EXPERIMENT 2

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To write a MATLAB script to study the basic operations on the Discrete–time signals.

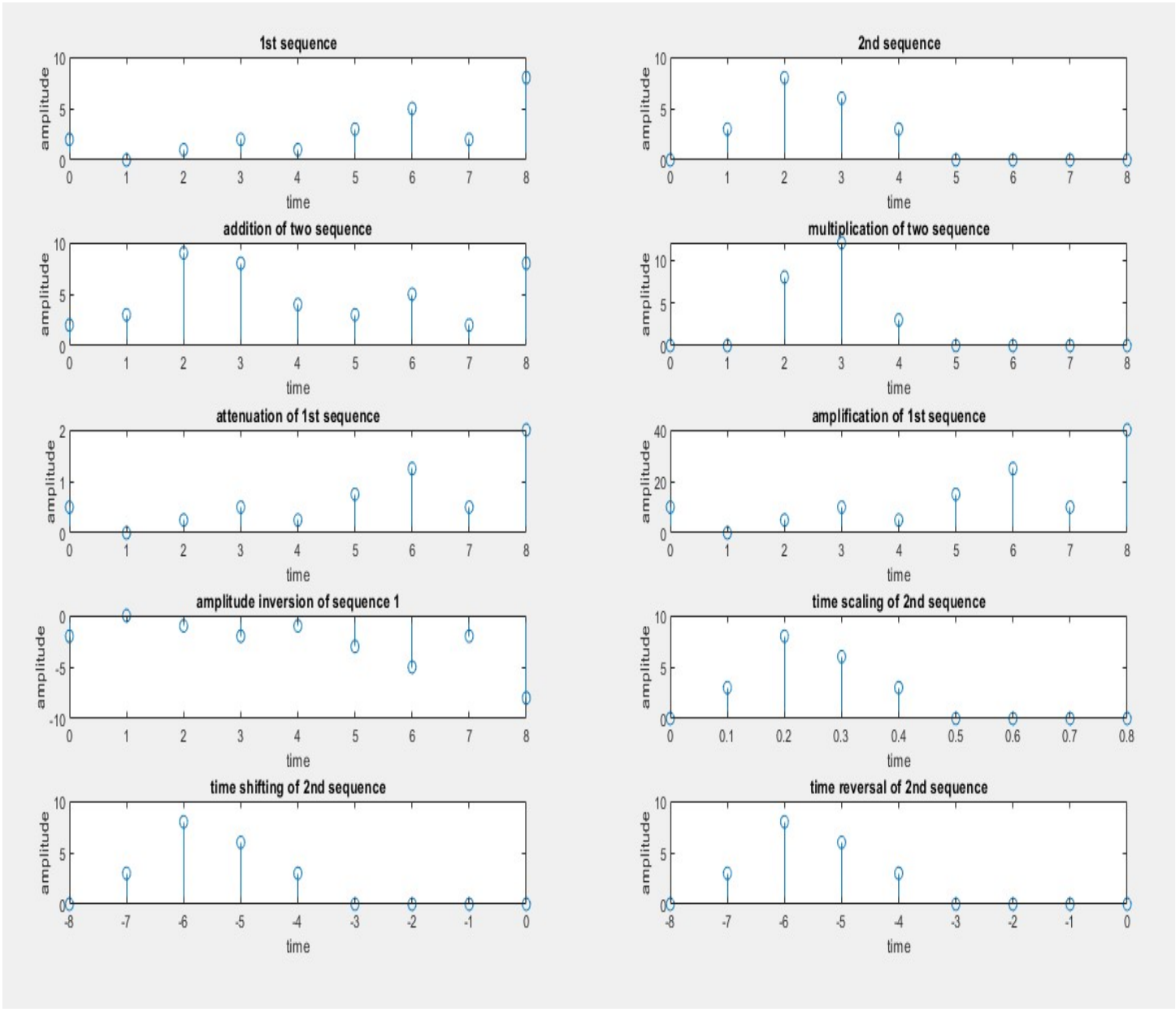
1) Amplitude manipulation
    i) Addition of two sequences
    ii) Multiplication of two sequences
    iii) Amplitude scaling
2) Time manipulation
    i) Time scaling
    ii) Time shifting
    iii) Time reversal

Code:

```
clc;    %clearing the screen
clear;  %clearing the variables
close all;  %closing all the previous windows

x1 = randi([0,9],1,randi(10));%generating the 1st sequence randomly
x2 = randi([0,9],1,randi(10));%generating the 2nd sequence randomly
n1 = length(x1); %length of the sequence
n2 = length(x2); %length of the sequence
n = max(n1,n2); % to have same length

if n1~=n2
    x1 = [x1, zeros(1,n-n1)]; %add zeros if needed
    x2 = [x2, zeros(1,n-n2)]; %add zeros if needed
end

subplot(5,2,1); %1st subplot
stem(0:n-1,x1); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('1st sequence'); %raw input sequence 1

subplot(5,2,2); %2nd subplot
stem(0:n-1,x2); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('2nd sequence'); %raw input sequence 2

% Amplitude Modulation
add = x1+ x2; %addition of two arrays
subplot(5,2,3); %3rd subplot
stem(0:n-1,add); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('addition of two sequence'); %addition of arrays
```

```
mul = x1 .* x2; %multiplication of two arrays
subplot(5,2,4); %3rd subplot
stem(0:n-1,mul); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('multiplication of two sequence'); %multiplication of arrays

atten = x1 .* .25; %attenuation of 1st array
subplot(5,2,5); %5th subplot
stem(0:n-1,atten); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('attenuation of 1st sequence'); %attenuation of 1st array

ampl = x1 .* 5; %amplification of 1st array
subplot(5,2,6); %5th subplot
stem(0:n-1,ampl); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('amplification of 1st sequence'); %amplification of 1st array

subplot(5,2,7); %7th subplot
stem(0:n-1,-x1); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('amplitude inversion of sequence 1'); %amplitude inversion of sequence 1


% Time Modulation

subplot(5,2,8); %8th subplot
stem((0:n-1)/10,x2); %discrete values of n/10 length
xlabel('time');
ylabel('amplitude');
title('time scaling of 2nd sequence'); %time scaling of 2nd sequence

subplot(5,2,9); %9th subplot
stem(-n+1:0,x2); %discrete values of n length
xlabel('time');
ylabel('amplitude');
title('time shifting of 2nd sequence'); %time shifting of 2nd sequence

subplot(5,2,10); %10th subplot
stem(-n+1:0,x2); %time reversed discrete values of n length
xlabel('time');
ylabel('amplitude');
title('time reversal of 2nd sequence'); %time reversal of 2nd sequence
```

Output:



Workspace

Name	Value
add	[2,3,9,8,4,3,5,2,8]
ampl	[10,0,5,10,5,15,25,10,40]
atten	[0.5000,0,0.2500,0.500...
mul	[0,0,8,12,3,0,0,0,0]
n	9
n1	9
n2	5
x1	[2,0,1,2,1,3,5,2,8]
x2	[0,3,8,6,3,0,0,0,0]