Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

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04 JAN 2023

[Total No. of Questions: 09] [Total No. of Pages: 2..]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 3rd
Name of Subject: Signals and Systems
Subject Code: PCEC-103
Paper ID: 16033

Max. Marks: 60

Time Allowed: 03 Hours

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

[Marks: 02 each]

Part – A

Q1.

a) Explain power spectral density and energy spectral density.

b) Define Signal to Noise Ratio in any system.

c) Compare power and energy signal using one example for each.

d) Contrast between stationary and non-stationary random processes.

e) Check the stability and causality of the LTI system whose impulse response is $h(t) = e^{-t}.u(t)$.

f) The signal is defined as $x(t) = 1$ for $-1 \leq t \leq 1$,

$x(t) = 0$ otherwise

Create the signal for (a) $x(-2 + t)$, (b) $x(t + 1).u(t)$

[Marks: 04 each]

Part – B

Q2. Classify and describe any four properties of Fourier series.

Q3. Discuss the properties of LTI system.

Q4. Explain the role of Ergodicity in random process with appropriate example.

Q5. Differentiate between Joint and conditional Probability.

Q6. Examine the noise in Bipolar Junction Transistors and FET.

Q7. Evaluate the Fourier transform of $x(t) = \sin w_c t .u(t)$.

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Part – C 04 JAN 2023 **[Marks: 12 each]**

Q8. Discuss various operations like scaling, shifting, folding, addition, subtraction and multiplication of signals with the help of suitable examples.

OR

Explain the importance of Parseval's Theorem in signals and systems with appropriate example. Also discuss the role of Parseval's Theorem in Fourier series

Q9. (a) Evaluate continuous time convolution integral of $y(t)= e^{-2t}. u(t) * u(t+2)$.

(b) If $f(x) = 2(1-x)^2$ $0 < x < 1$
$=0$ elsewhere

is the PDF of a random variable X, find $E[6X +3X^2]$, $E[2X +3]$ and variance of $2X+3$.

OR

Generate the sampled signal for any continuous time signal using the concept of sampling theorem. Also reconstruct the original signal graphically and mathematically from its sampled signal.

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