Scilab Textbook Companion for The Field of Electronics by R. Morrison[1]

Created by
Ashana Yamunashankar Shukla
Electrical
Electrical Engineering
Sardar Patel College of Engineering
College Teacher
None
Cross-Checked by
Chaitanya Potti

June 1, 2016

[1]Funded by a grant from the National Mission on Education through ICT, http://spoken-tutorial.org/NMEICT-Intro. This Textbook Companion and Scilab codes written in it can be downloaded from the "Textbook Companion Project" section at the website http://scilab.in

Book Description

Title: The Field of Electronics

Author: R. Morrison

Publisher: Wiley-inascience Publication, Canada

Edition: 1

Year: 2002

ISBN: 0-471-22290-9

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

Chapter 1

Electric field

Scilab code Exa 1.1 calculating Electric field intensity

```
1 clc;
2 n=512;  //frequency in Hz
3 l=67;   //wavelength in cm
4 v=n*l;   //calculating velocity
5 disp(v,"Velocity in cm/sec = ");   //displaying
    result
```

Scilab code Exa 1.2 calculating current

```
1 clc;
2 v=340;  //velocity in m/sec
3 l=0.68;   //wavelength in m
4 n=v/l;   //calculating frequency
5 disp(n,"Frequency in Hz = ");   //displaying result
```

Scilab code Exa 1.3 calculating resistance and conductance

```
clc;
v=3*10^8;  //velocity in m/sec
n=500*10^3;   //frequency in Hz
l=v/n;   //calculating wavelength
disp(l,"Wavelength in m = ");   //displaying result
```

Scilab code Exa 1.4 calculating current

```
clc;
v=330;  //velocity in m/sec
n=560;   //frequency in Hz
l=v/n;   //calculating wavelength
disp(l*30,"Distance travelled in 30 vibrations in m
   = ");   //displaying result
```

Scilab code Exa 1.5 calculating work

```
clc;
s=90;      //distance in m
u=0;       //initial velocity in m/sec
t=sqrt(90/4.9);     //calculating time using
   kinematical equation
t1=4.56-t;       //calculating time taken by sound to
    travel
v=s/t1;       //calculating velocity
disp(v,"Velocity in m/sec = ");  //displaying result
```

Scilab code Exa 1.6 calculating resistance

```
clc;
```

```
2 l1=1.5;    //wavelength in m
3 l2=2;    //wavelength in m
4 v1=120;   //velocity in m/sec
5 n=v1/l1;     //calculating frequency
6 v2=n*l2;    //calculating velocity
7 disp(v2,"Velocity in m/sec = ");  //displaying
    result
```

Scilab code Exa 1.7 calculating voltage

```
1 clc;
2 l=5641*10^-10;    //wavelength in m
3 c=3*10^8;          //velocity in m/sec
4 n=c/l;           //calculating frequency
5 u=1.58;         //refractive index of glass
6 cg=c/u;          //calculating velocity of light in
    glass
7 l1=cg/n;        //calculating wavelegth in glass
8 disp(l1*10^10,"Wavelength in glass in Angstrom =");
     //displaying result
```

Scilab code Exa 1.8 calculating voltage

```
1 clc;
2 n=12*10^6;          //frequency in Hz
3 v=3*10^8;          //velocity in m/sec
4 l=v/n;             //calculating wavelength
5 disp(l,"Wavelength in m = ");  //displaying result
```

Scilab code Exa 1.9 calculating internal resistance

```
clc;
n=400;          //frequency in Hz
v=300;          //velocity in m/sec
l=v/n;             //calculating wavelength
disp(l,"Wavelength in m = ");  //displaying result
```

Scilab code Exa 1.10 calculating voltage

```
clc;
a=20;        //amplitude in cm
n=6;        //frequency per second
w=2*(%pi)*n;    //omega in radians/sec
disp(w,"Omega in radians/sec = ");    //displaying
   result
```

Scilab code Exa 1.11 calculating power dissipated

```
clc;
a=6;       //amplitude in cm
n=9;       //frequency in Hz.
vmax=2*(%pi)*n*6;  //calculating velocity in cm/sec
acc=-((18*(%pi))^2)*6;  //calculating acc. in m/sec
   square
disp(vmax,"Maximum velocity in cm/sec = ");  //
   displaying result
disp("Velocity at extreme position = 0");    //
   displaying result
disp("Accelaration at mean position = 0");  //
   displaying result
disp(acc,"Accelaration at extreme position in m/sec
   square = ");  //displaying result
```

Scilab code Exa 1.12 calculating power dissipated

```
clc;
g=9.8;    //gravitational constant
m=50;    //mass in kg
l=0.2;    //length in m
T=0.6;     //time period
k=(m*g)/l;    //calculating constant
m=2450*((T/(2*(%pi)))^2);  //calcualting mass using
   given time period
disp(m,"Mass of body in kg = ");  //displaying
   result
```

Scilab code Exa 1.13 calculating the power level

```
clc;
v=4;  //volts
t=8;  //time in sec
ch=4;  //charge in Coloumb
c=ch/t;  //current
p=c*v;  //power
e=p*t;  //energy
disp(c,"Current in Ampere = ");  //displaying
   current
disp(p,"Power in Watt = ");  //displaying power
disp(e,"Energy in Joule = ");  //displaying energy
```

Scilab code Exa 1.14 finding configuration

```
clc;
disp("In a)parallel b)series c)Two pairs of parallel
    and then in series");  //displaying result
```

Scilab code Exa 1.15 no of resistances

```
clc;
p=1/8;  //power disipation per resistor
v=sqrt(100/8);  //voltage across each resistor
disp(14.14,"a)Voltage in Series in Ohm = "); //
    displaying result
disp(v,"b)Voltage in Parallel in Ohm =");  //
    displaying result
disp(7.07,"c)Voltage in Series-Parallel in Ohm = ");
     //displaying result
```

Scilab code Exa 1.16 calculating wattage rating

```
clc;
v=10;  //voltage in volt
t=2;  //time in sec
r=40;  //resistance in ohm
p=(v^2)/r;  //power
e=5/5;  //energy in Watt
disp(p,"Power in Watt = ");  //displaying power
disp("2 W resistor is adequate.");  //displaying
    result
```

Scilab code Exa 1.17 calculating power dissipation

```
clc;
v=24;  //voltage in volt
t=2;  //time in sec
r=48;  //resistance in ohm
p=(v^2)/r;  //calculating power
disp(p,"Power in Watt = ");  //displaying result
```

Scilab code Exa 1.18 calculating joules

```
clc;
i=60;  //current in ampere
v=12;  //voltage in volt
t=3600;  //time in sec
p=i*v*t;  //calculating power
disp(p,"Number of joules = ");  //displaying result
```

Scilab code Exa 1.19 calculating wattage

```
clc;
v=12;  //voltage in volt
ah=720;  //ampere-hours
am=ah/24;  //calculating amperage
r=v/am;  //calculating resistance
disp(r,"Load in Ohm = ");  //displaying result
```

Scilab code Exa 1.20 calculating current

```
clc;
p=200;  //power in Watt
v=12;  //voltage in volt
```

```
4 i=p/v;  //calculating current in Ampere
5 I=p/6;  //calculating
6 disp(i,"Current in Ampere = ");  //displaying
7 disp(I,"Current in Ampere if voltage were 6V = ");
    //displaying result
```

Scilab code Exa 1.21 calculating energy

```
1 clc;
2 E=10^6;  //in volt/m
3 e=8.85*10^-12;  //constant in F/m
4 v=10^-5;  //volume in m cube
5 en=(1/2)*e*E*E*v;  //calculating energy
6 disp(en,"Energy in Joule = ");  //displaying result
```

Scilab code Exa 1.22 calculating voltage

```
1 clc;
2 en=4.42*10^-5;  //energy in Joule
3 v=10^6;
4 q=(2*en)/v;  //calculating q
5 disp(q,"Charge in Coloumb = ");  //displaying result
```

Scilab code Exa 1.23 calculating force

```
1 clc;
2 e=4.42*10^-5;  //energy in Joule
3 v=1.1*10^-5;  //volume in m cube
4 dv=(10/100)*e;  //calculating change in energy
5 dd=10^-4;  //change in dimension in metre
```

```
6 f=dv/dd;  //calculating force
7 disp(f,"Force in kg = ");  //displaying result
```

Scilab code Exa 1.24 calculating average power

```
1 clc;
2 disp("a)1A for 1 sec = 10J/sec ");  //displaying
3 disp("b)10A for 0.1 sec = 100 J/sec");  //displaying
4 disp("c)100A for 0.01 sec = 1000 J/sec");  //
    displaying
```

Scilab code Exa 1.25 calculating peak power

```
1 clc;
2 disp("Peak power is when 100 A flows for 0.01 sec =
    1000J/sec");  //displaying
```

Chapter 2

Capacitance

Scilab code Exa 2.1 calculating capacitance

```
1 clc;
2 disp("Example 2.1");
3 v=3000;                //volume in metre cube.
4 theta=0.2;             //theta in owu(open window unit)
    .
5 s=1850;                //area in metre cube.
6 as=theta*s;     //calculating total absorbtion of
    surface.
7 T=(0.165*v)/as //calculating T using Sabine formula
8 disp(T,"Reverberation time of Room = ");    //
    Displaying Result.
```

Scilab code Exa 2.2 calculating charge

```
1 clc;
2 disp("Example 2.2");
3 v=120000;                                  //volume in
    metre cube.
```

```
4 t=1.5;                                    //time in second
    .
5 s=25000;                                  //area in metre
    cube.
6 a=(0.16*v)/(t*s);                        //using Sabine
    formula for calculating a
7 disp(a,"Average Absorbing Power of Surface = "); //
    Displaying Result.
```

Scilab code Exa 2.3 calculating D

```
1 clc;
2 disp("Example 2.3");
3 v=6000                          //Volume in metre cube.
4 as=20                           //surface absorbtion in
    owu(open window unit).
5 T=(0.165*v)/(as);               //calculating T using
    Sabine Formula.
6 disp(T,"Reverberation Time = "); //Displaying
    Result.
```

Scilab code Exa 2.4 calculating current

```
1 clc;
2 disp("Example2.4");
3 v=3500;                        //volume in metre cube.
4 n1=370-300;                    //no. of audience on wooden
    seats.
5 n2=300-70;                     //no. of empty wooden seats.
6 a1s1=0.04*60;                  //absorption due to wooden
    doors.
7 a2s2=0.03*700;                 //absorption due to
    plastered walls.
```

```
a3s3=0.06*50;              //absorption due to glass
   work.
a4s4=4.2*370;              //absorption due to audience
    on spungy and wooden
//seats.
a5s5=2*230;                //absorption due to empty
   seats.
sum=a1s1+a2s2+a3s3+a4s4+a5s5; //total absorption of
   cinema hall.
T=(0.165*v)/sum;           //calculating T using
   Sabine Formula.
disp(T,"Reverberation Time = ");      //Displaying
   Result.
```

Scilab code Exa 2.5 calculating time constant

```
clc;
disp("Example 2.5");
l=10;                                 //length in
   centimetres.
Y=20*10^11;                           //Young's Modulus in
   dyne/cm square.
R=8;                                  //Density in gram/cc
n=(1/(2*l))*sqrt(Y/R); //calculating frequency of
   vibration using
//young's modulus.
disp(n,"Frequency of vibration in Hz.");    //
   Displaying Result.
```

Scilab code Exa 2.6 calculating voltage

```
clc;
disp("Example 2.7");
```

```
3 t=0.1;                    //thickness in centimetre.
4 Y=8.75*10^11;             //Young's Modulus in dyne/cm
    square.
5 R=2.654;                  //Density in gram/cm square.
6 n=(1/(2*t))*sqrt(Y/R);    //calculating frequency
    using Young's modulus.
7 disp(n,"Frequency of Vibration in Hz = "); //
    Displaying Result.
```

Scilab code Exa 2.7 calculating resistance

```
1 clc;
2 disp("Example 2.7");
3 K=2.026*10^9;                 //Bulk Modulus in N/m
    square.
4 R=10^3;                       //Density in Kg/m cube.
5 V=sqrt(K/R);                  //Calculating speed using
    Bulk Modulus.
6 disp(V,"Velocity of sound waves in water in m/sec =
    "); //displaying result.
```

Scilab code Exa 2.8 calculating energy

```
1 clc;
2 disp("Example 2.8");
3 Y=1.41;               //Young's Modulus.
4 R=1.293*10^-3;        //Density of air in g/centimetre
    cube.
5 P=76*13.6*980;        //atmospheric pressure in dyne/cm
    square.
6 V=sqrt((Y*P)/R);      //calculating speed using young'
    s modulus.
```

```
7 disp(V,"Speed of ultrasonic wave in air at n.t.p. in
      cm/sec = "); //displaying result.
8 disp(V*10^-2,"Speed in m/sec"); //displaying result
    .
```

Scilab code Exa 2.9 finding H field intensity

```
1 clc;
2 r=0.1; //in metre
3 H=3/(2*(%pi)*r); //calculating H field intensity
4 disp(H,"H field intensity in A/metre = "); //
    displaying result
```

Scilab code Exa 2.10 calculating H field intensity

```
1 clc;
2 i=0.1; //current in Ampere
3 r=0.05; //radius in metre
4 h=(i*100)/(2*(%pi)*r); //calculating h
5 disp(h,"H field intensity for 100 turns in A/metre =
      "); //displaying result
```

Scilab code Exa 2.11 calculating H field intensity

```
1 clc;
2 disp("Radius is doubled.Therefore, H filed becomes
    half = 16 A/metre."); //displaying result
```

Scilab code Exa 2.12 calculating H field intensity

```
clc;
disp("H field at the center is nearly the same.");
   //displaying result
```

Scilab code Exa 2.13 calculating H field intensity

```
clc;
i=10;  //current
r=0.005;  //radius in metre
h1=(i)/(4*2*(%pi)*r);  //at half radius H is (1/4)th
disp(h1,"H field intensity at one half of radius in
   A/metre = ");  //displaying result
h2=(i)/(2*(%pi)*0.01);  //calculating H at surface
disp(h2,"H field intensity at surface in A/metre = "
   );  //displaying result
disp("H field intensity is proportional to radius.
   Therefore, it is zero at the center.");  //
   displaying result
```

Scilab code Exa 2.14 calculating time

```
clc;
v=2;  //voltage in volts
l=10^-3;  //inductance in Henry
i=10*10^-3;  //current
di=v/l;  //change in current in A/sec
t=i/di;  //calculating time
disp(t,"Time required to reach 0.01 A in sec = ");
   //displaying result
```

Scilab code Exa 2.15 calculating energy

```
clc;
v=2;  //voltage in volts
l=10^-3;  //inductance in Henry
i=10*10^-3;  //current
e=(1/2)*l*i*i;  //calculating energy
disp(e,"Energy in Joule = ");  //displaying result
```

Scilab code Exa 2.16 calculating H field

```
clc;
p=20*10^-2;  //path length in metre
m=20000;  //relative permeability of magnetic
   material
i=2*10^-3;  //current in Ampere
n=500;  //no of turns
h=n*i;  //calculating A/turn for 20 cm
disp(h,"H for 20 cm in A/turn = ");  //displaying
   result
a=h/(20*10^-2);  //calculating H per metre
disp(a,"H field per metre in A/metre = ");  //
   displaying result
```

Scilab code Exa 2.17 calculating B field

```
clc;
mo=(4*(%pi)*10^-7);  //relative permeability of free
    space
```

```
3  p=20*10^-2;  //path length in metre
4  m=20000;  //relative permeability of magnetic
       material
5  i=2*10^-3;  //current in Ampere
6  n=500;  //no of turns
7  H=n*i;  //calculating A/turn for 20 cm
8  disp(H,"H for 20 cm in A/turn = ");  //displaying
       result
9  a=H/(20*10^-2);  //calculating H per metre
10 disp(a,"H field per metre in A/metre = ");  //
       displaying result
11 B=(m*mo*a);  //calculating flux
12 disp(B,"Flux in Tesla = ");  //displaying result
```

Scilab code Exa 2.18 calculating flux

```
1  clc;
2  area=5*10^-4;  //area
3  mo=(4*(%pi)*10^-7);  //relative permeability of free
       space
4  p=20*10^-2;  //path length in metre
5  m=20000;  //relative permeability of magnetic
       material
6  i=2*10^-3;  //current in Ampere
7  n=500;  //no of turns
8  H=n*i;  //calculating A/turn for 20 cm
9  disp(H,"H for 20 cm in A/turn = ");  //displaying
       result
10 a=H/(20*10^-2);  //calculating H per metre
11 disp(a,"H field per metre in A/metre = ");  //
       displaying result
12 B=(m*mo*a);  //calculating flux
13 disp(B,"Flux in Tesla = ");  //displaying result
14 l=B*area;  //calculating flux density
15 disp(l,"Flux Density in Weber/metre = ");  //
```

```
   diaplaying result
```

Scilab code Exa 2.19 calculating time

```
clc;
v=0.04;  //voltage per turn in Volt
area=5*10^-4;  //metre square
B=v/area;  //calculating B
disp(B,"B in Tesla/sec = ");  //displaying result
H=B/(4*(%pi)*10^-7*20000);  //calculating H
disp(H,"H in A/m = ");  //displaying result
disp("Therefore, for 500 turns and 20 cm = 1.27 A/
   sec.25.4 ms for 20 mA and 38.1 ms for 30 mA");
   //displaying result
```

Scilab code Exa 2.20 calculating lowest frequency square wave

```
clc;
phi=0.5;  //flux density in Tesla
v=10;  //peak to peak voltage
disp("At 80 Tesla/sec it takes 1/160 sec to reach
   0.5 Tesla.Therefore,to reach maximum B in
   opposite sense and return to zero it will take
   4/160 sec.");  //displaying result
disp("This is a frequency of 40 Hz.");  //displaying
    result
```

Scilab code Exa 2.21 calculating energy

```
clc;
```

```
v=7.5*10^-5;  //volume in metre cube
b=1;  //flux in tesla
mo=4*(%pi)*10^-7;  //permeability of free space
m=20000;  //permeability of material
h=b/(m*mo);  //calculating field intensity
e=(1/2)*b*h*v;  //calculating energy
disp(e,"Energy in Joule = ");  //displaying energy
```

Scilab code Exa 2.22 calculating H field

```
clc;
v=7.5*10^-5;  //volume in metre cube
b=1;  //flux in tesla
mo=4*(%pi)*10^-7;  //permeability of free space
m=20000;  //permeability of material
h=b/(m*mo);  //calculating field intensity
e=(1/2)*b*h*v;  //calculating energy
disp(e,"Energy in Joule = ");  //displaying energy
disp(h,"Field in the gap = ");  //displaying field
   intensity
disp(h*10^-2,"Current per metre = Therefore in the
   gap of 0.001 m current required in mA = ");  //
   displaying result
```

Chapter 3

Utility power and circuit concepts

Scilab code Exa 3.1 calculating reactance

```
1 clc;
2 f=15;              //focal length in cm
3 v=10;             //image distance in cm
4 u=(150/5);  //calculating u using (1/f)=(1/v)-(1/u)
5 disp(u,"Object Distance in cm = ");  //displaying
    result
```

Scilab code Exa 3.2 calculating reactance

```
1 clc;
2 f=80;      //focal length in cm
3 f1=20;     //focallength of first lens in cm
4 f2=(80/3);  //using (1/F)=(1/f1)+(1/f2)
5 P=(100/f);   //power in D
6 P1=100/20;     //power of first lens
7 P2=P1-P;     //power in D
```

```
8 disp(P2,"Power in D = ");  //displaying result
```

Scilab code Exa 3.3 calculating impedance

```
1 clc;
2 P=2.5;      //Power in D
3 f=-(1/P);  //calculating f in m
4 disp(f,"Focal length in m = ");  //displaying result
```

Scilab code Exa 3.4 calculating impedance

```
1 clc;
2 m=4;      //magnigication
3 f=20;     //focal length in cm
4 u=(20*3)/(4);  //on simplifying (1/f)=(1/v)-(1/u)
5 v=(4*u);  //calculating v in cm
6 disp(u,"Object distance in cm = ");    //displaying
    result
7 disp(v,"Image distance in cm = ");     //displaying
    result
```

Scilab code Exa 3.5 calculating peak current

```
1 clc;
2 u=14;     //object distance in cm
3 f=-21;     //focal distance in cm
4 v=(-5/42);  //simplifying(1/f)=(1/v)-(1/u)
5 I=(3*-8.4)/(-14);    //using m=(1/0)=(v/u);
6 disp(v,"Image distance in cm = ");  //displaying
    result
7 disp(I,"I in cm = ");  //displaying result
```

Scilab code Exa 3.6 calculating impedance

```
clc;
fe=5;  //focal length in cm
D=25;  //distance od distinct vision in cm
m=1+(D/fe);  //calculating magnifying power
disp(m,"magnifying Power = ");  //displaying result
```

Scilab code Exa 3.7 calculating impedance

```
clc;
fe=5;  //focal length in cm
D=25;  //distance od distinct vision in cm
mo=30/(1+(D/fe));  //calculating magnification of
   objective lens
disp(mo,"Magnification produced by objective lens =
   ");  //displaying result
```

Scilab code Exa 3.8 calculating reactance

```
clc;
u=-6;    //object distance in cm
fo=4;    //focal distance in cm
fe=6;  //focal length in cm
D=25; //distance of distinct vision in cm
v=(12);   //using (1/f)=(1/v)-(1/u)
m=(v/u)*(1+(D/fe));  //calculating m
disp(v,"Image distance in cm = ");   //displaying
   result
```

```
9 disp(-m,"Magnifying Power = ");      //displaying
    result
```

Scilab code Exa 3.9 calculating slope

```
1 clc;
2 D=25;          //distance of distinct vision
3 u=-9;     //object distance in cm
4 fe=10;  //focal length in cm
5 v=(-90/1);    //using (1/f)=(1/v)-(1/u)
6 m=(v/u);  //calculating m
7 M=D/u;     //calculating Magnifying power of lens
8 disp(m,"Magnification of lens = ");    //displaying
    result
9 disp(-M,"Magnifying Power = ");      //displaying
    result
```

Scilab code Exa 3.10 calculating resonant frequency

```
1 clc;
2 fo=0.5;     //focal length of eye lens
3 D=25;          //distance of distinct vision
4 L=15;        //length in cm
5 m=375;    //magnification
6 fe=(-L*D)/(fo*((L/fo)-m));  //calculating fe
7 disp(fe,"Focal length of eye lens in cm = ");  //
    displaying result
```

Scilab code Exa 3.11 calculating natural frequency

```
clc;
m=5;     //magnifying power
L=24;       //length in cm
fe=4;    //focal length in cm
fo=5*fe;  //calculating fo
disp(fo,"Focal length of lens in cm = ");  //
   displaying result
```

Scilab code Exa 3.12 calculating current

```
clc;
D=25;          //distance of distinct vision in cm
fo=140;     //focal length of eye lens
fe=5;          //focal length in cm
m=-(fo/fe);    //calculating magnifying power
disp(m,"Magnifying power at normal adjustment = ");
    //displaying result
m1=-(fo/fe)*(1+(fe/D));     //calculating magnifying
   power
disp(m1,"Magnifying power atleast distance of
   distinct vision = ");  //displaying result
```

Scilab code Exa 3.13 calculating phase angle

```
clc;
M=5;          //Magnifying power
fo=10;     //focal length of eye lens
fe=fo/M;      //calculating fe
disp(fe,"Focal length of eye lens in cm = ");  //
   displaying result
```

Scilab code Exa 3.14 calculating impedance

```
clc;
fo=75;     //focal length of eye lens
D=25;        //distance of distinct vision
fe=5;       //focal  of eye lens in cm
M=-(fo/fe)*(1+(fe/D));  //calculating M
disp(M,"Magnifying power = ");  //displaying result
```

Scilab code Exa 3.15 calculating reactance

```
clc;
M=7;       //magnifying power
L=40;     //length
fe=(40/8);  //focal length of eye lens in cm
fo=(7*fe);    //calculating focal length
disp(fo,"Focal Length of lens in cm =");  //
   displaying result
```

Scilab code Exa 3.16 calculating phase angle

```
clc;
f=10^3;  //frequency in Hz
l=0.1;  //inductance in Henry
x=2*(%pi)*f*l;   //calculating reactance
disp(x,"Reactance in Ohm = ");  //displaying result
disp("Frequency needs to be raised by the ratio
   2000/628 for the frequency to equal the
   resistance.");
r=2000/x;
disp(r,"The frequency in Hz = ");  //displaying
   result
```

```
9 disp("At this frequency the phase angle is 45 degree
    .");  //displaying result
```

Scilab code Exa 3.17 calculating rms voltage

```
1 clc;
2 vpp=25;  //peak to peak voltage in volt
3 vp=vpp/2;  //calculating peak value in volt
4 rms=vp/sqrt(2);  //calculating rms value
5 disp(rms,"Rms value in volt = ");  //displaying
    result
```

Scilab code Exa 3.18 calculating peak voltage

```
1 clc;
2 v=118;  //voltage in volt
3 vp=v*sqrt(2);  //calculating peak voltage
4 disp(vp,"Peak voltage in volt = ");  //displaying
    result
```

Scilab code Exa 3.19 calculating rms voltage

```
1 clc;
2 r=1;  //reisstance in Ohm
3 p1=1/4;  //power for 1 Watt
4 p2=(2*2)/4;  //power for 2 Watt
5 p3=(3*3)/4;  //power for 3 Watt
6 p4=(4*4)/4;  //power for 4 Watt
7 tp=p1+p2+p3+p4;  //calculating total power
8 p=sqrt(tp);  //calculating rms value
9 disp(p,"RMS value in volt = ");  //displaying result
```

Scilab code Exa 3.20 calculating rms voltage

```
clc;
v1=6;  //voltage in volt
v2=8;  //voltage in volt
v=sqrt((v1*v1)+(v2*v2));  //calculating rms valu
disp(v,"RMS value in volt = ");  //displaying result
```

Scilab code Exa 3.21 calculating average dc voltage

```
clc;
v=12;  //voltage in volt
f=60;  //frequency in Hz
vt=v*sqrt(2);  //true voltage
vs=vt/10;  //sagging voltage
disp(vs);
av=vt-(vs/2);  //calculating average value
disp(av,"Average voltage in volt = ");  //displaying
    result
```

Scilab code Exa 3.22 calculating rms heating

```
clc;
v=10;  //voltage in volt
t=0.001;  //lasting time in sec
t1=0.01;  //recuring time in sec
r=1;  //resistance in Ohm
p=10;  //average power in Watt
v=sqrt(p/r);  //calculating dc voltage
```

```
8 disp(v,"DC Voltage in Volt = "); //displaying
    result
9 disp(v,"Therefore, the RMS value = "); //displaying
    result
```

Scilab code Exa 3.23 calculating time

```
1 clc;
2 l=10; //length in metre
3 s=0.3; //speed of energy in m/ns
4 tl=2*l; //length of round trip
5 t=tl/s; //time taken
6 disp(t,"Time taken for round trip in ns = "); //
    displaying result
```

Scilab code Exa 3.24 calculating current

```
1 clc;
2 z=50; //impedance in Ohm
3 l=10; //length in metre
4 v=10; //voltage in volt
5 t=0.3*10^-6; //time in sec
6 i=v/z; //calaulating current
7 disp(i,"Current on initial wave in Ampere = "); //
    displaying result
8 disp("It takes 0.13*10^-6 for a round trip.There are
    two round trips in 0.3*10^-6. The current
    triples for each round trip. At 0.3 s the
    current is multiplied by 6, or 1.2 A."); //
    displaying result
```

Scilab code Exa 3.25 calculating H field and voltage

```
clc;
f=300;  //frequency in Hz
r=1;  //distance in metre
i=2;  //current in Ampere
area=0.1;  //area in metre square
mo=4*(%pi)*10^-7;  //constant
H=i/(2*(%pi)*r);  //calcualting H field rms
disp(H,"H field intensity (rms) in A/m = ");  //
   displaying H field
Hp=H*sqrt(2);  //peak H
disp(Hp,"H field intensity (peak) in A/m = ");  //
   displaying result
Bp=(Hp*mo);  //calculating B peak in Tesla
disp(Bp,"Flux peak in Tesla = ");  //displaying B
vp=2*(%pi)*f*Bp;  //calculating v peak
disp(vp,"Peak voltage in volt = ");  //displaying
   result
```

Scilab code Exa 3.26 calculating peak voltage

```
clc;
v=10^-5;  //ac voltage
di=10*10^-3;  //discharge rate of current
t=10*10^-3;  //time in sec
ch=(14.14-0.6);  //charge of capacitor
q=ch*v;  //charge
disp(q,"Charge in Coloumb = ");  //displaying result
qt=di*t;  //charge for 10 ms
rc=q-qt;  //remaining charge
disp(qt,"Charge for 10 ms = ");  //displaying result
disp(rc,"Remaining charge in Coloumb = ");  //
   displaying result
a=(rc/q)*10;  //voltage
```

```
13 disp(a,"Voltage in volt = ");  //displaying result
```

Scilab code Exa 3.27 calculating power dissipated

```
1 clc;
2 s=12;  //sum of squares
3 hv=sqrt(s);  //heating voltage =sum of square roots
4 disp(hv,"Heating voltage in volts = ");  //
    displaying result
5 disp(s/10,"Power dissipated in Watt = ");  //
    displaying result
```

Scilab code Exa 3.28 calculating total voltage

```
1 clc;
2 vp=10;  //peak voltage
3 v=vp*sqrt(2);  //voltage
4 hc=10+7.07;  //horizontal components
5 disp(hc,"Hrizontal Components = ");  //horizontal
    components
6 vc=sqrt((hc*hc)+(7.07*7.07));  //vertical components
7 disp(vc,"Vertical Components = ");  //vertical
    components
```

Scilab code Exa 3.29 calculating current

```
1 clc;
2 c=5*10^-12;  //capacitanec in Farad
3 p=10*10^6;  //pulse in V/sec
4 i=c*p;  //current
5 disp(i,"Current in Ampere = ");  //displaying result
```

Chapter 4

A few more tools

Scilab code Exa 4.1 calculating resistance

```
1 clc;
2 q=1;          //no of coulomb
3 e=1.6*10^-19;    //charge on an electron
4 n=(q/e);  //calculating no of electrons
5 disp(n,"No of electrons = ");  //displaying result
```

Scilab code Exa 4.2 calculating resistance

```
1 clc;
2 F=4.5*9.8;    //in Newton
3 q=sqrt(((0.03^2)*4.5*9.8)/(9*10^9));  //calculating
    q using F=(1/4*3.14*eo)*((q1*q2)/(r^2))
4 disp(q,"Charge in coulomb = ");  //displaying result
```

Scilab code Exa 4.3 calculating inductance

```
clc;
q1=2*10^-7;     //charge in C
q2=3*10^-7;     //charge in C
r=30*10^-2;     //r in m
F=(9*10^9)*((q1*q2)/r^2);  //calculating F
disp(F,"Force in Newton = ");  //displaying result
```

Scilab code Exa 4.4 calculating resistance

```
clc;
q1=1;     //charge in C
q2=1;     //charge in C
r=1;     //r in m
F=(9*10^9)*((q1*q2)/r^2);  //calculating F
disp(F,"Force in Newton = ");  //displaying result
```

Scilab code Exa 4.5 calculating resistance

```
clc;
m=9*10^-31;       //mass of electron in kg
q=-3.2*10^-7;     //charge in C
e=-1.6*10^-19;     //charge on electron in C
n=(q/e);  //calculating n
M=n*m;     //calculating mass transfered
disp(n,"no. of electrons = ");   //displaying result
disp(M,"Mass transfered to polythene in kg = ");  //
   displaying result
```

Scilab code Exa 4.6 calculating H

```
clc;
q1=1.6*10^-19;     //charge in C
q2=-1.6*10^-19;     //charge in C
r=10^-9;     //r in m
F=(9*10^9)*((q1*q2)/r^2);  //calculating F
disp(F,"Force in Newton = ");  //displaying result
```

Scilab code Exa 4.7 calculating frequency

```
clc;
Va=-10; //voltage in volts
W=100;  //work in Joule
q=2;    //charge in Coulomb
v=(Va)+(W/q);  //calculating v
disp(v,"Voltage in Volts = ");  //displaying result
```

Scilab code Exa 4.8 calculating H

```
clc;
eo=(8.854*10^-12);    //constant
E=2;    //magnitude of electric field in N/C
r=0.5;  //r in m
q=E*4*(%pi)*(eo)*(r^2);    //calculating charge
disp(q,"Charge in Coulomb = ");  //displaying result
```

Scilab code Exa 4.9 calculating distance

```
clc;
e=-1.6*10^-19;  //charge on electron in Coulomb
q=20*10^-6;  //charge in Coulomb
```

```
4 r1=0.1;  //r1 in m
5 r2=0.05;  //r2 in m
6 Va=9*10^9*(q/r1);  //calculating voltage at A
7 Vb=9*10^9*(q/r2);  //calculating voltage at B
8 V=Va-Vb;    //potential difference
9 W=V*e;     //calculating work done in joule
10 disp(W,"Work done to take the electron from A to B
   in Joule = ");  //displaying result
```

Scilab code Exa 4.10 calculating wave impedance

```
1 clc;
2 q1=(2*10^-8);  //charge in coulomb
3 q2=(-2*10^-8);  //charge in coulomb
4 q3=(3*10^-8);  //charge in coulomb
5 q4=(6*10^-8);  //charge in coulomb
6 s=1;  //side in m
7 V=(9*10^9)*(1/s)*(q1+q2+q3+q4);  //calculating
   voltage
8 disp(V,"Voltage in Volts = ");  //displaying result
```

Scilab code Exa 4.11 calculating wave impedance

```
1 clc;
2 eo=8.85*10^-12;  //constant
3 q=2*10^-6;   //charge in coulomb
4 l=9;   //length in cm
5 fi=(q/eo);  //calcualting flux in (N m square)/c
6 disp(fi,"Flux through the surface in (N m square)/c
   = ");  //displaying result
```

Scilab code Exa 4.12 calculating H

```
clc;
eo=8.85*10^-12;  //constant
r=1.2;   //r in m
t=80*10^-6;  //surface sharge density in c/m square
q=t*4*(%pi)*(r^2);  //calculating charge
fi=q/eo;     //calculating flux
disp(fi,"Flux in N m square/c = ");  //displaying
   result
```

Scilab code Exa 4.13 calculating field strength

```
clc;
eo=8.85*10^-12;  //constant
E=9*10^4;   //Electric field in N/C
r=2*10^-2;   //r in m
L=2*(%pi)*E*eo*r;  //calculating linear charge
   density
disp(L,"Linear charge density per cm = ");  //
   displaying result
```

Scilab code Exa 4.14 calculating E

```
clc;
o=17*10^-22;   //surface charge density in cm^-2
eo=8.85*10^-12;  //constant
E=o/eo;  //calculating electric intensity in region
   III
disp("Electric Intensity in regions I and II = 0");
    //displaying result
disp(E,"Electric Intensity in region III in N/C = ")
   ;   //displaying result
```

Scilab code Exa 4.15 calculating E

```
clc;
r=0.05;  // in m
eo=8.85*10^-12;  //constant
q=10^-9;  //charge at point P in Coulomb
E=q/(4*(%pi)*eo*(r^2));  //calculating electric
    field
disp(E,"Electric field in v/m = ");  //displaying
    result
r1=0.2;  //in m
V1=q/(4*(%pi)*eo*r1);  //calculating potential
    difference
disp(V1," Potential difference between two points in
     Volt = ");  //displaying result
```

Scilab code Exa 4.16 calculating one skin depth

```
clc;
eo=8.85*10^-12;  //constant
o=80*10^-6;  //surface charge density in c/ square
r=1.2;  //in m
q=o*(%pi)*(r^2);  //calculating charge in Coulomb
fi=q/eo;  //calculating electric flux
disp(q,"Charge in Coulomb = ");  //displaying result
disp(fi,"Electric flux in N m square/c = ");  //
    displaying result
```

Scilab code Exa 4.17 calculating one skin depth

```
clc;
V=250;  //potential difference in Volt
C=10^-11;  //capacitance in farad
q=C*V;  //calculating charge
disp(q,"Charge in Coulomb = ");  //displaying result
```

Scilab code Exa 4.18 calculating skin depth

```
clc;
r=6.4*10^6;  //in m
C=r/(9*10^9);  //calculating charge
disp(C,"Capacitance in Farad = ");  //displaying
    result
```

Scilab code Exa 4.19 calculating WCC

```
clc;
C=2;  //capacitance in Farad
d=0.5*10^-2;  //distance in m
eo=8.85*10^-12;  //constant
A=(C*d)/(eo);  //calculating area
disp(A,"Area in m square = ");  //displaying result
```

Scilab code Exa 4.20 calculating WCC

```
clc;
A=0.02;  //area in m square
r=0.5;  //r in m
d=(A/(4*(%pi)*r));  //calculating distance
disp(d,"Distance between the plates in m = ");  //
    displaying result
```

Scilab code Exa 4.21 calculating WCC

```
clc;
eo=8.85*10^-12;  //constant
A=1;  //area in m square
d=2*10^-3;  //r in m
K=4;  //constant
C=(K*eo*A)/d;   //calculating capacitance
disp(C,"Capacitance in Farad = = ");  //displaying
   result
```

Scilab code Exa 4.22 calculating WCC

```
clc;
cm=10*10^-6;  //capacitance in Farad
K=2;  //constant
co=cm/K;  //calculating co
disp(co,"capacity of capacitor with air between the
   plates in Farad = ");  //displaying result
```

Scilab code Exa 4.23 calculating magnetising current max

```
clc;
v=100;        //v in volt
c1=8*10^-6;  //capacitance in Farad
c2=12*10^-6;  //capacitance in Farad
c3=24*10^-6;  //capacitance in Farad
cs=4/(10^6);  //calculating series capacitance
cp=(c1+c2+c3);  //calculating parallel capacitance
```

```
8 disp(cs,"Equivalent Series capacitance in farad = ")
    ; //displaying result
9 disp(cp,"Equivalent parallel capacitance in farad =
    "); //displaying result
10 qs=cs*v; //calculating charge
11 disp(qs,"charge on plate in Coulomb = "); //
    displaying result
```

Scilab code Exa 4.24 calculating peak voltage

```
1 clc;
2 C=9*10^-10; //capacitance in farad
3 V=100; //in volt
4 U=(1/2)*(C*(V^2)); //calculating energy stored
5 disp(U,"Energy stored in Joule = "); //displaying
    result
```

Scilab code Exa 4.25 calculating radiation

```
1 clc;
2 eo=8.85*10^-12; //constant
3 A=90*10^-4; //area in m square
4 d=2.5*10^-3; //distance in m
5 V=400; //in volt
6 C=(eo*A)/d; //calculating capacitance
7 disp(C,"Capacitance in Farad = "); //displaying
    result
8 W=(1/2)*(C*(V^2)); //calculating electrical energy
    stored
9 disp(W,"Electrical Energy stored in capacitor in
    Joule = "); //displaying result
```

Scilab code Exa 4.26 calculating primary current

```
clc;
v=100;          //v in volt
c1=1*10^-6;   //capacitance in Farad
c2=2*10^-6;   //capacitance in Farad
c3=3*10^-6;   //capacitance in Farad
cs=6/11;   //calculating series capacitance
cp=(c1+c2+c3);   //calculating parallel capacitance
disp(cs,"Equivalent Series capacitance in farad = ")
   ;  //displaying result
disp(cp,"Equivalent parallel capacitance in farad =
   ");  //displaying result
disp("Therefore Cp=(11*Cs)");  //displaying result
```

Scilab code Exa 4.27 calculating radiation

```
clc;
eo=8.85*10^-12;   //constant
V=6;   //v in volt
A=25*10^-4;   //area in m square
d=10^-3;   //distance in m
q=(eo*A*V)/d;   //calculating charge
W=q*V;    //calculating work done
disp(q,"Charge through battery in Coulomb = ");  //
   displaying result
disp(W,"Work done by Battery in Joule = ");  //
   displaying result
```

Chapter 5

Analog Design

Scilab code Exa 5.1 calculating delay

```
1 clc;
2 n=10^6;     //no. of electrons
3 e=1.6*10^-19;  //charge on an electron in C
4 q=n*e;    //calculating total charge
5 t=10^-3;    //time in second
6 I=q/t;     //calculating current
7 disp(I,"Current flowing in Ampere = ");  //
    displaying result
```

Scilab code Exa 5.2 calculating output signal

```
1 clc;
2 I=300*10^-3;    //current n Ampere
3 t=60;    //time in second
4 e=1.6*10^-19;  //chatge on electron in C
5 q=I*t;  //calculating charge
6 n=q/e;  //calculating no of electrons
7 disp(n,"No. of electrons = ");  //displaying result
```

Scilab code Exa 5.3 calculating output common mode signal

```
clc;
V=200;  //voltage in volt
R=100;  //resistance in Ohm
e=1.6*10^-19;  //charge on an electron in C
I=V/R;      //Ohm's law
t=1;  //time in second
q=I*t;  //calculating charge
n=q/e;  //calculating no of electrons
disp(n,"No. of electrons = ");  //displaying result
```

Scilab code Exa 5.4 calculating output signal

```
clc;
l=15;    //length in m
A=6*10^-7;  //area in m square
R=5;  //resistance in Ohm
p=(A*R)/l;  //calculating resistivity
disp(p,"Resistivity in Ohm metre = ");  //displaying
    result
```

Scilab code Exa 5.5 calculating energy loss

```
clc;
l=0.1;    //length in m
A=10^-4;  //area in m square
R=0.01;  //resistance in Ohm
p=(A*R)/l;  //calculating resistivity
```

```
6 disp(p,"Resistivity in Ohm metre = "); //displaying
    result
```

Scilab code Exa 5.6 calculating max peak current

```
1 clc;
2 L=1; //length in m
3 r=0.2*10^-3; //radius in m
4 A=%pi*(r)^2; //calculating area
5 disp(A)
6 R=2; //resistance in Ohm
7 P=(R*A)/L; //calculating resistivity
8 disp(P,"Resistivity in Ohm. metre = "); //
    displaying result
```

Scilab code Exa 5.7 calculating size

```
1 clc;
2 R1=5; //resisitance in Ohm
3 R2=9*5; //calculating using R2/A1=(l2/A2)*(A1/l1)
4 disp(R2,"Resisitance in Ohm = "); //displaying
    result
```

Scilab code Exa 5.8 calculating rms current

```
1 clc;
2 R1=5; //resisitance in Ohm
3 R2=4*5; //calculating using R2/A1=(l2/A2)*(A1/l1)
4 disp(R2,"Resisitance in Ohm = "); //displaying
    result
```

Scilab code Exa 5.9 calculating voltage

```
clc;
R1=2;    //resisitance in Ohm
R2=4;   //resistance in Ohm
R3=5;    //resistance in Ohm
R=(R1^-1)+(R2^-1)+(R3^-1);  //calculating parallel
    resistance
Rp=(1/R);
disp(Rp,"Resisitance in Ohm = ");  //displaying
    result
```

Scilab code Exa 5.10 calculating output impedance

```
clc;
Rs=40;    //resisitance in Ohm
disp("R2=8 when R1=32, R2=32 when R1=8 Resisitance
    in Ohm ");  //displaying result using (1/Rp)=(1/
    R1)+(1/R2)
```

Scilab code Exa 5.11 calculating output inductance

```
clc;
V=2;      //in volts
R1=30;    //resisitance in Ohm
R2=60;   //resistance in Ohm
Rp=(30*60)/(30+60);  //calculating parallel
    resistance
```

```
6 disp(Rp,"Resisitance in Ohm = "); //displaying
    result
7 I=V/Rp;      //Ohm's law
8 disp(I,"Current in Ampere = "); //displaying result
```

Scilab code Exa 5.12 calculating input capacitance

```
1 clc;
2 R1=2;   //resisitance in Ohm
3 R2=3;  //resistance in Ohm
4 R3=1;   //resistance in Ohm
5 Rp=(R1*R2)/(R1+R2); //calculating parallel
    resistance
6 R=Rp+1;       //1 Ohm in series
7 disp(R,"(1)Equivalent Resisitance in Ohm = "); //
    displaying result
8 Rs=(R1+R2+R3); //series resistances
9 disp(Rs,"(2)All resistances in series in Ohm = ");
    //displaying result
10 Rp=(1/R1)+(1/R2)+(1/R3); //calculating parallel
    resistance
11 disp((1/Rp),"(3)All in Parallel in Ohm = "); //
    displaying result
```

Scilab code Exa 5.13 calculating size

```
1 clc;
2 V=20;    //voltage in Volts
3 R1=2;   //resisitance in Ohm
4 R2=4;  //resistance in Ohm
5 R3=5;   //resistance in Ohm
6 Rp=(1/R1)+(1/R2)+(1/R3); //calculating parallel
    resistance
```

```
R=1/Rp;       //Parallel
disp(R,"(a)Equivalent Resisitance in Ohm = "); //
   displaying result
I1=V/R1;  //calculating current through R1
I2=V/R2;  //calculating current through R2
I3=V/R3;  //calculating current through R3
I=V/R;   //calculating total current
disp(I1,"Current through R1 in Ampere = "); //
   displaying result
disp(I2,"Current through R2 in Ampere = "); //
   displaying result
disp(I3,"Current through R3 in Ampere = "); //
   displaying result
disp(I,"Total current in Ampere = "); //displaying
   result
```

Scilab code Exa 5.14 calculating radiation

```
clc;
disp("Rp = 6/n");  //resistance in parallel
disp("R=7");  //total resistance
disp("From 1 and 2 we get n=3");  //displaying
   result
```

Scilab code Exa 5.15 calculating capacitance

```
clc;
R1=2;  //resistance in Ohm
R2=6;   //resistance in Ohm
R3=3;  //resistance in Ohm
V=24;   //voltage in volts
R=8;    //resistance in Ohm
I=V/R; //Ohm's Law
```

```
8 disp(I,"Current in Ampere = "); //displaying result
9 V1=I*R1; //Ohm's Law
10 disp(V1,"Voltage drop across R1 in Volts = "); //
   displaying result
11 V2=I*R2; //Ohm's Law
12 disp(V2,"Voltage drop across R2 in Volts = "); //
   displaying result
13 V3=I*R3; //Ohm's Law
14 disp(V3,"Voltage drop across R3 in Volts = "); //
   displaying result
```

Scilab code Exa 5.16 calculating max voltage

```
1 clc;
2 R=15; //resistance in Ohm
3 disp("KVL: 16I1+15I2=6 (1)"); //KVL equation
4 I1=-1.66; //from(1)
5 I2=2.17; //from (1)
6 disp(I1); //current in Ampere
7 disp(I2)
8 V=(I1+I2)*R; //calculating potential difference
9 disp(V,"Potential difference in Volt = "); //
   displaying result
```

Scilab code Exa 5.17 calculating max voltage

```
1 clc;
2 disp("3I1-I2-1=0 (1)"); //KVL equation
3 disp("3I1-I2+2I=2 (2)"); //KVL equation
4 disp("3I1-I1+2I=2 (3)"); //KVL equation
5 I1=0.2352; //from (1)(2)(3)through AB
6 I2=-0.11764; //from (1)(2)(3)through BD
7 I=0.58823; //from (1)(2)(3)through main circuit
```

```
Ig=-0.117647;  //current in Ampere
Ibc=I1-I2; //calculating current in BC
Iad=I-I1;  //calculating current in AD
Idc=I-I1-Ig;  //calculating current in DC
disp(Ibc,"Current in branch BC in Ampere = ");  //
   displaying result
disp(Iad,"Current in branch AD in Ampere = ");  //
   displaying result
disp(Idc,"Current in branch DC in Ampere = ");  //
   displaying result
```

Scilab code Exa 5.18 calculating time

```
clc;
P=10;  //Ohm
Q=3;   //Ohm
R=12;  //Ohm
S=6;  //Ohm
G=20;  //Ohm
disp("-12I+22I1+IgG=0  (1)");  //KVL
disp("6I-9I1+29Ig=0  (2)");  //KVL
disp("13I1-3Ig=2  (3)");  //KVL
Ig=7.797*10^-3;   //from (1)(2)(3)
disp(Ig,"Current through Galvanometer in Ampere = ")
   ;  //displaying result
```

Scilab code Exa 5.19 calculating time

```
clc;
P=500;  //power in Watts
V=200;  //voltage in Volts
R=(V^2)/P;  //using P=V^2*R
disp(R,"Resistance in Ohm = ");  //displaying result
```

```
6  V1=160;  //voltage in Volts
7  P1=(V1^2)/R;  //calculating power
8  Dp=500-P1;  //drop in heat
9  D=(Dp*100)/500;  //percentage drop
10 disp(D,"% Drop in heat production = ");  //
     displaying result
```

Chapter 6

Digital Design

Scilab code Exa 6.1 calculating dielectric constant

```
1 clc;
2 c=500*10^-12;  //capacitance in Farad
3 d=0.01;  //spacing in inch
4 eo=8.854*10^-12;  //dielectric constant of air in
     Farad per metre
5 er=7.1*10^-12;  //dielectric constant of material
6 area=0.02*d;  //in metre square
7 C=697*er;  //calculating capacitance
8 disp(C,"Capacitance in Farad = ");  //displaying
     result
```

Scilab code Exa 6.2 calculating output

```
1 clc;
2 r=100;  //resistance in Ohm
3 v=10;  //in volt
4 d=10;  //distance in feet
5 c=10*10^-6;  //capacitor in Farad
```

```
6 i=v/r;  //current
7 disp(i,"The wave travels the length of the line in
    20 ns. The current that flows in the capacitor is
     the short-circuit current = ");  //displaying
    result
8 ch=40*10^-9*0.1;  //charge
9 disp(ch,"The charge that flows in 40 ns = ");  //
    displaying result
10 v1=ch/c;  //voltage
11 disp(v1,"Voltage in a 10*10^-6 Farad Capacitor = ");
     //displaying result
```

Scilab code Exa 6.3 calculating size

```
1 clc;
2 i=20*10^-3;  //current
3 vd=1;  //voltage drop
4 t=10^-3;  //time in sec
5 q=i*t;  //charge
6 c=q/vd;  //capacitance
7 disp(c,"Capacitance in Farad = ");  //displaying
    result
```

Scilab code Exa 6.4 calculating voltage

```
1 clc;
2 c=15*10^-12;  //capacitance in F/ft
3 v=10;  //in volt
4 f=10*10^6;  //frequency in Hz
5 t=10*10^-9;  //time
6 imp=100;  //impedance in Ohm
7 l=3;  //length in metre
8 i=c*10^9;  //current
```

```
9 disp(i,"Current in Ampere = ");  //displaying result
10 disp("This is 1.5 V in 100 .");  //displaying result
```

Scilab code Exa 6.5 calculating radiation level

```
1 clc;
2 v=10;  //in volt
3 i=20*10^-3;  //current in Ampere
4 t=10*10^-9;  //time in sec
5 s=0.05;  //spacing in inch
6 l=50;  //length in cm
7 disp("The radiation using the standard model is
    316*10^-6V.");  //displaying result
8 f=1/((%pi)*t);  //frequency
9 disp(f,"Frequency in Hz = ");  //displaying result
10 rad=(316*57*0.6*10)/(3.33*9.9);  //radiation
11 disp(rad,"radiation level at 10 metre in (V*10^-6
    metre) = ");  //displaying result
```

Scilab code Exa 6.6 calculating radiation level

```
1 clc;
2 v=10;  //in volt
3 i=20*10^-3;  //current in Ampere
4 t=10*10^-9;  //time in sec
5 s=0.05;  //spacing in inch
6 l=50;  //length in cm
7 disp("The radiation using the standard model is
    316*10^-6V.");  //displaying result
8 f=1/((%pi)*t);  //frequency
9 disp(f,"Frequency in Hz = ");  //displaying result
10 rad=(316*57*0.6*10)/(3.33*9.9);  //radiation
```

```
11 disp(rad,"radiation level at 10 metre in (V*10^-6
     metre) = "); //displaying result
12 w=364; //ratio of areas
13 disp(w,"If the adjacent conductor is 0.05 in. away,
     the field is reduced by the ratio of areas in
     (10^-6*V/metre)= "); //displaying result
```

Scilab code Exa 6.7 calculating voltage

```
1 clc;
2 imp=0.2; //transfer impedance in Ohm/metre
3 f=50*10^6; //frequency in Hz
4 i=10*10^-3; //current in Ampere
5 l=2; //length in metre
6 disp("The voltage coupled to the cable is 0.02 V/m."
     ); //displaying
7 disp(" This is 0.04 V in 2 m."); //displaying
     result
8 disp("Half of the energy goes in each direction.");
     //displaying result
9 disp("At the unterminated end, the voltage doubles."
     ); //displaying result
10 disp("Thus, The result is 0.04 V."); //displaying
     result
```

Scilab code Exa 6.8 calculating voltage

```
1 clc;
2 hw=7.5; //half wavelength in metre
3 f=20*10^6; //frequency in Hz
4 a=0.03; //area in metre square
5 v=hw*a; //calculating voltage
6 disp(v,"Voltage in volt = "); //displaying result
```

Scilab code Exa 6.9 calculating WCC radiation

```
clc;
v=5;  //in volt
sp=2*10^-3;  //spacing in m
d=1;  //distance in metre
hw=7.5;  //half wavelength in metre
f=10.6*10^6;  //frequency in Hz
a=0.8;  //area in centimetre square
r=316;  //standard model radiation in (V*10^-6)/
   metre
n=316*(125*a*v*d)/(89*3.3);  //calculating radiation
disp(n,"Radiation in (V*10^-6)/metre = ");  //
   displaying result
```

Scilab code Exa 6.10 calculating radiation

```
clc;
v=5;  //in volt
sp=2*10^-3;  //spacing in m
d=1;  //distance in metre
hw=7.5;  //half wavelength in metre
f=10.6*10^6;  //frequency in Hz
a=0.3;  //area in centimetre square
r=316;  //standard model radiation in (V*10^-6)/
   metre
n=316*(500*a*v)/(89*3.3);  //calculating radiation
disp(n,"Radiation in (V*10^-6)/metre = ");  //
   displaying result
```

Scilab code Exa 6.11 calculating H field

```
clc;
mo=1/(4*(%pi)*10^-7);  //constant
a=0.01;  //area in m square
v=0.2;  //in volt
f=2*10^6;  //frequency in Hz
vp=v*sqrt(2);  //calculating peak voltage
disp(vp,"Peak voltage in volt = ");  //displaying
   result
b=vp/a;  //change in B field
disp(b,"Change in B field in Tesla/sec = ");  //
   displaying result
h=b*mo;  //calculating H field
disp(h,"H field is changing in A/m per sec");  //
   displaying result
disp("At 2 MHz the H-field peak is 1.79 A/m.");  //
   displaying result
disp("This is 1.26 A/m rms.");  //displaying result
```

Scilab code Exa 6.12 calculating WCC

```
clc;
dia=1;  //diameter in cm
f=300*10^6;  //frequency in Hz
i=5;  //current in Ampere
dis=10;  //in cm
dim=0.56;  //aperture dimension in cm
r=(dia*10^-2)/2;  //calculating radius in metre
h=(0.25)/(2*(%pi)*r);  //H field
disp(h,"H field in A/metre = ");  //displaying
   result
disp("For a plane wave the E field is 377 H = 3000V/
   m");  //displaying
att=75/dim;  //attenuation
```

```
12 disp(att,"Attenuation = "); //displaying result
13 disp("Thus, the field is 22.4 V/metre"); //
   displaying result
```

Scilab code Exa 6.13 finding the mode of coupling

```
1 clc;
2 ap=2; //aperture length in cm
3 f=(2/75)*3000; //field
4 disp(f,"Field is coupled with in V/metre = "); //
   displaying result
5 disp("For an area of 2 cm square,the voltage coupled
    is 2.13 V."); //displaying result
6 disp("This can damage a circuit."); //displaying
   result
```

Scilab code Exa 6.14 determining the type of filter

```
1 clc;
2 disp("The filter must attenuate the signal by a
   factor of 10."); //displaying result
3 f=300*10^6; //frequency in Hz
4 disp(" If R = 100 Ohm ,then the reactance of the
   capacitor should be about 10 Ohm."); //
   displaying result
5 c=1/(2*(%pi)*f*10); //calculating capacitance
6 disp(c,"At 300 MHz, this is in Farad = "); //
   displaying result
```

Scilab code Exa 6.15 calculating common mode voltage

```
clc;
i=54946;  //current in Ampere
d=1;  //distance in ft
r=0.33;  //in metre
f=425.89;  //frequency in Hz
h=i/(2*(%pi)*r);  //calculating H field
disp(h,"H field in A/metre = ");  //displaying
   result
mo=(4*(%pi)*10^-7);  //constant
b=mo*h;  //calculating B field
disp(b,"B field in Tesla = ");  //displaying result
area=0.02;  //area in metre square
flux=b*area;  //calculatin flux
disp(flux,"Flux in Wb = ");  //displaying result
v=(2*(%pi)*f);  //calculating voltage
disp(v,"Voltage in volt = ");  //displaying result
```

Scilab code Exa 6.16 observing output

```
clc;
disp("The reactance at 640 kHz is 75.4 Ohm.");  //
   displaying result
disp("For 20,000 A, the voltage drop is 1.5*10^6
   Volt.");  //displaying result
disp("The breakdown voltage for 6 in. is 300,000 V.
   Lightning will jump through the concrete.");  //
   displaying result
```