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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2021

SIGNALS, SYSTEMS AND RANDOM PROCESSES

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Discuss about Energy and Power signals 6M
 b Interpret whether the following systems are Static or dynamic, Linear or Non- Linear 6M
 and Time invariant or time variant
 $y(n) = \log_{10} |x(n)|$

OR

- 2 a Define a system. How are systems classified? Define each one of them with 6M
 examples
 b Determine whether the following systems are stable or not. 6M
 (i) $y(t) = (t+5)u(t)$ (ii) $h(n) = a^n$ for $0 < n < 11$

UNIT-II

- 3 a Explain about representation of a signal in exponential Fourier series 8M
 b Find the Fourier Transform of the following signals using Properties 4M
 (i) $e^{-at}u(t)$ (ii) $\delta(t+2) + \delta(t+1) + \delta(t-1) + \delta(t-2)$

OR

- 4 a Find the Fourier transform of the following signals 7M
 (i) $x(t) = e^{-3t}u(t)$ (ii) $x(t) = te^{-at}u(t)$ (iii) $x(t) = e^{-t} \cos 5t u(t)$
 b Demonstrate how Fourier Transform derived from Fourier Series 5M

UNIT-III

- a State and prove the time convolution theorem with Fourier transforms. 6M
 5 b State and prove the frequency convolution theorem with Fourier transforms. 6M

OR

- a The impulse response of a continuous-time system is expressed as $h(t) = e^{-2t}u(t)$.
 6 Find the Frequency response of the system 5M
 b Define the Following Properties of LTI System
 (i) Distributive Property (ii) Associative Property 7M

UNIT-IV

- 7 Define the following with examples 6M
 a i. Sample space ii. Event
 iii. Mutually exclusive events. iv. Independent events
 b A random variable X has a pdf 6M
 $f_X(x) = C(1-x^4) \quad -1 < x < 1$
 0 Otherwise
 Determine it 'C'

OR

- 8 a Explain the probability distribution and density functions. 6M
- b Let X is a continuous random variable with density function 6M
- $$f_X(x) = \begin{cases} x/9+k & 0 < x < 6 \\ 0 & \text{Otherwise} \end{cases}$$
- i) Find 'k' ii) Find $p[2 < x < 5]$

UNIT-V

- 9 a Briefly explain the concept of cross power density spectrum. 6M
- b Discuss the properties of cross power density spectrum 6M

OR

- 10 a Prove that the PSD of the derivative X (t) is equal to ω^2 times the PSD of $S_{xx}(\omega)$. 6M
- b Explain Distribution and Density function of a Random Process. 6M

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