Marks: 15	CSE320: Data Communication	Assignment 5
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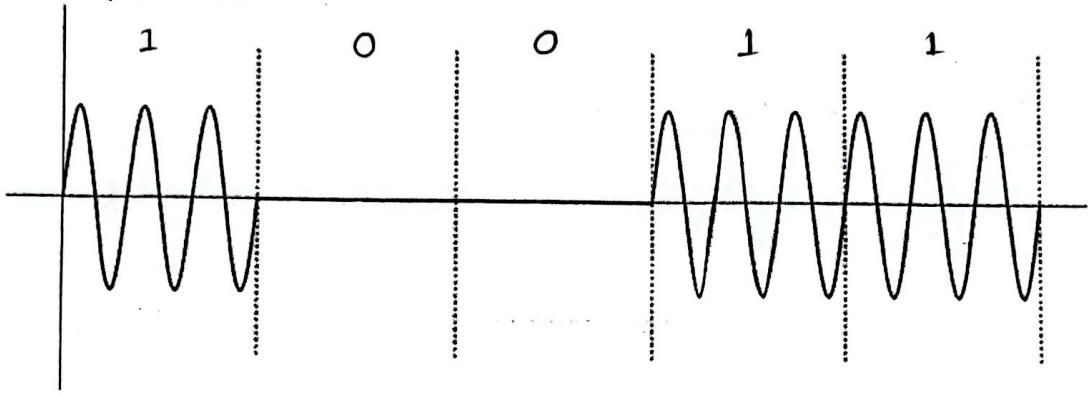
Amplitude Shift Keying (ASK)

Binary ASK:

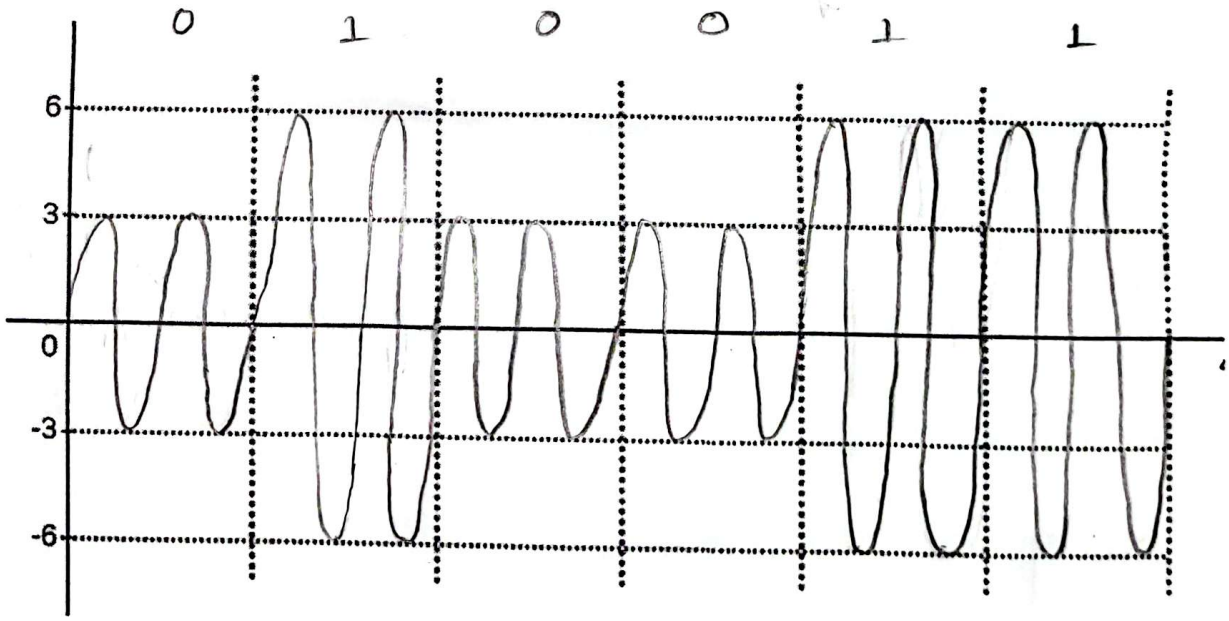
1. Determine the digital bit stream from the analog signal below. The signal was modulated using Binary ASK where 0 means signal element with no amplitude and 1 means signal element with amplitude of 3v.

0 → 0v
1 → 3v



2. Draw the analog signal for the digital bit stream 010011 using Binary ASK where 0 means signal element with amplitude of 3v and 1 means signal element with amplitude of 6v.
[*frequency = 2 for each signal element and phase 0 rad*]

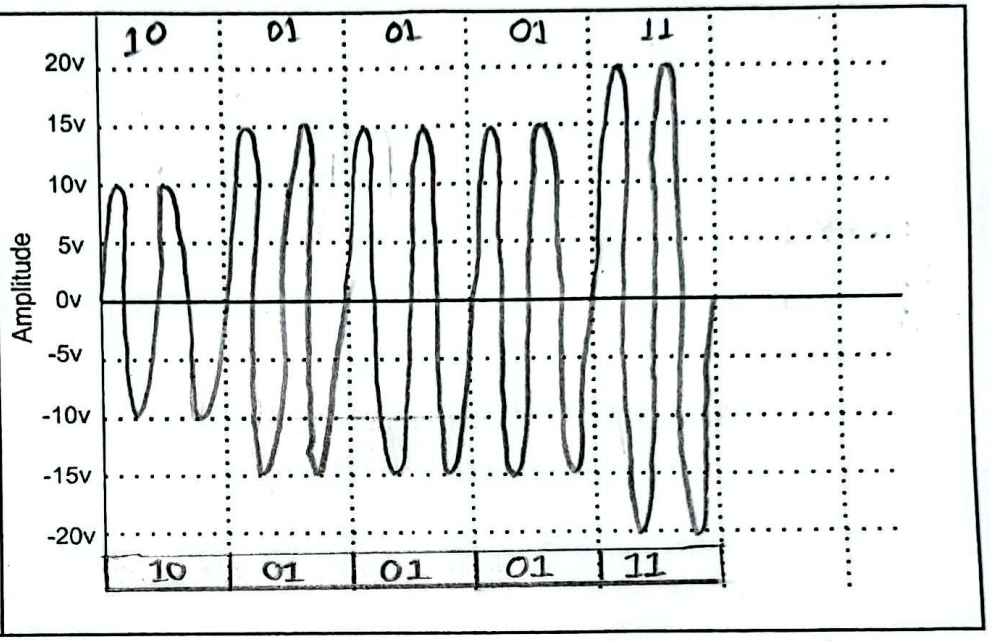
0 → 3v
1 → 6v



Multi-level ASK

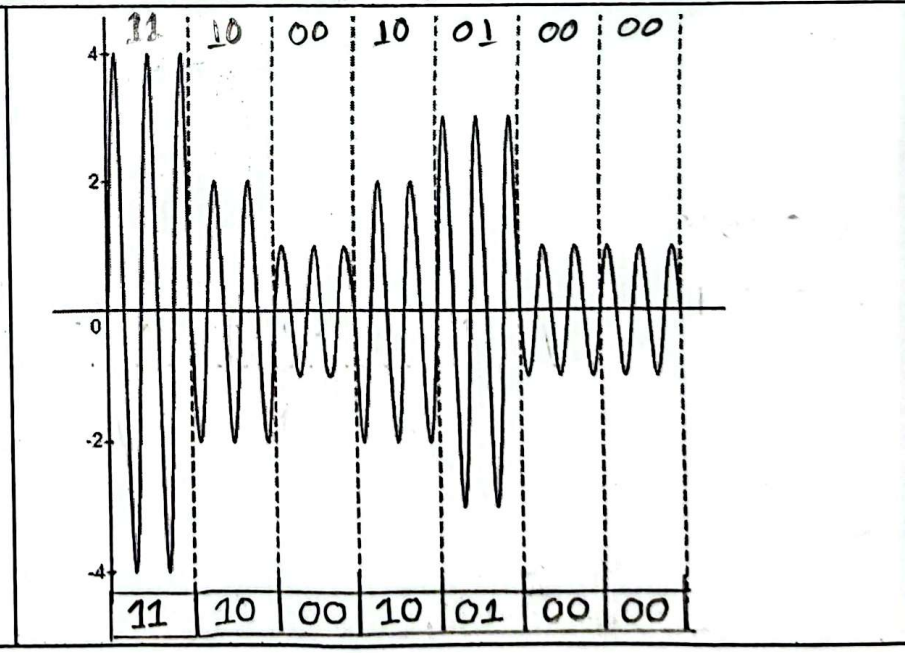
3. In a Multi level ASK, for each signal element, we want to send 2 bits at a time. We have used a carrier signal that has a frequency of 10 Hz (Each signal element has 2 cycles) and phase is 0 rad. If the amplitude changes according to the following table, draw the modulated signal for the bit sequence 1001010111

Bit Pattern	Max Amplitude
00	5v
01	15v
10	10v
11	20v



4. For the following Multi-level ASK, find the bitstream form the signal below:

Bit Pattern	Amplitude
00	1v
01	3v
10	2v
11	4v

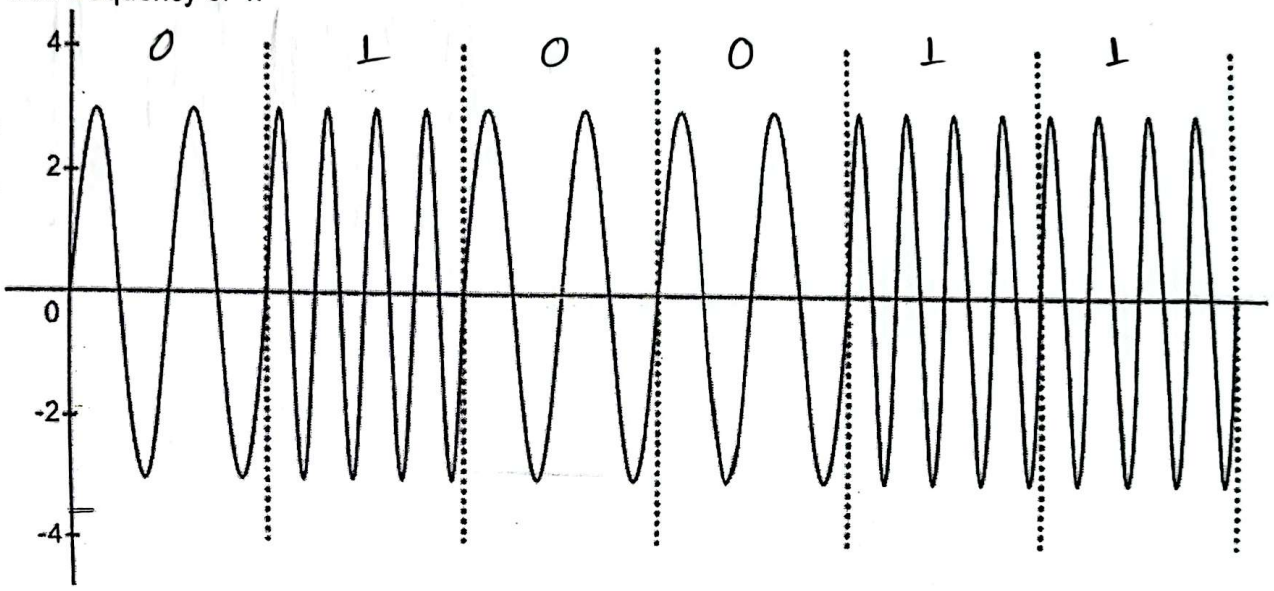


Frequency Shift Keying (FSK)

Binary FSK:

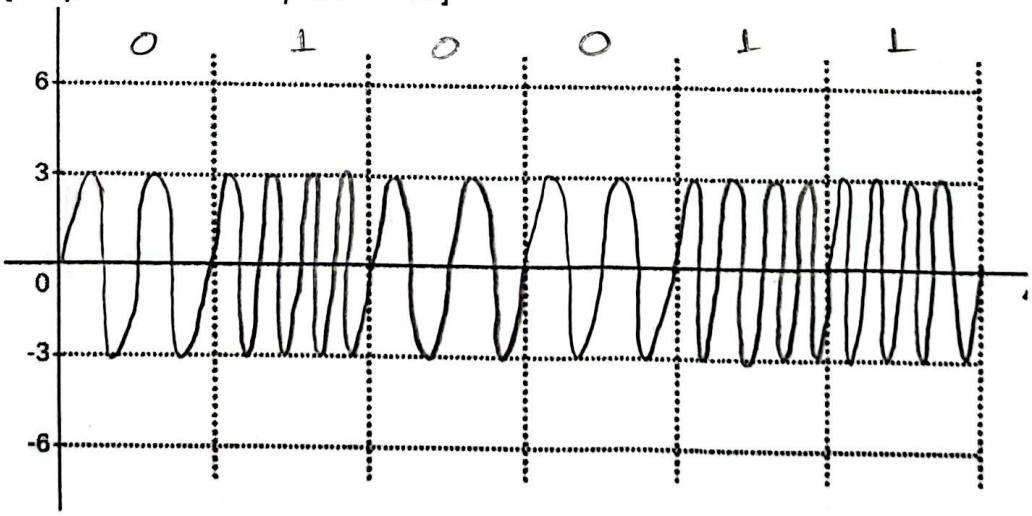
5. Determine the digital bit stream from the analog signal below. The signal was modulated using Binary FSK where 0 means signal element with frequency of 2 and 1 means signal element with frequency of 4.

0 → 2Hz
1 → 4Hz



6. Draw the analog signal for the digital bit stream 010011 using Binary FSK where 0 means signal element with frequency of 2 and 1 means signal element with frequency of 4.
[*Amplitude = 3v and phase 0 rad*]

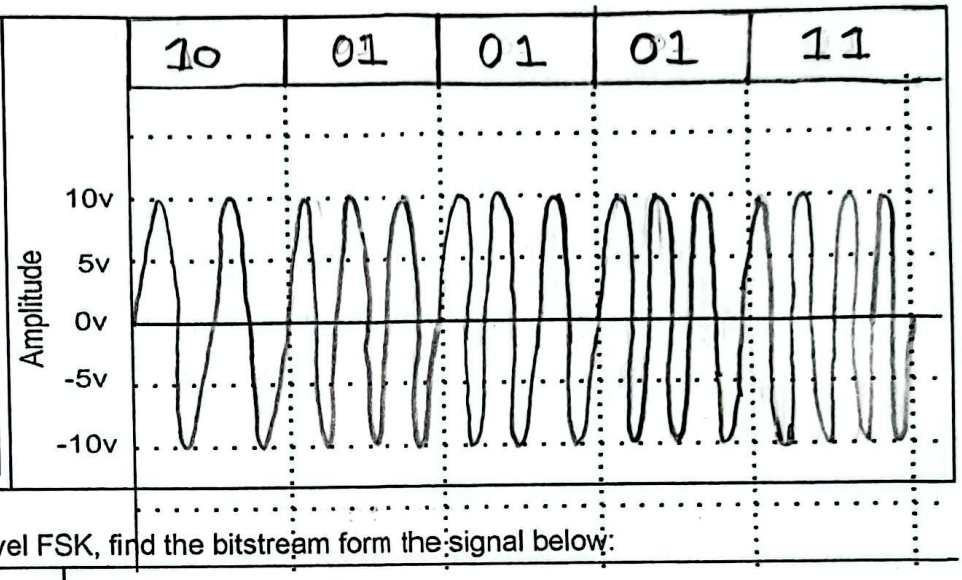
0 → 2Hz
1 → 4Hz



Multi level FSK

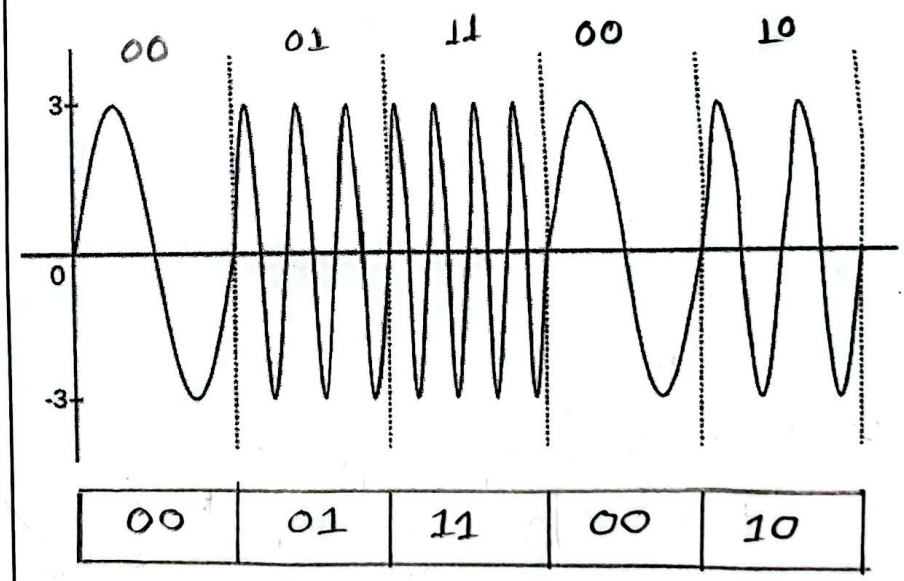
7. In a Multi level FSK, for each signal element, we want to send 2 bits at a time. We have used a carrier signal that has an amplitude of 10v and phase is 0 degree. If the frequency changes according to the following table, draw the modulated signal for the bit sequence 1001010111

Bit Pattern	# cycles of the signal element
00	1
01	3
10	2
11	4



8. For the following Multi-level FSK, find the bitstream form the signal below:

Bit Pattern	Frequency (each signal element)
00	1
01	3
10	2
11	4

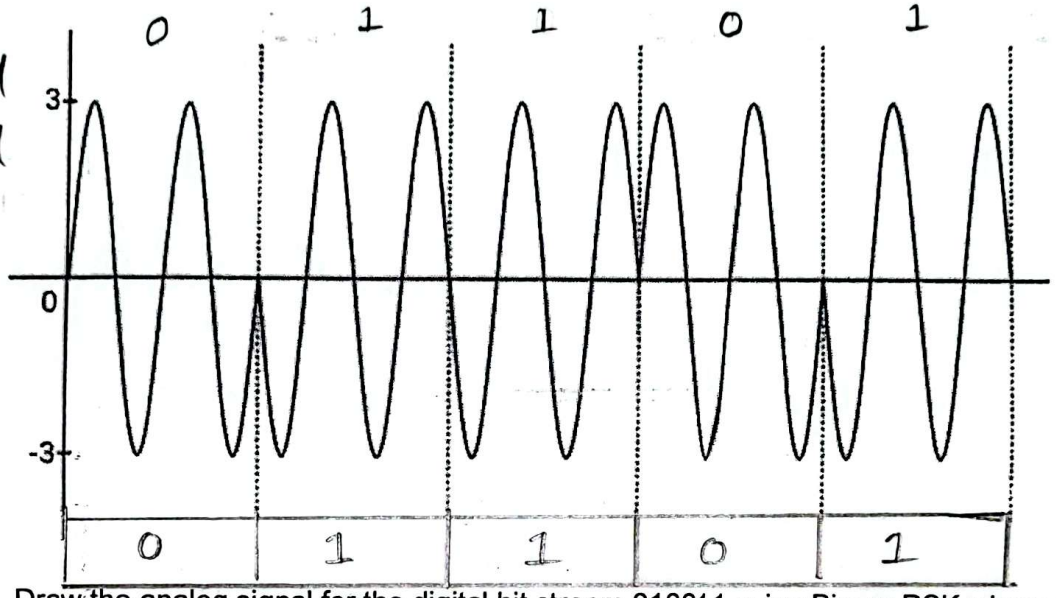


Phase Shift Keying (PSK)

Binary PSK

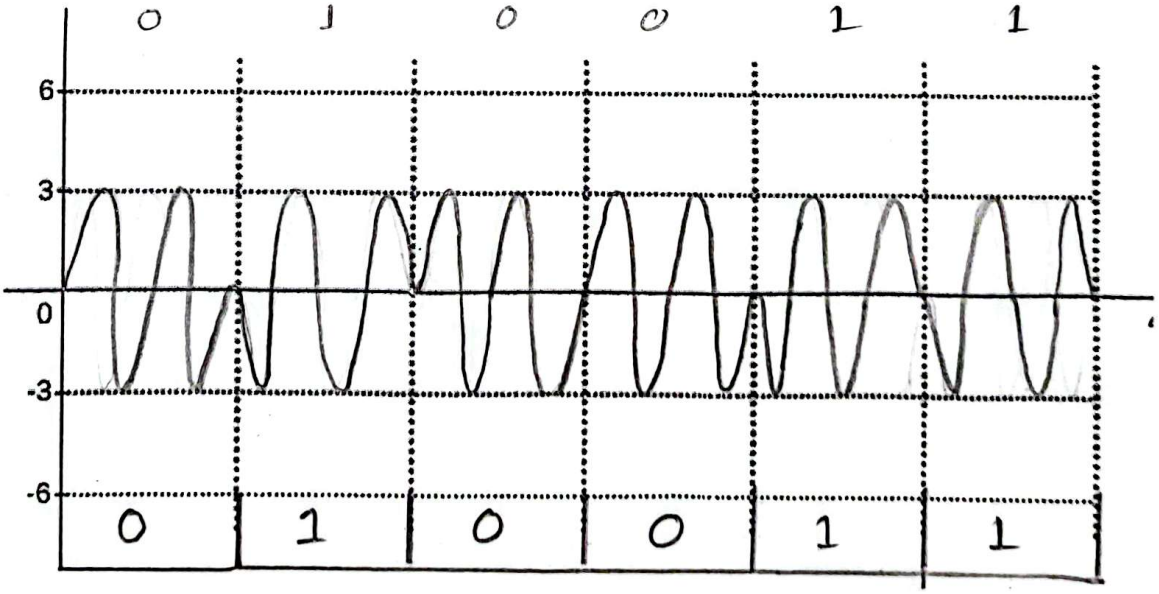
9. Determine the digital bit stream from the analog signal below. The signal was modulated using Binary PSK where 0 means signal element with phase of 0 rad and 1 means signal element with phase of π rad.

0 → 0 rad
1 → π rad



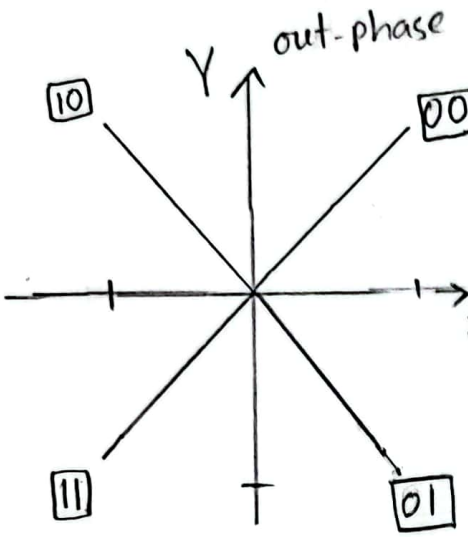
10. Draw the analog signal for the digital bit stream 010011 using Binary PSK where 0 means signal element with phase of 0 rad and 1 means signal element with phase of π rad.
[*Amplitude = 3v and freq = 2 (for each signal element)*]

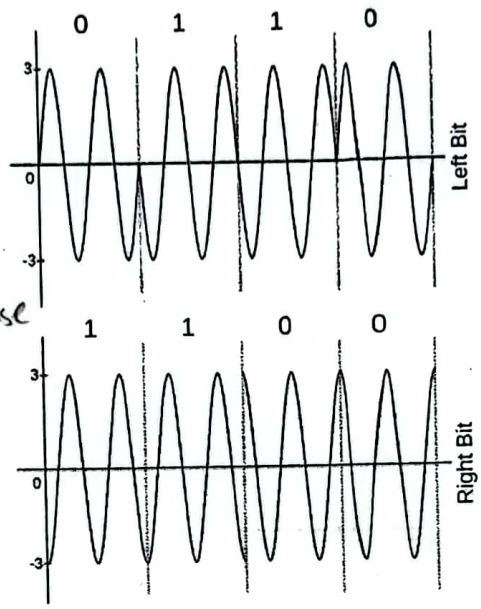
0 → 0 rad
1 → π rad



QPSK & Constellation Diagram:

11. Draw the constellation diagram for the QPSK given below:





bits	Phase
00	45°
10	135°
11	-135°/225°
01	-45°/315°

12. Draw the analog signal for the bit stream 1011001011 using the constellation diagram given below [frequency = 2 for each signal element]