R19

II B. TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, MARCH - 2022
SIGNALS AND SYSTEMS
(Electronics and Communication Engineering)
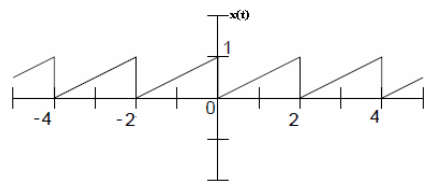
Time : 3 Hours   **Max. Marks : 60**

Note : Answer **ONE** question from each unit (**5 × 12 = 60 Marks**)

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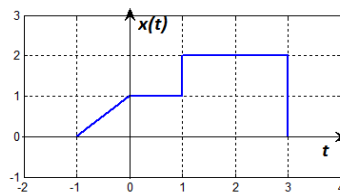UNIT-I

1. a) Check weather the given signals are Energy or Power signals [5M] and find the values. (i) $e^{-2t}u(t)$ ii) $e^{-j2\pi t}$

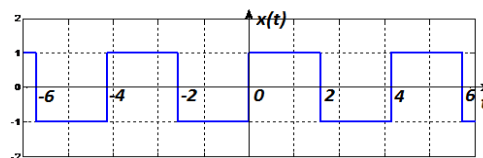   b) Represent the following signal using trigonometric Fourier [7M] Series.

(OR)

2. a) Perform the given operations on the given signal x(t) and sketch [6M] the resultant signals.

    (i) y(t)= x(-t) (ii) y(t)= x(2t- 3) (iii) y(t) = x(-2t+1)

    b) Represent the following signal using Exponential Fourier Series [6M] and plot the spectrum.

UNIT-II

3. a) Find the Fourier Transform and Draw the spectrum for the [8M] following Signals : (i) Unit Gate Function (ii) Unit Step function.

    b) What is Band pass signal? Briefly Explain sampling of Band [4M] pass Signals?

(OR)

4. a) Find the Fourier transform of a Triangular Function and plot [6M] the spectrum.

    b) (i) What is Aliasing? What are the various ways to avoid the [6M] aliasing?

    (ii) Determine the Nyquist rate and Nyquist interval of the give signal

    $$x(t) = 1 + \cos(2000\,\pi\,t) + \sin(4000\,\pi\,t)$$

UNIT-III

5. a) Define LTI system?   [6M]
        State the Condition for Distortion less transmission in time
        domain and Frequency domain.

    b) Find the convolution of $x_1(t) = e^{-2t}\, u(t)$ and $x_2(t) = e^{-3t}\, u(t)$.   [6M]
        and plot the resultant signal?

(OR)

6. a) Define Impulse Response? Compute the Impulse response for a   [6M]
        RC Circuit - LPF . (R - Series and C-Parallel).

    b) State and Prove the properties of auto correlation function?   [6M]

UNIT-IV

7. a) Find the LT and ROC of the following signals.   [6M]

        (i) $x(t) = 4e^{-2t}\, u(t) + 3e^{-3t}\, u(t)$, (ii) x(t) = t u(t)

    b) State and Prove the following properties of LT.   [6M]

        (i) Differentiation in S domain ; (ii) Convolution in Time domain

(OR)

8. a) State and Prove the Initial and Final value theorem in Laplace   [6M]
        transform?

    b) Find the inverse Laplace transform of the following   [6M]

        $(i)\, \dfrac{(s^2+2s+5)}{(s+3)(s+5)^2}$ Re(s) > -3 $(ii)X(S) = \dfrac{10(S+1)}{(S^2+4S+3)}$

UNIT-V

9. a) State the meaning of RoC in Z Transform and mention the RoC   [6M]
        for various classes of discrete time signals.

    b) Find the Z transform and RoC for the following signals.   [6M]
        x[n]= n a^n u(n) ; x[n]= - b^n u(-n-1)

(OR)

10. a) Sate and prove the time Shifting property of Z Transform.   [6M]
        Compute the Z transform and RoC for the signal x[n]= **δ**(n-2)

    b) A causal LTI system is described by the difference equation   [6M]
        y(n)=y(n-1)+y(n-2)+x(n-1), where x(n) is the input and y(n) is the
        output. Find
        i.   The system function H(Z), plot the poles and zeroes of H(Z)
             and indicate the region of convergence.
        ii. Is this system stable or not?

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