

Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech. / M. Tech. / Ph.D.

Branch : ECE

Semester : 5th

Title of the Course : Digital Signal Processing

Course Code : EC 355

Time: 2 Hours

Maximum Marks: 30

Q1. (a) Determine the power of the discrete time signal $(n) = \sin(\frac{\pi}{4})n$. [2X5=10]

(b) For each of following system, determine whether or not the system is time

iInvariant: (i) $y(n) = e^{x(n)}$

(ii) $y(n) = \sum_{K=n_0}^n x(K)$

(c) Determine the Z- transform of sequence $(n) = n(-1)^n u(n)$.

(d) Find $x(n)$ if $X(e^{jw}) = e^{-jw}(\frac{1}{2} + \frac{1}{2} \cos w)$.

(e) State and verify the circular time shift property of DFT.

Q 2. Perform the circular convolution of the following sequence: [4]

$x(n) = \{1, 2, 1, 2\}$ and $h(n) = \{4, 3, 2, 1\}$.

Q 3. Calculate IDFT of the sequence: [4]

$$X(K) = \left\{ 7, -0.707 - j0.707, -j, 0.707 - j0.707, 1, 0.707 + j0.707, j, -0.707 + j0.707 \right\}$$

Q 4. Using linear convolution, find $y(n)$ for the sequence : [4]

$x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$ and $h(n) = \{1, 2\}$ using overlap-add method.

Q 5. Find 4 point DFT of the sequence $(n) = \cos \frac{n\pi}{4}$. [4]

Q 6. State and explain the DIT FFT algorithm for calculating N point DFT. [4]