Department of Electrical and Electronic Engineering

Chittagong University of Engineering & Technology

Course Outline and Lecture Plan

Session: 2016 – 2017

Course No. : EEE 368	**Course Title :** Telecommunication Engineering Sessional	
Level : 3	**Term :** II	**Credit :** 1.5

Course Teachers :

1. Name: Jobaida Akhtar

Website:

E-mail: lily05.eee@gmail.com

Phone: 01747051590

2. Name: Naqib Sad Pathan

Website:

E-mail: naqib051.buet@gmail.com

Phone: +88-01814-424386

Course Objective:

The main objective of this course is to provide students with a complete overview of Digital Modulation Techniques in order to carry out different types of performance analysis, system design in MATLAB, Simulink and hardware.

Expected Learning outcome:

After the successful completion of this course, the students will be able to do the following:

No.	Course Outcomes (COs)
1.	Simulate digital modulation techniques using Simulink.
2.	Perform these techniques in hardware.
3.	Analyze the performance of different modulation and demodulations schemes.
4.	Design and simulate a required system.
5.	Formulate reports using standard format.

Marks Distribution:

Attendance			**10%**
Class Performance	**Lab Reports**	**10%**	**60%**
	Lab Test/ Lab Task	**30%**	
	Project	**20%**	
Quiz			**15%**
Viva			**15%**
		Total	**100%**

Experiment No.	**Topics**
1	Design and simulation of ASK and PSK modulator and demodulator using Simulink.
2	Design and simulation of ASK and PSK modulator and demodulator using MATLAB editor.
3	Design and simulation of BFSK modulator and demodulator using Simulink and MATLAB.
4	Design and simulation of QPSK modulator and demodulator using Simulink and MATLAB.
5	Study of GSM system.
LABTEST	
PROJECT	
VIVA	
QUIZ	

Signature of Course Teacher-1

Signature of Course Teacher-2

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Chittagong University of Engineering and Technology

Course No. : EEE 368

Telecommunication Engineering Sessional

Experiment No.: 01

Name of the Experiment: ***Design and simulation of ASK and PSK modulator and demodulator using Simulink.***

OBJECTIVES:

- **To generate and demodulate amplitude shift keyed (ASK) signal using Simulink**
- **To generate and demodulate phase shift keyed (PSK) signal using Simulink**

Circuit diagram:

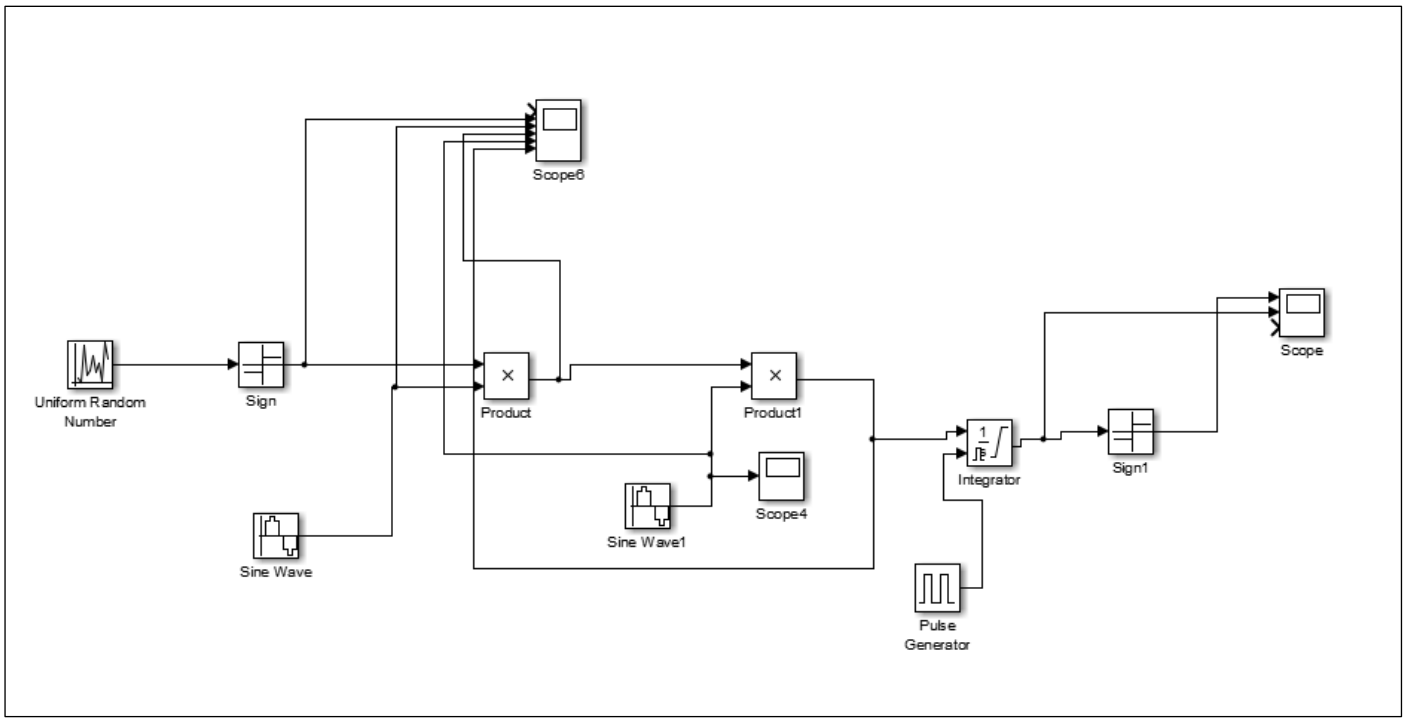

Figure 01: Simulink block diagram for generating and demodulating amplitude shift keyed (ASK) signal.

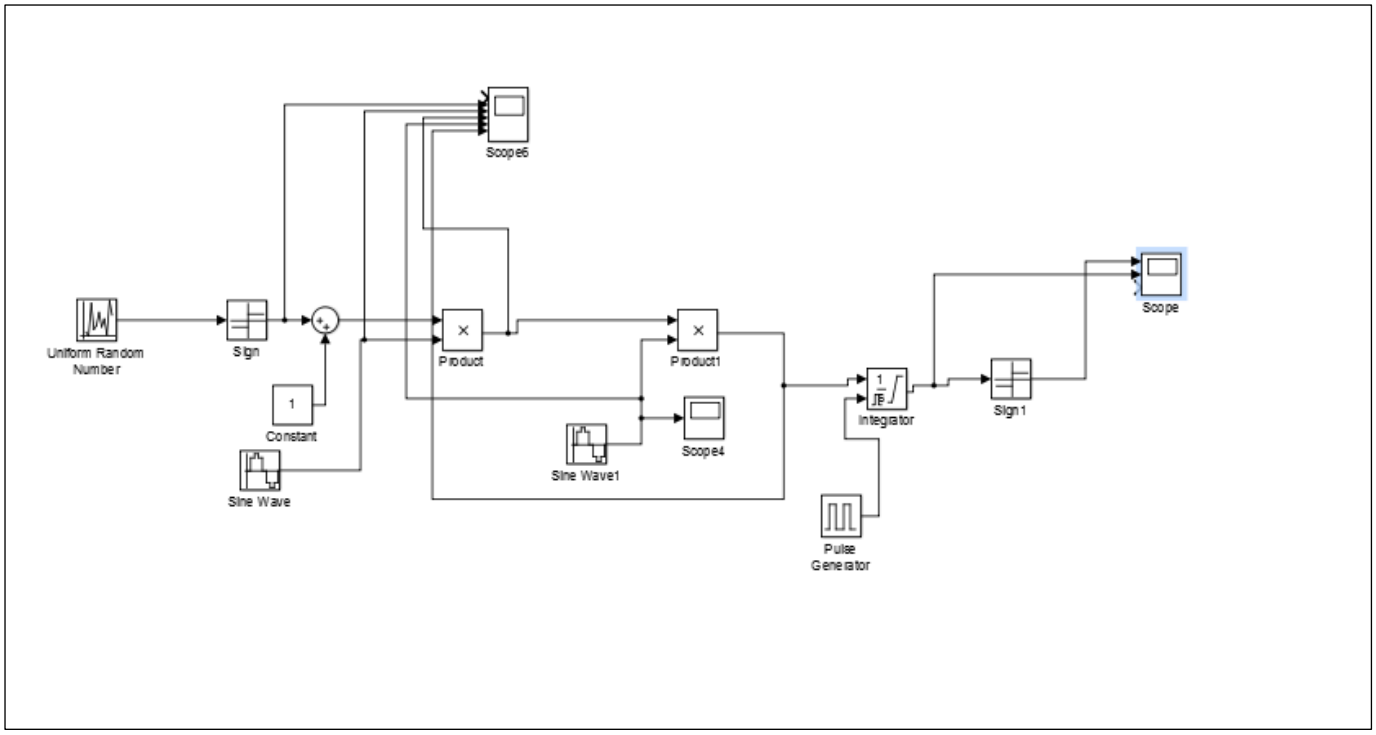

Figure 02: Simulink block diagram for generating and demodulating phase shift keyed (PSK) signal.

N.B. For completing circuit diagram and simulation follow the manual **"Simulink tutorial for Digital Modulation."**

Report:

1. Draw and simulate the block diagrams and attach all the waveforms of modulated and demodulated signals.
2. What are the advantages of ASK over PSK?
3. What are the advantages of PSK over ASK?

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Chittagong University of Engineering and Technology

Course No. : EEE 368

Telecommunication Engineering Sessional

Experiment No.: 02

Name of the Experiment: ***Design and simulation of ASK and PSK modulator and demodulator using MATLAB.***

OBJECTIVES:

- **To generate and demodulate amplitude shift keyed (ASK) signal using MATLAB**
- **To generate and demodulate phase shift keyed (PSK) signal using MATLAB**

MATLAB code for ASK modulation and demodulation:

```
%ASK Modulation

clc;
clear all;
close all;
%GENERATE CARRIER SIGNAL
Tb=1; fc=10;
Fs=100;
N=8;
t=(0:1/Fs:N-1/Fs)*Tb;
c=sqrt(2/Tb)*sin(2*pi*fc*t);
%generate message signal
m=round(rand(1,N));

for i=1:N
    if m(i)==1
        message1,(i-1)*(Tb*Fs)+1:i*(Tb*Fs))= ones(1,Tb*Fs);
    else
        message(1,(i-1)*(Tb*Fs)+1:i*(Tb*Fs))=zeros(1,Tb*Fs);
    end

end
ask_sig=message.*c;
%plot the message and ASK signal
subplot(5,1,1);axis([0 N -2 2]);stem(1:N,m);
subplot(5,1,2);axis([0 N -2 2]);plot(t,message,'r');
title('message signal');xlabel('t--->');ylabel('m(t)');grid on
hold on

%Plot the carrier signal and input binary data
subplot(5,1,3);plot(t,c);
title('carrier signal');xlabel('t--->');ylabel('c(t)');grid on
subplot(5,1,4);plot(t,ask_sig);
title('ASK signal');xlabel('t--->');ylabel('s(t)');grid on
hold on
```

```
%% DEMODULATION
ask_dmod=ask_sig.*c;
%%decision
for i=1:N
    integrator_div=sum(ask_dmod((i-1)*Fs*Tb+1:i*Fs*Tb))/Fs;
    if integrator_div>.5
        demod(i)=1;
    else
        demod(i)=0;
    end
end
bit_match=[m' demod']
%plot demodulated binary data bits
subplot(5,1,5);stem(demod);
title('ASK demodulated signal'); xlabel('n--->');ylabel('b(n)');grid on
```

Lab Work:

1. See the description of following functions in command window: rand, round, floor, ceil, ones, zeros, hold, grid, plot, subplot etc.
   Example: write ***help rand*** or ***doc rand*** and press enter in command window of matlab to see the descriptions.
   Run the program and observe all waveforms.
2. Modify the program to generate PSK modulator and demodulator.

Report:

1. Attach all the necessary waveforms of ASK and PSK modulation and demodulation.
2. Plot the frequency spectrum of ASK and PSK signal (SET Fs=10 for this simulation).
3. Plot the frequency spectrum of modulated ASK and PSK signal (SET Fs=10 and fc=3 for this simulation).
4. Which analog modulation is analogous to ASK?
5. Which analog modulation is analogous to PSK?

Code Snippet for Fourier transform:
(for clear visualization set Fs=10 for this part)

```
N_FFT=1024;
f=Fs*(-.5:1/N_FFT:.5-1/N_FFT);
MSG=fftshift(abs(fft(message,N_FFT)));
figure
plot(f,MSG)
```