Tregunta 1. Cual es la schal obtenida en tiempo discreto al utilizar un conversor análogo digital de 5 bits con ficuencia de 5 KHz, aplicado a la Señal continua x(t) = 0.3 cos (1000 Tit- T/4) + 0.6 sen (2000 Tit) + 0.1 cos (11000 Tit-T)? Realizar la simulación del proceso de digitalización incluyendo al menos 3 ciclos de la señal x(t). de que la digitalización no sea apropiada; diseñe e implemente un conversor adecuado para la señal estudiada. El conversor debe permiter configurar la cantidad de bits y la frecuencia de muestreo, indicandole al Tusuario si dicha ficcuencia es apropiada o no, y graficar la señal continua, discreta y digital Se comienza determinando si cumple Nyquist Frewencia de muestreo: 5000 Hz W, = 1000TT Wy : 2000 TT W3 = 11000 TI W = 277 F F = W 211 F, = W. - 1000 # - 500 HZ F2 = W2 = 2000 # = 1000 HZ 27 F3 = W3 - 11000 # = 5500 Hz - Frewence FS > 2 Fmax 5000 >, 2 (5500) No comple Nyquist 5000 > 11000 Allasing

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> Cos (100 OTI t - 7/4)
 (os (d + B): Cos (d) (os (B) + Sen (K) Sen (B)
 ((os (1000 TH + T/4) = (os (1000 TH) (os (-T/4) + Sen (1000 TH) Sen (-T/4)
 = 0.707 (os (1000 Tt) - 0.707 Sen (1000 Tt)
-> (0) (11000 TH - TT)
 (os (x + B) : (os (x) (os (B) + Sen (x) Sen (B)
(05 (11000 TH - T) = (05 (11000 TH) (05 (-T) + Sen (11000 TH) Sen (-T)
= - (os (1100071 t)
x(t) = 0.2121 ( (as (1000 mt) - Sen (1000 mt)) + 0.6 Sen (2000 mt) - (as (11000 mt)
Teniendo en eventa que
Ti = 100
           _ [rad/s]
     500 TT
T2 : 177
           [rad/s]
     1000 1
T3 = 111
     5500 TT
Ademas
W. - 1000 Fi - 1 EQ
    2000 17
w. . 1000 € . 1 € Q
Wz
     11000 TT
W2 : 2000 FT - 2 € Q
     1100017 11
la señal x(t) es cuasiperiódica, con período
T = KT, = 1 T2 = TT3 con K, 1, 1 62
T = K 111 = 1 111
       500 TT
                              5500 TT
                 1000 TT.
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55000\pi T = \begin{pmatrix} K & 1\pi \\ 5000\pi \end{pmatrix} 55000\pi = \begin{pmatrix} 1 & 1\pi \\ 1000\pi \end{pmatrix} 55000\pi = \begin{pmatrix} r & 1\pi \\ 5500\pi \end{pmatrix} 55000\pi
55000AT = K 110 A = 155 A = r 10 A
 55000T = KHO = 155 = 110
 El mem (110,55,10) = 110
 Entoners
 55000T = K110 = 155 = r10 = 110
 K=1, 1=2, r=11
 55000T = 110
      T = 110
             55000
      T = 1 [seq]
 Cambio de variable para discretizar
 t =nTs = n/Fs
 - 0.1 ( (os (11000 Tt)): -0.1 ( (os (11000 T n/Fs)
                         = -0.1 ((os (11000 TT / 5000)
                         = -0.1 (Cos ("TTn/s)
A copia = 11 TI Aliasing
                                                                                 Copia de guien?
Non = \frac{11\pi}{5} - 2\pi = \pi
2001 : 211 For = 211 Fort
For : 1011 . Fs = (T/s) . (5000) = 500 HZ
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FS: 12000 H2 W; 5: 1000 F1 W; 5: 1000 F1 Fi. 5: 500 H2 Fi. 5: 1000 H2 Fi. 5: 5500 H2 Fi. 5: 5500 H2 Fi. 5: 5500 H2 Fi. 1000 7: 11000 (umple Hyguet) -0.1 (os (11000 m/n/12000) 5: -0.1 (os (11mn/12)) Acri 1: 11 F1 [-7, 17] 7 Original, 17 17 17 18 H5: 5 Fott 5: F1: 2001 (1000) (um/12) 5: 5500 H2 Fi. 11 H2 H3 H3 H3 H4	Manteand	lo una	nueva	Freeven	119	de	mues	treo									
W1 = 7000 TI F1 = 500 HZ F2 = 1000 HZ F3 = 5500 HZ F3 = 5500 HZ F3 > 2 fmax 12000 > 2(5500) 12000 > 10000 Comple Mygnist -0.1 Cos (11000 TV / 12000) = -0.1 Cos (1171/12) 1.001 = 11 T1	Fs = 12000) Hz															
# = 11000 FI Fi = 500 Hz Fi = 5500 Hz Fi = 500 Hz Fi = 500 Hz Fi = 500 Hz Fi = 11000 Comple Hyguet - 0.1 Cos (11000 T/n/12000) = -0.1 Cos (1171/12) Acri = 11 T	N, = 10001	n															
Fi = 500 Hz Fi = 1000 Hz Fi = 5500 Hz Fi > 2 Fmax 12000 > 2 (5500) 12000 > 11000 Cumple Hyguist - 0.1 Cos (11000 T/n/12000) = -0.1 Cos (1171/12) Acri = 11 Ti	V2 = 2000	Ti															
F3: 5500 H2 F3: 5500 H2 F3: 5500 H2 F3: 2 Fmax 12000 > 2(5500) 12000 > 11000 Cumple Nygust -0.1 Cos (11000 M/1/2000) = -0.1 Cos (11111/12) Acri = 11 Ti	u3 = 11000	π															
F3 = \$500 Hz F5 > 2 Fmax 12000 > 2(5500) 12000 > 11000 Cumple Hygust - 0.1 Cos (11000 T/n/12000) = -0.1 (os ("Tm/12) 12 10 11 12 15 17 17 18 18 18 19 19 19 19 19 19 19	F. = 500 1	нг				*											
F3 >, 2 Fmax 12000 >, 2(5500) 12000 >, 11000 Comple Nyguist - 0.1 Cos (11000 \(\text{TI} \) \	2 : 1000	Hz														L X	
2000 > 11000 Cumple Hygust -0.1 Cos (11000 71/1/2000) = -0.1 Cos (1171/12) Nort = 11 T	3 = 5500	Нг															
12000 > 11000 Comple Hygust - 0.1 Cos (11000 T/T/12000) = -0.1 Cos (11TT/12) Don = 11 T [-T, T] > Original. 12 For = F. Don = (12000) (11T/12) = 5500 Hz 2T1 11 11 11 11 11 11 11 11 1	Fs > 2 Fm	ax															
$\begin{array}{llll} -0.1 & \cos{\left(\frac{11000 \pi / n}{12000}\right)} & = -0.1 & \cos{\left(\frac{11 \pi n}{12}\right)} \\ -0.1 & = & \frac{11 \pi}{12} & \left[-\pi, \pi \right] & = & Original, \\ & & & & & & & \\ & & & & & \\ & & & & & \\ & & & & & & \\ & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & \\ & & & & & \\ & & & & \\ & & & & & \\ & & & & \\ & & & & & \\ & & & & & \\ & & & & \\ & & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \\ & &$	12000 > 21	(5500)									,						
$A \circ n = \frac{11 \pi}{12} [-\pi_1 \pi] \rightarrow Oug_{mal}$ For $= \frac{1}{12} \frac{\pi}{12} = \frac{(12000)(\pi/12)}{2\pi} = 5500 \text{ Hz}$ $= \frac{1}{12} \frac{\pi}{12} = \frac{1}{12} \frac{\pi}{$	2000 > 110	000 (imple 1	Nyguist													
For $i = \frac{12}{15} \cdot \frac{1}{1000} \cdot \frac{1000}{1000} \cdot \frac{1000}{100$	- 0.1 Cos (11000 7/-	112000) = -0.1	Cos	(""	17/12)										
$F_{O(1)} = \frac{F_{O(1)}}{2\pi} = \frac{(12000)(11\pi/12)}{2\pi} = 5500 \text{ Hz}$ $\frac{11}{11} = \frac{11}{11} = \frac{11}{11$	Nort = 11				,	+	7					+	-	-	-	\vdash	-
277 11		7 L - 17	, 17 -	Ougina	-												
Bits = 5 Estados = 2#bits = 2 ⁵ = 32		2				55	00 Hz										
		? • Nor1		00) (47/		55	00 Hz										
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			11 -	//	- 1/ -		11	,	1		11 -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			//	//	1/ -		11 -		1/		11 -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			4		11 -		11		7		11 -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			//		1/ -		11 -	,			11 -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			//	//	-1/		11 -	,	11		H -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		55			11	- 11	1/		//		1		# -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		550			//	11	1/ -			,	11		// -
	For1 = <u>F</u> s	2 . No11	- (120	00) ("П/ 2П		55			//	- 1/	1/ -		//		1		// -
	For1 = <u>F</u> s	2 · No11	- (120	00) ("П/ 2П		55			//	- 1/	1/ -		//		1		// -