

Roll No.

Total Pages : 4

305405

May 2019

B.Tech. (ECE) IVth Semester

SIGNAL AND SYSTEM

(ECC-01)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
- (ii) *Answer any four questions from Part-B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) List commonly seen signals in everyday life, and in various branches of science and engineering. (1.5)
- (b) Explain the relation between step and impulse response of system. (1.5)
- (c) Express the given discrete signals using impulse signal.

$$x(n) = \{-1 \quad 3 \quad 1 \quad 2 \quad 4 \quad 0\}. \quad (1.5)$$

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- (d) Find the Fourier transform of $x(t) = \delta(t)$. (1.5)
- (e) State and explain Parseval's Theorem in brief. (1.5)
- (f) Find the Laplace transform of signal: $x(t) = e^{-4t}u(t)$. (1.5)
- (g) What is meant by poles and zeros of system? (1.5)
- (h) Define Z-Transform for discrete time signal. (1.5)
- (i) Compute the Transfer Function of the system described by the difference equation:
 $y(n) - 2y(n-1) + 3y(n-2) = 3x(n)$. (1.5)
- (j) Define the state-transition matrix and list its properties. (1.5)

PART-B

- (a) Discuss the classification of continuous and discrete time signals with example. (7)
- (b) Explain the properties of continuous and discrete time system. (8)
- (c) Explain the analysis of continuous and discrete Linear Time Invariant system with necessary mathematical analysis. Explain the causality and stability properties of Linear Time Invariant System in terms of impulse response. (10)
- (d) Find the linear convolution for the signal
 $x(n) = \{2, 1, 0, 3\}$
 $h(n) = \{3, 0, -1, 2\}$. (5)

4. (a) Write the exponential and trigonometric form of the Fourier series representation of periodic signal. (5)
- (b) Explain the Fourier transform and list various properties. (5)
- (c) Compute the Fourier transform of signal:
 $x(t) = 2e^{-3at}u(t)$. (5)
5. (a) Sketch the pole zero plot of a system having transfer
 $H(s) = \frac{s-1}{s^2+8s+15}$. (5)
- (b) Discuss the significance of Laplace Transform in analysis of system. (5)
- (c) Find the Laplace transform of $x(t) = 6e^{-t}u(t)$. (30x). (5)

6. (a) Discuss the significance of Region of Convergence in Z-Transform. (5)
- (b) Find the z-transform of the signal
 $x(n) = (3)^n u(n)$ for $n \geq 0$. (5)
- (c) Find the inverse of z-transform

$$x(z) = \frac{z^{-1}}{(1-z^{-1})\left(1-\frac{1}{2}z^{-1}\right)}$$

ROC: $|z| > 1$.

(5)

State and prove sampling theorem with necessary analysis. Also explain the effect of aliasing and discuss the process of reconstruction of band limited signal from its sample.

(15)
