ET0096 MST SAMPLE ANSWERS:

A1	d	A6	b
A2	a	A7	d
A3	c	A8	b
A4	a	A9	b
A5	c	A10	a

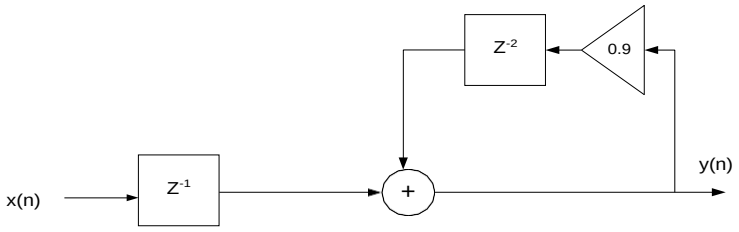
B1a)

Quantizer:	To convert each sample of the signals into a binary codeword. In other words, it converts the continuous-amplitude signal to a discrete-amplitude signal and encodes the samples into binary codewords.

Reconstruction filter:	This is usually a low pass filter used to smoothen the output signal such that it becomes continuous-amplitude.

i) x(0)=1.0000 x(1)= 3.1743
ii) x(t) = cos(1000πt) + 2sin(2500πt) + sin(3000πt)
iii) 1.5 kHz

B2) a) y = { 0 1.0000 0 0.9000}
b) y(n) = 0.9 y(n- 2) + x(n-1)

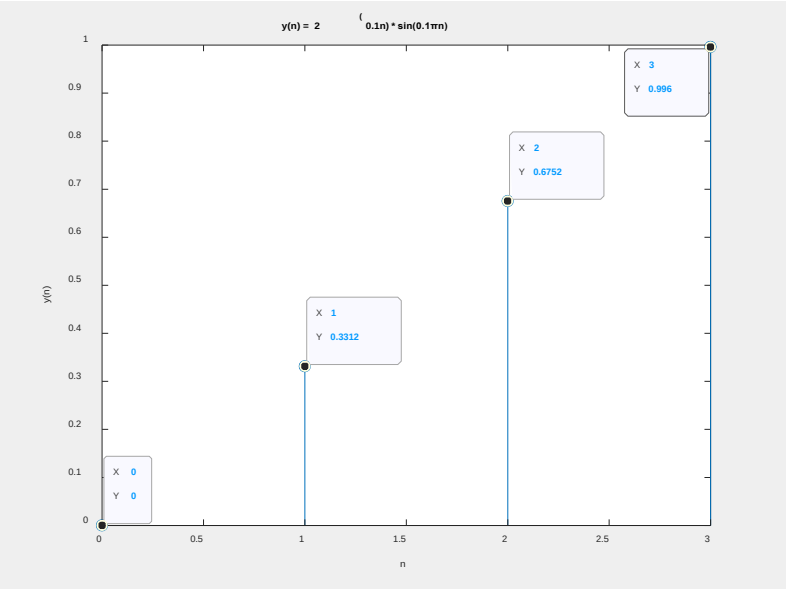


c) Stable, as n increases, y(n) seems to decrease

B3)
a) x(n)= {1,2,3,4,5,6,7}

x(n-2)= {0,0, 1,2,3,4,5,6,7}
x(3n) = {1,4,7}
$x_1(n)$ = 2x(n-2)+x(n) and $x_2(n)$ = x(3n)+x(n-2)
$x_1(n)$ = { 1 2 5 8 11 14 17 12 14}
$x_2(n)$ = { 1 4 8 2 3 4 5 6 7}

b) y(n) = {0 0.3312 0.6752 0.9960}



y1 = { 0 0.3312 0.6752 0.9960}

B4) $x_1(n)$ = 2δ(n) + 2δ(n-2) + 2δ(n-3)={1 2 3}
$x_2(n)$ = u(n) – u(n-2) = {1 1}

a) $x_1(n)$ * $x_2(n)$ = { 1 3 5 3}

b) y(n) = { 1 3 5 3}

c) Autocorrelation of $x_1(n)$ = {3 8 14 8 3}