PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations – December 2025

Date: 26 – 12- 2025   **Time:** 9:30am – 12:30pm

School: SOE	**Program:** B. Tech
Course Code: ECE2003	**Course Name:** SIGNALS AND SYSTEMS
Semester: MK	**Max Marks:** 100 **Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	20	30	50	-	-

Instructions:

    (i) ***Read all questions carefully and answer accordingly.***

    (ii) ***Do not write anything on the question paper other than roll number.***

Part A

Answer ALL the Questions. Each question carries 2marks.   **10Q x 2M=20M**

1	Plot the functions x(n-1) and x(2n) for the given x(n)={1,2,1,2,1,2,1} where x(0) is the middle value which makes the signal even.	2 Marks	L1	CO1
2	How are systems classified?	2 Marks	L1	CO1
3	Determine whether the system $y(n) = Ax(n) + B$ is linear or nonlinear	2 Marks	L1	CO1
4	Give the formula of Exponential Fourier series Coefficients 'a$_0$' and 'a$_k$'	2 Marks	L2	CO2
5	Dirichlet- Jordan, a Mathematician gives sufficient conditions for an existence of Fourier series. List the Dirichlet conditions for the existence of Fourier series.	2 Marks	L2	CO2
6	Find the Fourier Transform of $e^{-4t}u(t)$	2 Marks	L2	CO2
7	Identify the property and use it to Find the Fourier Transform of $x(t - 2)$, If $x(t) = e^{j3t}u(t)$	2 Marks	L2	CO2
8	Find the unilateral Laplace Transform of Ramp function	2 Marks	L3	CO3
9	Find the Z Transform of the Unit step sequence	2 Marks	L3	CO3
10	List the properties of ROC of ZT	2 Marks	L3	CO3

Part B
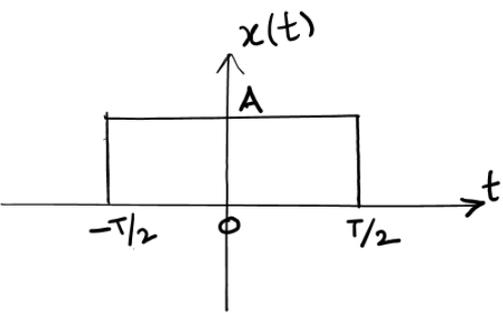
Answer the Questions   **Total 80 Marks**

11.	a.	The signal which has finite energy and zero average power is called as energy signal. Justify the given signal, $x(t) = e^{(-10t)}u(t)$ is energy or power signal.	10 Marks	L1	CO1

Or

12.	a.	Draw and verify whether the given signal is Even signal or Odd signal $x(n) = 2\delta(n+2) + \delta(n+1) + \delta(n) + \delta(n-1) + 2\delta(n-2)$	10 Marks	L1	CO1

13.	a.	The Fourier transform is a generalization of the complex Fourier series in the limit $T \to \infty$. Find the Fourier transform of the signal x(t) shown in figure.	10 Marks	L2	CO2

Or

14.	a.	The Fourier transform is a generalization of the complex Fourier series in the limit $T \to \infty$. Find the Fourier transform of the signal $x(t) = e^{-a|t|}$.	10 Marks	L2	CO2

15.	a.	A very simple application of Laplace transform in the area of Physics is to find out the harmonic vibration of a beam which is supported at two ends. Find the Laplace transform of $x(t) = e^{at}\sin(\omega o t)\,u(t)$	10 Marks	L3	CO3

Or

16.	a.	State and prove Parseval's Energy theorem with respect to Fourier Transform.	10 Marks	L2	CO2

17.	a.	Fourier transform exists only when signal x(t) is integrable. Find the Fourier transform for the given signal, $x(t) = e^{(-at)}u(t)$. Verify the results using Laplace transform and justify if the results are same.	15 Marks	L2	CO2

Or

18.	a.	Fourier transform exists, when signal x(t) has finite number of discontinuities and finite number of maxima and minima in every finite time interval. Find the Fourier transform of Signum function, *sgn(t)* and from the result of Signum function, find the Fourier transform of $e^{-at}u(t)$ and $e^{at}u(-t)$.	15 Marks	L2	CO2

19.	a.	State and prove Initial Value and Final value theorem for Laplace Transform. Also mention Properties of ROC of LT.	15 Marks	L3	CO3

Or

20.	a.	Find the convolution of the signals $x(t) = e^{-2t}u(t)$ and $x(t) = e^{-4t}u(t)$ using the convolution property of Laplace Transform. Also verify the result by the time domain method (Hint: Convolution formula)	15 Marks	L3	CO3

21.	a.	The z-transform is a mathematical tool, which is used to convert the difference equations in time-domain into the algebraic equations in z-domain. Prove that the sequences $x_1(n) = a^n u(n)$ and $x_2(n) = -a^n u(-n-1)$ have the same X(z)and differ only in ROC. Also plot their ROCs	20 Marks	L3	CO3

Or

22.	a.	Laplace transform provides a unified approach in solving initial and boundary value problems. Find the inverse Laplace transform of the following. $X(S) = \frac{8S}{(S^2+3S+2)}$, with ROC $-2 < Re\{S\} < -1$	20 Marks	L3	CO3

***** BEST WISHES *****