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REGISTRATION NO.: 19BEC1278

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TDM&FDM

AIM: Write a MATLAB program to execute and display the output TDM and FDM.

SOFTWARE REQUIRED: MATLAB

THEORY:

FDM

frequency-division multiplexing (FDM) is a technique by which the total bandwidth available in a communication medium is divided into a series of non-overlapping frrequency , each of which is used to carry a separate signal. This allows a single transmission medium such as a cable or optical fiber to be shared by multiple independent signals. Another use is to carry separate serial bits or segments of a higher rate signal in parallel.

The most common example of frequency-division multiplexing is radio and television broadcasting, in which multiple radio signals at different frequencies pass through the air at the same time.

TDM

Time-division multiplexing (TDM) is a method of transmitting and receiving independent signals over a common signal path by means of synchronized switches at each end of the transmission line so that each signal appears on the line only a fraction of time in an alternating pattern. This method transmits two or more digital signals or analog signals over a common channel.

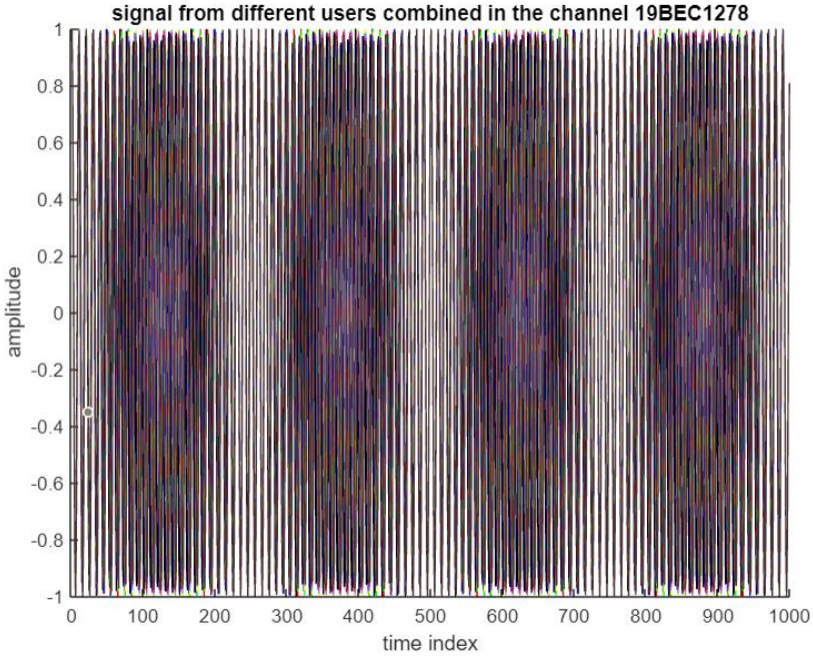
FDM:

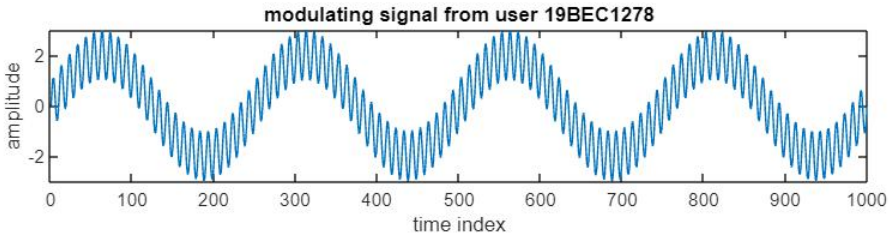
MATLAB CODE:

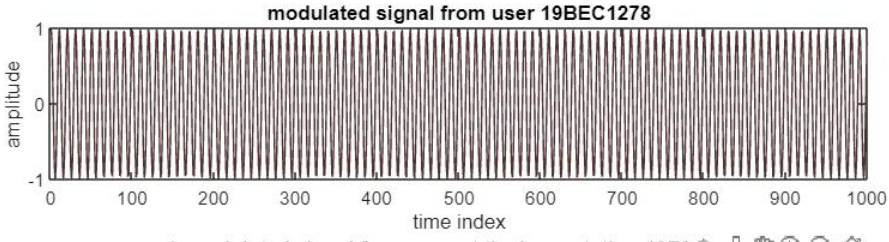
```
clc;
clear all
close all
samples=1000;
nos=8;
mfreq=[30 40 50 60 70 80 90 100];
cfreq=[300 600 900 1200 1500 1800 2100 2400];
freqdev=10;
t=linspace(0,1000,samples);
for i=1:nos
    m(i,:)=sin(2*pi*mfreq(1,i)*t)+2*sin(pi*8*t);
end
for i=1:nos
    y(i,:)=fmmod(m(i,:),cfreq(1,i),10*cfreq(1,i),freqdev);

end
ch_op=awgn(sum(y),0,'measured');
for i=1:nos
    z(i,:)=fmdemod(y(i,:),cfreq(1,i),10*cfreq(1,i),freqdev);

end

C={'k','b','r' ,'g','y',[.5 .6 .7],[.8 .2 .6],[.3 .2 .2]};
for i=1:nos
    figure(1)
    hold on
    plot(y(i,:),'color',C{i});
```

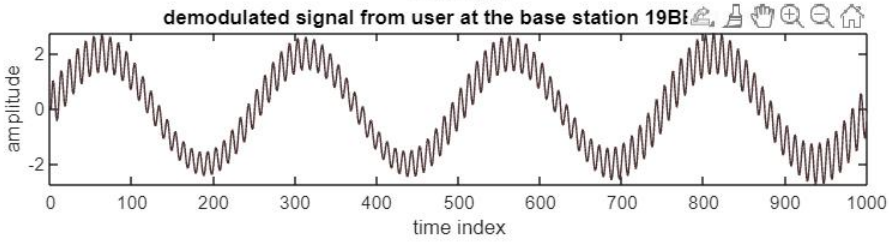
```
    xlabel('time index');
    ylabel('amplitude');
    title('signal from different users combined in the channel 19BEC1278')
    figure
    subplot(3,1,1)
    plot(m(i,:))
    xlabel('time index');
    ylabel('amplitude');
    title('modulating signal from user 19BEC1278')
    subplot(3,1,2)
    plot(y(i,:),'color',C{i});
    xlabel('time index');
    ylabel('amplitude');
    title('modulated signal from user 19BEC1278')
    subplot(3,1,3)
    plot(z(i,:),'color',C{i})
    xlabel('time index');
    ylabel('amplitude');
    title('demodulated signal from user at the base station 19BEC1278')
end
figure
plot(ch_op)
xlabel('time index');
ylabel('amplitude');
title('signal after passing through the channel 19BEC1278')
```

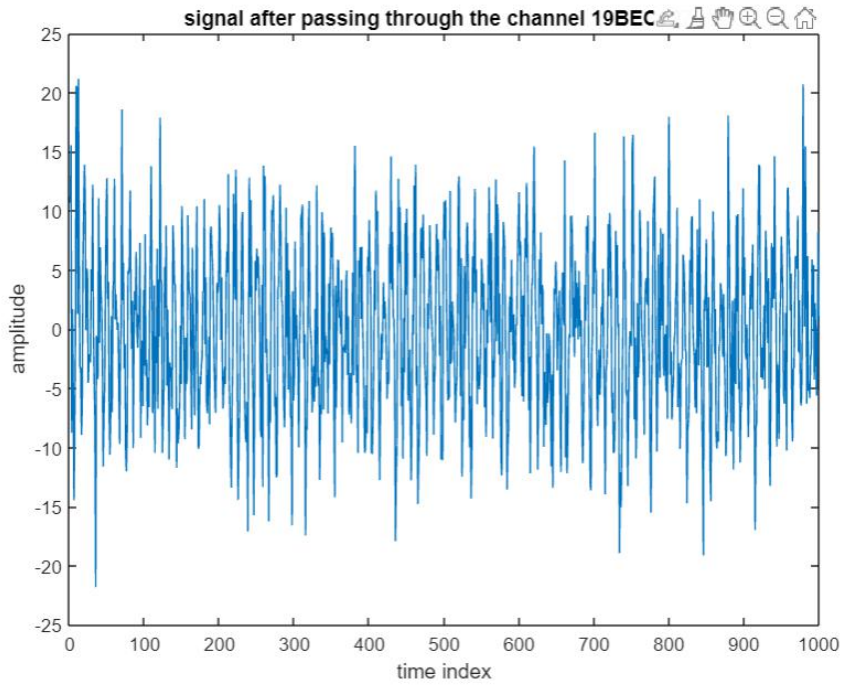
OUTPUT:


signal from different users combined in the channel 19BEC1278
amplitude
time index


modulating signal from user 19BEC1278
amplitude
time index


modulated signal from user 19BEC1278
amplitude
time index


demodulated signal from user at the base station 19BE
amplitude
time index



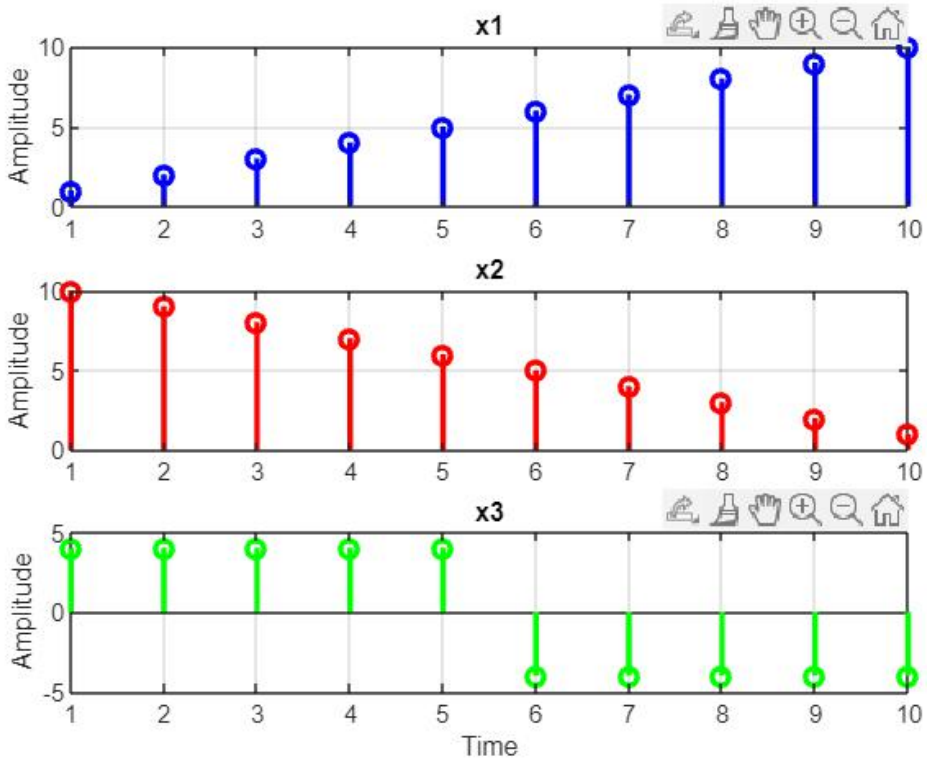
TDM:

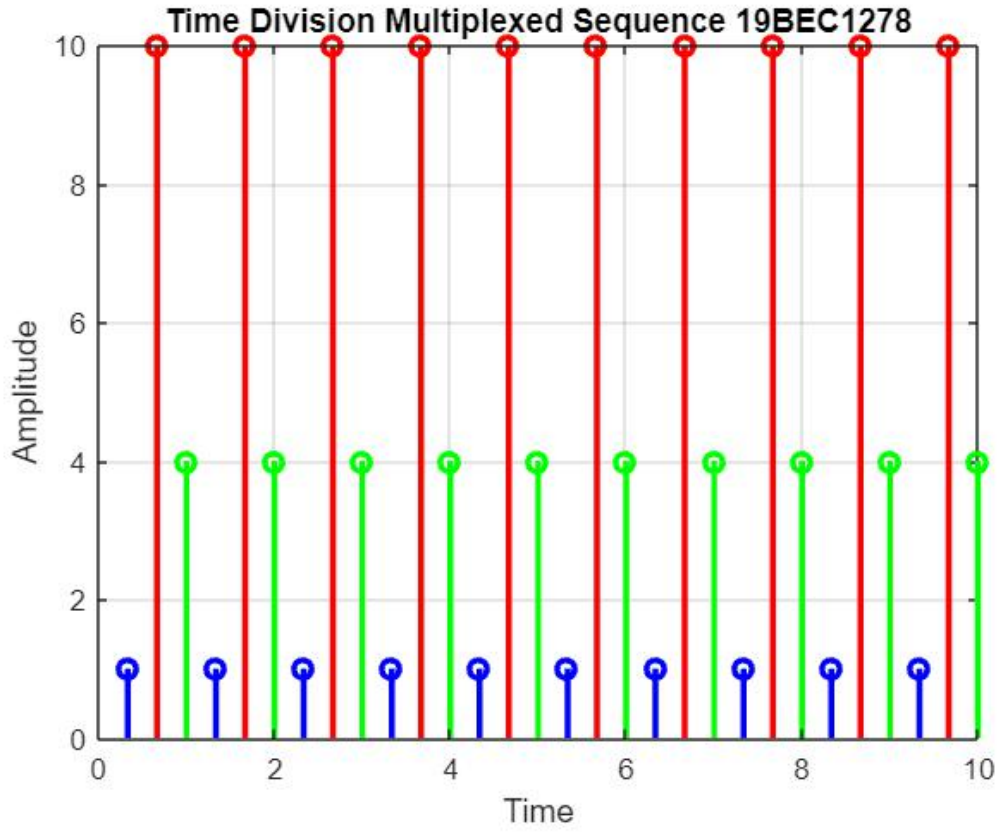
MATLAB CODE:

```
%% TDM

clc; clear;

close all;

x1=1:10,

x2=10:-1:1,

x3(1:5)=4,

x3(6:10)=-4,

x(1,:)=x1,

x(2,:)=x2,

x(3,:)=x3

[r c]=size(x);

k=0;

% Multiplexing

for i=1:c

    for j=1:r

        k=k+1;
```

```
        y(k)=x(j,1);
    end
end
% Plotting
color='ybrgmkc';
figure(1)
sig='x1';
for i=1:r
    sig(2)=i+48;
    j=mod(i,7)+1;
    subplot(r,1,i)
    stem(x(i,:),color(j),'linewidth',2)
    title(sig)
    ylabel('Amplitude')
    grid
end
xlabel('Time')
t=1/r:1/r:c;
figure(2)
for i=1:r
    j=mod(i,7)+1;
    stem(t(i:r:r*c),y(i:r:r*c),color(j),'linewidth',2)
    hold on
    grid
end
hold off
title(['Time Division Multiplexed Sequence 19BEC1278'])
xlabel('Time')
ylabel('Amplitude')
```

OUTPUT:


x1
Amplitude
x2
Amplitude
x3
Amplitude
Time


Time Division Multiplexed Sequence 19BEC1278
Amplitude
Time

INFERENCE:

Hence, a MATLAB program is implemented to execute and display the output of TDM and FDM.