

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, APRIL - 2026**

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 1 mark

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	Define periodic signal.	M1.03	R
2	Outline the graphical representations of a discrete-time signal.	M1.01	U
3	Define even signal.	M1.03	R
4	Show the mathematical representation of an elementary continuous-time signal.	M1.02	U
5	Define a dynamic system.	M2.01	R
6	Show a differential equation representing a continuous time system.	M2.01	U
7	The Fourier transform of a real even signal is.....and.....	M3.04	U
8	The spectrum of a continuous-time signal is..... (periodic/ aperiodic/continuous/discrete)	M3.01	R
9	Define ROC of a Laplace transform.	M4.02	R

PART B

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

(8 x 3 = 24 Marks)

		Module outcome	Cognitive level
1	Differentiate deterministic and random Signals.	M1.03	U
2	List any six mathematical operations on signals.	M1.04	R
3	Show the mathematical and graphical representations of any three elementary discrete-time signals.	M1.02	U
4	Differentiate energy signals and power signals.	M1.03	U
5	What is meant by BIBO stability of a system? Describe how the stability of a system is checked when the impulse response is given.	M2.04	U
6	What is the impulse response of a system? Illustrate the significance of impulse response.	M2.03	U
7	Check whether the following systems are causal or not a) $y(n) = x(n) - 0.5x(n - 2)$ (1¹/₂Marks) b) $y(t) = x(t) + x(t + 3)$ (1¹/₂Marks)	M2.04	A
8	State the conditions for the existence of the Fourier transform.	M3.04	R

9	State and describe the initial value theorem of Laplace transform with an example.	M4.03	R
10	List the properties of ROC of Laplace transform.	M4.02	R

PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Classify signals. Illustrate each type of signal. OR	M1.04	U
IV	Plot the following signals neatly and check whether they are energy signals or power signals. a) $u(t-1) + u(t-2) + u(t-3) - 3.u(t-4)$ (3Marks) b) $r(t-4)-r(t-6)$ (4Marks) <i>(u(t) is continuous time unit step signal, r (t)is continuous time unit ramp signal.</i>	M1.04	A
V	Check whether the given system is an LTI system or not: a) $y(t) = x^2(t)$ (2Marks) b) $y(t) = x(t^2)$ (2 Marks) c) $y(n) = x(n-2)$ (3 Marks)	M2.04	A
VI	OR Differentiate Continuous time (CT) systems and discrete time(DT) systems in terms of definition, representation, and impulse response. Give one example each for CT and DT systems.	M2.04	U
VII	What is aliasing? Illustrate the effect of sampling on the spectrum when the sampling frequency is above the Nyquist rate, equal to the Nyquist rate, and below the Nyquist rate. OR	M3.03	U
VIII	State and illustrate the convolution property of the Fourier Transform.	M3.04	U
IX	Explain the following properties of the Fourier series: a) Linearity. (1 Mark) b) Time shift. (2Marks) c) Symmetry. (2 Marks) d) Time domain multiplication. (2 Marks)	M3.01	U
X	OR Find the Fourier transform of the following signals a) $e^{-at}u(t)$ (2Marks) b) $\delta(t)$ (2Marks) c) $\cos(\omega_0 t)$ (3Marks)	M3.04	R
XI	Solve to find the inverse Laplace transform of a) $\frac{s-a}{(s-3)(s-2)}$ (3Marks) b) $\frac{s-a}{(s-a)^2+b^2}$ (2Marks) c) $\frac{1}{(s-a)^2}$ (2Marks)	M4.04	A

XII	<p style="text-align: center;">OR</p> <p>Write the Laplace transform of the following signals</p> <p>a) $\cos(bt)$ b) $e^{-at}u(t)$ c) $\sin(bt)$ d) $\delta(t)$</p> <p>e) $r(t)$ f) $p(t)$ g) $u(t)$</p> <p style="text-align: right;">(1Mark each)</p>	M4.01	R
XIII	<p>Explain the following properties of Laplace transform:</p> <p>a) Time scaling (2 Marks)</p> <p>b) Differentiation in time domain (2 Marks)</p> <p>c) Shift in s-domain (1 Mark)</p> <p>d) Final value theorem. (2 Marks)</p> <p style="text-align: center;">OR</p>	M4.03	U
XIV	<p>List any 3 applications of Laplace transform. Summarize each application in 3 or 4 sentences.</p>	M4.01	U
