

Roll No

EC-4002 (CBGS)

B.E. IV Semester

Examination, November 2019

Choice Based Grading System (CBGS)

Signals and Systems

Time : Three Hours

Maximum Marks : 70

- Note: i) Attempt any five questions.
ii) All questions carry equal marks.

1. Examine the following system and show if they are causal LTI or not

- $y(n) = \cos[x(n)]$
- $y(n) = \sum_{k=-\infty}^{n+1} x(k)$
- $y(n) = x(-n+2)$
- $y(n) = x(2n)$
- $y(n) = x^2(n)$
- $y(n) = e^{x(n)}$

2. a) Determine the Zero-input response of the system described by the homogeneous second order difference equation.

$$y(n) - 3y(n-1) - 4y(n-2) = 0$$

- Determine the impulse response $h(n)$ for the system described by the second order difference equation

$$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$$

3. Determine the Z-transform and ROC of the following signal

- $x(n) = [3(2^n) - 4(3^n)]u(n)$
- $x(n) = (\cos w_0 n)u(n)$
- $x(n) = na^n u(n)$
- $x(n) = \begin{cases} 1, & 0 \leq n \leq N-1 \\ 0 & \text{elsewhere} \end{cases}$

4. Determine the casual signal $x(n]$ having the z-transform

- $x(z) = \frac{1}{(1-2z^{-1})(1-z^{-1})^2}$
- $x(z) = \frac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}$
- $x(z) = \frac{1+2z^{-2}}{1+z^{-2}}$
- $x(z) = \frac{5z^{-1}}{(1-2z^{-1})(3-z^{-1})}$

5. a) Determine the step response of the system

$$y(n) = \alpha y(n-1) + x(n) \quad -1 < \alpha < 1$$

when the initial condition is $y(-1) = 1$

- b) Discuss the properties of convolution summation of DTLTI system.
6. a) State and prove any three properties of discrete time Fourier series.
- b) Determine the Fourier series of the rectangular pulses train signal of figure 1.

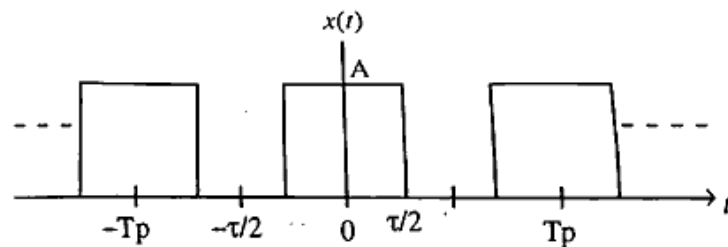


Figure 1

7. Explain briefly about different realization structures of discrete time system.
8. Write short notes on any two of the following:
- Recursive and Non recursive system
 - Unilateral z-transform
 - Applications of DTFT
