

SIGNALS & SYSTEMS
(Common to ECE and EIE)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- Find the frequencies present in a signal $x(t) = \sin 3t + \cos^2(t)$.
- Draw the graphical form of decaying, raising and double exponential signals.
- What are the characteristics of filter?
- How to represent periodic signals by Fourier series?
- List out any two Fourier transformable pairs.
- Determine the DTFT of $\delta(n-2) + \delta(n+2)$.
- Obtain the magnitude of frequency domain of unit step signal $u(n)$.
- Mention the characteristics of distortion less transmission system.
- Differentiate Fourier, Laplace and z-Transforms.
- State the final value theorem of Laplace and z-transforms.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- What is the concept of impulse function? Why the amplitude is infinity at origin? Explain.
 - Examine the continuous time system $y(t) = T\{x(t)\} = 2x(t) + 3$ for linearity, time invariance, causality and stability.

OR

- Why the unit step signal $u(t)$ is not even and not odd? Separate even and odd parts of $u(t)$.
 - Construct the convoluted signal $x(t) = x_1(t) \otimes x_2(t)$, where $x_1(t) = u(t-1) - u(t-4)$ and $x_2(t) = u(t-2) - u(t-3)$.

UNIT – II

- List out any three properties of continuous time trigonometric Fourier series.
 - Analyze the representation of a signal by a set of mutually orthogonal sinusoidal signals.

OR

- What is the importance of discrete time Fourier series?
 - How discrete time filters are described with differential equations? Explain with suitable example.

UNIT – III

- Compare Fourier transform with Fourier series.
 - Obtain the time domain representation of $X(w) = \frac{jw}{(2 + jw)^2}$

OR

- State and prove convolution property of Fourier transform.
 - Find the Fourier transform of $x(n) = n(n-1)u(n)$. Draw its magnitude spectrum.

UNIT – IV

- What is the importance of sampling theorem in communication? Explain.
 - Analyze the effect of under sampling in communication.

OR

- Describe time and frequency domain aspects of non-ideal filters.
 - Give one example for first order and second order discrete time systems. Obtain the relation between output and input.

UNIT – V

- List any three Laplace transformable pairs.
 - Solve the difference equation $y(n) - 2y(n-1) = x(n)$ with $x(n) = (1/3)^n u(n)$.

OR

- Analyze the various constraints on ROC for various classes of discrete time signals.
 - Get the Z-Transform of $y(n) = 3x(n) + 2x(n-1)$ for $x(n) = 3(1/2)^n u(n) + 2(1/3)^n u(n)$.
