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**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester III - 2022

Course Code : ECE2003

Course Name : Sem III - ECE2003 - Signals and Systems

Program : B. TECH

Date : 31-OCT-2023

Time : 11:30AM - 1:00PM

Max Marks : 50

Weightage : 25%

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.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. The impulse function is a very short pulse used to evaluate system dynamics. Sketch the impulse function and mention its characteristics.
(CO1) [Knowledge]
2. Signals can also be classified into deterministic and random signal. Define deterministic and random signals with examples.
(CO1) [Knowledge]
3. The signal which is symmetric around vertical axis is even signal and symmetric about origin is odd signal. Find even and odd parts of the given signal, $x(t) = 2 + t + t^2 + t^4 + t^7$.
(CO1) [Knowledge]
4. The signal created by microphone is an example of aperiodic signal. Find whether the given signals are periodic or not, if periodic find its fundamental period, (a) $x(t) = \sin(12\pi t)$ (b) $x(t) = \sin(\pi t) u(t)$.
(CO1) [Knowledge]
5. Dirichlet- Jordan, a Mathematician gives sufficient conditions for an existence of Fourier series. List the Dirichlet conditions for the existence of Fourier series.
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. The signal which has finite energy and zero average power is called as energy signal. Justify the given signal, $x(t) = e^{-10t} u(t)$ is energy or power signal.
(CO1) [Comprehension]

7. The process of multiplying a constant to the time axis of a signal is known as time scaling. It can be time compression or time expansion. Find $y_1(t) = x(2t)$ and $y_2(t) = x(t/2)$ for the discrete signal $x(n) = [1, 2, 1, 1]$.

(CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. 1. Convolution is a mathematical way of combining two signals to form a third signal. Perform discrete convolution for the input sequence, $x(n) = \{4, 3, 2, 1\}$ and impulse response, $h(n) = \{1, 1, 1\}$ using graphical method. Verify the answers with tabular method.

(CO1) [Application]