Scilab Textbook Companion for Principle of Communication Engineering by A. Singh and A. K. Chhabra[1]

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May 13, 2014

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Book Description

Title: Principle of Communication Engineering

Author: A. Singh and A. K. Chhabra

Publisher: S. Chand And Co. Ltd., New Delhi

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Year: 2003

ISBN: 81-219-0476-5

Scilab numbering policy used in this document and the relation to the above book.

Exa Example (Solved example)

Eqn Equation (Particular equation of the above book)

AP Appendix to Example(Scilab Code that is an Appednix to a particular Example of the above book)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means a scilab code whose theory is explained in Section 2.3 of the book.

Contents

List of Scilab Codes

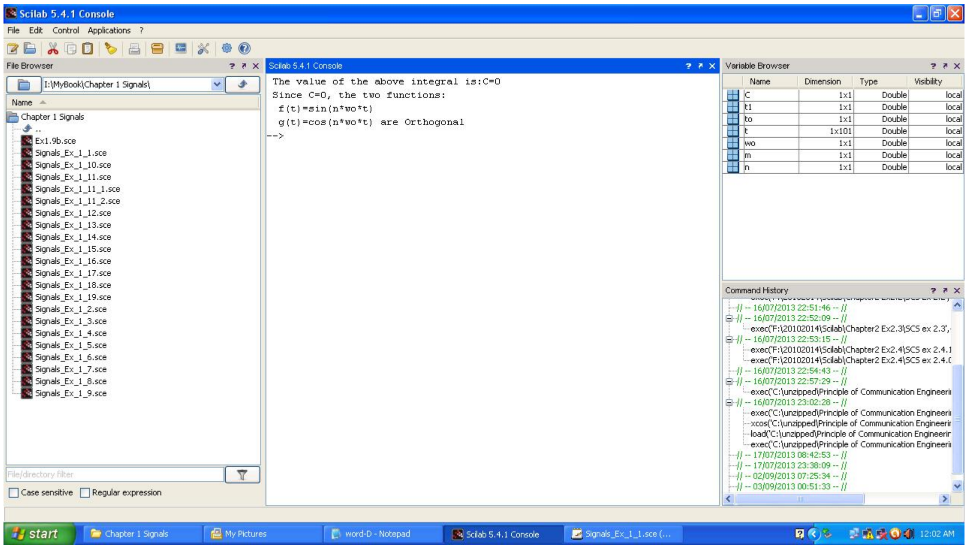
List of Figures

Chapter 1

Signals

Scilab code Exa 1.1 Signals Ex 1 1

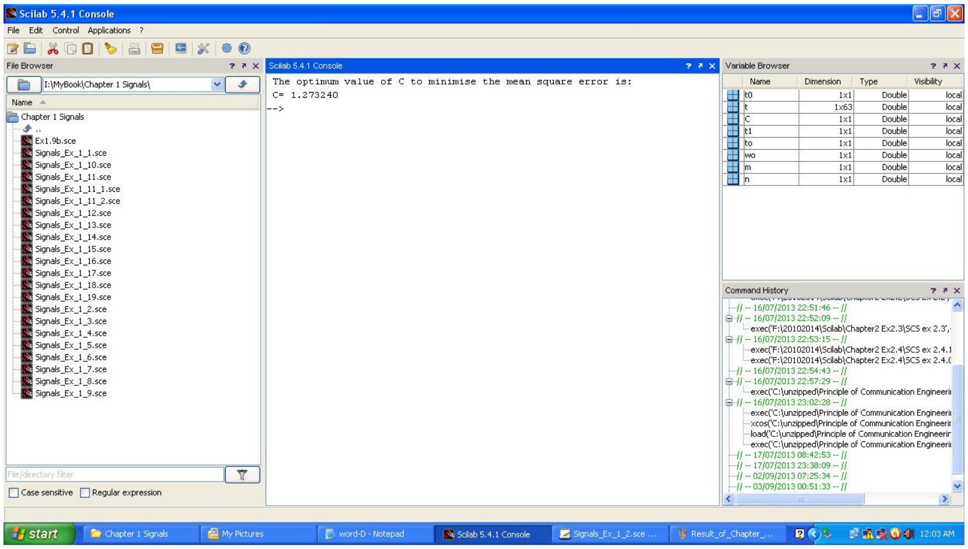
```
clc
//Chapter1: Signals
//Example1,page no12
//Given:
n=round(rand())//any integers
m=round(rand())//any integers
wo=2*(n+m)*%pi//Angular Freq
t=0:0.01:2*%pi/wo
to=0,t1=2*%pi/wo
C= integrate('sin(n*wo*t)*cos(m*wo*t)','t',to,t1)//integrating sin(n*wo*t)*cos(m*wo*t) function
mprintf('The value of the above integral is:C=%d\n Since C=%d, the two functions: \n  f(t)=sin(n*wo*t)\n  g(t)=cos(n*wo*t) are Orthogonal',C,C)
```



```
 The value of the above integral is:C=0
 Since C=0, the two functions:
  f(t)=sin(n*wo*t)
  g(t)=cos(n*wo*t) are Orthogonal
-->
```

Name	Dimension	Type	Visibility
C	1x1	Double	local
t1	1x1	Double	local
to	1x1	Double	local
t	1x101	Double	local
wo	1x1	Double	local
m	1x1	Double	local
n	1x1	Double	local

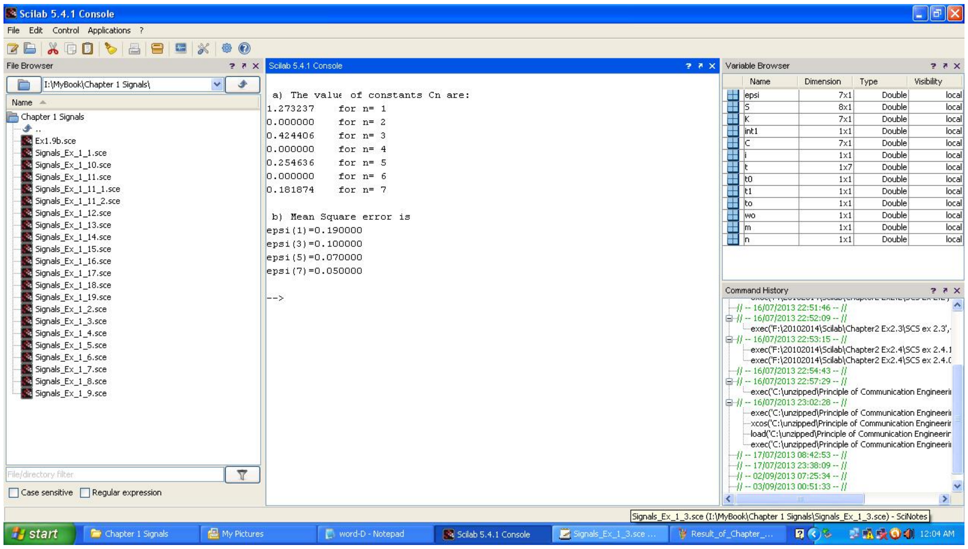
Figure 1.1: Signals Ex 1 1



```
 The optimum value of C to minimise the mean square error is:
 C= 1.273240
-->
```

Name	Dimension	Type	Visibility
t0	1x1	Double	local
t	1x63	Double	local
C	1x1	Double	local
t1	1x1	Double	local
to	1x1	Double	local
wo	1x1	Double	local
m	1x1	Double	local
n	1x1	Double	local

Figure 1.2: Signals Ex 1 2



```
 a) The value of constants Cn are:
1.273237    for n= 1
0.000000    for n= 2
0.424406    for n= 3
0.000000    for n= 4
0.254636    for n= 5
0.000000    for n= 6
0.181874    for n= 7

 b) Mean Square error is
epsi(1)=0.190000
epsi(3)=0.100000
epsi(5)=0.070000
epsi(7)=0.050000

-->
```

Name	Dimension	Type	Visibility
epsi	7x1	Double	local
S	8x1	Double	local
K	7x1	Double	local
int1	1x1	Double	local
C	7x1	Double	local
i	1x1	Double	local
t	1x7	Double	local
t0	1x1	Double	local
t1	1x1	Double	local
to	1x1	Double	local
wo	1x1	Double	local
m	1x1	Double	local
n	1x1	Double	local

```
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
```

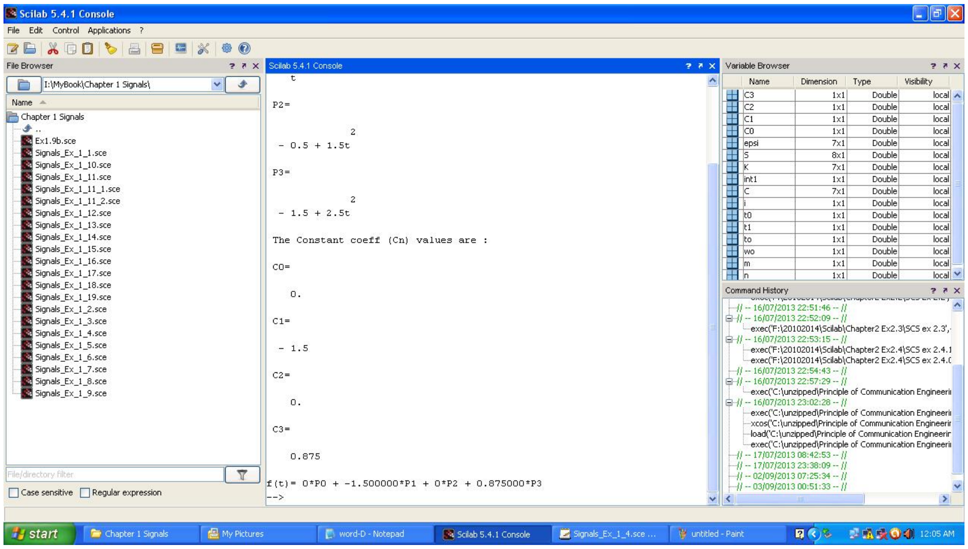
Figure 1.3: Signals Ex 1 3

Scilab code Exa 1.2 Signals Ex 1 2

```
clc
//Chapter1: Signals
//Example1,page no 12
//Given:
// Curve on page no 9....fig 1.6
t=0:0.1:2*%pi,t0=0,t1=2*%pi
C=((integrate('sin(t)','t',t0,t1/2)-integrate('sin(t)','t',t1/2,t1))/integrate('(sin(t))^2','t',t0,t1))

mprintf('The optimum value of C to minimise the mean square error is:\n C= %f',C)
```

Scilab code Exa 1.3 Signals Ex 1 3

```
clc
//Chapter1: Signals
//Example2,page no12
//Given:
//a  // Referance Figure on page no 9.. (1.6d)
t=0:2*3.14,t0=0,t1=2*3.14
disp('a) The value of constants Cn are:')
for i=1:7
    C(i)=((integrate('sin(i*t)','t',t0,t1/2)-integrate('sin(i*t)','t',t1/2,t1))/integrate('(sin(i*t))^2','t',t0,t1))
    if C(i)<=0.01 then C(i)=0
    end
    mprintf('%f    for n= %d\n',C(i),i)
end
//b Mean Square error

int1=integrate('(1)^2','t',t0,t1)
for n=1:7
    if modulo(n,2)==0 then
        C(n)=0
    else
    C(n)=4/(n*%pi)
end
end
for n=1:7

    K(n)=integrate('(sin(n*t))^2','t',t0,t1)

end
K(n)=%pi

for n=1:7
S(1)=0
    S(n+1)=S(n)+(((C(n))^2)*K(n))

end
//Mean Square error
```



```
    t

 P2=

                 2
  - 0.5 + 1.5t

 P3=

                 2
  - 1.5 + 2.5t

 The Constant coeff (Cn) values are :

 C0=

    0.

 C1=

  - 1.5

 C2=

    0.

 C3=

    0.875

f(t)= 0*P0 + -1.500000*P1 + 0*P2 + 0.875000*P3
-->
```

Name	Dimension	Type	Visibility
C3	1x1	Double	local
C2	1x1	Double	local
C1	1x1	Double	local
C0	1x1	Double	local
epsi	7x1	Double	local
S	8x1	Double	local
K	7x1	Double	local
int1	1x1	Double	local
C	7x1	Double	local
i	1x1	Double	local
t0	1x1	Double	local
t1	1x1	Double	local
to	1x1	Double	local
wo	1x1	Double	local
m	1x1	Double	local
n	1x1	Double	local

```
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
```

Figure 1.4: Signals Ex 1 4

```
for n=1:7
    epsi(n)=(1/(t1-t0)*(int1-S(n+1)))
end
disp('b) Mean Square error is')
for n=1:2:7
mprintf('epsi(%d)=%f\n',n,round(100*epsi(n))/100)

end
```

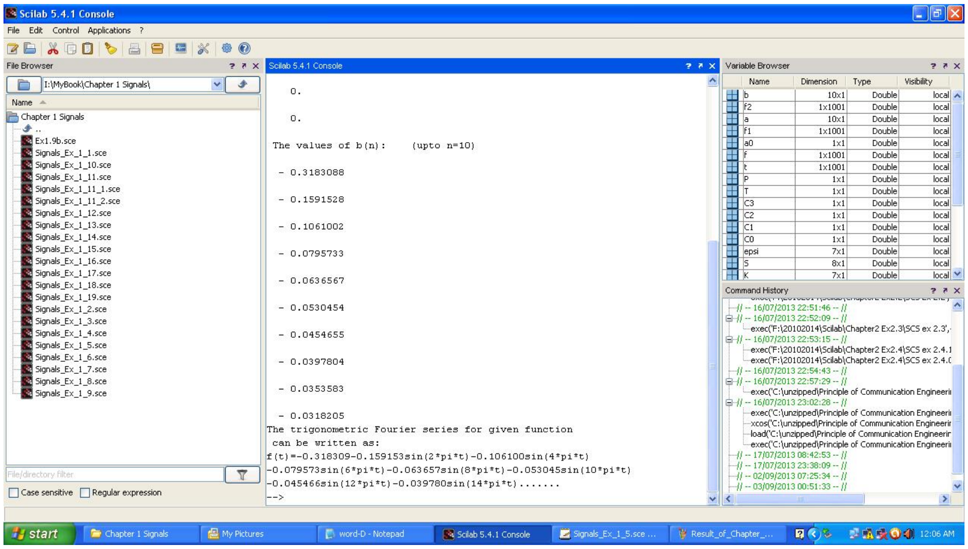
Scilab code Exa 1.4 Signals Ex 1 4

```
clc
//Chapter1: Signals
//Example1, page no12
//Given:
t=-1:0.01:1,t0=-1,t1=1
```

```
// Legendre Polynomial
t=poly(0,"t")
P0=poly(1,"t","c")
P1=poly([0,1],"t","c")
P2=poly([-0.5,0,1.5],"t","c")
P3=poly([-1.5,0,2.5,0],"t","c")
disp(P3,'P3=',P2,'P2=',P1,'P1=',P0,'P0=')
//The Constant coeff (Cn)
C0=0.5*(integrate('1','t',-1,0)+integrate('-1','t',0,1))
C1=1.5*(integrate('t','t',-1,0)+integrate('-t','t',0,1))
C2=2.5*(integrate('(1.5*t^2)-0.5','t',-1,0)+integrate('-(1.5*t^2)+0.5','t',0,1))
C3=3.5*(integrate('(2.5*t^3)-(1.5*t)','t',-1,0)+integrate('-(2.5*t^3)+(1.5*t)','t',0,1))
disp('The Constant coeff (Cn) values are :')
disp(C3,'C3=',C2,'C2=',C1,'C1=',C0,'C0=')
mprintf('\nf(t)= %d*%s + %f*%s + %d*%s + %f*%s',C0,"P0",C1,"P1",C2,"P2",C3,"P3")
```

Scilab code Exa 1.5 Signals Ex 1 5

```
clc
//Chapter 1 Signals
//Example 1.5, page no 19
//given
T=1,t0=0,wo=2*%pi
P=1
t=0:0.001:1
f=P*t
//The trigonometric Fourier series coeff for given function
```

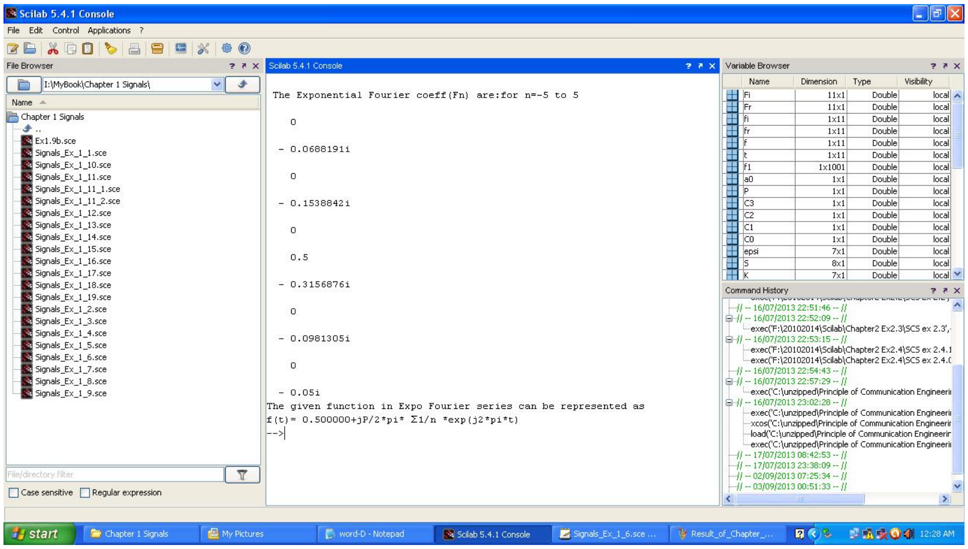


```
    0.

    0.

 The values of b(n):    (upto n=10)

  - 0.3183088

  - 0.1591528

  - 0.1061002

  - 0.0795733

  - 0.0636567

  - 0.0530454

  - 0.0454655

  - 0.0397804

  - 0.0353583

  - 0.0318205
The trigonometric Fourier series for given function
 can be written as:
f(t)=-0.318309-0.159153sin(2*pi*t)-0.106100sin(4*pi*t)
-0.079573sin(6*pi*t)-0.063657sin(8*pi*t)-0.053045sin(10*pi*t)
-0.045466sin(12*pi*t)-0.039780sin(14*pi*t).......
-->
```

Name	Dimension	Type	Visibility
b	10x1	Double	local
f2	1x1001	Double	local
a	10x1	Double	local
f1	1x1001	Double	local
a0	1x1	Double	local
f	1x1001	Double	local
t	1x1001	Double	local
P	1x1	Double	local
T	1x1	Double	local
C3	1x1	Double	local
C2	1x1	Double	local
C1	1x1	Double	local
C0	1x1	Double	local
epsi	7x1	Double	local
S	8x1	Double	local
K	7x1	Double	local

Figure 1.5: Signals Ex 1 5

```
a0=(1/T)*inttrap(t,f)

for n=1:10
    f1=(P*t).*cos(wo*n*t)
    a(n)=(2/T)*inttrap(t,f1)
    if a(n)<0.01 then
        a(n)=0
    end
end
for n=1:10
    f2=(P*t).*sin(2*%pi*(1/T)*n*t)
    b(n)=(2/T)*inttrap(t,f2)
end
// Displaying trigonometric Fourier series coeff
mprintf('The value of a0 is: %f\n',a0)
disp('The values of a(n):    (upto n=10)')
for n=1:10
    disp(a(n))
end
disp('The values of b(n):     (upto n=10)')
```



```
 The Exponential Fourier coeff(Fn) are:for n=-5 to 5

    0

  - 0.0688191i

    0

  - 0.1538842i

    0

    0.5

  - 0.3156876i

    0

  - 0.0981305i

    0

  - 0.05i
The given function in Expo Fourier series can be represented as
f(t)= 0.500000+jP/2*pi* Σ1/n *exp(j2*pi*t)
-->
```

Name	Dimension	Type	Visibility
Fi	11x1	Double	local
Fr	11x1	Double	local
fi	1x11	Double	local
fr	1x11	Double	local
f	1x11	Double	local
t	1x11	Double	local
f1	1x1001	Double	local
a0	1x1	Double	local
P	1x1	Double	local
C3	1x1	Double	local
C2	1x1	Double	local
C1	1x1	Double	local
C0	1x1	Double	local
epsi	7x1	Double	local
S	8x1	Double	local
K	7x1	Double	local

Figure 1.6: Signals Ex 1 6

```
for n=1:10
    disp(b(n))
end
mprintf('The trigonometric Fourier series for given
   function\n can be written as:\n')
mprintf('f(t)=%f%fsin(2*pi*t)%fsin(4*pi*t)\n%fsin(6*
   pi*t)%fsin(8*pi*t)%fsin(10*pi*t)\n%fsin(12*pi*t)
   %fsin(14*pi*t).......',b(1),b(2),b(3),b(4),b(5),b
   (6),b(7),b(8))
```

Scilab code Exa 1.6 Signals Ex 1 6

```
clc
//Chapter 1 Signals
//Example 1.6, page no 21
//given
```

```

t0=1,T=1,w0=2*3.14/T,P=1
t=0:0.1:1
f=P*t// function f(t)=P*t, 0<t<1
a=1
disp('The Exponential Fourier coeff(Fn) are:for n=-5 to 5')
for n=-5:5// Calculating the fourier coeff
    fr=f.*cos(%pi*n*t/T)
    Fr(a)=inttrap(t,fr)
    fi=f.*sin(%pi*n*t/T)
    Fi(a)=inttrap(t,fi)
    if Fr(a)<0.01 then Fr(a)=0
    end
    if Fi(a)<0.01 then
        Fi(a)=0
    end
    disp(Fr(a)-%i*Fi(a))
    a=a+1
end
mprintf('The given function in Expo Fourier series can be represented as \n')
mprintf('f(t)= %f+jP/2*pi*    1/n *exp(j2*pi*t)',P/2)
```

Scilab code Exa 1.7 Signals Ex 1 7

```
clc
close
clear
//Chapter 1 Signals
//Example 1.7, page no 22
//given
```

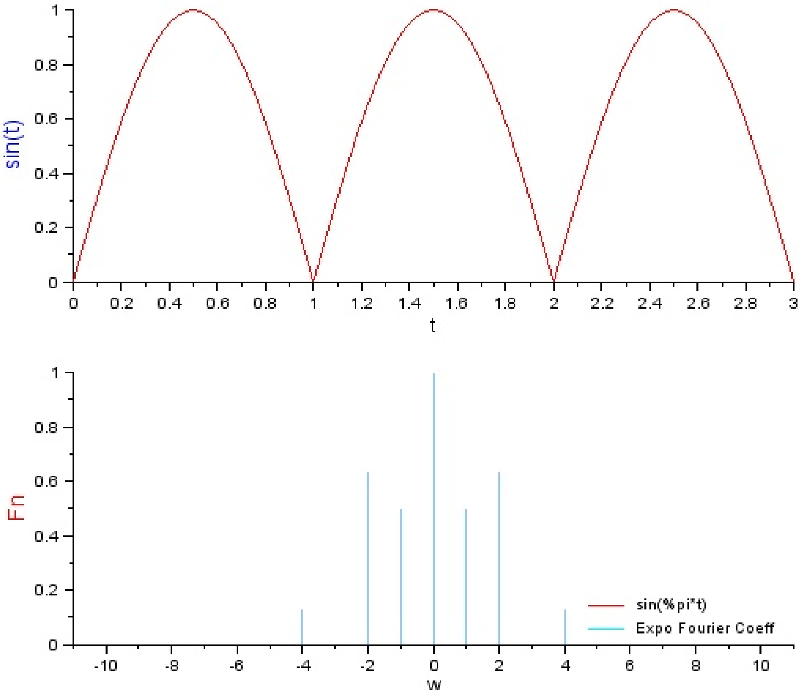


Figure 1.7: Signals Ex 1 7

```
V=1
t0=1,T=1,w0=2*3.14/T,P=1
t=0:0.01:3
f=V*abs(sin(%pi*t))
//The Expo fourier series coeff
disp('The Expo fourier series coeff are: for n=-5 to 5')
a=1
for n=-5:5
    fr=f.*cos(%pi*n*t/T)
    Fr(a)=inttrap(t,fr)
    fi=f.*sin(%pi*n*t/T)
    Fi(a)=inttrap(t,fi)

    mag(a)=abs(Fr(a)+%i*Fi(a))

    disp(Fr(a)-(%i*Fi(a)))
    x(1 ,size(t,2))=0
    x=x+((Fr(a))-%i*Fi(a)).*(cos(%pi*n*t/T)+%i*sin(%pi*n*t/T))
    a=a+1
end
mprintf('The given function in Expo Fourier series can be represented as \n')
mprintf('f(t)= 2V/pi -2V*exp(j2*pi*t)/3*pi -2V*exp(j2*pi*t)/15*pi\n        -2V*exp(j2*pi*t)/35*pi ...\n      -2V*exp(-j2*pi*t)/3*pi -2V*exp(-j2*pi*t)/15*pi...')
n=-5:5
subplot(2,1,1),plot2d(t,f,style=5)// Rectified sine function Plot
xlabel("t", "fontsize", 2);
ylabel("sin(t)", "fontsize", 3, "color", "blue");
subplot(2,1,2),plot2d3(n,mag,12,rect=[-11,0,11,1],style=4)//Plot of the magnitude of the Fourier coeff
xlabel("w", "fontsize", 2);
ylabel("Fn", "fontsize", 3, "color", "red");
```

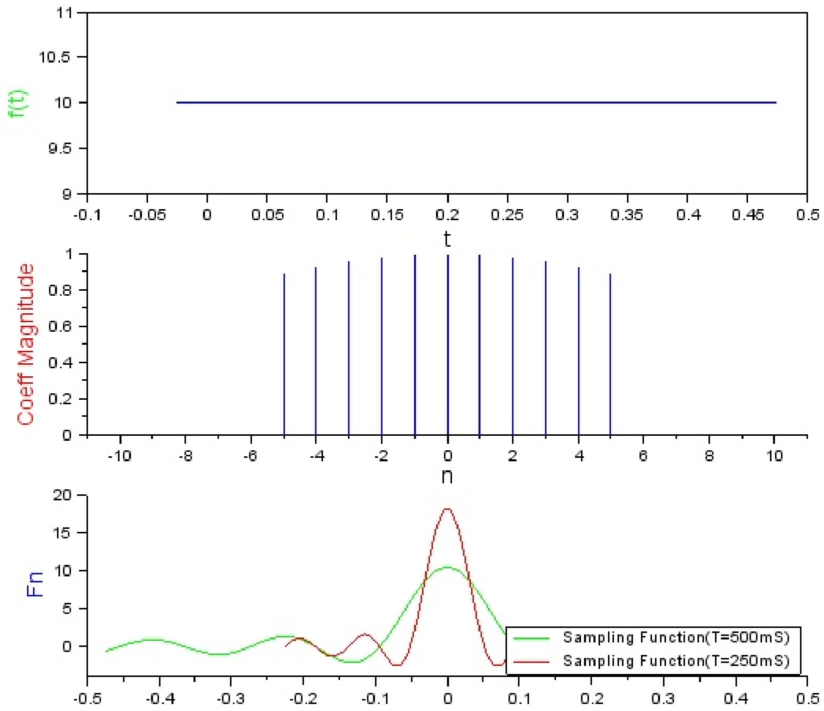


Figure 1.8: Signals Ex 1 8

```
legends(["sin(%pi*t)";"Expo Fourier Coeff"],[5,4],
    with_box=%f, opt="lr" )
```

Scilab code Exa 1.8 Signals Ex 1 8

```
clc
clear
close
//Chapter 1 Signals
//Example 1.8, page no 24
//given
```

```

T=500e-3,w0=2*%pi/T,d=50e-3,A=10
t=-d/2:0.01:T-d/2
t1=-d/2:0.01:d/2
f1=A
t2=d/2:0.01:T-(d/2)
f2=0
a=1
disp('The fourier series coeff Fn are:')
for n=-5:5
    if n==0 then
       Fr(a)=1,Fi(a)=0
    else
    fa1=f1.*cos(%pi*n*t1/T)
    fa2=f2.*cos(%pi*n*t2/T)
     fb1=f1.*sin(%pi*n*t1/T)
    fb2=f2.*sin(%pi*n*t2/T)
    end
    Fr(a)=1/T*(inttrap(t1,fa1)+inttrap(t2,fa2))
    Fi(a)=1/T*(inttrap(t1,fb1)+inttrap(t2,fb2))
    mag(a)=abs(Fr(a)+%i*Fi(a))
    //  disp(mag(a))
    disp(Fr(a)-%i*Fi(a))
     x(1,size(t,2))=0
    x=x+((Fr(a))-%i*Fi(a)).*(cos(%pi*n*t/T)+%i*sin(%pi*n*t/T))
    a=a+1

end
n=-5:5
subplot(3,1,1),plot(t,f1)
xlabel("t", "fontsize", 3);
ylabel("f(t)", "fontsize", 3, "color", "green");
subplot(3,1,2),plot2d3(n,mag,2,rect=[-11,0,11,1])//expo fourier series coeff
xlabel("n", "fontsize", 3);
ylabel("Coeff Magnitude", "fontsize", 3, "color", "red");
```

```
subplot(3,1,3),plot2d(t,x,style=3),plot2d(-t,x,style=3) // one sided spectrum with T=500ms
xlabel("w", "fontsize", 3);
ylabel("Fn", "fontsize", 3, "color", "blue");
legends(['Sampling Function(T=500mS)';'Sampling Function(T=250mS)'],[3,5],opt="lr")
T1=T/2
t=-d/2:0.01:T1-d/2
t1=-d/2:0.01:d/2
f1=A
t2=d/2:0.01:T1-(d/2)
f2=0
//The Expo fourier series coeff
for n=-5:5
    if n==0 then
       Fr1(a)=1,Fi1(a)=0
    else
    fr1=f1.*cos(%pi*n*t1/T1)
    fr2=f2.*cos(%pi*n*t2/T1)
     fi1=f1.*sin(%pi*n*t1/T1)
    fi2=f2.*sin(%pi*n*t2/T1)
    end
    Fr1(a)=1/T1*(inttrap(t1,fr1)+inttrap(t2,fr2))
    Fi1(a)=1/T1*(inttrap(t1,fi1)+inttrap(t2,fi2))
    mag(a)=abs(Fr1(a)+%i*Fi1(a))
    disp(Fr1(a)-%i*Fi1(a))
     y(1,size(t,2))=0
    y=y+((Fr1(a))-%i*Fi1(a)).*(cos(%pi*n*t/T1)+%i*sin(%pi*n*t/T1))
     a=a+1
end
plot2d(t,y, style=5),plot2d(-t,y,style=5)// double sided spectrum with T=250ms
```

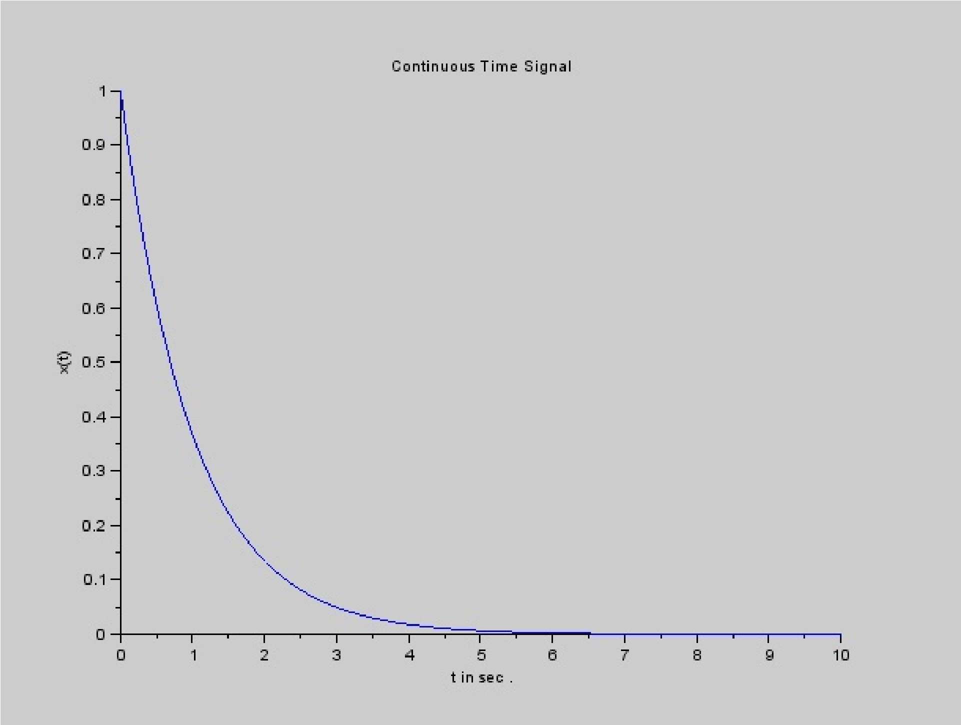


Figure 1.9: Signals Ex 1 9

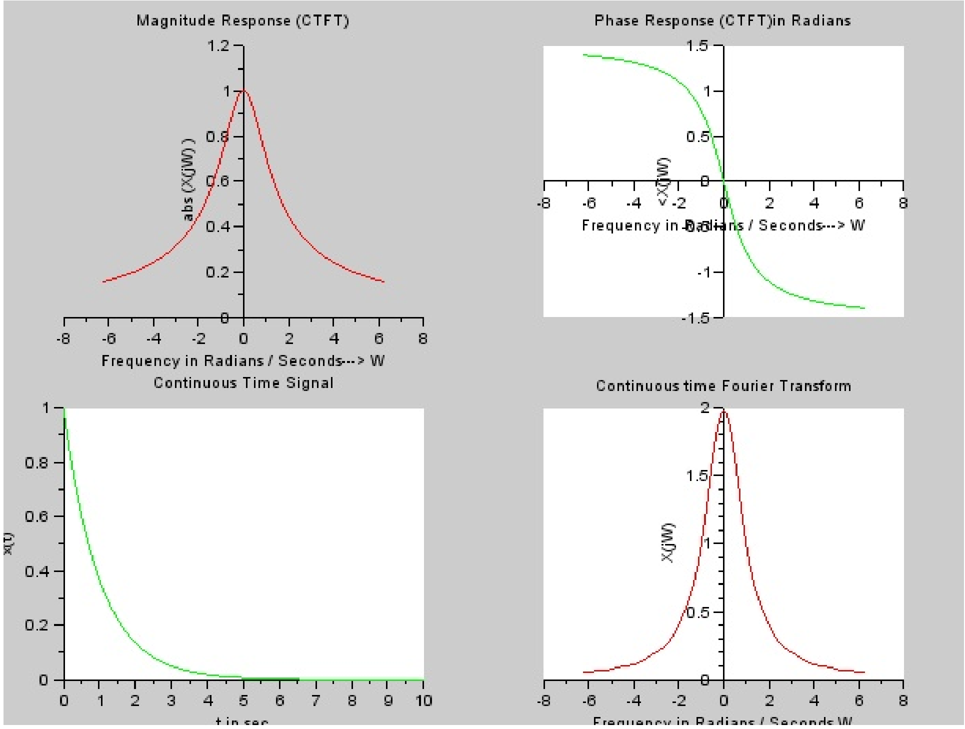


Figure 1.10: Signals Ex 1 9

Scilab code Exa 1.9 Signals Ex 1 9

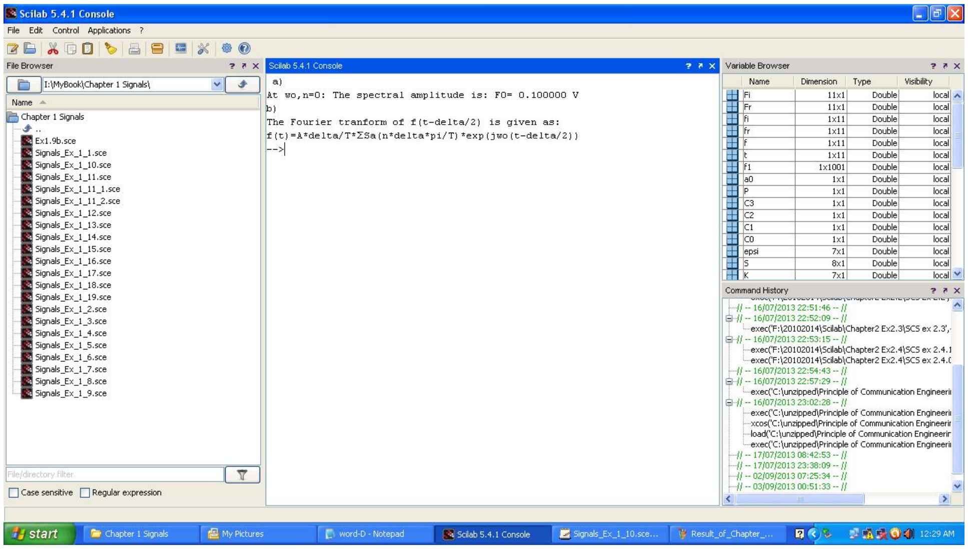
```
clc; clear;close;
//Chapter1: Signals
//Example 1.9a,page no12
//Given:
// Analog Signal
A =1; // Amplitude
Dt = 0.005;
t = 0: Dt :10;
xt = exp(-A*t);
// Continuous time Fourier Transform
Wmax =2*%pi*1; // Analog Frequency = 1Hz
K = 4;
k = 0:(K/1000):K;
W = k* Wmax /K;
XW = xt*exp(-sqrt(-1)*t'*W)*Dt
XW_Mag =abs(XW);
W = [-mtlb_fliplr(W),W(2:1001)]; // Omega from -Wmax to Wmax
XW_Mag=[mtlb_fliplr(XW_Mag ),XW_Mag(2:1001)];
[XW_Phase ,db] = phasemag (XW);
XW_Phase = [-mtlb_fliplr( XW_Phase ),XW_Phase(2:1001)];
// Plotting Continuous Time Signal
figure
a=gca();
a.y_location = "origin";
plot(t,xt);
xlabel( 't in sec .');
ylabel(' x(t) ')
title(' Continuous Time Signal ' )
figure
// Plotting Magnitude Response of CTS
```

```
subplot (2 ,2 ,1);
a = gca ();
a.y_location = "origin";
plot2d(W, XW_Mag,style=5 );
xlabel ( ' Frequency in Radians / Seconds---> W' );
ylabel ( ' abs (X(jW) ) ' )
title ( 'Magnitude Response (CTFT) ' )
// Plotting Phase Reponse of CTS
subplot (2 ,2 ,2);
a =gca();
a.y_location="origin";
a.x_location="origin";
plot2d(W, XW_Phase *%pi/180,style=3);
xlabel(' Frequency in Radians / Seconds---> W');
ylabel('<X(jW) ')
title(' Phase Response (CTFT)in Radians' )
mprintf('|F(w)|= 1/sqrt(a^2+w^2) and\n Theta(w)=-atan(w/a)')

//Chapter1: Signals
//Example 1.9b,page no12
//Given:
// Analog Signal


A=1;// Amplitude
Dt=0.005;
t1=-4.5:Dt:4.5;
xt1=exp(-A*abs(t1));
// Continuous time Fourier Transform
Wmax1 =2*%pi*1;// Analog Frequency = 1Hz
K=4;
k=0:(K/1000):K;
W1=k*Wmax1/K;
XW1=xt1*exp(-sqrt(-1)*t1'*W1)*Dt;
XW1=real(XW1);
W1=[-mtlb_fliplr(W1), W1(2:1001) ]; // Omega from -Wmax to Wmax
```

```
XW1=[ mtlb_fliplr(XW1), XW1(2:1001) ];
//subplot(1 ,1 ,1)
subplot(2 ,2 ,3);
b=gca();
b.y_location = "origin";
plot2d(t,xt,3);
xlabel('t in sec.');
ylabel('x(t)')
title(' Continuous Time Signal')
subplot(2 ,2 ,4);
b =gca();
b.y_location = "origin";
plot2d(W1,XW1,5);
xlabel('Frequency in Radians / Seconds W');
ylabel('X(jW)')
title('Continuous time Fourier Transform ')

mprintf('|F(w)|= 2*a/sqrt(a^2+w^2) and\n Theta(w)=0'
    )
```

Scilab code Exa 1.10 Signals Ex 1 10

```
clc
//Chapter1: Signals
//Example1.10, page no 38
//Given
//a
A=1,delta=1e-3,T=10e-3
w0=2*%pi/T,n=0
for i=0:10
    if n==0 then
        Sa=1
    else
```



```
 a)
At wo,n=0: The spectral amplitude is: F0= 0.100000 V
b)
The Fourier tranform of f(t-delta/2) is given as:
f(t)=A*delta/T*ΣSa(n*delta*pi/T)*exp(jwo(t-delta/2))
-->
```

Figure 1.11: Signals Ex 1 10

```
            Sa=sin(n*%pi*delta/T)/(n*%pi*delta/T)
        end

end

F=(A*delta/T)*Sa//spectral Amplitude
mprintf('a)\nAt wo,n=0: The spectral amplitude is: F0= %f V\n',F)
//b
// displaying the fourier Transform of the given function
mprintf('b)\nThe Fourier tranform of f(t-delta/2) is given as: '),
mprintf('\nf(t)=A*delta/T*   Sa(n*delta*pi/T)*exp(jwo(t-delta/2))')
```

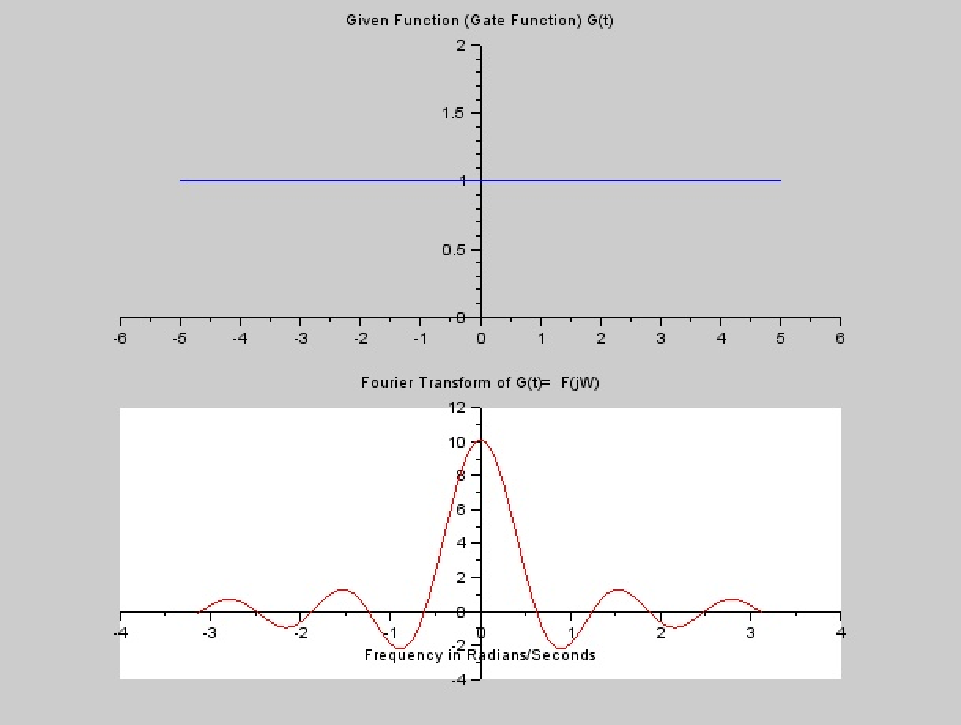


Figure 1.12: Signals Ex 1 11 Pg 39

Scilab code Exa 1.11.1 Signals Ex 1 11 Pg 39

```
clear ;
clc ;
close ;
//Chapter1
//Example1.11(1), page no 39
//Given
T = 10; //time Tau
Tg = -T/2 :0.1: T/2; // time period for given Gate Function -tau/2 to tau/2
G_t0 = 1; //Magnitude of Gate Function (A)
G_t = G_t0* ones (1, length (Tg));// Gate function G(t)
f = -%pi: %pi / length (Tg): %pi ;
Dw = 0.1;
F_jW =G_t*exp(sqrt(-1)*Tg'*f)*Dw;// fourier Transform of the gate function
F_jW = real(F_jW);
// Plotting the Fourier Transform of G(t)
figure
subplot (2 ,1 ,1)
a=gca();
a.y_location ="origin";
a.x_location ="origin";
plot2d(Tg,G_t,2);
xtitle( ' Given Function (Gate Function) G(t) ' )
subplot(2 ,1 ,2)
a= gca();
a.y_location ="origin";
a.x_location ="origin";
plot2d(f,F_jW,5);
xlabel('Frequency in Radians/Seconds ');
title('Continuous time Fourier Transform X(jW)' )
xtitle ( 'Fourier Transform of G(t)= F(jW) ' )
mprintf('F(w)= A*t*Sa(w*t/2) ')
```

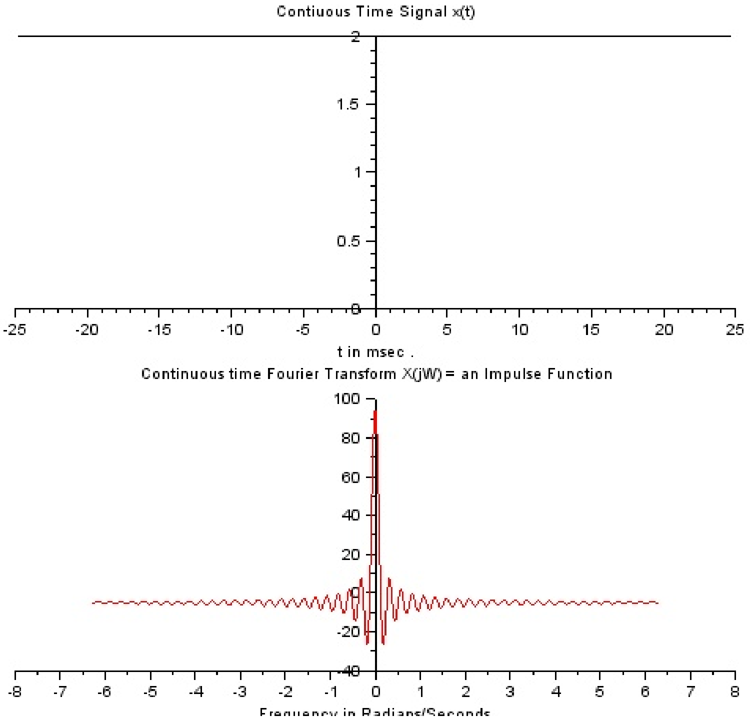
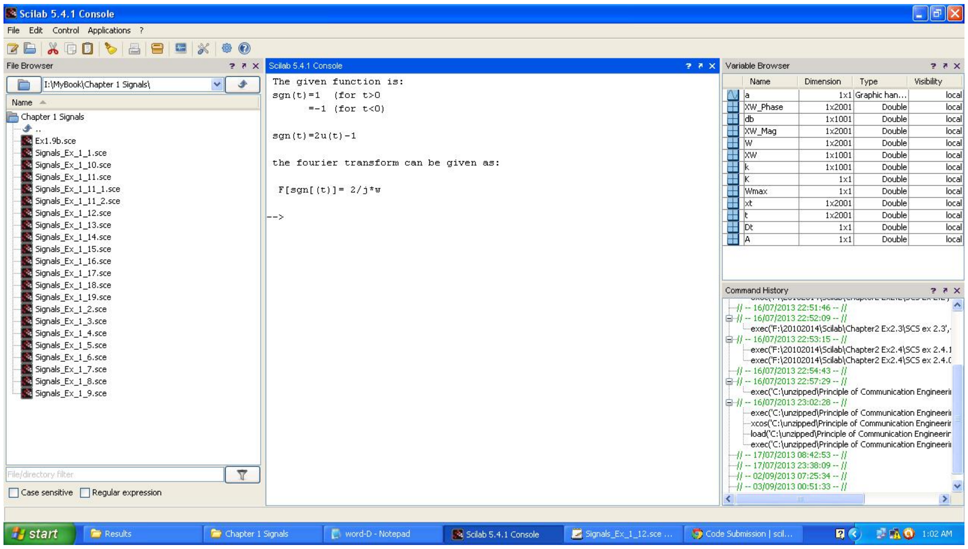


Figure 1.13: Signals Ex 1 11 Pg43

Scilab code Exa 1.11.2 Signals Ex 1 11 Pg43

```
clc
//Chapter1
//Example1.11(2), page no 43
//Given
clear ;
close ;
// CTS Signal
A=2;// Amplitude
```

```
Dt=0.01;
T1=49.5; //Time in seconds
t=-T1/2: Dt:T1 /2;
for i=1:length(t)
xt(i)= A;
end
// Continuous time Fourier Transform
Wmax=2*%pi*1;// Analog Frequency = 1Hz
K =4;
k=0:(K/1000):K;
W=k*Wmax/K;
xt=xt';
XW =(xt*exp(-sqrt(-1)*t'*W)*Dt)-5;
XW_Mag =real(XW);
W =[-mtlb_fliplr(W), W(2:1001)]; // Omega from -Wmax
    to Wmax
XW_Mag =[mtlb_fliplr( XW_Mag ), XW_Mag(2:1001)];
subplot(2 ,1 ,1);
a =gca();
a.data_bounds =[ -4 ,0;4 ,2];
a.y_location =”origin”;
plot2d(t,xt);
xlabel('t in msec .');
title(' Contiuous Time Signal x(t) ')
subplot(2 ,1 ,2);
a=gca();
a.y_location =”origin”;
plot2d(W,XW_Mag,5);
xlabel('Frequency in Radians/Seconds ');
title('Continuous time Fourier Transform X(jW) = an
   Impulse Function' )
mprintf('|F(w)|= 2*pi*A*delta(w), Hence the Fourier
   Transform of constant is an Impulse Function')
```



```
The given function is:
sgn(t)=1  (for t>0
      =-1 (for t<0)

sgn(t)=2u(t)-1

the fourier transform can be given as:

 F[sgn[(t)]= 2/j*w

-->
```

Name	Dimension	Type	Visibility
a	1x1	Graphic han...	local
XW_Phase	1x2001	Double	local
db	1x1001	Double	local
XW_Mag	1x2001	Double	local
W	1x2001	Double	local
XW	1x1001	Double	local
k	1x1001	Double	local
K	1x1	Double	local
Wmax	1x1	Double	local
xt	1x2001	Double	local
t	1x2001	Double	local
Dt	1x1	Double	local
A	1x1	Double	local

Figure 1.14: Signals Ex 1 12

Scilab code Exa 1.12 Signals Ex 1 12

```

clc
//Chapter 1
//Ex1.12, page no 43
//Given
mprintf('The given function is:\n sgn(t)=1  (for t
    >0\n         =-1 (for t<0)\n')// displaying the
    given function
disp('sgn(t)=2u(t)-1')
disp('the fourier transform can be given as:'),disp(
    ' F[sgn[(t)]= 2/j*w')// displaying the fourier
    Transform of the given function
```

Scilab code Exa 1.13 Signals Ex 1 13

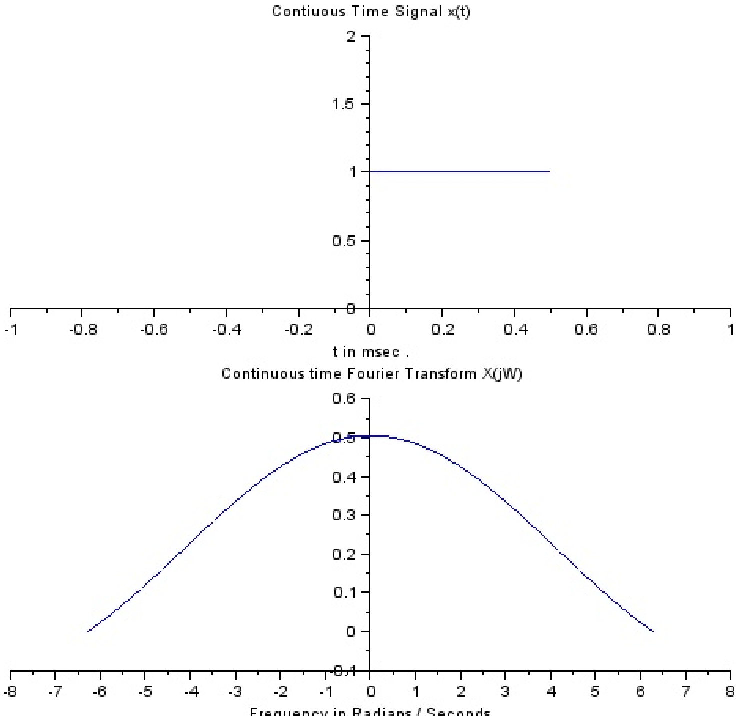


Figure 1.15: Signals Ex 1 13

```
clear ;
clc ;
close ;
//Chapter 1
//Ex1.13, page no 44
// CTS Signal
A =1; // Amplitude
Dt = 0.005;
T1 =0.5; //Time in seconds
t=0:Dt:T1;
for i = 1: length(t)
xt(i)=A;
end
// Continuous time Fourier Transform
Wmax= 2*%pi*1; // Analog Frequency = 1Hz
K =4;
k=0:(K/1000):K;
W =k*Wmax/K;
xt=xt';
XW =xt*exp(-sqrt(-1)*t'*W)*Dt;
XW_Mag =real(XW);
W =[-mtlb_fliplr(W), W(2:1001)]; // Omega from –Wmax to Wmax
XW_Mag =[mtlb_fliplr( XW_Mag ), XW_Mag(2:1001)];
// displaying the given function
subplot(2 ,1 ,1);
a =gca();
a.data_bounds =[ -1,0;1,2];
a.y_location ="origin";
plot(t,xt);
xlabel('t in msec .');
title(' Contiuous Time Signal x(t) ')
// displaying the fourier Transform of the given function
subplot(2 ,1 ,2);
a=gca();
mprintf('F(w)= 1/(j*w)+ pi*delta(w)')
a.y_location ="origin";
```

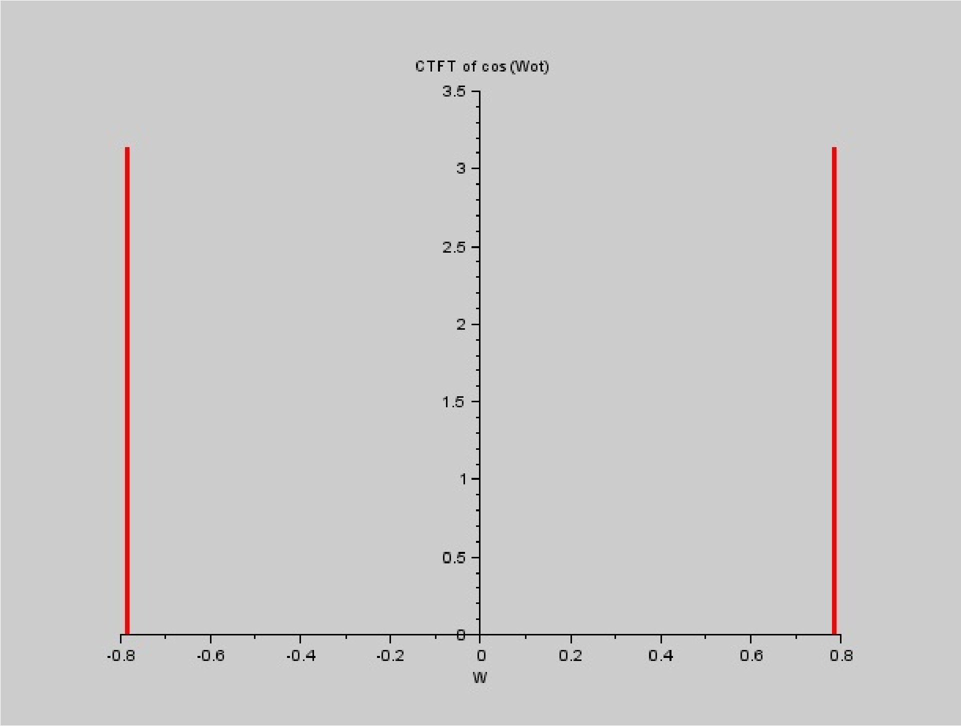


Figure 1.16: Signals Ex 1 14

```
plot(W, XW_Mag);
xlabel('Frequency in Radians / Seconds ');
title('Continuous time Fourier Transform X(jW)' )
```

Scilab code Exa 1.14 Signals Ex 1 14

```
//Chapter 1
//Ex1.14, page no 44
// CTS Signal
```

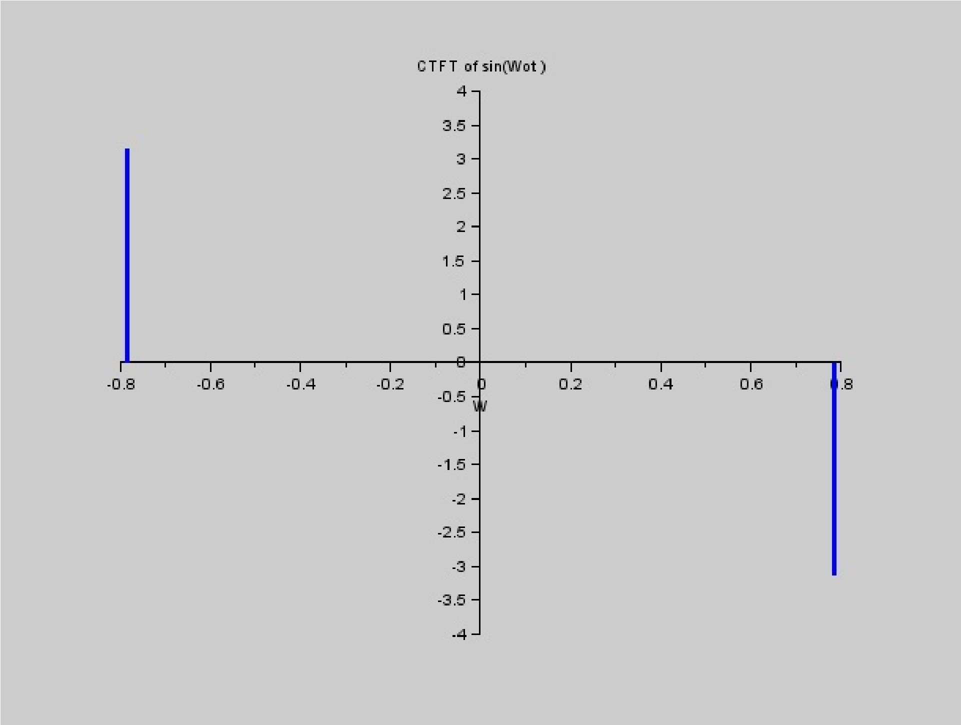
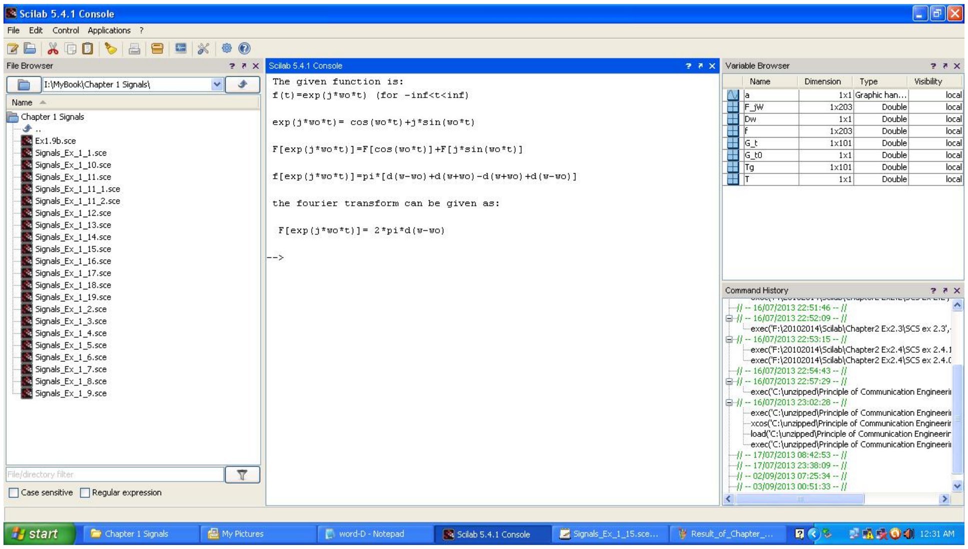


Figure 1.17: Signals Ex 1 14

```
// Continuous Time Fourier Transforms of
// Sinusoidal waveforms(a)sin(Wot)(b)cos(Wot)
clear ;
clc ;
close ;
// CTFT
T1 = 2;
T = 4* T1;
Wo = 2* %pi /T;
W = [-Wo ,0, Wo ];
ak = (2* %pi *Wo*T1/ %pi )/ sqrt ( -1);
XW = [-ak ,0, ak ];
ak1 = (2* %pi*Wo*T1/%pi);
XW1 =[ ak1 ,0, ak1 ];
//displaying the given function
figure
a =gca();
a.y_location="origin";
a.x_location="origin";
plot2d3('gnn',W,imag(XW),2);
poly1=a.children(1).children(1) ;
poly1.thickness =3;
xlabel( 'W' );
title( 'CTFT of sin(Wot ) ')
//displaying the fourier Transform of the given function
figure
a =gca();
a.y_location="origin";
a.x_location="origin";
plot2d3('gnn',W,XW1,5);
poly1 =a.children(1).children(1) ;
poly1.thickness = 3;
xlabel( 'W' );
title( 'CTFT of cos (Wot)')
```



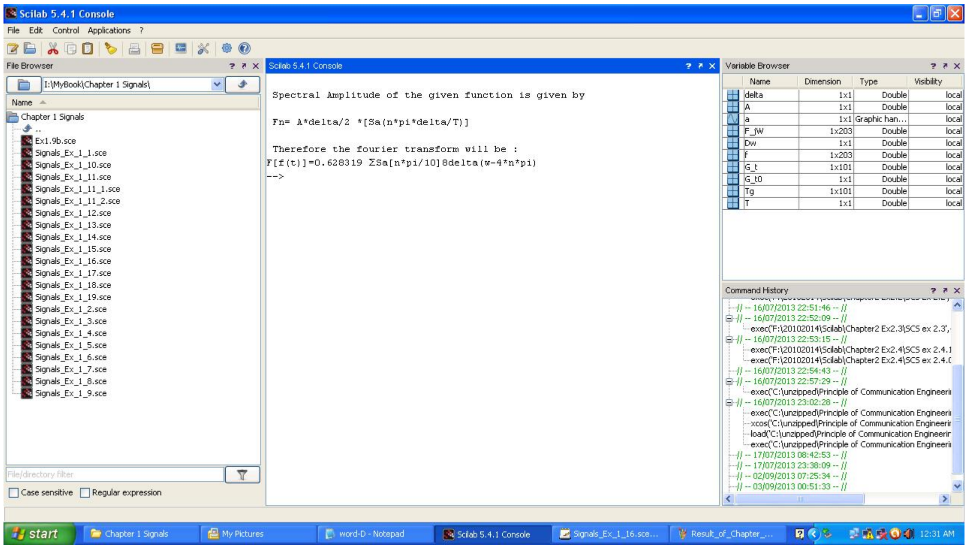
```
The given function is:
f(t)=exp(j*wo*t)  (for -inf<t<inf)

exp(j*wo*t)= cos(wo*t)+j*sin(wo*t)

F[exp(j*wo*t)]=F[cos(wo*t)]+F[j*sin(wo*t)]

f[exp(j*wo*t)]=pi*[d(w-wo)+d(w+wo)-d(w+wo)+d(w-wo)]

the fourier transform can be given as:

 F[exp(j*wo*t)]= 2*pi*d(w-wo)

-->
```

Name	Dimension	Type	Visibility
a	1x1	Graphic han...	local
F_jW	1x203	Double	local
Dw	1x1	Double	local
f	1x203	Double	local
G_t	1x101	Double	local
G_t0	1x1	Double	local
Tg	1x101	Double	local
T	1x1	Double	local

Figure 1.18: Signals Ex 1 15

Scilab code Exa 1.15 Signals Ex 1 15

```
clc
//Chapter 1
//Ex1.12, page no 43
//Given
mprintf('The given function is:\n f(t)=exp(j*wo*t) (for -inf<t<inf)\n')// Displaying the given function
disp('exp(j*wo*t)= cos(wo*t)+j*sin(wo*t)')
disp('F[exp(j*wo*t)]=F[cos(wo*t)]+F[j*sin(wo*t)]')
disp('f[exp(j*wo*t)]=pi*[d(w-wo)+d(w+wo)-d(w+wo)+d(w-wo)]')
disp('the fourier transform can be given as:'),disp(' F[exp(j*wo*t)]= 2*pi*d(w-wo)')// displaying the
```



File Browser

I:\MyBook\Chapter 1 Signals\

```
Chapter 1 Signals
  ..
  Ex1.9b.sce
  Signals_Ex_1_1.sce
  Signals_Ex_1_10.sce
  Signals_Ex_1_11.sce
  Signals_Ex_1_11_1.sce
  Signals_Ex_1_11_2.sce
  Signals_Ex_1_12.sce
  Signals_Ex_1_13.sce
  Signals_Ex_1_14.sce
  Signals_Ex_1_15.sce
  Signals_Ex_1_16.sce
  Signals_Ex_1_17.sce
  Signals_Ex_1_18.sce
  Signals_Ex_1_19.sce
  Signals_Ex_1_2.sce
  Signals_Ex_1_3.sce
  Signals_Ex_1_4.sce
  Signals_Ex_1_5.sce
  Signals_Ex_1_6.sce
  Signals_Ex_1_7.sce
  Signals_Ex_1_8.sce
  Signals_Ex_1_9.sce
```

Scilab 5.4.1 Console

```
 Spectral Amplitude of the given function is given by

 Fn= A*delta/2 *[Sa(n*pi*delta/T)]

 Therefore the fourier transform will be :
F[f(t)]=0.628319 ΣSa[n*pi/10]8delta(w-4*n*pi)
-->
```

Variable Browser

Name	Dimension	Type	Visibility
delta	1x1	Double	local
A	1x1	Double	local
a	1x1	Graphic han...	local
F_jW	1x203	Double	local
Dw	1x1	Double	local
f	1x203	Double	local
G_t	1x101	Double	local
G_t0	1x1	Double	local
Tg	1x101	Double	local
T	1x1	Double	local

Command History

```
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineeri
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
```

Figure 1.19: Signals Ex 1 16

```
    fourier Transform of the given function
```

Scilab code Exa 1.16 Signals Ex 1 16

```
clc

//Chapter 1
//Ex1.16, page no 47
A=1,delta=50e-3,T=500e-3
disp('Spectral Amplitude of the given function is
   given by ')// Displaying the expression for
   Spectral Amplitude
disp('Fn= A*delta/2 *[Sa(n*pi*delta/T)]')
disp('Therefore the fourier transform will be :')
mprintf('F[f(t)]=%f    Sa[n*pi/10]8delta(w-4*n*pi)'
   ,2*%pi*A*delta/T)// Displaying the Fourier
```

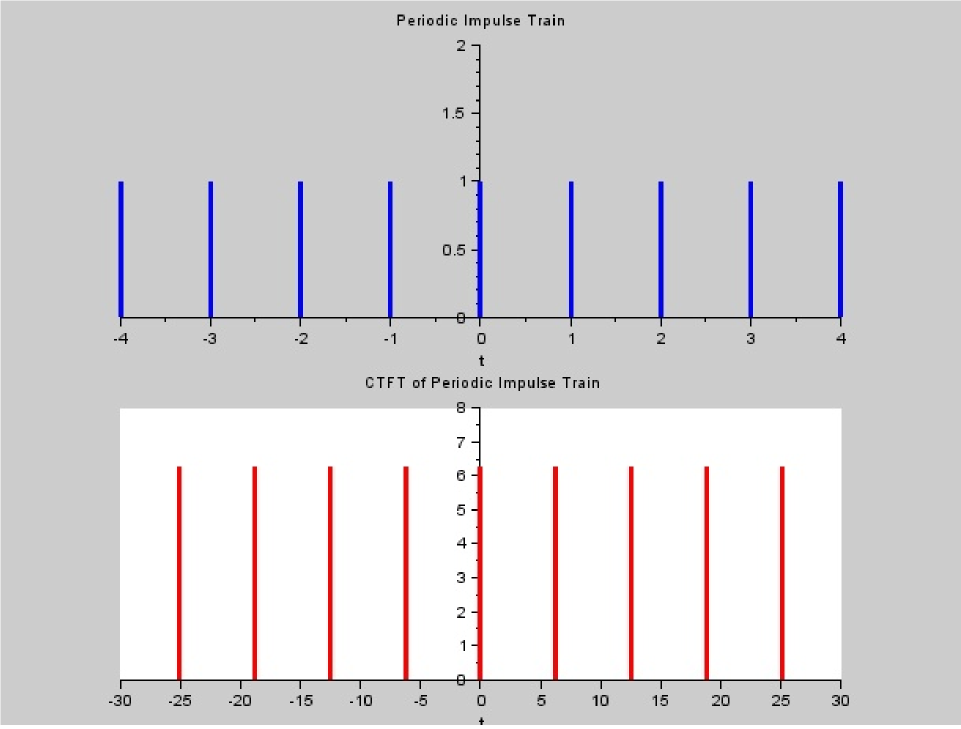


Figure 1.20: Signals Ex 1 17

```
  transform
```

Scilab code Exa 1.17 Signals Ex 1 17

```
clc
//Chapter1: Signals
//Example1,page no12
//Given:
// CTFT
T = -4:4;;
T1 = 1; // Sampling Interval
```

```
xt = ones (1, length (T));
ak = 1/ T1;
XW = 2* %pi *ak* ones (1, length (T));
Wo = 2*%pi/T1;
W = Wo*T;
// Displaying the given function
figure
subplot(2 ,1 ,1)
a=gca();
a.y_location="origin";
a.x_location="origin";
plot2d3('gnn',T,xt,2) ;
poly1 =a.children(1).children (1) ;
poly1.thickness = 3;
xlabel ( 't ' );
title('Periodic Impulse Train ')
// displaying the fourier Transform of the given function
subplot(2 ,1 ,2)
a=gca();
a.y_location="origin";
a.x_location="origin";
plot2d3('gnn',W,XW,5) ;
poly1=a.children(1).children(1) ;
poly1.thickness =3 ;
xlabel('t');
title ( 'CTFT of Periodic Impulse Train')

mprintf('F[  t(t)]= 2*pi/T*    (w-wo)')
```

Scilab code Exa 1.18 Signals Ex 1 18

```
clear ;
```

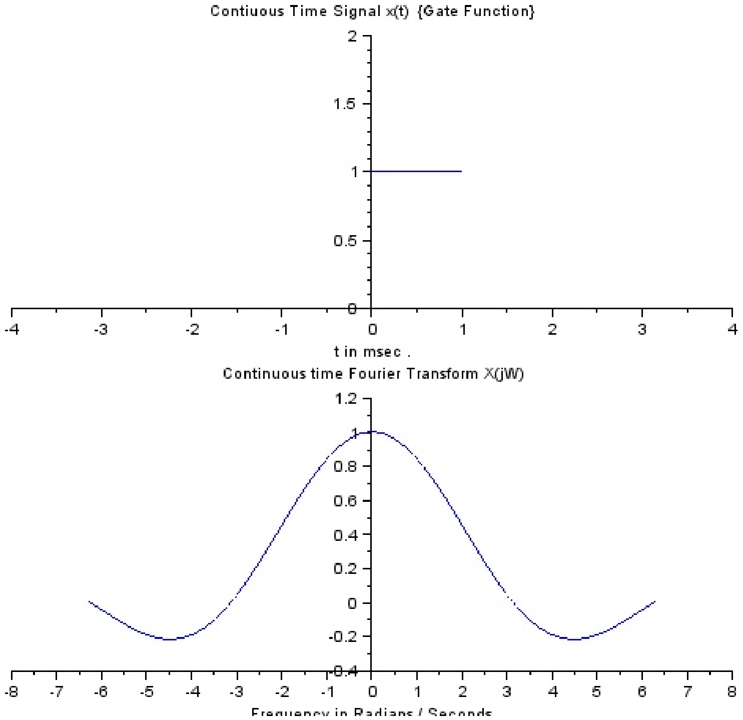


Figure 1.21: Signals Ex 1 18

```
clc ;
close ;
// CTS Signal
A =1; // Amplitude
Dt = 0.005;
T1 = 2; //Time in seconds
t = 0: Dt:T1 /2;
for i = 1: length (t)
xt(i) = A;
end
// Continuous time Fourier Transform
Wmax= 2*%pi*1; // Analog Frequency = 1Hz
K =4;
k=0:(K/1000):K;
W =k*Wmax/K;
xt=xt’;
XW =xt*exp(-sqrt(-1)*t’*W)*Dt;
XW_Mag =real(XW);
W =[-mtlb_fliplr(W), W(2:1001)]; // Omega from  Wmax to Wmax
XW_Mag =[mtlb_fliplr( XW_Mag ), XW_Mag(2:1001)];
// displaying the given function
subplot(2 ,1 ,1);
a =gca();
a.data_bounds =[ -4 ,0;4 ,2];
a.y_location =”origin”;
plot(t,xt);
xlabel(’t in msec .’);
title(’ Contiuous Time Signal x(t)  {Gate Function} ’)
// displaying the fourier Transform of the given function
subplot(2 ,1 ,2);
a=gca();
a.y_location =”origin”;
plot(W, XW_Mag);
xlabel(’Frequency in Radians / Seconds ’);
title(’Continuous time Fourier Transform X(jW)’ )
```

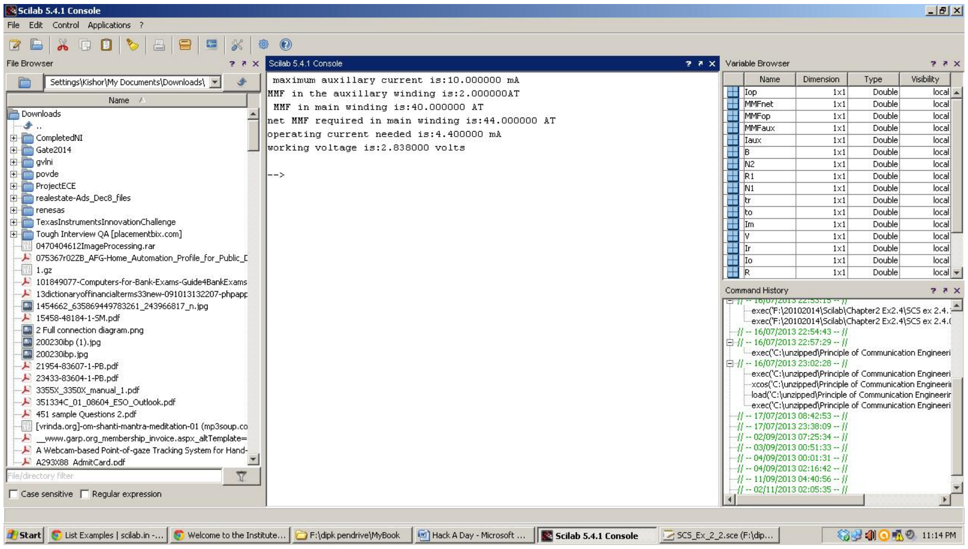
```
mprintf('Hence Fourier transform of given Gate function is:\n A*delta*Sa[w*delta/2]/ exp(-j*w*delta/2)')
```

Chapter 2

Switched Communication Systems

Scilab code Exa 2.2 Chapter 2 Example 2 2

```
clc;
// Chapter 2 Switched communication systems
//Example 2.2, page no 125
//given
Io=4*10^-3 //rqueired operating current
N1=10000 //no of turns in the main winding
R1=645 //resistence of the main winding in ohms
N2=200 //no of turns in auxillary winding
B=2 //spacing bias
Iaux=B/N2 //maximum auxillary current
mprintf('maximum auxillary current is:%f mA\n',Iaux*1e3)
MMFaux=N2*Iaux //MMF in the auxillary winding
mprintf('MMF in the auxillary winding is:%fAT \n',MMFaux)
MMFop=Io*N1 //operating MFF in main winding
mprintf( ' MMF in main winding is:%f AT \n',MMFop)
```



```
 maximum auxillary current is:10.000000 mA
MMF in the auxillary winding is:2.000000AT
 MMF in main winding is:40.000000 AT
net MMF required in main winding is:44.000000 AT
operating current needed is:4.400000 mA
working voltage is:2.838000 volts

-->
```

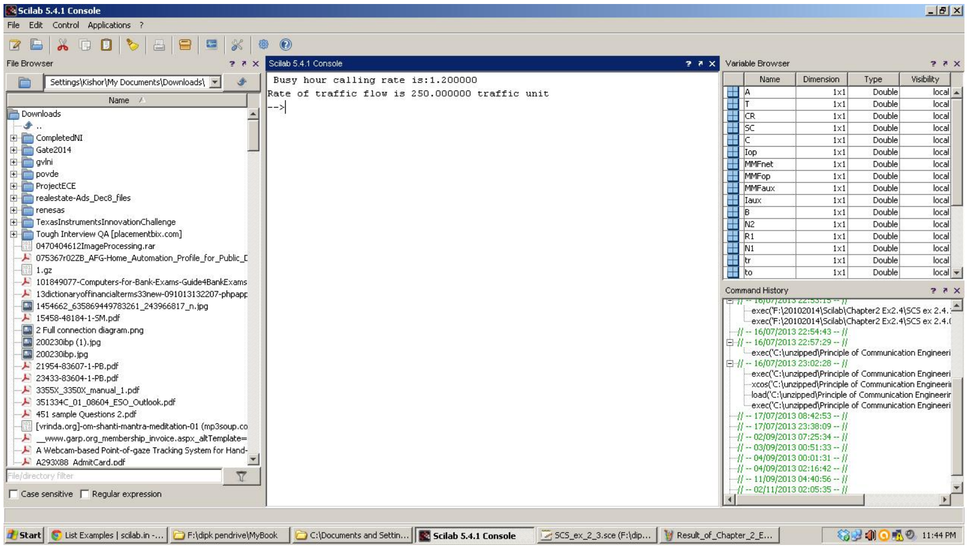
Name	Dimension	Type	Visibility
Iop	1x1	Double	local
MMFnet	1x1	Double	local
MMFop	1x1	Double	local
MMFaux	1x1	Double	local
Iaux	1x1	Double	local
B	1x1	Double	local
N2	1x1	Double	local
R1	1x1	Double	local
N1	1x1	Double	local
tr	1x1	Double	local
to	1x1	Double	local
Im	1x1	Double	local
V	1x1	Double	local
Ir	1x1	Double	local
Io	1x1	Double	local
R	1x1	Double	local

Figure 2.1: Chapter 2 Example 2 2

```
MMFnet=MMFop+(0.1*MMFop) //net MMF required in main winding
mprintf('net MMF required in main winding is:%f AT \n',MMFnet)
Iop=MMFnet/N1 //operating current needed
mprintf('operating current needed is:%f mA \n',Iop*1e3)
V=Iop*R1 //working voltage in volts
mprintf('working voltage is:%f volts \n',V)
```

Scilab code Exa 2.3 Chapter 2 Example 2 3

```
clc;
// Chapter 2 Switched communication systems
//Example 2.3,page no 125
//given
```



```
 Busy hour calling rate is:1.200000
Rate of traffic flow is 250.000000 traffic unit
-->
```

Name	Dimension	Type	Visibility
A	1x1	Double	local
T	1x1	Double	local
CR	1x1	Double	local
SC	1x1	Double	local
C	1x1	Double	local
Iop	1x1	Double	local
MMFnet	1x1	Double	local
MMFop	1x1	Double	local
MMFaux	1x1	Double	local
Iaux	1x1	Double	local
B	1x1	Double	local
N2	1x1	Double	local
R1	1x1	Double	local
N1	1x1	Double	local
tr	1x1	Double	local
to	1x1	Double	local

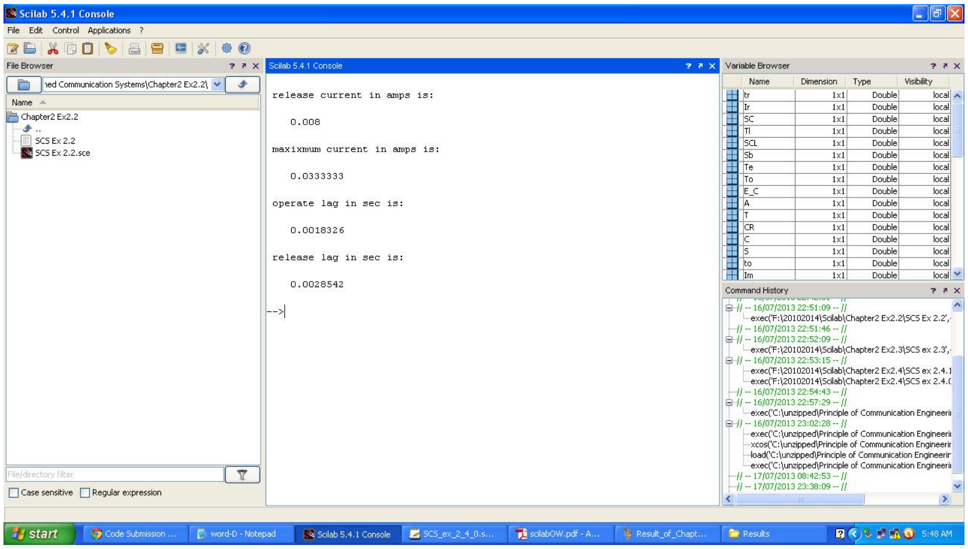
```
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineeri
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
// -- 04/09/2013 00:01:31 -- //
// -- 04/09/2013 02:16:42 -- //
// -- 11/09/2013 04:40:56 -- //
// -- 02/11/2013 02:05:35 -- //
```

Figure 2.2: Chapter 2 Example 2 3

```
C=6000//Tatol no of call in busy hour
SC=5000//no of subscribers
CR=C/SC//busy hour calling rate
mprintf('Busy hour calling rate is:%f \n',CR)
T=2.5/60//avarage duration of calls in hours

A=C*T//rate of traffic flow
mprintf('Rate of traffic flow is %f traffic unit ',A
   )
```

Scilab code Exa 2.4.0 Chapter 2 Example 2 4 Pg126 Top

```
clc;
// Chapter 2 Switched communication systems
//Example 2.4,page no 126
//given
```



```
release current in amps is:

   0.008

maximxum current in amps is:

   0.0333333

operate lag in sec is:

   0.0018326

release lag in sec is:

   0.0028542

-->
```

	Name	Dimension	Type	Visibility
	tr	1x1	Double	local
	Ir	1x1	Double	local
	SC	1x1	Double	local
	Tl	1x1	Double	local
	SCL	1x1	Double	local
	Sb	1x1	Double	local
	Te	1x1	Double	local
	To	1x1	Double	local
	E_C	1x1	Double	local
	A	1x1	Double	local
	T	1x1	Double	local
	CR	1x1	Double	local
	C	1x1	Double	local
	S	1x1	Double	local
	to	1x1	Double	local
	Im	1x1	Double	local

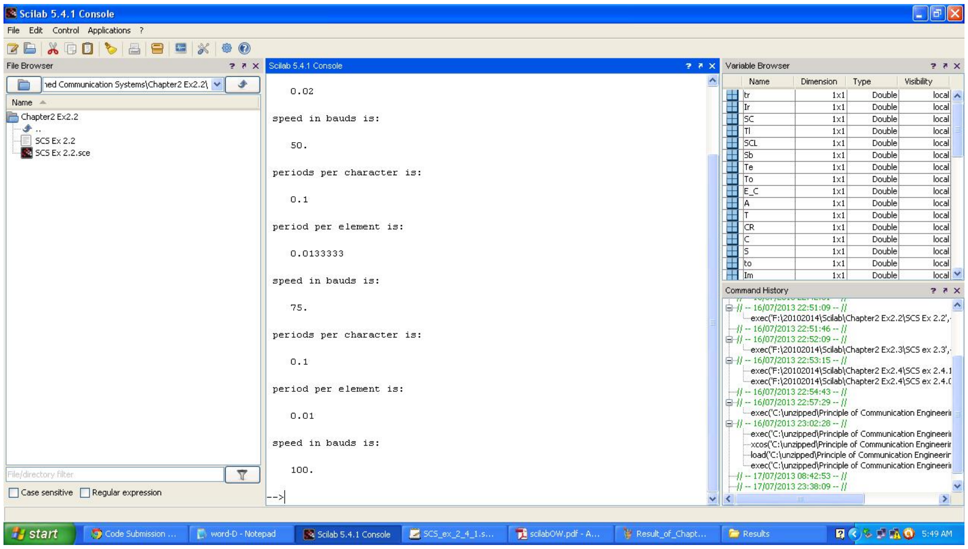
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerin
   load('C:\unzipped\Principle of Communication Engineerin
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 2.3: Chapter 2 Example 2 4 Pg126 Top

```
L=3//relay inductance in henry
R=1500//relay resistance in ohm
Io=20e-3//oparating current in amps
Ir=8e-3//release current in amps

V=50//supply volatage in volts
Im=V/R//maxixmum current in amps
mprintf('maxixmum current is %f mamps \n',Im*1e3)
to=(L/R)*log(1/(1-(Io/Im)))//operate lag in sec
mprintf('operate lag is %f msec \n',to*1000)
tr=(L/R)*log(Im/Ir)//release lag in sec
mprintf('release lag is %f msec \n',tr*1000)
```

Scilab code Exa 2.4.1 Chapter 2 Example 2 4 Pg126 Bottom

```
clc;
```



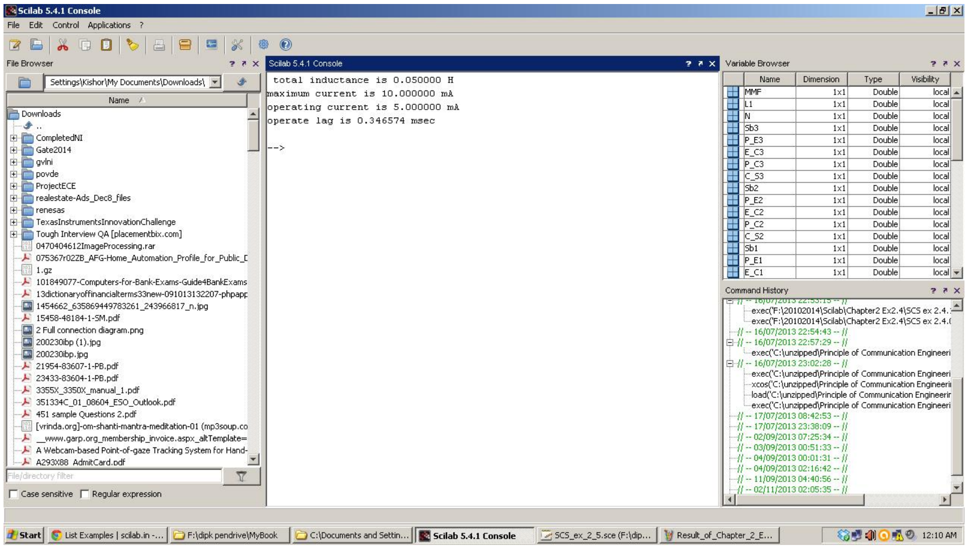
```
   0.02

speed in bauds is:

   50.

periods per character is:

   0.1

period per element is:

   0.0133333

speed in bauds is:

   75.

periods per character is:

   0.1

period per element is:

   0.01

speed in bauds is:

   100.

-->
```

Name	Dimension	Type	Visibility
tr	1x1	Double	local
Ir	1x1	Double	local
SC	1x1	Double	local
TI	1x1	Double	local
SCL	1x1	Double	local
Sb	1x1	Double	local
Te	1x1	Double	local
To	1x1	Double	local
E_C	1x1	Double	local
A	1x1	Double	local
T	1x1	Double	local
CR	1x1	Double	local
C	1x1	Double	local
S	1x1	Double	local
to	1x1	Double	local
Im	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 2.4: Chapter 2 Example 2 4 Pg126 Bottom

```
// Chapter 2 Switched communication systems
//Example 2.4.1,page no 126
//given
//a
C_S1=20/3//speed in characters per second
P_C1=1/C_S1//periods per character
mprintf('(a)\nperiods per character is:%f msec\n',P_C1*1e3)
E_C1=7.5//elements per character
P_E1=P_C1/E_C1//period per element
mprintf('period per element is:%f msec\n',P_E1*1e3)
Sb1=1/P_E1//speed in bauds
mprintf('speed is:%f bauds\n\n',Sb1)
//b
C_S2=10//speed in characters per second
P_C2=1/C_S2//periods per character
mprintf('(b)\nperiods per character is:%f msec\n',P_C2*1e3)
E_C2=7.5//elements per character
P_E2=P_C2/E_C2//period per element
```



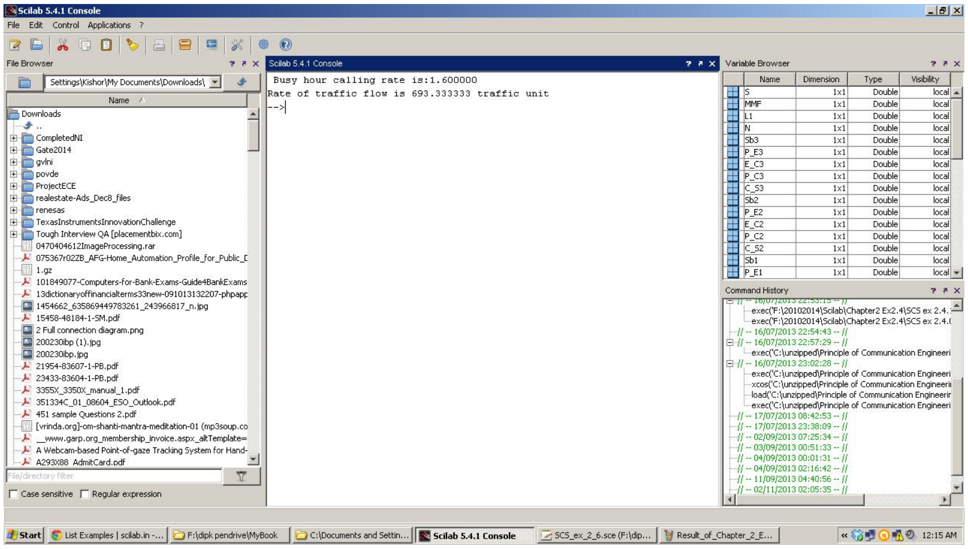
```
 total inductance is 0.050000 H
maximum current is 10.000000 mA
operating current is 5.000000 mA
operate lag is 0.346574 msec

-->
```

Name	Dimension	Type	Visibility
MMF	1x1	Double	local
L1	1x1	Double	local
N	1x1	Double	local
Sb3	1x1	Double	local
P_E3	1x1	Double	local
E_C3	1x1	Double	local
P_C3	1x1	Double	local
C_S3	1x1	Double	local
Sb2	1x1	Double	local
P_E2	1x1	Double	local
E_C2	1x1	Double	local
P_C2	1x1	Double	local
C_S2	1x1	Double	local
Sb1	1x1	Double	local
P_E1	1x1	Double	local
E_C1	1x1	Double	local

Figure 2.5: Chapter 2 Example 2 5

```
mprintf('period per element is:%f msec\n',P_E2*1e3)
Sb2=1/P_E2//speed in bauds
mprintf('speed is %f bauds\n\n', Sb2)
//c
C_S3=10//speed in characters per second
P_C3=1/C_S3//periods per character
mprintf('(c)\nperiods per character is:%f msec\n',
    P_C3*1e3)
E_C3=10//elements per character
P_E3=P_C3/E_C3//period per element
mprintf('period per element is:%f msec\n',P_E3*1e3)
Sb3=1/P_E3//speed in bauds
mprintf('speed is %f bauds\n',Sb3)
```

Scilab code Exa 2.5 Chapter 2 Example 2 5



```
Settings\Kishor\My Documents\Downloads\
Downloads
  ..
  CompletedNI
  Gate2014
  gvlni
  povde
  ProjectECE
  realestate-Ads_Dec8_files
  renesas
  TexasInstrumentsInnovationChallenge
  Tough Interview QA [placementbix.com]
  0470404612ImageProcessing.rar
  075367r02ZB_AFG-Home_Automation_Profile_for_Public_D
  1.gz
  101849077-Computers-for-Bank-Exams-Guide4BankExams
  13dictionaryoffinancialterms33new-091013132207-phpapp
  1454662_635869449783261_243966817_n.jpg
  15458-48184-1-SM.pdf
  2 Full connection diagram.png
  200230ibp (1).jpg
  200230ibp.jpg
  21954-83607-1-PB.pdf
  23433-83604-1-PB.pdf
  3355X_3350X_manual_1.pdf
  351334C_01_08604_ESO_Outlook.pdf
  451 sample Questions 2.pdf
  [vrinda.org]-om-shanti-mantra-meditation-01 (mp3soup.co
  __www.garp.org_membership_invoice.aspx_altTemplate=
  A Webcam-based Point-of-gaze Tracking System for Hand-
  A293X88_AdmitCard.pdf
```

```
 Busy hour calling rate is:1.600000
Rate of traffic flow is 693.333333 traffic unit
-->
```

Name	Dimension	Type	Visibility
S	1x1	Double	local
MMF	1x1	Double	local
L1	1x1	Double	local
N	1x1	Double	local
Sb3	1x1	Double	local
P_E3	1x1	Double	local
E_C3	1x1	Double	local
P_C3	1x1	Double	local
C_S3	1x1	Double	local
Sb2	1x1	Double	local
P_E2	1x1	Double	local
E_C2	1x1	Double	local
P_C2	1x1	Double	local
C_S2	1x1	Double	local
Sb1	1x1	Double	local
P_E1	1x1	Double	local

```
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
// -- 04/09/2013 00:01:31 -- //
// -- 04/09/2013 02:16:42 -- //
// -- 11/09/2013 04:40:56 -- //
// -- 02/11/2013 02:05:35 -- //
```

Figure 2.6: Chapter 2 Example 2 6

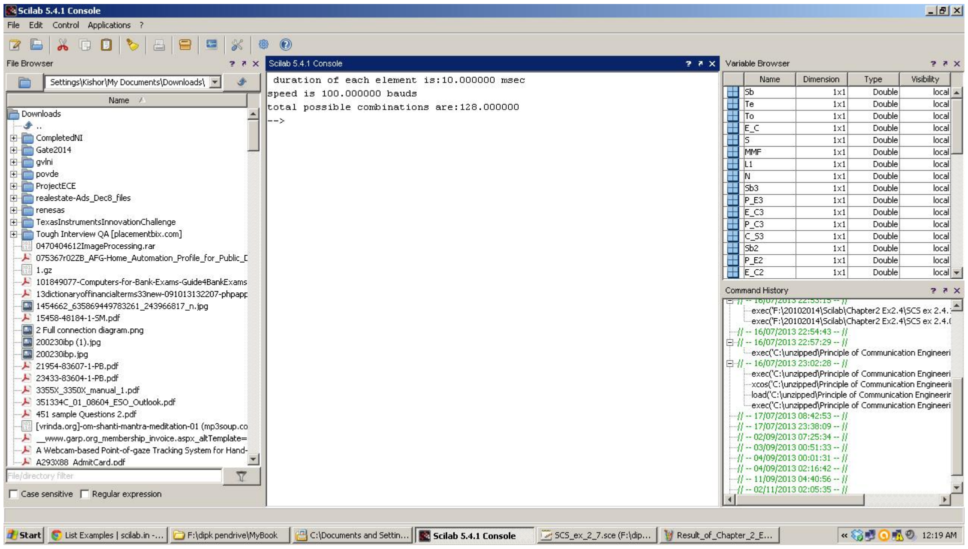
```
clc;
// Chapter 2 Switched communication systems
//Example 2.5,page no 127
//given
N=1000//no of turns
L1=5e-8//inductance per turn
L=N^2*L1//total inductance
mprintf('total inductance is %f H \n',L)
R=100//resistance of winding in ohm
MMF=5//operating MMF in amp. turn
V=1//voltage of received signal in volts
Im=V/R//maximum current
mprintf('maximum current is %f mA \n',Im*1e3)
Io=MMF/N//operating current
mprintf('operating current is %f mA \n',Io*1e3)
to=(L/R)*log(1/(1-(Io/Im)))//operate lag
mprintf('operate lag is %f msec \n',to*1e3)
```

Scilab code Exa 2.6 Chapter 2 Example 2 6

```
clc;
// Chapter 2 Switched communication systems
//Example 2.6,page no 128
//given
S=10000//no of subscribers
C=16000//Tatol no of call in busy hour
CR=C/S//busy hour calling rate
mprintf('Busy hour calling rate is:%f \n',CR)
T=2.6//avarage duration of calls in min

A=C*(T/60)//rate of traffic flow
mprintf('Rate of traffic flow is %f traffic unit ',A)
```

Scilab code Exa 2.7 Chapter 2 Example 2 7

```
clc;
// Chapter 2 Switched communication systems
//Example 2.7,page no 135
//given
N=7//no of character elements
E_C=10//elements per character (1+7+1+1)
To=100e-3//duration of one character
Te=To/E_C//duration of each element
mprintf('duration of each element is:%f msec\n',Te*1e3)
Sb=1/Te//speed in bauds
mprintf('speed is %f bauds\n',Sb)
```



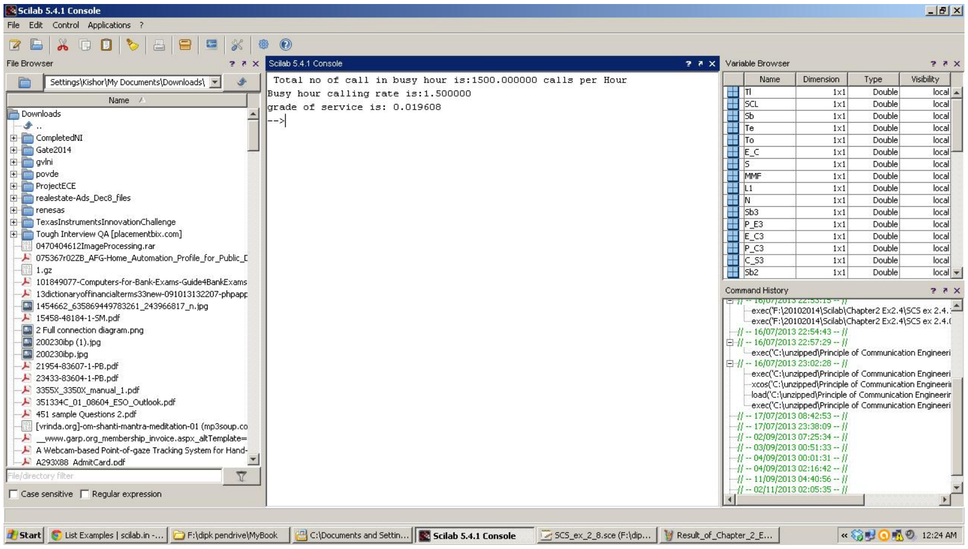
```
duration of each element is:10.000000 msec
speed is 100.000000 bauds
total possible combinations are:128.000000
-->
```

Figure 2.7: Chapter 2 Example 2 7

```
C=2^N//total possible combinations
mprintf('total possible combinations are:%f',C)
```

Scilab code Exa 2.8 Chapter 2 Example 2 8

```
clc;
// Chapter 2 Switched communication systems
//Example 2.8,page no 129
//given
S=1000//no of subscribers
T=2.4/60//avarage duration of calls in hours
A=60//rate of traffic flow
C=A/T//Tatol no of call in busy hour
mprintf('Total no of call in busy hour is:%f calls
   per Hour\n',C)
CR=C/S//busy hour calling rate
```



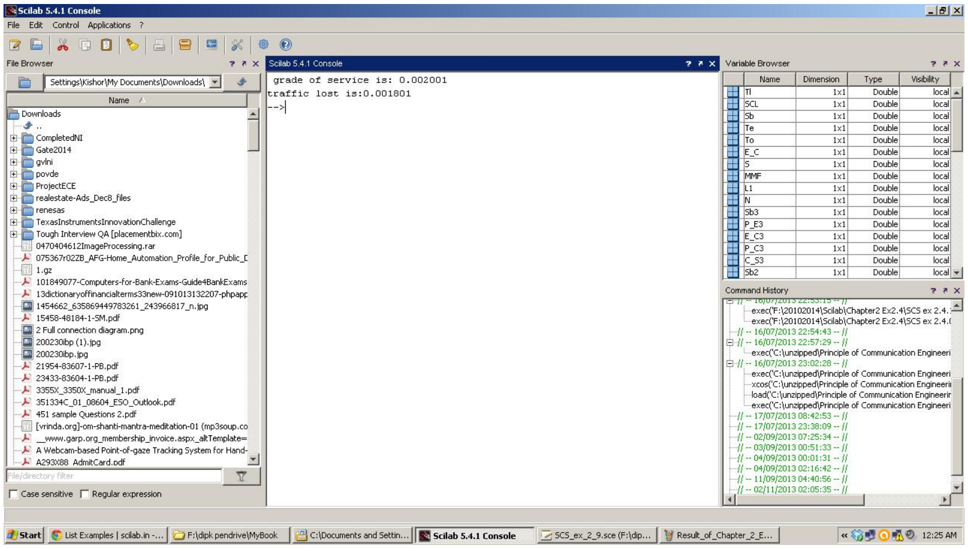
```
 Total no of call in busy hour is:1500.000000 calls per Hour
Busy hour calling rate is:1.500000
grade of service is: 0.019608
-->
```

Figure 2.8: Chapter 2 Example 2 8

```
mprintf('Busy hour calling rate is:%f \n',CR)
SCL=30//no of call lost per hour

B=SCL/(C+SCL)//grade of service
mprintf('grade of service is: %f',B)
```

Scilab code Exa 2.9 Chapter 2 Example 2 9

```
clc;
// Chapter 2 Switched communication systems
//Example 2.9,page no 129
//given
N=5//no of switches
A=0.9//traffic offered
//grade of service B=(A^N/N!)/(1+A+A^2/2!+A^3/3!+...+A^N/N!)
```


Scilab 5.4.1 Console
File
Edit
Control
Applications
?
File Browser
Settings\Kishor\My Documents\Downloads\
Name
Downloads
..
CompletedNI
Gate2014
gvlni
povde
ProjectECE
realestate-Ads_Dec8_files
renesas
TexasInstrumentsInnovationChallenge
Tough Interview QA [placementbix.com]
0470404612ImageProcessing.rar
075367r02ZB_AFG-Home_Automation_Profile_for_Public_D
1.gz
101849077-Computers-for-Bank-Exams-Guide4BankExams
13dictionaryoffinancialterms33new-091013132207-phpapp
1454662_635869449783261_243966817_n.jpg
15458-48184-1-SM.pdf
2 Full connection diagram.png
200230ibp (1).jpg
200230ibp.jpg
21954-83607-1-PB.pdf
23433-83604-1-PB.pdf
3355X_3350X_manual_1.pdf
351334C_01_08604_ESO_Outlook.pdf
451 sample Questions 2.pdf
[vrinda.org]-om-shanti-mantra-meditation-01 (mp3soup.co
__www.garp.org_membership_invoice.aspx_altTemplate=
A Webcam-based Point-of-gaze Tracking System for Hand-
A293X88_AdmitCard.pdf
File/directory filter
□ Case sensitive
□ Regular expression
Scilab 5.4.1 Console
Variable Browser
Command History
Start
List Examples | scilab.in -...
F:\dipk pendrive\MyBook
C:\Documents and Settin...
Scilab 5.4.1 Console
SCS_ex_2_9.sce (F:\dip...
Result_of_Chapter_2_E...
12:25 AM

```
 grade of service is: 0.002001
traffic lost is:0.001801
-->
```

Name	Dimension	Type	Visibility
Tl	1x1	Double	local
SCL	1x1	Double	local
Sb	1x1	Double	local
Te	1x1	Double	local
To	1x1	Double	local
E_C	1x1	Double	local
S	1x1	Double	local
MMF	1x1	Double	local
L1	1x1	Double	local
N	1x1	Double	local
Sb3	1x1	Double	local
P_E3	1x1	Double	local
E_C3	1x1	Double	local
P_C3	1x1	Double	local
C_S3	1x1	Double	local
Sb2	1x1	Double	local

```
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineeri
    load('C:\unzipped\Principle of Communication Engineeri
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
// -- 03/09/2013 00:51:33 -- //
// -- 04/09/2013 00:01:31 -- //
// -- 04/09/2013 02:16:42 -- //
// -- 11/09/2013 04:40:56 -- //
// -- 02/11/2013 02:05:35 -- //
```

Figure 2.9: Chapter 2 Example 2 9

```
//here
B=(A^N/factorial(N))/(1+A+(A^2/factorial(2))+(A^3/
   factorial(3))+(A^4/factorial(4))+(A^5/factorial
   (5)))
mprintf('grade of service is: %f\n',B)
Tl=A*B//traffic lost
mprintf('traffic lost is:%f',Tl)
```

Chapter 3

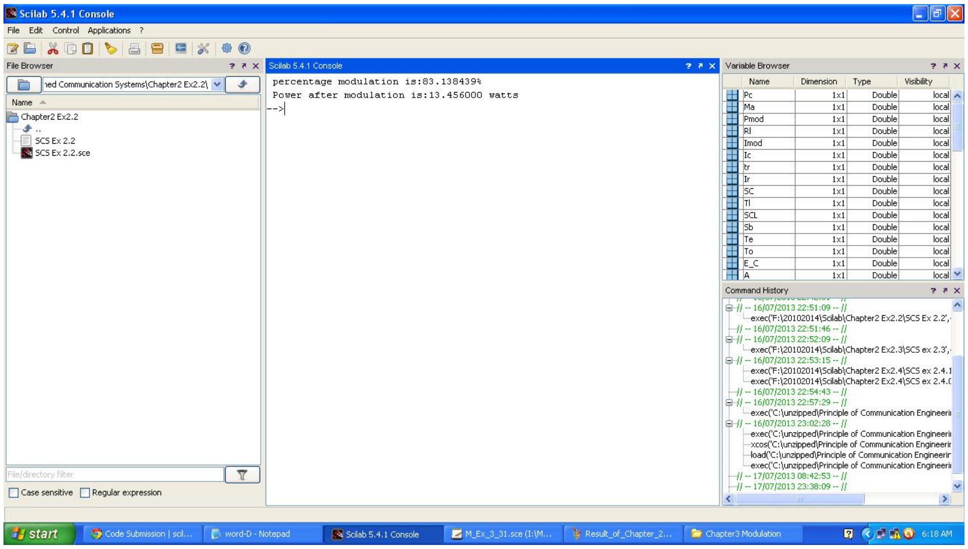
Modulation

Scilab code Exa 3.1 Modulation Ex 3 1

```
clc
//Chapter3: Modulation
//Example3.1, page no 135
//Given
Ic=10 //carrier current in Amps
Imod=11.6// Current after modulation
Rl=1//Assumed load in ohm
Pmod=Rl*Imod^2//power before modulation
Ma= sqrt(2*((Pmod/Ic^2)-1))//percentage modulation
Pc=10
Pmod=Pc*(1+(Ma^2/2))//power after modulation
mprintf('percentage modulation is:%f%c\n Power after
    modulation is:%f watts',Ma*100,'%',Pmod)
```

Scilab code Exa 3.2 Modulation Ex 3 2

```
clc
```



```
percentage modulation is:83.138439%
Power after modulation is:13.456000 watts
-->
```

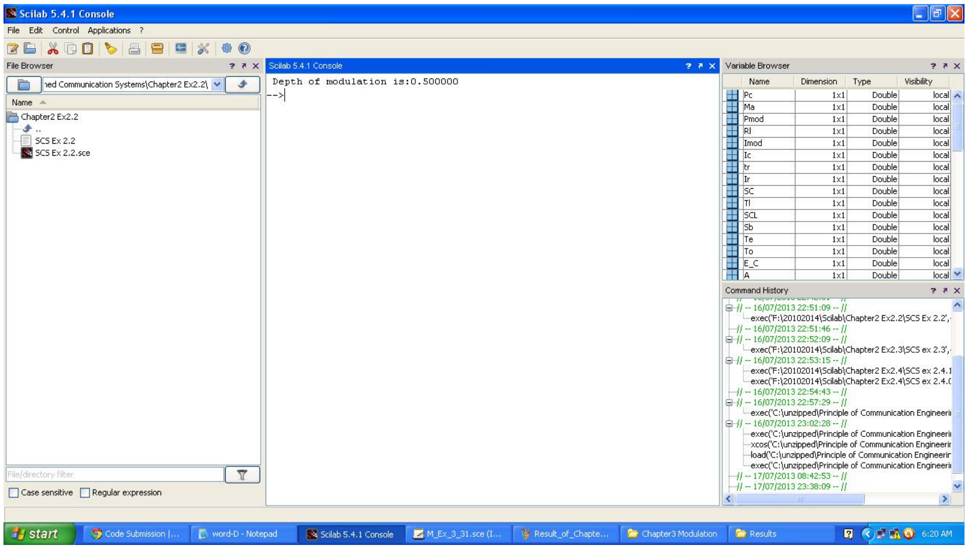
Name	Dimension	Type	Visibility
Pc	1x1	Double	local
Ma	1x1	Double	local
Pmod	1x1	Double	local
Rl	1x1	Double	local
Imod	1x1	Double	local
Ic	1x1	Double	local
tr	1x1	Double	local
Ir	1x1	Double	local
SC	1x1	Double	local
Tl	1x1	Double	local
SCL	1x1	Double	local
Sb	1x1	Double	local
Te	1x1	Double	local
To	1x1	Double	local
E_C	1x1	Double	local
A	1x1	Double	local

Figure 3.1: Modulation Ex 3 1

```
//Chapter3: Modulation
//Example3.2, page no 135
//Given
Pc=9e3// Tx Power without modulation
Pmod=10.125e3//Tx Power after modulation
Ma= sqrt(2*((Pmod/Pc)-1))//depth of (percentage) modulation
mprintf('Depth of modulation is:%f',Ma)
```

Scilab code Exa 3.3 Modulation Ex 3 3

```
clc
//Chapter3: Modulation
//Example3.3
//Given
M1=0.2//depth of modulation for first tone
```



```
Depth of modulation is:0.500000
-->
```

	Name	Dimension	Type	Visibility
▦	Pc	1x1	Double	local
▦	Ma	1x1	Double	local
▦	Pmod	1x1	Double	local
▦	Rl	1x1	Double	local
▦	Imod	1x1	Double	local
▦	Ic	1x1	Double	local
▦	tr	1x1	Double	local
▦	Ir	1x1	Double	local
▦	SC	1x1	Double	local
▦	Tl	1x1	Double	local
▦	SCL	1x1	Double	local
▦	Sb	1x1	Double	local
▦	Te	1x1	Double	local
▦	To	1x1	Double	local
▦	E_C	1x1	Double	local
▦	A	1x1	Double	local

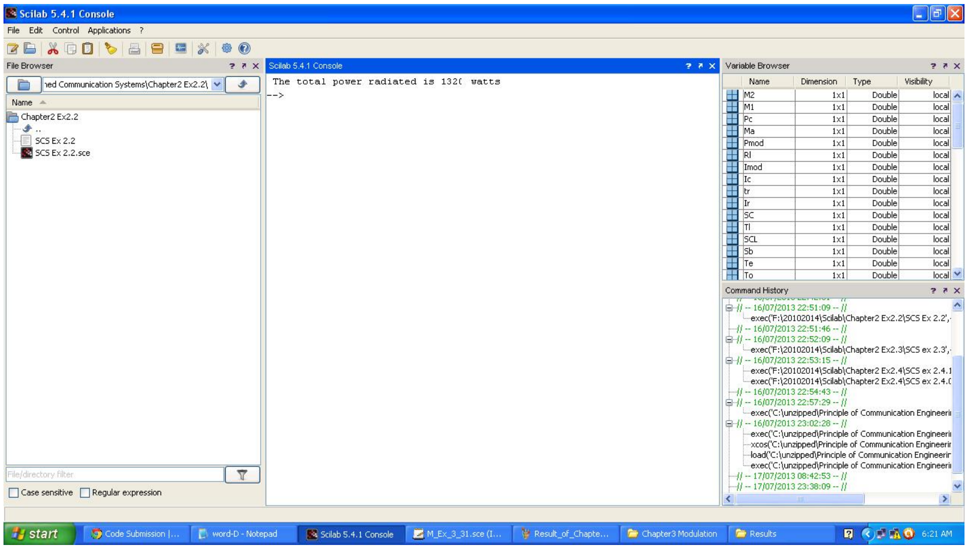
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.2: Modulation Ex 3 2

```
M2=0.4//depth of modulation for second tone
Pc=1200//Tx Power
Pmod=Pc*(1+M1^2/2+M2^2/2)//total power radiated
   after modulation by both the tones
mprintf('The total power radiated is %d watts',Pmod)
```

Scilab code Exa 3.4 Modulation Ex 3 4

```
clc
//Chapter3: Modulation
//Example3.4, page no 138
//Given
Ebb=2e3//DC plate supply
Ecc=-500//DC grid bias
Ib=67e-3//DC plate current
Ic=30e-3//DC grid current
```



```
 The total power radiated is 132(  watts
-->
```

Name	Dimension	Type	Visibility
M2	1x1	Double	local
M1	1x1	Double	local
Pc	1x1	Double	local
Ma	1x1	Double	local
Pmod	1x1	Double	local
Rl	1x1	Double	local
Imod	1x1	Double	local
Ic	1x1	Double	local
tr	1x1	Double	local
Ir	1x1	Double	local
SC	1x1	Double	local
Tl	1x1	Double	local
SCL	1x1	Double	local
Sb	1x1	Double	local
Te	1x1	Double	local
To	1x1	Double	local

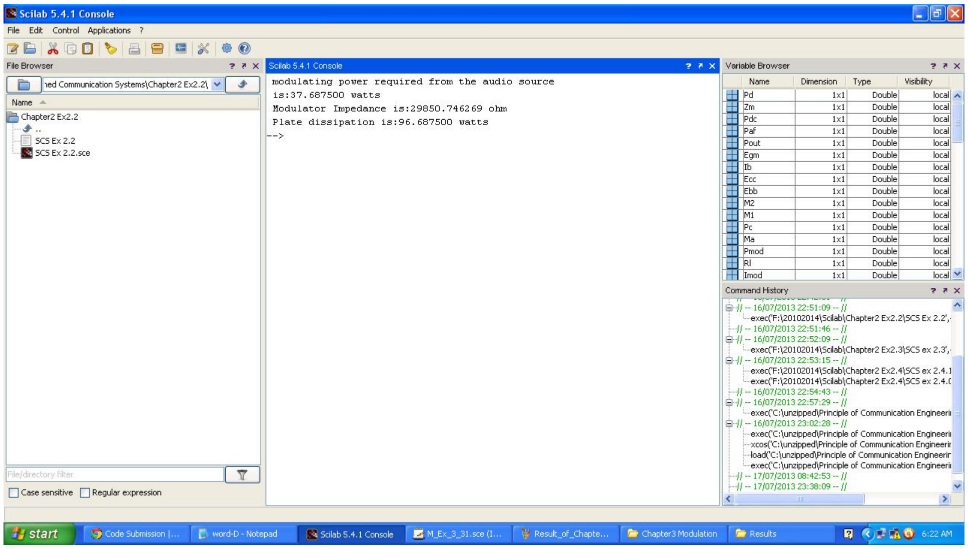
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.3: Modulation Ex 3 3

```
Egm=750//RF peak grid voltage
Pout=75//RF Power output
Ma=0.75//Depth of modulation
Paf=(Ma^2*Ebb*Ib)/(2*1)//modulating power required from the audio source
Pdc=Ebb*Ib//Power supplied by DC source
Zm=Ebb^2/Pdc//Modulator Impedance

Pd=Pdc+Paf-Pout//Plate dissipation
mprintf('modulating power required from the audio source\n is:%f watts\n Modulator Impedance is:%f ohm\n Plate dissipation is:%f watts',Paf,Zm,Pd)
```

Scilab code Exa 3.5 Modulation Ex 3 5

```
clc
```



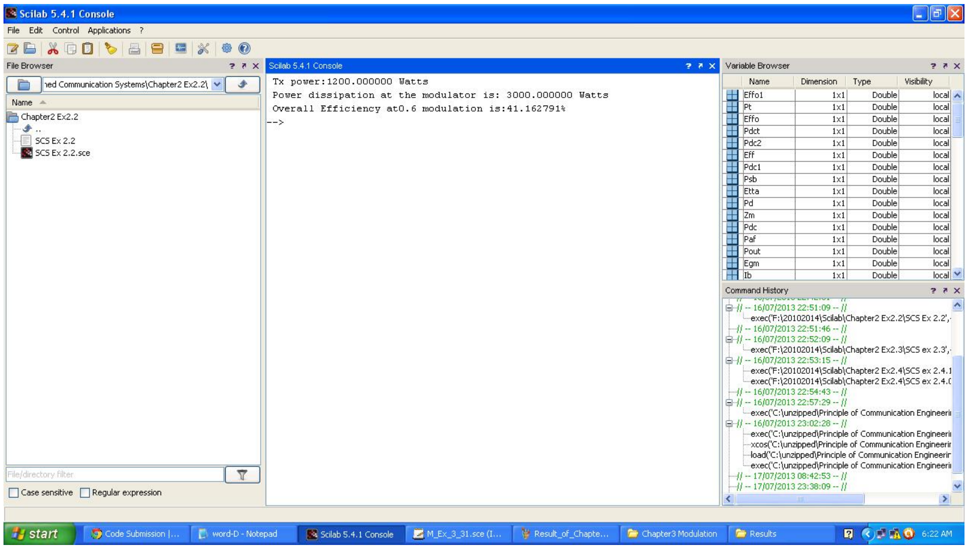
```
modulating power required from the audio source
 is:37.687500 watts
 Modulator Impedance is:29850.746269 ohm
 Plate dissipation is:96.687500 watts
-->
```

Name	Dimension	Type	Visibility
Pd	1x1	Double	local
Zm	1x1	Double	local
Pdc	1x1	Double	local
Paf	1x1	Double	local
Pout	1x1	Double	local
Egm	1x1	Double	local
Ib	1x1	Double	local
Ecc	1x1	Double	local
Ebb	1x1	Double	local
M2	1x1	Double	local
M1	1x1	Double	local
Pc	1x1	Double	local
Ma	1x1	Double	local
Pmod	1x1	Double	local
Rl	1x1	Double	local
Imod	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineeri
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.4: Modulation Ex 3 4

```
//Chapter3: Modulation
//Example3.5b, page no 139
//Given
Pd=944//Anode dissipation of the class C amplifier
    in watts
Ma=0.6//modulation depth,
Etta=0.6//efficiency
Pout=(Etta*Pd/(1-Etta))//power dissipation at 60%
    modulation
Pc=Pout/(1+(Ma^2/2))//Tx power
Psb=Pout-Pc
Pdc1=Pc/Etta//DC power inputto PA
Paf=Psb/Etta// modulation power input to PA
Eff=0.25// efficiency of the modulator
Pdc2=Paf/Eff//DC power input to modulator
Pdct=Pdc1+Pdc2//Total DC power to the system
Effo=Pout/Pdct//Overall Efficiency
Ma=1// 100% modulation
Pt=Pc*(1+(Ma^2)/2)
Psb=(Pc*Ma^2)/2
```



```
Tx power:1200.000000 Watts
Power dissipation at the modulator is: 3000.000000 Watts
Overall Efficiency at0.6 modulation is:41.162791%
-->
```

Name	Dimension	Type	Visibility
Effo1	1x1	Double	local
Pt	1x1	Double	local
Effo	1x1	Double	local
Pdct	1x1	Double	local
Pdc2	1x1	Double	local
Eff	1x1	Double	local
Pdc1	1x1	Double	local
Psb	1x1	Double	local
Etta	1x1	Double	local
Pd	1x1	Double	local
Zm	1x1	Double	local
Pdc	1x1	Double	local
Paf	1x1	Double	local
Pout	1x1	Double	local
Egm	1x1	Double	local
Ib	1x1	Double	local

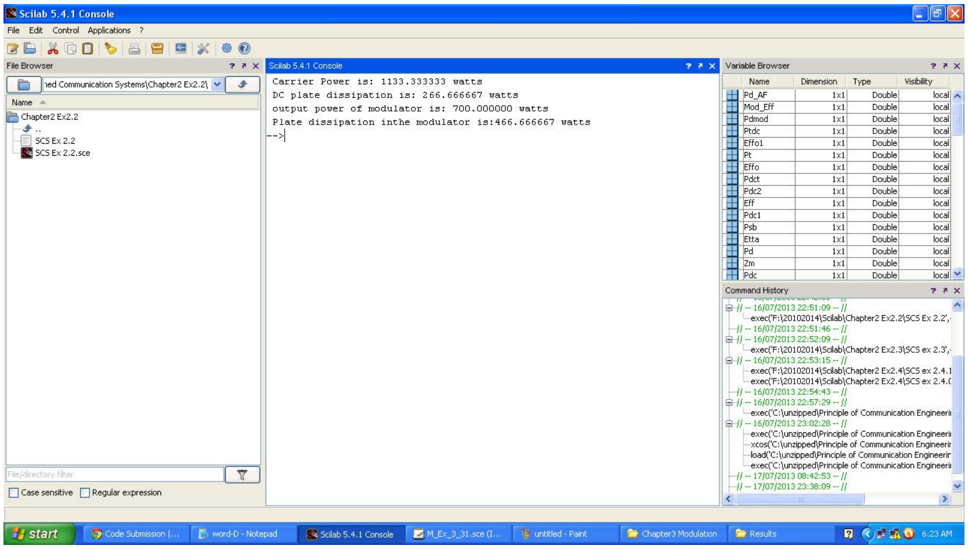
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.5: Modulation Ex 3 5

```
Paf=Psb/Etta//modulating input power to PA
Pdc2=Paf/Eff// DC power input to modulator
Pd=Pdc2-Paf//Power dissipation at the modulator
Effo1=Pout/(Pdc1+Pdc2)//Overall Efficiency
mprintf('Tx power:%f Watts\n Power dissipation at the modulator is: %f Watts\n Overall Efficiency at0.6 modulation is:%f%c ',Pc,Pd,100*Effo,'%')
```

Scilab code Exa 3.6 Modulation Ex 3 6

```
clc
//Chapter3: Modulation
//Example3.6, page no 141
//Given
Pdc=1400//DC power i/p to PA under 100% modulation
Ptdc=400//Plate dissipation
```



```
Carrier Power is: 1133.333333 watts
DC plate dissipation is: 266.666667 watts
output power of modulator is: 700.000000 watts
Plate dissipation inthe modulator is:466.666667 watts
-->
```

Name	Dimension	Type	Visibility
Pd_AF	1x1	Double	local
Mod_Eff	1x1	Double	local
Pdmod	1x1	Double	local
Ptdc	1x1	Double	local
Effo1	1x1	Double	local
Pt	1x1	Double	local
Effo	1x1	Double	local
Pdct	1x1	Double	local
Pdc2	1x1	Double	local
Eff	1x1	Double	local
Pdc1	1x1	Double	local
Psb	1x1	Double	local
Etta	1x1	Double	local
Pd	1x1	Double	local
Zm	1x1	Double	local
Pdc	1x1	Double	local

Figure 3.6: Modulation Ex 3 6

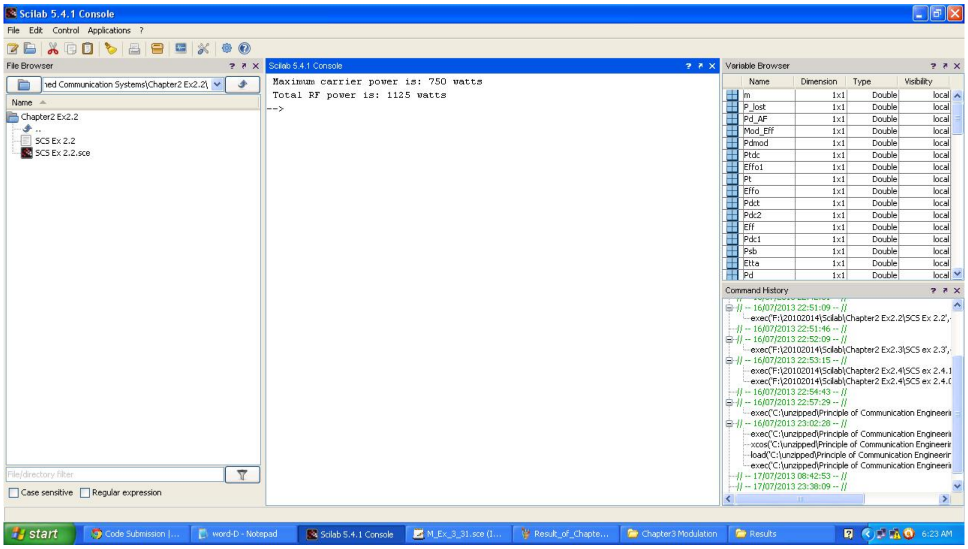
```
Pd=Ptdc*(2/3)//DC plate dissipation

Pdmod=Ptdc*(1/3)//
Pc=Pdc-Pd//Carrier Power

Psb=Pc/2//side band power
Paf=Psb+Pdmod//output power of modulator

Mod_Eff=0.6
Pdc2=Paf/Mod_Eff//DC i/p power to the modulator
Pd_AF=Pdc2-Paf//Plate dissipation inthe modulator
mprintf('Carrier Power is: %f watts \n DC plate
    dissipation is: %f watts\n output power of
    modulator is: %f watts\n Plate dissipation inthe
    modulator is:%f watts',Pc,Pd,Paf,Pd_AF)
```

Scilab code Exa 3.7 Modulation Ex 3 7

```
clc
//Chapter3: Modulation
//Example3.7, page no 141
//Given
Paf=500//Modulator output power
Eff=0.75//Efficiency of the amplifier
P_lost=Paf*(1-Eff)//modulating power lost in the amplifier
Psb=Paf*Eff//side band power

m=1
Pc=2*Psb

Pt=Pc+Psb//Total RF power
mprintf('Maximum carrier power is: %d watts\n Total RF power is: %d watts',Pc,Pt)
```

Scilab code Exa 3.8 Modulation Ex 3 8

```
clc
//Chapter3: Modulation
//Example3.8, page no 143
//Given
Po=3000// Rating of Power Amplifier
Pr=750//Push-Pull amplifier rated as
Paf=2*Pr//Rated power output from Push-Pull modulator
Eff=0.6
P_lost=Paf-(Eff*Paf)//Modulation power lost
Psb=Paf-P_lost//side band power

```



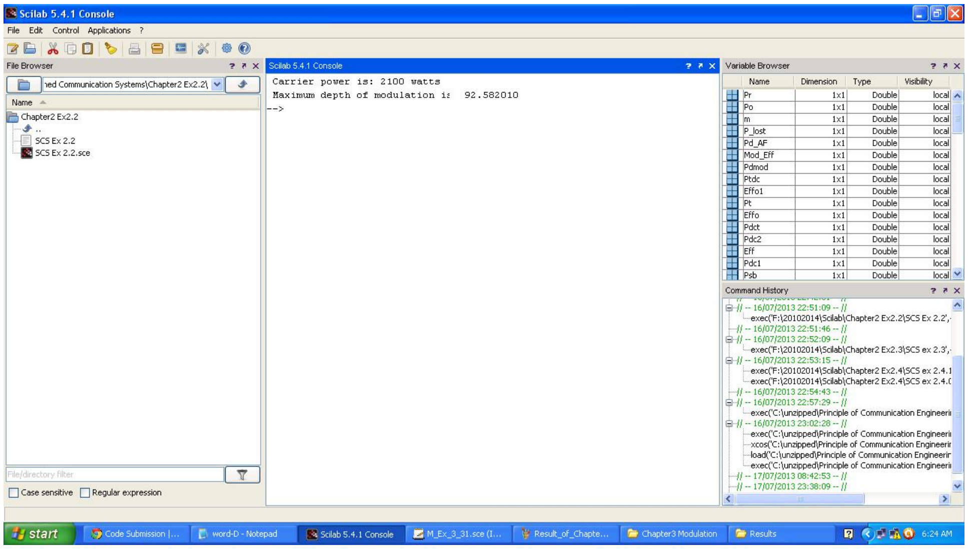
```
Maximum carrier power is: 750 watts
Total RF power is: 1125 watts
-->
```

Figure 3.7: Modulation Ex 3 7

```
Pc=Po-Psb//Carrier power
Ma=sqrt(2*Psb/Pc)*100//Maximum depth of modulation
mprintf('Carrier power is: %d watts\n Maximum depth
    of modulation is: %f',Pc,Ma)
```

Scilab code Exa 3.9 Modulation Ex 3 9

```
clc
//Chapter3: Modulation, page no 142
//Example3.9
//Given
t=0:0.001:10
//e=500*(1+(0.4*sin(3140*t)))*sin(6.28e7*t)
//a
wc=6.28e7//Carrier angular frequency
fc=wc/(2*%pi)// Carrier freq
```



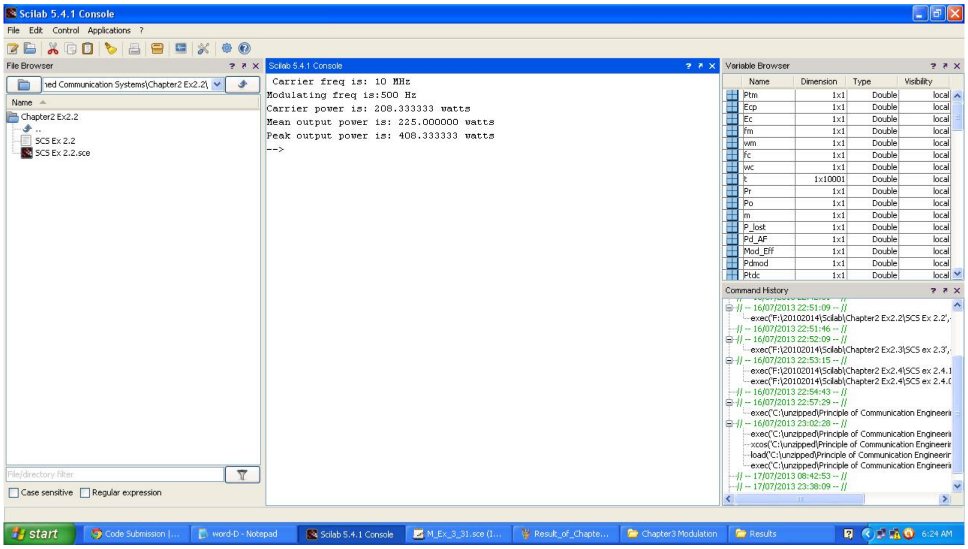
```
Carrier power is: 2100 watts
Maximum depth of modulation is:  92.582010
-->
```

Name	Dimension	Type	Visibility
Pr	1x1	Double	local
Po	1x1	Double	local
m	1x1	Double	local
P_lost	1x1	Double	local
Pd_AF	1x1	Double	local
Mod_Eff	1x1	Double	local
Pdmod	1x1	Double	local
Ptdc	1x1	Double	local
Effo1	1x1	Double	local
Pt	1x1	Double	local
Effo	1x1	Double	local
Pdct	1x1	Double	local
Pdc2	1x1	Double	local
Eff	1x1	Double	local
Pdc1	1x1	Double	local
Psb	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.8: Modulation Ex 3 8

```
//b
wm=3140//Modulating angular freq
fm=wm/(2*%pi)//Modulating freq
//c
Ec=500///peak carrier voltage
Pc=(Ec^2)/(2*600)//Carrier power
//d
Ma=0.4
Pt=Pc*(1+(Ma^2 / 2))//Mean output power
//e
Rl=600//load resistance
Ecp=Ec+(Ma*Ec)//Peak output voltage
Ptm=Ecp^2/(2*Rl)//Peak power
mprintf('Carrier freq is: %d MHz\nModulating freq is
    :%d Hz\nCarrier power is: %f watts\nMean output
    power is: %f watts\nPeak output power is: %f
    watts',round(fc*1e-6),round(fm),Pc,Pt,Ptm)
```



```
 Carrier freq is: 10 MHz
Modulating freq is:500 Hz
Carrier power is: 208.333333 watts
Mean output power is: 225.000000 watts
Peak output power is: 408.333333 watts
-->
```

Name	Dimension	Type	Visibility
Ptm	1x1	Double	local
Ecp	1x1	Double	local
Ec	1x1	Double	local
fm	1x1	Double	local
wm	1x1	Double	local
fc	1x1	Double	local
wc	1x1	Double	local
t	1x10001	Double	local
Pr	1x1	Double	local
Po	1x1	Double	local
m	1x1	Double	local
P_lost	1x1	Double	local
Pd_AF	1x1	Double	local
Mod_Eff	1x1	Double	local
Pdmod	1x1	Double	local
Ptdc	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.9: Modulation Ex 3 9

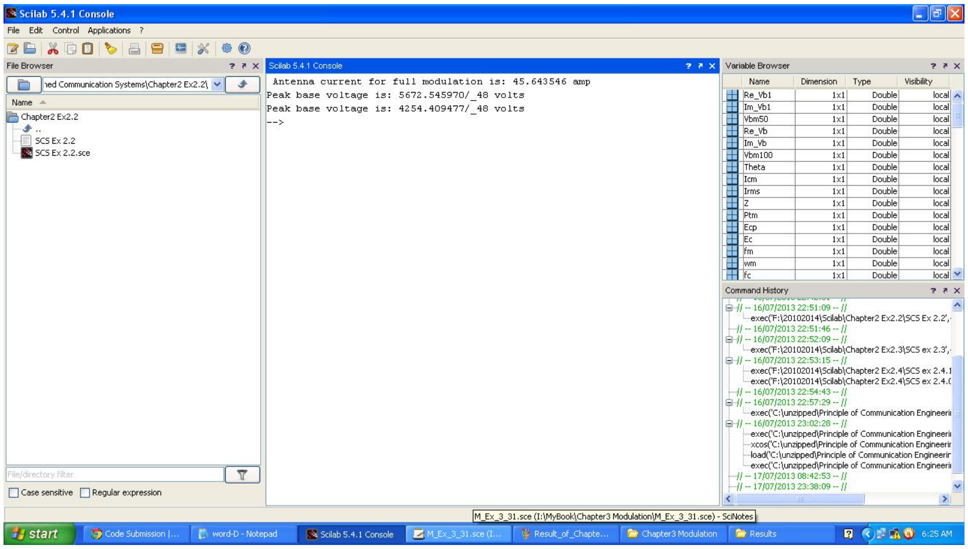
Scilab code Exa 3.10 Modulation Ex 3 10

```

clc
//Answers from the book are little deviated but the evaluated values in the scilab are correct results
//Chapter3: Modulation
//Example3.10, page no 143
//Given
//b
Pc=50e3//Carrier power
Z=36 + %i*40//base impedance of the antenna
Ma=1//modulation depth
Pmod=Pc*(1+((Ma^2)/2))//power delivered to the antenna under 100% modulation
//i
```

```
R=36//resistance of the antenna
Irms=sqrt(Pmod/R)//Antenna Current

//ii
Ic=sqrt(Pc/R)//RMS carrier current

Icm=Ic*sqrt(2)// Peak carrier current
Imod=2*Icm//Modulated current

Theta=atan(40/36)*180/%pi// from real and imaginary components of Z
Vbm100=Imod*Z//Peak base output voltage for 100% modulation
[Re_Vb,Im_Vb]=polar(Vbm100)

//iii
Ma=0.5
Imod=Icm*(1+0.5)

Vbm50=Imod*Z
[Re_Vb1,Im_Vb1]=polar(Vbm50)
mprintf('Antenna current for full modulation is: %f amp\nPeak base voltage is: %f/_%d volts\nPeak base voltage is: %f/_%d volts',Irms,Re_Vb,Theta,Re_Vb1,Theta)
// The Ans is little deviated from that of book as the decimal places considered while calculating at different stages might be different
```

Scilab code Exa 3.11 Modulation Ex 3 11

```
clf();
clc
```



```
 Antenna current for full modulation is: 45.643546 amp
Peak base voltage is: 5672.545970/_48 volts
Peak base voltage is: 4254.409477/_48 volts
-->
```

	Name	Dimension	Type	Visibility
	Re_Vb1	1x1	Double	local
	Im_Vb1	1x1	Double	local
	Vbm50	1x1	Double	local
	Re_Vb	1x1	Double	local
	Im_Vb	1x1	Double	local
	Vbm100	1x1	Double	local
	Theta	1x1	Double	local
	Icm	1x1	Double	local
	Irms	1x1	Double	local
	Z	1x1	Double	local
	Ptm	1x1	Double	local
	Ecp	1x1	Double	local
	Ec	1x1	Double	local
	fm	1x1	Double	local
	wm	1x1	Double	local
	fc	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
  exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
  exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
  exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
  exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
  exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
  exec('C:\unzipped\Principle of Communication Engineeri
  xcos('C:\unzipped\Principle of Communication Engineerin
  load('C:\unzipped\Principle of Communication Engineerin
  exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.10: Modulation Ex 3 10

```
//Chapter3: Modulation
//Example3.11, page no 144
//Given
deff(”[y]=f(x)”,”y=Ec*(1+ma*(sin(wm*x)))*sin(wc*x)”)
Ec=10,ma=0.5,wm=10000*%pi,wc=2*%pi*1e7
x=[0:0.01:20]*%pi/10;
subplot(2,1,1)
fplot2d(x,f)
xlabel(”t”, ”fontsize”, 3);
ylabel(”Modulated Wave”, ”fontsize”, 3, ”color”, ”red”);
Fc=wc/(2*%pi)
Fm=wm/(2*%pi)
Fusb=(wm+wc)/(2*%pi)
Flsb=(wm-wc)/(2*%pi)
mprintf('USB freq=%d k5Hz\nUSB amplitude=%f V\nLSB freq=%d kHz\nLSB amplitude=%f V\nCarrier amplitude=%d V',Fusb*1e-3,2.5,Flsb*-1e-3,2.5,10)
F=[0,2.5,10,2.5,0]
T=[-2,-1,0,1,2]
```

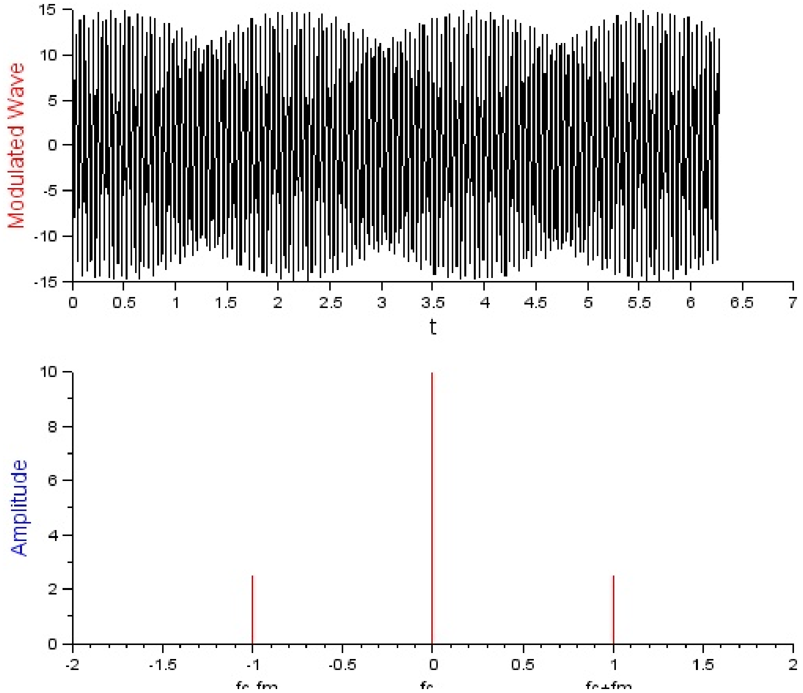
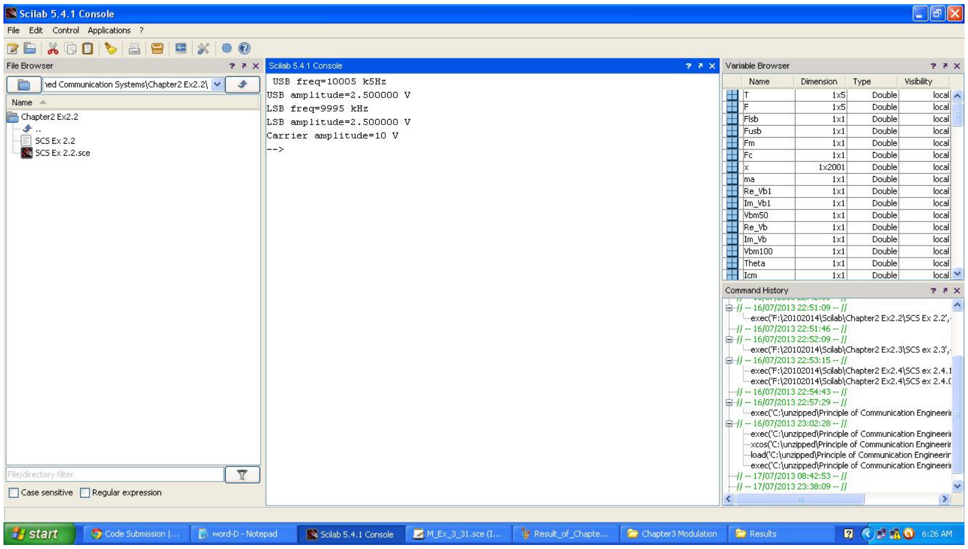


Figure 3.11: Modulation Ex 3 11

```
subplot(2,1,2)
plot2d3(T,F,5)
xlabel("Freq", "fontsize", 3);
ylabel("Amplitude", "fontsize", 3, "color", "blue");
xlabel("fc-fm                                         fc                                         fc+fm", "fontsize", 2);
```

Scilab code Exa 3.12 Modulation Ex 3 12



```
 USB freq=10005 k5Hz
USB amplitude=2.500000 V
LSB freq=9995 kHz
LSB amplitude=2.500000 V
Carrier amplitude=10 V
-->
```

Name	Dimension	Type	Visibility
T	1x5	Double	local
F	1x5	Double	local
Flsb	1x1	Double	local
Fusb	1x1	Double	local
Fm	1x1	Double	local
Fc	1x1	Double	local
x	1x2001	Double	local
ma	1x1	Double	local
Re_Vb1	1x1	Double	local
Im_Vb1	1x1	Double	local
Vbm50	1x1	Double	local
Re_Vb	1x1	Double	local
Im_Vb	1x1	Double	local
Vbm100	1x1	Double	local
Theta	1x1	Double	local
Icm	1x1	Double	local

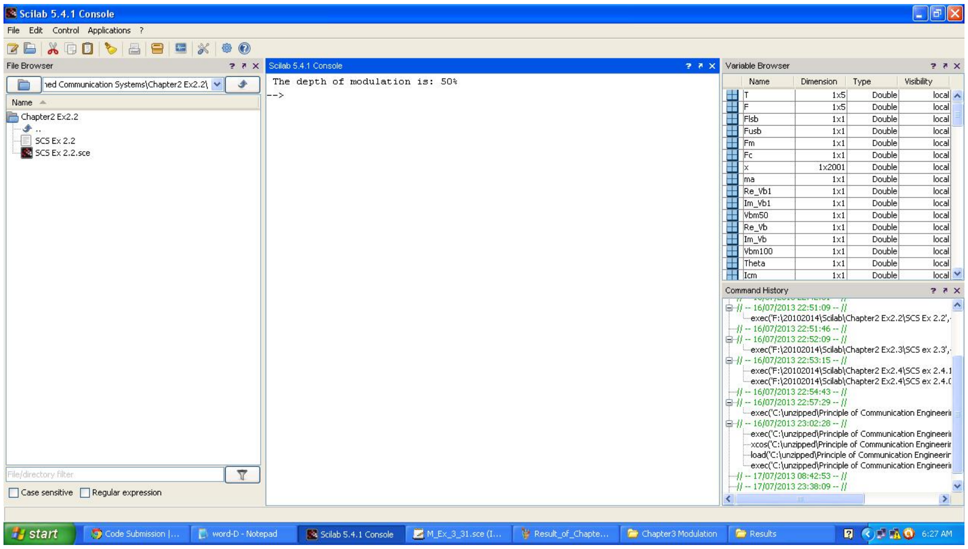
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.12: Modulation Ex 3 11

```
clc
//Chapter3: Modulation
//Example3.12 page no 145
//Given
Pc=9e3//unmodulated carrier power
Pt=10.125e3//Modulated carrier power
Ma=sqrt(2*((Pt/Pc)-1))//depth of modulation
mprintf('The depth of modulation is: %d%c',Ma*100,'%
    ')
```

Scilab code Exa 3.13 Modulation Ex 3 13

```
clc
//Chapter3: Modulation
//Example3.13 page no 148
//Given
```



```
 The depth of modulation is: 50%
-->
```

Name	Dimension	Type	Visibility
T	1x5	Double	local
F	1x5	Double	local
Flsb	1x1	Double	local
Fusb	1x1	Double	local
Fm	1x1	Double	local
Fc	1x1	Double	local
x	1x2001	Double	local
ma	1x1	Double	local
Re_Vb1	1x1	Double	local
Im_Vb1	1x1	Double	local
Vbm50	1x1	Double	local
Re_Vb	1x1	Double	local
Im_Vb	1x1	Double	local
Vbm100	1x1	Double	local
Theta	1x1	Double	local
Icm	1x1	Double	local

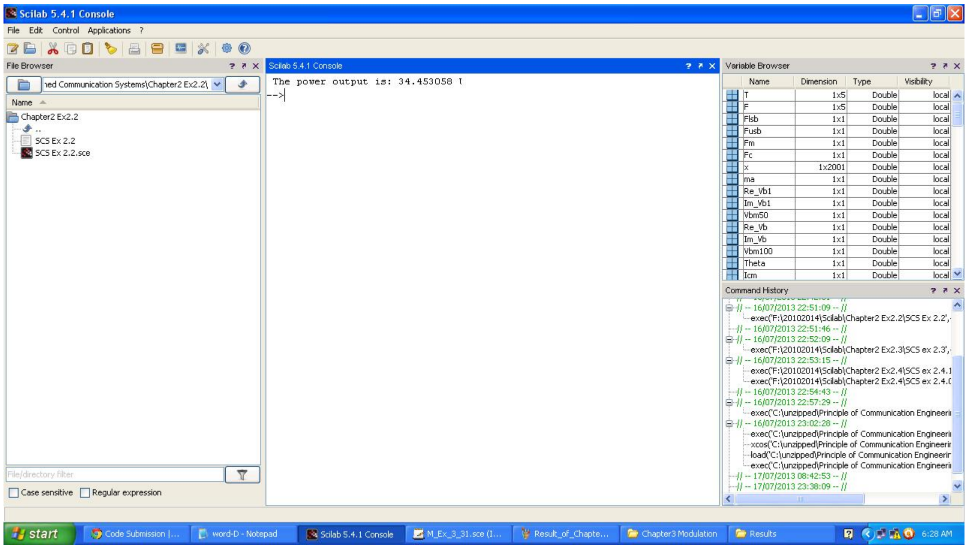
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.13: Modulation Ex 3 12

```
Pt=5e3//carrier power for 95% modulation
Ma=0.95
Pc=Pt/(1+((Ma^2)/2))//carrier power
Ma=0.2//average modulation by speech signal
Psb=(Ma^2)*Pc/2//the power n the sideband
Pout=Psb/2// because one of the side band is suppressed
mprintf('The power output is: %f W',Pout)
```

Scilab code Exa 3.14 Modulation Ex 3 14

```
clc
//Chapter3: Modulation
//Example3.14 page no 152
//Given
```



```
The power output is: 34.453058 W
-->
```

	Name	Dimension	Type	Visibility
	T	1x5	Double	local
	F	1x5	Double	local
	Flsb	1x1	Double	local
	Fusb	1x1	Double	local
	Fm	1x1	Double	local
	Fc	1x1	Double	local
	x	1x2001	Double	local
	ma	1x1	Double	local
	Re_Vb1	1x1	Double	local
	Im_Vb1	1x1	Double	local
	Vbm50	1x1	Double	local
	Re_Vb	1x1	Double	local
	Im_Vb	1x1	Double	local
	Vbm100	1x1	Double	local
	Theta	1x1	Double	local
	Icm	1x1	Double	local

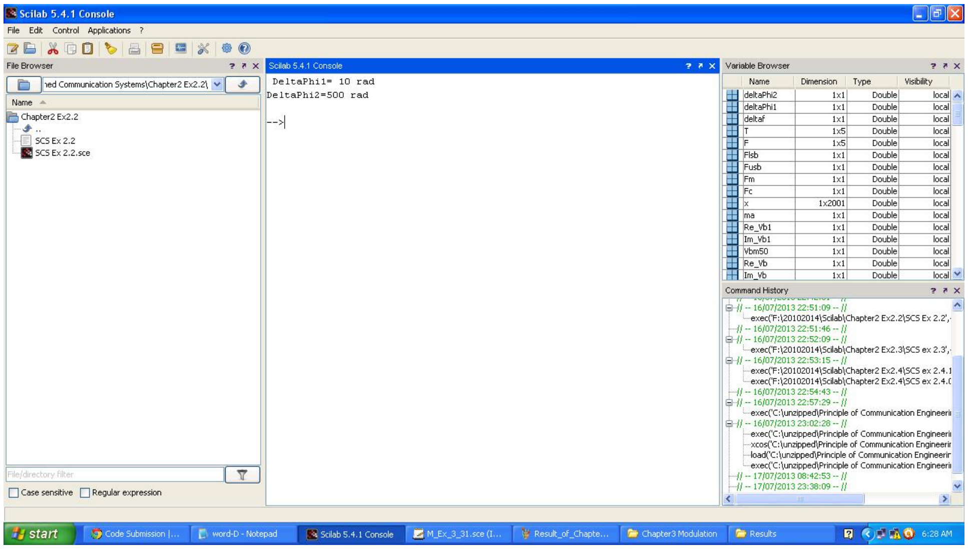
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.14: Modulation Ex 3 13

```
//Phi=(wc*t+Mf*sin(wmt))....instantaneous phase of
   FM
fm=5000//modulating freq
deltaf=50e3//freq deviation
deltaPhi1=deltaf/fm// Advance or retard in phase

fm=100//modulating freq in second signal
deltaPhi2=deltaf/fm
mprintf('DeltaPhi1= %d rad\nDeltaPhi2=%d rad\n',
    deltaPhi1,deltaPhi2)
```

Scilab code Exa 3.15 Modulation Ex 3 15

```
clc
//Chapter3: Modulation
//Example3.14 page no 157
```



```
DeltaPhi1= 10 rad
DeltaPhi2=500 rad

-->
```

Variable Browser

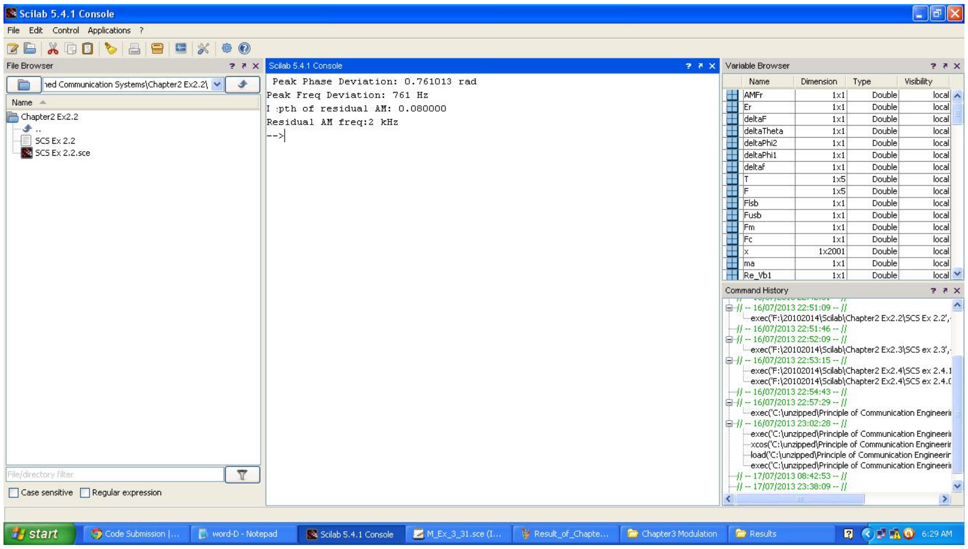
Name	Dimension	Type	Visibility
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local
deltaf	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local
Flsb	1x1	Double	local
Fusb	1x1	Double	local
Fm	1x1	Double	local
Fc	1x1	Double	local
x	1x2001	Double	local
ma	1x1	Double	local
Re_Vb1	1x1	Double	local
Im_Vb1	1x1	Double	local
Vbm50	1x1	Double	local
Re_Vb	1x1	Double	local
Im_Vb	1x1	Double	local

Command History

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.15: Modulation Ex 3 14

```
//Given
//e=Ec(1+0.4cos(2pie3*t))*sin(2pie7*t)
fm=1000//modulating s/g freq
deltaTheta=2*atan(0.4)//peak phase deviation

deltaF=deltaTheta*fm//Peak freq deviation

Ec=1
Er=sqrt((Ec^2)*(1+(0.4^2)))
m=(Er-Ec)/Ec//depth of residual AM

AMFr=2*fm// freq ofresidual AM
mprintf('Peak Phase Deviation: %f rad\nPeak Freq
    Deviation: %d Hz\nDepth of residual AM: %f\
    nResidual AM freq:%d kHz',deltaTheta,deltaF,(
    round(m*100)/100),AMFr*1e-3)
```

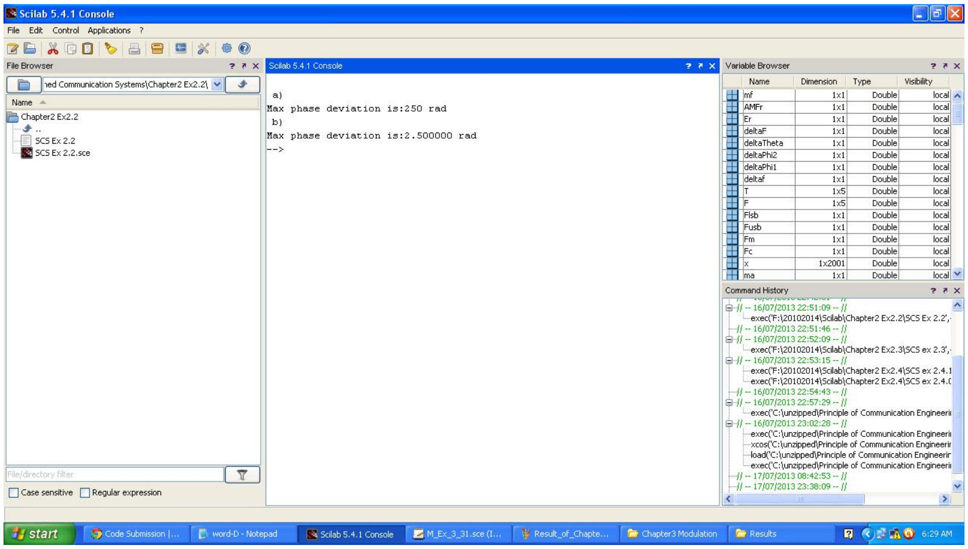


```
 Peak Phase Deviation: 0.761013 rad
Peak Freq Deviation: 761 Hz
I :pth of residual AM: 0.080000
Residual AM freq:2 kHz
-->
```

Figure 3.16: Modulation Ex 3 15

Scilab code Exa 3.16 Modulation Ex 3 16

```
clc
//Chapter3: Modulation
//Example3.16 page no 170
//Given
deltaF=25e3//freq deviation
//a
fm=100//modulation signal freq
mf=deltaF/fm// Max phase deviation
disp('a)')
mprintf('Max phase deviation is:%d rad',mf)
//b
fm=10e3//modulation signal freq
mf=deltaF/fm//Max phase deviation

disp('b)')
```



```
 a)
Max phase deviation is:250 rad
 b)
Max phase deviation is:2.500000 rad
-->
```

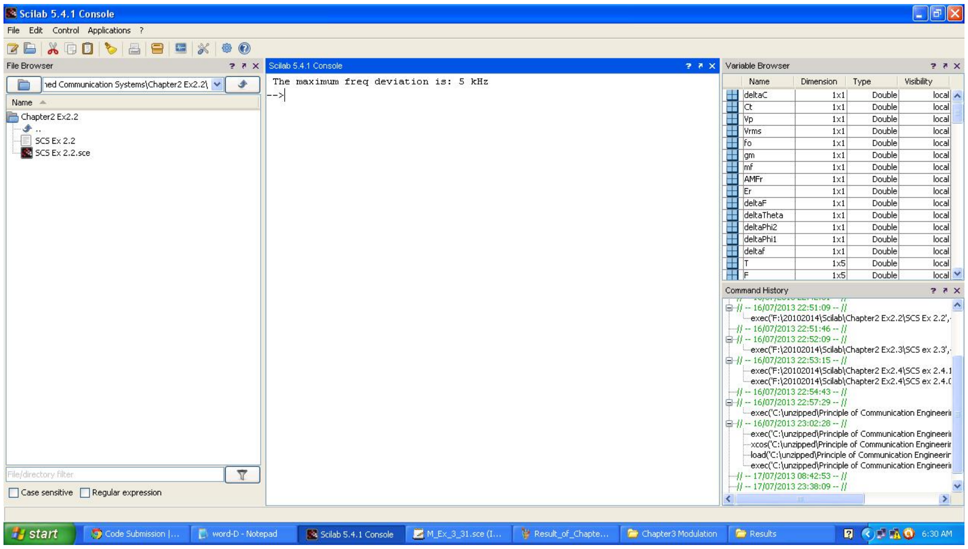
Name	Dimension	Type	Visibility
mf	1x1	Double	local
AMFr	1x1	Double	local
Er	1x1	Double	local
deltaF	1x1	Double	local
deltaTheta	1x1	Double	local
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local
deltaf	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local
Flsb	1x1	Double	local
Fusb	1x1	Double	local
Fm	1x1	Double	local
Fc	1x1	Double	local
x	1x2001	Double	local
ma	1x1	Double	local

Figure 3.17: Modulation Ex 3 16

```
mprintf('Max phase deviation is:%f rad',mf)
```

Scilab code Exa 3.17 Modulation Ex 3 17

```
clc
//Chapter3: Modulation
//Example3.17, page no 171
//Given
gm=0.1e-3// trans-conductance variation A/V
C=0.5e-12// capactance between anode and grid
R=1e3// resistance
fo=10e6// oscillator freq
Vrms=1.414//AF RMS voltage
Vp=sqrt(2)*Vrms//Peak voltage
Ct=100e-12//tank capacitance
deltaC=gm*C*R*Vp
```



```
 The maximum freq deviation is: 5 kHz
-->
```

Name	Dimension	Type	Visibility
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local
gm	1x1	Double	local
mf	1x1	Double	local
AMFr	1x1	Double	local
Er	1x1	Double	local
deltaF	1x1	Double	local
deltaTheta	1x1	Double	local
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local
deltaf	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local

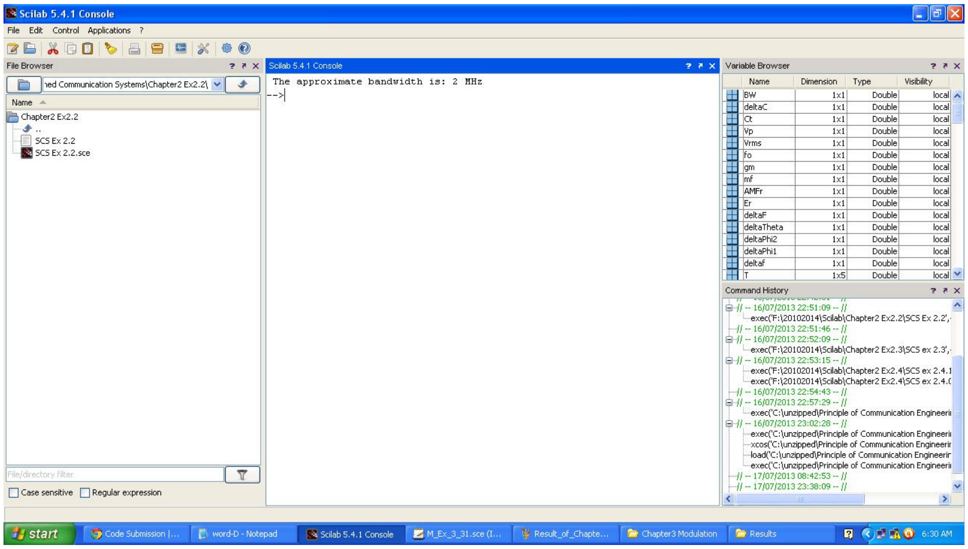
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.18: Modulation Ex 3 17

```

deltaF=fo*(deltaC/(2*Ct))// maximum freq deviation
mprintf('The maximum freq deviation is: %d kHz',
   round(deltaF/1000))
```

Scilab code Exa 3.18 Modulation Ex 3 18

```
clc
//Chapter3: Modulation
//Example3.18, page no 172
//Given
deltaF=1e6// max freq deviation
fm=10e3//modulating freq
mf=(2*deltaF)/fm// modulation coefficient
BW=mf*fm// bandwidth
```



```
The approximate bandwidth is: 2 MHz
-->
```

Name	Dimension	Type	Visibility
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local
gm	1x1	Double	local
mf	1x1	Double	local
AMFr	1x1	Double	local
Er	1x1	Double	local
deltaF	1x1	Double	local
deltaTheta	1x1	Double	local
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local
deltaf	1x1	Double	local
T	1x5	Double	local

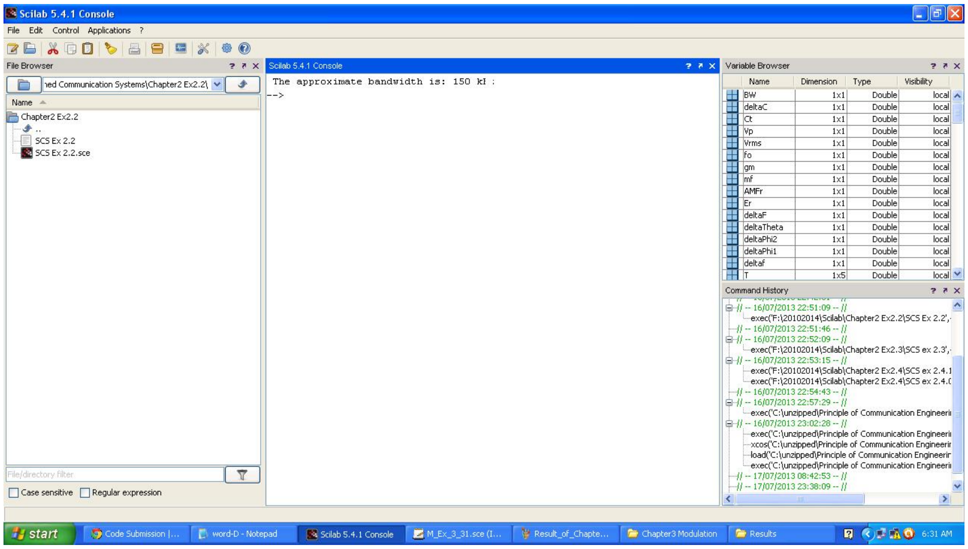
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.19: Modulation Ex 3 18

```
mprintf('The approximate bandwidth is: %d MHz',BW/1
    e6)
```

Scilab code Exa 3.19 Modulation Ex 3 19

```
clc
//Chapter3: Modulation
//Example3.19, page no 172
//Given
deltaF=75e3// max freq deviation
fm=15e3//modulation freq
mf=(2*deltaF)/fm// freq modulation depth
BW=mf*fm// Bandwidth
mprintf('The approximate bandwidth is: %d kHz',BW/1
    e3)
```



```
 The approximate bandwidth is: 150 kH :
-->
```

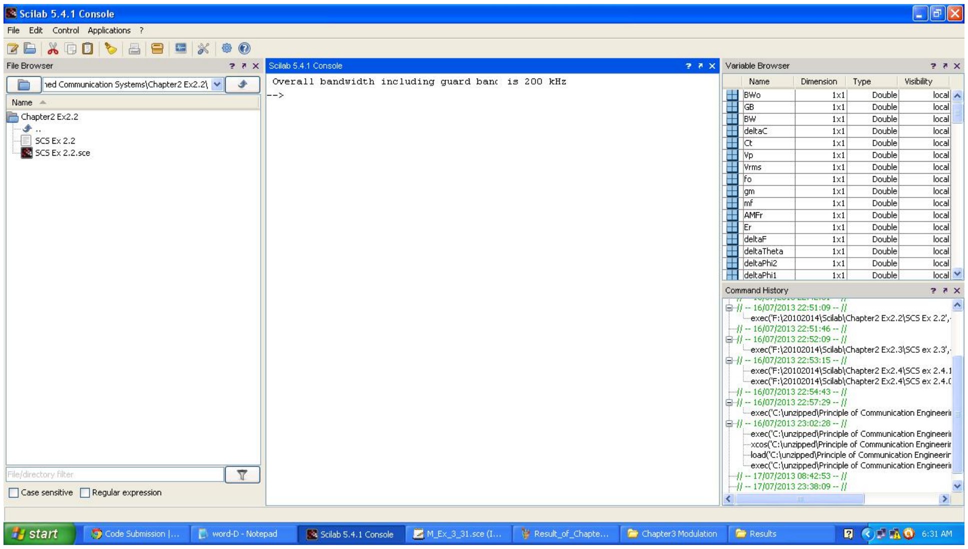
Name	Dimension	Type	Visibility
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local
gm	1x1	Double	local
mf	1x1	Double	local
AMFr	1x1	Double	local
Er	1x1	Double	local
deltaF	1x1	Double	local
deltaTheta	1x1	Double	local
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local
deltaf	1x1	Double	local
T	1x5	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.20: Modulation Ex 3 19

Scilab code Exa 3.21 Modulation Ex 3 21

```
clc
//Chapter3: Modulation
//Example3.21, page no 173
//Given
deltaF=75e3//freq deviation
fm=15e3// modulating freq
mf=deltaF/fm
BW=2*mf*fm// Bandwidth
GB=25e3//Guard Band
BWo=BW+(2*GB)// Overall bandwidth
mprintf('Overall bandwidth including guard band is
   %d kHz',BWo/1e3)
```



```
Overall bandwidth including guard banc is 200 kHz
-->
```

Name	Dimension	Type	Visibility
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local
gm	1x1	Double	local
mf	1x1	Double	local
AMFr	1x1	Double	local
Er	1x1	Double	local
deltaF	1x1	Double	local
deltaTheta	1x1	Double	local
deltaPhi2	1x1	Double	local
deltaPhi1	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.21: Modulation Ex 3 21

Scilab code Exa 3.25 Modulation Ex 3 25

```
clc
//Chapter3: Modulation
//Example3.25, pageno 175
//Given
//em=3sin(2*pi*1000t)+5cos(2*pi*3000t)
//ec=50sin(2*pi*500e3*t)
m1=0.06//(sine wave amplitude/ peak carrier voltage)
m2=0.1//(cosine wave amplitude/ peak carrier voltage)
Vc=50//Carrier voltage
R=50//load resistance
Pc=(Vc^2)/(2*R)//Peak carrier power
Pt=Pc*(1+((m1^2+m2^2)/2))//Total power after
```

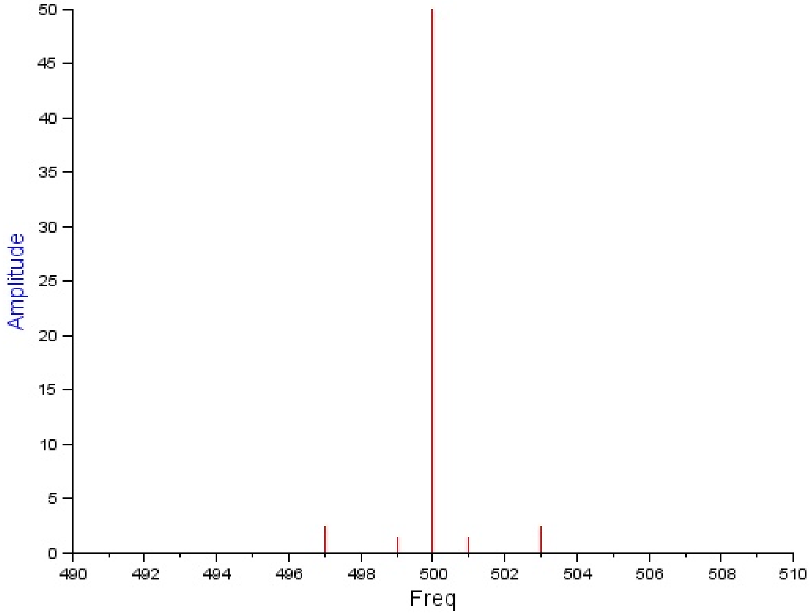
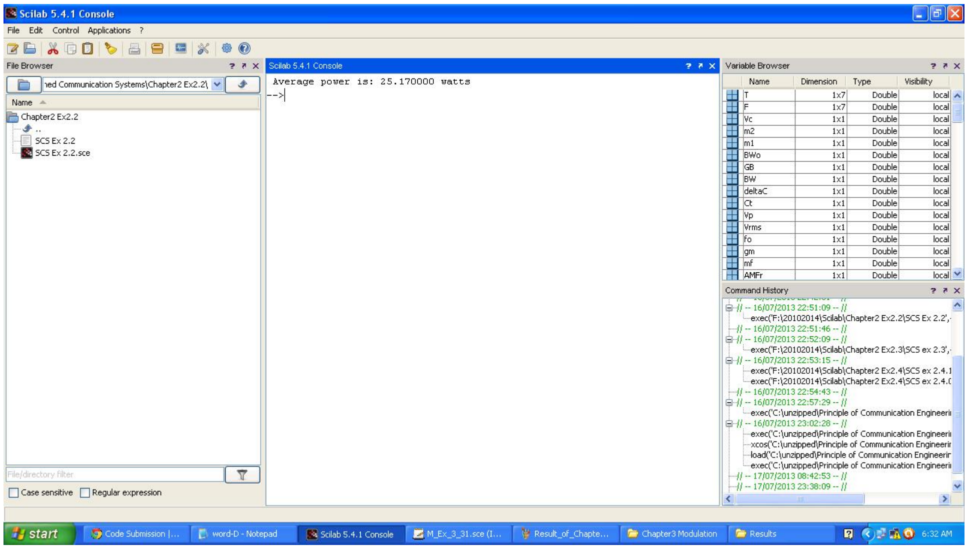


Figure 3.22: Modulation Ex 3 25

```
   modulation
mprintf('Average power is: %f watts',Pt)
F=[0,2.5,1.5,50,1.5,2.5,0]
T=[490,497,499,500,501,503,510]
plot2d3(T,F,5)
xlabel("Freq", "fontsize",3);
ylabel("Amplitude", "fontsize",3, "color", "blue");
```

Scilab code Exa 3.26 Modulation Ex 3 26



```
Average power is: 25.170000 watts
-->
```

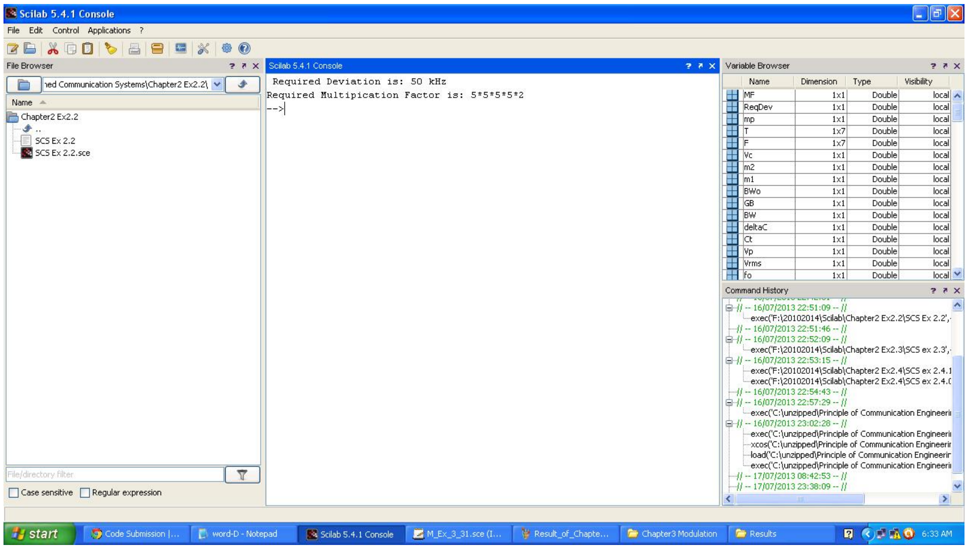
Name	Dimension	Type	Visibility
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local
gm	1x1	Double	local
mf	1x1	Double	local
AMFr	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineeri
    load('C:\unzipped\Principle of Communication Engineeri
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.23: Modulation Ex 3 25

```
clc
//Chapter3: Modulation
//Example3.26, page no 176
//Given
mp=0.1//Modulating index
fm=400//Modulating signal freq
deltaF=mp*fm//Max freq deviation
//disp(deltaF)
ReqDev=50e3// Required deviation
MF=ReqDev/deltaF// multiplication factor
mprintf('Required Deviation is: %d kHz\n',ReqDev/1e3
  )
mprintf('Required Multipication Factor is: 5*5*5*5*2
  ')
```

Scilab code Exa 3.27 Modulation Ex 3 27



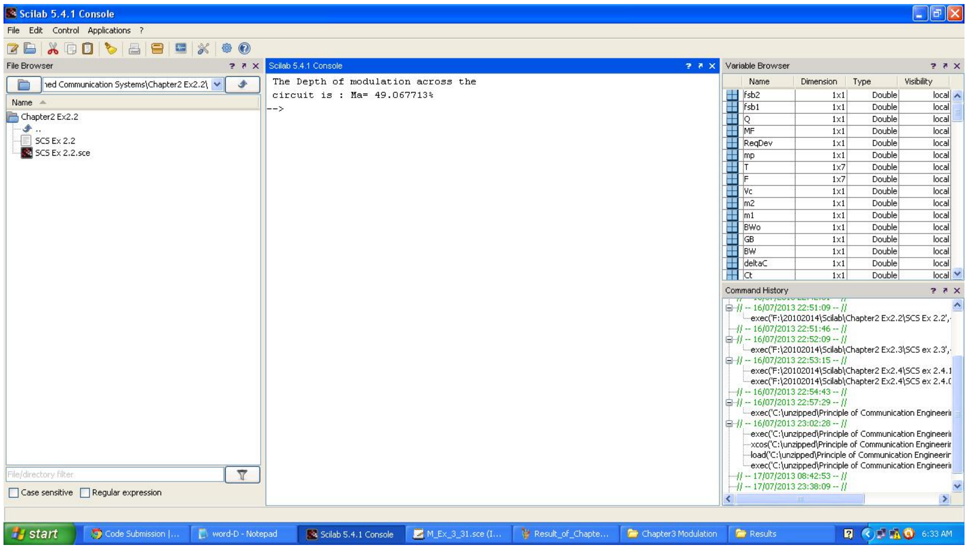
```
 Required Deviation is: 50 kHz
Required Multipication Factor is: 5*5*5*5*2
-->
```

Name	Dimension	Type	Visibility
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local
Vp	1x1	Double	local
Vrms	1x1	Double	local
fo	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.24: Modulation Ex 3 26

```
clc
//Chapter3: Modulation
//Example3.27, page no 176
//Given
Q=100 //Q factor
 fc=1000e3// Carrier freq
fsb1=999e3//lower Side band freq
fsb2=1001e3//Upper side Band freq
ma=0.5//Modulation depth of signal current
Ma=ma/1.019// Expression for Ma after simplification
mprintf('The Depth of modulation across the \n circuit is : Ma= %f%c',Ma*100,'%')

// Note : There are some calculation errors in the solution presented in the book
```



```
The Depth of modulation across the
circuit is : Ma= 49.067713%
-->
```

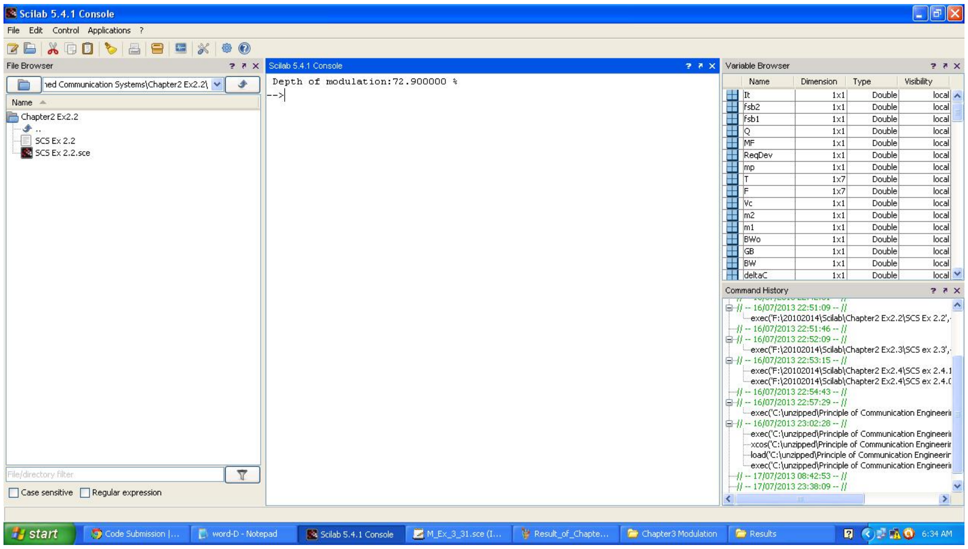
Name	Dimension	Type	Visibility
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local
Ct	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.25: Modulation Ex 3 27

Scilab code Exa 3.28 Modulation Ex 3 28

```
clc
//Chapter3: Modulation
//Example3.28, page no 177
//Given
R=1//Antenna Resistance assumed to be 1 ohm for ease
    of calculation
Ic=10.8// current with no modulation
Pc=Ic^2*R//power with no modulation
It=12.15//modulated current
Pt=It^2*R// modulated power
ma=(sqrt(2*(((It/Ic)^2)-1)))//modulation depth)

mprintf('Depth of modulation:%f %c',round(1000*ma)
    /10,'%');
```



```
Depth of modulation:72.900000 %
-->
```

Name	Dimension	Type	Visibility
It	1x1	Double	local
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local

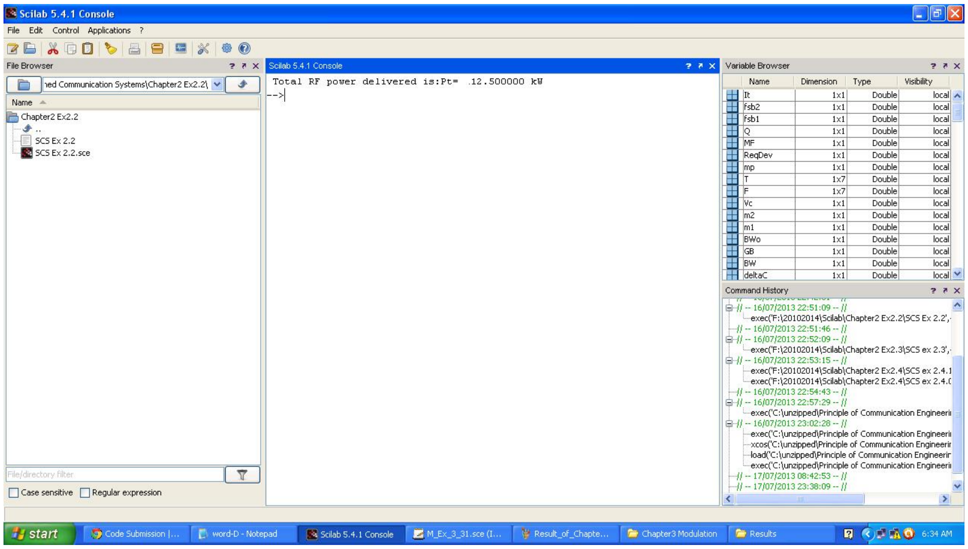
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineeri
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.26: Modulation Ex 3 28

Scilab code Exa 3.29 Modulation Ex 3 29

```
clc
//Chapter3: Modulation
//Example3.29, page no 177
//Given
Pc=100e3//Carrier power
ma=0.5//Depth of modulation
Pt=Pc*(1+((ma^2)/2))//total RF power
mprintf('Total RF power delivered is:Pt= %f kW',Pt/1e3)
```

Scilab code Exa 3.30 Modulation Ex 3 30



```
Total RF power delivered is:Pt=  12.500000 kW
-->
```

Name	Dimension	Type	Visibility
It	1x1	Double	local
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local
BW	1x1	Double	local
deltaC	1x1	Double	local

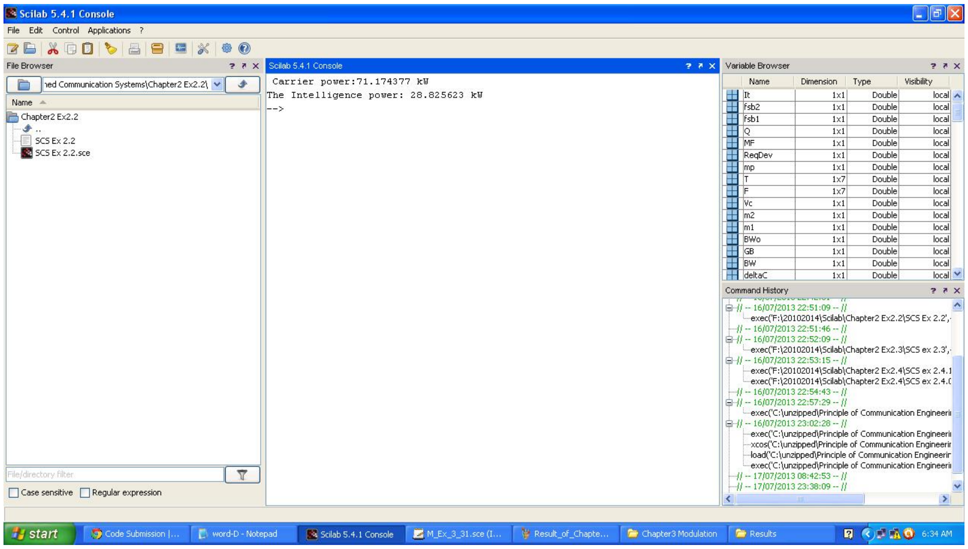
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 3.27: Modulation Ex 3 29

```
clc
//Chapter3: Modulation
//Example3.30, page no 178
//Given
Pt=100e3// Total power
ma=0.9//Depth of modulation
Pc=Pt/(1+((ma^2)/2))//Carrier power
Psb=Pt-Pc// Intelligence power i.e sideband power
mprintf('Carrier power:%f kW\nThe Intelligence power : %f kW',Pc/1000,Psb/1000)
```

Scilab code Exa 3.31 Modulation Ex 3 31

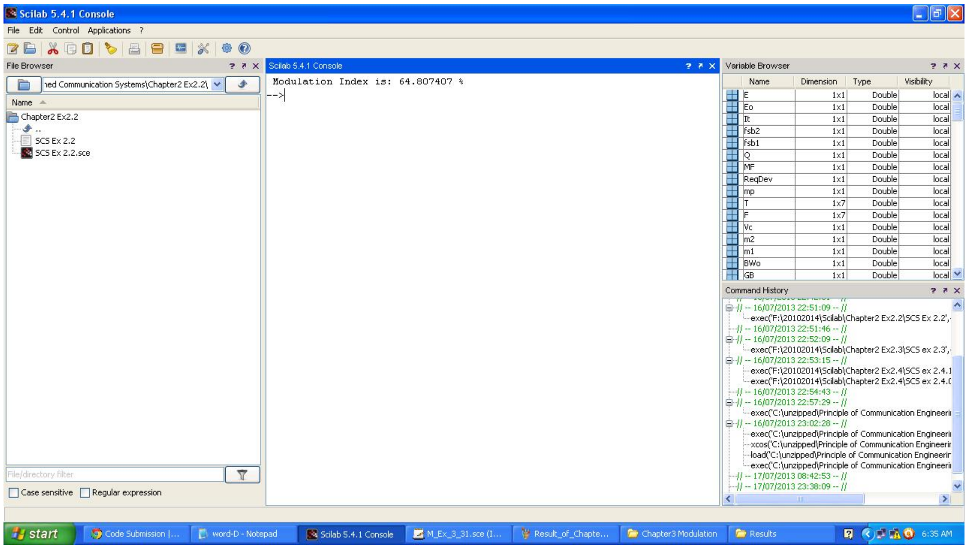
```
clc
//Chapter3: Modulation
//Example3.19, page no 178
```



```
 Carrier power:71.174377 kW
The Intelligence power: 28.825623 kW
-->
```

Figure 3.28: Modulation Ex 3 30

```
//Given
R=1// load resistance
Eo=100//RF voltage
Po=Eo^2/R//Carrier power
E=110//Modulated RMS voltage
Pt=E^2/R//Total modulated power
ma=sqrt(2*((Pt/Po)-1))// Depth of modulation
mprintf('Modulation Index is: %f %c',ma*100,'%')
```



```
 Modulation Index is: 64.807407 %
-->
```

Name	Dimension	Type	Visibility
E	1x1	Double	local
Eo	1x1	Double	local
It	1x1	Double	local
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
T	1x7	Double	local
F	1x7	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local
m1	1x1	Double	local
BWo	1x1	Double	local
GB	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

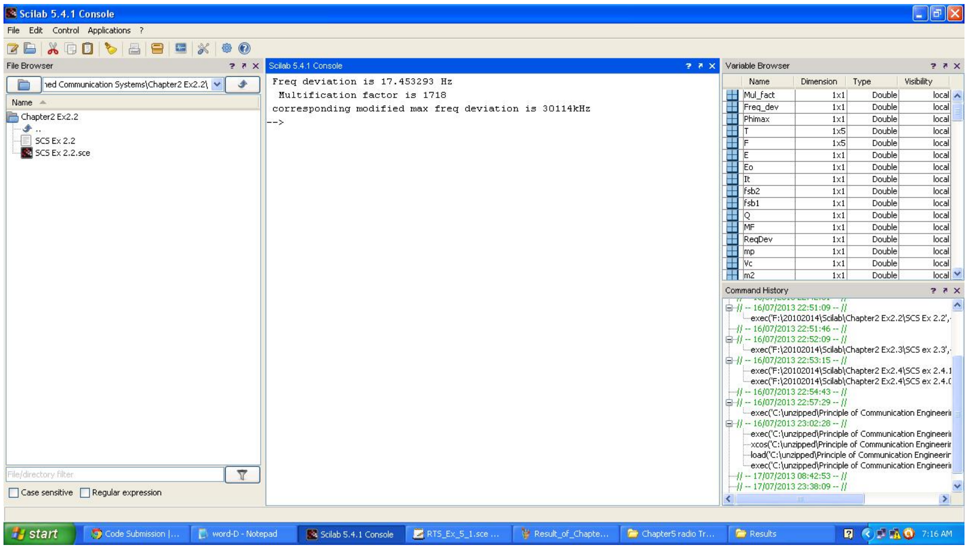
Figure 3.29: Modulation Ex 3 31

Chapter 5

Radio Transmission System

Scilab code Exa 5.1 RTS Ex 5 1

```
clc
//Chapter8
//Example8.15, page no 230
//Given
//b
fm=1e2//modulation freq
Phimax=10*%pi/180// Max Phase deviation
//i
Freq_dev=Phimax*fm// Freq deviation
//ii
Mul_fact=30e3/Freq_dev// Multification factor
mprintf('Freq deviation is %f Hz\n  Multification factor is %d\n corresponding modified max freq deviation is 30114kHz',Freq_dev,Mul_fact)
```



```
Freq deviation is 17.453293 Hz
 Multification factor is 1718
corresponding modified max freq deviation is 30114kHz
-->
```

Name	Dimension	Type	Visibility
Mul_fact	1x1	Double	local
Freq_dev	1x1	Double	local
Phimax	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local
E	1x1	Double	local
Eo	1x1	Double	local
It	1x1	Double	local
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerin
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 5.1: RTS Ex 5 1

Chapter 6

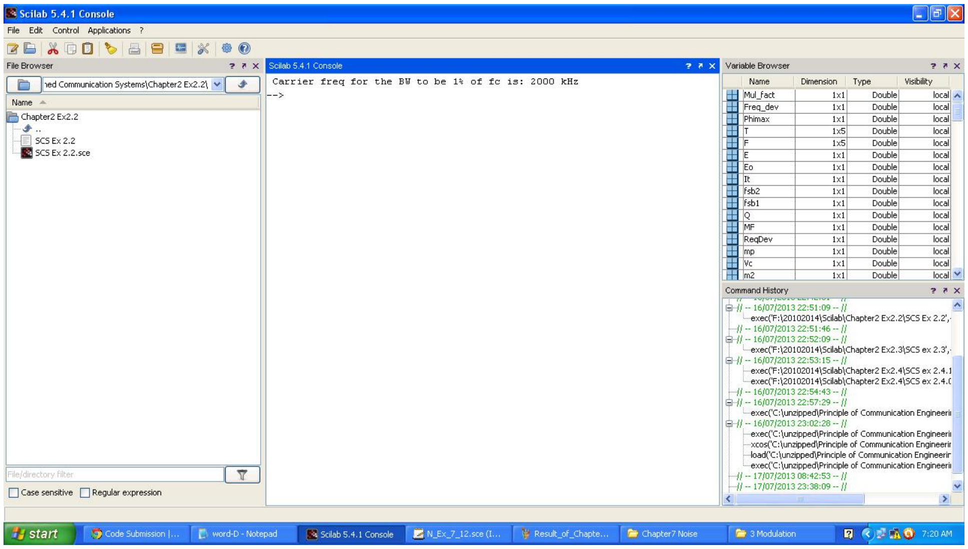
Radio Receivers

Scilab code Exa 6.1 Radio Receivers Ex 6 1

```
clc
//Chapter8
//Example8.15, page no 262
//Given
//Vm(t),Vc(t),Vmod(t)
fm=10e3//modulating freq
BW=2*fm// Bandwidth
fc=100*BW//Carrier freq
mprintf('Carrier freq for the BW to be 1%c of fc is: %d kHz','%',fc/1000)
```

Scilab code Exa 6.2 Radio Receivers Ex 6 2

```
clc
//Chapter8
//Example6.2, page no 262
//Given
```



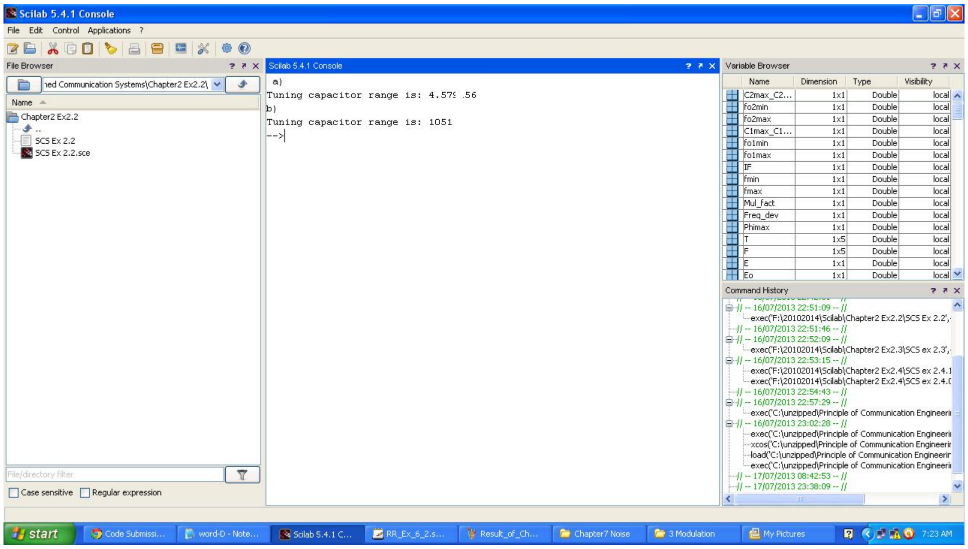
```
Carrier freq for the BW to be 1% of fc is: 2000 kHz
-->
```

Name	Dimension	Type	Visibility
Mul_fact	1x1	Double	local
Freq_dev	1x1	Double	local
Phimax	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local
E	1x1	Double	local
Eo	1x1	Double	local
It	1x1	Double	local
fsb2	1x1	Double	local
fsb1	1x1	Double	local
Q	1x1	Double	local
MF	1x1	Double	local
ReqDev	1x1	Double	local
mp	1x1	Double	local
Vc	1x1	Double	local
m2	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 6.1: Radio Receivers Ex 6 1

```
fmax=1600e3,fmin=500e3,IF=465e3
//i
fo1max=fmax+IF,fo1min=fmin+IF
C1max_C1min=(fo1max/fo1min)^2
//ii
fo2max=fmax-IF,fo2min=fmin-IF
C2max_C2min=(fo2max/fo2min)^2
mprintf('a)\nTuning capacitor range is: %f\nb)\
   nTuning capacitor range is: %d',C1max_C1min,
   C2max_C2min)
```



```
 a)
Tuning capacitor range is: 4.579 .56
b)
Tuning capacitor range is: 1051
-->
```

Name	Dimension	Type	Visibility
C2max_C2...	1x1	Double	local
fo2min	1x1	Double	local
fo2max	1x1	Double	local
C1max_C1...	1x1	Double	local
fo1min	1x1	Double	local
fo1max	1x1	Double	local
IF	1x1	Double	local
fmin	1x1	Double	local
fmax	1x1	Double	local
Mul_fact	1x1	Double	local
Freq_dev	1x1	Double	local
Phimax	1x1	Double	local
T	1x5	Double	local
F	1x5	Double	local
E	1x1	Double	local
Eo	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

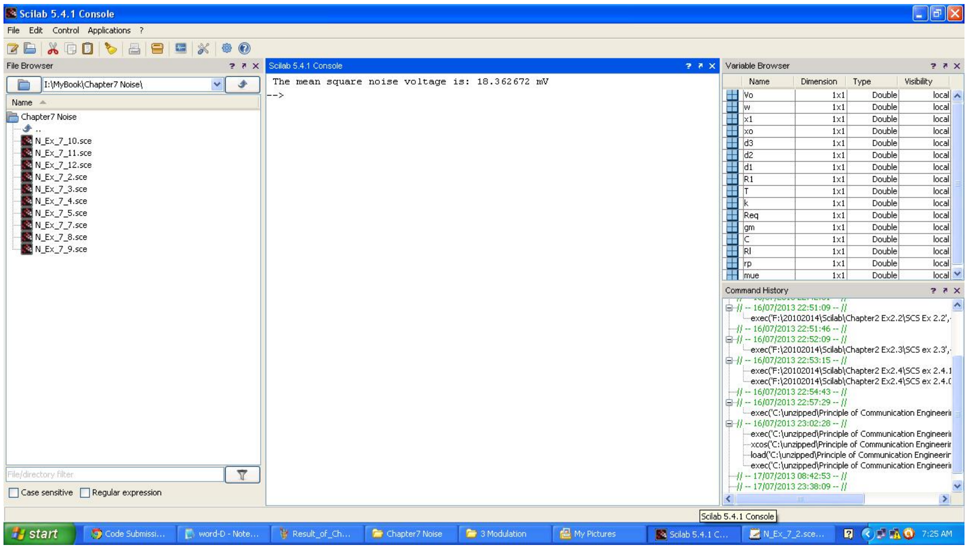
Figure 6.2: Radio Receivers Ex 6 2

Chapter 7

Noise

Scilab code Exa 7.2 Noise Ex 7 2

```
clc
//Chapter7
//Example7.2, page no 276
//Given
mue=25//
rp=5e3
Rl=10e3
C=1e-9
gm=mue/rp
Req=2.5/gm
//disp(Req , gm)
k=1.381e-23
T=293
R1=1e5
// Power density spectrum for respective res
d1=2*k*T*R1
d2=2*k*T*Req
d3=2*k*T*Rl
xo=0
x1=1e14
w=0:%inf
```



```
The mean square noise voltage is: 18.362672 mV
-->
```

	Name	Dimension	Type	Visibility
▦	Vo	1x1	Double	local
▦	w	1x1	Double	local
▦	x1	1x1	Double	local
▦	xo	1x1	Double	local
▦	d3	1x1	Double	local
▦	d2	1x1	Double	local
▦	d1	1x1	Double	local
▦	R1	1x1	Double	local
▦	T	1x1	Double	local
▦	k	1x1	Double	local
▦	Req	1x1	Double	local
▦	gm	1x1	Double	local
▦	C	1x1	Double	local
▦	Rl	1x1	Double	local
▦	rp	1x1	Double	local
▦	mue	1x1	Double	local

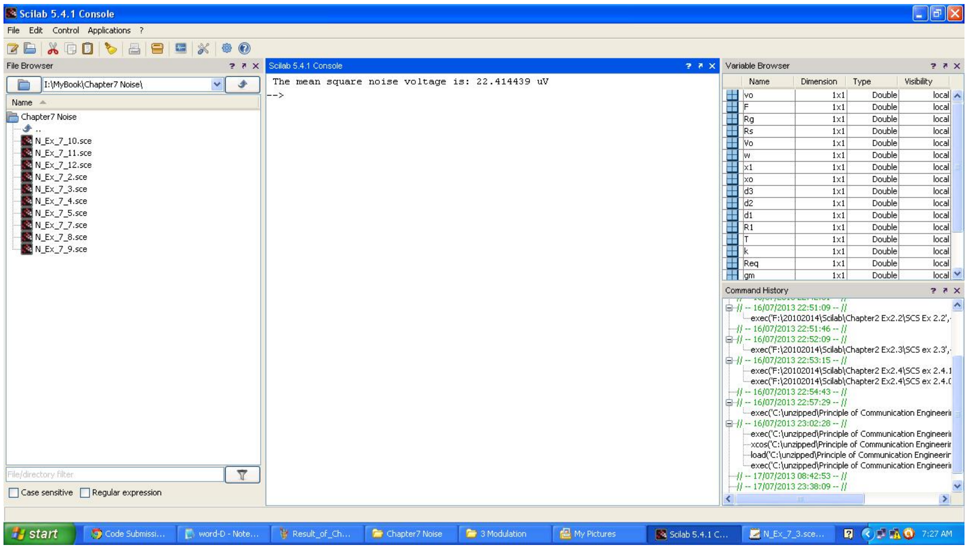
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.1: Noise Ex 7 2

```
//H1(w)=(-gm*rp*Rl)/(rp+Rl+(%i*w*rp*Rl*C))
Vo=sqrt((20231.65e2/%pi)*integrate('1/(((3e9)^2)+(w^2))','w',xo,x1))
mprintf('The mean square noise voltage is: %f mV',Vo*1e3)
```

Scilab code Exa 7.3 Noise Ex 7 3

```
clc
//Chapter7
//Example7.3, page no 279
//Given
mue=25
rp=5e3
Rs=1e3//input resistance
//Coupling Capacitors are assumed as short circuit
```



```
The mean square noise voltage is: 22.414439 uV
-->
```

Name	Dimension	Type	Visibility
vo	1x1	Double	local
F	1x1	Double	local
Rg	1x1	Double	local
Rs	1x1	Double	local
Vo	1x1	Double	local
w	1x1	Double	local
x1	1x1	Double	local
xo	1x1	Double	local
d3	1x1	Double	local
d2	1x1	Double	local
d1	1x1	Double	local
R1	1x1	Double	local
T	1x1	Double	local
k	1x1	Double	local
Req	1x1	Double	local
gm	1x1	Double	local

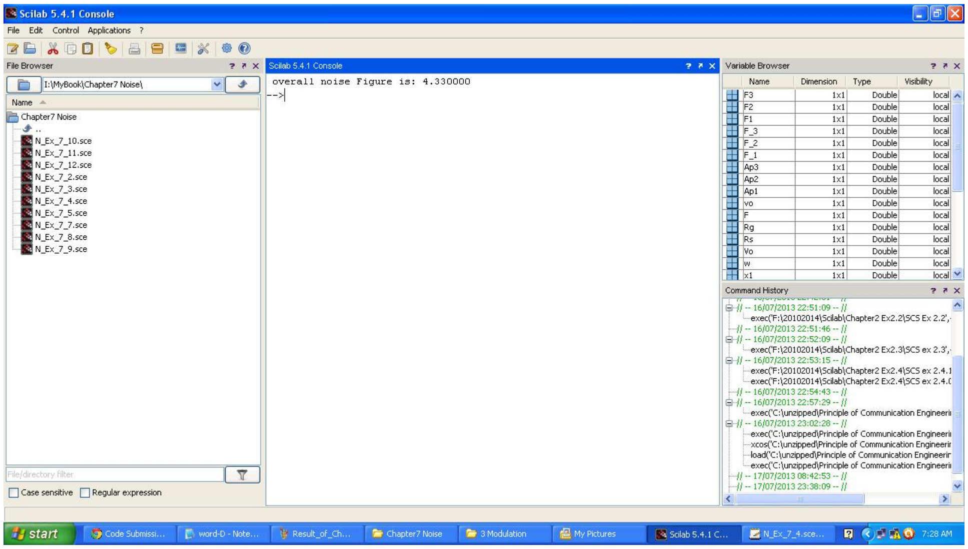
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.2: Noise Ex 7 3

```
Rg=1e5
gm=25/5e3
Req=2.5/gm
F=1+((((Req*(Rs+Rg)^2)+(Rg*Rs^2))/(Rs*Rg^2)))
xo=0
x1=1e10
w=0:%inf

vo=sqrt((30145e-8/%pi)*integrate('1/(((3e5)^2)+(w^2)
    )','w',xo,x1))
mprintf('The mean square noise voltage is: %f uV',vo
    *1e6)
```

Scilab code Exa 7.4 Noise Ex 7 4

```
clc
```



```
overall noise Figure is: 4.330000
-->
```

Name	Dimension	Type	Visibility
F3	1x1	Double	local
F2	1x1	Double	local
F1	1x1	Double	local
F_3	1x1	Double	local
F_2	1x1	Double	local
F_1	1x1	Double	local
Ap3	1x1	Double	local
Ap2	1x1	Double	local
Ap1	1x1	Double	local
vo	1x1	Double	local
F	1x1	Double	local
Rg	1x1	Double	local
Rs	1x1	Double	local
Vo	1x1	Double	local
w	1x1	Double	local
x1	1x1	Double	local

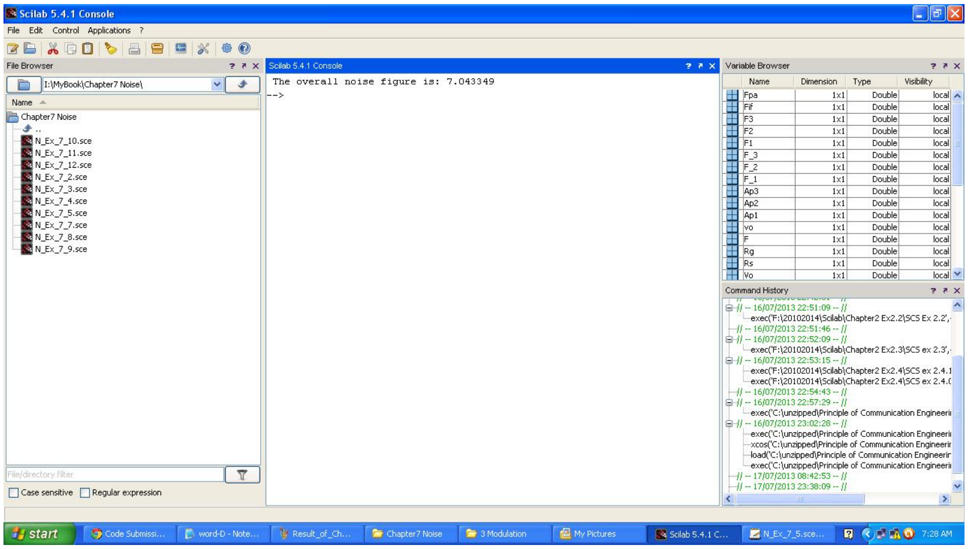
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.3: Noise Ex 7 4

```
//Chapter8
//Example7.4, page no 283
//Given
Ap1=10, Ap2=10, Ap3=10;  // Gain of each states
F_1=6, F_2=6, F_3=6;   //Noise figure of each state
F1= round(10^(F_1/10)), F2= round(10^(F_2/10)), F3= round(10^(F_3/10));   // approximating the values

F=F1+((F2-1)/Ap1)+((F3-1)/(Ap1*Ap2))
mprintf('overall noise Figure is: %f',F)
```

Scilab code Exa 7.5 Noise Ex 7 5

```
clc
//Chapter7
//Example7.5, page no 283
```



```
I:\MyBook\Chapter7 Noise\
Chapter7 Noise
  ..
  N_Ex_7_10.sce
  N_Ex_7_11.sce
  N_Ex_7_12.sce
  N_Ex_7_2.sce
  N_Ex_7_3.sce
  N_Ex_7_4.sce
  N_Ex_7_5.sce
  N_Ex_7_7.sce
  N_Ex_7_8.sce
  N_Ex_7_9.sce
```

```
 The overall noise figure is: 7.043349
-->
```

Name	Dimension	Type	Visibility
Fpa	1x1	Double	local
Fif	1x1	Double	local
F3	1x1	Double	local
F2	1x1	Double	local
F1	1x1	Double	local
F_3	1x1	Double	local
F_2	1x1	Double	local
F_1	1x1	Double	local
Ap3	1x1	Double	local
Ap2	1x1	Double	local
Ap1	1x1	Double	local
vo	1x1	Double	local
F	1x1	Double	local
Rg	1x1	Double	local
Rs	1x1	Double	local
Vo	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.4: Noise Ex 7 5

```
//Given
Fif=15// Noise figure of IF amplifier
Ap1=10// Gain of Preamplifier
Fpa=6//Noise figure of preamplifier
F2=10^(Fif/10)
F1=10^(Fpa/10)

F=F1+((F2-1)/Ap1)//overall noise figure
mprintf('The overall noise figure is: %f',F)
```

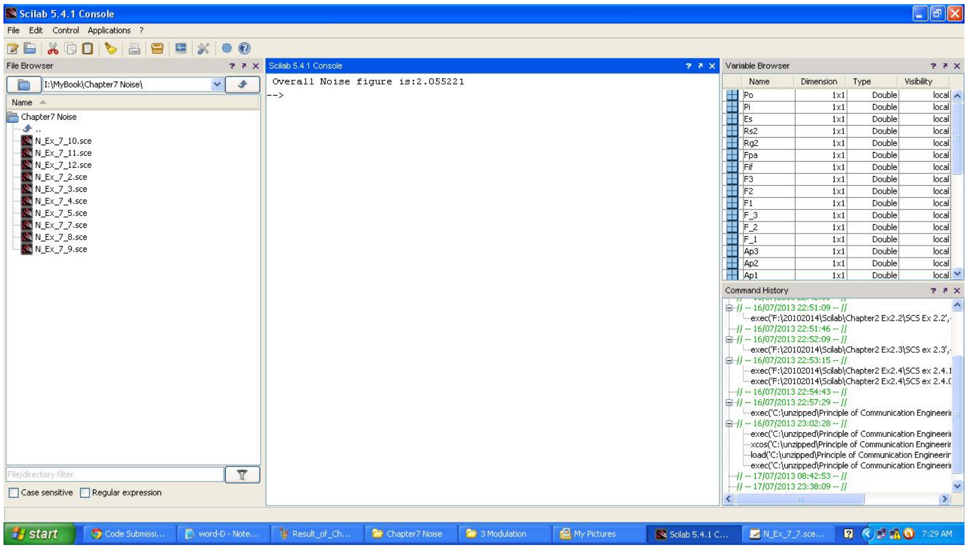
Scilab code Exa 7.7 Noise Ex 7 7

```
clc
//Chapter7
//Example7.6
//Given
```

```
mue=25// tube parameters
rp=10e3// tube parameters
gm=2.5e-3// transconductance
Req=2.5/gm// equivalent resistance
Rs=1000
Rg=1e5
F1=1+(((Req*((Rs+Rg)^2))+Rg*Rs^2)/(Rs*(Rg^2)))// noise figure of the first stage
Rg2=9.1e3
Rs2=10e3
Es=1// assuming Es=1 for ease of calculation
Pi=((Es/2e3)^2)*1e3
Po=1.532e-2*Es^2
Ap1=Po/Pi
F2=1+(((Req*((Rs2+Rg2)^2))+Rg2*Rs2^2)/(Rs2*(Rg2^2)))// noise figure of the second stage
F=(F1)+((F2-1)/Ap1)
mprintf('Overall Noise figure is:%f',F)
```

Scilab code Exa 7.8 Noise Ex 7 8

```
clc
//Chapter7
//Example7.8
//Given
g01=30// gain of 1st stage
g02=20//gain of 2nd stage
g03=40//gain of 3rd stage
F2=6// Noise factor of stage 2
F3=12// Noise factor of stage 3
Te1=4// Eq noise temp of stage 1
T=290// Room
G01=round(10^(g01/10))
```



```
 Overall Noise figure is:2.055221
-->
```

	Name	Dimension	Type	Visibility
	Po	1x1	Double	local
	Pi	1x1	Double	local
	Es	1x1	Double	local
	Rs2	1x1	Double	local
	Rg2	1x1	Double	local
	Fpa	1x1	Double	local
	Fif	1x1	Double	local
	F3	1x1	Double	local
	F2	1x1	Double	local
	F1	1x1	Double	local
	F_3	1x1	Double	local
	F_2	1x1	Double	local
	F_1	1x1	Double	local
	Ap3	1x1	Double	local
	Ap2	1x1	Double	local
	Ap1	1x1	Double	local

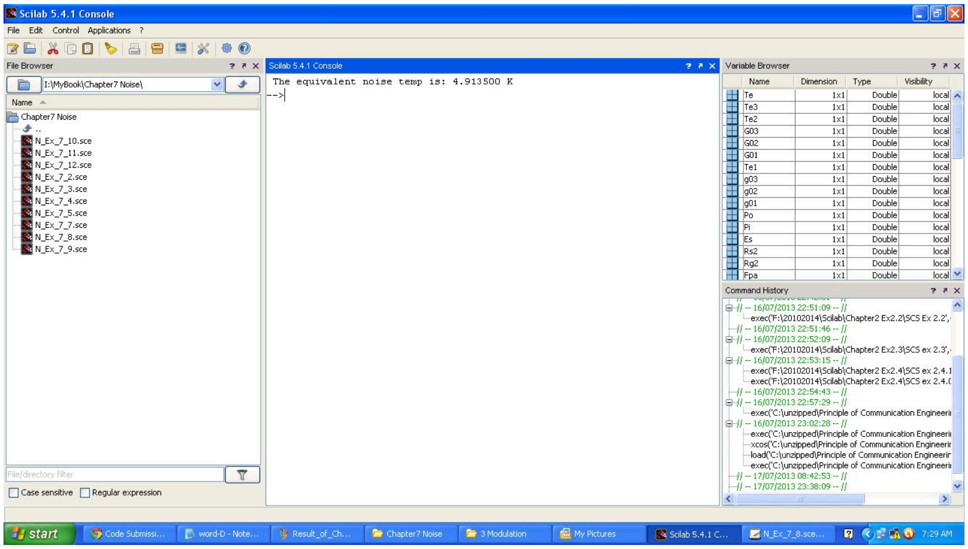
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineeri
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.5: Noise Ex 7 7

```
G02=round(10^(g02/10))
G03=round(10^(g03/10))
F_2=round(10^(F2/10))
F_3=round(10^(F3/10))
Te2=round((F_2-1))*T
Te3=round((F_3-1))*T
Te=Te1+(Te2/G01)+(Te3/(G01*G02))// Eq overall noise temp
mprintf('The equivalent noise temp is: %f K',Te)
```

Scilab code Exa 7.9 Noise Ex 7 9

```
clc
//Chapter7
//Example7.9
//Given
```



```
The equivalent noise temp is: 4.913500 K
-->
```

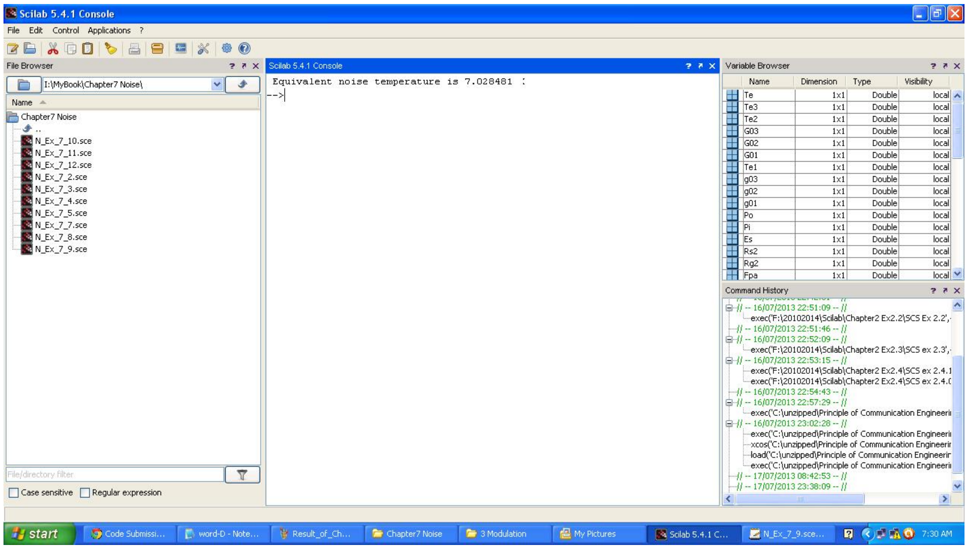
Name	Dimension	Type	Visibility
Te	1x1	Double	local
Te3	1x1	Double	local
Te2	1x1	Double	local
G03	1x1	Double	local
G02	1x1	Double	local
G01	1x1	Double	local
Te1	1x1	Double	local
g03	1x1	Double	local
g02	1x1	Double	local
g01	1x1	Double	local
Po	1x1	Double	local
Pi	1x1	Double	local
Es	1x1	Double	local
Rs2	1x1	Double	local
Rg2	1x1	Double	local
Fpa	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineeri
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.6: Noise Ex 7 8

```
g01=round(10^(25/10))//low noise amplifier gain
Te1=4//low noise amplifier noise temp
g02=round(10^(1.7))//preamplifier gain
F2=round(10^0.6)//preamplifier noise figure
F3=round(10^1.2)//preamplifier noise figure
T=290// room temp
Te2=round((F2-1)*T)
Te3=round((F3-1)*T)
Te=Te1+(Te2/g01)+(Te3/(g01*g02))//Overall noise Temperature
mprintf('Equivalent noise temperature is %f K',Te)
```

Scilab code Exa 7.10 Noise Ex 7 10



```
N_Ex_7_10.sce
N_Ex_7_11.sce
N_Ex_7_12.sce
N_Ex_7_2.sce
N_Ex_7_3.sce
N_Ex_7_4.sce
N_Ex_7_5.sce
N_Ex_7_7.sce
N_Ex_7_8.sce
N_Ex_7_9.sce
```

```
Equivalent noise temperature is 7.028481 :
-->
```

Name	Dimension	Type	Visibility
Te	1x1	Double	local
Te3	1x1	Double	local
Te2	1x1	Double	local
G03	1x1	Double	local
G02	1x1	Double	local
G01	1x1	Double	local
Te1	1x1	Double	local
g03	1x1	Double	local
g02	1x1	Double	local
g01	1x1	Double	local
Po	1x1	Double	local
Pi	1x1	Double	local
Es	1x1	Double	local
Rs2	1x1	Double	local
Rg2	1x1	Double	local
Fpa	1x1	Double	local

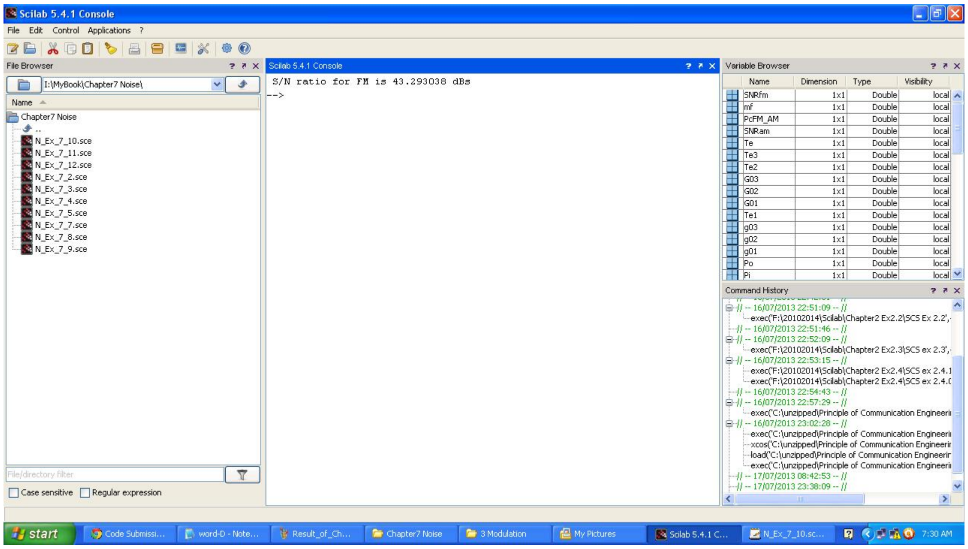
```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineeri
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.7: Noise Ex 7 9

```
clc
//Chapter7
//Example7.10
//Given
SNRam=25// Signal to noise ratio of AM
PcFM_AM=0.9//
mf=5
SNRfm=(10*log10(3*(mf^2)*(PcFM_AM)))+SNRam
mprintf('S/N ratio for FM is %f dBs',SNRfm)
// Note : There are some calculation errors in the
   solution presented in the book
```

Scilab code Exa 7.11 Noise Ex 7 11

```
clc
//Chapter7
```



```
 S/N ratio for FM is 43.293038 dBs
-->
```

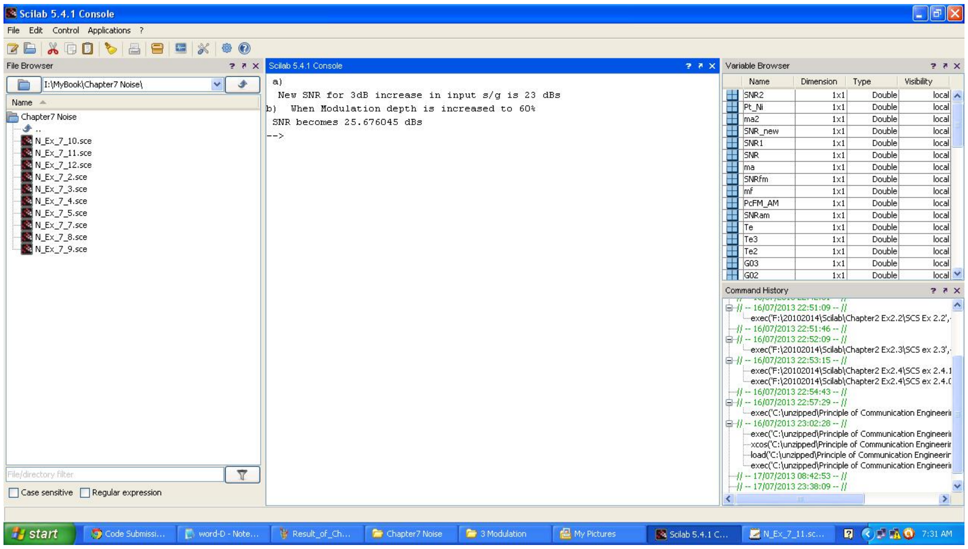
Name	Dimension	Type	Visibility
SNRfm	1x1	Double	local
mf	1x1	Double	local
PcFM_AM	1x1	Double	local
SNRam	1x1	Double	local
Te	1x1	Double	local
Te3	1x1	Double	local
Te2	1x1	Double	local
G03	1x1	Double	local
G02	1x1	Double	local
G01	1x1	Double	local
Te1	1x1	Double	local
g03	1x1	Double	local
g02	1x1	Double	local
g01	1x1	Double	local
Po	1x1	Double	local
Pi	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',-
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',-
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.8: Noise Ex 7 10

```
//Example7.11
//Given
ma=0.3
SNR=20// s/n ratio
SNR1=10^(0.1*SNR)
SNR_new=SNR+3
ma2=0.6// increased new depth of modulation
Pt_Ni=SNR1*((1+(ma^2))/(ma^2))
SNR2=10*log10(Pt_Ni*((ma2^2)/(1+((ma2^2)/2))))

mprintf('a)\n  New SNR for 3dB increase in input s/g
     is %d dBs\nb)  When Modulation depth is
    increased to 60%c\n SNR becomes %f dBs',SNR_new,'
   %',SNR2)
```

Scilab code Exa 7.12 Noise Ex 7 12



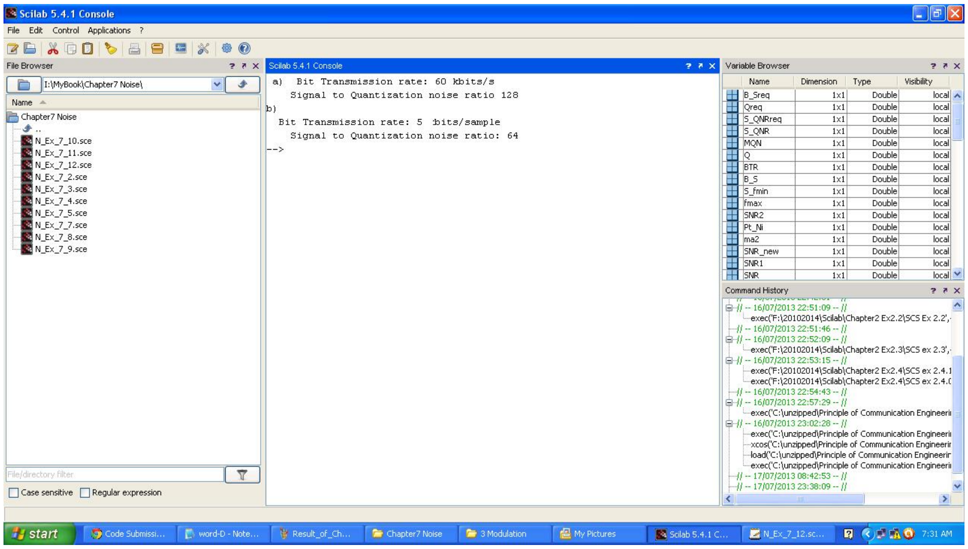
```
 a)
  New SNR for 3dB increase in input s/g is 23 dBs
b)  When Modulation depth is increased to 60%
 SNR becomes 25.676045 dBs
-->
```

Name	Dimension	Type	Visibility
SNR2	1x1	Double	local
Pt_Ni	1x1	Double	local
ma2	1x1	Double	local
SNR_new	1x1	Double	local
SNR1	1x1	Double	local
SNR	1x1	Double	local
ma	1x1	Double	local
SNRfm	1x1	Double	local
mf	1x1	Double	local
PcFM_AM	1x1	Double	local
SNRam	1x1	Double	local
Te	1x1	Double	local
Te3	1x1	Double	local
Te2	1x1	Double	local
G03	1x1	Double	local
G02	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineeri
   load('C:\unzipped\Principle of Communication Engineeri
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.9: Noise Ex 7 11

```
clc
//Chapter7
//Example7.12
//Given
fmax=5e3//max s/g freq
S_fmin=2*fmax// Min sampling freq
B_S=6//Binary bits sent per sample
BTR=B_S*S_fmin//Bit Transmission rate
Q=2^B_S//No of Quantizable levels
MQN=0.5/Q//Max Quantization noise
S_QNR=MQN^-1// Signal to Quantization noise ratio
//b
S_QNRreq=0.5*S_QNR// Signal to Quantization noise
    ratio
Qreq=0.5*S_QNRreq//No of Quantizable levels
B_Sreq=log2(Qreq)//Binary bits sent per sample
mprintf('a)  Bit Transmission rate: %d kbits/s\n
    Signal to Quantization noise ratio %d \nb)\n  Bit
     Transmission rate: %d kbits/sample\n     Signal
    to Quantization noise ratio: %d',BTR/1000,S_QNR,
```



```
 a)  Bit Transmission rate: 60 kbits/s
    Signal to Quantization noise ratio 128
b)
  Bit Transmission rate: 5  bits/sample
    Signal to Quantization noise ratio: 64
-->
```

Name	Dimension	Type	Visibility
B_Sreq	1x1	Double	local
Qreq	1x1	Double	local
S_QNRreq	1x1	Double	local
S_QNR	1x1	Double	local
MQN	1x1	Double	local
Q	1x1	Double	local
BTR	1x1	Double	local
B_S	1x1	Double	local
S_fmin	1x1	Double	local
fmax	1x1	Double	local
SNR2	1x1	Double	local
Pt_Ni	1x1	Double	local
ma2	1x1	Double	local
SNR_new	1x1	Double	local
SNR1	1x1	Double	local
SNR	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 7.10: Noise Ex 7 12

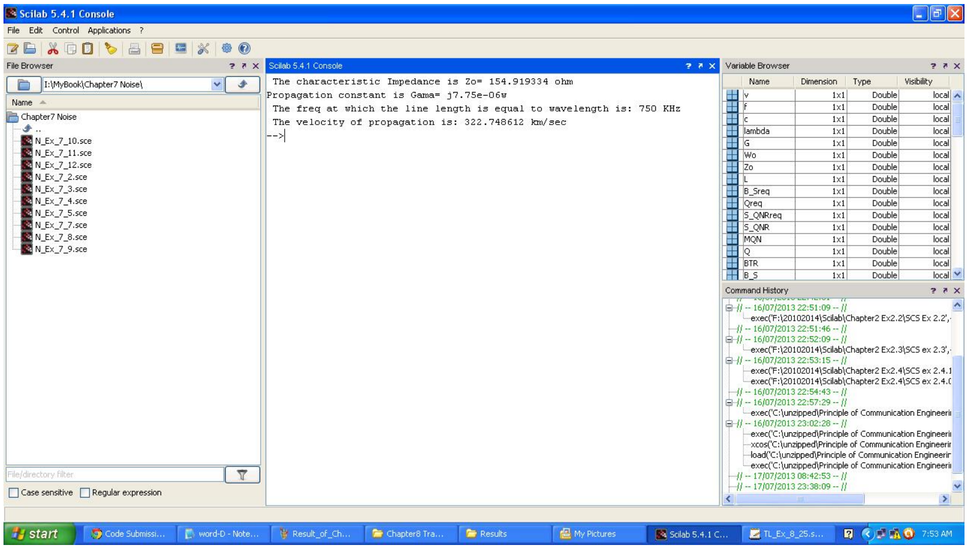
```
    B_Sreq,S_QNRreq)
```

Chapter 8

Transmission Line

Scilab code Exa 8.1 Transmission Line Ex 8 1

```
clc
//Chapter8
//Example8.1, page no 313
//Given
//a
L=1.2*10^-3//distributed inductance
C=0.05*10^-6//distributed capacitance
Zo=sqrt(L/C)//Characteristic Impedance
mprintf('The characteristic Impedance is Zo= %f ohm',Zo)
Wo=1// Assumedfor ease of calculation
G=%i*sqrt(L*C)*Wo
mprintf('\nPropagation constant is Gama= j%3.2ew',G*-%i)
//b
//i
lambda=0.4e3//wavelength=Line length
c=3e8
f=c/lambda
```



```
 The characteristic Impedance is Zo= 154.919334 ohm
Propagation constant is Gama= j7.75e-06w
 The freq at which the line length is equal to wavelength is: 750 KHz
 The velocity of propagation is: 322.748612 km/sec
-->
```

	Name	Dimension	Type	Visibility
	v	1x1	Double	local
	f	1x1	Double	local
	c	1x1	Double	local
	lambda	1x1	Double	local
	G	1x1	Double	local
	Wo	1x1	Double	local
	Zo	1x1	Double	local
	L	1x1	Double	local
	B_Sreq	1x1	Double	local
	Qreq	1x1	Double	local
	S_QNRreq	1x1	Double	local
	S_QNR	1x1	Double	local
	MQN	1x1	Double	local
	Q	1x1	Double	local
	BTR	1x1	Double	local
	B_S	1x1	Double	local

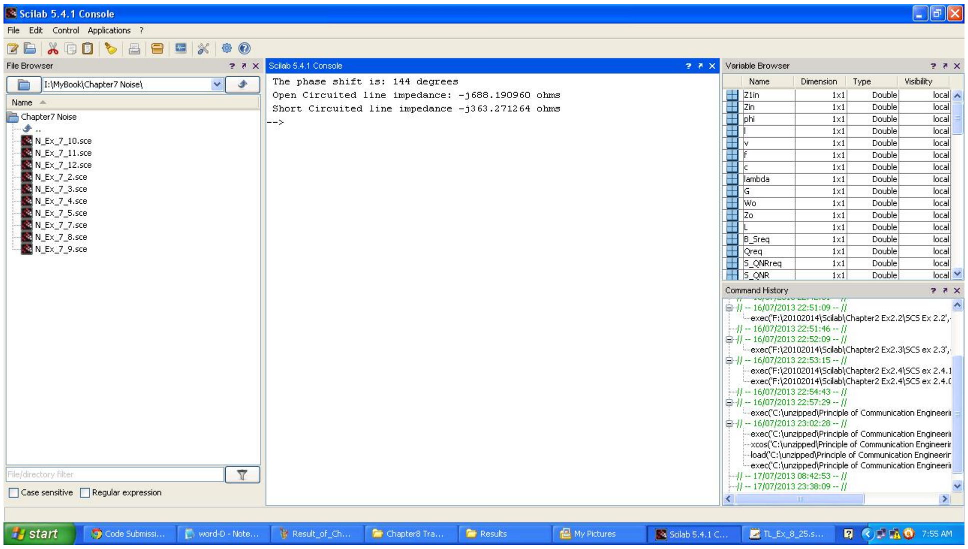
```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 8.1: Transmission Line Ex 8 1

```
//ii
L=L'*0.4
C=C'*0.4
v=1/(sqrt(L*C))
mprintf('\n The freq at which the line length is equal to wavelength is: %d KHz\n The velocity of propagation is: %f km/sec',f*1e-3,v*1e-3)
```

Scilab code Exa 8.2 Transmission Line Ex 8 2

```
clc
//Chapter8
//Example8.2, page no 314
//Given
v=3e8// velocty of light
f=1.2e6// Operating Freq
```



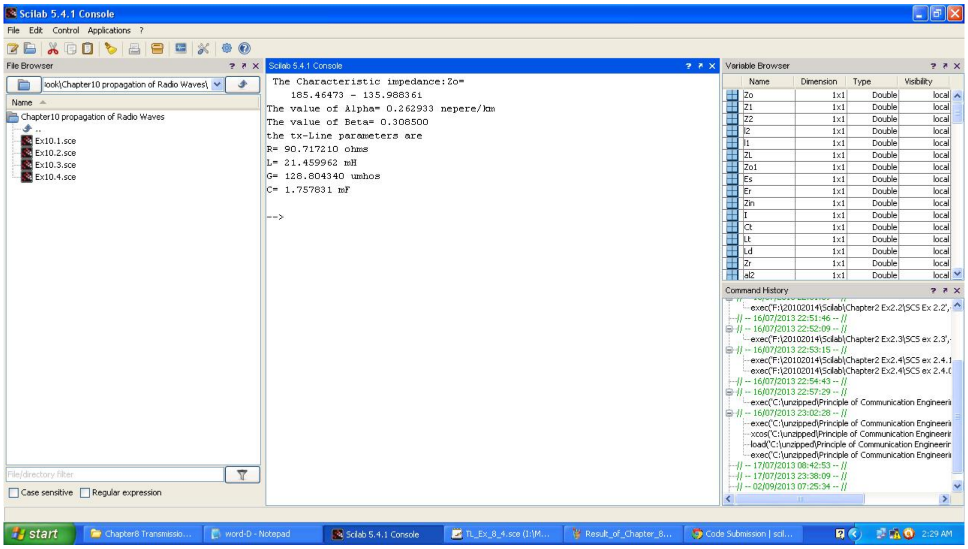
```
 The phase shift is: 144 degrees
 Open Circuited line impedance: -j688.190960 ohms
 Short Circuited line impedance -j363.271264 ohms
-->
```

Name	Dimension	Type	Visibility
Z1in	1x1	Double	local
Zin	1x1	Double	local
phi	1x1	Double	local
l	1x1	Double	local
v	1x1	Double	local
f	1x1	Double	local
c	1x1	Double	local
lambda	1x1	Double	local
G	1x1	Double	local
Wo	1x1	Double	local
Zo	1x1	Double	local
L	1x1	Double	local
B_Sreq	1x1	Double	local
Qreq	1x1	Double	local
S_QNRreq	1x1	Double	local
S_QNR	1x1	Double	local

```
// -- 16/07/2013 22:51:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
```

Figure 8.2: Transmission Line Ex 8 2

```
lambda=v/f
//disp(lambda)
l=100// length of the Tx-Line
phi=2*(%pi*l)/(lambda)// Phase shift in degrees
Zo=500// Characteristic impedance
//a Open circuited Line

Zin=-%i*Zo*(cos(phi)/sin(phi))

//b Short circuited Line
Z1in=%i*Zo*tan(phi)
mprintf('The phase shift is: %d degrees\n Open
   Circuited line impedance: -j%f ohms\n Short
   Circuited line impedance -j%f ohms',phi*180/%pi,-
   Zin*%i,Z1in*%i)
```

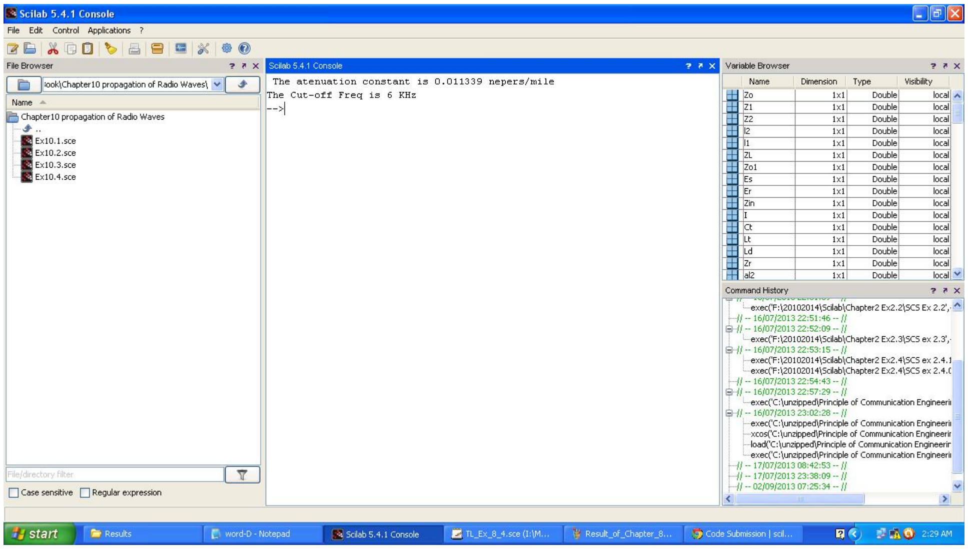


```
 The Characteristic impedance:Zo=
    185.46473 - 135.98836i
The value of Alpha= 0.262933 nepere/km
The value of Beta= 0.308500
the tx-Line parameters are
R= 90.717210 ohms
L= 21.459962 mH
G= 128.804340 umhos
C= 1.757831 mF

-->
```

Figure 8.3: Transmission Line Ex 8 3

Scilab code Exa 8.3 Transmission Line Ex 8 3

```

clc
//Chapter8
//Example8.3, page no 315
//Given
f=1600
w=1000
Zoc=2460*exp(%i*-86.5*%pi/180)// Open circuited Line
    impedance
Zsc=21.5*exp(%i*14*%pi/180)// Short circuited Line
    impedance
Zo=sqrt(Zoc*Zsc)// Characteristic impedance
A=real(sqrt(Zsc/Zoc))// tan(a+ jBeta) = A + jB
B=imag(sqrt(Zsc/Zoc))
l=1/4
alpha=(1/(4*l))*log(((1+A^2+B)^2)/(((1-A)^2)+B^2))
    //Attenuation Constant
Beta=(1/(2*l))*atan((2*B)/(1-A^2-B))  //phase
```



```
ook\Chapter10 propagation of Radio Waves\
Chapter10 propagation of Radio Waves
..
Ex10.1.sce
Ex10.2.sce
Ex10.3.sce
Ex10.4.sce
```

```
 The atenuation constant is 0.011339 nepers/mile
The Cut-off Freq is 6 KHz
-->
```

Name	Dimension	Type	Visibility
Zo	1x1	Double	local
Z1	1x1	Double	local
Z2	1x1	Double	local
I2	1x1	Double	local
I1	1x1	Double	local
ZL	1x1	Double	local
Zo1	1x1	Double	local
Es	1x1	Double	local
Er	1x1	Double	local
Zin	1x1	Double	local
I	1x1	Double	local
Ct	1x1	Double	local
Lt	1x1	Double	local
Ld	1x1	Double	local
Zr	1x1	Double	local
al2	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.4: Transmission Line Ex 8 4

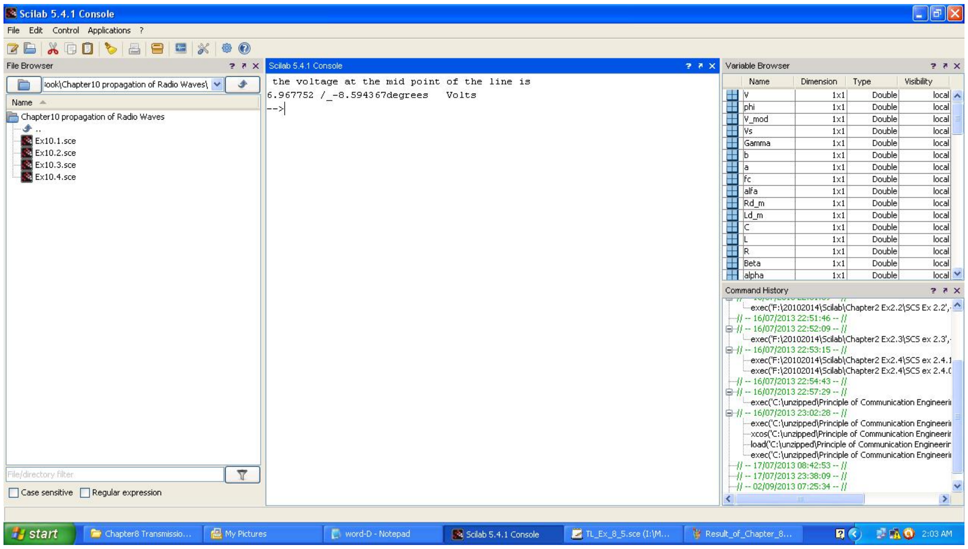
```
    constant

//the tx-Line parameters
R=real(Zo*complex(alpha,Beta))
L=imag(Zo*complex(alpha,Beta))
G=real(complex(alpha,Beta)/Zo)
C=imag(complex(alpha,Beta)/Zo)
mprintf('The Characteristic impedance:Zo= ') ,disp(
    Zo)
mprintf('The value of Alpha= %f nepere/km\n',alpha)
mprintf('The value of Beta= %f \n',Beta)
mprintf('the tx-Line parameters are\nR= %f ohms\nL=
    %f mH\nG= %f umhos\nC= %f mF\n',R,L,G*1e6,C*1e3)

// Note : There are some calculation errors in the
    solution presented in the book
```

Scilab code Exa 8.4 Transmission Line Ex 8 4

```
clc
//Chapter8
//Example8.4, page no 316
//Given
d=0.7// distance between two insertions
Ld_m= (80e-3)*(10/7)//Loading coil inductance
//disp(Ld_m)
Rd_m=100/7//Loading coil resistance
//disp(Rd_m)
R=20+Rd_m//Line resistance
L=Ld_m// Line inductance
C=0.05e-6// Line Capacitance
alfa=0.5*R*sqrt(C/L)//Attenuation Constant
//
fc=(%pi*d*sqrt(L*C))^-1//cut off freq
mprintf('The atenuation constant is %f nepers/mile\nThe Cut-off Freq is %d KHz',alfa,fc*1e-3)

// Note : There are some calculation errors in the solution presented in the book
```

Scilab code Exa 8.5 Transmission Line Ex 8 5

```
clc
//Chapter8
//Example8.5, page no 317
//Given
a=0.7//attenuation constant
```



```
 the voltage at the mid point of the line is
6.967752 /_-8.594367degrees   Volts
-->
```

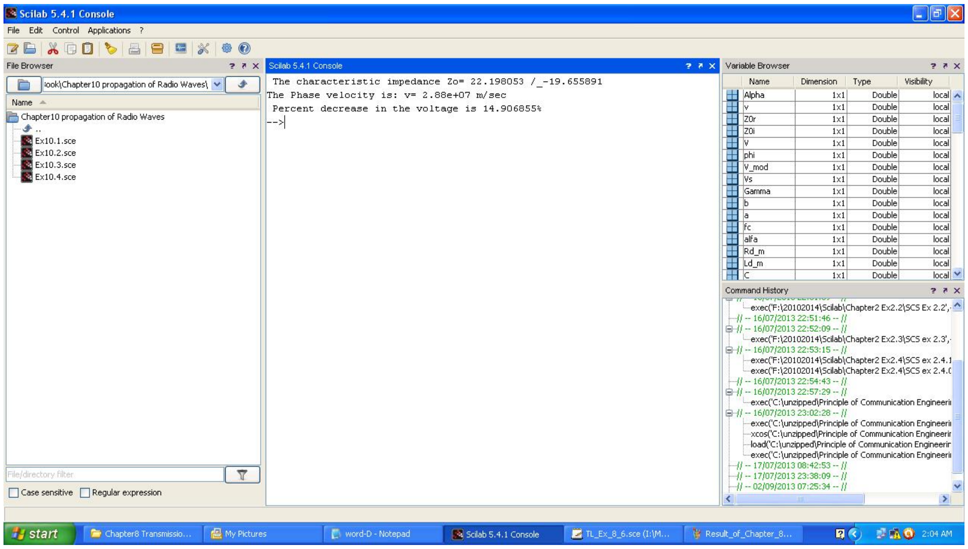
Name	Dimension	Type	Visibility
V	1x1	Double	local
phi	1x1	Double	local
V_mod	1x1	Double	local
Vs	1x1	Double	local
Gamma	1x1	Double	local
b	1x1	Double	local
a	1x1	Double	local
fc	1x1	Double	local
alfa	1x1	Double	local
Rd_m	1x1	Double	local
Ld_m	1x1	Double	local
C	1x1	Double	local
L	1x1	Double	local
R	1x1	Double	local
Beta	1x1	Double	local
alpha	1x1	Double	local

```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.(
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerir
load('C:\unzipped\Principle of Communication Engineerir
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.5: Transmission Line Ex 8 5

```
b=0.3//phase constant
Gamma=a+(%i*b)//propagation constant
l=0.5// half length of line( for midpoint)
Vs=10// Excitation voltage
V_mod=Vs*(%e^(-a*l))//Magnitude of the Vs

phi=b*l*180/%pi//phase shift
V=V_mod*(%e^(-%i*(phi*%pi/180)))//voltage at the mid point
mprintf('the voltage at the mid point of the line is \n%f /_-%fdegrees    Volts',V,phi)

// Note : There are some calculation errors in the solution presented in the book
```

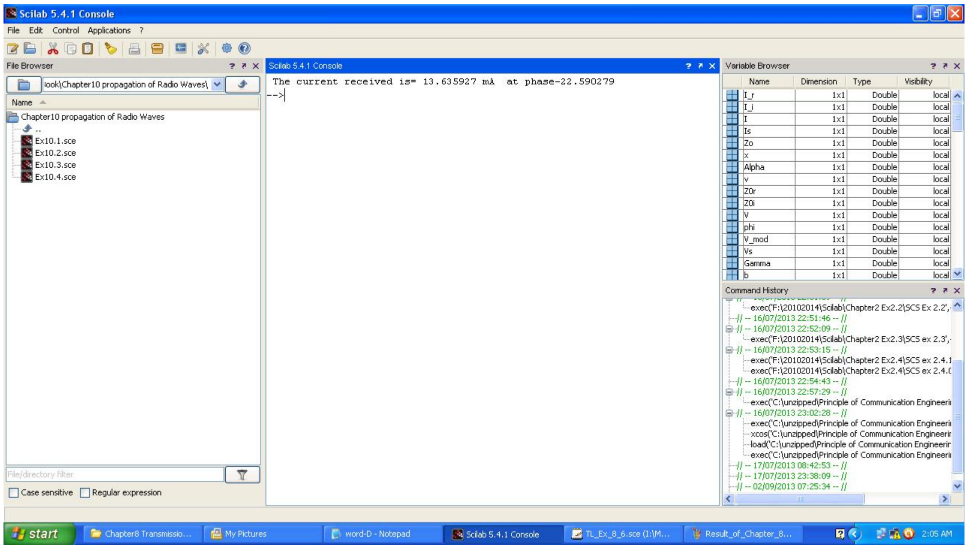
Scilab code Exa 8.6 Transmission Line Ex 8 6



```
 The characteristic impedance Zo= 22.198053 /_-19.655891
The Phase velocity is: v= 2.88e+07 m/sec
 Percent decrease in the voltage is 14.906855%
-->
```

Figure 8.6: Transmission Line Ex 8 6

```
clc
//Chapter8
//Example8.6, page no 317
//GivenR=0.01
R=0.01,l=1e3
L=1e-6
G=1e-6
C=0.001e-6
f=1.59e3// operating freq
w=2*%pi*f// angular freq
//a
Zo=sqrt((R+(%i*w*L))*0.35/(G+(%i*w*C)))//characteristic impedance
[Z0r,Z0i]=polar(Zo)
//b

Beta=sqrt(0.5*(sqrt((((R^2)+(round(w^2)*(L^2)))*(round(G^2)+(round(w^2)*(C^2))))-(round(R*G)-((w^2)*L*C))))//Phase constant

```



```
 The current received is= 13.635927 mA  at phase-22.590279
-->
```

Name	Dimension	Type	Visibility
I_r	1x1	Double	local
I_i	1x1	Double	local
I	1x1	Double	local
Is	1x1	Double	local
Zo	1x1	Double	local
x	1x1	Double	local
Alpha	1x1	Double	local
v	1x1	Double	local
Z0r	1x1	Double	local
Z0i	1x1	Double	local
V	1x1	Double	local
phi	1x1	Double	local
V_mod	1x1	Double	local
Vs	1x1	Double	local
Gamma	1x1	Double	local
b	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.7: Transmission Line Ex 8 15 Pg334

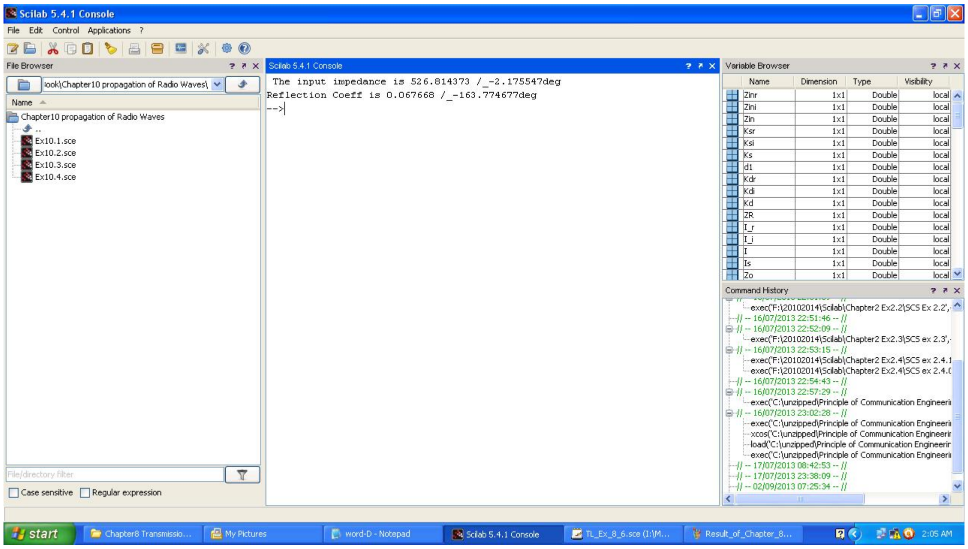
```
v=w/Beta//phase velocity

//c
Alpha=sqrt(0.5*(sqrt((((R^2)+((w^2)*(L^2)))*((G^2)+((w^2)*(C^2)))))+((R*G)-((w^2)*L*C))))//attenuation constant
Vs=1//Assumed for easeof calculation
A=(Vs-(Vs*exp(-Alpha*l)))*100
mprintf('The characteristic impedance Zo= %f /_%f \n',Z0r,Z0i*180/%pi)
mprintf('The Phase velocity is: v= %3.2e m/sec\n Percent decrease in the voltage is %f%c',v,A,'%')

// Note : There are some calculation errors in the solution presented in the book
```

Scilab code Exa 8.15 Transmission Line Ex 8 15 Pg334

```
clc
//Chapter8
//Example8.15, page no 334
//GivenR=0.01
x=10//line length
Zo=100// characteristic impedance
a=0.1// attenuation constant
Beta=0.05// phase constant
Is=20e-3// source current
Gamma=a+ %i*Beta// propagation constant

I=Is/cosh(Gamma*x)// received current

[I_r,I_i]=polar(I)

mprintf('The current received is= %f mA  at phase%f'
   ,1000*I_r,I_i*180/%pi)
```

Scilab code Exa 8.15.1 Transmission Line Ex 8 15 Pg348

```
clc
//Chapter8
//Example8.15, page no 348
//Given
l=100// Tx–line length
ZR=200//Terminal resistance
Zo=600//Characteristic impedance
a=0.01//attenuation constant
Beta=0.03//phase constant
d=0//reflection coeff at load is Zero
Gamma=a+%i*Beta//propagation constant
```

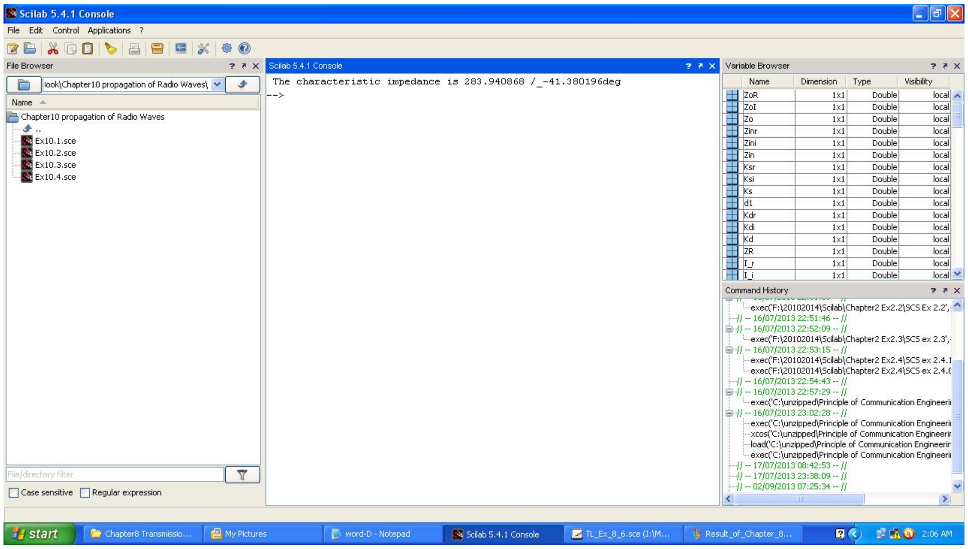


```
 The input impedance is 526.814373 /_-2.175547deg
Reflection Coeff is 0.067668 /_-163.774677deg
-->
```

Name	Dimension	Type	Visibility
Zinr	1x1	Double	local
Zini	1x1	Double	local
Zin	1x1	Double	local
Ksr	1x1	Double	local
Ksi	1x1	Double	local
Ks	1x1	Double	local
d1	1x1	Double	local
Kdr	1x1	Double	local
Kdi	1x1	Double	local
Kd	1x1	Double	local
ZR	1x1	Double	local
I_r	1x1	Double	local
I_i	1x1	Double	local
I	1x1	Double	local
Is	1x1	Double	local
Zo	1x1	Double	local

Figure 8.8: Transmission Line Ex 8 15 Pg348

```
Kd=((ZR-Zo)/(ZR+Zo))*%e^(-2*Gamma*d)//reflection
    coeff at point D d km from load
[Kdr,Kdi]=polar(Kd)
d1=100// distance
Ks=((ZR-Zo)/(ZR+Zo))*%e^(-2*Gamma*d1)//reflection
    coeff at the sending end
[Ksr,Ksi]=polar(Ks)
Zin=Zo*(((ZR*cosh(Gamma*l))+(Zo*sinh(Gamma*l)))/((Zo
    *cosh(Gamma*l))+(ZR*sinh(Gamma*l))))//Input
    impedance
[Zinr,Zini]=polar(Zin)
mprintf('The input impedance is %f /_%fdeg\
    nReflection Coeff is %f /_%fdeg',Zinr,Zini*180/
    %pi,Ksr,Ksi*180/%pi)

// Note : There are some calculation errors in the
    solution presented in the book
```



```
The characteristic impedance is 283.940868 /_-41.380196deg
-->
```

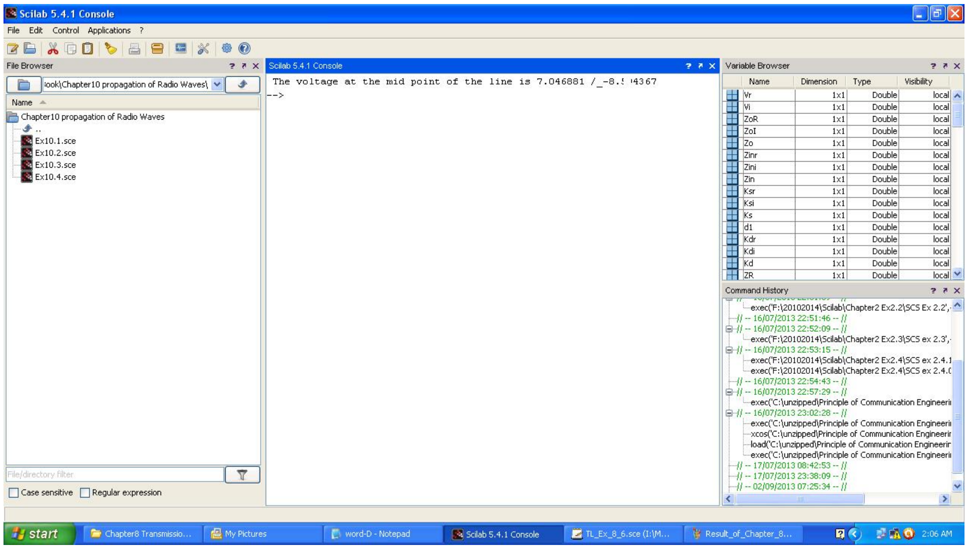
Name	Dimension	Type	Visibility
ZoR	1x1	Double	local
ZoI	1x1	Double	local
Zo	1x1	Double	local
Zinr	1x1	Double	local
Zini	1x1	Double	local
Zin	1x1	Double	local
Ksr	1x1	Double	local
Ksi	1x1	Double	local
Ks	1x1	Double	local
d1	1x1	Double	local
Kdr	1x1	Double	local
Kdi	1x1	Double	local
Kd	1x1	Double	local
ZR	1x1	Double	local
I_r	1x1	Double	local
I_i	1x1	Double	local

```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerir
load('C:\unzipped\Principle of Communication Engineerir
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.9: Transmission Line Ex 8 16

Scilab code Exa 8.16 Transmission Line Ex 8 16

```
clc
//Chapter8
//Example8.16, page no 349
//Given
L=1e-3//inductance
R=40// Resistance
C=0.1e-6// capacitance
G=1e-6//conductance
w=5000// angular freq
Zo=sqrt(complex(R,(w*L))/complex(G,(w*C)))//
    Characteristic impedance
//Zr=sqrt(sqrt(R^2+(w*L)^2)/sqrt(G^2+(w*C)^2))
[ZoR,ZoI]=polar(Zo)
mprintf('The characteristic impedance is %f /_%fdeg'
    ,ZoR,ZoI*180/%pi)
```



```
 The voltage at the mid point of the line is 7.046881 /_-8.594367
-->
```

Name	Dimension	Type	Visibility
Vr	1x1	Double	local
Vi	1x1	Double	local
ZoR	1x1	Double	local
ZoI	1x1	Double	local
Zo	1x1	Double	local
Zinr	1x1	Double	local
Zini	1x1	Double	local
Zin	1x1	Double	local
Ksr	1x1	Double	local
Ksi	1x1	Double	local
Ks	1x1	Double	local
d1	1x1	Double	local
Kdr	1x1	Double	local
Kdi	1x1	Double	local
Kd	1x1	Double	local
ZR	1x1	Double	local

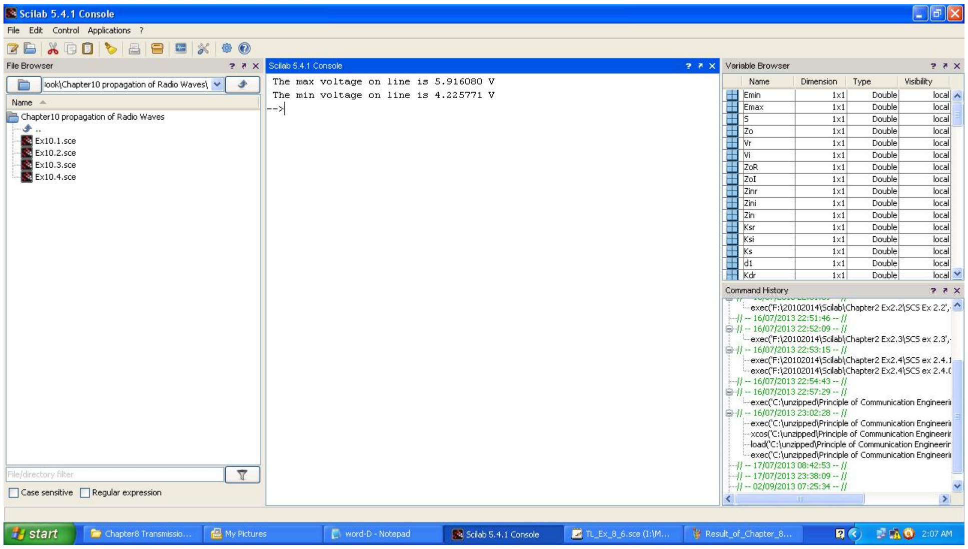
```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.10: Transmission Line Ex 8 17

```

// Note : There are some calculation errors in the solution presented in the book
```

Scilab code Exa 8.17 Transmission Line Ex 8 17

```
clc
//Chapter8
//Example8.17, page no 349
//Given
l=0.5//half line distance
Vs=10//Excitation voltage
Gamma=0.7+%i*0.3//propagation constant
[Vr,Vi]=polar(Vs*(%e^(-Gamma*l)))//vtg at mid point
mprintf('The voltage at the mid point of the line is %f /_%f ',Vr,Vi*180/%pi)
```



```
 The max voltage on line is 5.916080 V
 The min voltage on line is 4.225771 V
-->
```

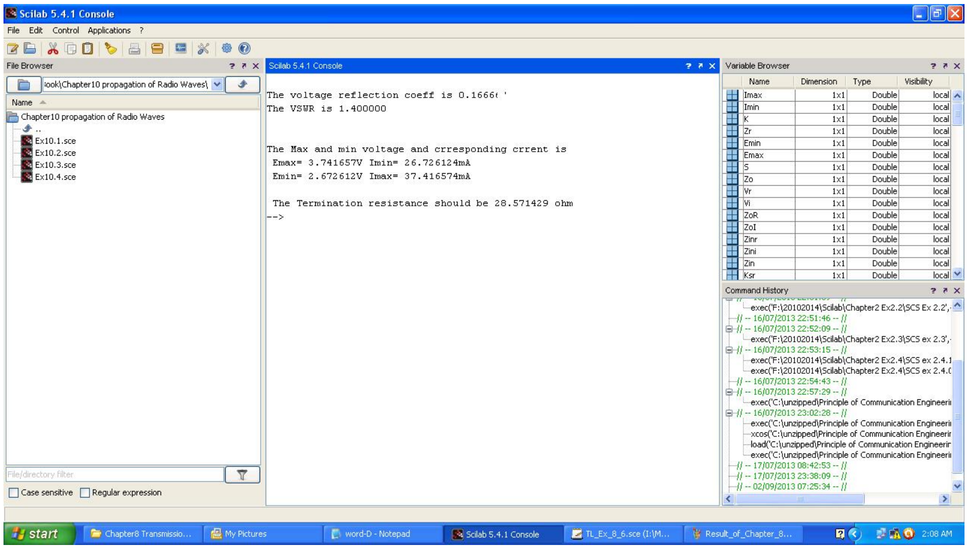
Name	Dimension	Type	Visibility
Emin	1x1	Double	local
Emax	1x1	Double	local
S	1x1	Double	local
Zo	1x1	Double	local
Vr	1x1	Double	local
Vi	1x1	Double	local
ZoR	1x1	Double	local
ZoI	1x1	Double	local
Zinr	1x1	Double	local
Zini	1x1	Double	local
Zin	1x1	Double	local
Ksr	1x1	Double	local
Ksi	1x1	Double	local
Ks	1x1	Double	local
d1	1x1	Double	local
Kdr	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.11: Transmission Line Ex 8 18

Scilab code Exa 8.18 Transmission Line Ex 8 18

```
clc
//Chapter8
//Example8.18, page no350
//Given
Zo=50// characteristic impedance
P=500e-3//Supplied power
S=1.4//VSWR on the line
Emax=sqrt(Zo*S*P)//Max vtg

Emin=sqrt(Zo*P/S)// Min vtg
mprintf('The max voltage on line is %f V\n The min voltage on line is %f V',Emax,Emin)
```



```
The voltage reflection coeff is 0.1666( '
The VSWR is 1.400000


The Max and min voltage and crresponding crrent is
 Emax= 3.741657V Imin= 26.726124mA
 Emin= 2.672612V Imax= 37.416574mA

 The Termination resistance should be 28.571429 ohm
-->
```

Figure 8.12: Transmission Line Ex 8 19

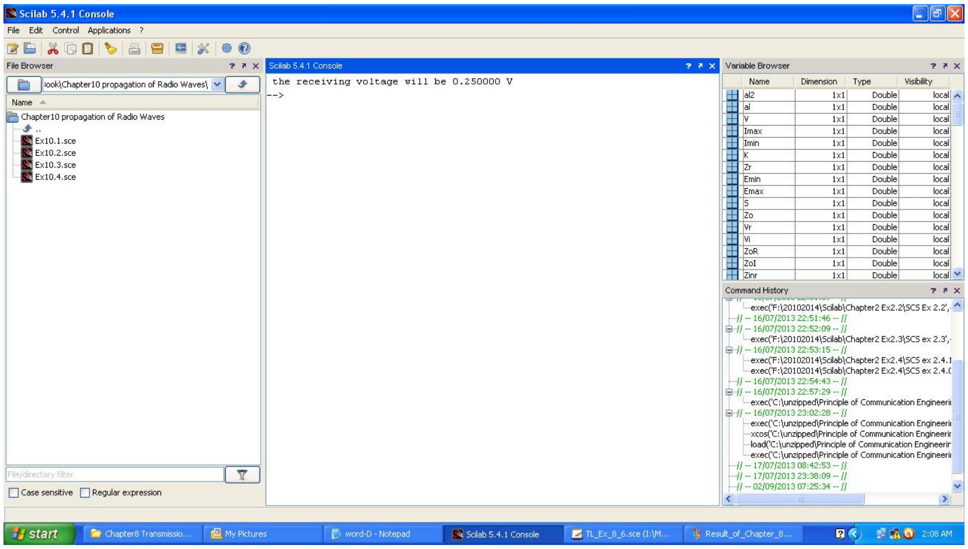
Scilab code Exa 8.19 Transmission Line Ex 8 19

```
clc
//Chapter8
//Example8.19, page no 350
//Given
Zo=100// Characteristic Impedance
P=100e-3//Load power
Zr=140//Load Resistance
f=100e3// Operating freq
//a
K=(Zr-Zo)/(Zo+Zr)//Vtg Reflection coeff

//b
S=(1+K)/(1-K)//VSWR
```

```

//c+d
Emax=sqrt(Zr*P)//Max line vltg
Imin=Emax/Zr//Min line current

Emin=Emax/S// Min line vltg
Imax=S*Imin//Max line current

//e
R=14000/40

Zr=(Zo^2)/R//
mprintf('\nThe voltage reflection coeff is %f\nThe VSWR is %f\n\n\nThe Max and min voltage and crresponding crrent is\n Emax= %fV Imin= %fmA\n Emin= %fV Imax= %fmA\n\n The Termination resistance should be %f ohm',K,S,Emax,Imin*1e3,Emin,Imax*1e3,Zr)
```

Scilab code Exa 8.20 Transmission Line Ex 8 20

```
clc
//Chapter8
//Example8.20, page no 352
//Given
V=0.5//receiving vtg
Vs=2//Source vtg
al=-log(V/Vs)//attenuation

al2=al*1.5
V=Vs*%e^-al2//receiving voltage
mprintf('the receiving voltage will be %f V',V)
```



```
the receiving voltage will be 0.250000 V
-->
```

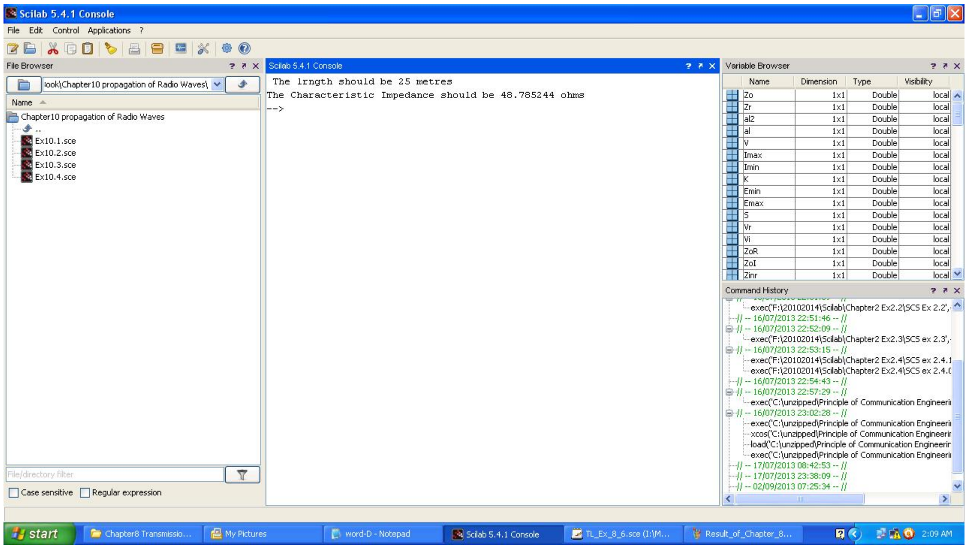
Name	Dimension	Type	Visibility
al2	1x1	Double	local
al	1x1	Double	local
V	1x1	Double	local
Imax	1x1	Double	local
Imin	1x1	Double	local
K	1x1	Double	local
Zr	1x1	Double	local
Emin	1x1	Double	local
Emax	1x1	Double	local
S	1x1	Double	local
Zo	1x1	Double	local
Vr	1x1	Double	local
Vi	1x1	Double	local
ZoR	1x1	Double	local
ZoI	1x1	Double	local
Zinr	1x1	Double	local

```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerir
load('C:\unzipped\Principle of Communication Engineerir
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.13: Transmission Line Ex 8 20

Scilab code Exa 8.22 Transmission Line Ex 8 22

```
clc
//Chapter8
//Example8.22, page no352
//Given
Zin=25+%i*15// Internal Impedance
Zr=70-%i*42//load
f=3e6//operating freq
v=3e8//light velocity
L=v/(4*f)//length of the line

Zo=sqrt(Zin*Zr)//Characteristic Impedance
mprintf('The lrngth should be %d metres\nThe Characteristic Impedance should be %f ohms',L,Zo)
```



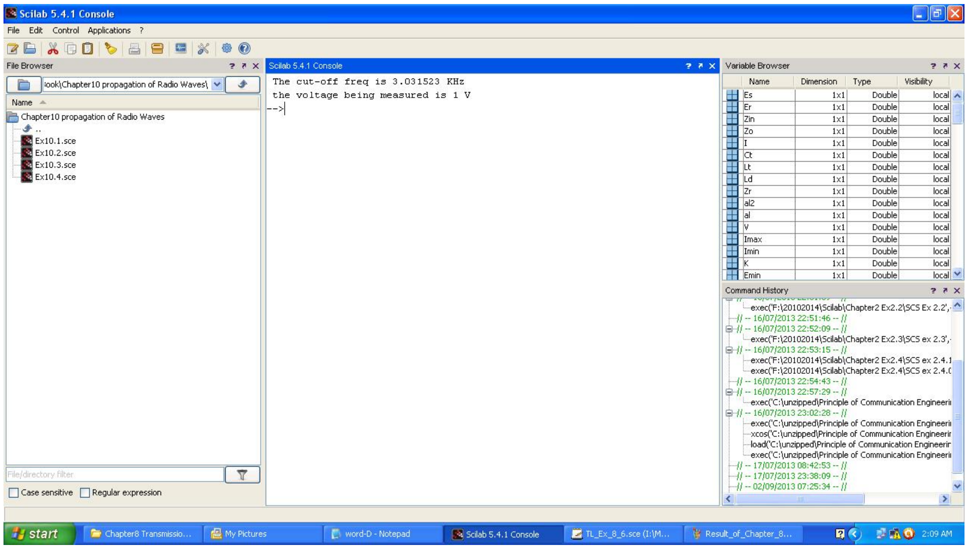
```
 The lrngth should be 25 metres
The Characteristic Impedance should be 48.785244 ohms
-->
```

Name	Dimension	Type	Visibility
Zo	1x1	Double	local
Zr	1x1	Double	local
al2	1x1	Double	local
al	1x1	Double	local
V	1x1	Double	local
Imax	1x1	Double	local
Imin	1x1	Double	local
K	1x1	Double	local
Emin	1x1	Double	local
Emax	1x1	Double	local
S	1x1	Double	local
Vr	1x1	Double	local
Vi	1x1	Double	local
ZoR	1x1	Double	local
ZoI	1x1	Double	local
Zinr	1x1	Double	local

Figure 8.14: Transmission Line Ex 8 22

Scilab code Exa 8.23 Transmission Line Ex 8 23

```
clc
//Chapter8
//Example8.23, page no353
//Given
//a
L=1e-3// inductance
C=61.25e-9//capacitance
Ld=44e-3//coil inductance
d=2//distance intervals after which coils are added
Lt=(L*2)+(Ld*2)//total inductance
Ct=C*2//total capacitance
fc=(%pi*sqrt(Lt*Ct))^-1//cut off freq

```



```
The cut-off freq is 3.031523 KHz
the voltage being measured is 1 V
-->
```

Name	Dimension	Type	Visibility
Es	1x1	Double	local
Er	1x1	Double	local
Zin	1x1	Double	local
Zo	1x1	Double	local
I	1x1	Double	local
Ct	1x1	Double	local
Lt	1x1	Double	local
Ld	1x1	Double	local
Zr	1x1	Double	local
al2	1x1	Double	local
al	1x1	Double	local
V	1x1	Double	local
Imax	1x1	Double	local
Imin	1x1	Double	local
K	1x1	Double	local
Emin	1x1	Double	local

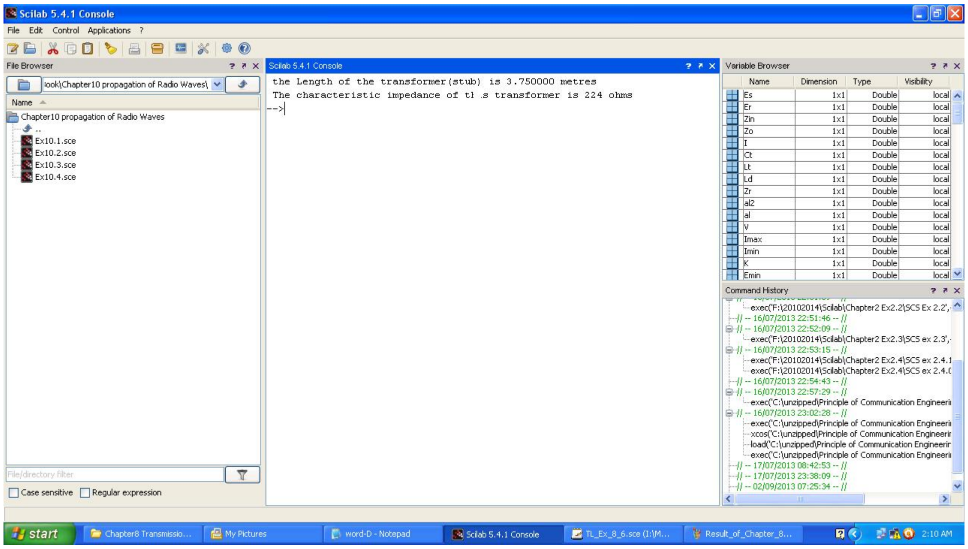
```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerir
load('C:\unzipped\Principle of Communication Engineerir
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 8.15: Transmission Line Ex 8 23

```
//b
I=100e-3//milliameter range
R=1//milliameter resistance
Zo=100//characteristic impedance
Zin=(Zo^2)/R//input impedance

Er=I*R//
Es=Er*sqrt(Zin/Zo)
mprintf('The cut-off freq is %f KHz \n the voltage
    being measured is %d V',fc*1e-3,Es)
```

Scilab code Exa 8.24 Transmission Line Ex 8 24

```
clc
//Chapter8
//Example8.24, page no 354
```



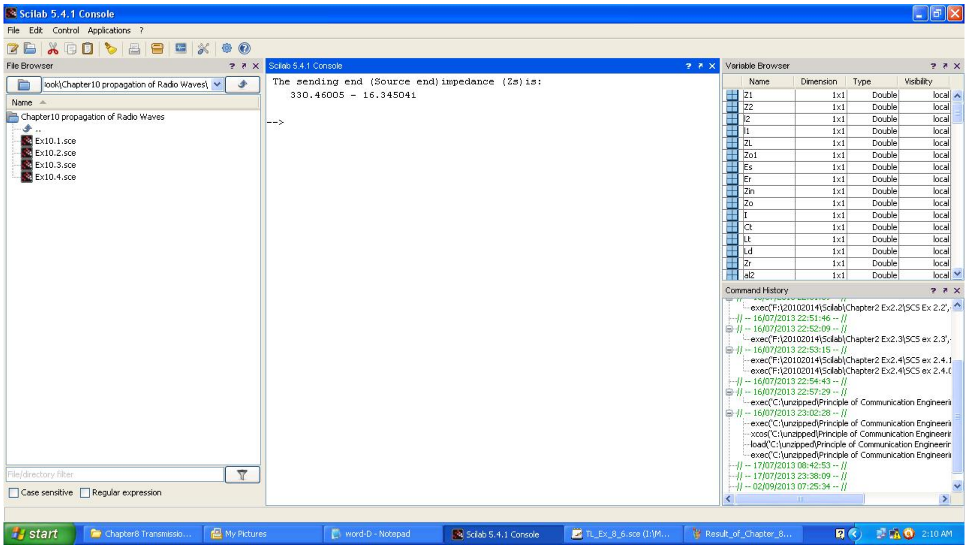
```
the Length of the transformer(stub) is 3.750000 metres
The characteristic impedance of tl .s transformer is 224 ohms
-->
```

Figure 8.16: Transmission Line Ex 8 24

```
//Given
f=20e6//tuned freq
ZR=100//Equivalent aerial Resistance
Zin=500//input impedance
c=3e8
lambda=c/f
l=lambda/4//lambda/4 Transformer

Zo=sqrt(Zin*ZR)//Characteristic impedance
mprintf('the Length of the transformer(stub) is %f metres\n The characteristic impedance of this transformer is %d ohms',l,round(Zo))
```

Scilab code Exa 8.25 Transmission Line Ex 8 25

```
clc
```



```
The sending end (Source end)impedance (Zs)is:
   330.46005 - 16.34504i

-->
```

Figure 8.17: Transmission Line Ex 8 25

```
//Chapter8
//Example8.25, page no 354
//Given
lambda=5//wavelength
Zo=200//Characteristic impedance
Zo1=100//Zo'
ZL=50+(%i*50)// load impedance
l1=0.4*lambda
l2=0.2*lambda
Beta=(2*%pi/lambda)// phase difference
Z2=Zo1*(((ZL*cos(Beta*l2))+(%i*Zo1*sin(Beta*l2)))/((Zo1*cos(Beta*l2))+(%i*ZL*sin(Beta*l2))))//I/p Impedance offered by I2toI1
Z1=Zo*(((Z2*cos(Beta*l1))+(%i*Zo*sin(Beta*l1)))/((Zo*cos(Beta*l1))+(%i*Z2*sin(Beta*l1))))//I/p impedance
mprintf('The sending end (Source end)impedance (Zl) is: '),disp(Z1)
```

Chapter 9

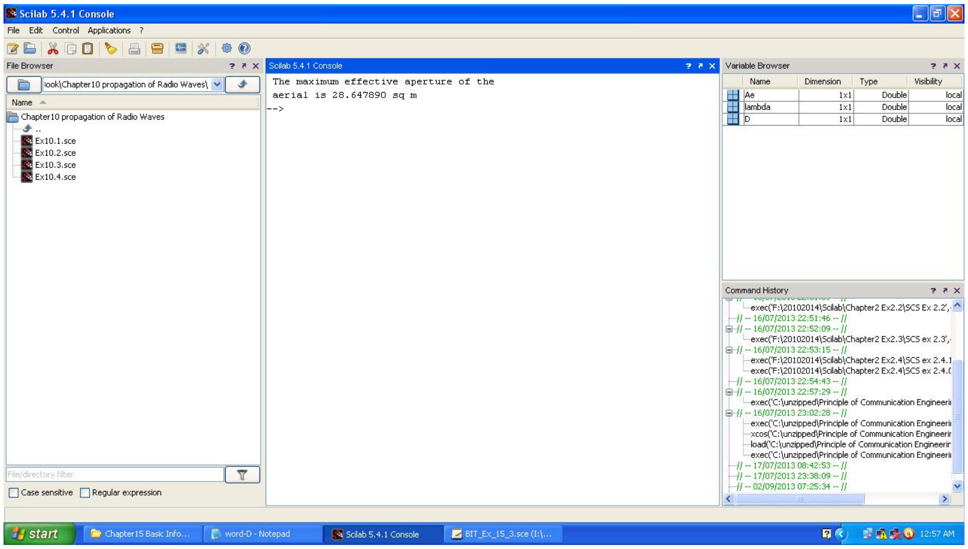
Aerials

Scilab code Exa 9.1 Aerials Ex 9 1

```
clc
//Chapter9
//Example9.1, page no 397
//Given
D=90// directivity
lambda=2// wavelength
Ae=(D*(lambda^2))/(4*%pi)//effective aperture
mprintf('The maximum effective aperture of the\n
    aerial is %f sq m',Ae)
```

Scilab code Exa 9.2 Aerials Ex 9 2

```
clc
//Chapter9
//Example9.2, page no 397
//Given
n=10//no of aerial elements
```



```
The maximum effective aperture of the
aerial is 28.647890 sq m
-->
```

	Name	Dimension	Type	Visibility
▦	Ae	1x1	Double	local
▦	lambda	1x1	Double	local
▦	D	1x1	Double	local

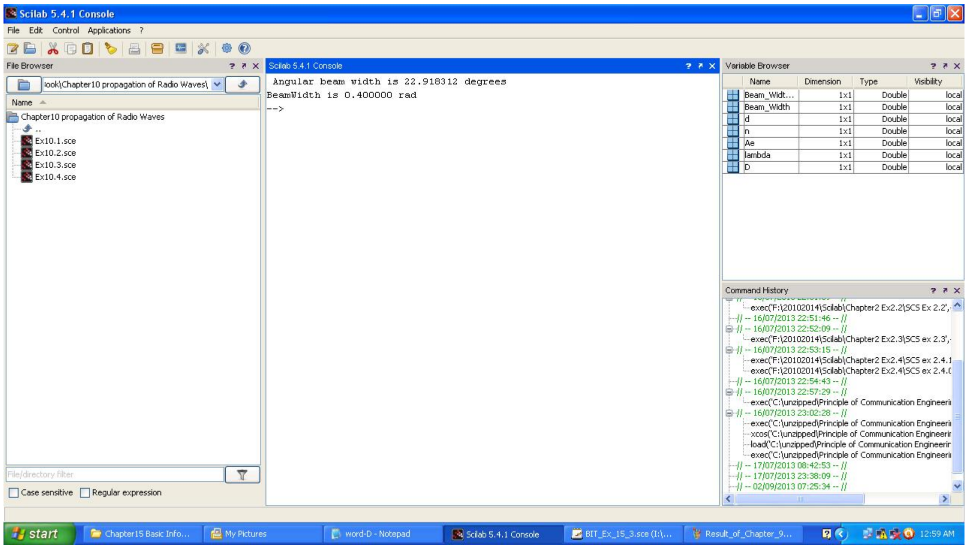
```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerin
load('C:\unzipped\Principle of Communication Engineerin
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.1: Aerials Ex 9 1

```
d=0.5//distance in terms of wavelength
Beam_Width=2/(n*d)//
Beam_Width_degrees=Beam_Width*180/%pi
mprintf('Angular beam width is %f degrees\nBeamWidth
    is %f rad',Beam_Width_degrees,Beam_Width)
```

Scilab code Exa 9.3 Aerials Ex 9 3

```
clc
//Chapter9
//Example9.3, pageno 397
//Given
r=1//assume distance for ease of calculation
//Pav(theta)=(1000/(3*%pi*r^2))*((sin(theta))^2)
theta=0:0.1:%pi
x0=0,x1=%pi
```



```
 Angular beam width is 22.918312 degrees
BeamWidth is 0.400000 rad
-->
```

Name	Dimension	Type	Visibility
Beam_Widt...	1x1	Double	local
Beam_Width	1x1	Double	local
d	1x1	Double	local
n	1x1	Double	local
Ae	1x1	Double	local
lambda	1x1	Double	local
D	1x1	Double	local

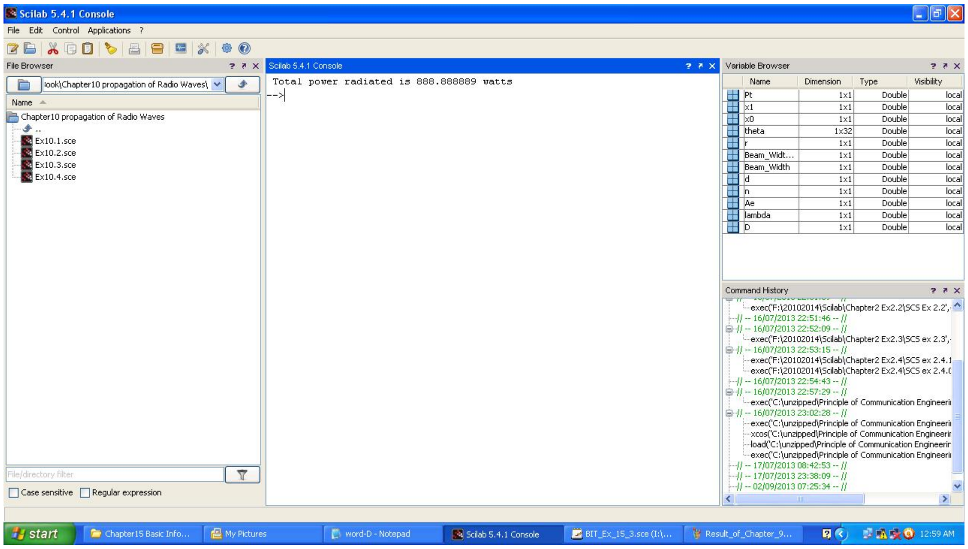
```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerir
load('C:\unzipped\Principle of Communication Engineerir
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.2: Aerials Ex 9 2

```
Pt=(2000/(3*r^2))*integrate('(sin(theta))^3','theta'
    ,x0,x1)//Total power radiated
mprintf('Total power radiated is %f watts',Pt)
```

Scilab code Exa 9.4 Aerials Ex 9 4

```
clc
//Chapter9
//Example9.4, page no 398
//Given
dl=2// length of wire
I=6//current in the wire
f=1e6// operating freq
r=30e3//distance at which field is to be calculated
theta=90//right angles to the wire axis
lambda=300// wavelength
```



```
Total power radiated is 888.888889 watts
-->
```

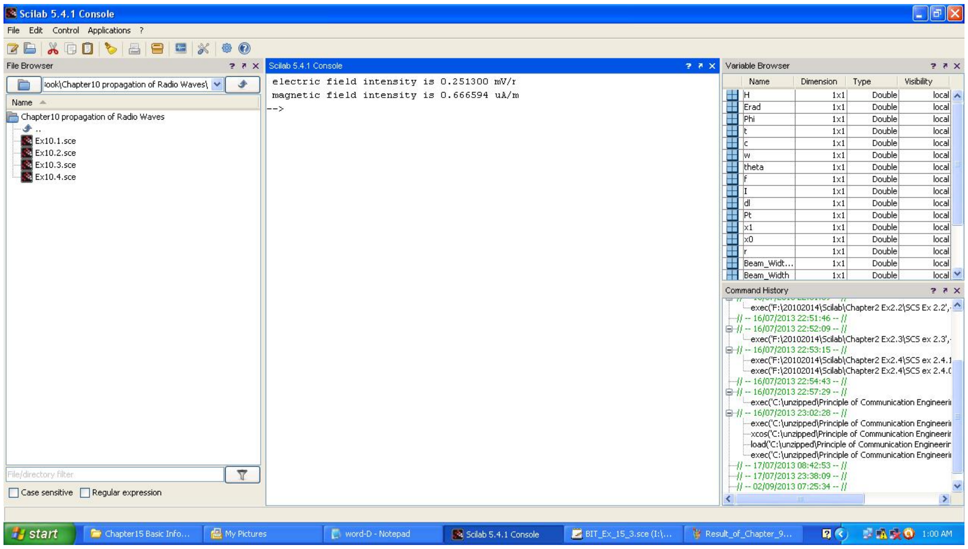
Name	Dimension	Type	Visibility
Pt	1x1	Double	local
x1	1x1	Double	local
x0	1x1	Double	local
theta	1x32	Double	local
r	1x1	Double	local
Beam_Widt...	1x1	Double	local
Beam_Width	1x1	Double	local
d	1x1	Double	local
n	1x1	Double	local
Ae	1x1	Double	local
lambda	1x1	Double	local
D	1x1	Double	local

Figure 9.3: Aerials Ex 9 3

```
w=2*%pi*f//angular freq
c=3e8,t=f^-1
Phi=w*(t-(r/c))//Phase shift
Erad=25.13e-5*cos(Phi)//Radiation electric field intensity
H=Erad/(120*%pi)//Radiation magnetic field intensity
mprintf('electric field intensity is %f mV/m \n magnetic field intensity is %f uA/m',Erad*1e3,H*1e6)
```

Scilab code Exa 9.5 Aerials Ex 9 5

```
clc
//Chapter9
//Example9.5
//Given
```



```
electric field intensity is 0.251300 mV/r
magnetic field intensity is 0.666594 uA/m
-->
```

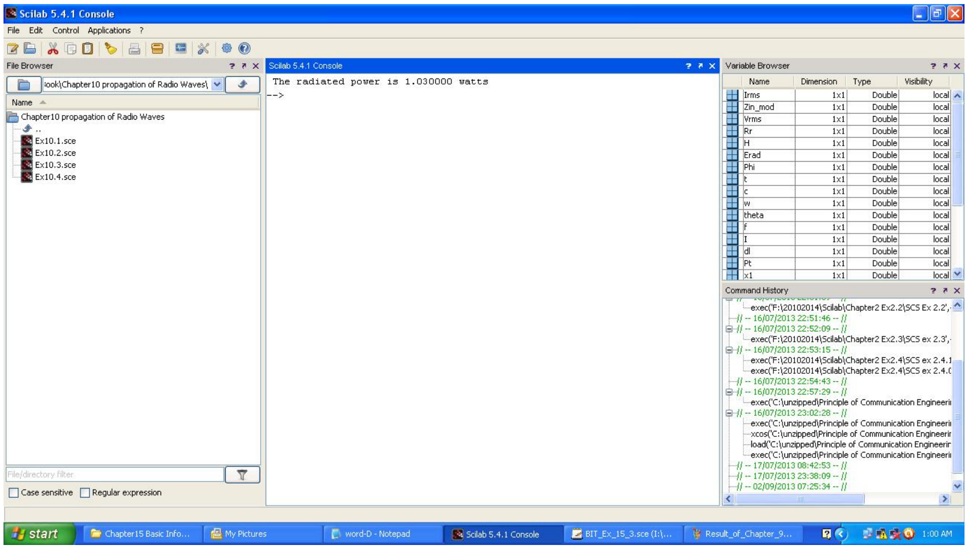
Name	Dimension	Type	Visibility
H	1x1	Double	local
Erad	1x1	Double	local
Phi	1x1	Double	local
t	1x1	Double	local
c	1x1	Double	local
w	1x1	Double	local
theta	1x1	Double	local
f	1x1	Double	local
I	1x1	Double	local
dl	1x1	Double	local
Pt	1x1	Double	local
x1	1x1	Double	local
x0	1x1	Double	local
r	1x1	Double	local
Beam_Widt...	1x1	Double	local
Beam_Width	1x1	Double	local

Figure 9.4: Aerials Ex 9 4

```
//c
Rr=73// radition resistance
Vrms=10//RMS voltage of the signal
Zin_mod=sqrt((73^2)+(42^2))//absolute input
    impedance
Irms=Vrms/Zin_mod//RMS current
Pt=(Irms^2)*Rr// Radiated power
mprintf('The radiated power is %f watts',round(100*
    Pt)/100)
```

Scilab code Exa 9.6 Aerials Ex 9 6

```
clc
//Chapter9
//Example9.6
//Given
```



```
ook\Chapter10 propagation of Radio Waves\
Name
Chapter10 propagation of Radio Waves
..
Ex10.1.sce
Ex10.2.sce
Ex10.3.sce
Ex10.4.sce
```

```
 The radiated power is 1.030000 watts
-->
```

Name	Dimension	Type	Visibility
Irms	1x1	Double	local
Zin_mod	1x1	Double	local
Vrms	1x1	Double	local
Rr	1x1	Double	local
H	1x1	Double	local
Erad	1x1	Double	local
Phi	1x1	Double	local
t	1x1	Double	local
c	1x1	Double	local
w	1x1	Double	local
theta	1x1	Double	local
f	1x1	Double	local
I	1x1	Double	local
dl	1x1	Double	local
Pt	1x1	Double	local
x1	1x1	Double	local

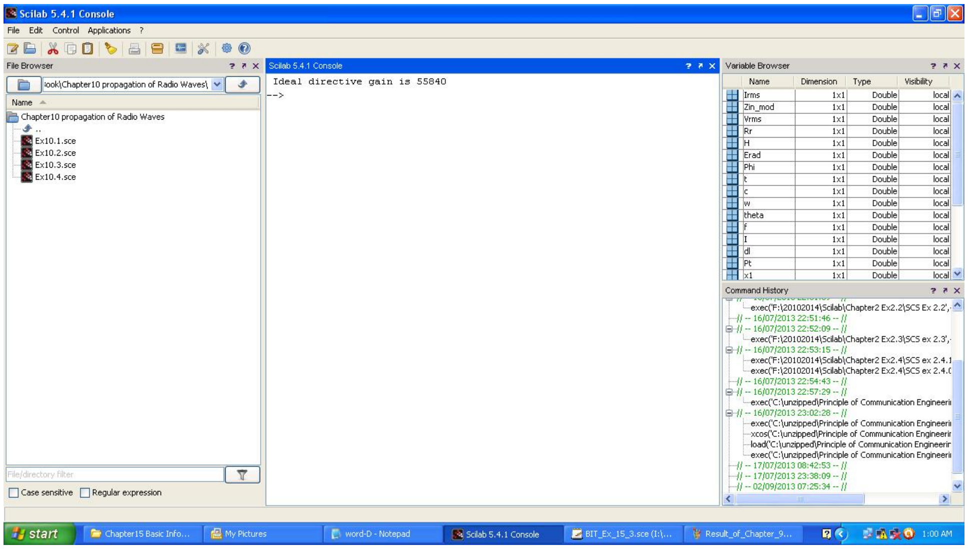
```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.5: Aerials Ex 9 5

```
//b
c=3e8
f=2e9//operating freq
Ae=100//aperture area
lambda=c/f// operating wavwlength
D=((4*3.141*Ae)/(lambda^2))// Directivity
mprintf('Ideal directive gain is %d',D)
```

Scilab code Exa 9.7 Aerials Ex 9 7

```
clc
//Chapter9
//Example9.7, pageno 400
//Given
//b
n=10// no of aerial elements
```



```
Ideal directive gain is 55840
-->
```

Name	Dimension	Type	Visibility
Irms	1x1	Double	local
Zin_mod	1x1	Double	local
Vrms	1x1	Double	local
Rr	1x1	Double	local
H	1x1	Double	local
Erad	1x1	Double	local
Phi	1x1	Double	local
t	1x1	Double	local
c	1x1	Double	local
w	1x1	Double	local
theta	1x1	Double	local
f	1x1	Double	local
I	1x1	Double	local
dl	1x1	Double	local
Pt	1x1	Double	local
x1	1x1	Double	local

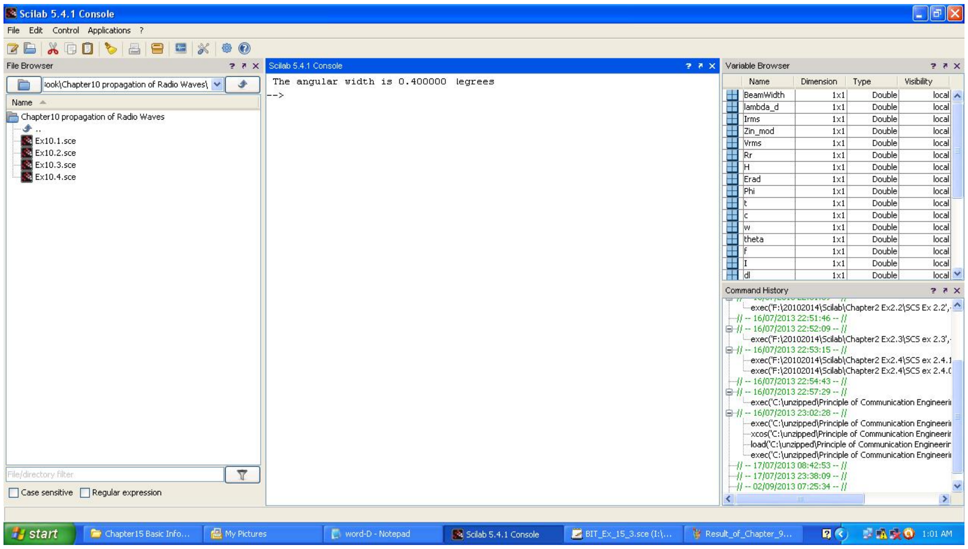
```
   exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
   exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
   exec('C:\unzipped\Principle of Communication Engineeri
   xcos('C:\unzipped\Principle of Communication Engineerir
   load('C:\unzipped\Principle of Communication Engineerir
   exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.6: Aerials Ex 9 6

```
lambda_d=2//
BeamWidth=2*lambda_d/n// Beamwidth
mprintf('The angular width is %f degrees',BeamWidth)
```

Scilab code Exa 9.8 Aerials Ex 9 8

```
clc
//Chapter9
//Example9.8, page no 400
//Given
D1=1,D2=1.5*D1 // diameters of the new reflectors D1=1assumed for ease of calculation
G_dbs=10*log10((D2/D1)^2)//Gain in dBs
mprintf('Overall Gain is %f dBs',round(1000*G_dbs)/1000)
```



```
 The angular width is 0.400000  legrees
-->
```

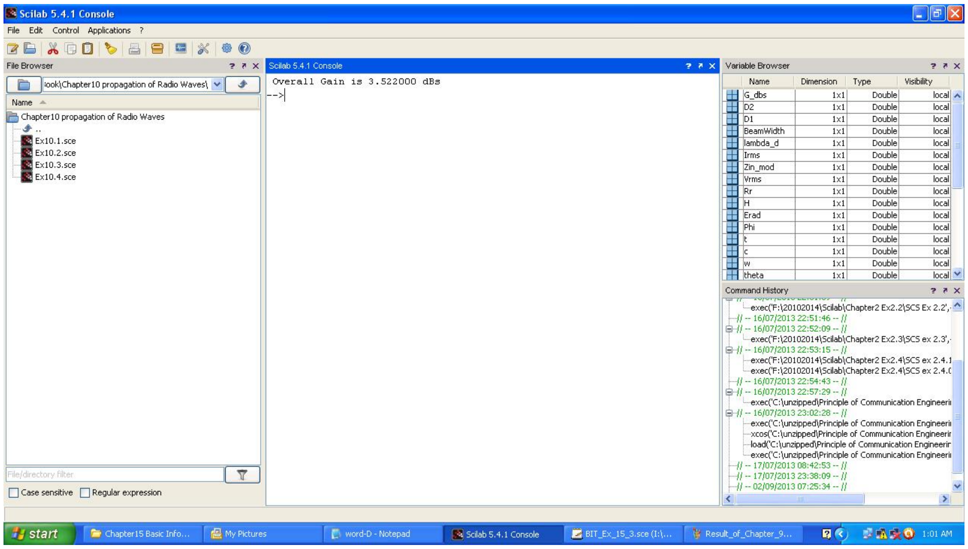
Name	Dimension	Type	Visibility
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local
Vrms	1x1	Double	local
Rr	1x1	Double	local
H	1x1	Double	local
Erad	1x1	Double	local
Phi	1x1	Double	local
t	1x1	Double	local
c	1x1	Double	local
w	1x1	Double	local
theta	1x1	Double	local
f	1x1	Double	local
I	1x1	Double	local
dl	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.7: Aerials Ex 9 7

Scilab code Exa 9.9 Aerials Ex 9 9

```
clc
//Chapter9
//Example9.9
//Given
//b
c=3e8
f=800e3// operating freq
dl=27//effective height
lambda=c/f

Rr=40*(3.142^2)*(dl/lambda)^2//Radiation Resistance
mprintf('Radiation resistance is %f ohm',Rr)
```

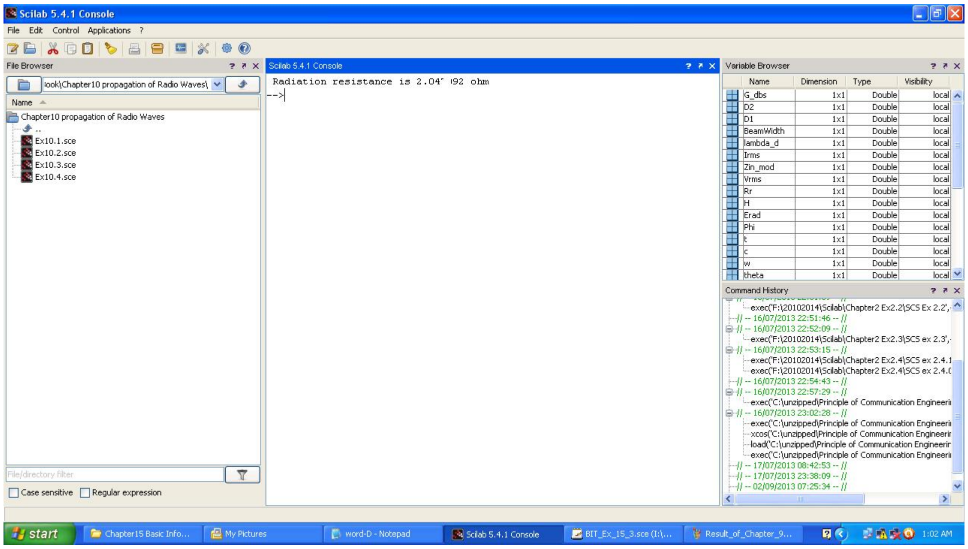


```
 Overall Gain is 3.522000 dBs
-->
```

Name	Dimension	Type	Visibility
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local
Vrms	1x1	Double	local
Rr	1x1	Double	local
H	1x1	Double	local
Erad	1x1	Double	local
Phi	1x1	Double	local
t	1x1	Double	local
c	1x1	Double	local
w	1x1	Double	local
theta	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.8: Aerials Ex 9 8



```
 Radiation resistance is 2.04' '92 ohm
-->
```

	Name	Dimension	Type	Visibility
▦	G_dbs	1x1	Double	local
▦	D2	1x1	Double	local
▦	D1	1x1	Double	local
▦	BeamWidth	1x1	Double	local
▦	lambda_d	1x1	Double	local
▦	Irms	1x1	Double	local
▦	Zin_mod	1x1	Double	local
▦	Vrms	1x1	Double	local
▦	Rr	1x1	Double	local
▦	H	1x1	Double	local
▦	Erad	1x1	Double	local
▦	Phi	1x1	Double	local
▦	t	1x1	Double	local
▦	c	1x1	Double	local
▦	w	1x1	Double	local
▦	theta	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 9.9: Aerials Ex 9 9

Chapter 10

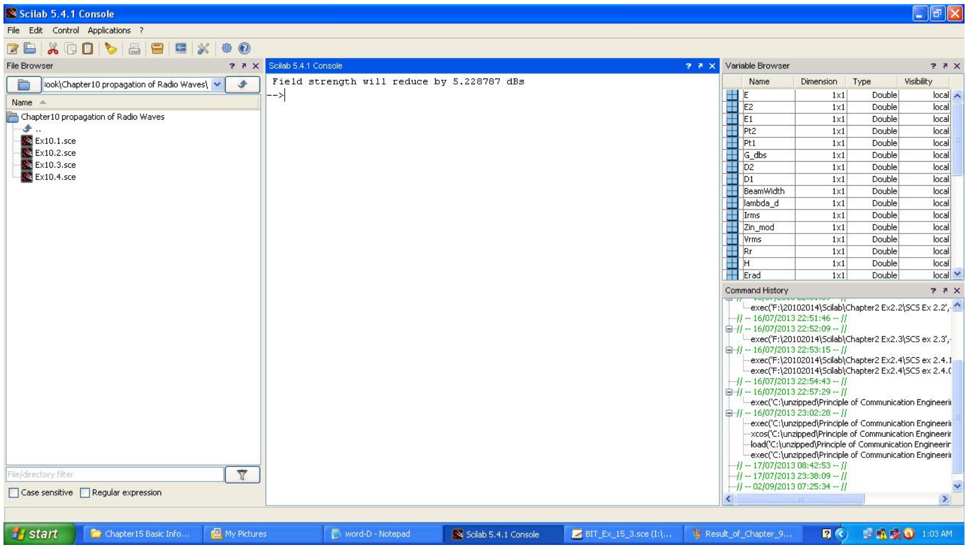
Propagation of Radio Waves

Scilab code Exa 10.1 PoRW Ex 10 1

```
clc
//Chapter10
//Example10.1
//Given
Pt1=100//Radiated power
Pt2=30// Reduced Power
r=1//assume distance to be unity for easeof calculation
E1=300*sqrt(100)/r
E2=300*sqrt(30)/r
E=20*log10((E2/E1))// Reduction in field strength in dBs
mprintf('Field strength will reduce by %f dBs',-E)
```

Scilab code Exa 10.2 PoRW Ex 10 2

```
clc
```



```
Field strength will reduce by 5.228787 dBs
-->
```

File Browser: iook\Chapter10 propagation of Radio Waves\

```
Chapter10 propagation of Radio Waves
  ..
  Ex10.1.sce
  Ex10.2.sce
  Ex10.3.sce
  Ex10.4.sce
```

☐ Case sensitive ☐ Regular expression

Name	Dimension	Type	Visibility
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local
Vrms	1x1	Double	local
Rr	1x1	Double	local
H	1x1	Double	local
Erad	1x1	Double	local

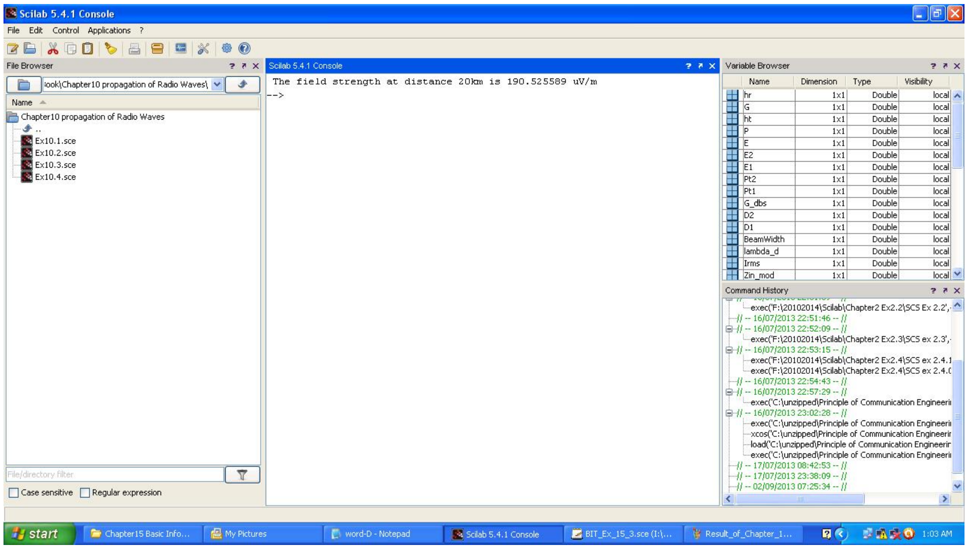
```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 10.1: PoRW Ex 10 1

```
//Chapter10
//Example10.2
//Given
P=3//Transmitter power
ht=100// Antenna height
G=5//Antenna gain
d=20e3//distance
lambda=1,hr=1//assumed
E=((88*G*ht*hr*P^0.5)/(lambda*d^2))//field strength
mprintf('The field strength at distance 20km is %f
    uV/m',E*1e6)
```

Scilab code Exa 10.3 PoRW Ex 10 3

```
clc
//Chapter10
```



```
The field strength at distance 20km is 190.525589 uV/m
-->
```

Name	Dimension	Type	Visibility
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local

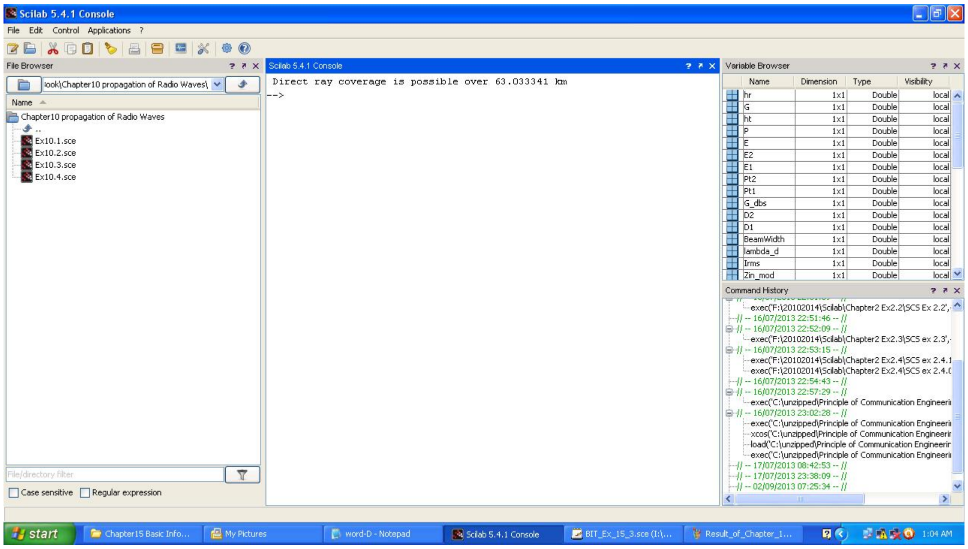
```
exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
exec('C:\unzipped\Principle of Communication Engineeri
xcos('C:\unzipped\Principle of Communication Engineerin
load('C:\unzipped\Principle of Communication Engineerin
exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 10.2: PoRW Ex 10 2

```
//Example10.3
//Given
ht=152.5,hr=9.15 // Antenna height
d=4100*(sqrt(ht)+sqrt(hr)) //distance
mprintf('Direct ray coverage is possible over %f km'
   ,d*1e-3)
```

Scilab code Exa 10.4 PoRW Ex 10 4

```
clc
//Chapter10
//Example10.4
//Given
//b
ht=3e3,hr=5e3 // Antenna height
d=4100*(sqrt(ht)+sqrt(hr))//distance
```



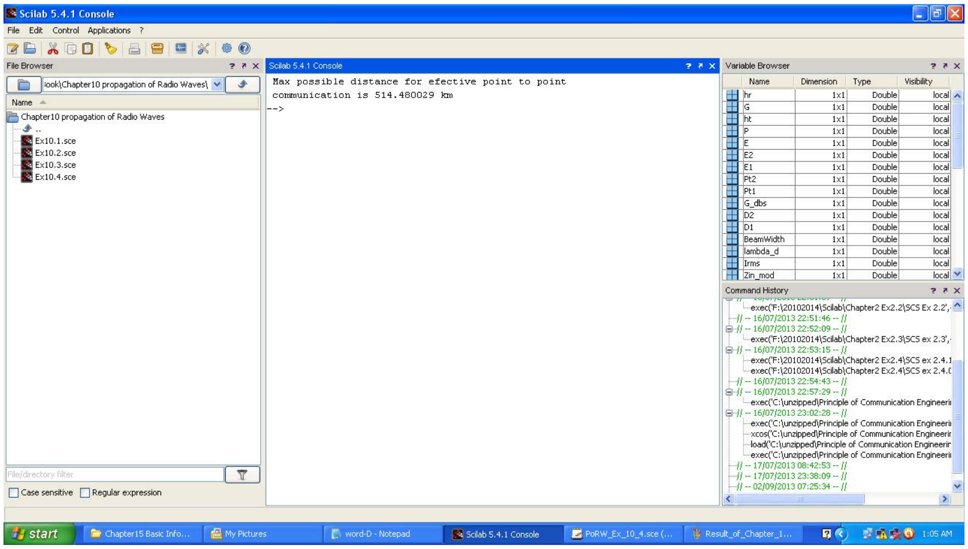
```
Direct ray coverage is possible over 63.033341 km
-->
```

Name	Dimension	Type	Visibility
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 10.3: PoRW Ex 10 3

```
mprintf('Max possible distance for efective point to
    point\n communication is %f km',d*1e-3)
```



```
Max possible distance for efective point to point
communication is 514.480029 km
-->
```

Name	Dimension	Type	Visibility
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local
BeamWidth	1x1	Double	local
lambda_d	1x1	Double	local
Irms	1x1	Double	local
Zin_mod	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

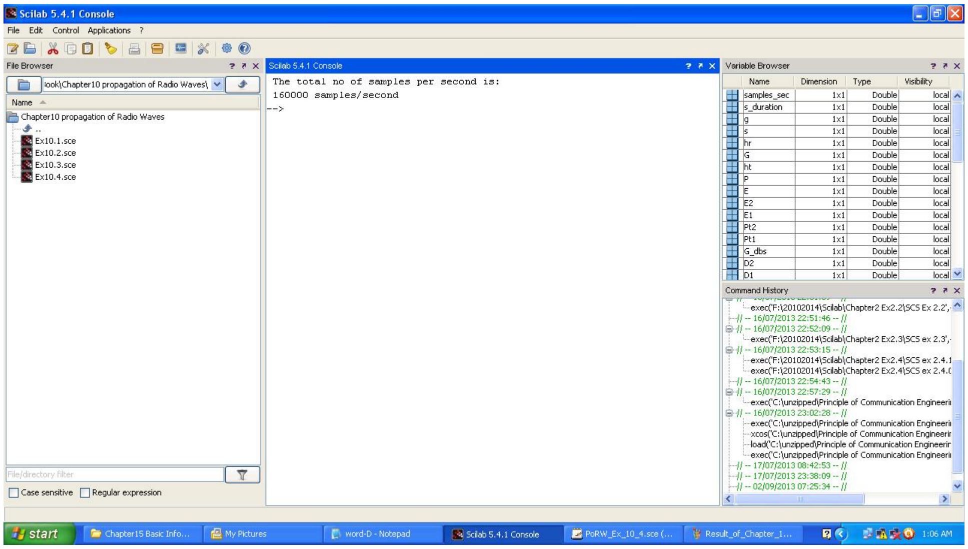
Figure 10.4: PoRW Ex 10 4

Chapter 11

BroadBand Communication

Scilab code Exa 11.1 BBC Ex 11 1

```
clc
//Chapter11
//Example11.1, page no 435
//Given
//a
c=20// no of signal channels
s=8e3// Channel sampling rate
t=1/s// time interval over which ll channels are sampled once
//b
g=5e-6// guaed time for each channel sample
s_duration=t-g// duration of each sample
//c
samples_sec=c*s//
mprintf('The total no of samples per second is:\n %d samples/second',samples_sec)
```



```
The total no of samples per second is:
160000 samples/second
-->
```

Name	Dimension	Type	Visibility
samples_sec	1x1	Double	local
s_duration	1x1	Double	local
g	1x1	Double	local
s	1x1	Double	local
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local
G_dbs	1x1	Double	local
D2	1x1	Double	local
D1	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 11.1: BBC Ex 11 1

Chapter 15

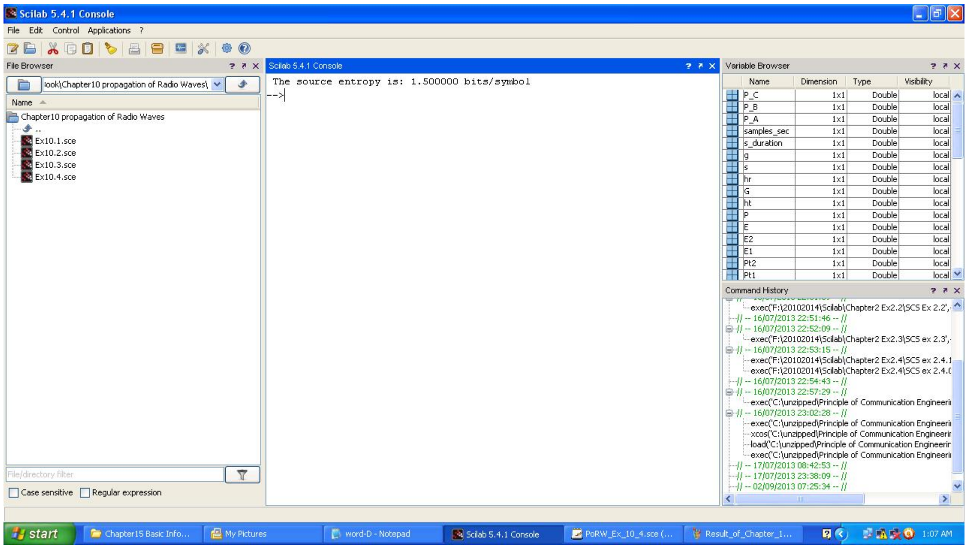
Basic Information Theory

Scilab code Exa 15.1 BIT Ex 15 1

```
clc
//Chapter15
//Example15.1, page no 533
//Given
P_A=0.5// probability of producing symbol 'A'
P_B=0.25// probability of producing symbol 'B'
P_C=0.25// probability of producing symbol 'C'
H=P_A*log2(1/P_A)+P_B*log2(1/P_B)+P_C*log2(1/P_C)//
    the source entropy
mprintf('The source entropy is: %f bits/symbol',H)
```

Scilab code Exa 15.2 BIT Ex 15 2

```
clc
//Chapter15
//Example15.2, page no 535
//Given
```



```
 The source entropy is: 1.500000 bits/symbol
-->
```

Name	Dimension	Type	Visibility
P_C	1x1	Double	local
P_B	1x1	Double	local
P_A	1x1	Double	local
samples_sec	1x1	Double	local
s_duration	1x1	Double	local
g	1x1	Double	local
s	1x1	Double	local
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local
E2	1x1	Double	local
E1	1x1	Double	local
Pt2	1x1	Double	local
Pt1	1x1	Double	local

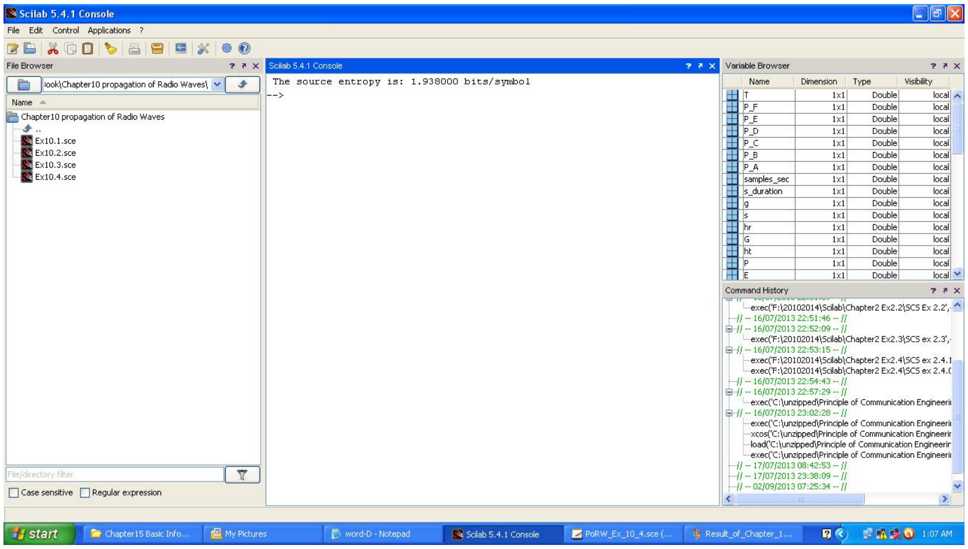
```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 15.1: BIT Ex 15 1

```
P_A=0.5,P_B=0.25,P_C=1/32,P_D=1/8,P_E=1/16,P_F=1/32 // probabilities of producing respective symbol
H=(P_A*log2(1/P_A))+(P_B*log2(1/P_B))+(P_C*log2(1/P_C))+(P_D*log2(1/P_D))+(P_E*log2(1/P_E))+(P_F*log2(1/P_F))// Source Entropy
n=6,T=1
mprintf('The source entropy is: %f bits/symbol', round(1000*H)/1000)
```

Scilab code Exa 15.3 BIT Ex 15 3

```
// the Answer in the book is wrong.It is printed as 90.4 for SNR3 but it should be 100.59
clc
//Chapter15
//Example15.3, page no 536
```



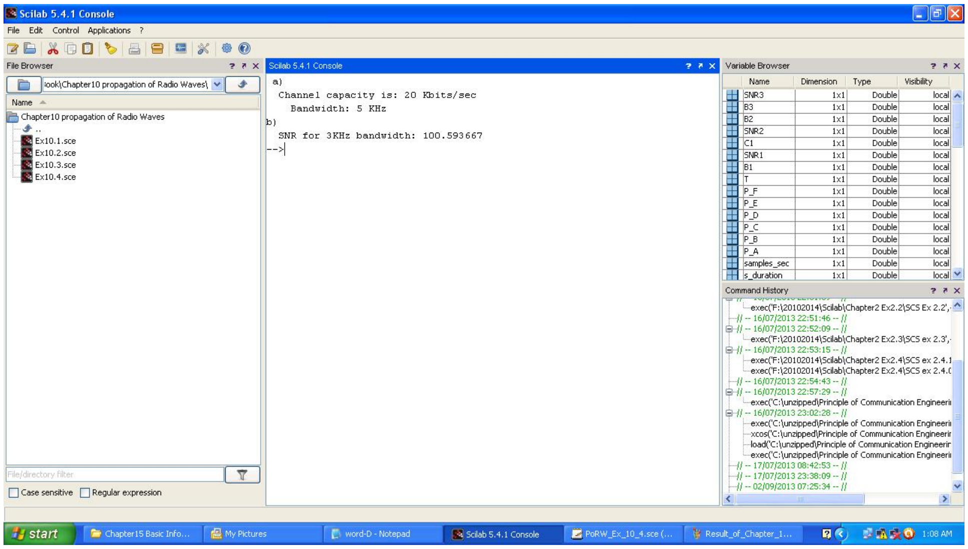
```
The source entropy is: 1.938000 bits/symbol
-->
```

Name	Dimension	Type	Visibility
T	1x1	Double	local
P_F	1x1	Double	local
P_E	1x1	Double	local
P_D	1x1	Double	local
P_C	1x1	Double	local
P_B	1x1	Double	local
P_A	1x1	Double	local
samples_sec	1x1	Double	local
s_duration	1x1	Double	local
g	1x1	Double	local
s	1x1	Double	local
hr	1x1	Double	local
G	1x1	Double	local
ht	1x1	Double	local
P	1x1	Double	local
E	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerin
    load('C:\unzipped\Principle of Communication Engineerin
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 15.2: BIT Ex 15 2

```
//Given
//a
B1=4e3//Channel Bandwidth
SNR1=31//Channel SNR
C1=B1*log2(1+SNR1)//Channel Capacity
SNR2=14//Reduced SNR
B2=round(C1/log2(1+SNR2))//Bandwidth for reduced SNR with same Channel capacity

//b
B3=3e3//Reduced Bandwidth
SNR3=(2^(C1/B3))-1//Signal Power for reduced bandwidth
mprintf('a)\n  Channel capacity is: %d Kbits/sec\n  Bandwidth: %d KHz\nb)\n  SNR for 3KHz bandwidth: %f',C1*1e-3,B2*1e-3,SNR3)
```



```
 a)
  Channel capacity is: 20 Kbits/sec
    Bandwidth: 5 KHz
b)
  SNR for 3KHz bandwidth: 100.593667
-->
```

Name	Dimension	Type	Visibility
SNR3	1x1	Double	local
B3	1x1	Double	local
B2	1x1	Double	local
SNR2	1x1	Double	local
C1	1x1	Double	local
SNR1	1x1	Double	local
B1	1x1	Double	local
T	1x1	Double	local
P_F	1x1	Double	local
P_E	1x1	Double	local
P_D	1x1	Double	local
P_C	1x1	Double	local
P_B	1x1	Double	local
P_A	1x1	Double	local
samples_sec	1x1	Double	local
s_duration	1x1	Double	local

```
    exec('F:\20102014\Scilab\Chapter2 Ex2.2\SCS Ex 2.2',
// -- 16/07/2013 22:51:46 -- //
// -- 16/07/2013 22:52:09 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.3\SCS ex 2.3',
// -- 16/07/2013 22:53:15 -- //
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.1
    exec('F:\20102014\Scilab\Chapter2 Ex2.4\SCS ex 2.4.0
// -- 16/07/2013 22:54:43 -- //
// -- 16/07/2013 22:57:29 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 16/07/2013 23:02:28 -- //
    exec('C:\unzipped\Principle of Communication Engineeri
    xcos('C:\unzipped\Principle of Communication Engineerir
    load('C:\unzipped\Principle of Communication Engineerir
    exec('C:\unzipped\Principle of Communication Engineeri
// -- 17/07/2013 08:42:53 -- //
// -- 17/07/2013 23:38:09 -- //
// -- 02/09/2013 07:25:34 -- //
```

Figure 15.3: BIT Ex 15 3