Experiment-6

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AIM: To study amplitude shift keying (ASK), frequency shift keying (FSK), and phase shift keying (PSK) modulation technique and verify waveforms.

APPARATUS: MATLAB

THEORY:

1. Modulation : Modulation is a process, by which some characteristic of a carrier wave is varied in accordance with a modulating (message) signal.

Digital modulation : It is a special kind of modulation, where the message signal is digital in nature and the carrier wave is analog (sinusoidal) in nature.

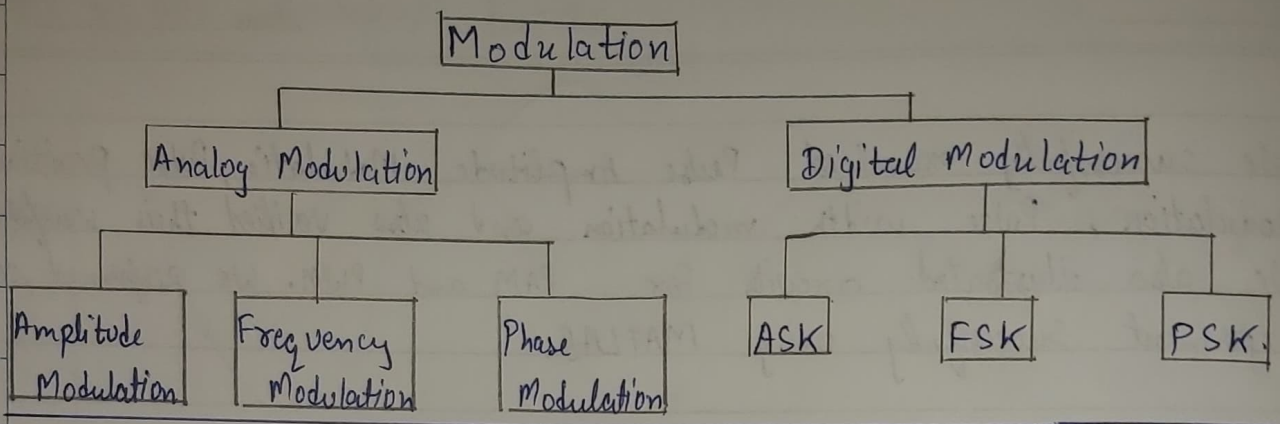
The ASK, FSK and PSK are analogous to AM, FM and PM respectively. The difference is that in digital modulation techniques (ASK, FSK and PSK) the modulation signal is digital in nature while in AM, FM and PM modulating signal is analog in nature.

2. ASK (Amplitude Shift Keying)

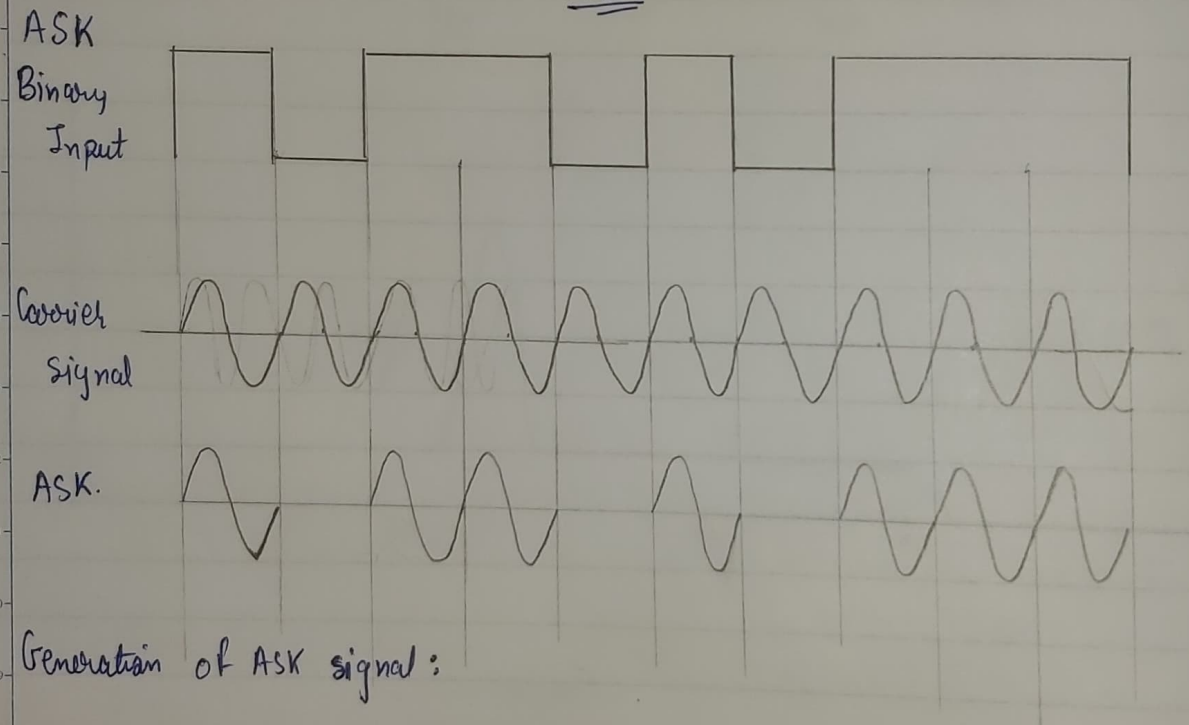
→ In ASK, the amplitude of the carrier wave is changed (switched) according to the digital input signal (modulating signal).

⇒ Application of ASK:
1. Wireless Base Station
2. Low Frequency RF Application
3. Industrial Network Devices

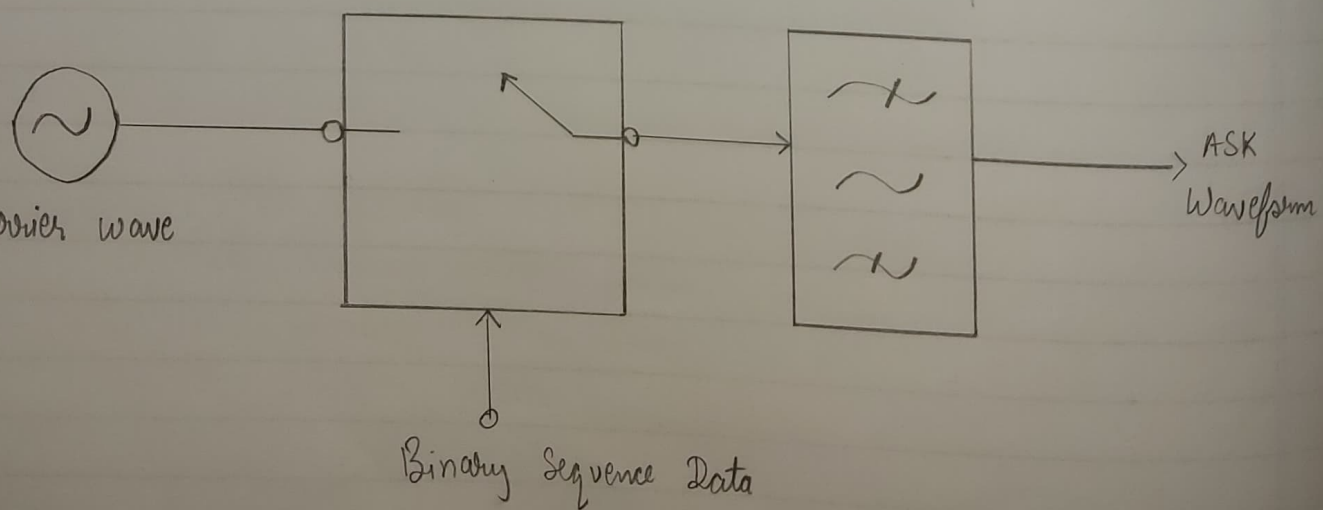
Teacher's Signature :



ASK



Generation of ASK signal:



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AIM :

3. FSK (Frequency Shift Keying)

→ If the frequency of sinusoidal carrier wave is varied (switched) depending on the digital input signal, then it is known as the frequency shift keying.

→ Application of FSK:-

1. High frequency radio transmission.

4. PSK (Phase Shift Keying)

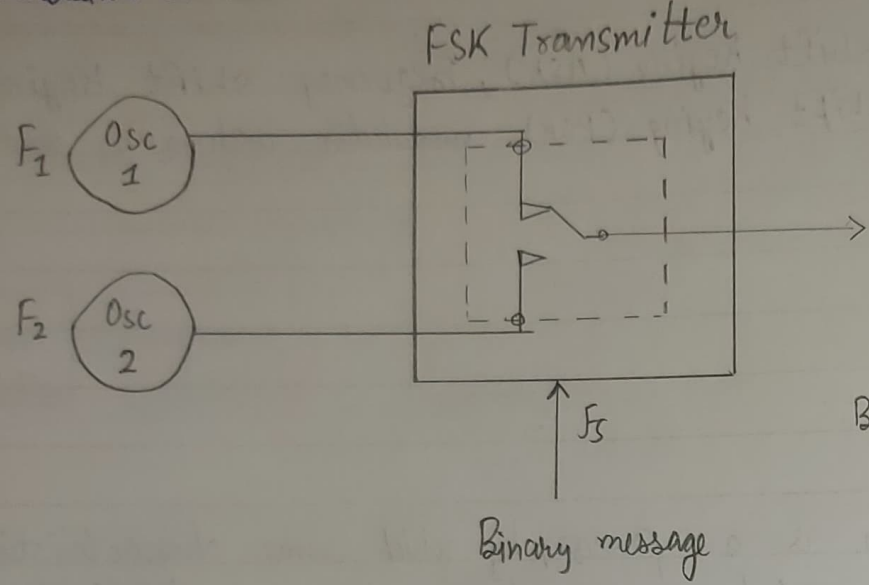
→ In PSK, phase of the carrier wave (analog in nature) is switched as per the input digital signal.

Application of PSK:

1. It is widely used to for wireless LANs, RFID and Bluetooth communication.

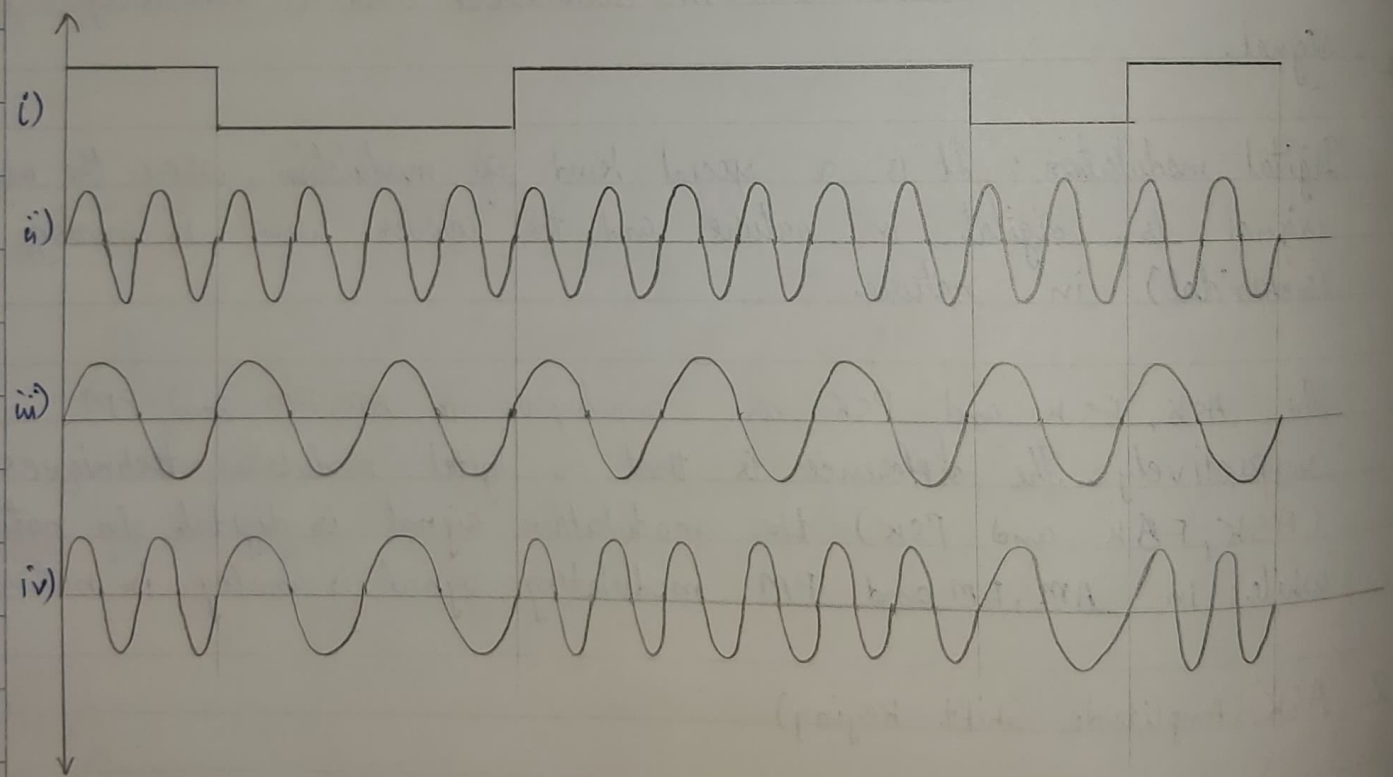
FSK

Generation of FSK :



$F_1 \cong F_2$

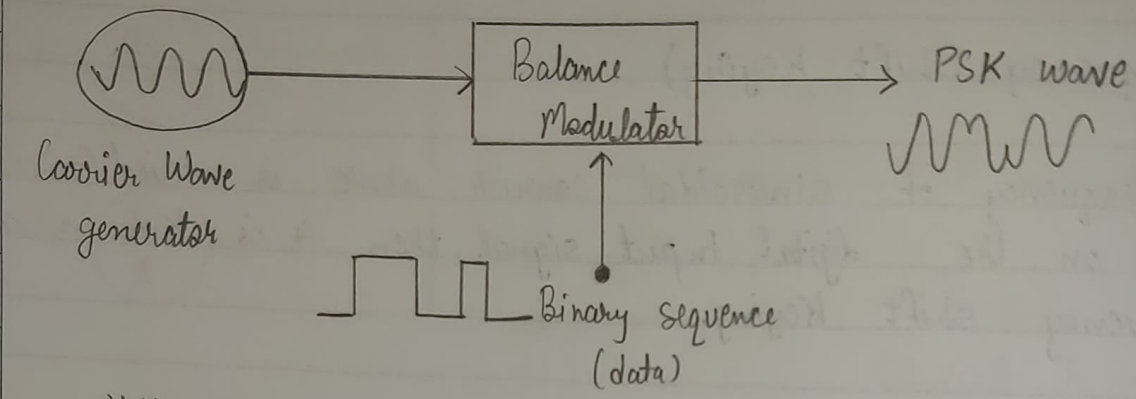
Bit rate $F_s << F_1$

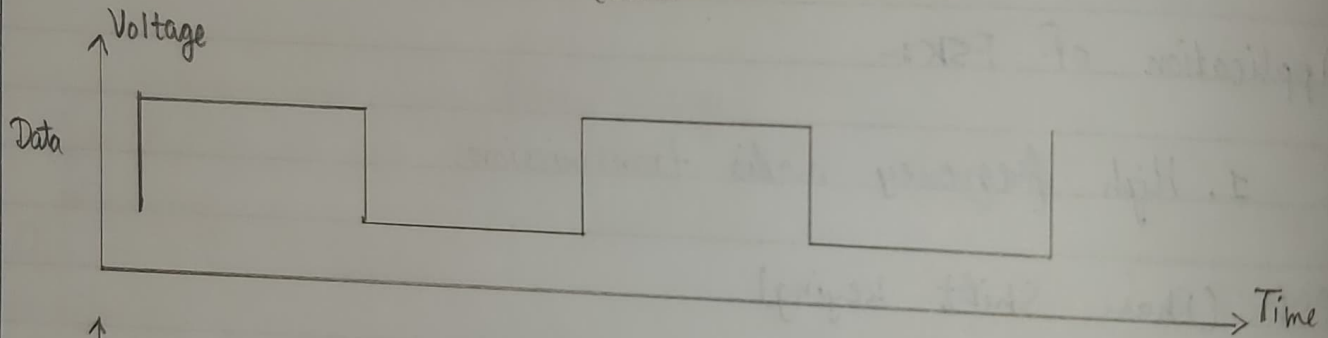


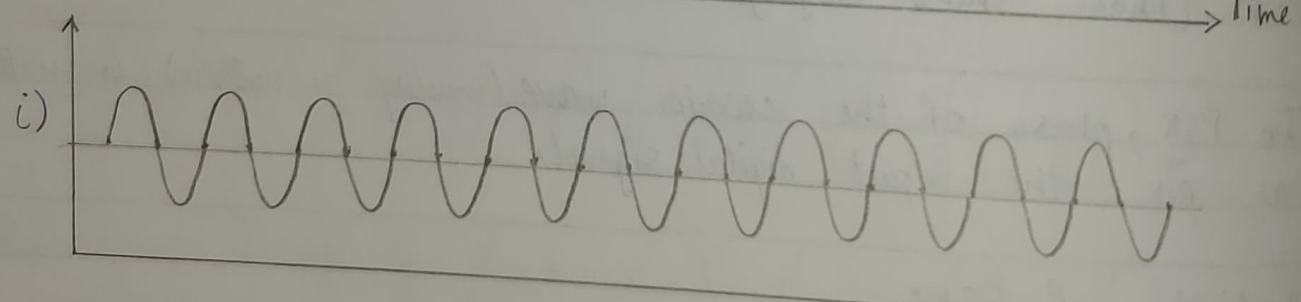
i) Digital bitstream
ii) High frequency carrier wave
iii) Low frequency carrier wave
iv) FSK modulated wave.

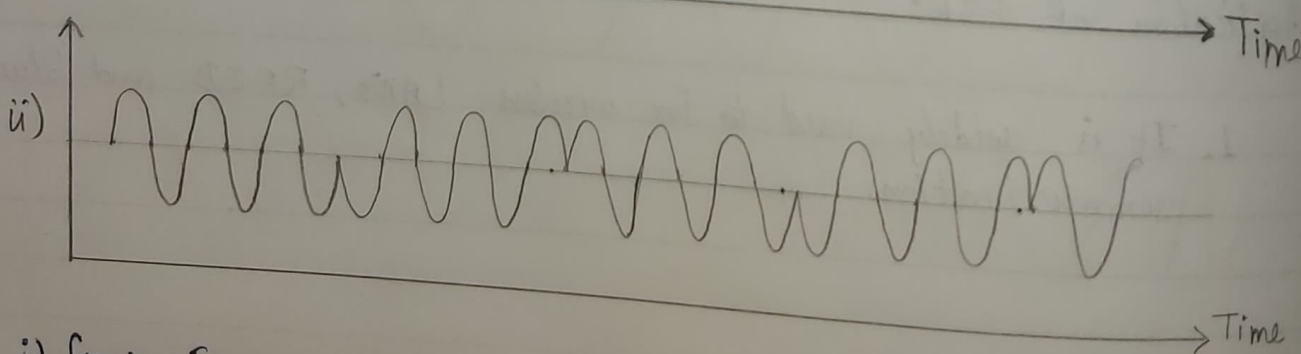
PSK

Generation of PSK







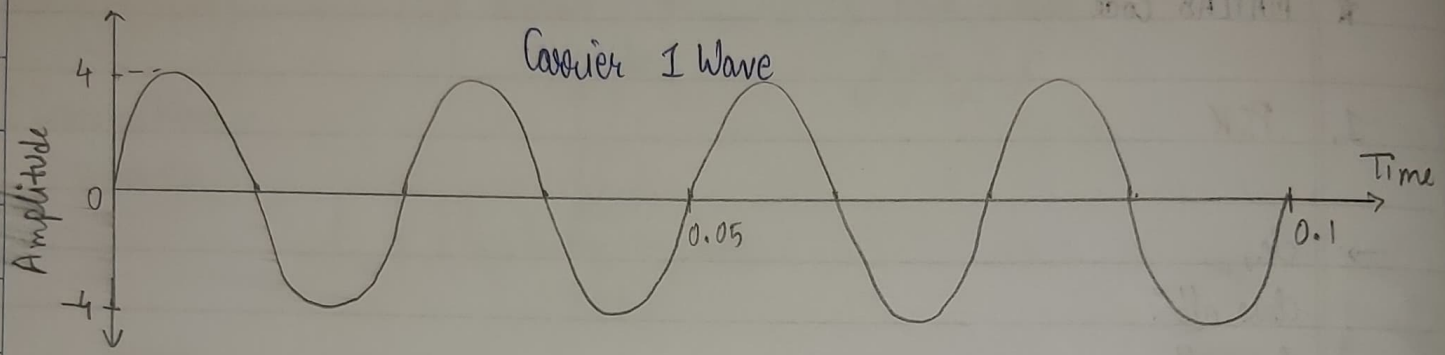


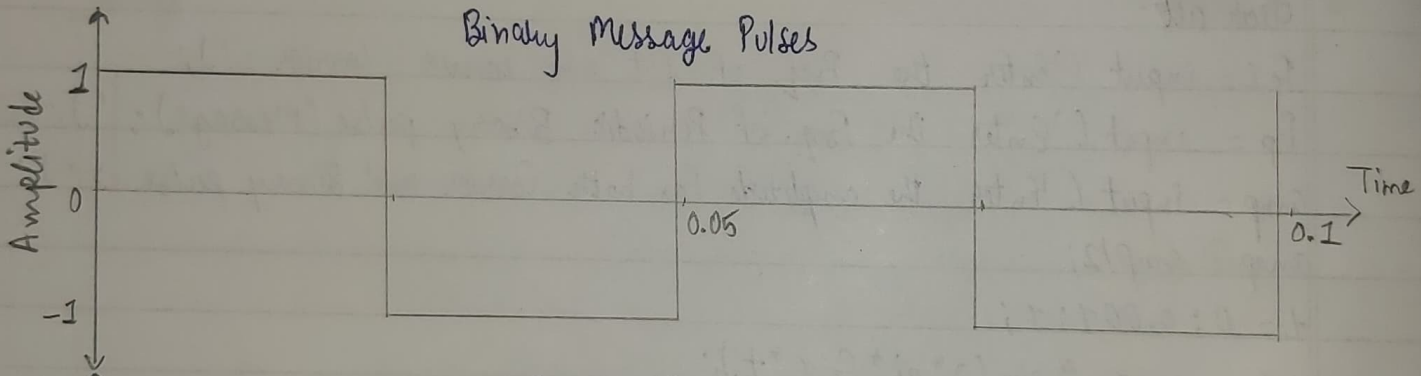
i) Carrier Frequency Before Modulation
ii) Carrier Frequency After Modulation.

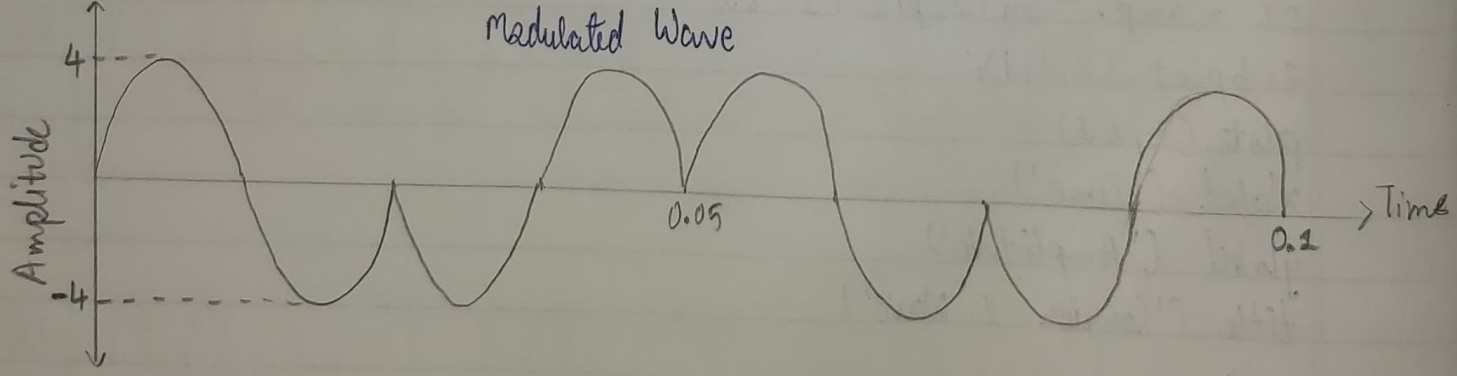
Waveforms using MATLAB

PSK

1) $F_{c1} = 40\ Hz$ $F_p = 20\ Hz$ amp = 8 V

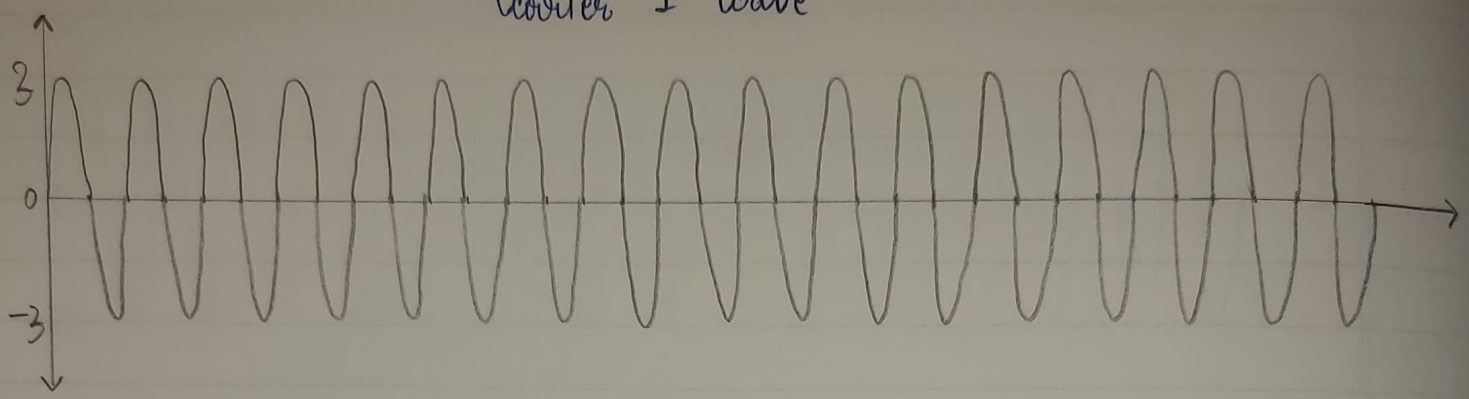




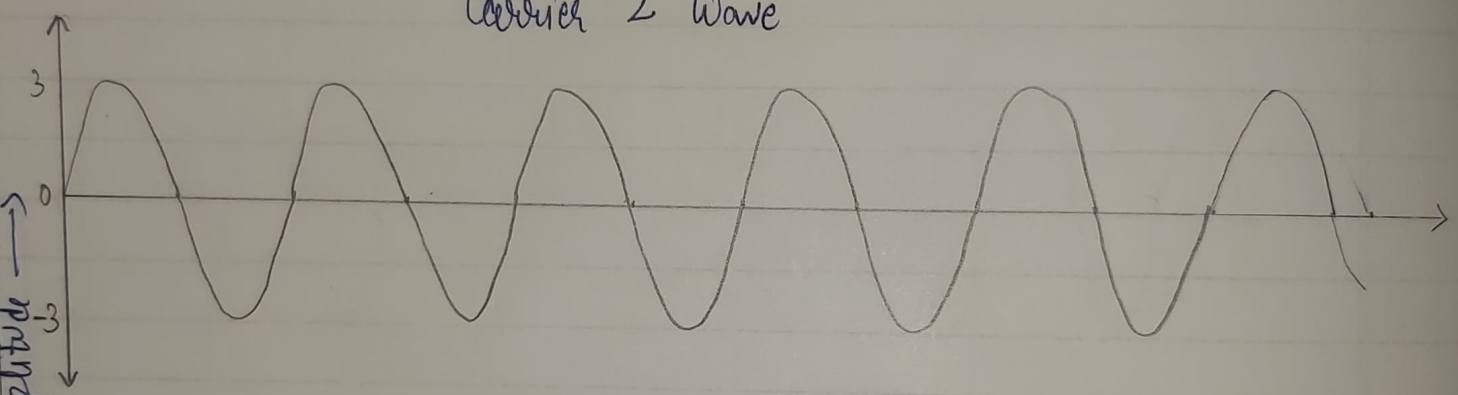


2) $F_{c1} = 30$ $F_{c2} = 10$ $F_p = 5$ amp = 6

Carrier 1 wave

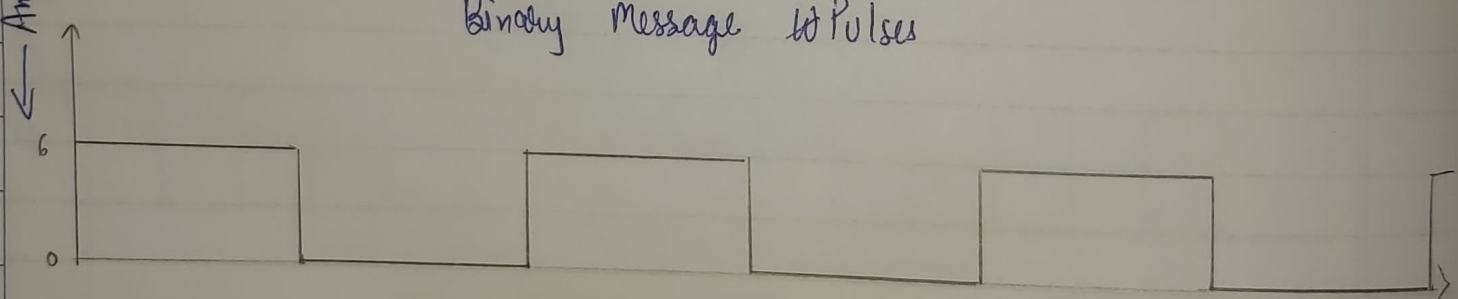


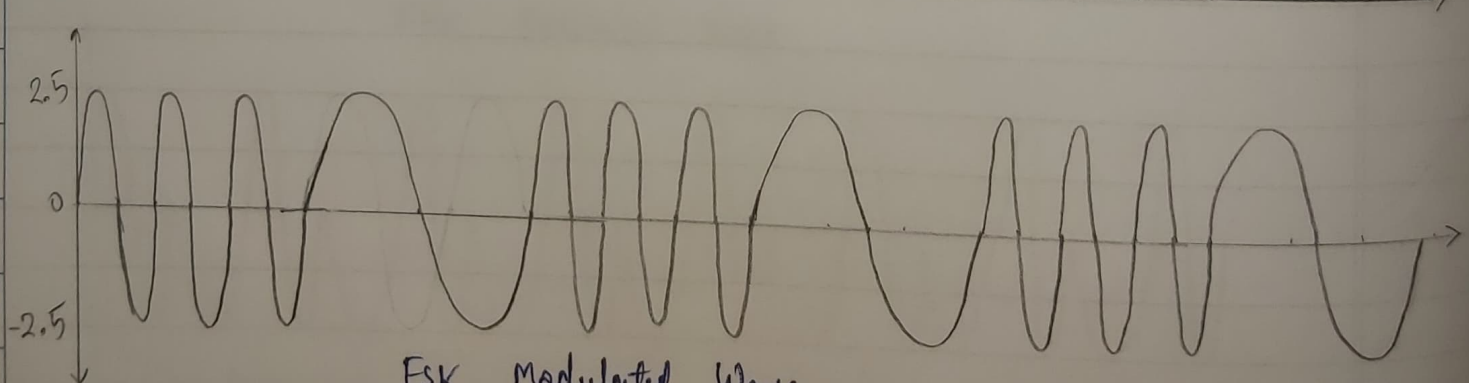
Carrier 2 Wave



← Amplitude →

Binary Message to Pulses



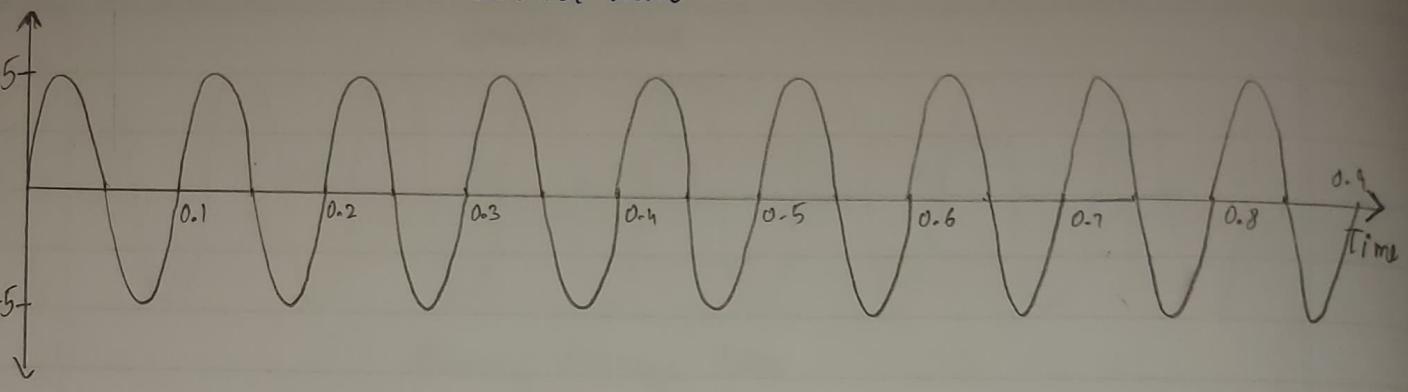


Fsk Modulated Wave.

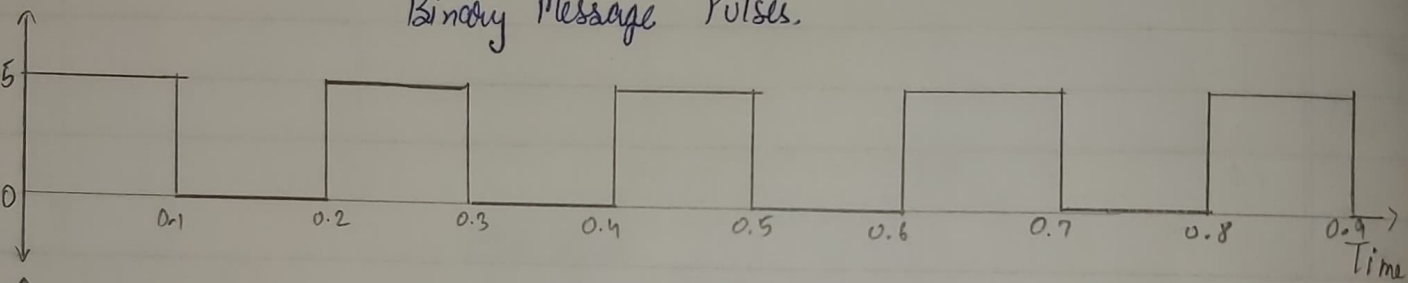
Time ⟶

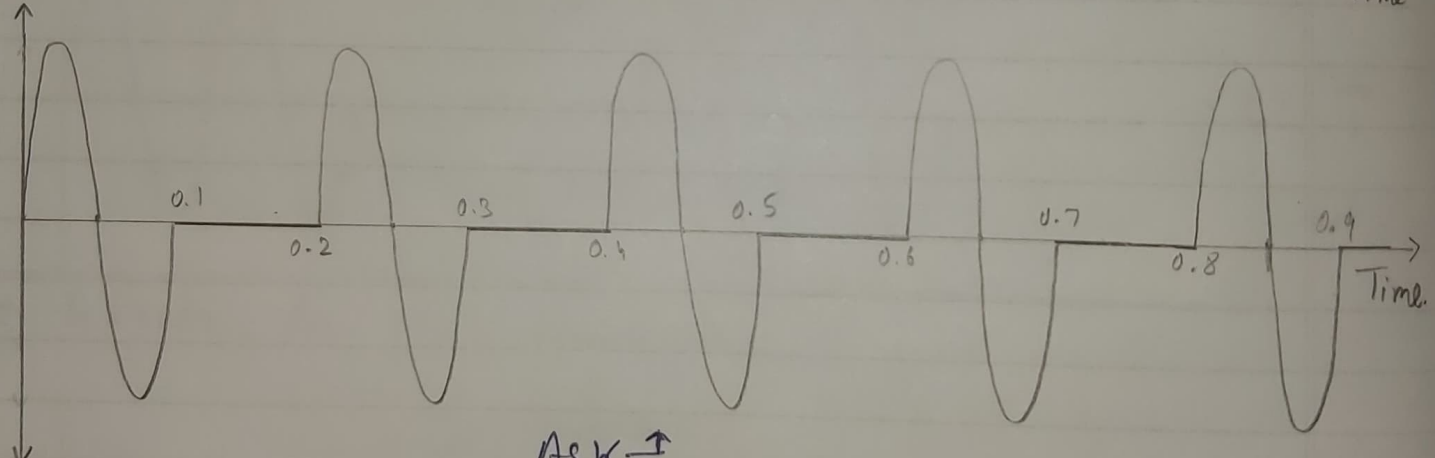
3) $f_c = 10\,Hz$ $f_p = 5\,Hz$ amp = 5

Carrier Wave



Binary Message Pulses.





ASK

Amplitude

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AIM :

CONCLUSION We successfully studied ASK, PSK and FSK modulation technique and verified their waveforms using MATLAB. We also observed the schematic diagrams for ASK, FSK and PSK.