



**AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH
(AIUB)**

Faculty of Science & Technology
Undergraduate Program

Course: DATA COMMUNICATION

Fall 2022-23

Section:I

Group: 3

Lab Report-03

Submitted by

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Submitted to

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Performance Task for Lab Report: (your ID = AB-CDEFG-H)

****Generate a composite signal using two simple signals as,**

$x = A_1 \sin(2\pi((C+D+H)*100)t) + A_2 \cos(2\pi((D+E+H)*100)t) + s*\text{randn}(\text{size}(t));$

(a) Select the value of the amplitudes as follows: let $A_1 = (A+B+H)$, $A_2 = (B+C+H)$ and $s =$

$(C+D+H)/30$

(b) Calculate the SNR value of the composite signal.

(c) Find the bandwidth of the signal and calculate the maximum capacity of the channel.

(d) What will be the signal level to achieve the data rate?

Source Code::

```
clc
close all
A=2;%20-42556-1 Group member Id
B=0;
C=4;
D=2;
E=5;
F=5;
G=6;
H=1;
A1 = (A+B+H);
A2 = (B+C+H);
s =(C+D+H)/30;
fs=10000;
t=0:1/fs:3;
signal = A1*sin(2*pi*((C+D+H)*100)*t ) + A2*cos(2*pi*((D+E+H)*100)*t);
f1=(C+D+H)*100% frequency for 1st wavelength
f2=(D+E+H)*100%frequency for 2nd wavelength
noi_se=s*randn(size(t));
noisy_x= signal+noi_se;
ps=(A1^2)/2+(A2^2)/2;
pn=s^2;
% SNR value of the composite signal
SNR_theory = ps/pn
SNR_theory_db = 10*log10(SNR_theory)
SNR_matlab=snr(signal,noi_se)
%bandwidth of the signal and calculate the maximum capacity of the channel
bandwidth = obw(signal,fs)
Capacity = bandwidth*log2(1+SNR_theory)
%the signal level to achieve the data rate
signal_level= floor(2^(Capacity/(2*bandwidth)))
```

Command Window

f1 =

700

f2 =

800

SNR_theory =

312.2449

SNR_theory_db =

24.9450

fx

SNR_theory =

312.2449

SNR_theory_db =

24.9450

SNR_matlab =

24.9902

```
bandwidth =
```

```
100.5441
```

```
Capacity =
```

```
833.6263
```

```
signal_level =
```

```
17
```