

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER - 2024**

SIGNALS AND SYSTEMS

[Maximum Marks : 75]

[Time : 3 hours]

PART-A

I. Answer **all** the following questions in one word or sentence. Each question carries 1 mark.

(9x1=9 marks)

		Module Outcome	Cognitive level
1	List any two applications of signals and systems.	M1.01	R
2	How does a discrete time signal differ from a continuous-time signal?	M1.03	U
3	State the concept of BIBO stability of a system.	M2.04	R
4	Define a discrete time system.	M2.02	R
5	State the significance of Fourier representation of signals.	M3.01	R
6	Which Fourier representation is used for non-periodic signals?	M3.04	R
7	State the condition to avoid aliasing effect.	M3.03	A
8	Define poles in the context of Laplace transform of a signal.	M4.02	A
9	Laplace transform will transform a signal from time domain todomain.	M4.01	R

PART B

II. Answer **any Eight** questions from the following. Each question carries 3 marks.

(8x3=24 marks)

		Module Outcome	Cognitive level
1	Differentiate Fourier series and Fourier transform.	M3.01	U
2	With an example, explain the concept of invertibility of a system.	M2.04	U
3	Describe the impulse response of a system and explain how it relates to the system's behaviour.	M2.03	U
4	Check whether the following system is causal : $y(n)=x(n^2)$.	M2.04	U
5	List the basic steps involved in evaluating the response of a system using convolution.	M2.03	R
6	State Dirichlet's conditions for existence of Fourier Series.	M3.01	R
7	Differentiate even and odd signals with examples.	M1.04	U
8	Write the analysis and synthesis equations of CTFT.	M3.04	R
9	List any three properties of Fourier Series coefficients of discrete time signal.	M3.03	R
10	State any 3 properties of ROC of Laplace transform.	M4.02	R

PART C

Answer **all** questions from the following. Each question carries 7 marks.

(6x7=42marks)

		Module Outcome	Cognitive level
III	Construct $x(t)$ using suitable elementary signals and write the mathematical representation of the same. <div align="center"> </div>	M1.04	A
	OR		
IV	Explain any four elementary continuous time signals with graphical and mathematical representations.	M1.02	U
V	Evaluate the response and plot the output of the system. $h(n) = \delta(n + 1) + 4\delta(n) + 3\delta(n - 1) + 2\delta(n - 2)$ for the input signal $x(n) = \delta(n) + 3\delta(n - 1) + 2\delta(n - 2) + \delta(n - 3)$	M2.03	A
	OR		
VI	Explain any three properties of systems with examples for each.	M2.04	U
VII	Plot the following signals (i) $u(t) + u(-t)$ (1 mark) (ii) $u(t) - u(t - 3)$ (2 marks) (iii) $3u(-t + 2)$ (2 marks) (iv) $u(-4t + 1)$ (2 marks)	M1.04	U
	OR		
VIII	How are the signals classified? Explain any three.	M1.03	U
IX	State Sampling theorem. Explain how a signal can be reconstructed from its samples with the aid of necessary diagrams.	M3.03	U
	OR		
X	Explain the concept of Continuous Time Fourier Series with a suitable example.	M3.01	U
XI	Explain any seven properties of Laplace transform.	M4.03	U
	OR		
XII	Find the Laplace transform and sketch the ROC for the following signal, $x(t) = e^{-3t} u(t) + e^{-2t} u(t)$	M4.01	U
XIII	Determine the Laplace transform of the following signals. (i) $\delta(t)$ (2 marks) (ii) $u(t)$ (2 marks) (iii) $t u(t)$ (3 marks)	M4.01	U
	OR		
XIV	Compute the inverse Laplace transform of $X(s) = \frac{s}{s^2 + 5s + 6}$	M4.04	A
