TED (21) 5201
(Revision-2021)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER - 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 1 mark

(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	Illustrate the mathematical representation of a continuous-time sinusoidal signal.	M1.02	U
2	Define random signal.	M1.03	R
3	Define odd signal.	M1.03	R
4	Write the differential equation representing a continuous- time system.	M2.01	U
5	Define a time - invariant system.	M2.04	R
6	If the maximum frequency component of a discrete-time signal is 10KHz, what is the Nyquist rate of sampling for the signal?	M3.03	A
7	The frequency domain representation of a continuous time periodic signal is evaluated using……..(FS/DTFS/FT/DTFT).	M3.04	R
8	Write the Laplace Transform of the unit step function u (t).	M4.01	R
9	Write the Inverse Laplace transform of $\frac{2}{s^2+4}$.	M4.04	U

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	Represent mathematically and graphically unit ramp signal in continuous time domain and discrete time domain.	M1.02	U
2	Define real and imaginary signals.	M1.03	U
3	Differentiate odd signals and even signals. Give one example of each.	M1.03	U
4	Explain time shifting operation and its effect on signals.	M1.04	U
5	Compare continuous-time and discrete-time systems.	M2.02	U
6	Explain the significance of the impulse response in determining the behaviour of a continuous-time system.	M2.03	U

7	Identify whether the following systems are time invariant or not: a) $y(t) = x^2(t)$ b) $y(n) = x(n+1)$	M2.04	A
8	Write Fourier Transforms of Impulse, Step and Sinusoidal signals.	M3.04	R
9	Write the Region of Convergence (ROC) for the following signals: a) A right-sided exponential signal. b) A left-sided exponential signal. c) A two-sided exponential signal.	M4.02	R
10	State the linearity property of the Laplace Transform.	M4.03	R

PART C
Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Explain the difference between energy and power signals, and demonstrate how the energy and power of a signal are calculated using examples.	M1.03	U
	OR		
IV	Consider the continuous-time signal x (t) given by: x (t) = u (t)- u (t-6). Draw a) x(t) (1 Mark) b) 3x(t) (1 Mark) c) x(-t) (1 Mark) d) x(3t) (2 Marks) *e)* $x(0.5t)$ (2 Marks)	M1.04	A
V	Check whether the following systems are linear or not: a) y(t) = x(t) +3 (1 Mark) b) y(t) = $\frac{d}{dt}x(t)$ (2 Marks) c) y(t) = $e^{x(t)}$ (2 Marks) d) y(t) = $\cos(x(t))$ (2Marks)	M2.04	A
	OR		
VI	Describe the properties of systems including linearity, time- invariance, causality, and stability with examples.	M2.04	U
VII	Describe the Sampling Theorem. Explain how incorrect sampling rates can lead to aliasing.	M3.03	U
	OR		
VIII	State and illustrate following properties of the Discrete Time Fourier Transform (DTFT). a) Linearity. (I Mark) b) Time shifting. (2Marks) c) Frequency shifting. (2 Marks) d) Convolution in time domain. (2 Marks)	M3.04	U

IX	Explain the following properties of Fourier series: a) Linearity. (I Mark) b) Time shift. (2Marks) c) Frequency shift. (2 Marks) d) Multiplication in time domain. (2 Marks) **OR**	M3.01	U
X	Determine the Fourier transform of the following signals: a) Dirac delta function (1 Mark) b) $e^{-a/t/}$ (3 Marks) c) $sin(w_0t)$ (3 Marks)	M3.04	U
XI	List the Laplace Transforms for any seven elementary signals. **OR**	M4.01	R
XII	Solve to find the inverse Laplace transform of the following: a) $\frac{1}{(s+1)(s+2)}$ (3 Marks) b) $\frac{2s}{s^2+1}$ (1 Mark) c) $\frac{s+3}{s^2+6s+13}$ (3 Marks)	M4.04	A
XIII	Define the region of convergence (ROC) of the Laplace transform. Summarize the features of ROC for stable and causal systems. **OR**	M4.02	U
XIV	Explain the following properties of Laplace transform: a) Time reversal (1 Mark) b) Time shifting (2 Marks) c) Convolution in time domain (2 Marks) d) Final value theorem. (2 Marks)	M4.03	U

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