COURSE CODE(CREDITS): 18B11EC511 (4)   MAX. MARKS: 15

COURSE NAME: PRINCIPLES OF DIGITAL SIGNAL PROCESSING

COURSE INSTRUCTORS: 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. Consider the system: $y[n] = T[x[n]] = x[n^2]$

(a) Determine if the system is time invariant.

(b) Assume that the signal, $x[n]$ is applied to the system is: $x[n] = \begin{cases} 1, 0 \leq n \leq 3 \\ 0, elsewhere \end{cases}$

(i) Determine and sketch the signal $y[n] = T[x[n]]$.

(ii) Sketch the signal $y2[n] = y[n-2]$.

(iii) Determine and sketch the signal $x2[n] = x[n-2]$

(iv) Sketch the signal $y3[n] = T[x2[n]]$

(v) Compare and write conclusions about the signals $y2[n]$ and $y3[n]$.

(c) If the impulse response to the given system is: $h[n] = (n+1) u[n]$, then determine the system output, $y[n]$ for the input, $x[n]$ given above.

[0.5 + 5X0.5 +3 = 6]CO1

Q2. Determine if the following system is (a) Stable, (b) Causal, (c) Time Invariant (d) Linear

$$y[n] = x[n] + nx[n+1]$$

[4X1.5 = 6]CO1

Q3. Explain how the following properties of LTI system can help in reducing the computation time for determining the output of the system for any given input:

(a) Commutative Property.

(b) Associative Property.

(c) Distributive Property.

[3]CO4