Experiment 6

Amplitude SHIFT KEYING (ASK)
Frequency SHIFT KEYING (FSK)
PHASE SHIFT KEYING (PSK)

AIM:- To study ASK, FSK and PSK modulation techniques and verify waveforms.

Apparatus: MATLAB

Theory:

1) Modulation:- It is a process by which some characteristics 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).

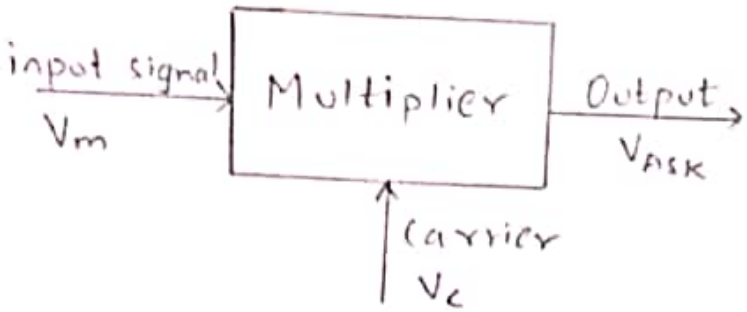
The ASK, FSK and PSK are analogues to AM, FM and PM. The difference is that it is digital and that is analog in nature.

2) ASK:- In ASK the amplitude of the carrier wave is changed acc to the digital input signal (modulating signal).

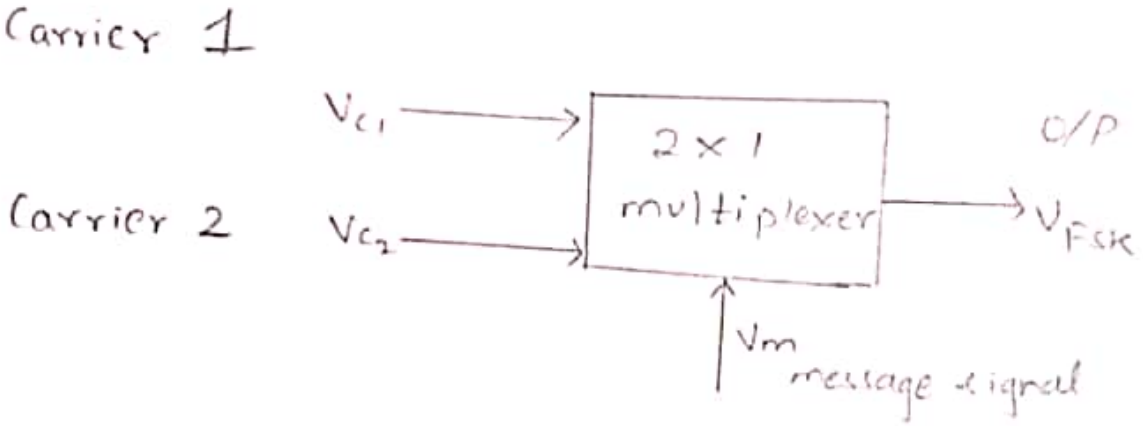
Teacher's Signature :

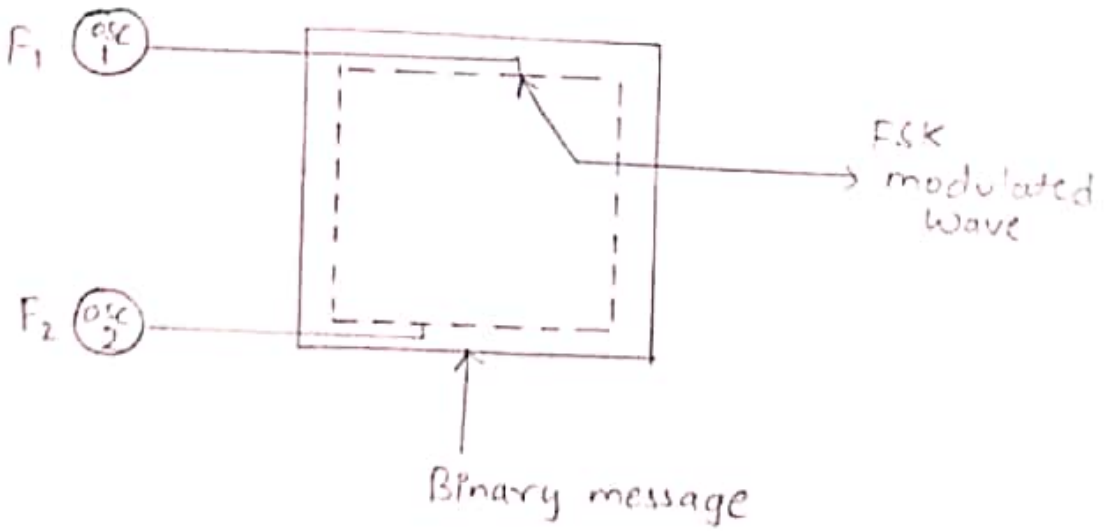
BLOCK DIAGRAM

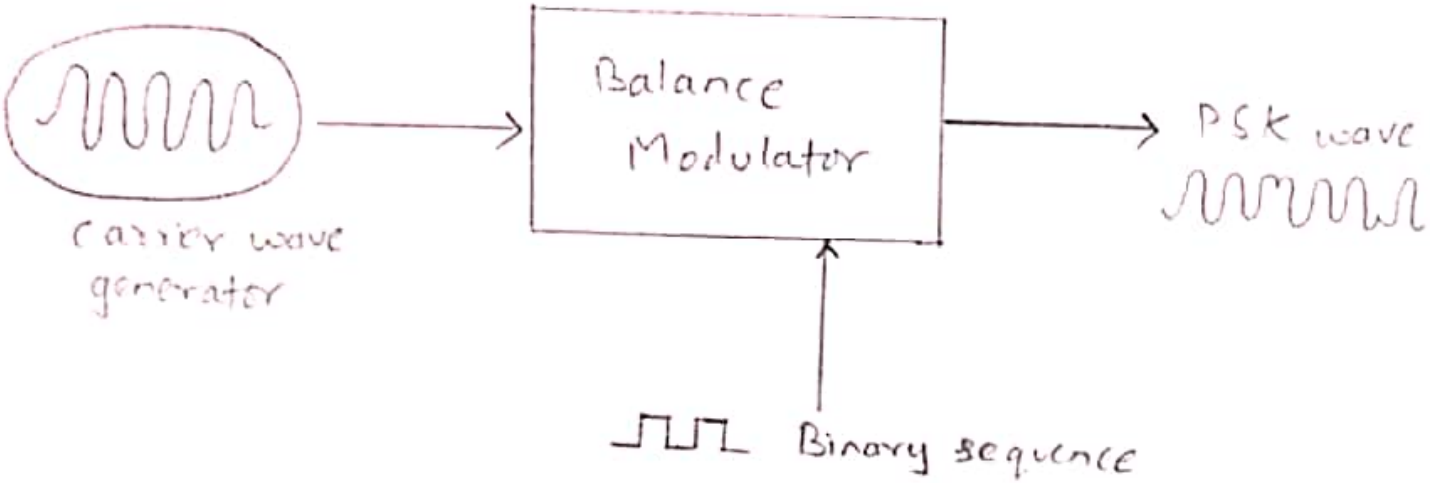
1) Block diagram of generation of ASK signal.



2) Block diagram of FSK Generator







Block diagram showing generation of PSK.

Application of ASK : 1) Wireless Base station
2) Low frequency RF applicatn
3) Industrial network Devices.

3) FSK :-
If the frequency of sinusoidal carrier wave is varied depending on the input signal, then it is known as FSK.

Application of FSK :- High frequency radio transmission

4) PSK :-
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 for wireless LAN's, RFID and bluetooth Communicatn

MATLAB CODE

```
% ASK Signal
clc; clear all; close all;
fc = input ('Enter the freq of sine wave carrier');
fp = input ('Enter the frequency of periodic binary pulse');
amp = input ('Enter the amplitude (for carrier & Binary)');
t = 0: 0.0001 : 1;
c = amp * sin (2*π*fc*t);
```

Teacher's Signature :

```
c = amp * sin (2*pi*fc*t);
subplot (3,1,1)
plot (t, c);
x label ('Time');
Y label ('Amplitude');
title ('Carrier wave');

m = amp/2 x square (2*Pi* fp *t) + (amp/2);
Subplot (3,1,2);
Plot (t, m);
x label ('Time');
Y label ('Amplitude');
title ('Binary message pulse');
   w = c x m;
   subplot (3,1,3);
   plot (t, w);
  x label ('time');
  Y label ('Amplitude');
  title ('Amplitude Shift keyed signal');

% FSK Signal
 clc; clear all; close all;
 fc1 = input ('Enter the frequency of 1st sine
                              wave carrier');
fc2 = input('Enter the frq of 2nd sine wave carrier');
fp = input('Enter the frq of periodic binary pulse')
amp = input('Enter the amplitude (For both carrier
                    and binary pulse message');
```

Teacher's Signature :

1)

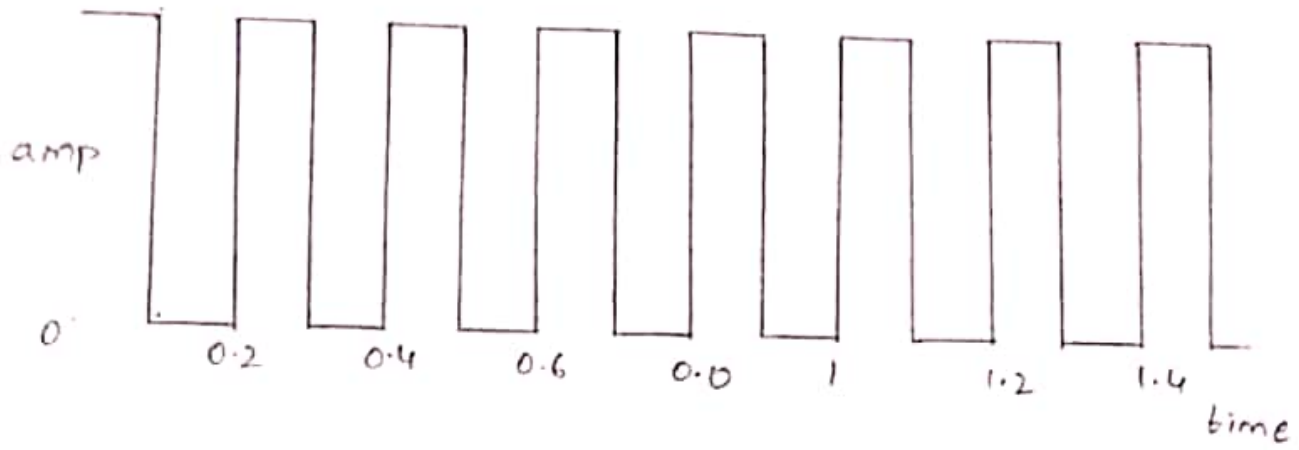
ASK

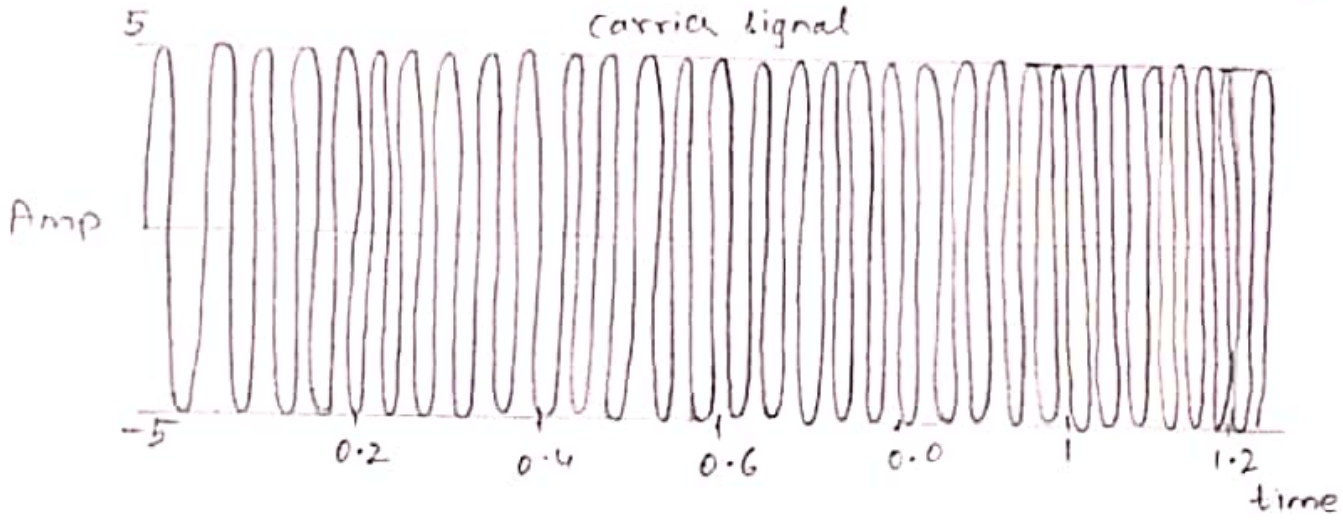
$f_c = 20Hz$

$f_b = 5Hz$

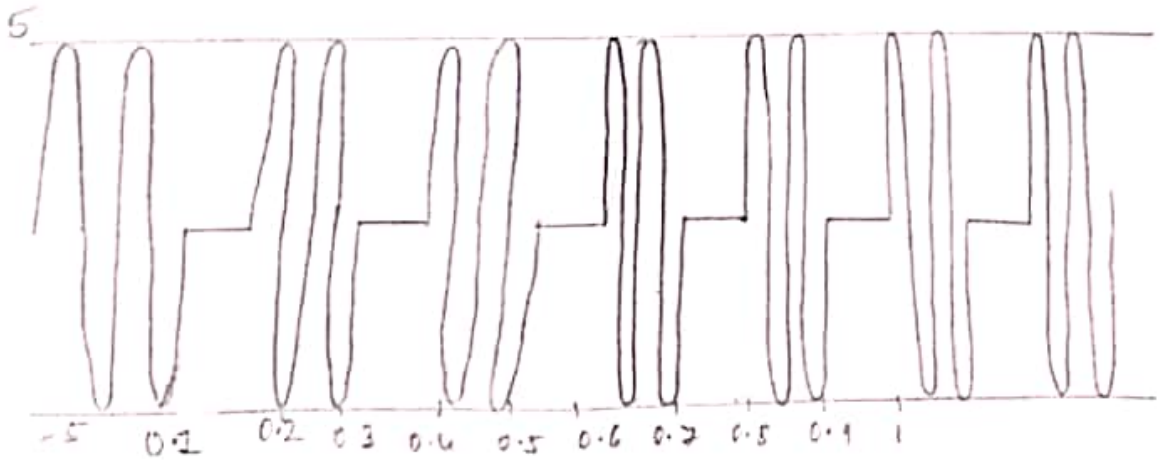
amp = 5

message signal





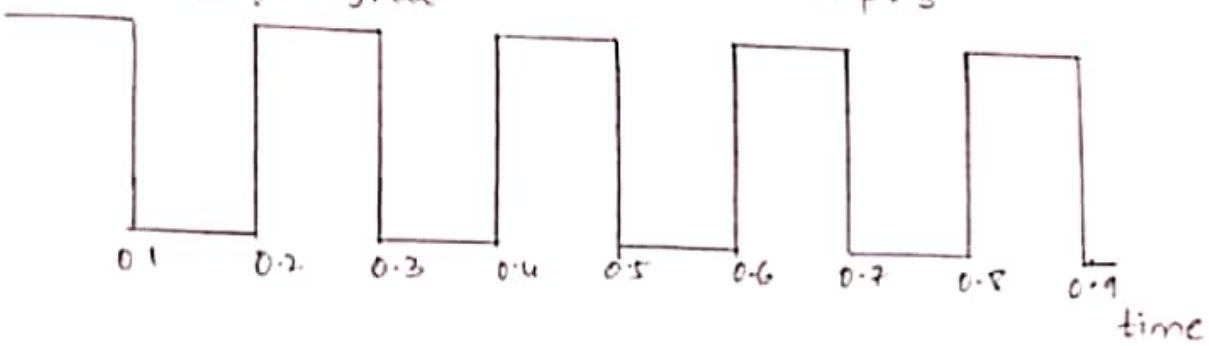
Amplitude shift keying signal



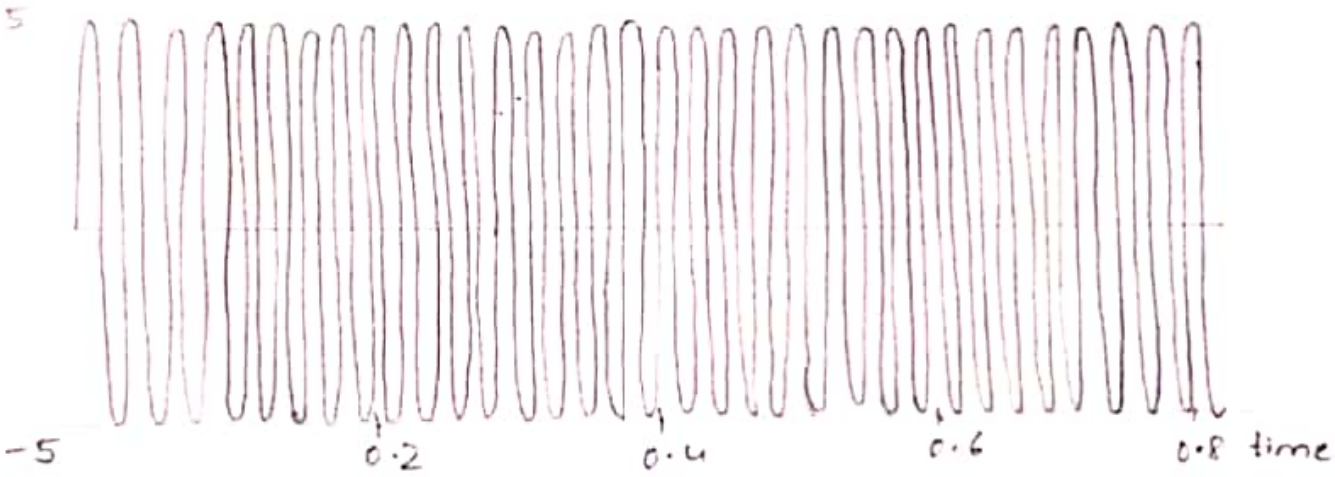
2) ASK

Fc = 45Hz
Fp = 5Hz
amp = 5

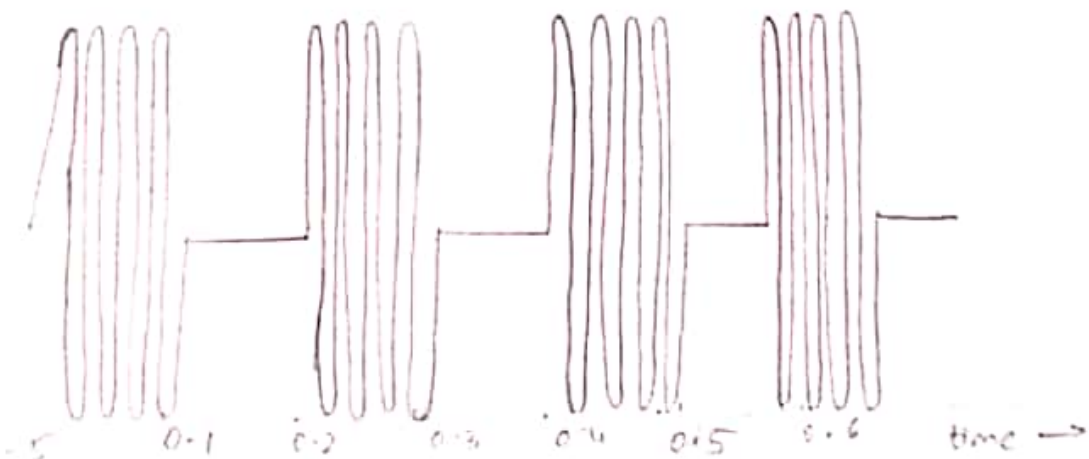
Message Signal



Carrier Signal



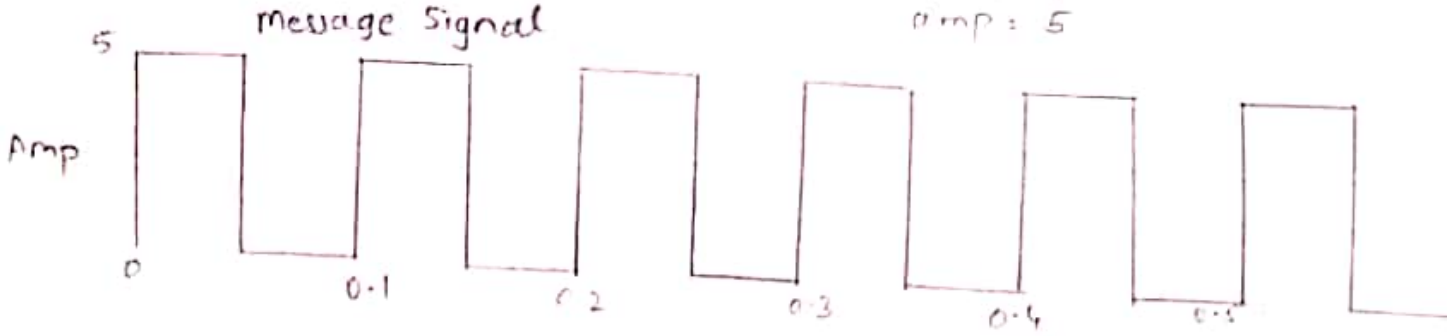
Amplitude shift keying signal



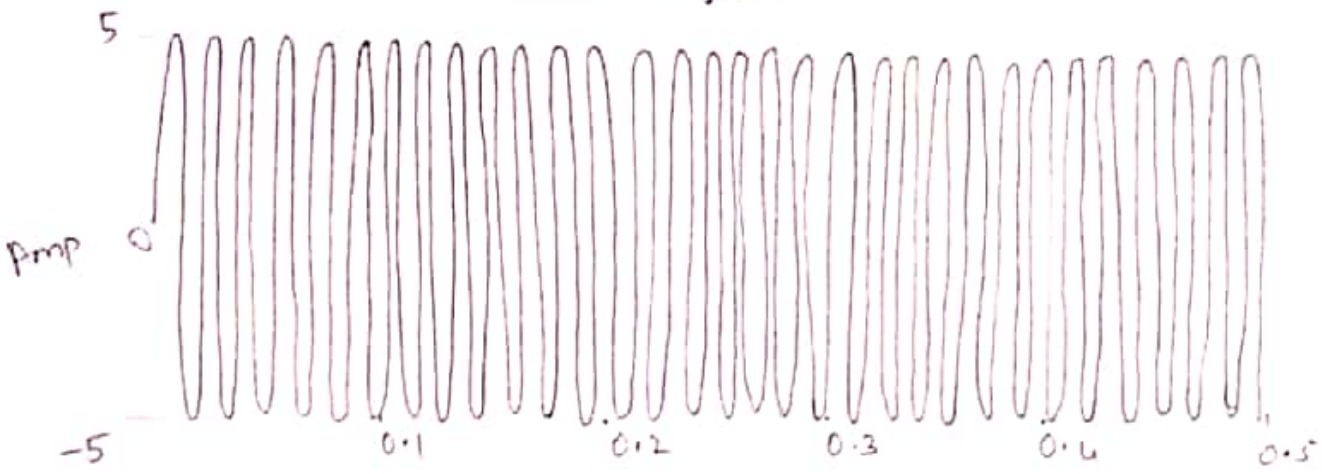
3) ASK

$f_c = 50Hz$
$f_p = 10Hz$
Amp = 5

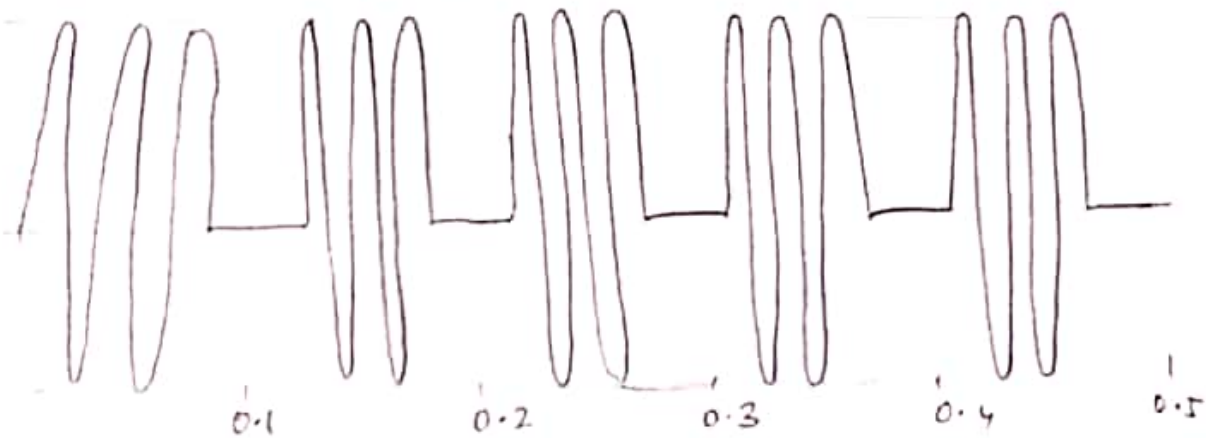
Message Signal



Carrier signal



Amplitude shift keying signal

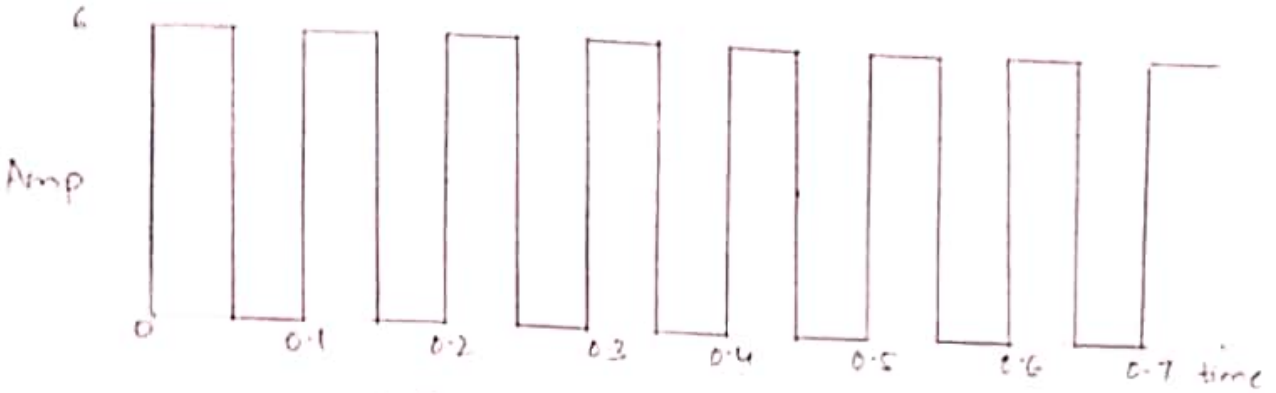


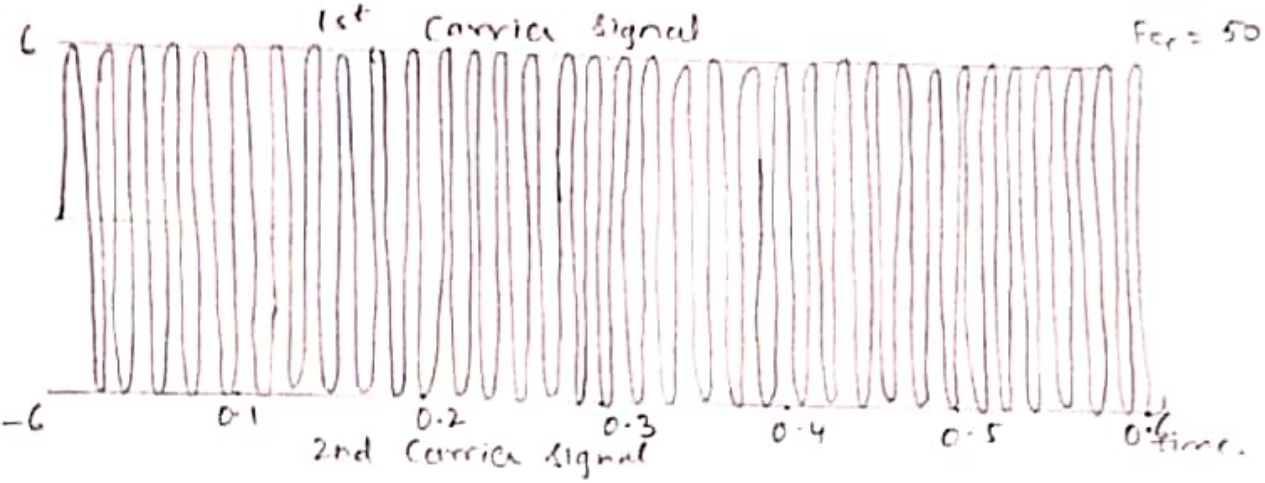
```
amp = amp/2
t = 0:0.001:1;
c1 = amp x sin(2xPix fc1xt);
c2 = amp x sin(2xPix fc2xt);
subplot(4,1,1);
Plot(t, c1);
Xlabel('time'); Y label('Amplitude');
title('carrier wave 1');
subplot(4,1,2);
plot(t,c2);
x label('Time'); Y label('Amplitude');
title('carrier 2 wave');
m = amp x square(2xPixfpxt) + amp;
subplot(4,1,3);
plot(t,m);
x label('time'); Y label('Amplitude);
title('Binary message pulse');
  for i=0:1000
      if m(i+1) == 0
          mm(i+1) = c2(i+1);
      else
          mm(i+1) = c1(i+1);
      end
  end
subplot(4,1,4);
plot(t, mm)
x label('Time'); Y label('Amplitude');
Title('modulated wave');
```

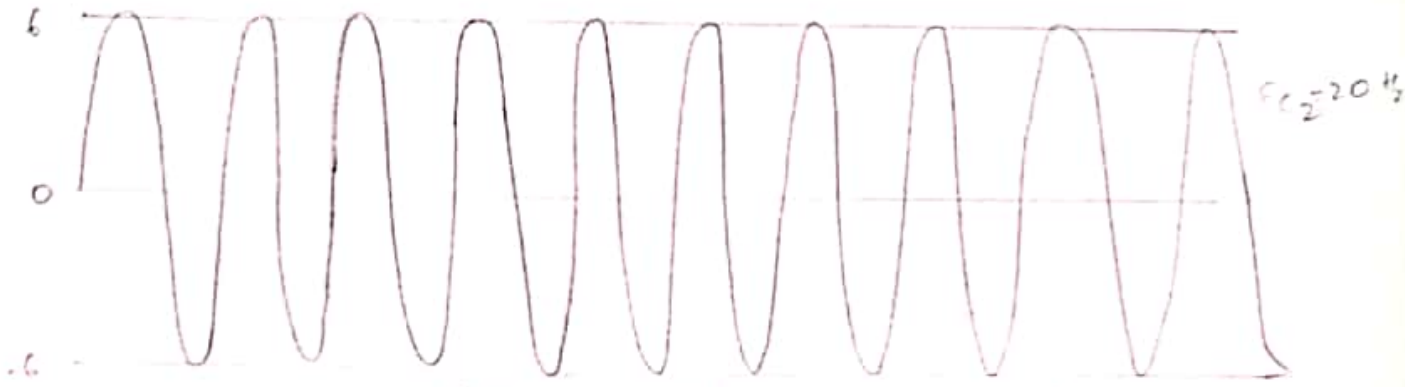
Teacher's Signature :

1) FSK

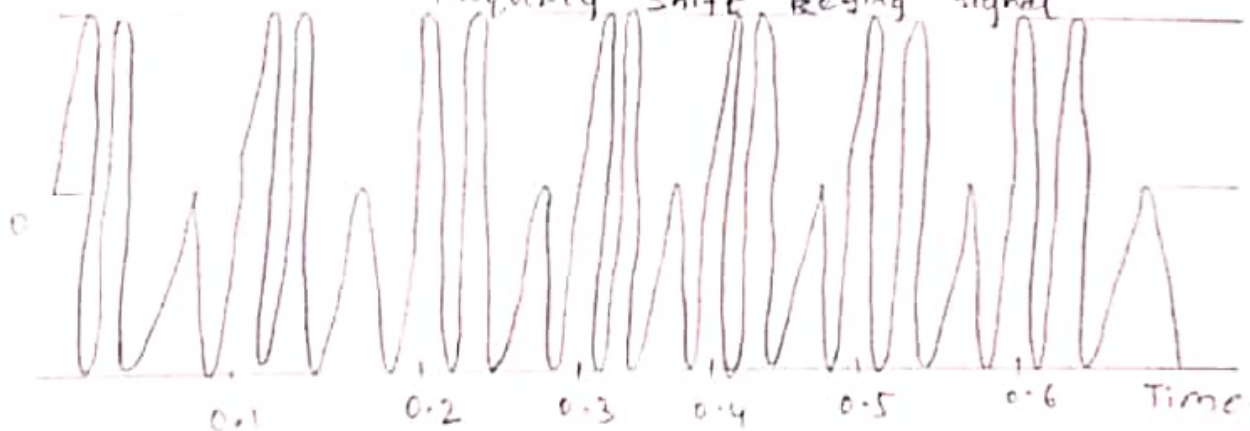
F_{c1} : 50Hz f_s : 20Hz
T_p : 10Hz amp = 6







Frequency shift keying signal

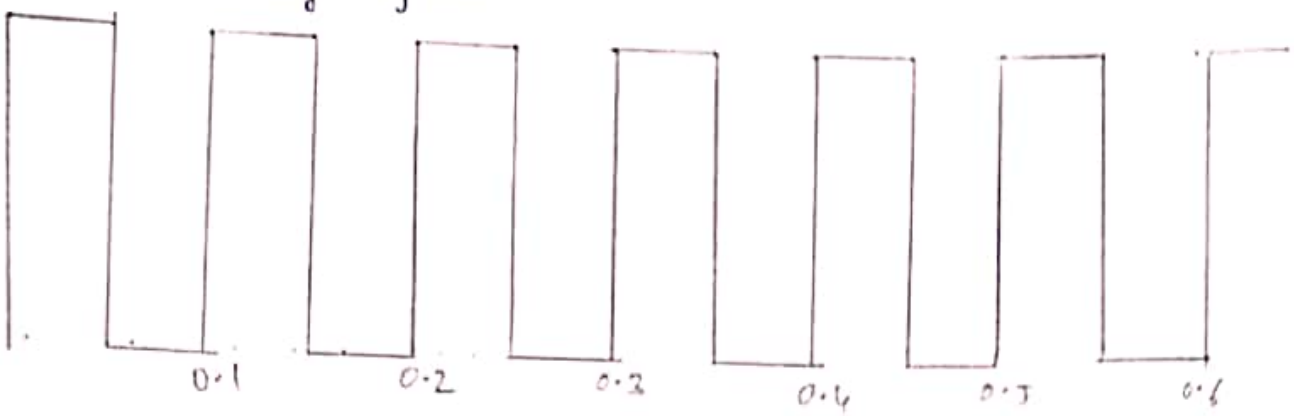


2> FSK

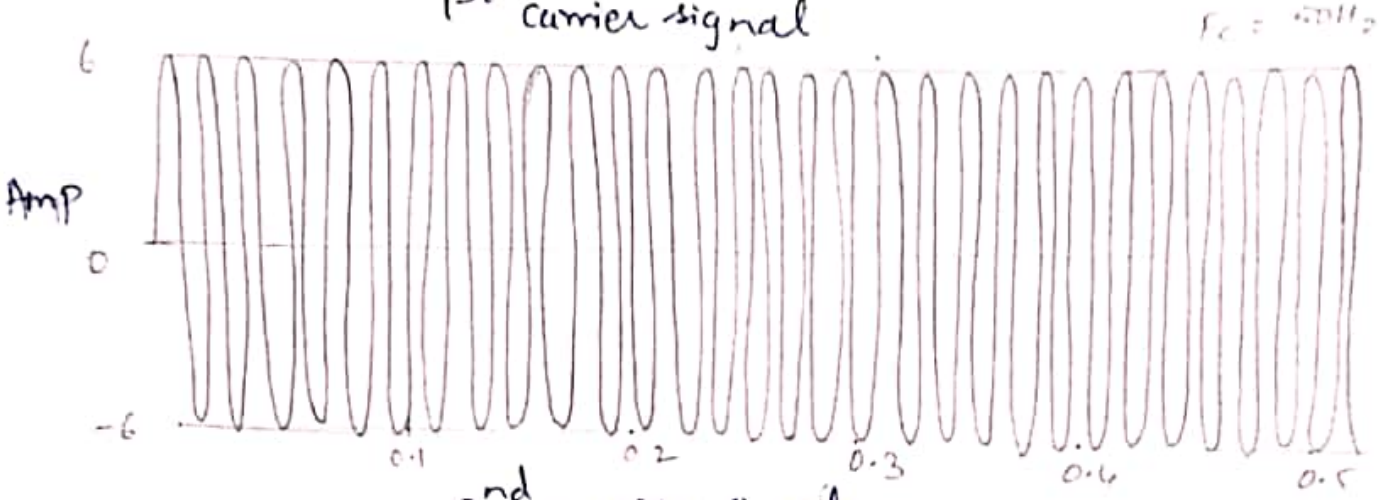
$F_{c_1} = 50Hz$ $F_{c_2} = 30Hz$

$F_p = 10Hz$ amp = 6.

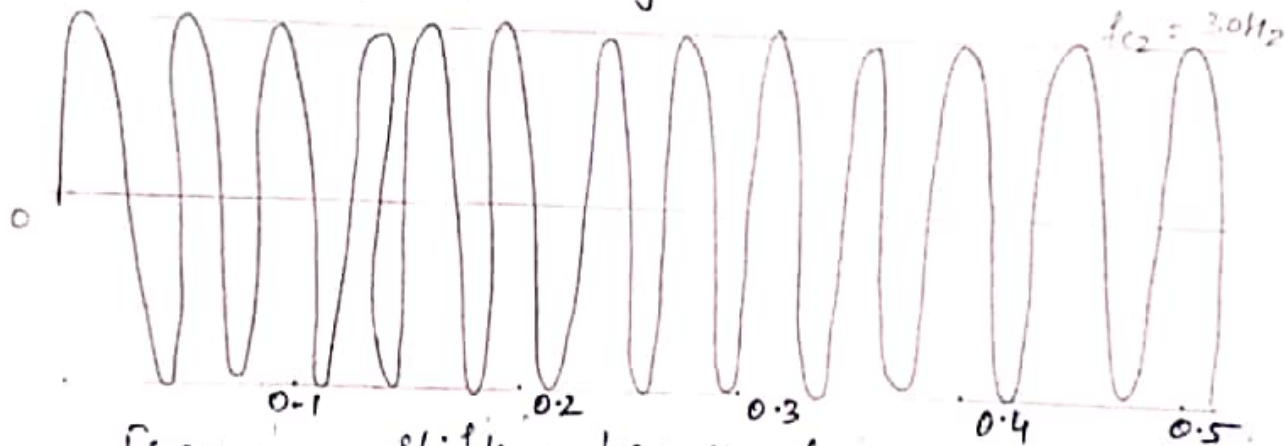
Message signal.



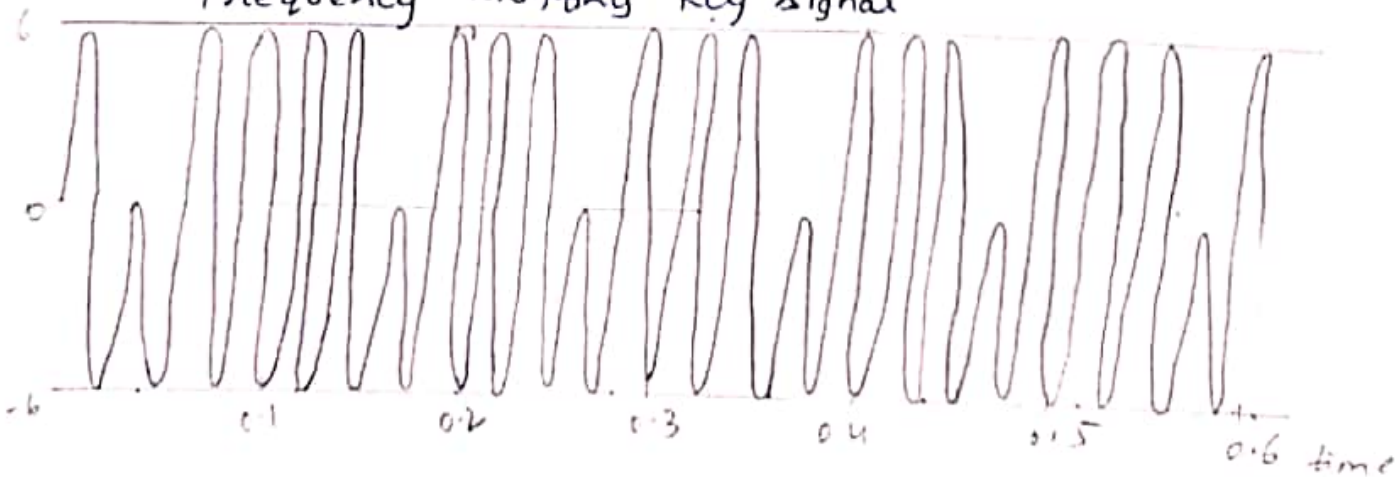
1st carrier signal



2nd carrier signal



Frequency shifting key signal

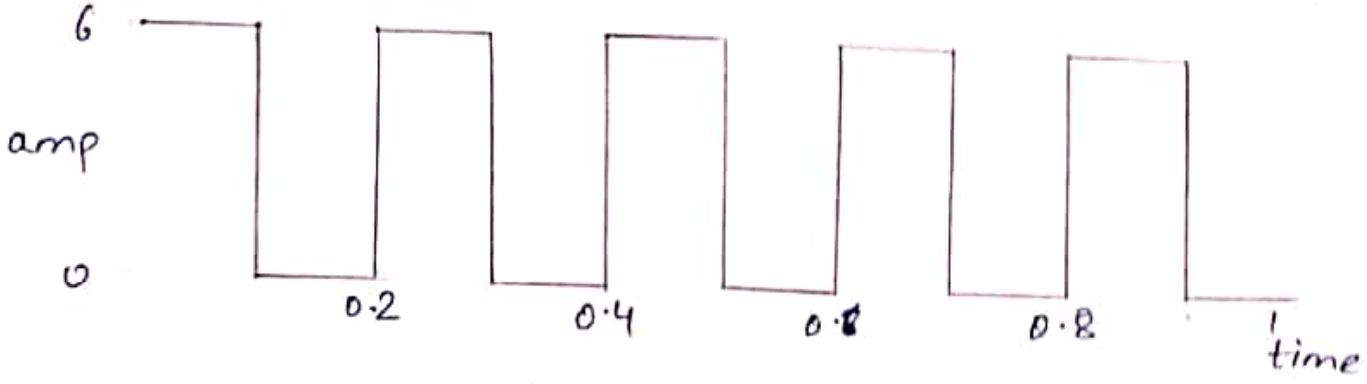


3) FSK

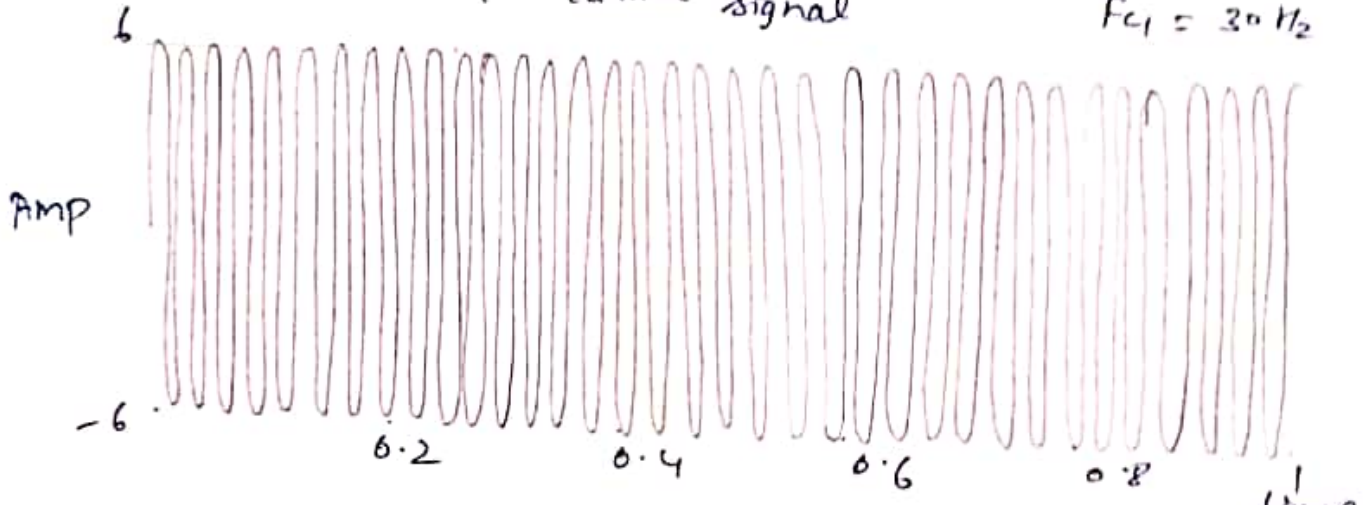
$F_{c_1} = 30Hz$ $F_{c_2} = 10Hz$

$F_p = 5Hz$ amp = 6

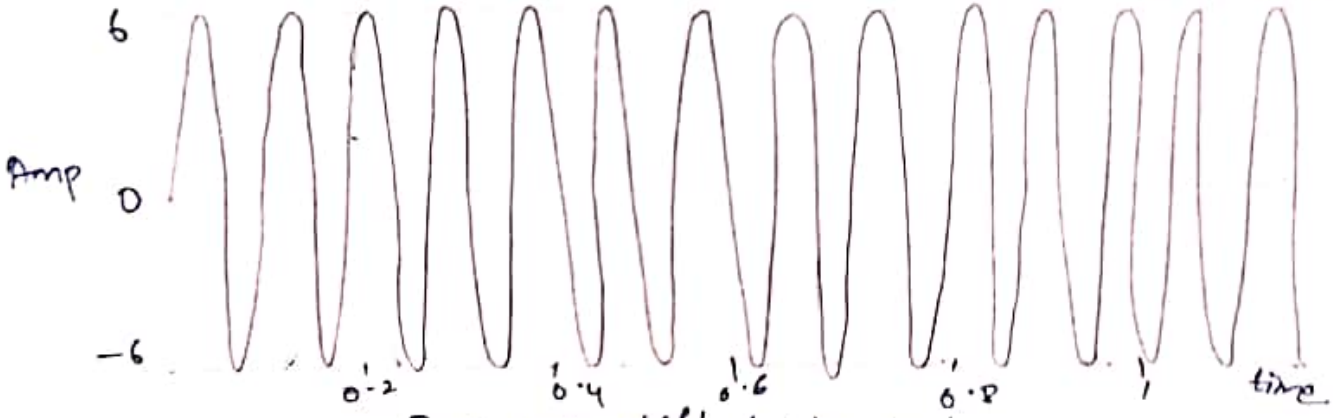
Message signal



1st carrier signal $F_{c_1} = 30Hz$



2nd carrier frequency $F_{c_2} = 10Hz$



Frequency shift keying signal.

```
%. PSK Signal
clc; clear all; close all;
fc = input ('Enter the frequency of sine wave carrier');
fp = input ('Enter the frequency of periodic binary Pulse');
amp = input ('Enter the amplitude ');

t = 0: 0.001: 1;
c = amp x sin(2 x Pi x fc x t);
Subplot (3,1,1); Plot (t,c);
X label ('Time'); Ylabel ('Amplitude');
Title ('Carrier wave');
grid on;
m = square(2 x Pi x fp x t);
subplot (3,1,2); Plot (t,m);
x label ('time'); Y label ('Amplitude');
title ('Binary message pulse');
w = c x m ;
subplot (3,1,3);
plot(t, w);
x label('time'); Y label ('Amplitude')
grid on;
```

Conclusion

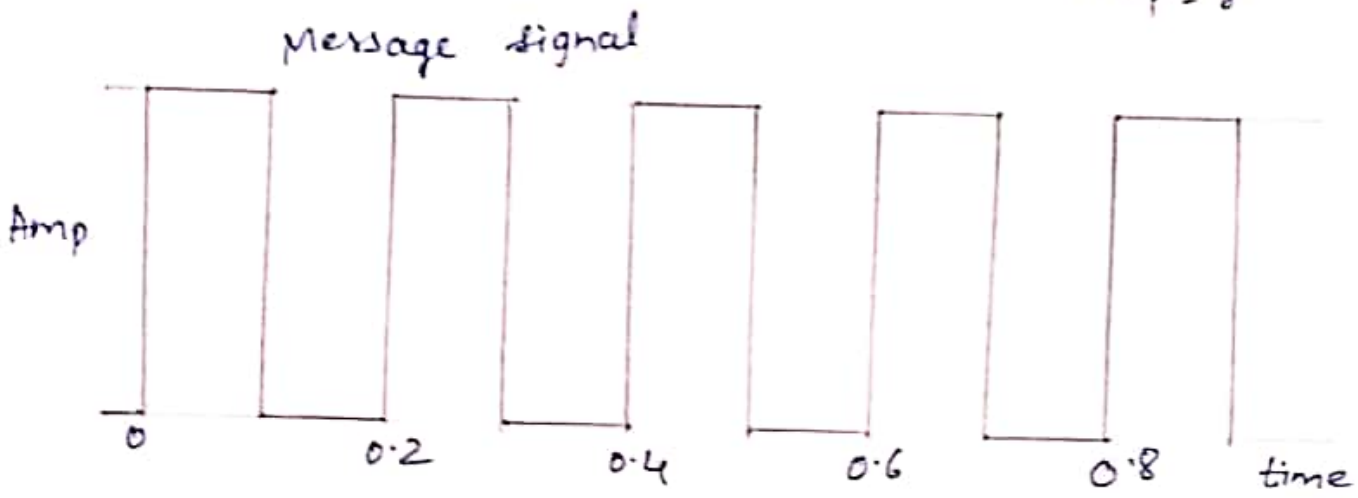
We have successfully studied ASK, PSK, FSK modulation technique and verified their waveforms using MATLAB. we also observe the Schematic diagram for ASK, PSK and FSK

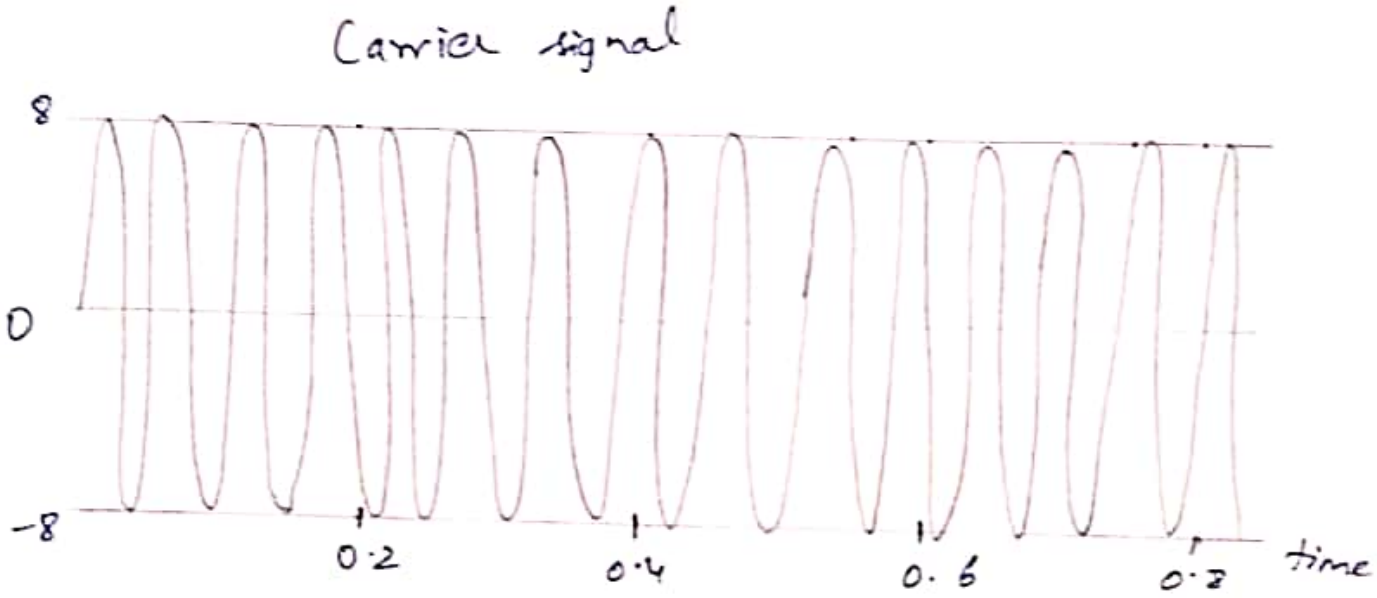
Teacher's Signature :

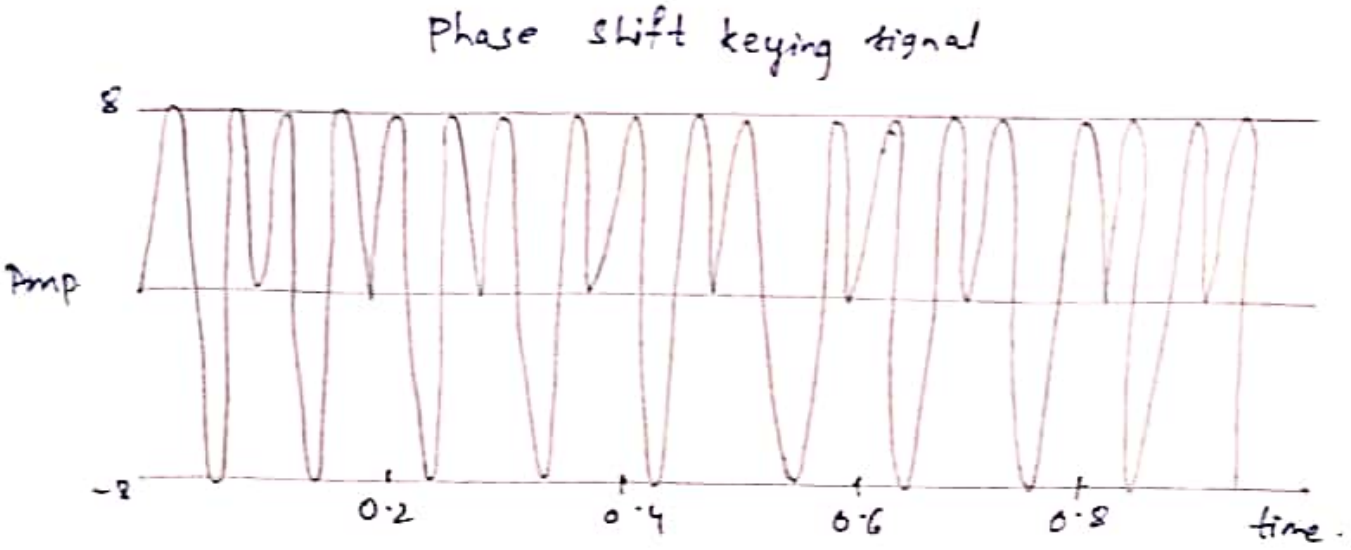
1) PSK

$F_c = 15Hz$ $T_p = 5Hz$

amp = 8





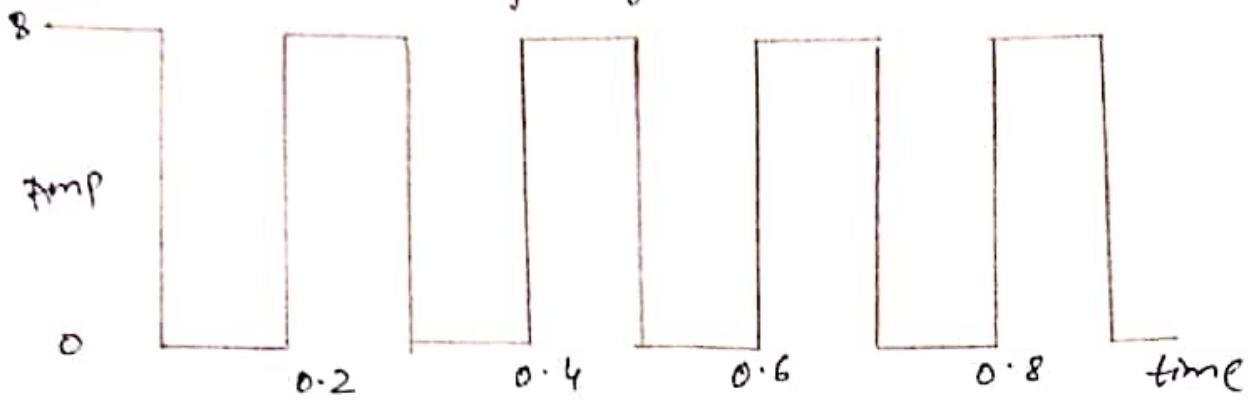


2) PSK

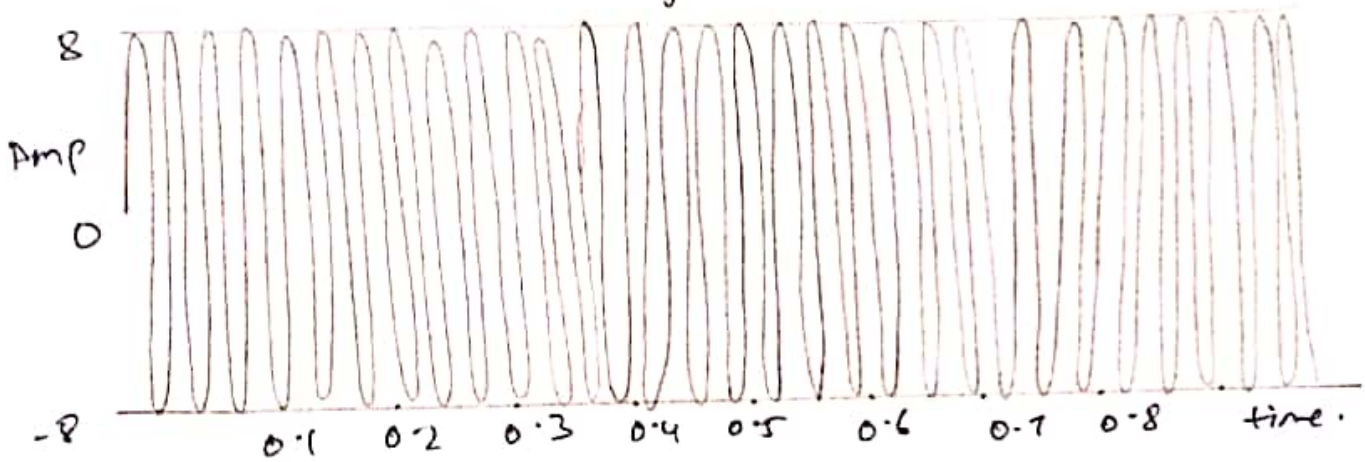
$f_c = 2.5Hz$ $T_p = 5Hz$

amp = 8

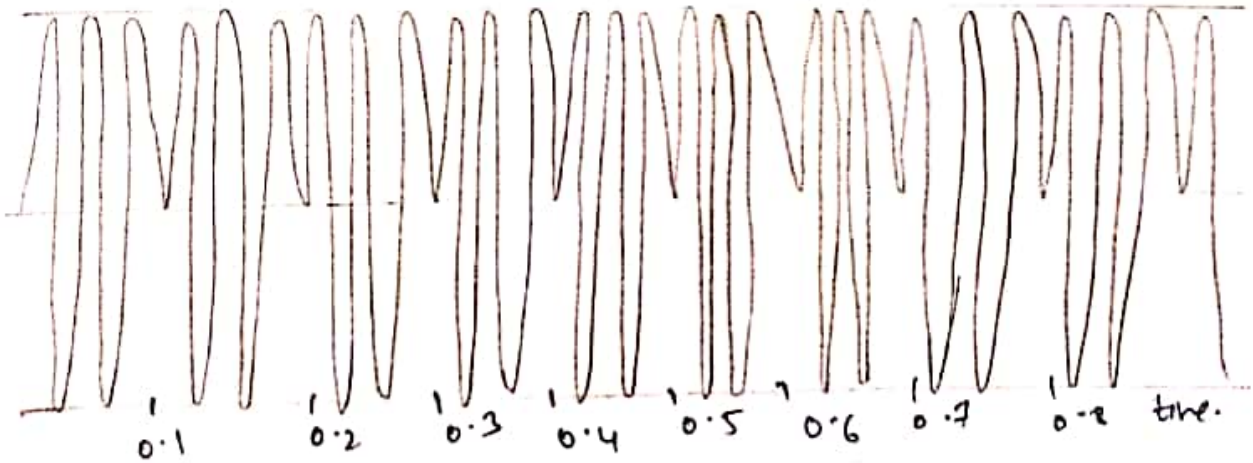
Message signal.



carrier signal



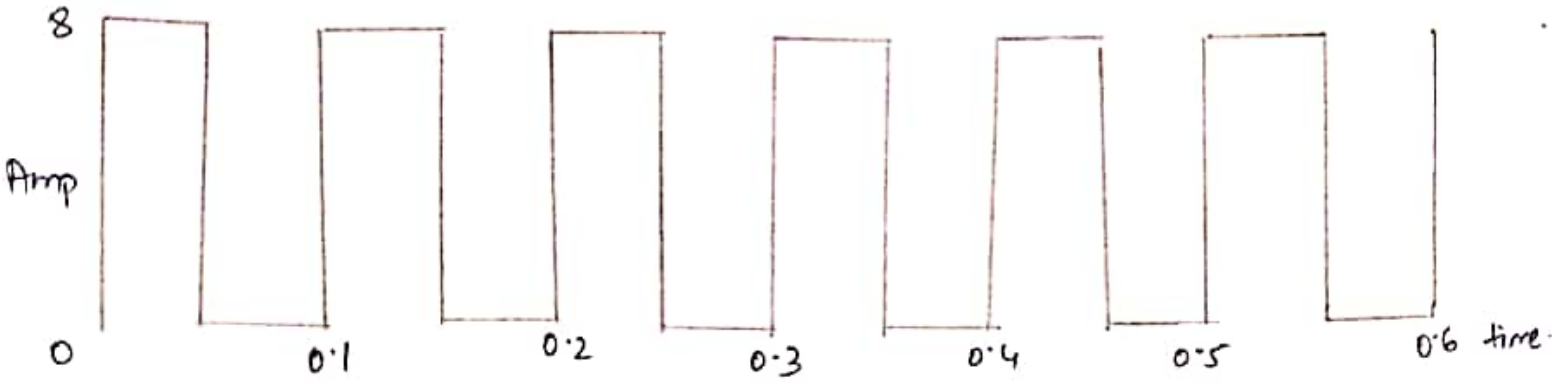
Phase shift keying signal



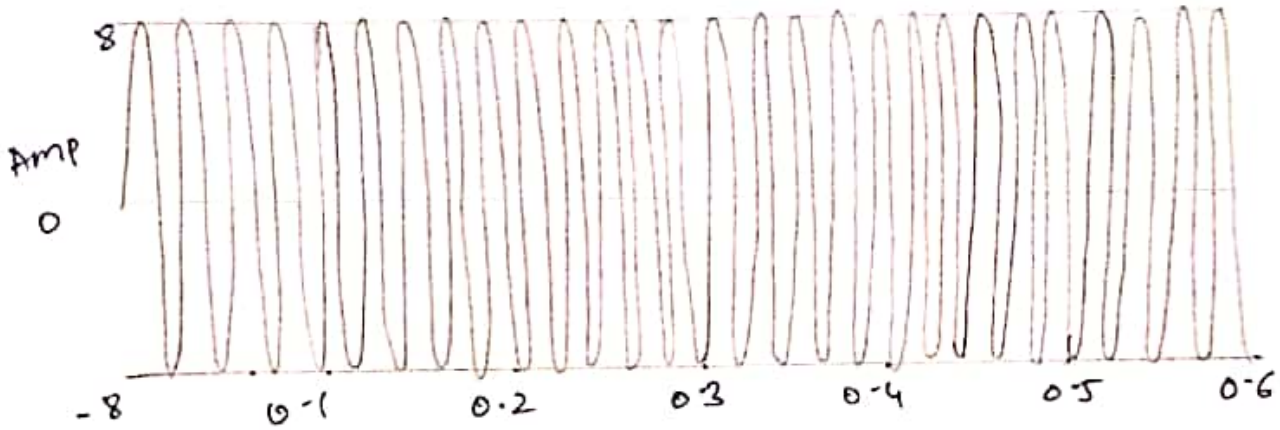
3) PSK

$F_c = 40\,Hz$ $F_p = 10\,Hz$.
amp = 8

Message signal



carrier signal



Phase shift keying