magnitude and phase curves of the zero-order hold. 7

(c) State and prove Sampling Theorem. 8

2. (a) Using the inversion integr hod obtain the inverse z-transform of. 10

$$X(z)=\frac{8}{(z-2)(z-}$$

(b) Solve the difference ion described by $y(n+2)-3y(n-1)+2y$ $(0)=0,\ y(1)=1,$ $x(n)=3^n$ using z-transform. 10

3. (a) Determine the stability the system $F(z)=2z^4+5z^3+10z^2+2z+$ sing Routh;s criterion. 12

(b) Describe the Liapunov y analysis of discrete time systems. 8

4. Design a digital controller for th m shown in fig. (1) Use the bode diagram appı n the w plane. The design specifications are thı hase margin is 55°, the gain margin be at leas and the static velocity error constant be 5 sec sampling time-period is specified as 0.1 sec. 20

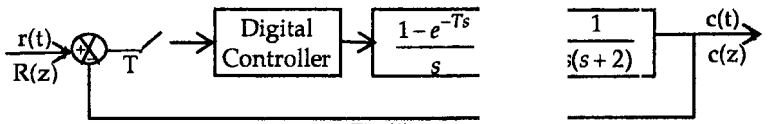

Fig (1)

5. Obtain a state-space representation of pulse transfer function $\frac{Y(z)}{U(z)}=\frac{z^3+8z^2+17z+8}{(z+1)(z+2)(z+3)}$ such that the state matrix is diagonal. 20

6. Investigate the controllability & observability of the following system : 20

$$x(k+1)=\begin{pmatrix}-1 & 1\\ 0 & -1\end{pmatrix}x(k)+\begin{pmatrix}0\\ 1\end{pmatrix}u(k)\ ;\ y(k)=\begin{pmatrix}1 & 1\end{pmatrix}x(k)$$

7. Write a detailed technical note on design of state observers. 20

8. (a) Write a technical note on the DSP control of digital control systems. 10

(b) Discuss the effect of finite word length and quantization on closed loop pole placement. 10