

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-1, 2015

B.Tech (5th Semester, ECE)

COURSE CODE: 10B11EC512

MAXIMUM MARKS: 15

COURSE NAME: Digital Signal Processing

MAX. TIME: 1 Hrs

COURSE CREDIT: 4

NOTE: All questions are compulsory.

1. Compute the circular convolution between $x(n)$ and $h(n)$, where $h(n) = \{2, 1, 2, 1\}$ and $x(n) = \{1, 2, 3, 4\}$. [3 Marks]

2. The first five points of the eight-point DFT of a real-valued sequence are $\{0.25, 0.125 - j0.3018, 0, 0.125 - j0.0518, 0\}$. Determine the remaining three points. [3 Marks]

3. If $x(n)$ is real and even with a rational z-transform, show that

$$X(z) = X(z^{-1})$$

And describe what constraints this places on the poles and zeros of $X(z)$. [3 Marks]

4. For the two sinusoidal signals having frequencies 25 Hz and 125 Hz, find the corresponding discrete time signals for these two tonal signals using sampling frequency 100 samples/ sec. [2 Marks]

5. A digital system having phase

$$\theta(\omega) = -k\omega,$$

k is a constant, If the group delay of this system is 10 ms, what would be the phase delay. [2 Marks]

6. A causal pole-zero system is BIBO stable if its poles are inside the unit circle. Consider now a pole-zero system that is BIBO stable and has its poles inside the unit circle. Is the system always causal? (Hint: consider the system $h_1(n) = a^n u(n)$ and $h_2(n) = a^n u(n+3)$, $|a| < 1$). [2 Marks]
