SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

AN AUTONOMOUS INSTITUTION

Accredited AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

B.E. – Electronics and Communication Engineering

23ECT201 & Signals and Systems

UNIT I - CONTINUOUS AND DISCRETE TIME SIGNALS AND SYSTEMS

QUESTION BANK

PART - B

1. How are the signals classified? Explain. (8) (Nov/Dec 2012)

(or)

Distinguish between the following:
Continuous Time Signal and Discrete Time signal (4) (Apr/May 2010)
Periodic and aperiodic signals. (4) (Apr/May 2010)
Deterministic and Random signals. (4) (Apr/May 2010)

(or)

Give an account for classification of signals in detail. (10) (Apr/May 2015)

(or)

Discuss various forms of real and exponential signals with graphical representation. (6) (Nov/Dec 2013)

(or)

Define unit step, ramp, pulse, impulse and exponential signals. Obtain the relationship between the Unit step and unit ramp function. (10) (Apr/May 2013)

(or)

Give the equations and draw the waveforms of discrete time real and complex exponential signals. (4) (Nov/Dec 2012)

(or)

Write about elementary continuous time signals in detail. (8) (Nov/Dec 2009)

(or)

Given $x[n] = \{1, 4, 3, -1, 2\}$. Plot the following signals.

(i)x(-n-1) (ii) x(-n/2) (iii) x(-2n+1) (iv) $x\left[-\frac{n}{2}+2\right]$ (16) (Nov/Dec2015)

(or)

Sketch the following signals:
(a) 2 U(t - 3) (3) (Apr/May 2011)
(b) 2 δ(n) + 3 δ(n – 1) (3) (Apr/May 2011)

(or)

Sketch the following signals:
1) [u(t -2)+u(t-4)] (Apr/May 2015)
2) (t-4) [u(t -2)-u(t-4)] (6) (Apr/May 2015)

(or)

Distinguish between Unit step and Unit ramp functions. (4) (Apr/May 2012)

(or)

Find the summation $\sum_{n=-8}^{\infty} e^{2n}\delta(n-2)$ (4) (Apr/May 2010)

(or)

Explain the properties of Unit impulse functions. (4) (Apr/May 2010)

2. Determine whether the signal x(t) = sin 20 π t + sin 5 π t is periodic and if it is periodic find the fundamental period. (5) (Nov/Dec 2013)

(or)

Find the fundamental period T of the signal x(n) = cos(n π/2) – sin(n π/8) + 3 cos(n π/4 + π/3) (6) (Apr/May 2013)

(or)

Determine whether the following signal is periodic. If periodic, determine the fundamental period.x(t) = 3 cos t + 4 cos (t /3) (4) (Nov/Dec 2012)

(or)

Determine whether each of the signals are periodic, if periodic find the fundamental period.

(a) $x(t) = \cos(2 \pi t)^2$

(b) x(n) = cos(n π/3) + sin(n π/4) (6) (Nov/Dec 2010)

(or)

Find whether the signal x(t) = 2 cos (10t + 1) – sin(4t-1) is periodic or not. (4) (Apr/May 2010)

(or)

Find the fundamental period T of the signal x(t) = 20 cos(10 π t + π/6) (4) (Apr/May 2010)

(or)

Check if x(t)=4 cos (3πt+π/4)+2 cos (4πt) is periodic. (6) (Apr/May 2015)

(or)

Check whether the following signals are periodic or aperiodic signals

a) x(t)=cos 2t+sint/5.

b) x(n)=3+cos π/2n+cos2n. (16) (Nov/Dec 2014)

(or)

Find whether the following signals are periodic or aperiodic .If periodic find the fundamental period and fundamental frequency $x_1(n) = \sin 2\pi t + \cos \pi t$ $x_2(n) = \sin \frac{n\pi}{3} \cdot \cos \frac{n\pi}{5}$ (8) (Apr/May2016)

3. Define energy and power signals. Find whether the signal $x(n) = (1/2)^n u(n)$ is energy or power signal and calculate their energy or power. (5) (Nov/Dec 2013)

(or)

Define an energy and power signal. (4) (Apr/May 2013)

(or)

Determine whether the following signals are energy or power and calculate their energy or power:

(1) $x(n) = (1/2)^n u(n)$

(2) $x(t) = \text{rect}(t / T_0)$

(3) $x(t) = \cos^2(\omega_0 t)$ (12) (Apr/May 2013)

(or)

Find whether the signal is an energy or power signal:

(a) x(t) = exp(-2t). U(t)

(b) x(n) = U(n) (10) (Apr/May 2011)

(or)

Determine the energy and power of the following signals:

(a) $x(n) = (-0.5)^n u(n)$

(b) x(t) = t u(t) (10) (Nov/Dec 2010)

(or)

Determine power and RMS for signals $x_1(t) = 5 \cos (50 t + \pi/3)$ and $x_2(t) = 10 \cos 5t \cos 10 t$. (10) (Nov/Dec 2009)

(or)

Find whether the following signals are power or energy signals. Determine power or energy of the signals

$g(t) = 5 \cos\left(17\pi t + \frac{\pi}{4}\right) + 2 \sin\left(19\pi t + \frac{\pi}{3}\right)$ (8) (Apr/May2016)

$g(n) = (0.5)^n u(n)$

4. Determine whether the discrete time system y(n) = x(n) cos(ωn) is

(a) Memoryless (b) Stable (c) Causal (d) Linear (e) Time invariant
(16) (Nov/Dec 2013)

(or)

Determine whether the following system is linear, time invariant, stable and invertible.

(1) $y(n) = x^2(n)$
(2) $y(n) = x(-n)$ (10) (Nov/Dec 2012)

(Or)

Define LTI system. List the properties of LTI system and explain. (6) (Nov/Dec 2012)

(or)

Determine whether the following system is linear, dynamic, causal and time invariant.

(a) $y_1(t) = x(t - 3) + (3 - t)$
(b) $y_2(t) = dx(t) / dt$
(c) $y_1[n] = n\, x[n] + bx^2[n]$
(d) Even {x[n-1]} (16) (Apr/May 2012)

(or)

A discrete time system is given as $y(n) - y^2(n-1) = x(n)$. A bounded input of $x(n) = 2\,\delta(n)$ is applied to the system. Assume that the system is initially relaxed. Check whether system is stable or unstable.
(16) (Apr/May 2012)

(or)

Check for the properties (a) linearity, (b) Time invariance, (iii) Causality, (d) Stability for the systems given below:

(a) $y(n) = \sin(x(n))$
(b) $y(t) = t\, x(t) + x(t + 1)$ (16) (Apr/May 2011)
(c) For the system y(n)=log[x(n)], Check for linearity Causality Time invariance and Stability.
(10) (Apr/May 2015)
(d) Check whether the following system is linear, causal time invariant, and or stable.
(1) y(n)=x(n)-x(n-1) (2) y(t)= d/dt[x(t)] (16) (Nov/Dec 2014)

(or)

Determine whether the following systems are linear or not.

(1) $\frac{dy(t)}{dt} + 3ty(t) = t^2 x(t)$
(2) $y(n) = 2\, x(n) + 1 / (x(n-1))$ (8) (Nov/Dec 2009)

(or)

Determine whether the following systems are time-invariant or not.

(1) $y(t) = t\, x(t)$
(2) $y(n) = x(2n)$ (8) (Nov/Dec 2009)

(or)

Given the input output relationship of a continuous time system y(t)=tx(-t). Determine whether the system is causal ,stable,linear and time invariant. (16) (Nov/Dec 2015)

(or)

Find whether the following systems are time variant or fixed.Also find Find whether the systems are linear or nonlinear. (16) (Apr/May2016)

$$\frac{d^3y(t)}{dt^3} + 4\frac{d^2y(t)}{dt^2} + 5\frac{dy}{dt} + y^2t = x(t)$$

$$y(n) = an^2 \times (n) + bn \times (n - 2)$$