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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023**

Semester : Semester VI - 2020

Course Code : ECE3002

Course Name : Sem VI - ECE3002 - Digital Signal Processing

Program : ECM

Date : 18-APR-2023

Time : 9:30AM - 11AM

Max Marks : 60

Weightage : 30%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. The discrete time unit impulse function, also known as the unit sample function, is of great importance to the study of signals and systems. The discrete impulse function is defined by _____
(CO1) [Knowledge]
2. An Anti causal system can be a non causal system where as a non causal system cannot be a anti causal system. Identify type of the system with equation $y(n)=a^n(x(n))$
(CO1) [Knowledge]
3. A Continuous time unit step signal maintains a constant value of unity for all the values of $t>0$. Draw the delayed form of the unit step signal by 4 units.
(CO1) [Knowledge]
4. A DT signal $x(n)$ is holding a magnitude of unity for n values starting from 0 to infinity. Identify and represent the signal in Z Domain.
(CO2) [Knowledge]
5. A DT signal $x(n)$ is varying linearly with respect to time 'n'. For n values starting from 0 to infinity; Identify and represent the signal in Z Domain.
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

6. A toy gun fires a shot (ball) up in the air every odd instances of time. The total distance from ground level is measured as the sample at any instant. The ball achieves a height (in meters) of 2, 3, 4, and 5 respectively as above. If the impulse response of the system is represented as $h[n] = [1, 0, 1]$, obtain the overall response of the system $y[n]$ with above signal as input.
(CO1) [Comprehension]
7. A signal is said to be energy signal if energy is finite and power is zero. Derive the energy of the sequence $x(n)=\{3,5,7,9,11\}$
(CO1) [Comprehension]
8. The signal transformation is a mathematical method for transforming time domain representation to frequency domain representations. Derive the Z transform of the following DT Sequence $x(n)=d(n)+2d(n-1)+3d(n-2)+5d(n-3)$. Where 'd' represents Delta function.
(CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

9. For LTI system output is characterised in time domain. To determine an output directly in the time domain requires the convolution of the input with the impulse signal. Find the response of the DTLTI system with input $x(n)=\{1,2,3,4,5\}$ and impulse response $h(n)=\{1,-1,1\}$
(CO1) [Application]
10. $x(n) = \{1,2,3,4,5,6,7,8\}$ where n varies from (-2) to (5) . It mean that $x(0)=3$; Find the Z transform of the sequence $x(n)$.
(CO2) [Application]