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

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June 16, 2014

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.

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List of Scilab Codes

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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

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

Scilab code Exa 1.4 calculating current

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

Scilab code Exa 1.5 calculating work

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

Scilab code Exa 1.6 calculating resistance

```
1 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

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

Scilab code Exa 1.10 calculating voltage

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

Scilab code Exa 1.11 calculating power dissipated

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

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Scilab code Exa 1.12 calculating power dissipated

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

Scilab code Exa 1.13 calculating the power level

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

Scilab code Exa 1.14 finding configuration

```scilab
1 clc;
2 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

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

Scilab code Exa 1.16 calculating wattage rating

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

Scilab code Exa 1.17 calculating power dissipation

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

Scilab code Exa 1.18 calculating joules

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

Scilab code Exa 1.19 calculating wattage

```
1 clc;
2 v=12;   //voltage in volt
3 ah=720;   //ampere−hours
4 am=ah/24;   //calculating amperage
5 r=v/am;   //calculating resistance
6 disp(r,"Load in Ohm = ");   //displaying result
```

Scilab code Exa 1.20 calculating current

```
1 clc;
2 p=200;   //power in Watt
3 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.
```

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```
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.
```

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

Scilab code Exa 2.5 calculating time constant

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

Scilab code Exa 2.6 calculating voltage

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

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```
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

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

Scilab code Exa 2.13 calculating H field intensity

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

Scilab code Exa 2.14 calculating time

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

Scilab code Exa 2.15 calculating energy

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

Scilab code Exa 2.16 calculating H field

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

Scilab code Exa 2.17 calculating B field

```scilab
1 clc;
2 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 = ");   //
```

Scilab code Exa 2.19 calculating time

```
1 clc;
2 v=0.04;  //voltage per turn in Volt
3 area=5*10^-4;  //metre square
4 B=v/area;  //calculating B
5 disp(B,"B in Tesla/sec = ");  //displaying result
6 H=B/(4*(%pi)*10^-7*20000);  //calculating H
7 disp(H,"H in A/m = ");  //displaying result
8 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

```
1 clc;
2 phi=0.5;  //flux density in Tesla
3 v=10;  //peak to peak voltage
4 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
5 disp("This is a frequency of 40 Hz.");  //displaying
      result
```

Scilab code Exa 2.21 calculating energy

```
1 clc;
```

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

Scilab code Exa 2.22 calculating H field

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

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```
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

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

Scilab code Exa 3.7 calculating impedance

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

Scilab code Exa 3.8 calculating reactance

```
1 clc;
2 u=-6;  //object distance in cm
3 fo=4;  //focal distance in cm
4 fe=6;  //focal length in cm
5 D=25;  //distance of distinct vision in cm
6 v=(12);  //using (1/f)=(1/v)-(1/u)
7 m=(v/u)*(1+(D/fe));  //calculating m
8 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

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

Scilab code Exa 3.12 calculating current

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

Scilab code Exa 3.13 calculating phase angle

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

Scilab code Exa 3.14 calculating impedance

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

Scilab code Exa 3.15 calculating reactance

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

Scilab code Exa 3.16 calculating phase angle

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

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```
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

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

Scilab code Exa 3.21 calculating average dc voltage

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

Scilab code Exa 3.22 calculating rms heating

```
1 clc;
2 v=10;   //voltage in volt
3 t=0.001;   //lasting time in sec
4 t1=0.01;   //recuring time in sec
5 r=1;   //resistance in Ohm
6 p=10;   //average power in Watt
7 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

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

Scilab code Exa 3.26 calculating peak voltage

```
1  clc;
2  v=10^-5;   //ac voltage
3  di=10*10^-3;   //discharge rate of current
4  t=10*10^-3;   //time in sec
5  ch=(14.14-0.6);   //charge of capacitor
6  q=ch*v;   //charge
7  disp(q,"Charge in Coloumb = ");   //displaying result
8  qt=di*t;   //charge for 10 ms
9  rc=q-qt;   //remaining charge
10 disp(qt,"Charge for 10 ms = ");   //displaying result
11 disp(rc,"Remaining charge in Coloumb = ");   //
       displaying result
12 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

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

Scilab code Exa 4.4 calculating resistance

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

Scilab code Exa 4.5 calculating resistance

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

Scilab code Exa 4.6 calculating H

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

Scilab code Exa 4.7 calculating frequency

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

Scilab code Exa 4.8 calculating H

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

Scilab code Exa 4.9 calculating distance

```
1 clc;
2 e=-1.6*10^-19;   //charge on electron in Coulomb
3 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

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

Scilab code Exa 4.13 calculating field strength

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

Scilab code Exa 4.14 calculating E

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

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Scilab code Exa 4.15 calculating E

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

Scilab code Exa 4.16 calculating one skin depth

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

Scilab code Exa 4.17 calculating one skin depth

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

Scilab code Exa 4.18 calculating skin depth

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

Scilab code Exa 4.19 calculating WCC

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

Scilab code Exa 4.20 calculating WCC

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

Scilab code Exa 4.21 calculating WCC

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

Scilab code Exa 4.22 calculating WCC

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

Scilab code Exa 4.23 calculating magnetising current max

```
1 clc;
2 v=100;         //v in volt
3 c1=8*10^-6;   //capacitance in Farad
4 c2=12*10^-6;   //capacitance in Farad
5 c3=24*10^-6;   //capacitance in Farad
6 cs=4/(10^6);   //calculating series capacitance
7 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

```
1  clc;
2  v=100;          //v in volt
3  c1=1*10^-6;    //capacitance in Farad
4  c2=2*10^-6;    //capacitance in Farad
5  c3=3*10^-6;    //capacitance in Farad
6  cs=6/11;    //calculating series capacitance
7  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 disp("Therefore Cp=(11*Cs)");   //displaying result
```

Scilab code Exa 4.27 calculating radiation

```
1  clc;
2  eo=8.85*10^-12;   //constant
3  V=6;   //v in volt
4  A=25*10^-4;   //area in m square
5  d=10^-3;   //distance in m
6  q=(eo*A*V)/d;   //calculating charge
7  W=q*V;    //calculating work done
8  disp(q,"Charge through battery in Coulomb = ");   //
       displaying result
9  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
```

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Scilab code Exa 5.3 calculating output common mode signal

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

Scilab code Exa 5.4 calculating output signal

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

Scilab code Exa 5.5 calculating energy loss

```
1 clc;
2 l=0.1;    //length in m
3 A=10^-4;    //area in m square
4 R=0.01;    //resistance in Ohm
5 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

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

Scilab code Exa 5.10 calculating output impedance

```
1 clc;
2 Rs=40;    // resisitance in Ohm
3 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

```
1 clc;
2 V=2;      // in volts
3 R1=30;    // resisitance in Ohm
4 R2=60;   // resistance in Ohm
5 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
```

```
7  R=1/Rp;          //Parallel
8  disp(R,"(a)Equivalent Resisitance in Ohm = ");   //
      displaying result
9  I1=V/R1;   //calculating current through R1
10 I2=V/R2;   //calculating current through R2
11 I3=V/R3;   //calculating current through R3
12 I=V/R;    //calculating total current
13 disp(I1,"Current through R1 in Ampere = ");   //
      displaying result
14 disp(I2,"Current through R2 in Ampere = ");   //
      displaying result
15 disp(I3,"Current through R3 in Ampere = ");   //
      displaying result
16 disp(I,"Total current in Ampere = ");   //displaying
      result
```

Scilab code Exa 5.14 calculating radiation

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

Scilab code Exa 5.15 calculating capacitance

```
1  clc;
2  R1=2;   //resistance in Ohm
3  R2=6;    //resistance in Ohm
4  R3=3;   //resistance in Ohm
5  V=24;    //voltage in volts
6  R=8;     //resistance in Ohm
7  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
```

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

Scilab code Exa 5.18 calculating time

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

Scilab code Exa 5.19 calculating time

```
1  clc;
2  P=500;   //power in Watts
3  V=200;   //voltage in Volts
4  R=(V^2)/P;   //using P=V^2*R
5  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
```

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```
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

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

Scilab code Exa 6.10 calculating radiation

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

Scilab code Exa 6.11 calculating H field

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

Scilab code Exa 6.12 calculating WCC

```
1  clc;
2  dia=1;  //diameter in cm
3  f=300*10^6;  //frequency in Hz
4  i=5;  //current in Ampere
5  dis=10;  //in cm
6  dim=0.56;  //aperture dimension in cm
7  r=(dia*10^-2)/2;  //calculating radius in metre
8  h=(0.25)/(2*(%pi)*r);  //H field
9  disp(h,"H field in A/metre = ");  //displaying
      result
10 disp("For a plane wave the E field is 377 H = 3000V/
      m");  //displaying
11 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

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

Scilab code Exa 6.16 observing output

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