MONASH University

FIT9137 Introduction to computer architecture and networks - S2 2022

Question 2

Not yet answered

Marked out of 6.00

Modulation B

Encoding table

Symbol	Frequency	Amplitude	Phase
0000	1Hz	2.83	45
0001	1Hz	5.66	45
0010	1Hz	4.47	63.43
0011	1Hz	4.47	26.57
0100	1Hz	2.83	135
0101	1Hz	5.66	135
0110	1Hz	4.47	153.43
0111	1Hz	4.47	116.57
1000	1Hz	2.83	225
1001	1Hz	5.66	225
1010	1Hz	4.47	243.43
1011	1Hz	4.47	206.57
1100	1Hz	2.83	315
1101	1Hz	5.66	315
1110	1Hz	4.47	333.43
1111	1Hz	4.47	296.57

Note 1: Use the above encoding rules for all the tasks below.
Note 2: The phase values are in degrees.

Tasks:

1. Enter the coordinates of each symbol in your constellation diagram in the table below.
Only enter numerial values up to 2 decimal points. Any other character, except minus sign for negative values, will result in an incorrect answer. **[32 Marks]**

Symbol	X	Y
0000	2.00	2.00
0001	4.00	4.00
0010	2.00	4.00
0011	4.00	2.00
0100	-2.00	2.00

0101	-4.00	4.00
0110	-4.00	2.00
0111	-2.00	4.00
1000	-2.00	-2.00
1001	-4.00	-4.00
1010	-2.00	-4.00
1011	-4.00	-2.00
1100	2.00	-2.00
1101	4.00	-4.00
1110	4.00	-2.00
1111	2.00	-4.00

2. Draw a constellation diagram for the modulation scheme using Desmos. Enter the URL of your saved Desmos constellation diagram in the following field (for reference):

3. Draw a wave form for each symbol using Desmos. Place all the waveforms in the first period: [0-1].
Tip: a frequency of 1 Hz corresponds to 2πx in the sine wave formula. Enter the URL of your saved Desmos symbols in the following field (for reference):

https://www.desmos.com/calculator/7oq0xqtais

4. Sample the symbols specified in the table below at the given X coordinates (using the plots you made in previous step). You can easily do this in Desmos: plot the symbol, then click on the curve and drag the mouse pointer around. Desmos will display the X and Y coordinate of the point on the curve. Move the cursor until the X coordinate matches the one given in the table. Record the Y coordinate and enter it into the table. Enter only numeric values up to 2 decimal points. Any other character, except minus sign for negative values, will result in an incorrect answer. **[32 Marks]**

Symbol	X	Y
0000	0.3	1.29
	0.7	-2.52
0010	0.3	2.57
	0.7	-5.04
0100	0.3	0.67
	0.7	-3.14
0101	0.3	3.18
	0.7	-4.42
1001	0.3	-2.52
	0.7	1.29

1011	0.3	-5.04
	0.7	2.57
1110	0.3	-4.42
	0.7	3.18
1111	0.3	-3.14
	0.7	0.67

5. Demodulate the following message (Figure 1). Remember that one symbol corresponds to one time unit (i.e., one unit on the X axis) since the frequency is 1 Hz. **[8 Marks]**

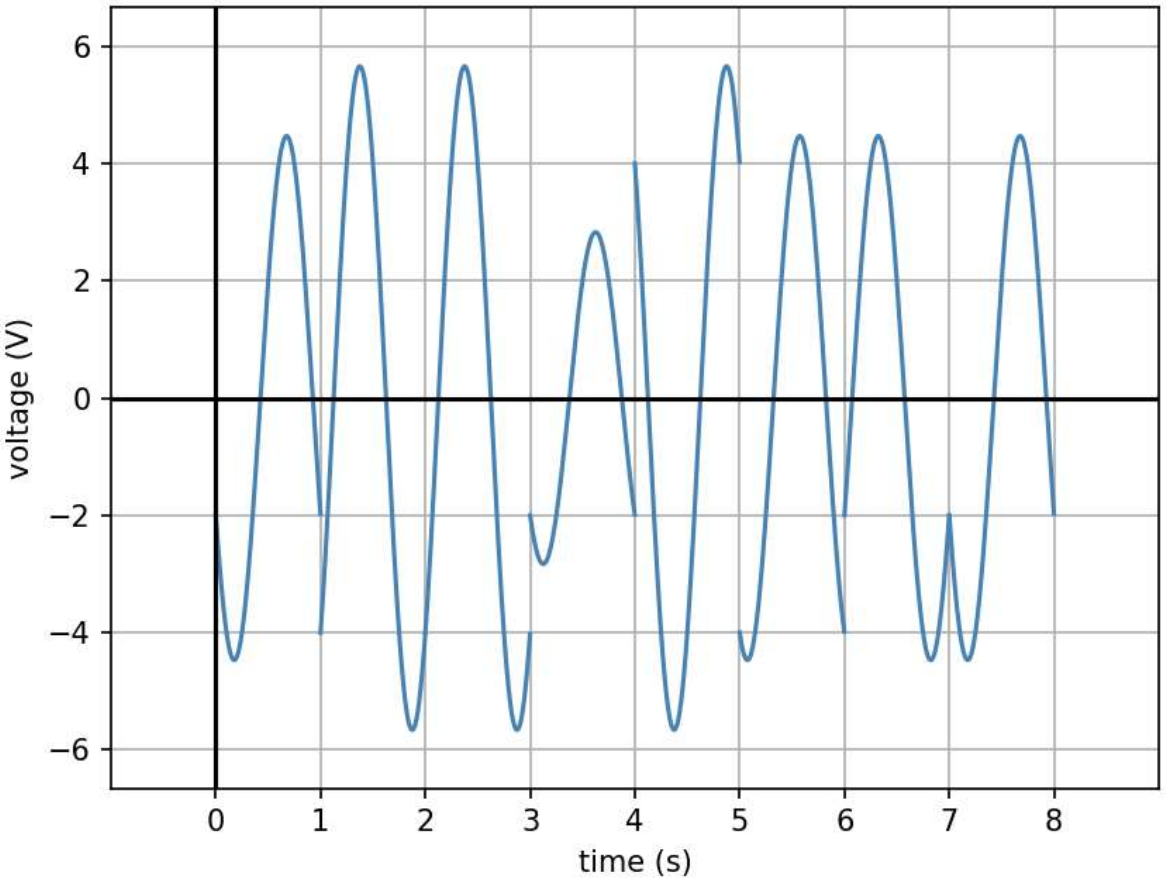

Figure 1 - Modulated message

Enter the demodulated message here:

You must enter the message as a simple sequence of 0 and 1, without spaces or commas between them (for example, 0001100100).

◄ Sample Quiz FIT9137 (not marked)

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Assignment 3 details ►