



Programme: B.Tech (ECE)

Slot: B1+TB1

Class Nbrs: VL2023240102251, 53, 55, 57, 59, 61

Max Marks: 50

Duration: 90 Min

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ANSWER ALL QUESTIONS

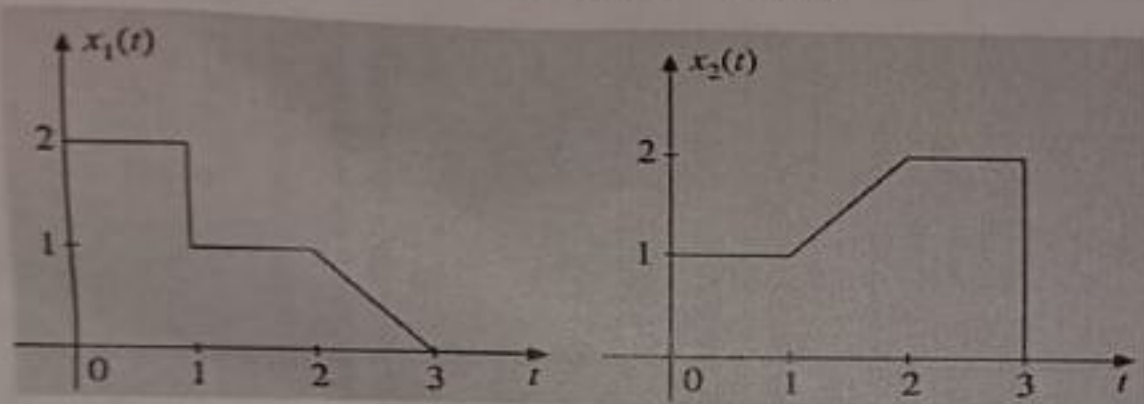
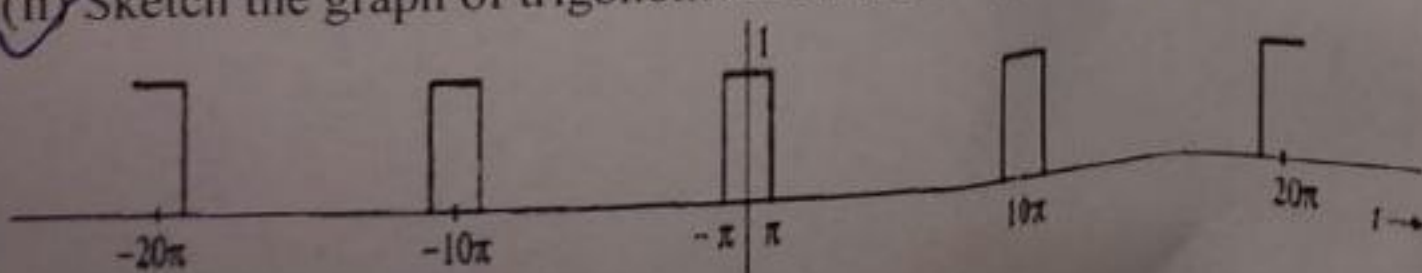
Q.No	Question	Mark	CO	BL
1.	(a). For the signals shown below, find $x_1(t) \times x_2(t)$ 	[5]		
2.	(b). Find the ℓ_1 and ℓ_2 norms of the vector $\mathbf{a} = [3, -2]^T$. Classify the following signals: a. $x_1(t) = \cos t + \sin \sqrt{3}t$ as periodic or non-periodic. If periodic, find the fundamental period. b. $x_2(t) = Ae^{-\alpha t} u(t)$, $\alpha > 0$ as energy or power signals. Also, find the power/energy. c. $x_3[n] = 2e^{j3n}$ as energy or power signals. Also, find the power/energy. d. $x_4[n] = \cos\left(\frac{1}{5}\pi n\right) \sin\left(\frac{1}{3}\pi n\right)$ as periodic or non-periodic. If periodic find the fundamental period.	[5]	CO1	L3
3.	(a). A system is represented by the following difference equation: $y(n) = 3y^2(n-1) - nx(n) + 4x(n-1) - x(n+1)$, $n \geq 0$ Is the system linear, time-invariant, stable and causal? (b). Show that the system described by the following equation is linear. $\frac{dy}{dt} + 3y(t) = x(t)$	[8+2]	CO2	L3
4.	Determine the response of an LTI system characterized by an impulse response $h(t) = u(t-3)$, when a signal $x(t) = e^{2t}u(-t)$ is given as input.	[10]	CO2	L3
5.	For the periodic signal $x(t)$ shown in Fig. 1 below (i) Determine the compact trigonometric Fourier series. (ii) Sketch the graph of trigonometric Fourier spectra. 	[10]	CO3	L4

Fig. 1.