Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations June 2019
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 60

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

UNIT-I

1   **a**   What are the basic operations on signals? Illustrate with an example.   5M

    b   Determine whether the following are energy or power signals.   7M
      i) $x(t) = e^{-2t} u(t)$ ii) $x(t) = A \cos t$ iii) r(t) = t u(t)

OR

2   **a**   With regard to Fourier series representation, justify the following statements: 6M
      i)   Odd functions have only sine terms
      ii)   Even functions have no sine terms
      iii) Functions with half wave symmetry have only odd harmonics

    b   What are the Dirichlet conditions? Derive the formulae for Fourier coefficients.   6M

UNIT-II

3   **a**   State and prove the properties of Fourier transform.   5M

    b   Find the Fourier transform of following signals: 7M
      i) $x(t) = e^{at} u(-t)$ ii) $x(t) = t e^{-at} u(t)$ iii) $x(t) = cos(\Omega_0 t) u(t)$

OR

4   **a**   What are the difference between Fourier series and Fourier transform?   6M

    b   Find the Fourier transform of the following   6M
      i) $A \sin (2\pi f_c t) u(t)$ ii) $A \, rect \, (\frac{t}{T} \cos 2\pi f_c t)$

UNIT-III

5   **a**   Explain how input and output signals are related to impulse response of LTI system.   5M

    b   Let the system function of a LTI system is $(j\omega) = \frac{1}{j\omega+2}$. What is the output of the system for an input $e^{-t} u(t.)$ 7M

OR

6   **a**   Explain the following sampling techniques: 5M
      i)   Natural Sampling   ii) Flat top sampling

    b   What is aliasing and anti aliasing? What are the causes to it and how it can be eliminated?   7M

UNIT-IV

7   **a**   State and prove time convolution theorem associated with Fourier transform.   5M

    b   Find the convolution of the two continuous time signals $x(t) = e^{-|t|}$, for all t and $\Box(t) = e^{-2t}$ for $t \geq 1$ and 0 for $t < 1$.   7M

OR

8   **a**   If a function x(t) has a power spectral density S(W), find the power spectral density of   i) Integral $x(t)$ ii) Derivative of $x(t)$ 8M
         iii) Bring out the relation between them

    b   State the Properties of auto correlation function.   4M

UNIT-V

9 **a** Find the Z-transform of $x[n] = \left(\frac{1}{2}\right)n\, u(n) + \left(\frac{1}{3}\right)n\, u[-n-1.]$ 6M

b Derive the Convolution theorem and scaling property of Z-transform.   6M

OR

10 **a** Determine the Laplace transform and sketch the pole – zero plot of the following signals   6M

    (i) $x(t) = e^{-t}\cos(2t)$ (ii) $te^{-t}\, u(t)$

b Obtain the inverse transform of $F(S) = \dfrac{1}{s(s+10)(s-3)}$ using partial fraction method.   6M

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