

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-II Semester (ECS/ECE)

COURSE CODE (CREDITS): 25B11EC414/25B11EC311

MAX MARKS: 25

COURSE NAME: SIGNALS AND SYSTEMS

COURSE INSTRUCTOR: Dr Rajiv Kumar

MAX. TIME: 1 Hour 30 Min

Note: (a) All questions are compulsory.

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

(c) Use of non-programmable calculator is allowed

Q.No	Question	CO	Marks
Q1	<p>A) You are given following signal $x(t)$:</p> $x(t) = t[u(t) - u(t - 3)]$ <p>Evaluate its first differentiation $\frac{dx(t)}{dt}$ and plot it with respect to time.</p> <p>B) What is the most significant advantage of representing a signal $x(t)$ using a Fourier Series expansion?</p>	CO-1	5
Q2	<p>A continuous-time signal is defined as</p> $x(t) = 2 + \cos(2\pi t) + A \sin(\pi t)$ <ol style="list-style-type: none"> Determine the fundamental angular frequency ω_0 of the signal. Compute the exponential Fourier series coefficients a_k. Express the signal in exponential Fourier series form. Sketch the magnitude spectrum and phase spectrum corresponding to the Fourier series representation. 	CO-3	5
Q3	<p>For each of the following two different continuous-time signals:</p> $x(t) = e^{-at}, \quad a > 0$ <p>and,</p> $x(t) = \delta(t - t_0)$ <p>Perform the following tasks:</p> <ol style="list-style-type: none"> Determine the Fourier Transform $X(\omega)$. Sketch the magnitude spectrum $X(\omega)$. Sketch the phase spectrum $\angle X(\omega)$. <p>Present all results clearly as functions of angular frequency 'ω'.</p>	CO-3	5

Q4	<p>A) Explain Gibbs' phenomenon associated with Fourier Series. Why does it occur, and what does it indicate about the convergence of the series near discontinuities?</p> <p>B) Explain the time reversal property and its effect on Fourier coefficients both discrete and continuous time.</p>	CO-3	2.5+2.5 = 5
Q5	<p>A) A discrete-time LTI system has the impulse response</p> $h[n] = \frac{1}{N} \cdot (u[n] - u[n - N])$ <p>and is excited by the input signal $x[n] = u[n]$.</p> <p>Using the convolution property of the Discrete Time Fourier Transform, obtain the expression for the output spectrum $X(e^{j\omega})$.</p> <p>B) State and prove the Parseval's theorem for Discrete Time Fourier Transform (DTFS).</p>	CO-3	3+2 = 5

JNTU TEST 2 EXAMINATIONS MARCH 2026