

Code :R7411008

R7

IV B.Tech I Semester(R07) Supplementary Examinations, May/June 2011
DIGITAL CONTROL SYSTEMS

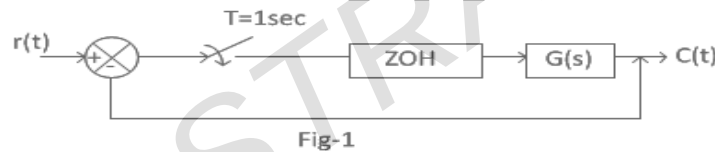
(Common to Electronics & Instrumentation Engineering, Electronics & Control Engineering)

Time: 3 hours

Max Marks: 80

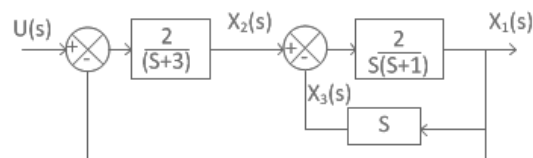
Answer any FIVE questions
All questions carry equal marks

- Determine the z- transform and their ROC of the following discrete sequences
 (i) $f_{(k)} = \{3, 2, 5, 7\}$ (ii) $f(k) = \{2, 4, 5, 7, 3\}$
 - Find the one side z - transform of the discrete sequences generated by mathematically sampling the following continuous time functions.
 (i) $f_{(t)} = e^{-at} \cos wt$ (ii) $f_{(t)} = e^{-at} \sin wt$
- The input-output relation of a sampled data system is described by the equation
 $c(k+2)+3c(k+1)+4c(k) = r(k+1)-r(k)$
 Determine the z - transform function. Also obtain the weighting sequence of the system.
 - Solve the difference equation $c(k+2)+3c(k+1)+2c(k)=u(k)$ given that
 $c(0)=1; c(1)=-3; c(k)=0$ for $k < 0$.
- Explain the analysis of systems with impulse sampling.
 - For the sampled data control system shown in fig(1) find the response to unit step i/p, where
 $G(s) = \frac{1}{s+1}$



- A discrete time system has the transform function

$$\frac{Y(z)}{U(z)} = \frac{4z^3 - 12z^2 + 13z - 7}{(z-1)^2(z-2)}$$
 Determine the state model of the system in any two forms?
- For the given system shown in fig(2). Determine whether the system is completely controllable and observable.



- Explain Jury stability test and Bilinear Transformation test with suitable example.
- Explain Design procedure in w-plane with suitable example.
- Consider the system described by the state model
 $\dot{x} = AX$ where $A = \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix}$; $c = [1 \ 0]$ $Y=CX$
 Design a full - order state observer. The described eigen values for the observer matrix are $M_1 = -5$; $M_2 = -5$.
