

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION-OCTOBER-2025

B.Tech-Vth Semester (ECE)

COURSE CODE (CREDITS): 18B11EC511 (4)

MAX. MARKS: 25

COURSE NAME: Principles of Digital Signal Processing

COURSE INSTRUCTOR: Dr. Pardeep Garg

MAX. TIME: 1.5 Hours

Note: (a) All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems. (c) A Scientific Calculator (non-programmable) is allowed.

Q.No	Question	CO	Marks
Q1	Find $x(n)$ using (i) long division method and (ii) partial fraction expansion method for $X(z)$ given as: $X(z) = \frac{2 + 3z^{-1}}{(1 + z^{-1}) \left(1 + \frac{1}{2}z^{-1}\right) \left(1 - \frac{1}{4}z^{-1}\right)}$	CO-2	3.5+3.5=7
Q2	Determine the inverse z-transform of $X(z) = \frac{z^2}{(z-a)}, \text{ ROC } z > a $ using contour integration-residue method.	CO-2	3
Q3	Check whether the following system is linear and time-invariant (LTI): $F[x(n)] = a[x(n)]^2 + bx(n)$	CO-2	4
Q4	Compute the convolution $y(n) = x(n) * h(n)$ of the signals: $x(n) = \{1, 1, 0, 1, 1\} \text{ and } h(n) = \{1, -2, -3, 4\}$	CO-2	4
Q5	Derive the Discrete Fourier Transform (DFT) of the data sequence $x(n) = \{1, 1, 2, 2, 3, 3\}$ and compute the corresponding amplitude and phase spectrum.	CO-3	5
Q6	Explain how the Fast Fourier Transform (FFT) is developed from the Discrete Fourier Transform (DFT) to reduce computation time?	CO-3	2