



**PILLAI COLLEGE OF ENGINEERING**  
(Autonomous)

**A+**  
**NAAAC**

Department of Electronics and Telecommunication Engineering

# **Simulation of ASK, FSK and PSK using MATLAB**

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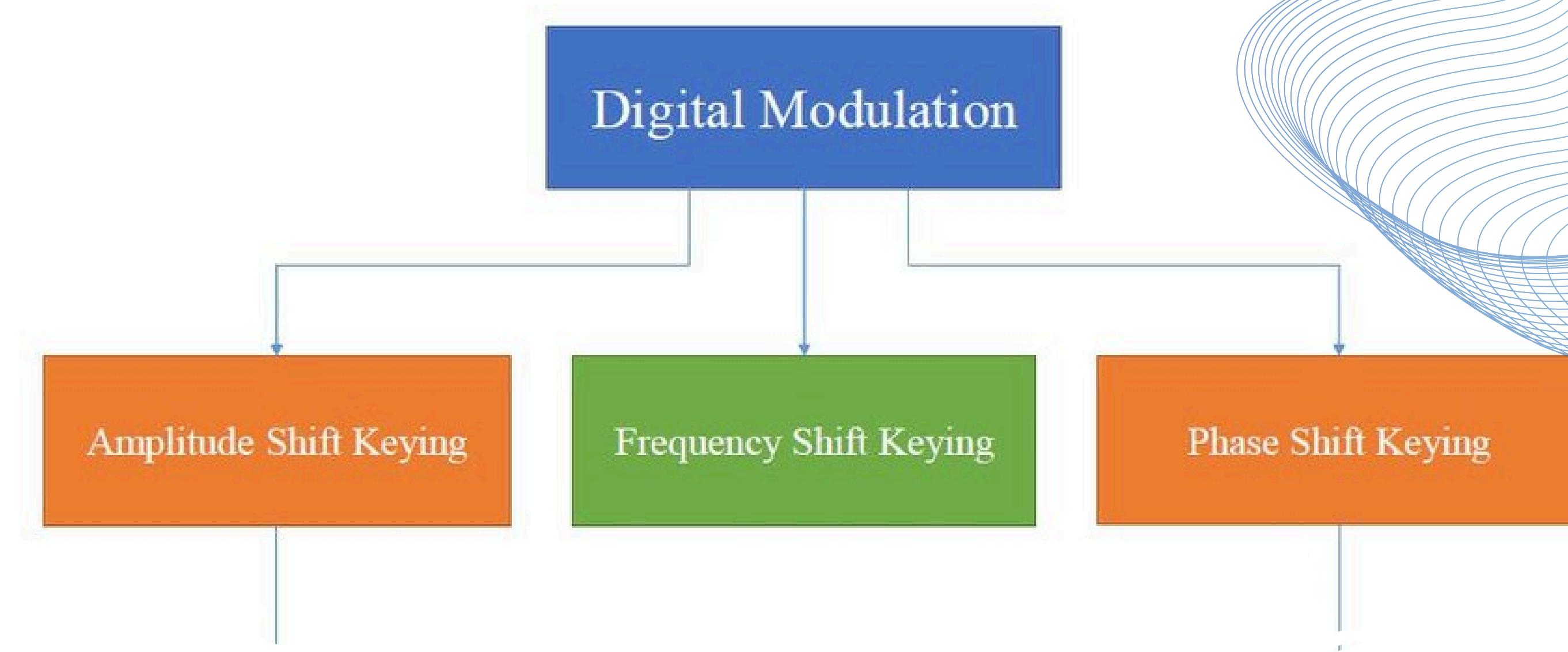
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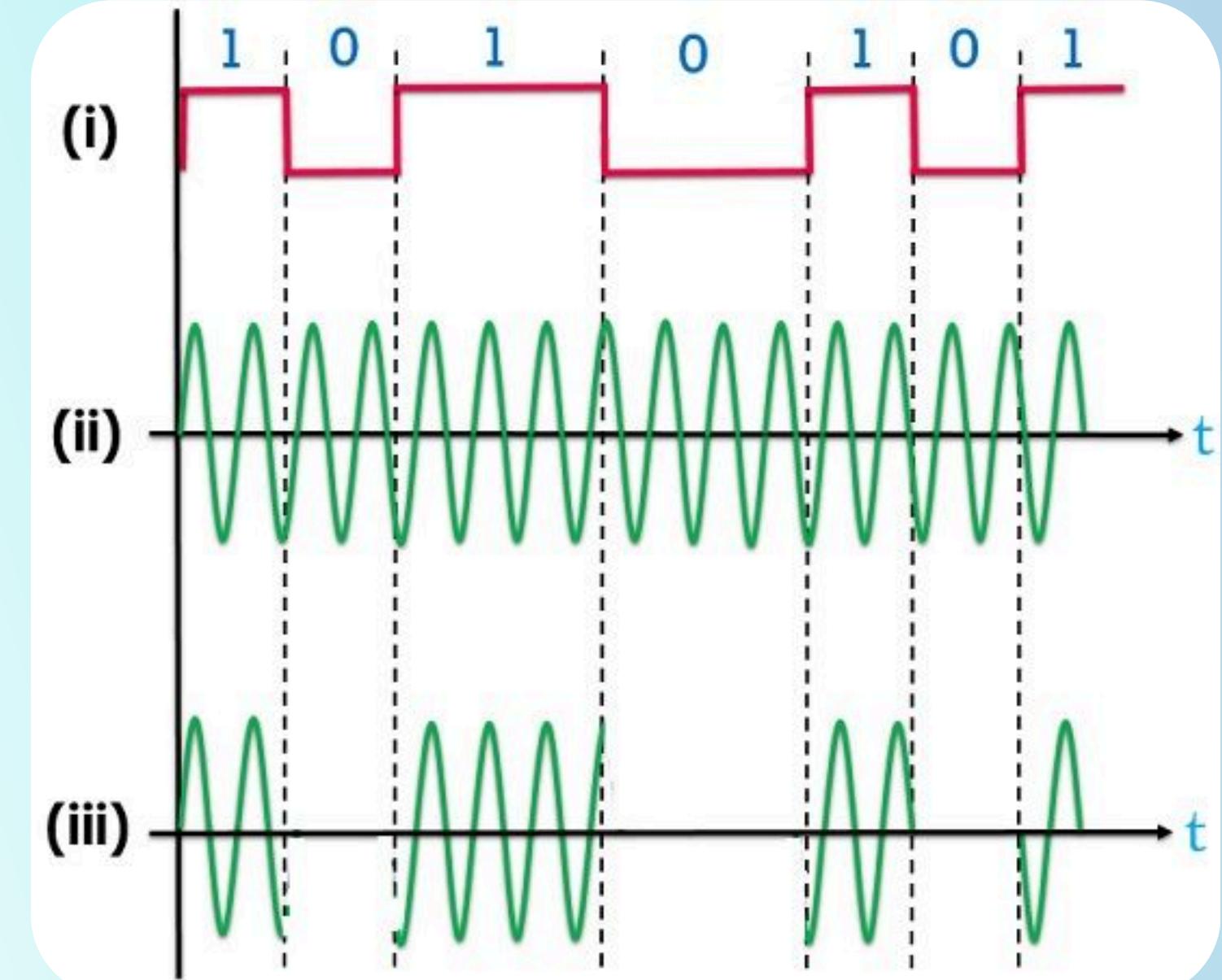
# What is Digital Modulation?

Digital modulation is the process of transmitting digital information by varying a carrier signal's amplitude, frequency, or phase.



# Amplitude Shift Keying

- The amplitude of the carrier wave changes according to the digital data.
- Frequency and phase remain constant
- Binary 1 → transmitted as high amplitude
- Binary 0 → transmitted as low (or zero) amplitude



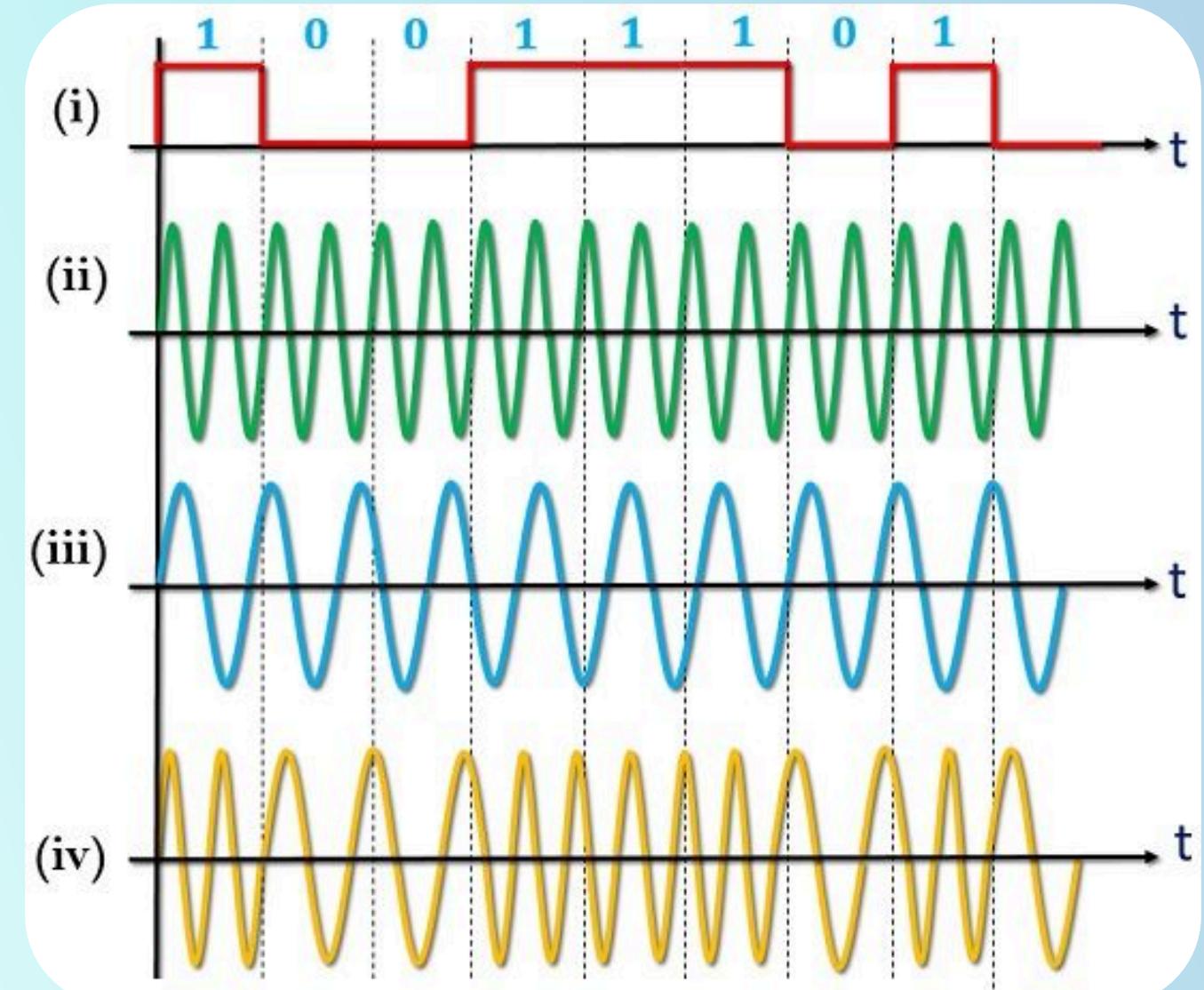
(i)digital bit sequence

(ii)carrier wave

(iii)ASK modulated wave

# Frequency Shift Keying

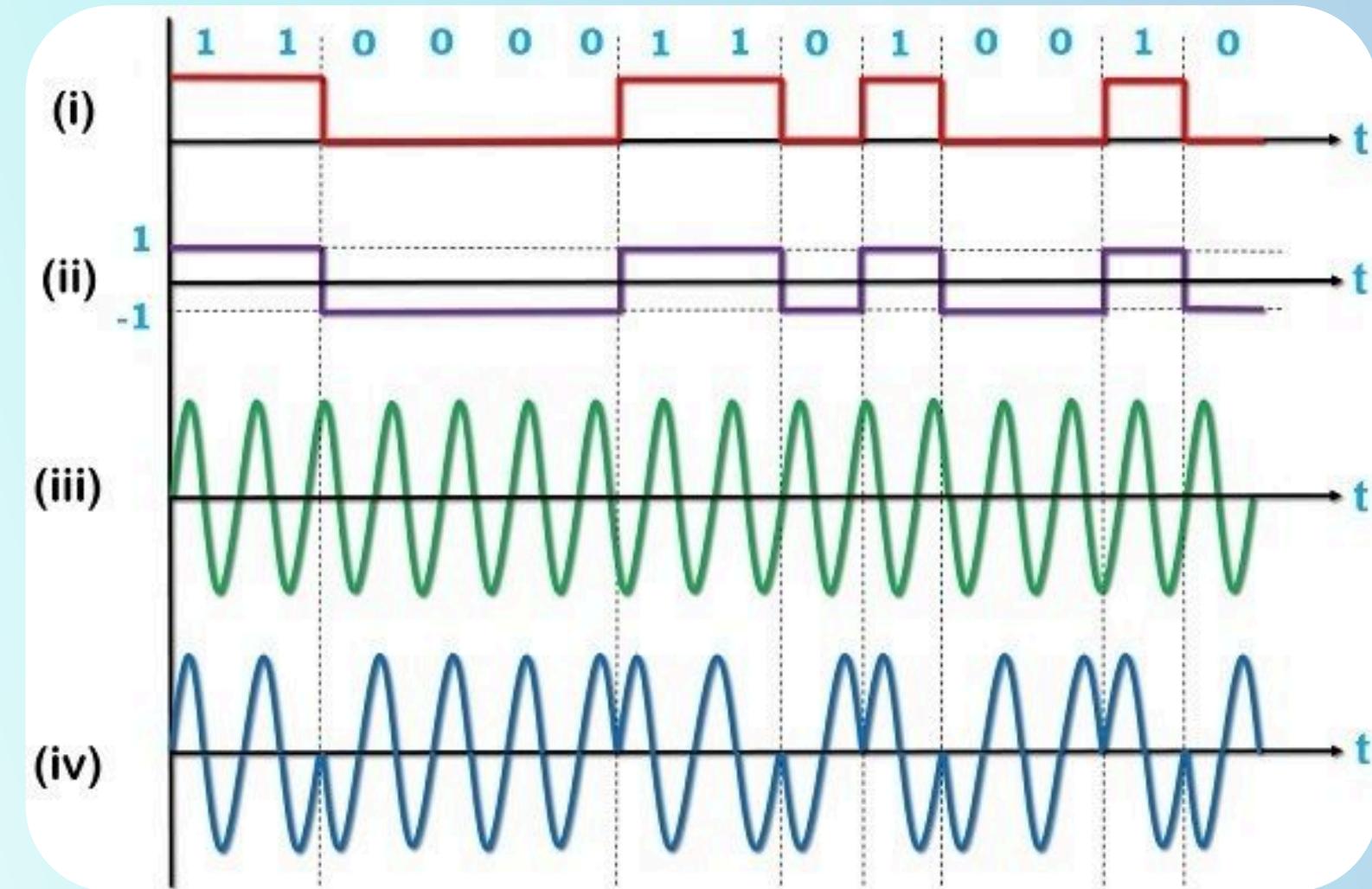
- The frequency of the carrier wave varies according to binary data
- Amplitude and phase remain constant.
- Binary 1 → transmitted at frequency  $f_1$
- Binary 0 → transmitted at frequency  $f_0$
- Two main types: Binary FSK (BFSK) and M-ary FSK



- (i) digital bitstream
- (ii) high frequency carrier wave
- (iii) low frequency carrier wave
- (iv) FSK modulated wave

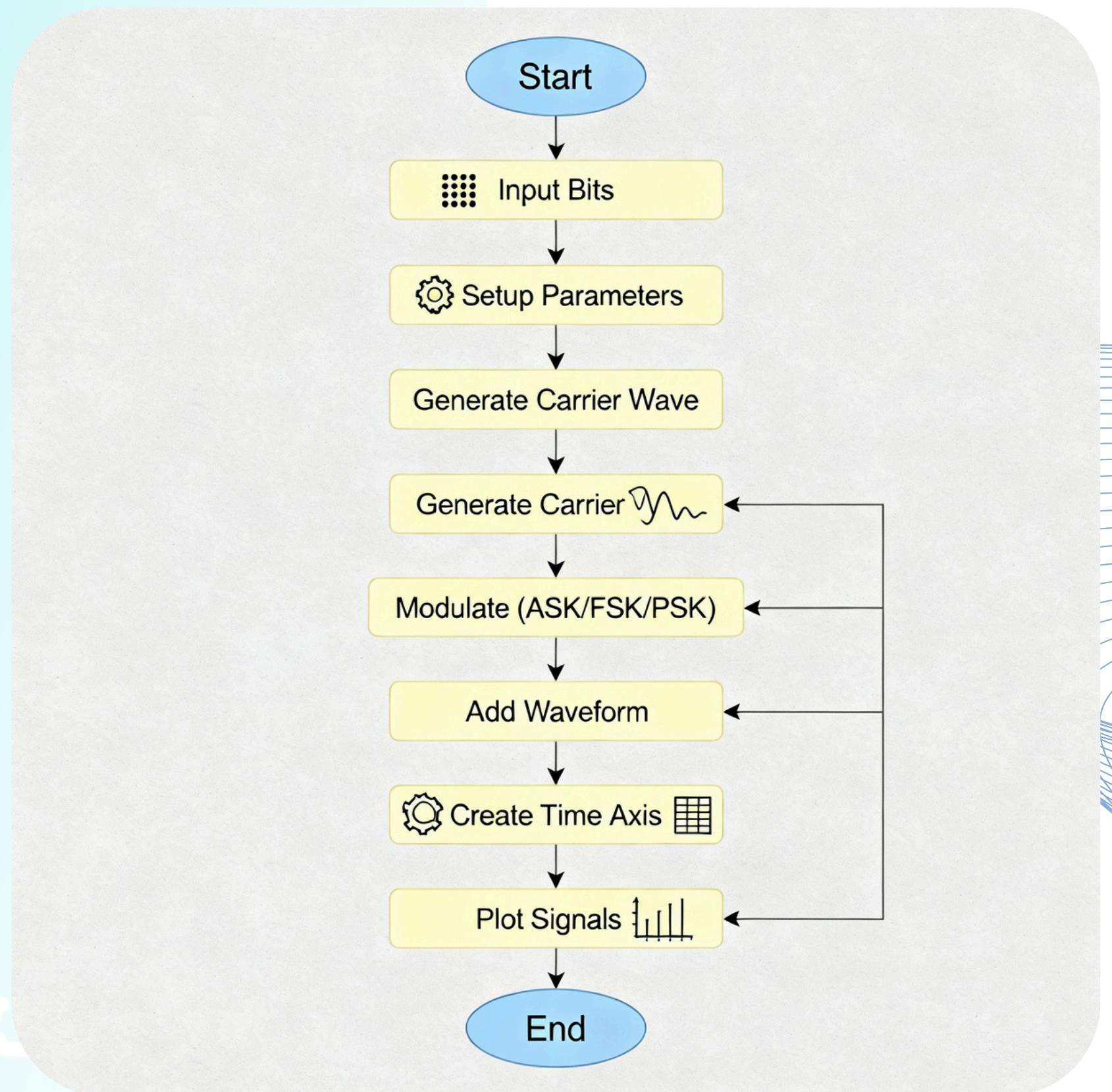
# Phase Shift Keying

- The phase of the carrier signal is changed according to digital data
- Amplitude and frequency remain constant
- Binary PSK (BPSK): two phases ( $0^\circ$  and  $180^\circ$ ) - represents bits 0 and 1
- Quadrature PSK (QPSK): four phases - transmits 2 bits per symbol.

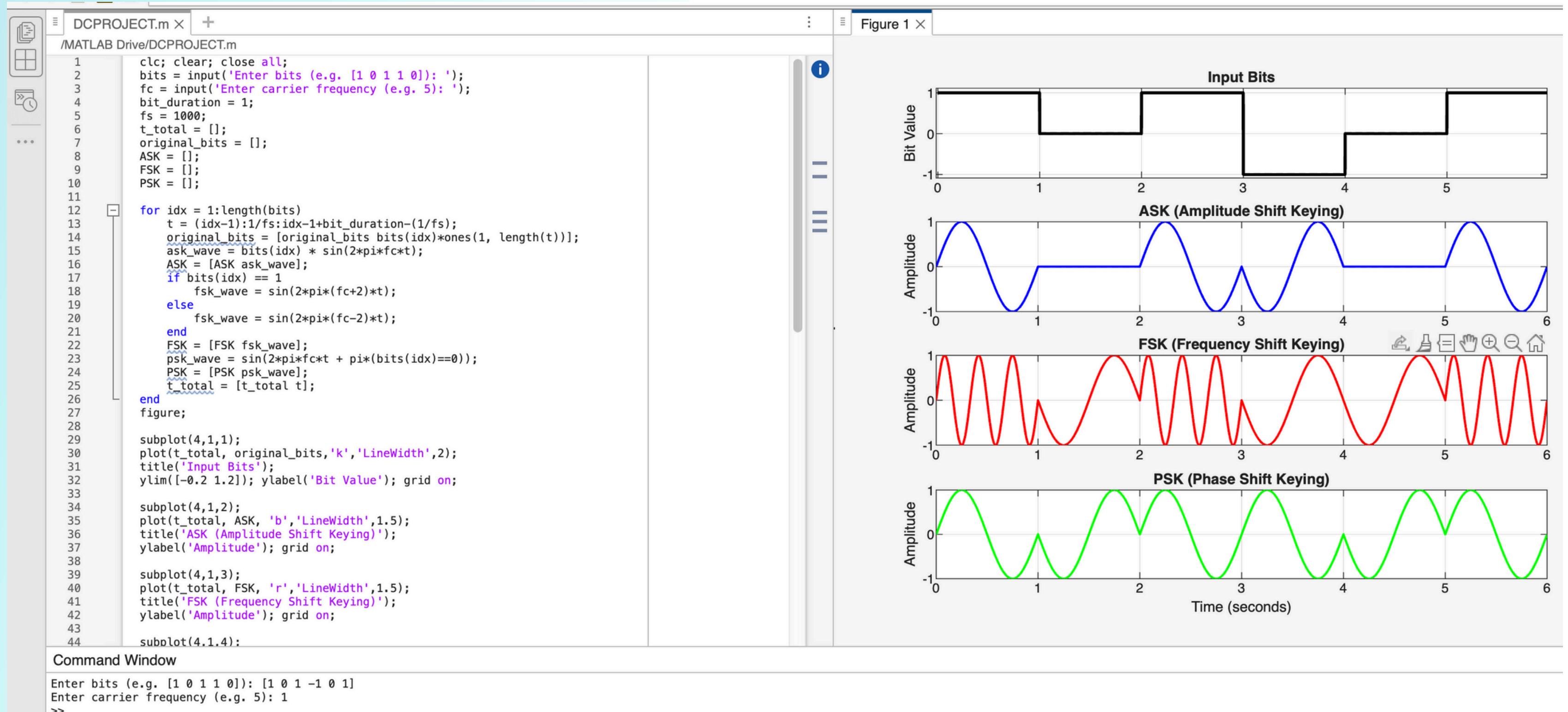


- (i) binary data sequence
- (ii) bipolar NRZ sequence
- (iii) carrier wave
- (iv) BPSK waveform

# Flowchart

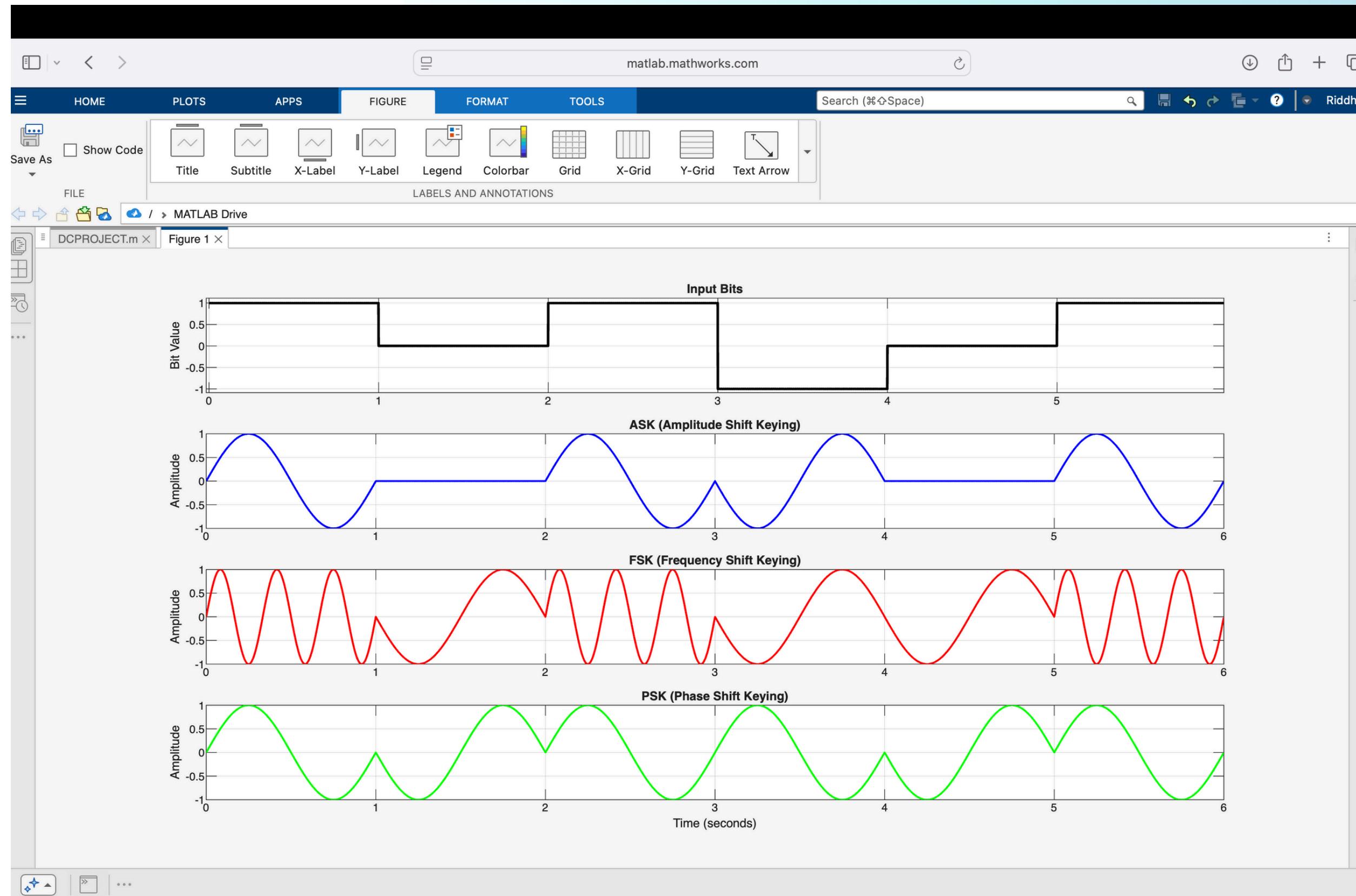


# WORKING MODEL



Source: MatLab

# OUTPUT



Source: MatLab

# ADVANTAGES

- High efficiency and reliable signal transmission.
- Easy multiplexing and integration of services.
- Robust error correction and signal regeneration.
- Immunity to noise/interference, improved security.

# **DISADVANTAGES**

- Potential data misinterpretation without nonverbal cues.
- Dependence on technology; requires stable hardware/software.
- Possible information overload and security vulnerabilities.
- Increased system complexity compared to analog

# APPLICATIONS

- Mobile and wireless communications (cellular networks, Wi-Fi, Bluetooth).
- Internet and computer networks (data transmission, networking).
- Satellite, broadcast radio/TV, remote sensing.
- Industrial automation, smart grids, and control systems



# Reference

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