

10 DEC 2018

SE/EXTC/SEM IV/CBCS

3 Hours

Total marks: 80



- Question no. 1 is compulsory
- Attempt any Three questions from remaining

20

Q1. Answer any 4 questions from the given questions:

- Find even and odd part of following continuous time signals
 - $X(t) = 3 + 2t + 5t^2$.
 - $x_2(t) = \sin 2t + \cos t + \sin t \cos 2t$
- Determine energy and power of the unit step signal
- Explain the application of Signals and System in Multimedia Processing.
- Construct the block diagram of discrete time systems whose input output relations are described by following difference equations
 - $Y_1(n) = 0.5x(n) + 0.5x(n-1)$
 - $Y_2(n) = 0.25y_1(n-1) + 0.5x(n) + 0.75x(n-1)$
- Test the given system for linearity, causality, stability, memory and time variant.

$$y(t) = x(t^2)$$

- Give advantages of state space analysis for system analysis

Q2. Perform convolution of $x_1(t) = e^{-3t}u(t)$ and $x_2(t) = tu(t)$ using mathematical method and also by graphical method. 20

Q3.a. Determine the sequence $x[n]$ associated with Z-Transform 10

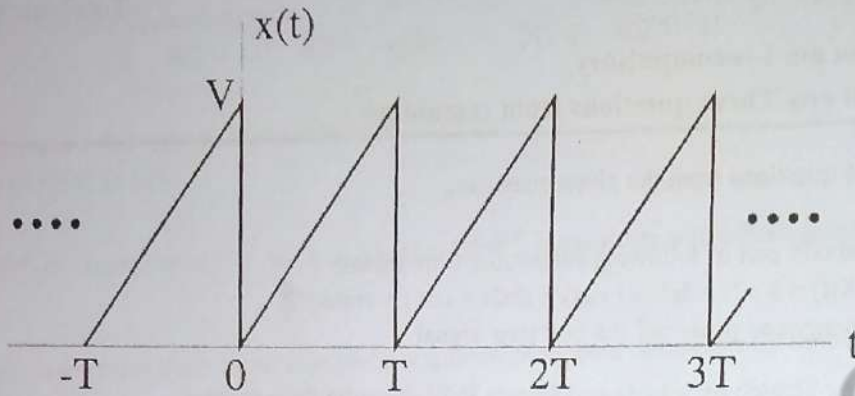
$$X(z) = \frac{1}{1 - 1.5z^{-1} + 0.5z^{-2}}$$

b. Find the impulse response $h(n)$ of the system if the spectrum is given by 10

$$H(e^{j\omega}) = \frac{1}{3} (1 + \cos \omega)$$

Q4.a. Explain the procedure to obtain transfer function of system from state model of the system. 10

b. Find exponential Fourier series for $x(t)$



Q5.a Determine Fourier transform of gate function given by $x(t) = A$ for $|t| \leq \frac{\tau}{2}$

b. Find Laplace transform of $x(t) = u(t) - u(t - a)$.

c. Find Initial and final value using Laplace transform

$$X(s) = \frac{7s + 6}{s(3s + 5)}$$

Q6. Write short note on **any two**:

- Relation of ESD, PSD with auto-correlation
- ROC in Z-Transform and Laplace Transform
- Feedforward Control system
