Code No: 156CV **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August/September - 2021
SIGNALS AND SYSTEMS
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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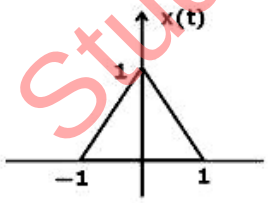
1.a) Find the expression for mean square error using the expression of a function using orthogonal signal space.
b) Find the even and odd components of the signal x(t) = cost + sin t + cost sint. [8+7]

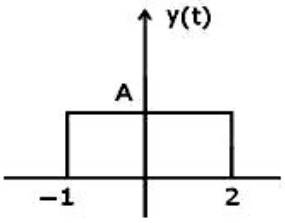
2.a) Derive the expression for component vector of approximating the function $f_1(t)$ over $f_2(t)$ and also prove that the component vector becomes zero if $f_1(t)$ and $f_2(t)$ are orthogonal.
b) Define and sketch the following elementary signals.
i) Exponential Signals ii) Sinusoidal Signals [7+8]

3.a) Explain Dirichlet's conditions to obtain Fourier series representation of any signal.
b) Obtain the relations between the coefficients of trigonometric Fourier series and Exponential Fourier series. [7+8]

4.a) Find the Fourier series representation and sketch the amplitude and phase spectrum for the signal $x(n) = 5 + \sin(n\pi/2) + \cos(n\pi/4)$.
b) With regard to Fourier series representation, justify the following statements:
i) Odd functions have only sine term
ii) Even functions have no sine term
iii) Functions with half wave symmetry have only odd harmonics. [6+9]

5. Find the convolution using graphical method of the following two signals: [15]





6.a) Explain causality and physical reliability of a system and explain poly- wiener criterion.
b) Obtain the relationship between the bandwidth and rise time of ideal High pass filter. [8+7]

7. Find the inverse z-transform of $x(z) = (z^2+z)/(z-1)(z-3)$, ROC: $z>3$.
Using a) Partial fraction method b) Residue method c) Convolution method. [5+5+5]

8.a) State and Prove sampling theorem for low pass signals. Also, explain the recovery of original signal from its sampled signal. Draw neat diagrams wherever necessary.
b) List and explain the properties of Auto-correlation. [8+7]

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