Experiment-6

U19CS095

Date

i) Amplitude shift keying (ASK)

ii) Frequency shift keying (FSK)

iii) phase shift keying (PSK)

Aim :⇒ To study the amplitude shift keying (ASK), frequency shift keying (FSK) and phase shift keying (PSK) modulation technique and verify waveform.

Theory :⇒ In case of amplitude shift keying the amplitude of the resultant output (modulated) depend upon the input data. this is also a type of Amplitude modulation which represent the binary data in form of the variation in amplitude of signal.

ASK is a digital modulation technique defined as the process of shifting the amplitude of the carrier signal between two levels, depending on whether 1 or 0 is to be transmitted.

U19CS095

Date

let the message signal be binary sequence of 1's and 0's. It can be represented as function of time as follow

$$V_m = \begin{cases} V_m & \text{, when symbol is 1} \\ 0 & \text{, when symbol is 0} \end{cases}$$

let the carrier be defined as

$$V_c = V_c \cos \omega_c t$$

then corresponding ASK signal is given by product of V_m and V_c as

$$V_{ASK} = V_m V_c \cos \omega_c t \quad \text{when symbol is 1}$$
$$= 0 \quad \text{when symbol is 0}$$

ii) In case of frequency shift keying, output signal will be either high or low, depending upon the input data applied.
FSK is the digital modulation technique, in which the frequency of the carrier sign varies according to discrete digital changes. FSK is a scheme of frequency modulati

U19CS095

Date

let V_m be the message signal.

$V_m(t) = V_m$

let the two carriers be defined as

$V_{c1} = V_c \cos \omega_{c1} t$

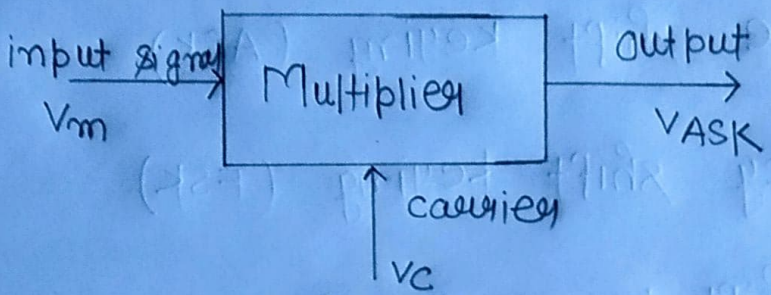
$V_{c2} = V_c \cos \omega_{c2} t$

then corresponding FSK signal is defined as

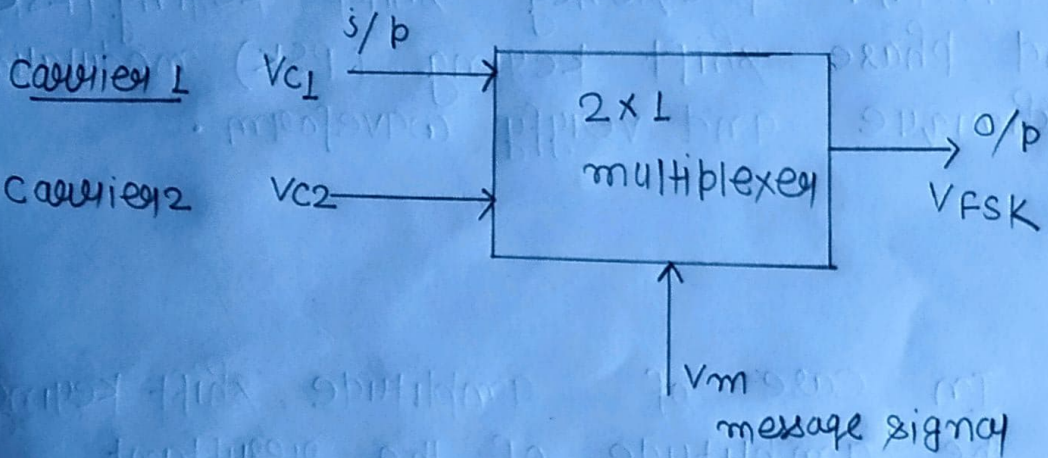
$V_{FSK} = V_m V_c \cos \omega_{c1} t$ when symbol is 1

$= V_m V_c \cos \omega_{c2} t$ when symbol is 0

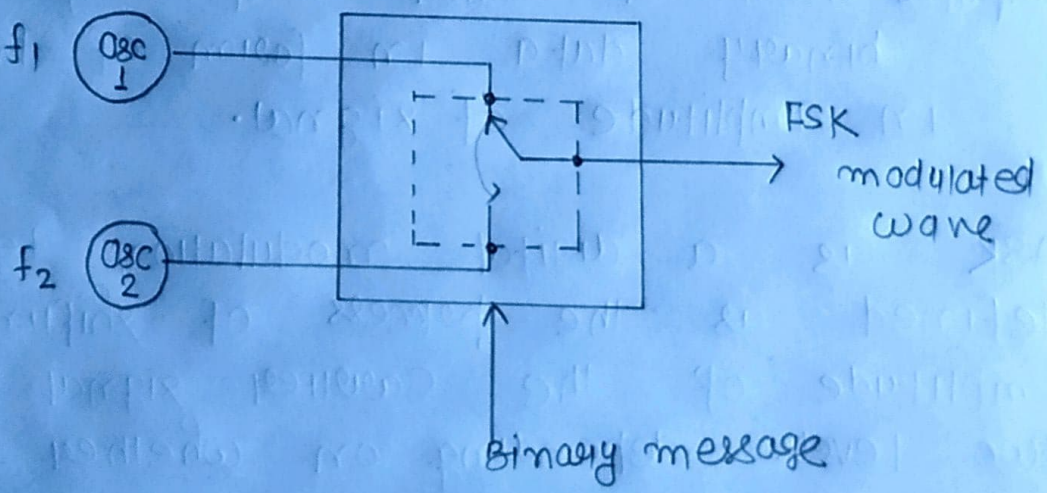
iii) phase shift keying (PSK) is the digital modulation technique. in which the phase of carrier signal is changed by varying the sine and cosine input at a time.
The phase of output signal signal get shifted depending upon the input.



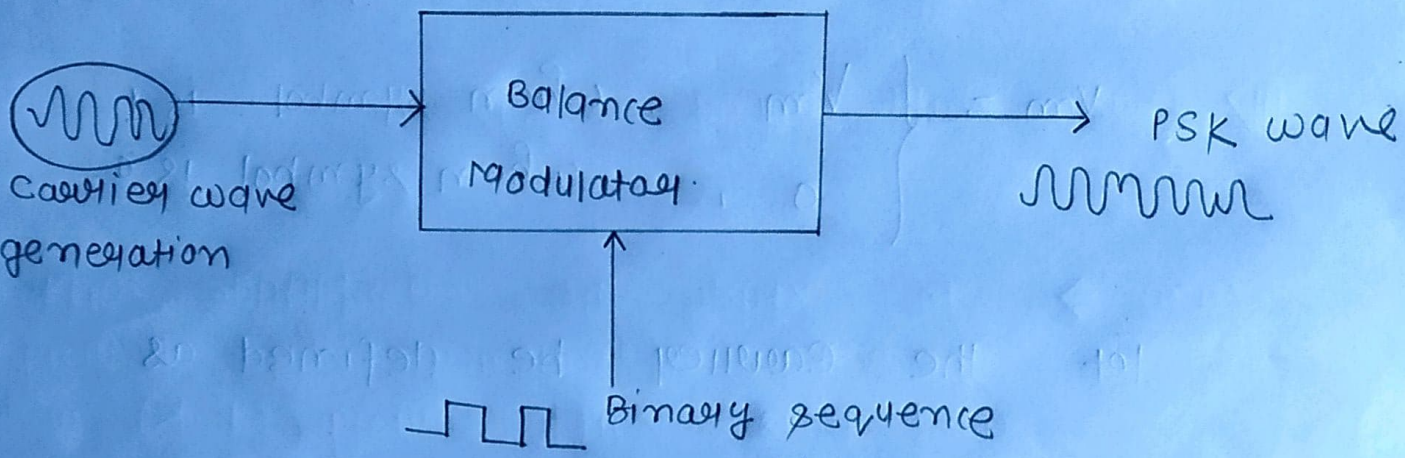
Block diagram of generation of ASK signal



Block diagram of FSK generator



U19CS095



Block Diagram showing generation of PSK

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Matlab code for A.S.K

Date

```
clc;
clear all;
close all;
fc = input('Enter the value of carrier frequency');
fp = input('Enter the value of frequency for
            binary message signal');

amp = input('Enter the amplitude for Am & Ac');
t = 0:0.001:1
amp = amp/2;

m = amp.* square(2*pi*fp*t) +amp;

c = amp.* sin(2*pi*fc*t);

ask = c.*m;
subplot(3,1,1)
xlabel(t,m); plot(t,m);
xlabel('Time');
ylabel('Amplitude');
title('message signal');
subplot(3,1,2)
plot(t,c)
xlabel('time')
ylabel('Amplitude')
title('Carrier')
```

```
subplot(3,1,3)
plot (t, ask);
xlabel('Time')
ylabel ('Amplitude')
title ("ASK modulated signal');
```

A.SK

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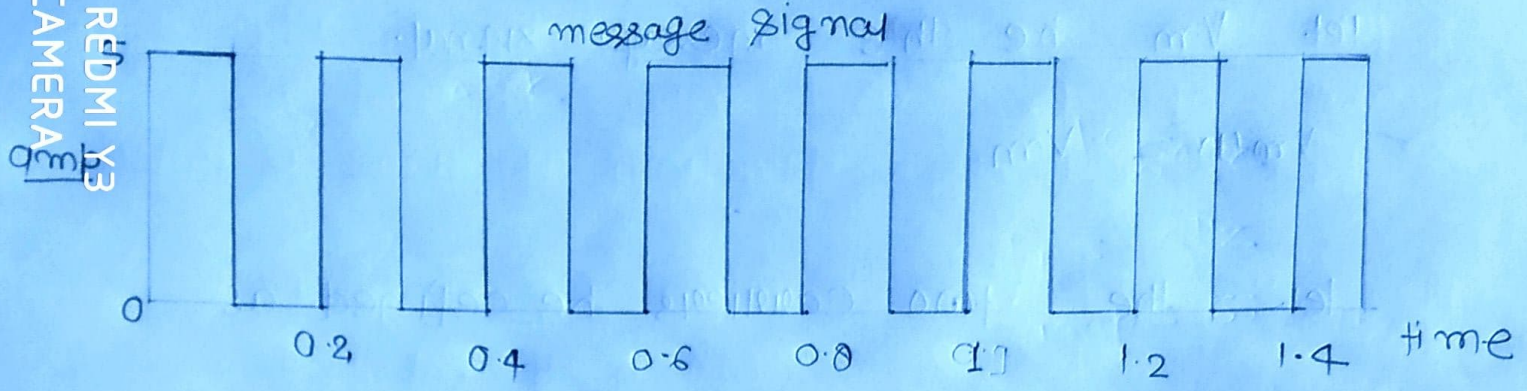
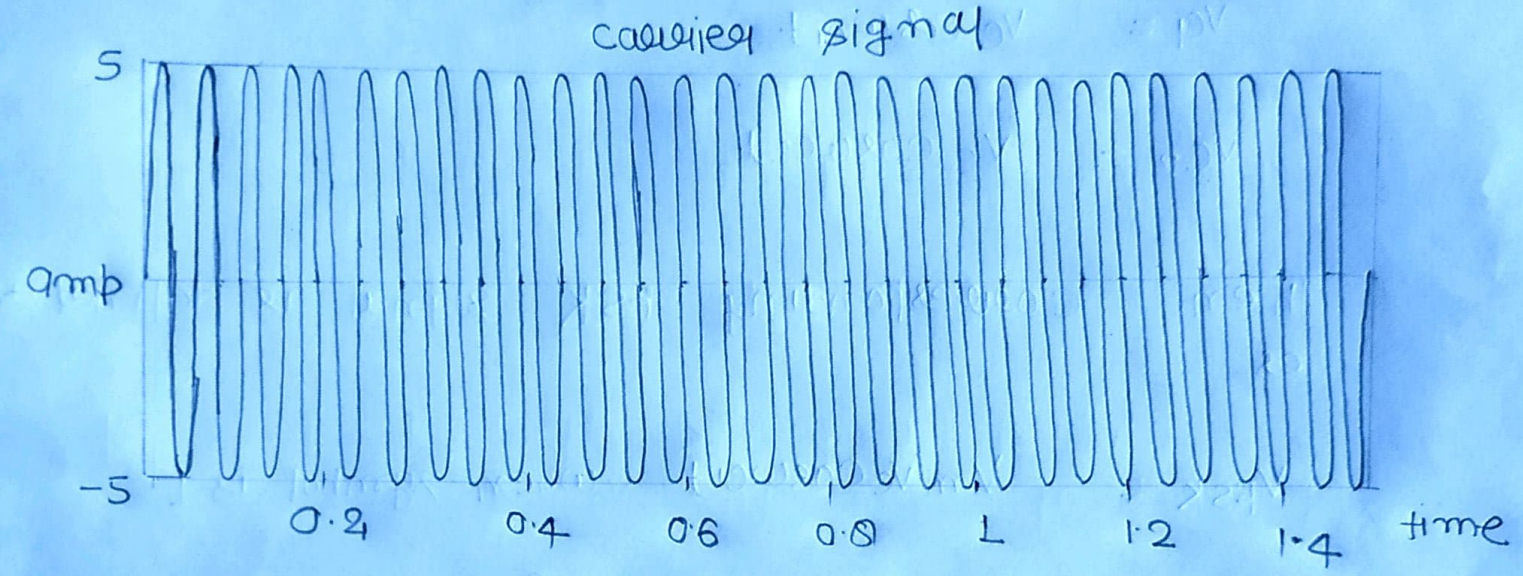
A.S.K

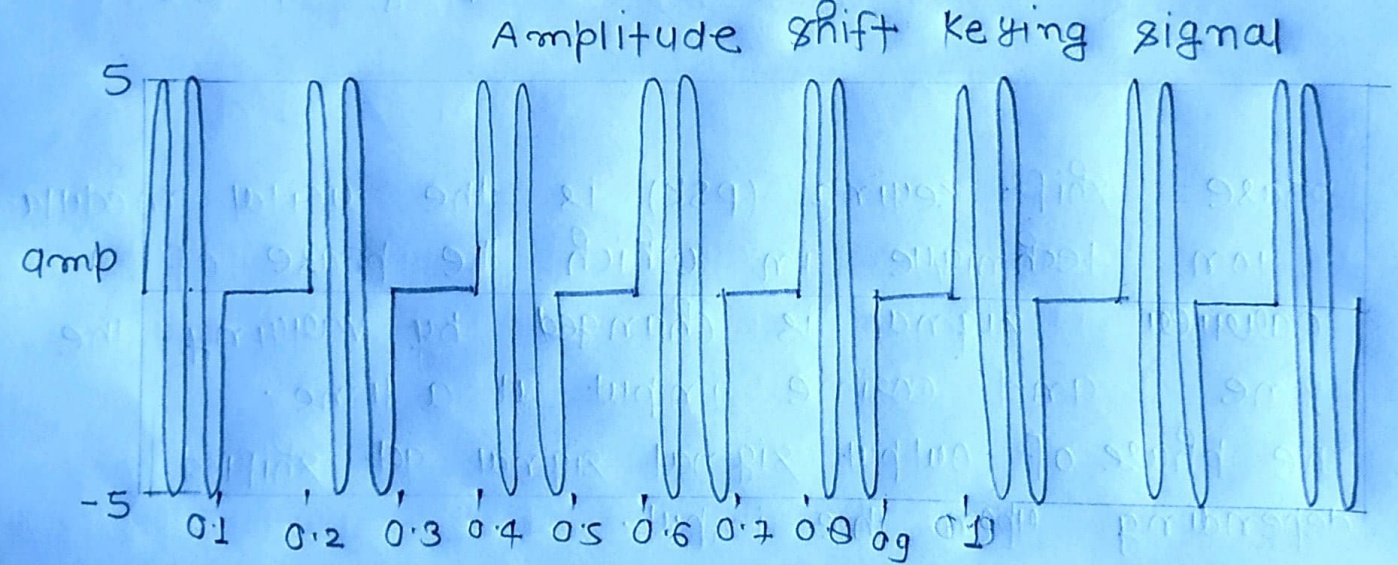
$f_c = 20Hz$

$f_p = 5Hz$

amp = 5;







2) A·S·K

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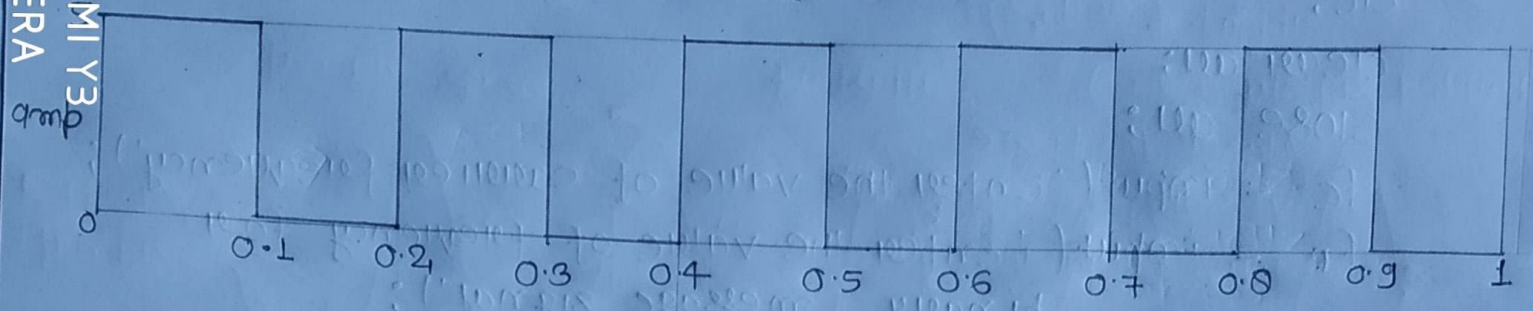
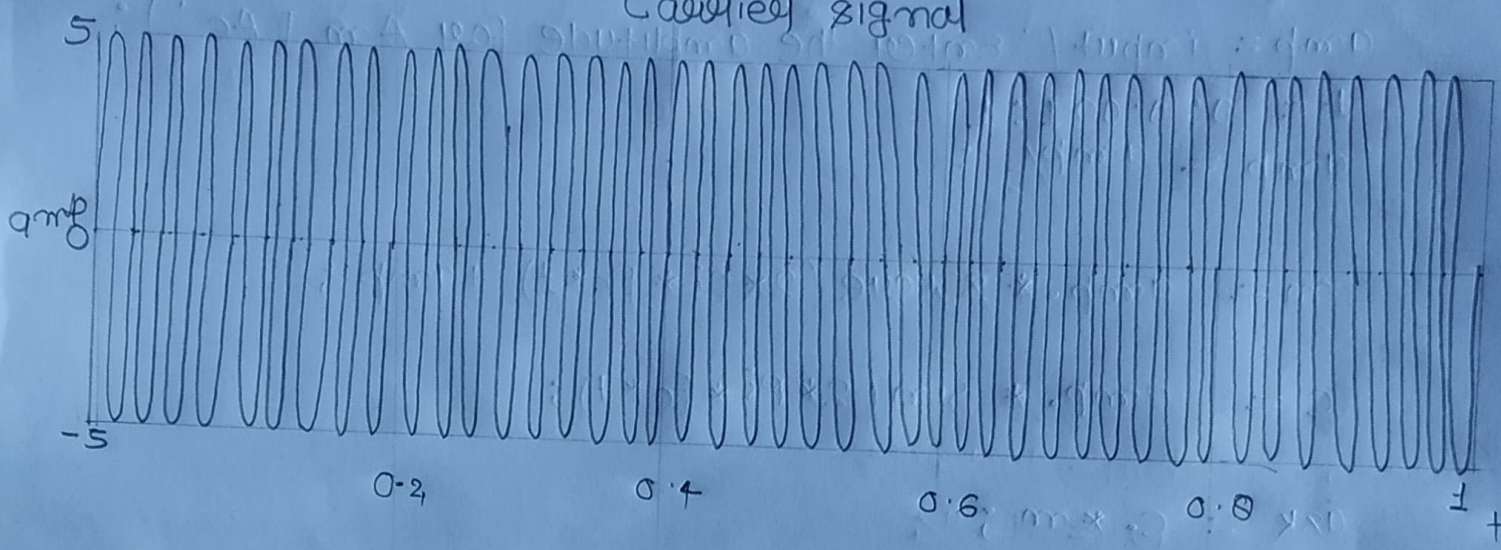
A·S·K

fc = 45Hz
fp = 5Hz
amp = 5;

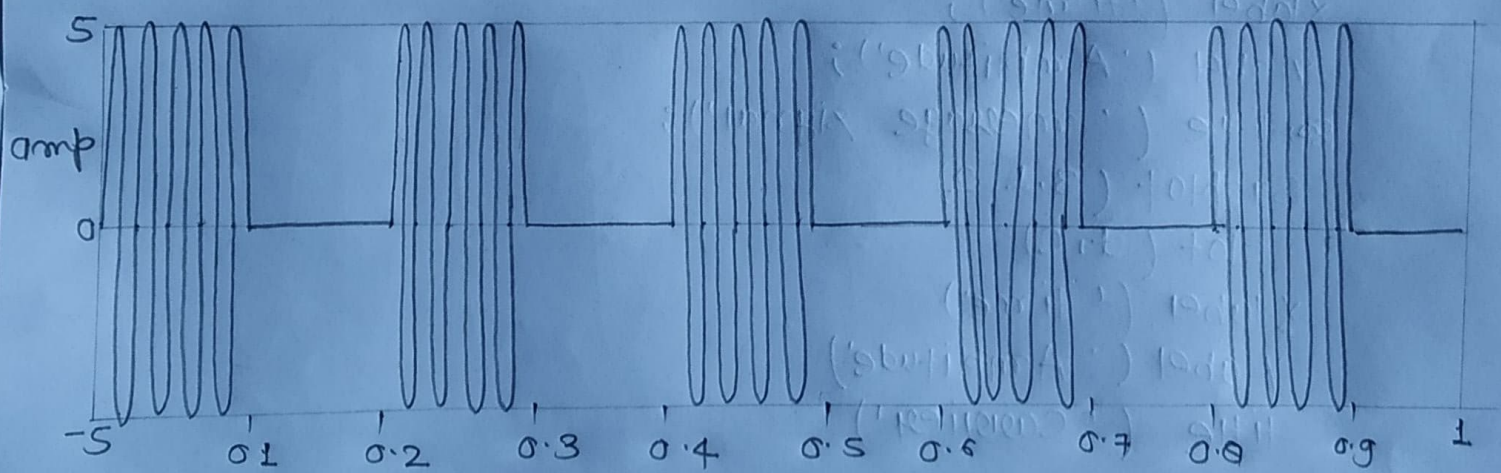
message signal



Carriey signal



Amplitude shift keying signal

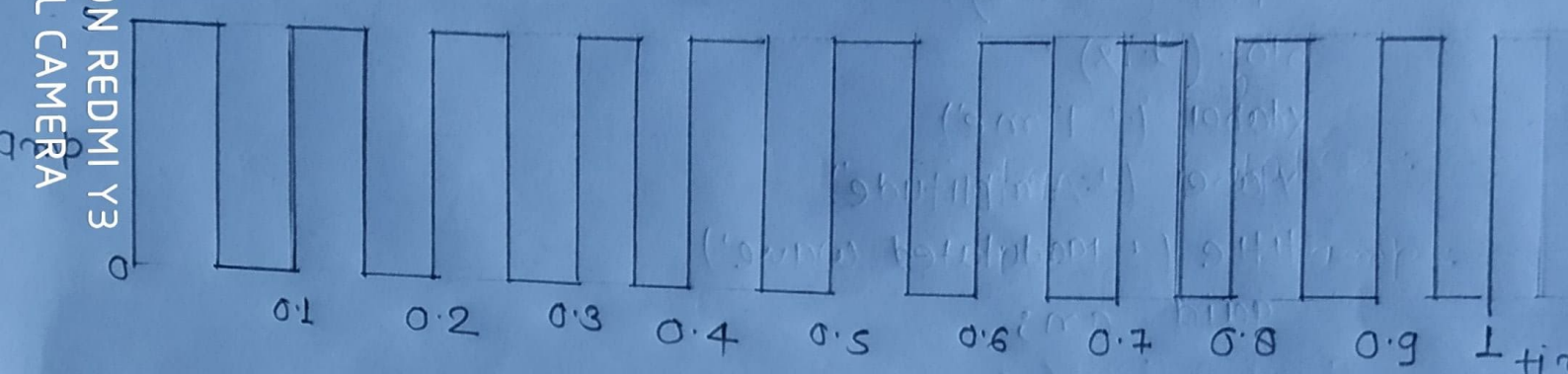


ASK

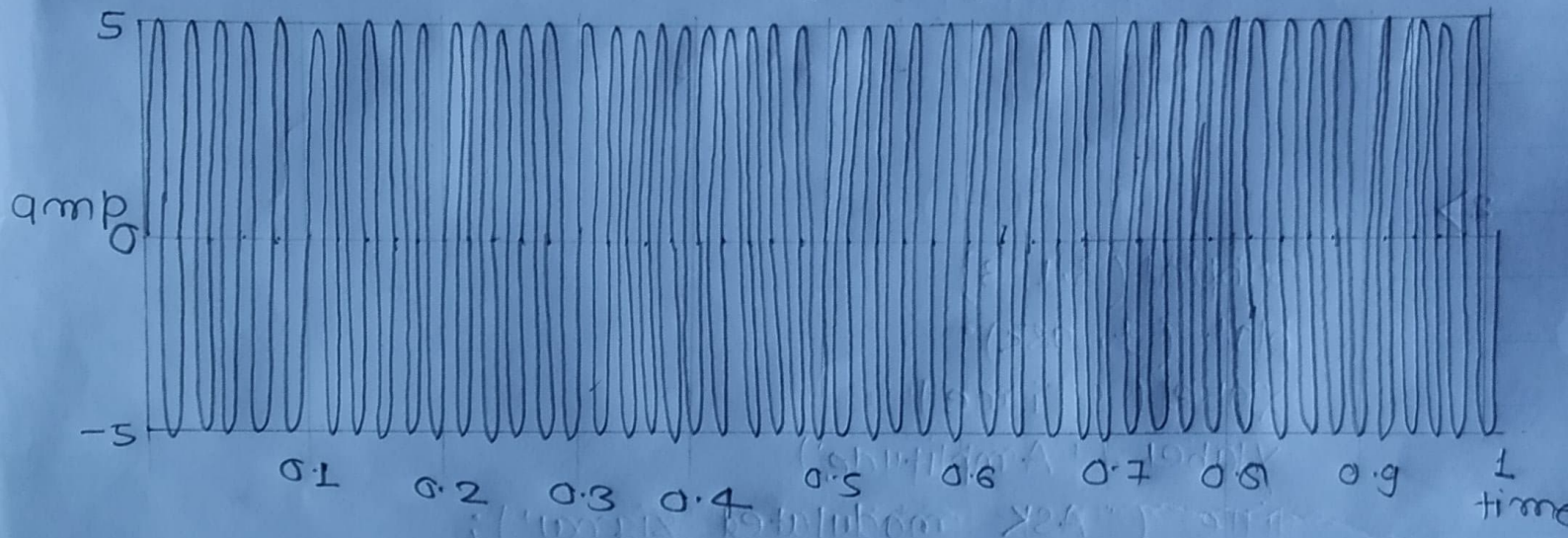
Vigesogs

$f_c = 50Hz$
$f_p = 10Hz$
amp = 5;

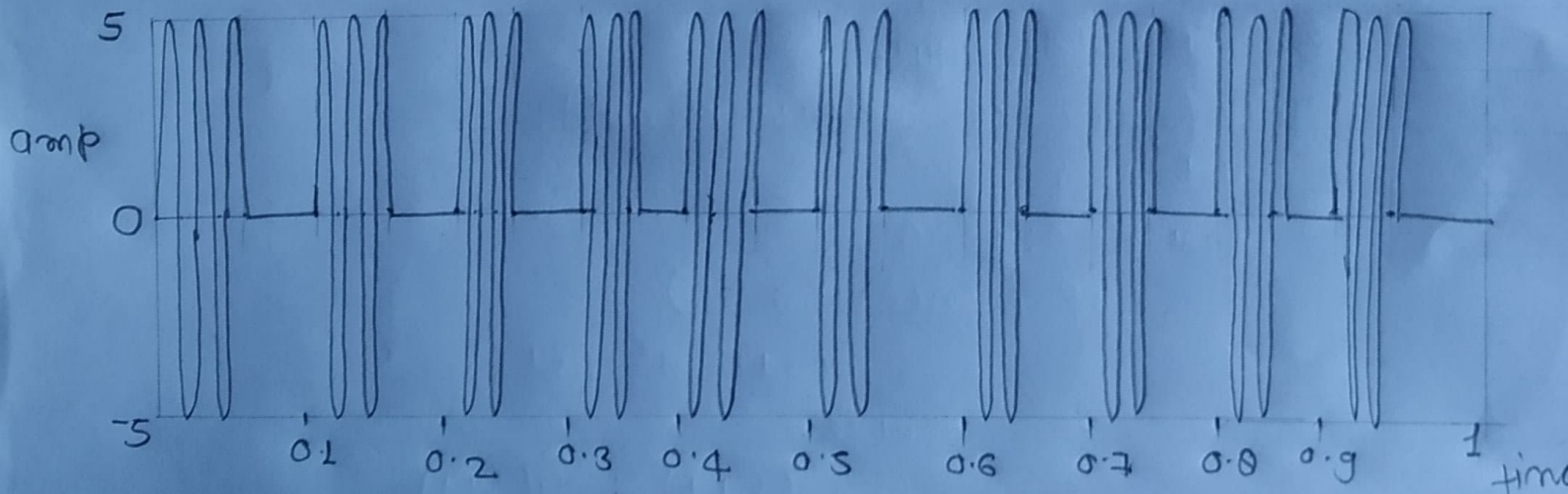
message signal



Carrier signal



Amplitude shift keying signal



Matlab Code for FSK

Date

```
clc;
clear all;
close all;
fc1 = input('Enter the frequency for 1st carrier signa
fc2 = input('Enter the frequency for 2nd carrier signal

fp = input('Enter the frequency for binary message
        signal');

amp = input('Enter the Amplitude for message & carrier

c1 = amp.* sin(2*pi*fc1*t);
c2 = amp.* sin(2*pi*fc2*t);

m = (amp/2).* square(2*pi*fp*t) + (amp/2);

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(4,1,1)
```

Date

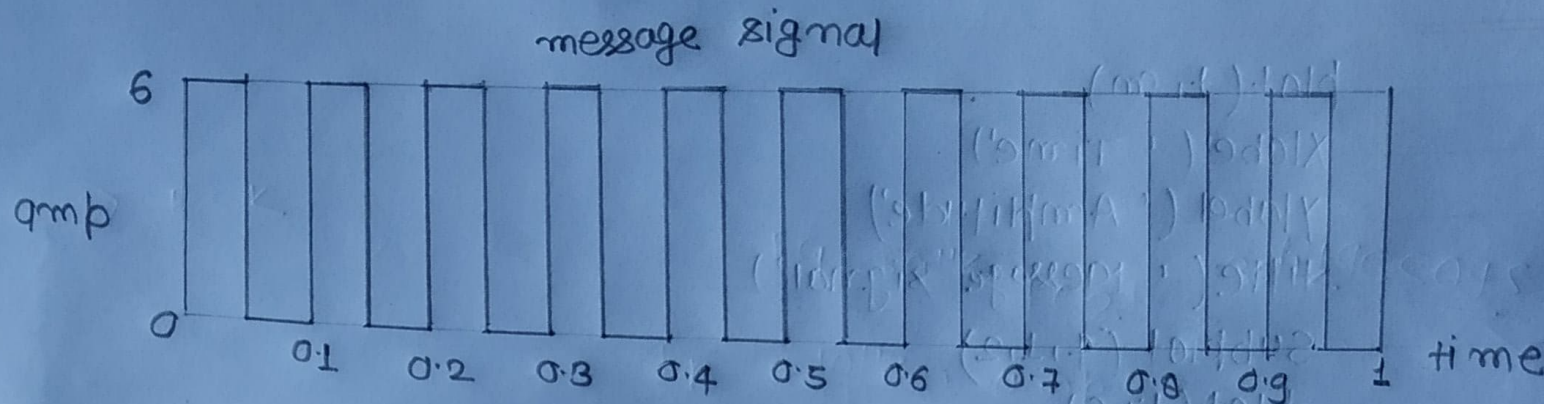
```
plot(t, m)
xlabel('Time')
ylabel('Amplitude')
title('Message signal')
subplot(4,1,2)
plot(t, c)
xlabel('time')
ylabel('amplitude')
title('1st carrier signal')

subplot(4,1,3)
plot(t, c2)
xlabel('time')
ylabel('Amplitude')
title('2nd carrier signal)

subplot(4,1,4)
plot(t, mm)
xlabel('time')
ylabel('Amplitude')
title('FSK modulated signal)
```

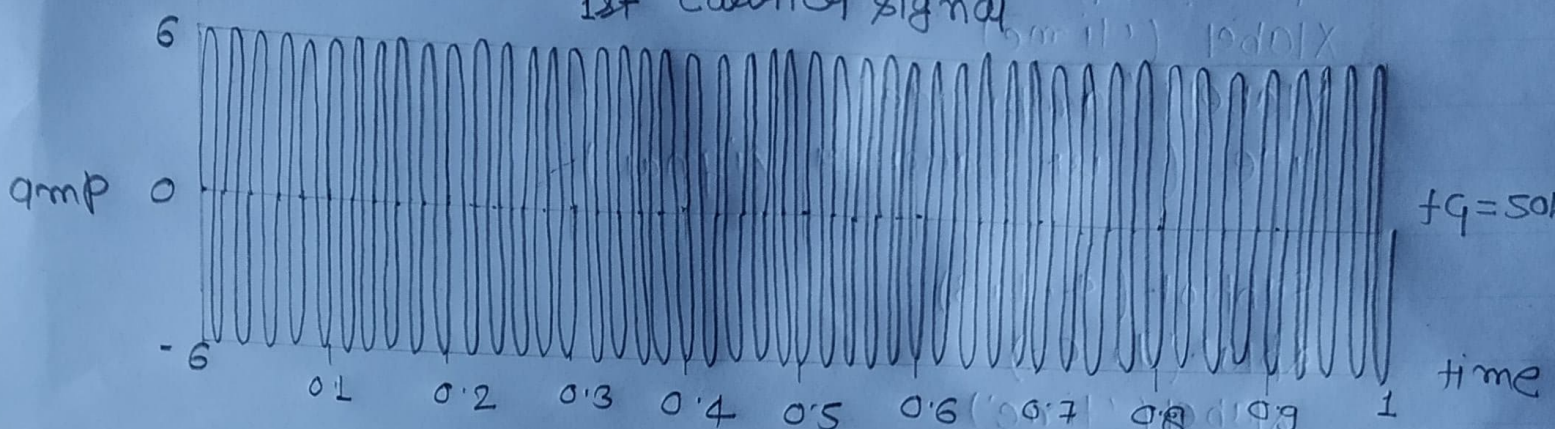
1) F.S.K

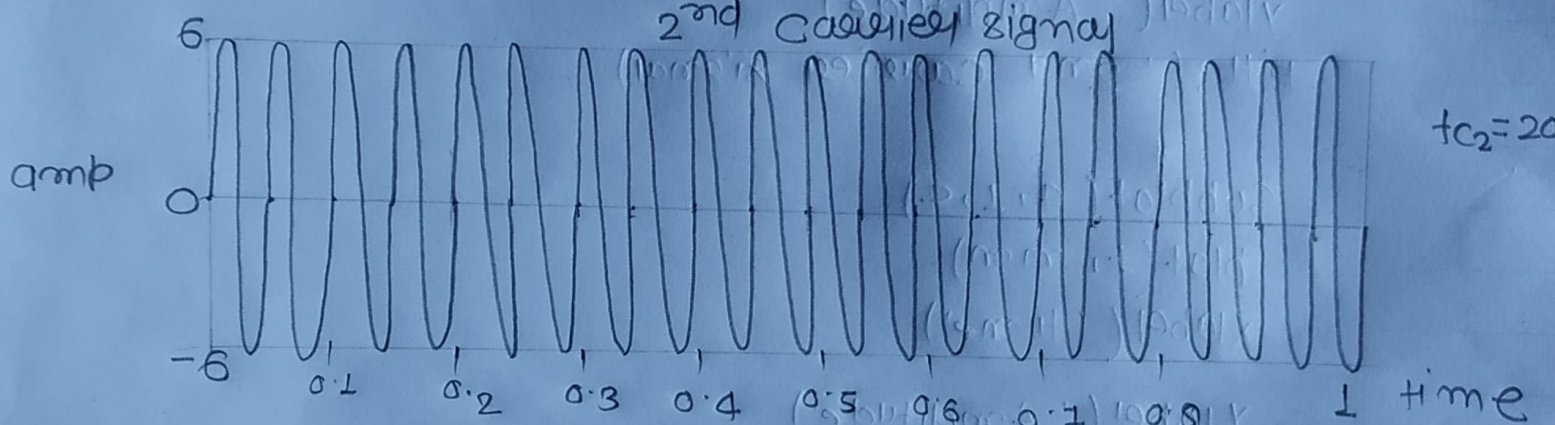
U19CS095

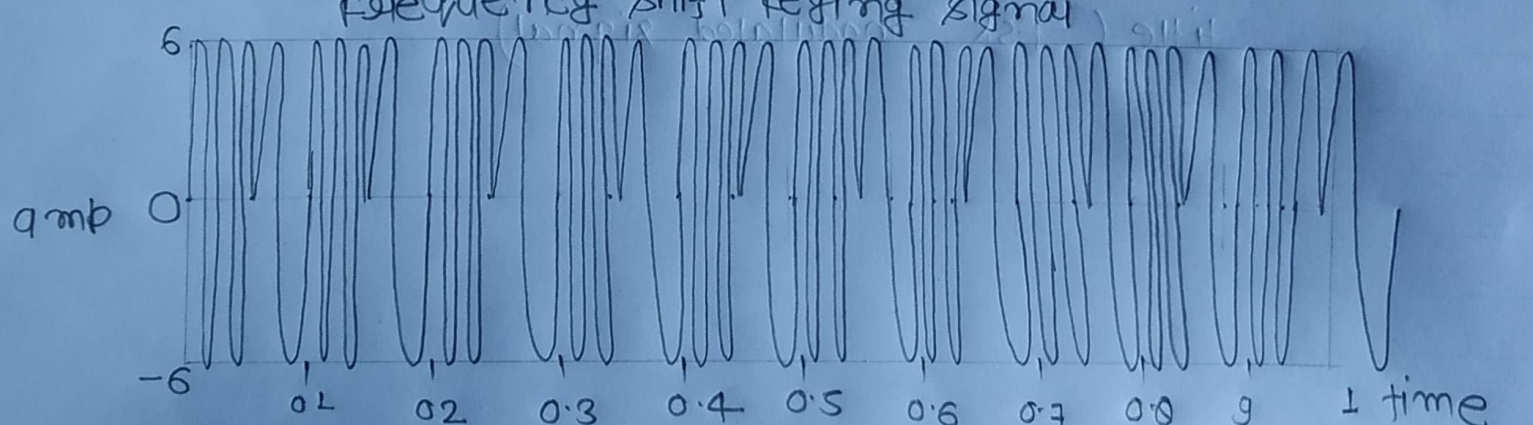
$f_q = 50Hz$, $f_{C2} = 20Hz$

$f_p = 10Hz$, $amp = 6$

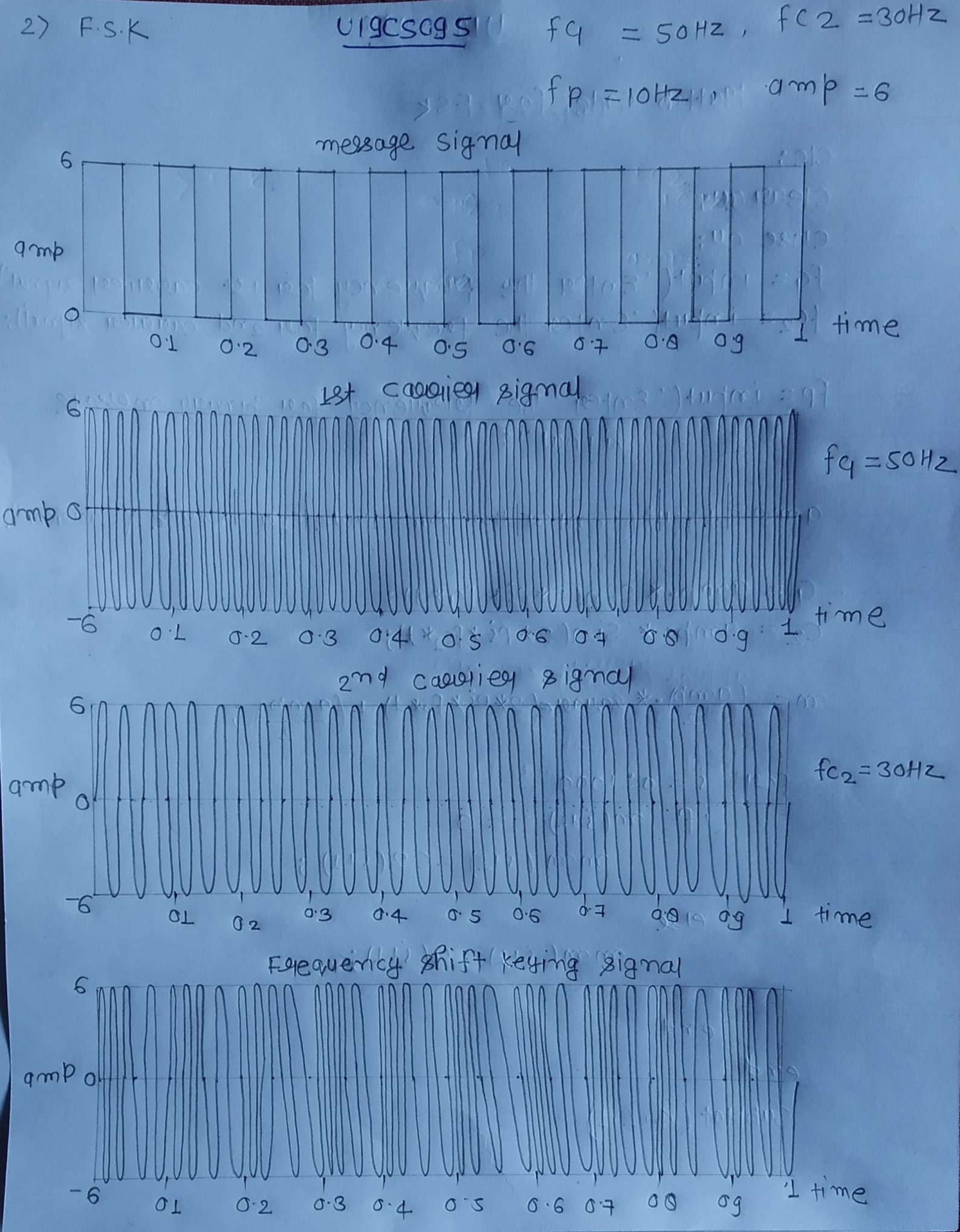








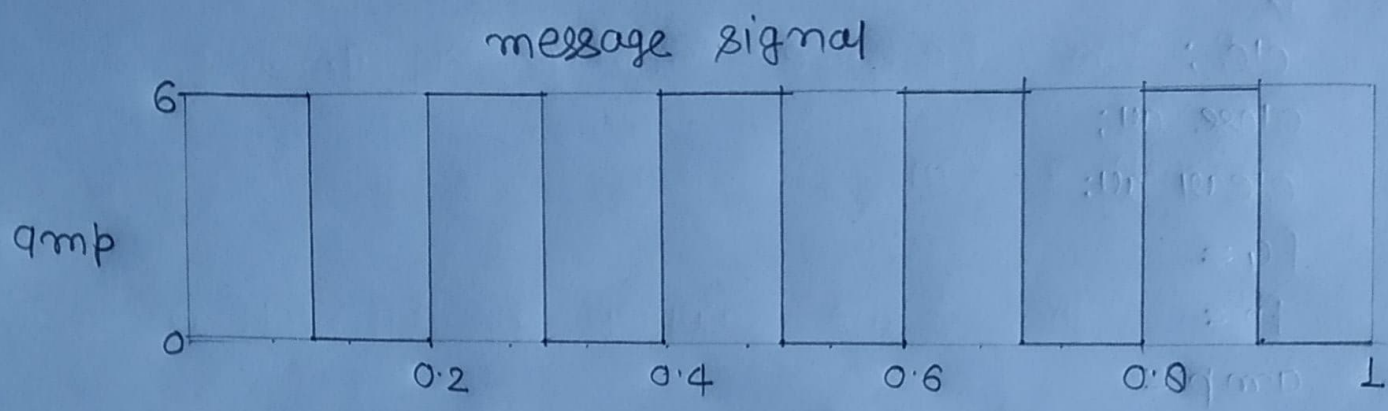
2) F.S.K

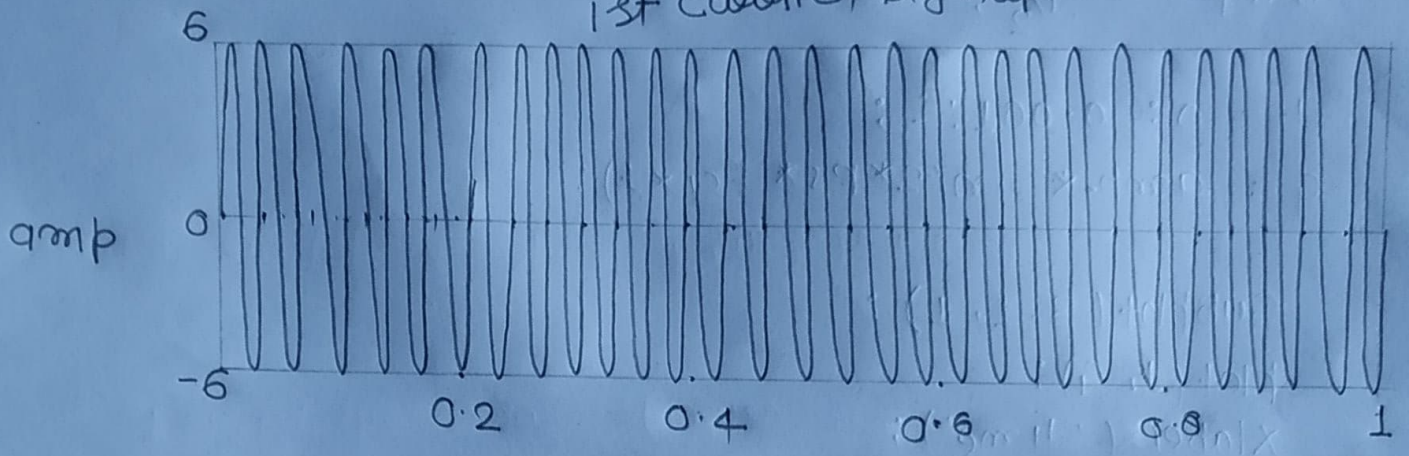

fc = 50Hz, fc2 = 30Hz
fp = 10Hz, amp = 6
message signal
6
amp
0
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
time
1st carrier signal
6
amp
0
-6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
time
fc = 50Hz
2nd carrier signal
6
amp
0
-6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
time
fc2 = 30Hz
Frequency shift keying signal
6
amp
0
-6
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
time

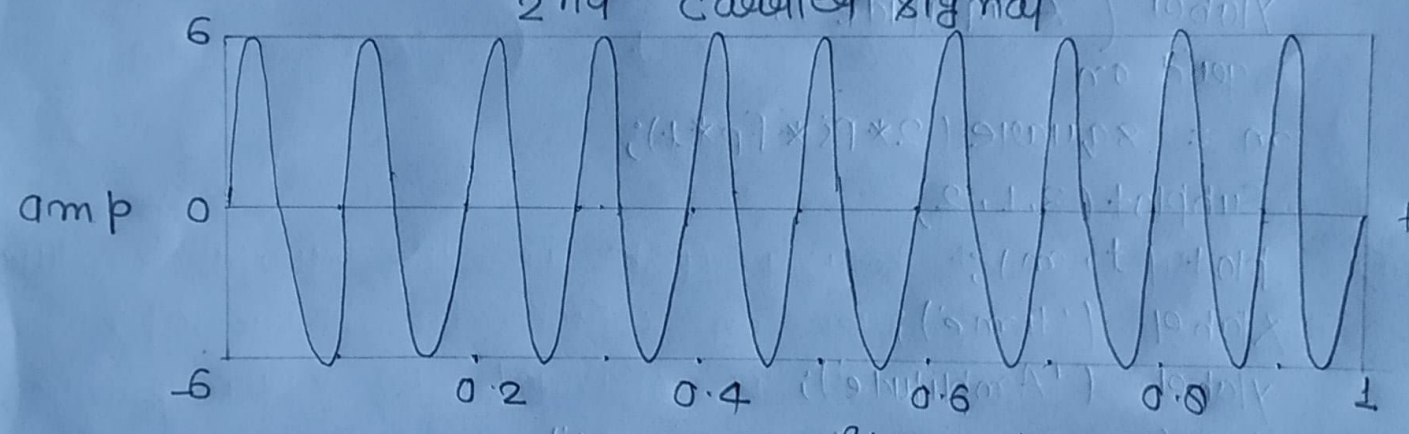
3) F.SK

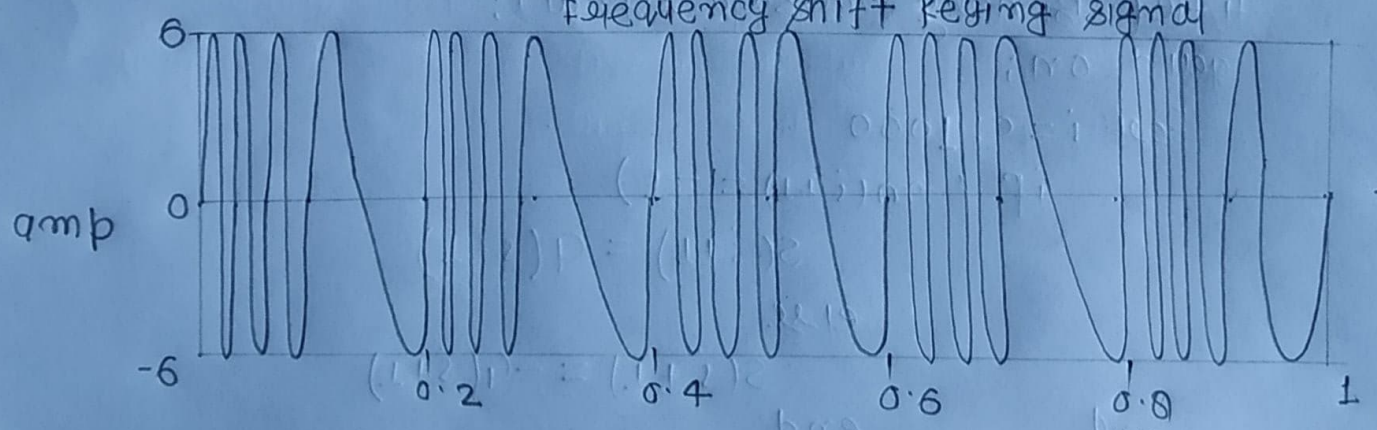
$f_{c1} = 30\,Hz$, $f_{c2} = 10\,Hz$

$f_p = 5\,Hz$, amp = 6









U19CS095

1) Matlab code for [redacted] PSK

Date

```
clc;
close all;
clear all;
fc =
fp =
amp =
amp = amp/2;

t = 0: 0.001: L;
c = amp.* sin(2*pi* fc *t);

 subplot(3, 1, 1);
 plot(t, c);
 xlabel ('time');
 ylabel ('Amplitude');
  grid on;
 m = square(2*pi*fp*t);
  subplot(3,1,2)
  plot(t, m);
  xlabel ('time');
  ylabel ('Amplitude');
  title('Binary message signal');
  grid on;
    for i=0:1000
        if (m(i+1)==1)
                s(i+1) = c(i+1)
            else
                s(i+1) = -c(i+1)
    end          end
```

2)

U19CS095

```
subplot (3,1,3);
 plot (t,s);
 xlabel ('Time')
 ylabel ('Amplitude')
 title ('Modulated wave')
  grid on;
```

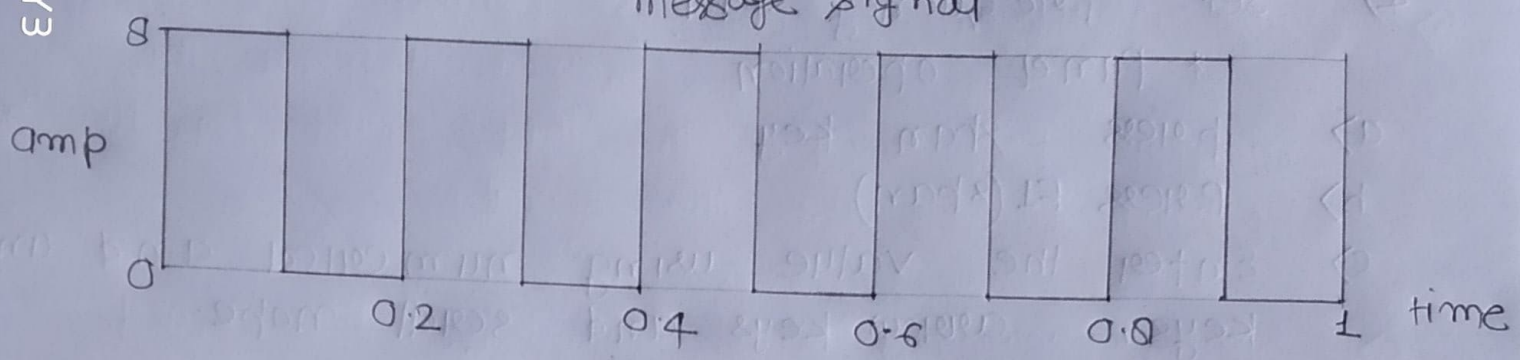
PSK

U19CS093

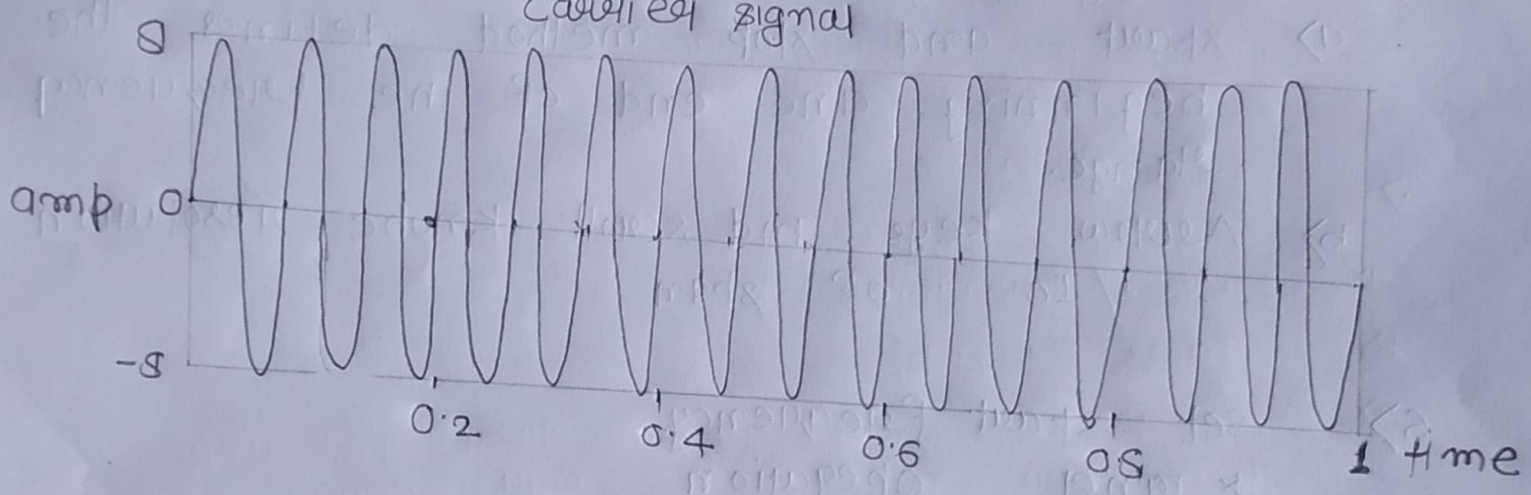
fc = 15Hz fp = 5Hz

amp = 8

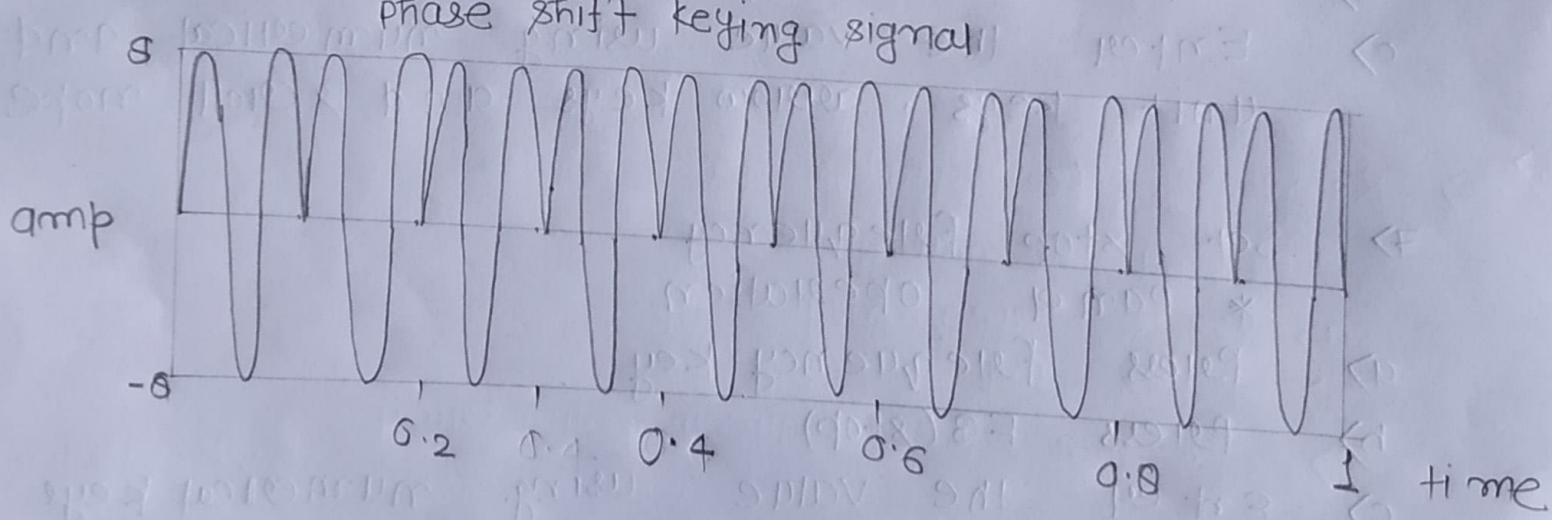
message signal



Carrier signal



phase shift keying signal

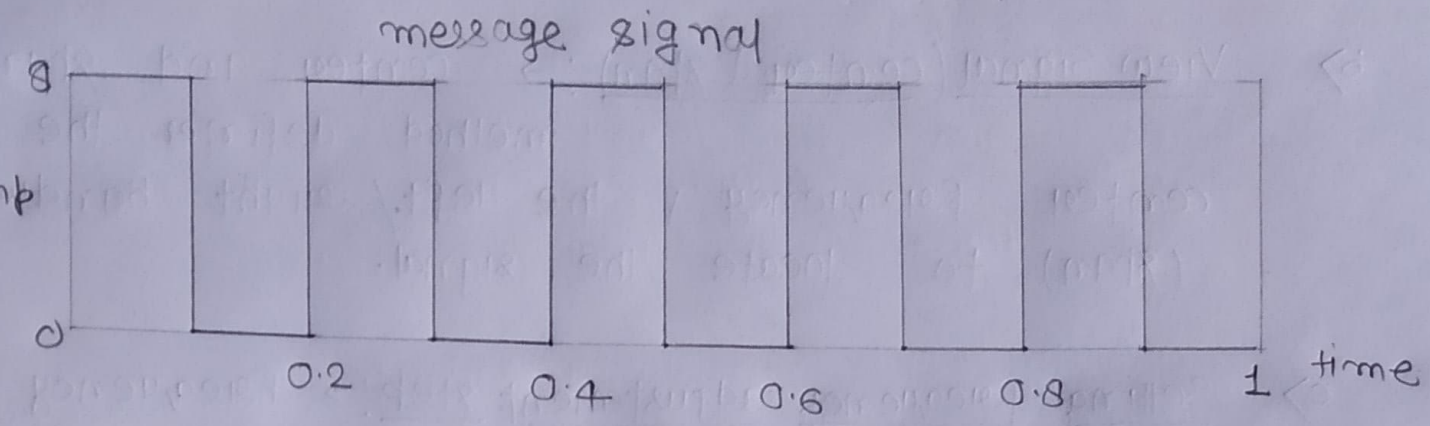


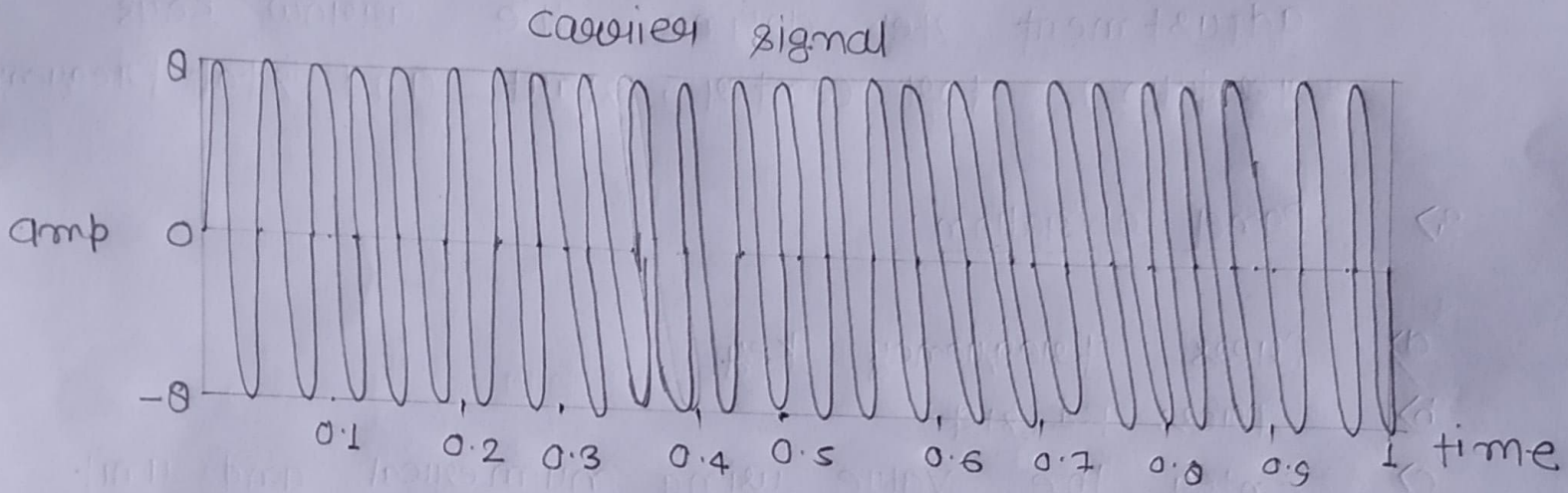
2) P.S.K

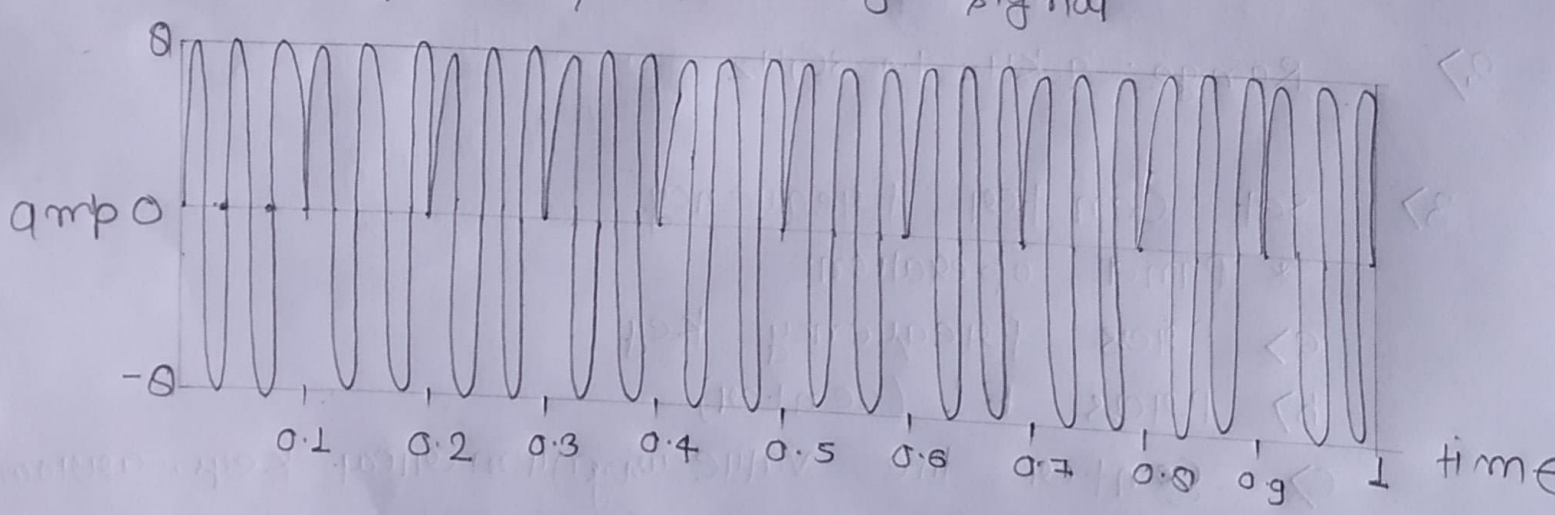
U19CS093

$f_c = 25Hz$, $f_p = 5Hz$

amp = 8



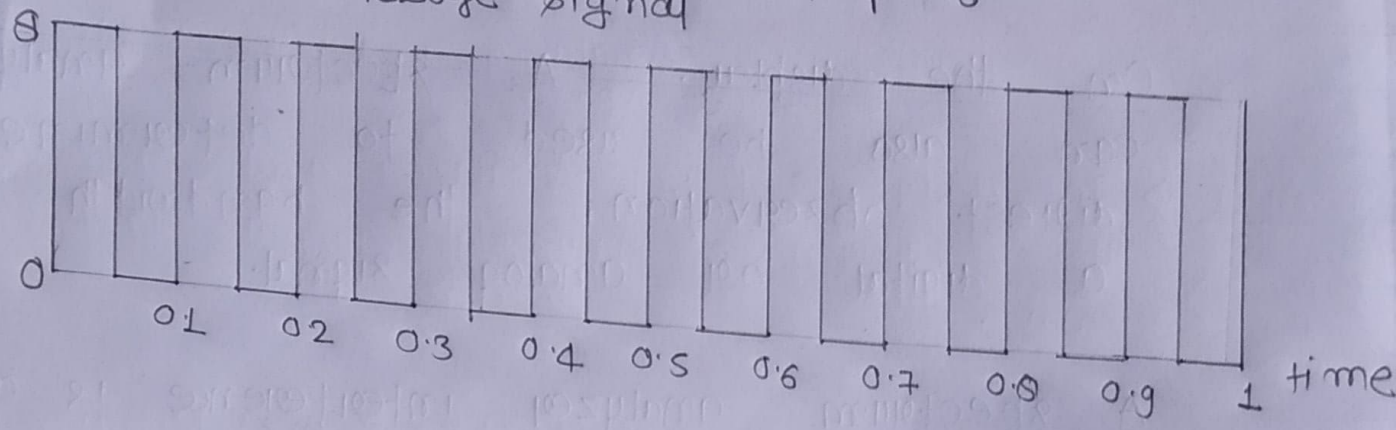




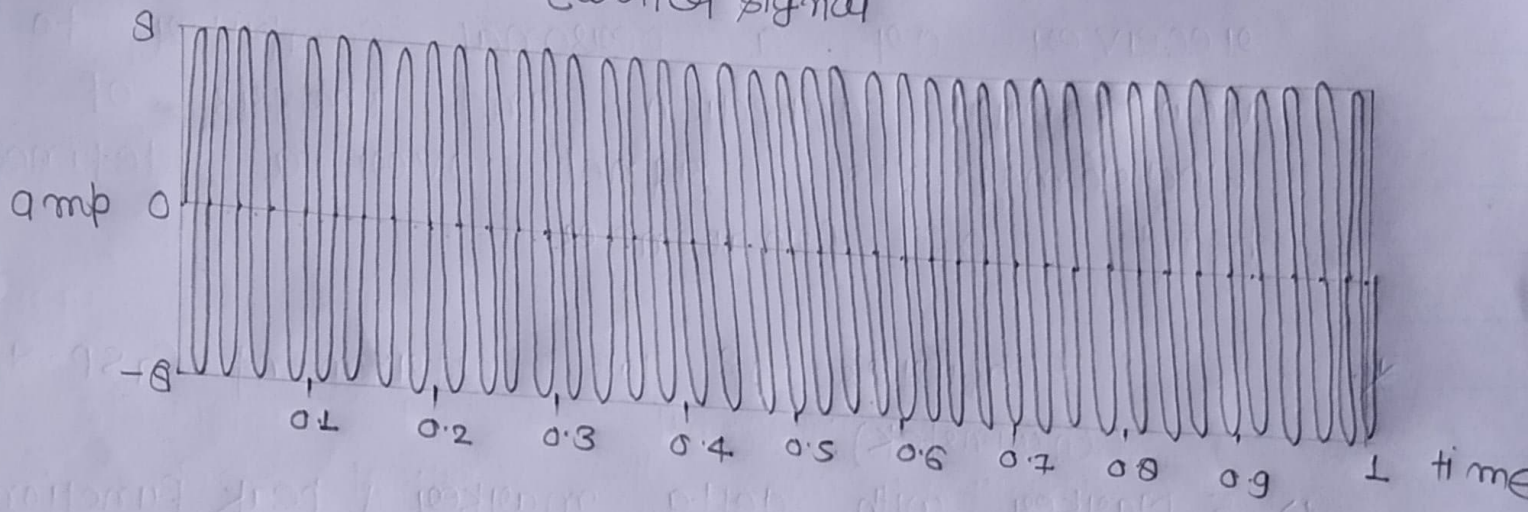
P.S.K

$f_c = 40Hz$; $f_p = 10Hz$

message signal amp = 8



Carrier signal



phase shift keying