DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2025

SIGNALS AND SYSTEMS

[Maximum Marks: **75**]   [Time: **3** Hours]

PART-A

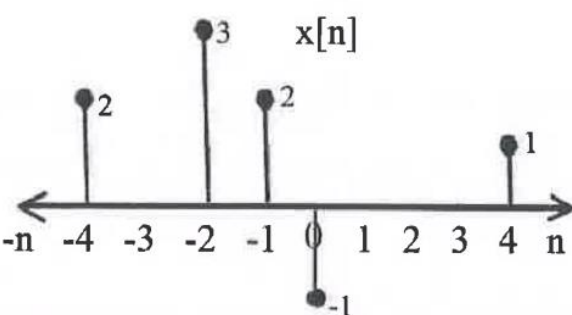**I. Answer '*all*' the following questions in one word or one sentence. Each question carries '*one*' mark.**

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1.	List any two standard signals.	M1.01	R
2.	Represent a Signum function in terms of unit step signal.	M1.02	U
3.	Define a causal system.	M2.04	R
4.	Write the differential equation to represent a general continuous time LTI system.	M2.01	R
5.	Expand the term DTFT.	M3.04	R
6.	Define Nyquist rate.	M3.01	R
7.	Plot a unit step function.	ML.02	R
8.	Express the time scaling property of Laplace transform.	M4.01	R
9.	Write the Laplace transform for unit step signal.	M4.01	U

PART-B

II. Answer any '*eight*' questions from the following. Each question carries '*three*' marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1.	Distinguish continuous time and discrete time signals.	M1.03	U
2.	Illustrate the time shifting of any signal an example.	M1.04	U
3.	Differentiate stable and unstable system.	M2.04	U
4.	Define a discrete time system with example.	M2.02	U
5.	Represent the following discrete time signal in terms of impulses.	M2.03	A
6.	What is Aliasing. Explain any two corrective measures to reduce the effect of aliasing.	M3.03	A
7.	Illustrate the amplitude scaling of any signal with example.	M1.04	U

8.	Find the Laplace transform and ROC of: x(t) = 2 u(t)	M4.02	U
9.	Differentiate even and odd signals.	M1.03	U
10.	Find the inverse Laplace transform of $\frac{1}{s}$; $0 < \text{Re}\{s\} < a$	M4.04	U

PART-C
Answer *'all'* questions from the following. Each question carries *'seven'* marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	a) Define signals. (1 marks) b) Explain any 6 basic elementary signals. (6 marks)	M1.02	U
	OR		
IV.	Find the convolution of x[n] = {1, 2, 3, 4} and h[n] = {l, 2, 1, 2}.	M1.04	A
V.	Explain Fourier transform of continuous time periodic signal.	M3.04	U
	OR		
VI.	Find the Fourier series of $x(t) = sin\omega_0t$ with diagrams.	M3.01	A
VII.	Distinguish between time invariant and time variant systems with examples.	M2.04	U
	OR		
VIII.	Explain the classification of systems based on memory.	M2.01	U
IX.	Describe any 7 properties of Discrete time Fourier series.	M3.02	U
	OR		
X.	Find the Fourier transform of x(t) = e^{-at}.u(t) - e^{-at}.u(-t).	M3.04	A
XI.	Explain any 7 properties of Laplace transform.	M4.03	U
	OR		
XII.	Find the Laplace transform and ROC of: a) x(t) = e^{at}. u(-t) (3 marks) b) x(t) = e^{-2t}. cos(3t) u(t) (4 marks)	M4.01	A
XIII.	Find the Laplace transform of a) Unit Impulse function (2 marks) b) Parabolic function (2 marks) c) Sine function (3 marks)	M4.01	U
	OR		
XIV.	Find the inverse Laplace transform of: a) $F(s) = \frac{2}{s^2+4}$ (2 marks) b) $F(s) = \frac{s+1}{s^2+2s+10}$ (5 marks)	M4.04	A

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