Digital Modulation Techniques

- Digital Modulation provides more information capacity, high data security, quicker system availability with great quality communication. Hence, digital modulation techniques have a greater demand, for their capacity to convey larger amounts of data than analog modulation techniques.

1. **ASK - Amplitude Shift Keying**: This means changing the signal's height based on the input. It can be either no change (zero level) or positive and negative variations, depending on the carrier frequency.

2. **FSK - Frequency Shift Keying**: Here, the signal's pitch goes either high or low based on the input data.

3. **PSK - Phase Shift Keying**: PSK is like turning a signal's direction in a circle. Depending on the input, it can turn a little (BPSK), turn to different parts of the circle (QPSK), or turn differently based on its previous direction (DPSK).

Amplitude Shift Keying

1. **ASK - Amplitude Shift Keying**: This means changing the signal's height based on the input. It can be either no change (zero level) or positive and negative variations, depending on the carrier frequency.

- Any modulated signal has a high frequency carrier. The binary signal when ASK modulated, gives a zero value for Low input while it gives the carrier output for High input.

Amplitude Shift Keying
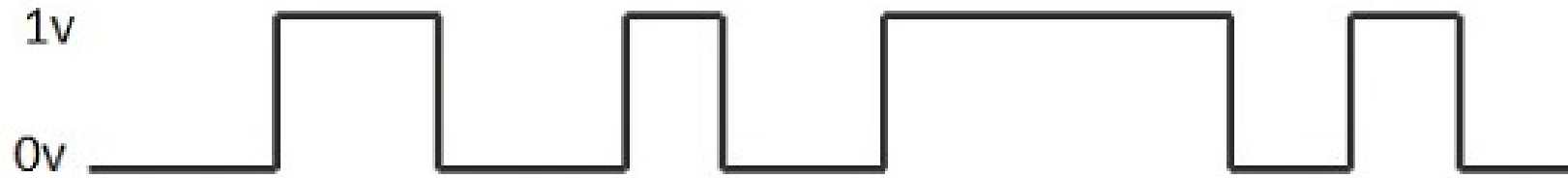
Input binary sequence
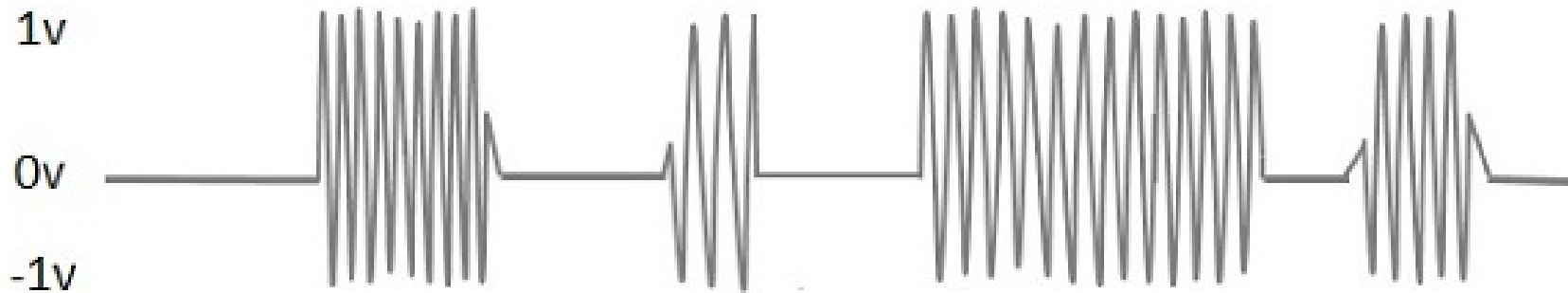
ASK Modulated output wave

Frequency Shift Keying

FSK - Frequency Shift Keying: ~~Here~~, the signal's pitch goes either high or low based on the input data.

- The output of a FSK modulated wave is high in frequency for a binary High input and is low in frequency for a binary Low input. The binary 1s and 0s are called Mark and Space frequencies.

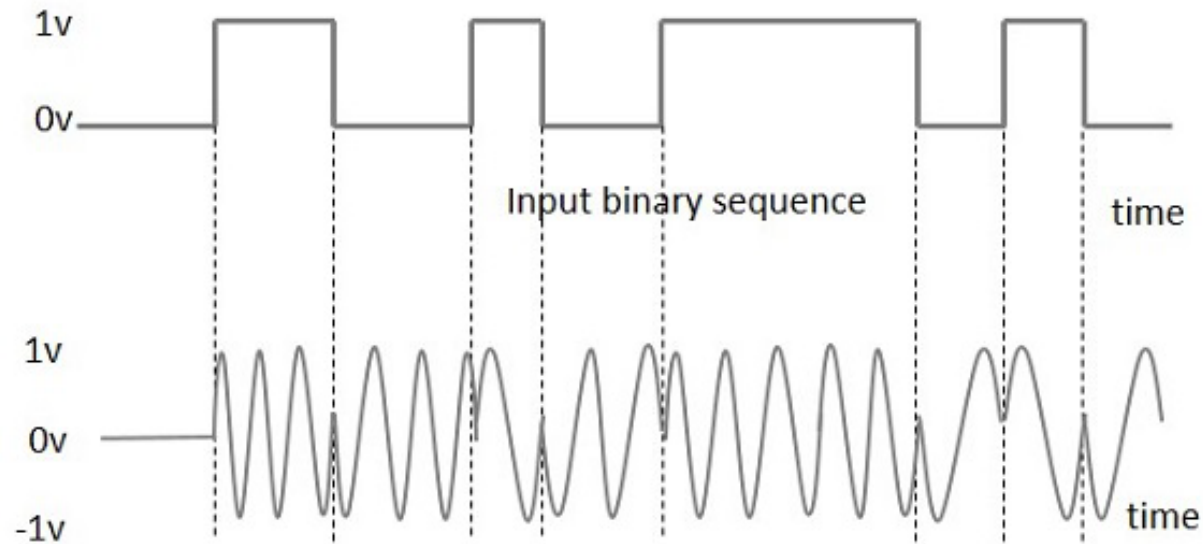# Frequency Shift Keying

Input binary sequence
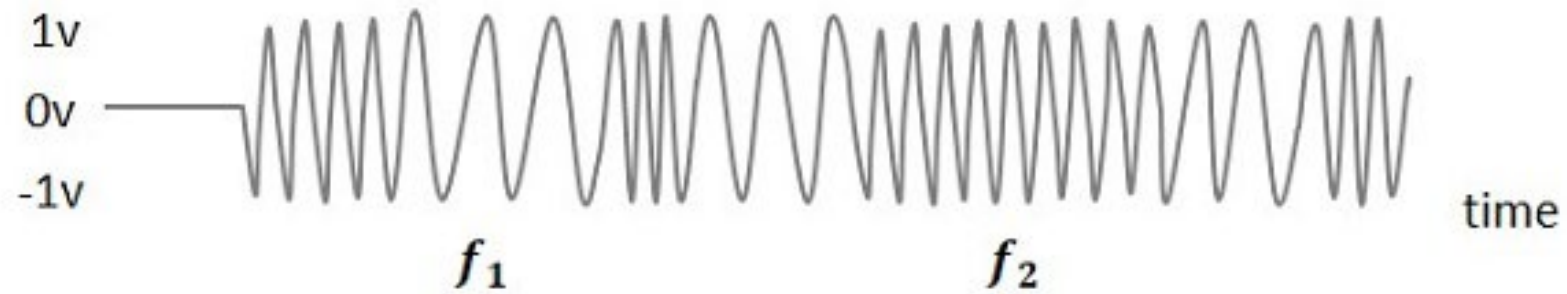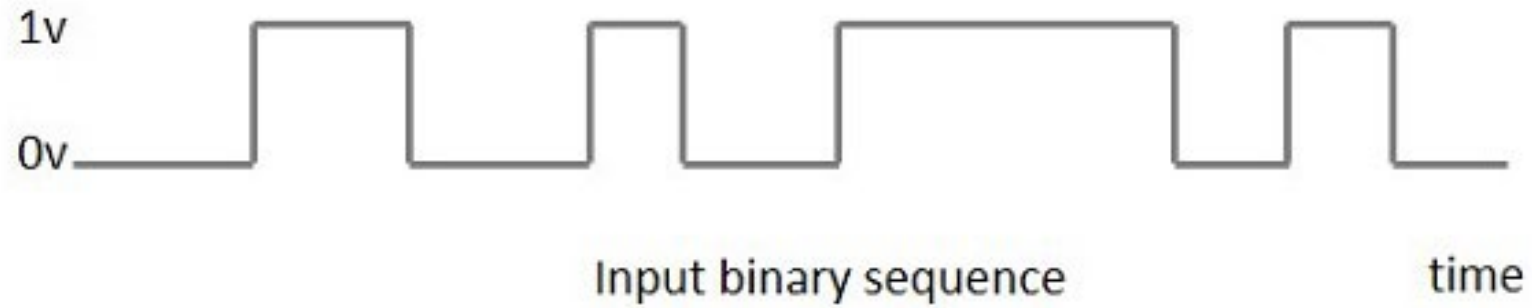
FSK Modulated output wave

Binary Phase Shift Keying

Binary Phase Shift Keying (BPSK) is a digital modulation technique that shifts the phase of a carrier signal to represent binary data, typically using 0 and 180-degree phase shifts for 0 and 1.


BPSK Modulated output wave

Quadrature Phase Shift Keying

- This is the phase shift keying technique, in which the sine wave carrier takes four phase reversals such as 0°, 90°, 180°, and 270°.

Quadrature Phase Shift Keying (QPSK) is a digital modulation method that encodes binary data by changing the phase of the carrier signal in four possible ways, allowing for two bits to be transmitted per symbol.

Quadrature Phase Shift Keying

Carrier / Channel

Modulating value from two bits

| 0 | 2 | 1 | 3 |
| (00) | (10) | (01) | (11) |

Modulated Result
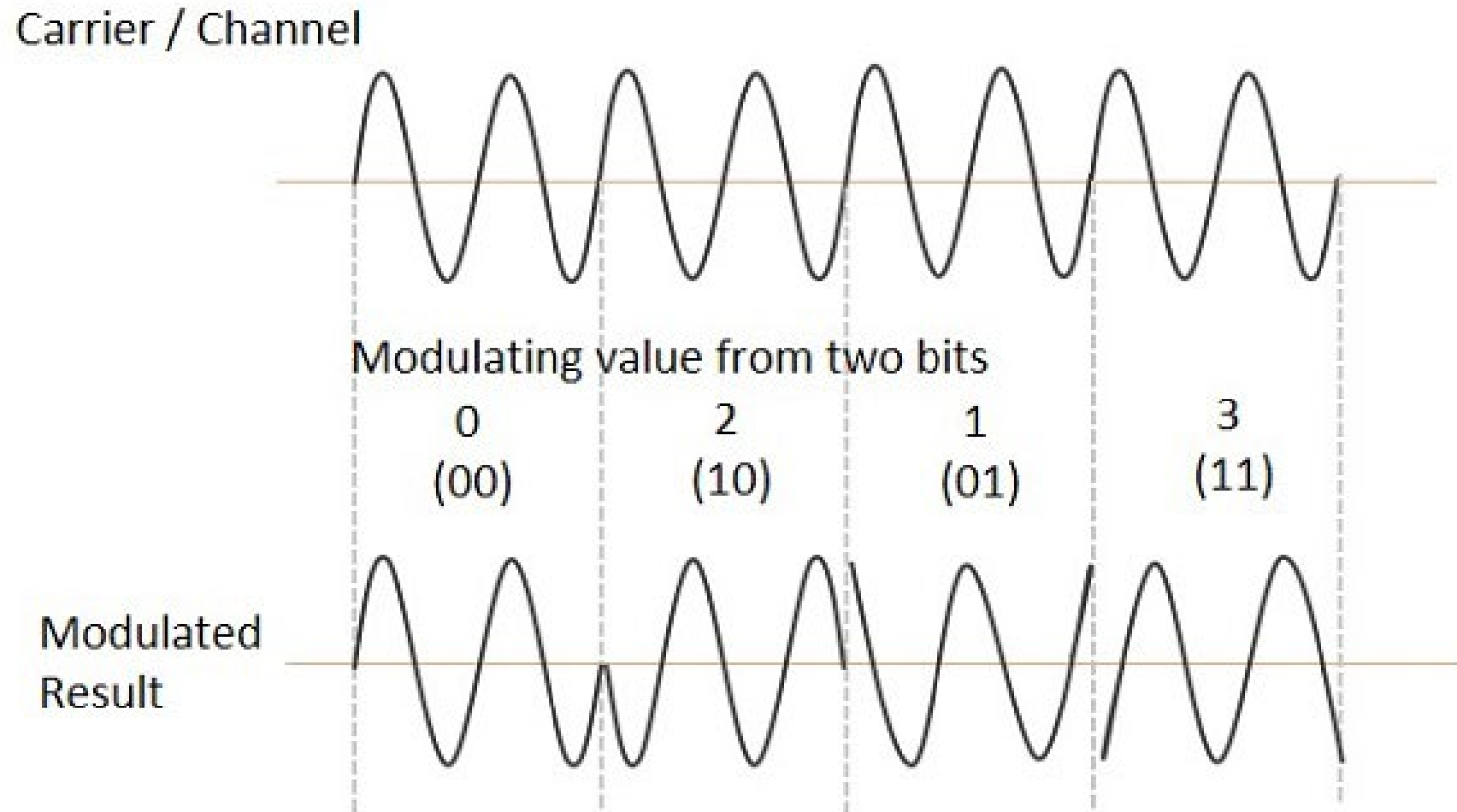
Differential   Phase Shift Keying

Differential Phase Shift Keying (DPSK) is a modulation scheme where the phase of the signal changes relative to its previous state to encode binary data.