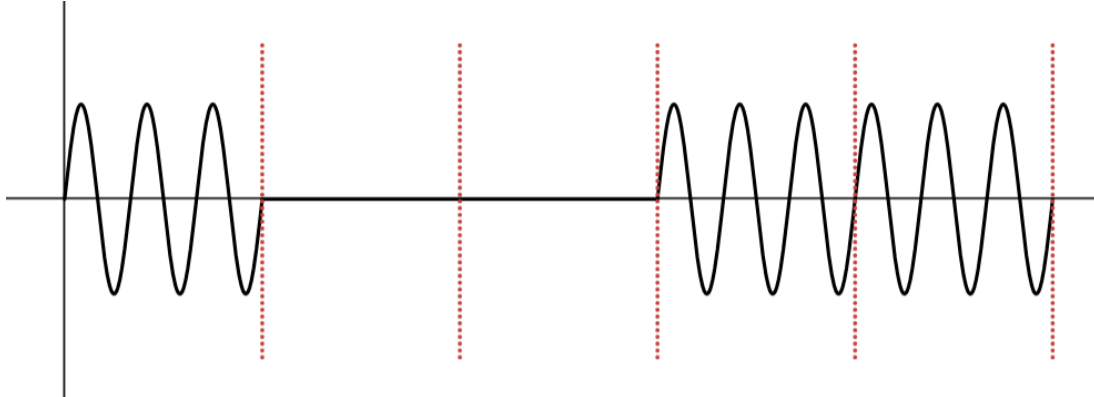


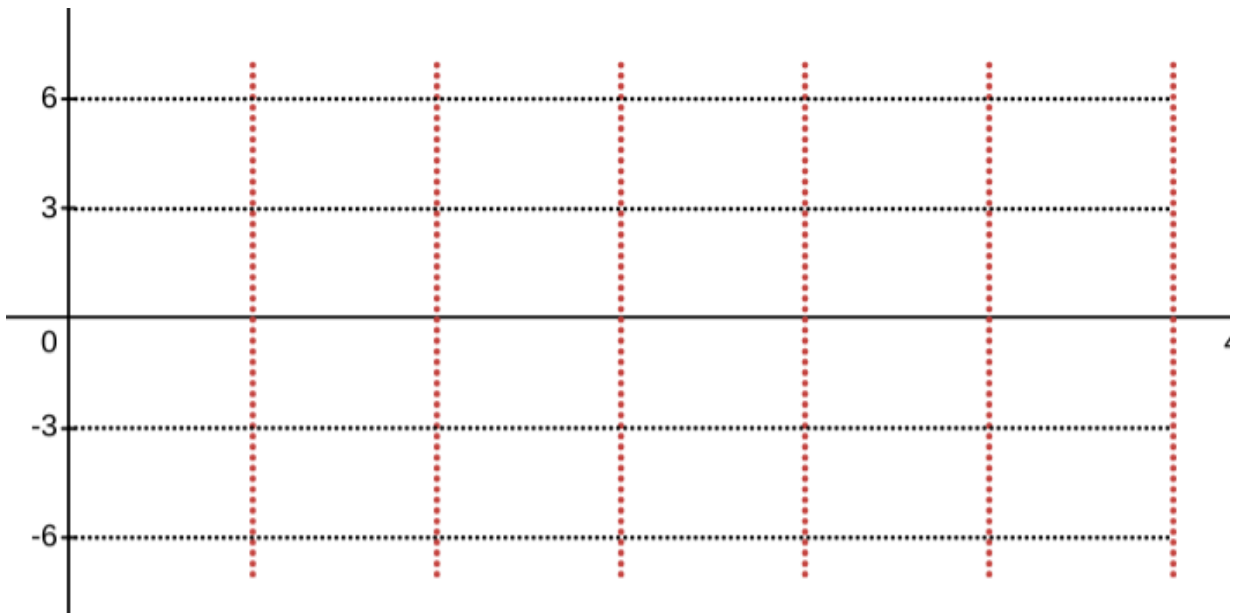
Amplitude Shift Keying (ASK)

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 $3v$.

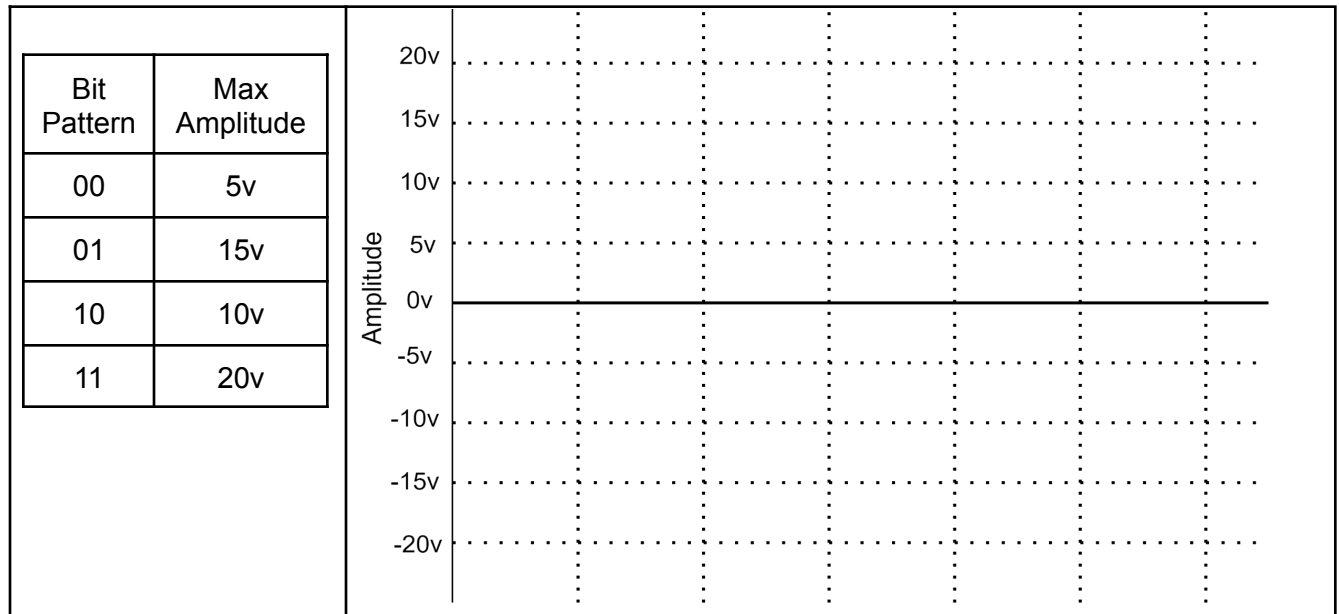


2. Draw the analog signal for the digital bit stream 010011 using Binary ASK where 0 means signal element with amplitude of $3v$ and 1 means signal element with amplitude of $6v$.
[frequency = 2 for each signal element and phase 0 rad]

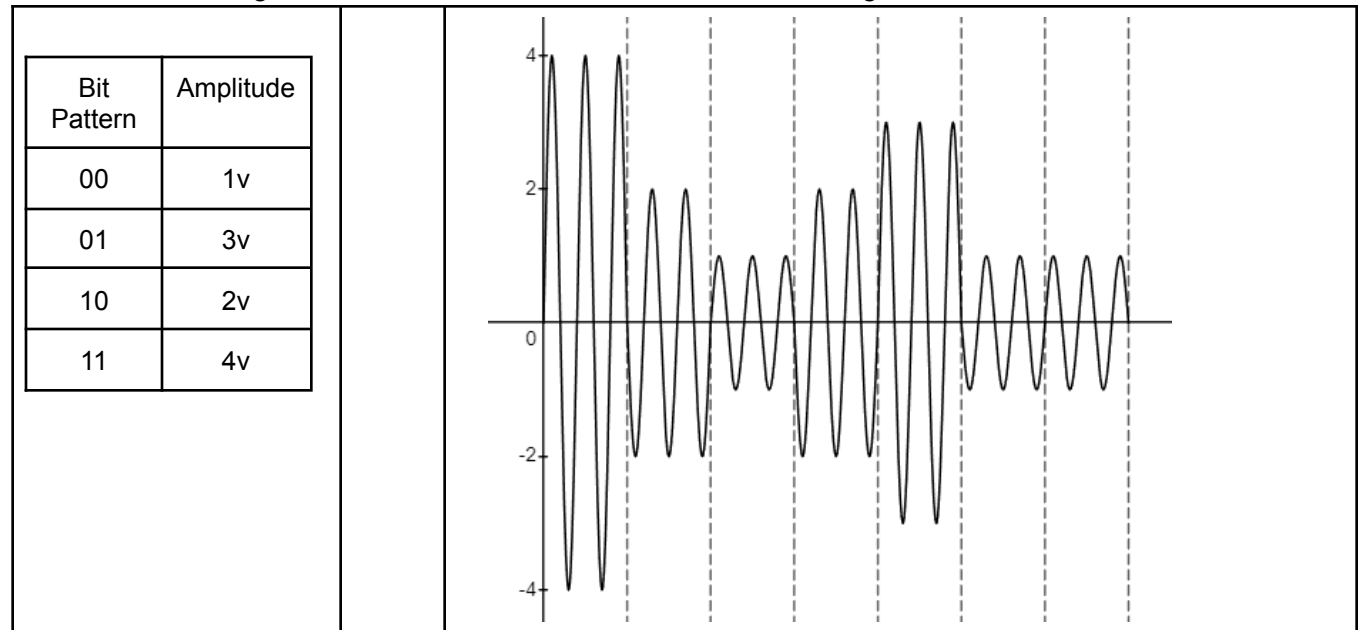


Multi-level ASK

3. In a Multilevel 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



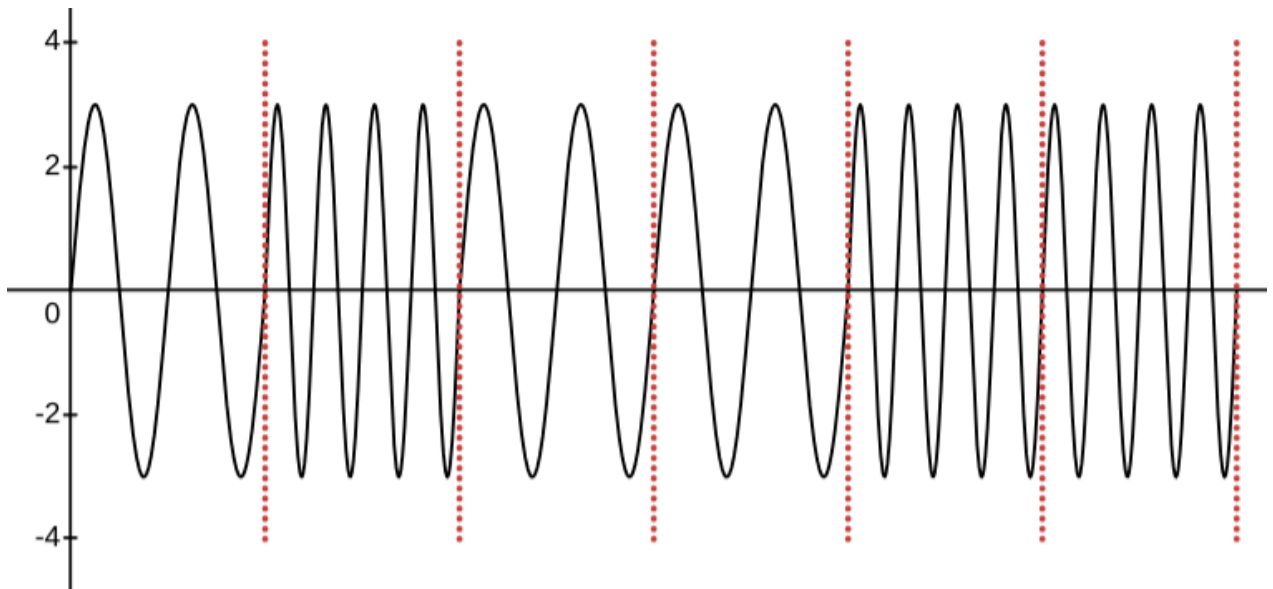
4. For the following Multi-level ASK, find the bitstream from the signal below:



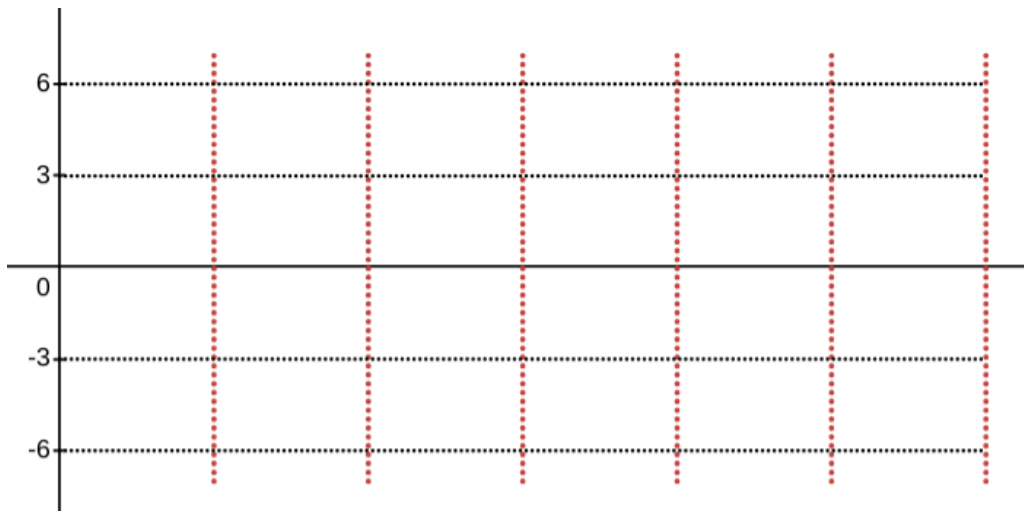
Frequency Shift Keying (FSK)

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.



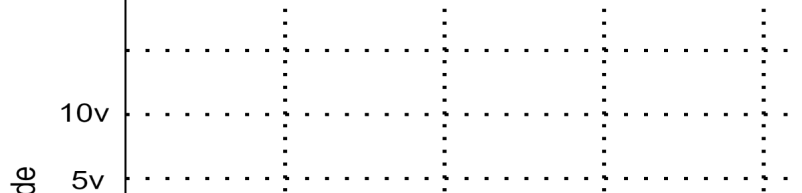
6. Draw the analog signal for the digital bit stream 010011 using Binary FSK where 0 means signal element with frequency of 2 and 1 means signal element with frequency of 4.
[Amplitude = 3v and phase 0 rad]



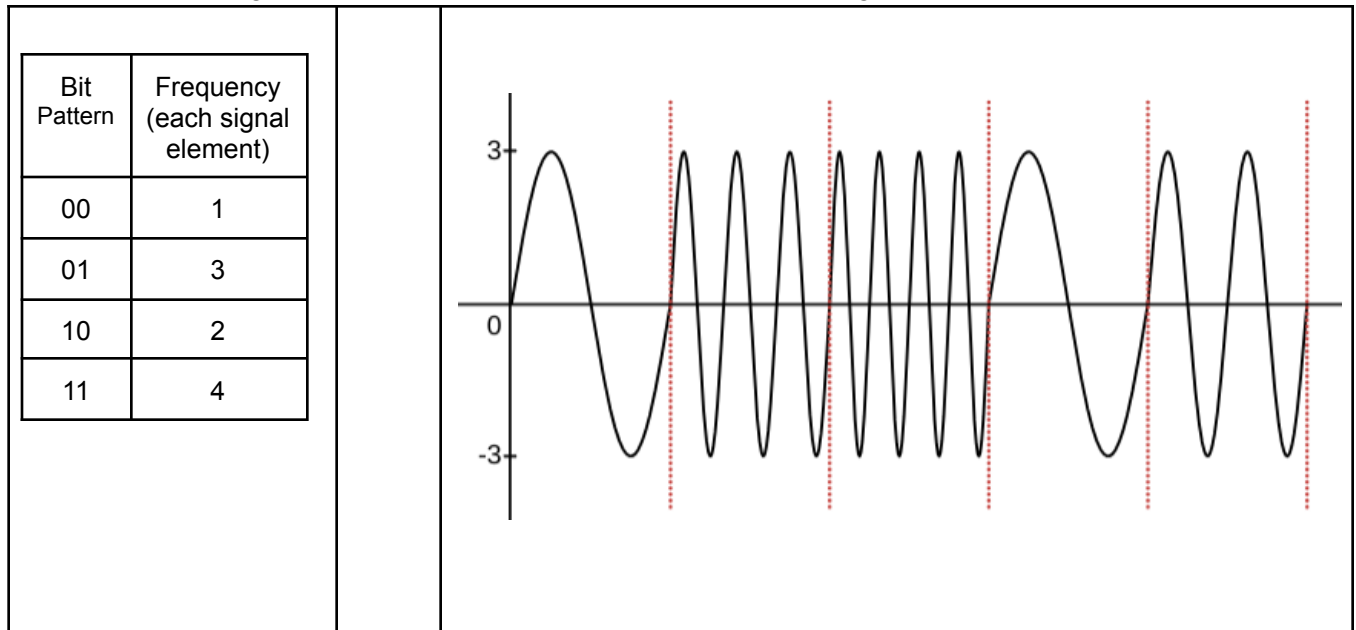
Multi-level FSK

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



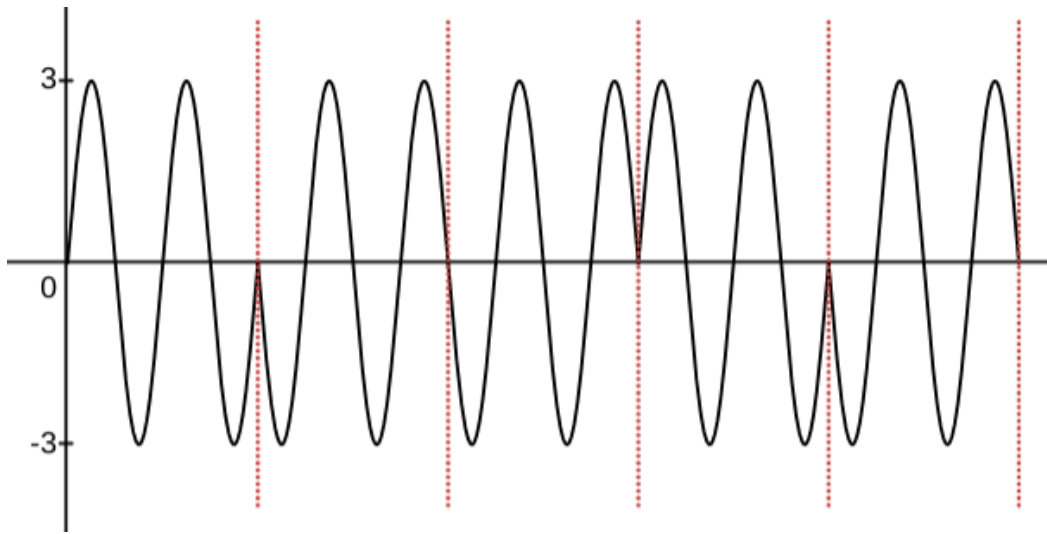
8. For the following Multi-level FSK, find the bitstream from the signal below:



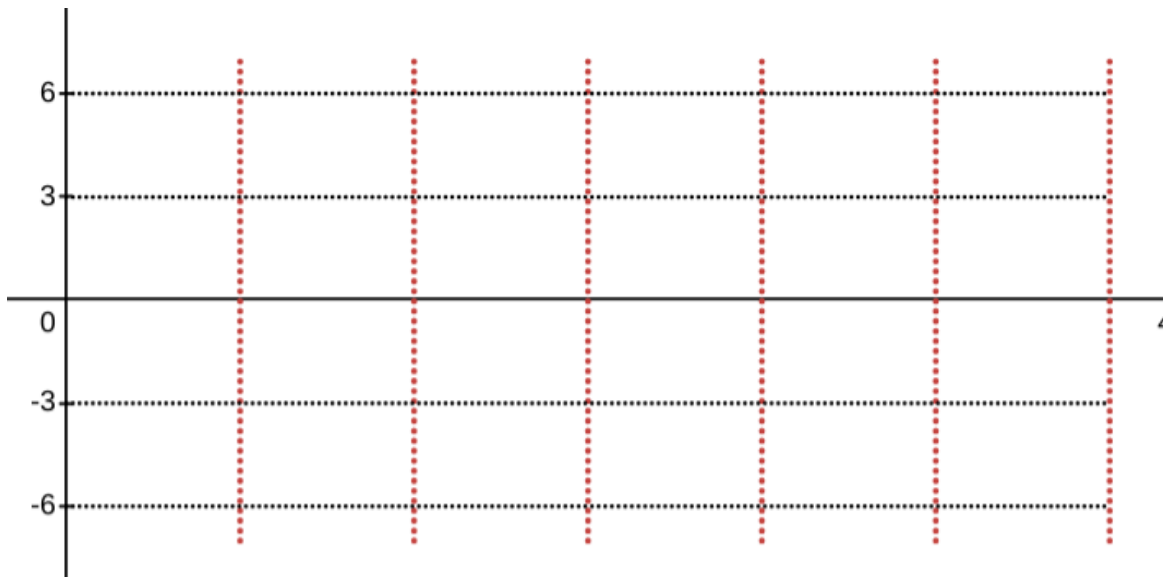
Phase Shift Keying (PSK)

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.

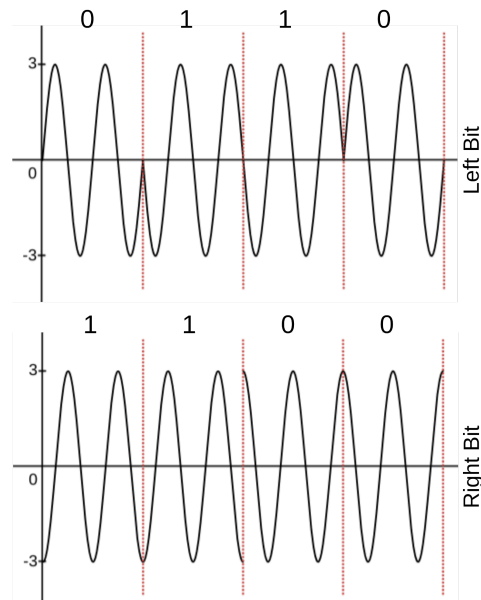


10. Draw the analog signal for the digital bit stream 010011 using Binary PSK where 0 means signal element with phase of 0 rad and 1 means signal element with phase of π rad.
[Amplitude = 3v and freq = 2 (for each signal element)]



QPSK & Constellation Diagram:

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



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

