fomenky's

UNIVERSITY OF BUEA
MID-SEMESTER EXAMINATION

MONTH: February
YEAR: 2018
DATE: 09/02/2018
INSTRUCTION: Answer ALL questions

COURSE INSTRUCTORS: SONE EKONDE
COURSE TITLE: Signals and Systems
TIME ALLOWED: 2 HOURS

1. The following questions concern the function x(n) given as

$$x(n) = 2\sin\left(\frac{n\pi}{2}\right)[u(n+3) - u(n-4)]$$

Sketch x(n) and hence sketch the following functions

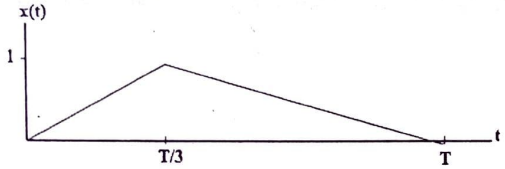
a) $x_1(n) = x[n+2] + x[-1-n]$

b) $x_2(n) = x[3n]\delta[n-1]$

c) $x_3(n) = x_e(n)$ where $x_e(n)$ is the even function of x(n)

(10 marks)

2. Use the sketch of x(t) below to answer the following questions



Sketch the following functions

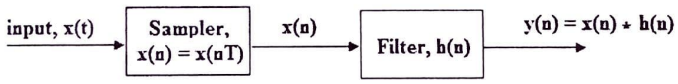
a) $x_1(t) = x[t+T] + x[-T-t]$

b) $x_2(t) = \frac{1}{2}x(t)u(t) + x(-t)u(t)$

c) $x_3(t) = x_o(t)$ where $x_o(t)$ is the odd function of x(t)

(6 marks)

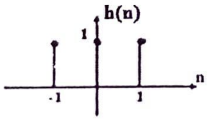
3. A periodic signal x(t) is first sampled to obtain x(n) before being fed into a filter with impulse response h(n)



The periodic signal $x(t) = \sin 2\pi t$ is sampled using the rate f = 4Hz. (Note that T = 1/f)

i) Deduce the discrete-time signal in two periods

ii) Hence, use discrete-time convolution to deduce output, y(n) for an impulse response given as



(9 marks)

4. Consider the linear shift-invariant system characterized by the second-order linear constant coefficient difference equation

$$y(n) = 2y(n-1) - y(n-2) + x(n) - 2x(n-1) + x(n-2)$$

i) Draw the corresponding block diagram of the system **(2 marks)**

ii) Determine if the system is memoryless, causal and stable **(3 marks)**