

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

M.Tech-I Semester (ECE)

COURSE CODE (CREDITS): 21MIWEC145 (03)

MAX. MARKS: 15

COURSE NAME: Architecture and Algorithms for DSP Systems

COURSE INSTRUCTORS: Dr. Vikas Baghel

MAX. TIME: 1 Hour

*Note: (a) All questions are compulsory.*

*(b) Marks are indicated against each question in square brackets.*

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

- Q1.** Explain the update rule for the filter coefficients in the LMS algorithm using block diagram? How is it derived? [5] [CO3]
- Q2.** a) What is the Discrete Cosine Transform (DCT) and what is its primary purpose in signal processing? [2] [CO3]  
b) What is the mathematical foundation of the Discrete Cosine Transform (DCT)? [3]
- Q3.** a) Explain the mathematical formula for 1D convolution and provide an example. [1] [CO1]  
b) How does convolution differ from cross-correlation? Write the relationship between them. [1]  
c) Find the convolution and correlation of  $x(n) = [1 \ 4 \ 7]$  and  $h(n) = [3 \ 4]$ . [2]  
d) Write any three Digital Signal Processing (DSP) algorithms along with their respective practical applications? [1]