MONASH University

ITO4137 Architecture and networks TP3-23

Started on	Sunday, 28 May 2023, 5:09 PM
State	Finished
Completed on	Sunday, 28 May 2023, 6:03 PM
Time taken	53 mins 55 secs
Marks	1.00/1.00
Grade	**100.00** out of 100.00

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Question 1

Correct

Mark 1.00 out of 1.00

Modulation B

Encoding table

Symbol	Frequency	Amplitude	Phase
0000	1Hz	2	0
0001	1Hz	2	90
0010	1Hz	2	180
0011	1Hz	2	270
0100	1Hz	3	45
0101	1Hz	3	135
0110	1Hz	3	225
0111	1Hz	3	315
1000	1Hz	4	0
1001	1Hz	4	90
1010	1Hz	4	180
1011	1Hz	4	270
1100	1Hz	5	45
1101	1Hz	5	135
1110	1Hz	5	225
1111	1Hz	5	315

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 ✔	0 ✔
0001	0 ✔	2 ✔
0010	-2 ✔	0 ✔
0011	0 ✔	-2 ✔
0100	2.12 ✔	2.12 ✔
0101	-2.12 ✔	2.12 ✔
0110	-2.12 ✔	-2.12 ✔

0110	-2.12 ✔	-2.12 ✔
0111	2.12 ✔	-2.12 ✔
1000	4 ✔	0 ✔
1001	0 ✔	4 ✔
1010	-4 ✔	0 ✔
1011	0 ✔	-4 ✔
1100	3.54 ✔	3.54 ✔
1101	-3.54 ✔	3.54 ✔
1110	-3.54 ✔	-3.54 ✔
1111	3.54 ✔	-3.54 ✔

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):

https://www.desmos.com/calculator/re8u4b6zl2 ✔

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/tcvkm6ebri ✔

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	1.90 ✔
	0.7	-1.90 ✔
0010	0.3	-1.90 ✔
	0.7	1.90 ✔
0111	0.3	2.67 ✔
	0.7	-1.36 ✔
1001	0.3	-1.24 ✔
	0.7	-1.24 ✔
1011	0.3	1.24 ✔
	0.7	1.24 ✔
1100	0.3	2.27 ✔

1100	0.7	-4.46 ✔
1101	0.3	-4.46 ✔
	0.7	2.27 ✔
1110	0.3	-2.27 ✔
	0.7	4.46 ✔

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]**

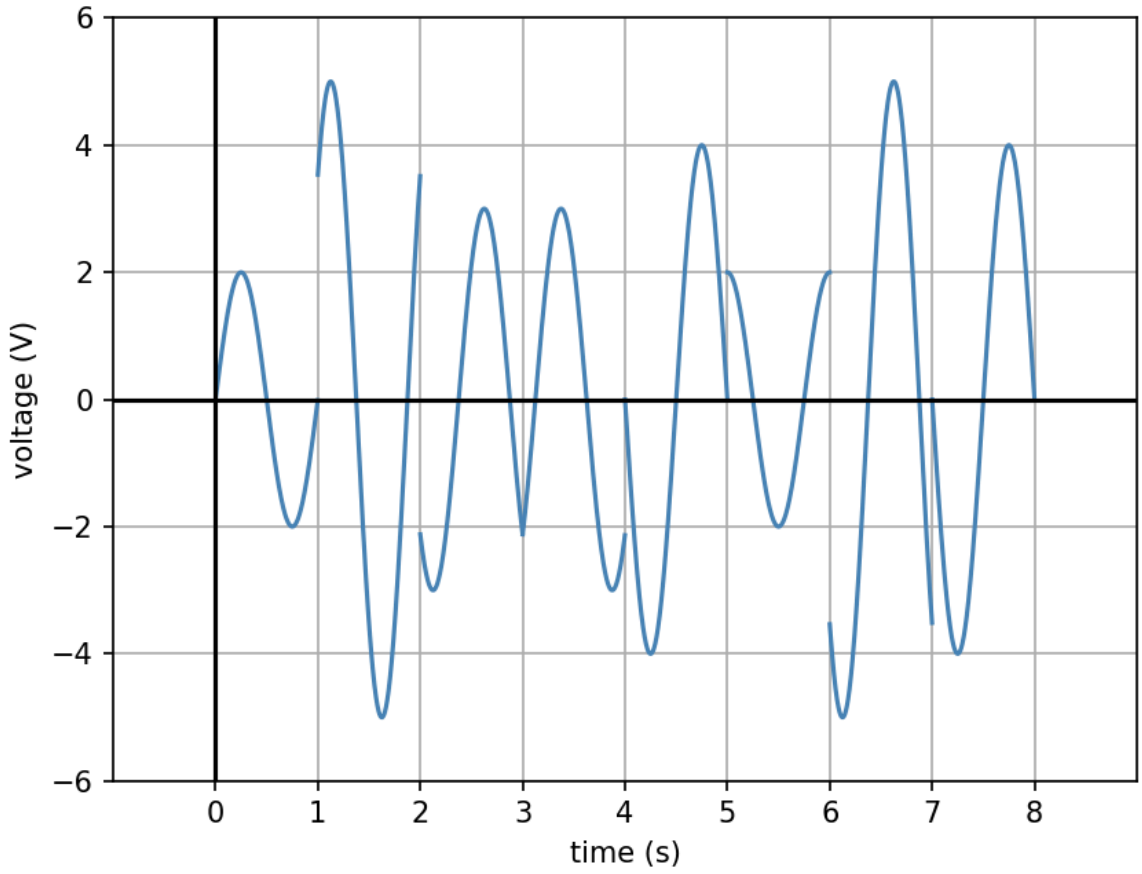

Figure 1 - Modulated message

Enter the demodulated message here: 00001100011001111010000111101010 ✔

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

◀ Announcements

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Assessment 2: Network traffic analysis ▶