R09

Code No: 09A30402

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, May/June-2013
Signals and Systems
(Common to ECE, EIE, BME, ETM, ICE)

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

Answer any five questions
All questions carry equal marks
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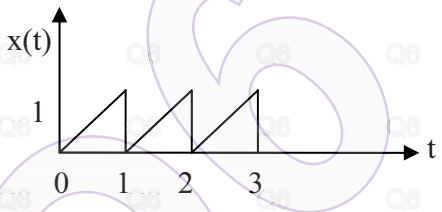
1.a) Define Orthogonal Signal Space and closed or Complete set of orthogonal functions and hence represent a function by a closed or complete set of mutually orthogonal functions.

b) Derive the expression for approximating a given function f(t) by a set of n orthogonal functions $g_1(t)$, $g_2(t)$,……., $g_n(t)$ and also show that the mean square error can be reduced when a function is approximated by a more number of orthogonal functions. [7+8]

2.a) For the Periodic function given below derive the exponential form of Fourier Series and plot magnitude and phase spectrum.



b) Compute Fourier transform of Standard signals like Unit Step, Unit Impulse, Single Sided exponential, Double Sided Exponential and Gate function. [7+8]

3.a) What is an LTI system? Show that an LTI system combined with time scaling property may result in an Time-variant system.

b) An LTI system with an impulse response $h(n) = 2(½)^n u(n)$ is excited by the input sequence x(n). Determine the output response of the system for the following input signals
i) $x(n) = 5(¾)^n u(n)$
ii) $x(n) = nu(n)$. [7+8]

4.a) State and prove Parseval's Theorem

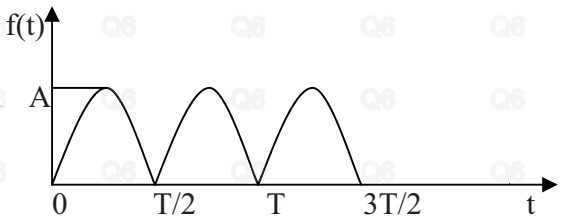
b) Find the convolution of two signals x(n) = {1, 1, 0, 1, 1} and h(n) = {1, -2, -3, 4} and represent them graphically. [7+8]

5.a) Define Nyquist rate. Compare the merits and demerits of performing sampling using impulse, Natural and Flat-top sampling techniques.

b) Discuss the process of reconstructing the signal from its samples. [8+7]

6.a) Determine the Laplace transform of
i) $f(t) = e^{-at} \sin\omega t$
ii) $f(t) = e^{-at} \cosh\omega t$.

b) Find the Laplace transform of the wave form shown below. [8+7]



7.a) Determine the impulse and unit step response of the systems described by the difference equation $y(n) = 0.6y(n-1)-0.08y(n-2)+x(n)$.

b) Define Region of Convergence and state its properties w.r.to Z- Transform. [8+7]

8.a) Show that autocorrelation and power spectral density form a Fourier Transform Pair.

b) Discuss the process of extraction of a signal from noise in frequency domain. [8+7]

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