

(3 Hours)

[Total Marks80]

- N.B. : (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) All questions carry equal marks.
 (4) Assume Suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
- Test given system for Linearity, Causality, Stability, Memory and Time Invariant
 $y(t) = x(2t)$
 - Explain the concept of ROC in Z transform and Laplace Transform
 - Discuss the application of Signals in Control systems.
 - Determine the relationship between CTFT and LT
 - Find the z-transform of $x(n) = a^n u(n)$ and sketch the RoC
- 2 a $x(t) = 2, 0 \leq t \leq 6$ [10]
 $= 0, \text{ elsewhere}$
 Sketch $x(t), x(-t), -x(t), x(t-2), x(t+3), 2x(t), x(2t), x(t/2), x(t) + x(-t)$ and $x(t) - x(t-2)$
- b Find $x[n]$ using partial fraction method from $X(z) = 1/(1 - 1.5z^{-1} + 0.5z^{-2})$ [10]
- 3 a For a LTI system, input $x(t)$ and impulse response $h(t)$ are given below. Find the output using convolution. [10]
 $x(t) = h(t) = A, -T \leq t \leq T$
 $= 0, \text{ elsewhere}$
- b Find the Z Transform of $x(n) = 0.5^n u(n) + 0.8^n u(-n-1)$. Also specify ROC [10]
- 4 a find Continuous time Fourier Transform of $x(t) = A$ for $-T/2 < t < T/2$ [10]
- b find continuous time fourier Transform of $x(t) = \cos(2\pi f_0 t)$ [10]
- 5 a Find the Laplace transform of $x(t) = u(t) - u(t-a)$ where $a > 0$ and sketch the RoC. [10]
- b Find the transfer function $H(z)$ and impulse response $h[n]$ of a discrete time system with I/O relation $y[n] - 0.5y[n-1] = x[n] + 2x[n-1]$ [10]
- 6 a $x[n] = [1, 3, 1 \underline{2}]$. Sketch $x[n], x[n+1], x[n-1], x[-n], x[-n+2], x[-n-2], x[2n]$, [10]
 Underline in $x[n]$ shows origin.
- b Realize the system using Direct form I and II, cascade and parallel form [10]
 $y(n) - 5y(n-1) + 6y(n-2) = x(n) + 0.3x(n-1)$