JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST–1 EXAMINATION – 2026

B.Tech–III Semester (ECE/EE-VLSI)

COURSE CODE (CREDITS): 25B11EC311 (4) **MAX. MARKS:** 15

COURSENAME: Signals and Systems

COURSE INSTRUCTORS: Dr. Vikas Baghel **MAX. TIME:** 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

(c) Use of calculators is allowed.

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Q.No	Question	CO	Marks
Q1	**(a)** Determine whether each signal is periodic. For every periodic signal, find its fundamental period: $x_1(t) = 2\cos(8t) + 3\sin\left(12t + \frac{\pi}{4}\right), \quad x_2[n] = \cos\left(\frac{\pi n}{\sqrt{2}}\right)$	CO1	[3]
	(b) Use the properties of the unit impulse to simplify: (i) $(t-1)^2\delta(t-1)$, (ii) $\cos(2t) * \delta\left(t - \frac{\pi}{4}\right)$, (iii) $\int_{-\infty}^{\infty} \delta(3\tau - 6)e^{-(t-\tau)}\, d\tau$		[3]
	(c) Classify each signal as an energy signal or a power signal and calculate the corresponding energy or average power: $x_1(t) = 4e^{-2t}u(t), \quad x_2[n] = \left(\frac{1}{3}\right)^n u[n]$		[3]

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Q.No	Question	CO	Marks
Q2	**(a)** Compute and sketch the discrete-time convolution $y[n] = x[n] * h[n]$, where $$x[n] = \delta[n] + 2\delta[n-1] - \delta[n-2], \qquad h[n] = \delta[n] + \delta[n-2]$$	CO2	[2]
	(b) For each impulse response, determine whether the corresponding LTI system is causal and/or BIBO stable: $$h[n] = (1/3)^n u[-n-1]$$ Justify your answers using the appropriate conditions on $h[n]$.		[4]

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