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**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester IV - 2021

Course Code : EEE2001

Course Name : Sem IV - EEE2001 - Signals and Systems

Program : ISR

Date : 15-APR-2023

Time : 9.30AM - 11.00AM

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.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 3 = 15M)

1. Traditionally in signal processing, the energy of a signal is defined using the square of the signal magnitude, the envelope of squared signal magnitude or the integral of squared signal magnitude. Energy of the signal $x(t)=2; 0 \leq t \leq 2$ and $x(t)=0$ elsewhere is _____
a) 8J (CO1) [Knowledge]
b) 4J
c) 2J
d) 18J
2. To find the odd part of $x(t)$ which formula is used?
a) $x(t) = 2x(t)$ (CO1) [Knowledge]
b) $x(t) = 1/2((x(t)+ x(-t))$
c) $x(t) = 1/2((x(t)-x(-t))$
d) $x_e(t) = 2x(t)$
3. $y(t)=2 x(t)$,system is linear or nonlinear
a) Linear (CO1) [Knowledge]
b) Nonlinear
c) a& b
d) None

4. A signal is said to be even signal, it satisfy _____ condition

a) $x(-t) = x(t)$

(CO2) [Knowledge]

b) $x(-t) = -x(t)$

c) $x(t) = -x(t)$

d) None

5. A signal is said to be odd signal, it satisfy _____ condition

a) $x(-t) = x(t)$

(CO2) [Knowledge]

b) $x(-t) = -x(t)$

c) $x(t) = -x(t)$

d) None

PART B

ANSWER ALL THE QUESTIONS

(4 X 5 = 20M)

6. For applications like digital signal processing operations like time shifting, amplification and scaling are performed. Referring to the above statements Explain the concept of time shifting, scaling and reversal by drawing the updated signal $u(-t+8)$

(CO1) [Comprehension]

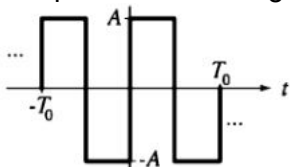
7. A system transforms input signals into output signals. A system is a function mapping input signals into output signals. We concentrate on systems with one input and one output signal, i.e., single-input, single-output (SISO) systems. $y = S(u)$ means the system S acts on input signal u to produce output signal y . The system perform cosine operation on the input signal. Comment on the type of system mentioned in the statements.

(CO1) [Comprehension]

8. Fourier series are the ones that are used in applied mathematics, and especially in the field of physics and electronics, to express periodic functions such as those that comprise communications signal waveforms. It is used to represent non-sinusoidal periodic signals into harmonic components of sinusoidal signals. Referring to the above statements, state the special conditions where fourier series may not exist.

(CO2) [Comprehension]

9. Fourier Series is very useful for circuit analysis, electronics, signal processing etc. The study of Fourier series is the backbone of Harmonic analysis. Harmonic analysis is used for filter design, noise and signal analysis. Harmonic analysis is also very important in power system and power electronics studies. In power network, harmonics are mainly generated by non-linear elements and switching equipment. The output waveform of an inverter circuit is given below. Identify the harmonic components in the signal



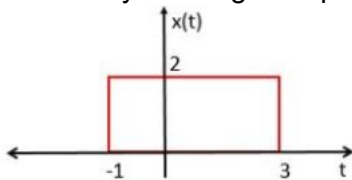
(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 15 = 15M)

10. For applications like digital signal processing operations like time shifting, amplification and scaling are performed. Referring to the above statements, Explain the concept of time shifting, scaling and reversal by drawing the updated signal $x(-3t+8)$ for the signal $x(t)$ given in Fig below



(CO1) [Comprehension]