R18

Code No: 153BT

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020
SIGNALS AND SYSTEMS
(Common to ECE, EIE)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) Show that f(t) is orthogonal to signals cost, cos2t, cos3t, … cos nt for all integer values of n, n≠0, over the interval (0,2π) if $x(t) = \begin{cases} 1, & for\ 0 < t < \pi \\ -1, & for\ \pi < t < 2\pi \end{cases}$

b) Discover the analogy of vectors and signals in terms of orthogonality. [6+9]

2.a) Estimate the mean square error value of a function f(t).

b) Sketch the following signals (i) r(t)-r(t-1)-r(t-3)+r(t-4) (ii)$\pi\left(\frac{t-2}{2}\right) + \pi(2t - 3.5)$[7+8]

3.a) Assume that T=2, determine the Fourier series expansion of the signal shown below figure 1 with amplitude of ±1.

Figure: 1

b) Prove the following properties of the Fourier transform: (i) duality (ii) modulation.[8+7]

4.a) Determine the exponential Fourier series from trigonometric Fourier series.

b) Solve the Fourier transform of the rectangular pulse. [6+9]

5.a) Find the convolution of the rectangular pulse given below figure 2 with itself.

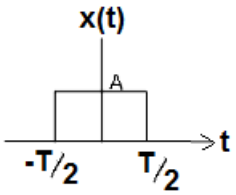

Figure: 2

b) Explain causality and physical relizability of a system and give Paley wiener criterion. [8+7]

6.a) A system produces an output of y(t)= e^{-t} u(t) for an input of x(t)= e^{-2t} u(t). Determine the impulse response and frequency response of the system.

b) Compare the signals and system bandwidth. [9+6]

7. Evaluate the Laplace Transforms of the following functions:
a) Exponential function b) Unit step function c) Damped sine function. [15]

8.a) Prove that for a signal, auto correlation and PSD form a Fourier transform pair.

b) A function f(t) has a PSD of S(w). Find the PSD of i) integral of f(t) and ii) time derivative of f(t). [7+8]

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