

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-III Semester (ECE)

COURSE CODE (CREDITS): 25B11EC311 (4)

MAX. MARKS: 25

COURSE NAME: Signals and Systems

COURSE INSTRUCTORS: Dr. Vikas Baghel

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 a standard scientific calculator is allowed

Q.No	Question	CO	Marks
Q1	Consider the discrete-time signal $x[n] = 1 - \sum_{k=3}^{\infty} \delta[n - 1 - k]$ Determine the values of the integers M and n_0 so that $x[n]$ may be expressed as $x[n] = u[Mn - n_0]$	CO1	5
Q2	A continuous-time periodic signal $x(t)$ is real valued and has a fundamental period $T = 8$. The nonzero Fourier series coefficients for $x(t)$ are $a_1 = a_{-1} = 2, a_3 = a_{-3}^* = 4j$ Express $x(t)$ in the form $x(t) = \sum_{k=0}^{\infty} A_k \cos(w_k t + \phi_k)$	CO3	5
Q3	a. Derive Parseval's relation for DTFT. b. Using Parseval's relation, find the total energy of the signal $x[n] = \left(\frac{1}{2}\right)^n u[n].$	CO3	5

Q4	Consider the Fourier transform pair $e^{- t } \stackrel{FT}{\Leftrightarrow} \frac{2}{1 + w^2}$ a. Use the appropriate Fourier transform properties to find the Fourier transform of $te^{- t }$. b. Use the result from part (a), along with the duality property, to determine the $\frac{4t}{(1 + t^2)^2}$	CO3	5
Q5	Compute the convolution of $x(t) = te^{-2t}u(t)$ and $h(t) = e^t u(-t)$ by calculating $X(w)$ and $H(w)$, using the convolution property, and inverse transforming.	CO3	5