

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Make-up Examination-Nov-2025

COURSE CODE (CREDITS): 18B1WEC636 (2)

MAX. MARKS: 25

COURSE NAME: Fundamentals of Digital Signal Processing & Applications

COURSE INSTRUCTORS: Dr. Vikas Baghel

MAX. TIME: 1 Hour 30 Minutes

Note: 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	a. Define periodic and aperiodic discrete-time signals with one suitable example each. b. Determine the fundamental period of $x[n] = \sin(\pi n/3) + \cos(\pi n/2)$.	CO1	5
Q2	a. State and prove the time-reversal and time-shifting properties of LTI discrete-time systems. b. For $y[n] = x[n] + 0.5x[n-1]$, test whether the system is linear and causal.	CO1	5
Q3	a. Derive the expression for the z-transform of a right-sided exponential sequence $x[n] = a^n u[n]$. b. Determine the ROC and inverse z-transform of $X(z) = z / (z - 0.6)$.	CO3	5
Q4	a. Prove the frequency-shifting property of the DTFT. b. Find the DTFT of $x[n] = (0.5)^n u[n]$.	CO2	5
Q5	Consider a discrete-time LTI system described by the equation: $y[n] = 0.8y[n-1] + x[n] - x[n-1]$ a. Determine the system function $H(z)$. b. Find the poles and zeros of $H(z)$. c. Comment on the stability and causality of the system.	CO4	5