Scilab Textbook Companion for Electronic Measurements And Instrumentation by P. Sharma[1]

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Book Description

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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 4

1 Measurement measurement units and standards and standards 5

2 Errors and their analysis 7

3 Transducers 21

4 Bridge measurement 27

5 Analog meters 37

6 data converters 48

7 Display devices and digital systems 55

8 cathode ray oscilloscope 61

List of Scilab Codes

Exa 1.3	find system accuracy system precision	5
Exa 1.5	Find resolution of the meter	6
Exa 2.1	Find maximum and minimum value of resistor	7
Exa 2.2	Find limiting error in percentage	7
Exa 2.3	Find unknown resistance relative limiting error in percentage and in ohms	8
Exa 2.4	Find limiting error	9
Exa 2.5	Find magnitude of limiting error fot R1 and R2	9
Exa 2.6	Find error in computed value of power dissipation	10
Exa 2.7	find the limiting error for the power calculated	11
Exa 2.8	Find limiting error	11
Exa 2.9	Find limiting error when measured voltage is a V1 b V2	12
Exa 2.10	Find volume percentage error and absolute error	13
Exa 2.11	Find unknown resistance percent error and error in ohm	13
Exa 2.12	Find arithmetic mean	14
Exa 2.13	Find deviation	15
Exa 2.14	Find deviation	16
Exa 2.15	find arithmetic mean standard deviation and probable error of onereading	17
Exa 2.16	Find a arithmetic mean b deviation of each value c algebric sum of deviation d average deviation e standard deviation	18
Exa 2.17	find a arithmetic mean b deviation from mean c average deviation d standard deviation e variance f probable reading of one error	19
Exa 3.2	Find change in resistance	21
Exa 3.3	Find output voltage of an ac LVDT for a minus point 3 inch b minus point 25 inch	21

Exa 3.4	Find sensitivity of LVDT	22
Exa 3.5	Find output voltage	23
Exa 3.6	Find a Sensitivity of LVDT b sensitivity of entire setup c resolution of the instrument	23
Exa 3.7	Find value of capacitance after application of pressure	24
Exa 3.8	Find thermoelectric sensitivity and emf developed	25
Exa 3.9	Find value of protection resistance	25
Exa 4.1	Find value of unknown resistance and fractional uncertainty in its value	27
Exa 4.2	Find output voltage	28
Exa 4.3	Find temperature at which thevenin voltage is 50mV	28
Exa 4.4	Find deflection of the galvenometer	29
Exa 4.5	Find limiting value of unknown resistance	30
Exa 4.6	Find magnitude and phase angle of Z4 arm	31
Exa 4.7	find value of unknown inductance resistance and Q for maxwell bridge	31
Exa 4.8	find relative permittivity of specimen	32
Exa 4.9	Find equivalent parallel resistance and capacitance	33
Exa 4.10	find value of arm CD	34
Exa 4.11	find value of arm CD	34
Exa 4.12	find value of arm AD	35
Exa 4.13	find value of frequency of the bridge arm resistance of arm AD	36
Exa 5.1	Find terminal voltage when load impedance is a 10 ohm b 20 ohm c 40 ohm	37
Exa 5.2	Find load current when varible load are a 100 ohm b10 ohm	38
Exa 5.3	Find equivalant voltage source of the ac current source	38
Exa 5.4	Find equivalant current source	39
Exa 5.5	Find value of shunt resistance for ammeter	39
Exa 5.6	Find value of shunt resistance for the range a 0 to 1A b 0 to 5A c 0 to 10A	40
Exa 5.8	Find the value of multiplier resistance for the range a 0 to 10V b 0 to 50V c 0 to 100V d 0 to 200V	41
Exa 5.9	Find the value of multiplier resistance for the range a 0 to 10V b 0 to 50V c 0 to 100V d 0 to 200V using sensitivity method	42

Exa 5.10 Find reading of voltmeter and percentage error when a sensitivity of voltmeter is 100 kilo ohm per volt b sensitivity of voltmeter is 500 kilo ohm per volt 43
Exa 5.11 Find a value of R1 and R2 b change in value of R2 c half scale deflection 44
Exa 5.12 Find R1 and Rsh 44
Exa 5.13 Find value of required multiplier resistance 45
Exa 5.14 Find value of multiplier resistance 46
Exa 5.15 Find value of multiplier resistance 46
Exa 6.1 Find output voltage for a binary input a 1111 b 1100 . 48
Exa 6.2 Find output voltage 49
Exa 6.3 Find output voltage if input is 101101111 49
Exa 6.4 Find values of a LSB b MSB c full scale output 50
Exa 6.5 Find resolution and voltage 50
Exa 6.6 Find conversion time required for invertor 51
Exa 6.9 Find total number of pulses and display reading 52
Exa 6.10 Find input voltage 52
Exa 6.11 Find a output voltage after 1 sec b fall time of reference voltage waveform 53
Exa 7.1 convert 1101 into decimal 55
Exa 7.2 convert 17 octal into decimal 55
Exa 7.3 convert 1E hexadecimal into decimal 56
Exa 7.20 Find input frequency applied to the system 56
Exa 7.21 find frequency of the system 57
Exa 7.22 find frequency time period of the system 57
Exa 7.23 Find a resolution of the voltmeter b display of point 6368 in voltmeter on the 10V range c display of point 6368 in voltmeter on the 1V range 58
Exa 7.24 Find a resolution of the voltmeter b display of 16 point 58 in voltmeter on the 10V range c display of point 7254 in voltmeter on the 1V and 10V range 59
Exa 7.25 find out range of measured reading 60
Exa 8.1 find deflection sensitivity of CRO 61
Exa 8.2 Find peak to peak amplitude of the signal and frequency of the signal 61
Exa 8.3 Find amplitude of the waveform 62
Exa 8.4 Find rms value of signal under test 63
Exa 8.5 Find value of current 63

Exa 8.6 Find value of current 64
Exa 8.7 Find peak amplitude and frequency of the signal . . . 64
Exa 8.8 Find frequency of horizontal signal 65
Exa 8.9 Find frequency of the waveform 66
Exa 8.10 what will be the setting of time base knob 66
Exa 8.11 Find ratio of frequencies of vertical and horizontal signals 67
Exa 8.12 find phase angle 68
Exa 8.13 Find bandwidth of CRO 68

Chapter 1

Measurement measurement units and standards and standards

Scilab code Exa 1.3 find system accuracy system precision

```
1 //caption:find (a)system accuracy(b)system precision
2 //Ex1.3
3 clc
4 clear
5 close
6 Tmin=100.3//minimum measured temperature at true
     value(in degree centigrate)
7 Tmax=100.5//maximum measured temperature at true
     value(in degree centigrate)
8 T1=100.4//measured temperature at true value(in
     degree centigrate)
9 T2=100.3//measured temperature at true value(in
     degree centigrate)
10 Tt=100//true value(in degree centigrate)
11 A=((Tmax-Tt)/Tt)*100
12 disp(A,'(a)system accuracy(in %)=')
13 M=(T1+Tmin+Tmax+T2)/4
```

```
14 Md=Tmax-M
15 disp(Md,'(b)system precision(in %)=')
```

Scilab code Exa 1.5 Find resolution of the meter

```
1 //caption:Find resolution of the meter
2 //Ex1.5
3 clc
4 clear
5 close
6 Rmax=100//maximum range of voltmeter(in V)
7 D=200//division on scale
8 Sd=0.5//divisions which can be read
9 V=Rmax/D
10 R=Sd*V
11 disp(R,'resolution of the meter is(in V)=')
```

Chapter 2

Errors and their analysis

Scilab code Exa 2.1 Find maximum and minimum value of resistor

```
1 //caption:Find maximum and minimum value of resistor
2 //Ex2.1
3 clc
4 clear
5 close
6 R=100//magnitude of resistor(in ohm)
7 Lmin=-5//minimum limiting error(in %)
8 Lmax=5//maximum limiting error(in %)
9 Le=(R*Lmax)/100
10 Rmax=R+Le
11 disp(Rmax,'maximum value of resistor(in ohm)=')
12 Rmin=R-Le
13 disp(Rmin,'minimum value of resistor(in ohm)=')
```

Scilab code Exa 2.2 Find limiting error in percentage

```
1 //caption:Find limiting error in percentage
2 //Ex2.2
3 clc
4 clear
5 close
6 V=150//maximum range of voltmeter(in V)
7 A=0.02//magnitude of accuracy(in V)
8 Vm=83//voltage measured
9 dA=A*V
10 %er=(dA/Vm)*100
11 disp(%er,'limiting error(in %)=')
```

Scilab code Exa 2.3 Find unknown resistance relative limiting error in percentage and in ohms

```
1 //caption:Find unknown resistance,relative limiting
    error in percentage and in ohms
2 //Ex2.3
3 clc
4 clear
5 close
6 R1=90//resistance of arm wheatstone bridge(in ohm)
7 Rle1=0.5//limiting error for R1(in %)
8 R2=900//resistance of arm wheatstone bridge(in ohm)
9 Rle2=0.8//limiting error for R2(in %)
10 R3=825//resistance of arm wheatstone bridge(in ohm)
11 Rle3=0.6//limiting error for R3(in %)
12 Rx=(R2*R3)/R1
13 disp(Rx,'unknown resistance(in ohm)=')
14 dR1=(R1*Rle1)/100
15 dR2=(R2*Rle2)/100
```

```
dR3=(R3*Rle3)/100
dR=((dR2/R2)+(dR3/R3)+(dR1/R1))*100
disp(dR,'relative limiting error(in %)=')
Le=(dR*Rx)/100
disp(Le,'limiting error(in ohm)=')
```

Scilab code Exa 2.4 Find limiting error

```
//caption:Find limiting error
//Ex2.4
clc
clear
close
V1=500//referance reading of voltmeter(in V)
V2=150//Voltage at which limiting error to be
   calculated(in V)
Ar=0.015//magnitude of accuracy limit
dA=Ar*V1
er=(dA/V2)*100
disp(er,'limiting error(in %)=')
```

Scilab code Exa 2.5 Find magnitude of limiting error fot R1 and R2

```
//caption:Find magnitude of limiting error fot R1
   and R2
```

```
2 //Ex2.5
3 clc
4 clear
5 close
6 R1=36//resistance(in ohm)
7 R2=75//resistance(in ohm)
8 er=0.005//limiting error(in ohm)
9 dR1=R1*er
10 disp(dR1,'magnitude of limiting error for R1(in ohm)
   =')
11 dR2=R2*er
12 disp(dR2,'magnitude of limiting error for R2(in ohm)
   =')
```

Scilab code Exa 2.6 Find error in computed value of power dissipation

```
1 //caption:Find error in computed value of power
   dissipation
2 //Ex2.6
3 clc
4 clear
5 close
6 R=100//resistor(in ohm)
7 Rer=0.2//error in current measurment(in ohm)
8 I=2//current(in A)
9 Ier=0.01//error in current measurment(in ohm)
10 dR=(Rer/R)*100
11 dI=(Ier/I)*100
12 P=(I^2)*R
13 dPo=2*dI+dR
14 dP=(P*dPo)/100
```

```
15 disp(dP,'error in computed value of power
     dissipation(in W)=')
```

Scilab code Exa 2.7 find the limiting error for the power calculated

```
1 //caption:find the limiting error for the power
     calculated
2 //Ex2.7
3 clc
4 clear
5 close
6 A=0.01//magnitude of accuracy
7 V=150//range of voltmeter(in V)
8 Vr=100//Reading of voltmeter(in V)
9 I=100//range of ammeter(in mA)
10 Ir=55//ammeter reading(in mA)
11 dV=A*V
12 dEv=(dV/Vr)*100
13 dA=A*I
14 dEi=(dA/Ir)*100
15 dE=(dEv+dEi)
16 disp(dE,'limiting error for the power calculated(in
     %)=')
```

Scilab code Exa 2.8 Find limiting error

```
//caption:Find limiting error
//Ex2.8
clc
clear
close
dP=1.5//limiting error in power(in %)
dI=1//limiting error in current(in %)
dR=(dP+2*dI)
disp(dR,'limiting error(in %)=')
```

Scilab code Exa 2.9 Find limiting error when measured voltage is a V1 b V2

```
//caption:Find limiting error when measured voltage
    is(a)V1(b)V2
//Ex2.9
clc
clear
close
Ar=0.01//magnitude of accuracy(in V)
V1=50//measured voltage(in V)
V2=25//measured voltage(in V)
Vmax=100//maximum range of voltage
dA=Ar*Vmax
er1=(dA/V1)*100
disp(er1,'limiting error when measured voltage is V1
    (in %)=')
er2=(dA/V2)*100
disp(er2,'limiting error when measured voltage is V2
    (in %)=')
```

Scilab code Exa 2.10 Find volume percentage error and absolute error

```
1 //caption:Find volume,percentage error and absolute
    error
2 //Ex2.10
3 clc
4 clear
5 close
6 a=0.80//side of the cube(in m)
7 er=0.5//possible error in measurement(in %)
8 V=(a*a*a)
9 disp(V,'volume(in meter^3)=')
10 %er=3*er
11 disp(%er,'percentage error(in %)=')
12 Aer=(%er*V)/100
13 disp(Aer,'absolute error(in meter^3)=')
```

Scilab code Exa 2.11 Find unknown resistance percent error and error in ohm

```
1 //caption:Find unknown resistance,percent error and
    error in ohm
2 //Ex2.11
3 clc
```

```
clear
close
P=100//resistance of arm of wheatstone bridge(in ohm
    )
ep=0.5//error in P(in %)
Q=50//resistance of arm of wheatstone bridge(in ohm)
eq=0.5//error in Q(in %)
S=75.5//resistance of arm of wheatstone bridge(in
    ohm)
es=0.5//error in S(in %)
X=(P*S)/Q
disp(X,'unknown resistance(in ohm)=')
xo1=ep+es-eq
disp(xo1,'percent error when Q is taken positive(in
    %)=')
ex1=(xo1*X)/100
disp(ex1,'error in ohm(in ohm)=')
xo2=ep+es+eq
disp(xo2,'percent error when Q is taken negative(in
    %)=')
ex2=(xo2*X)/100
disp(ex2,'error in ohm(in ohm)=')
```

Scilab code Exa 2.12 Find arithmetic mean

```
//caption:Find arithmetic mean
//Ex2.12
clc
clear
close
x1=25.65//first reading(in W)
```

```
x2=24.39//second reading(in W)
x3=23.75//third reading(in W)
x4=26.42//fourth reading(in W)
x5=24.92//fifth reading(in W)
X=(x1+x2+x3+x4+x5)/5
disp(X,'arithmetic mean(in W)=')
```

Scilab code Exa 2.13 Find deviation

```
//caption:Find deviation
//Ex2.13
clc
clear
close
x1=25.65//first reading(in W)
x2=24.39//second reading(in W)
x3=23.75//third reading(in W)
x4=26.42//fourth reading(in W)
x5=24.92//fifth reading(in W)
X=(x1+x2+x3+x4+x5)/5
d1=x1-X
disp(d1,'deviation=')
d2=x2-X
disp(d2,'deviation=')
d3=x3-X
disp(d3,'deviation=')
d4=x4-X
disp(d4,'deviation=')
d5=x5-X
disp(d5,'deviation=')
```

Scilab code Exa 2.14 Find deviation

```
1  //caption:Find deviation
2  //Ex2.14
3  clc
4  clear
5  close
6  x1=25.65//first reading(in W)
7  x2=24.39//second reading(in W)
8  x3=23.75//third reading(in W)
9  x4=26.42//fourth reading(in W)
10 x5=24.92//fifth reading(in W)
11 n=5//number of readings
12 X=(x1+x2+x3+x4+x5)/5
13 d1=x1-X
14 d2=x2-X
15 d3=x3-X
16 d4=x4-X
17 d5=x5-X
18 D1=d1//mod of d1
19 D2=-(d2)//mod of d2
20 D3=-(d3)//mod of d3
21 D4=d4//mod of d4
22 D5=-(d5)//mod of d5
23 D=(D1+D2+D3+D4+D5)/n
24 disp(D,'deviation(in W)=')
```

Scilab code Exa 2.15 find arithmetic mean standard deviation and probable error of onereading

```
1 //caption:find arithmetic mean,standard deviation
    and probable error of onereading
2 //Ex2.15
3 clc
4 clear
5 close
6 x1=30.30//level of liquid(in mm)
7 x2=30.25//level of liquid(in mm)
8 x3=30.40//level of liquid(in mm)
9 x4=30.00//level of liquid(in mm)
10 n=4//numberof readings
11 x=(x1+x2+x3+x4)/n
12 disp(x,'arithmatic mean(in mm)=')
13 d1=x1-x
14 d2=x2-x
15 d3=x3-x
16 d4=x4-x
17 S=((d1^2+d2^2+d3^2+d4^2)/(n-1))^0.5
18 disp(S,'standard deviation(in mm)=')
19 P=0.6745*S
20 disp(P,'probable error(in mm)=')
```

Scilab code Exa 2.16 Find a arithmetic mean b deviation of each value c algebric sum of deviation d average deviation e standard deviation

```
1  //caption:Find(a)arithmetic mean(b)deviation of each
       value(c)algebric sum of deviation(d)average
     deviation(e)standard deviation
2  //Ex2.16
3  clc
4  clear
5  close
6  x1=10//first reading
7  x2=11//second reading
8  x3=9//third reading
9  x4=10.5//fourth reading
10 x5=9.5//fifth reading
11 n=5//number of reading
12 x=(x1+x2+x3+x4+x5)/n
13 disp(x,'(a)arithmetic mean=')
14 d1=x1-x
15 d2=x2-x
16 d3=x3-x
17 d4=x4-x
18 d5=x5-x
19 disp(d5,d4,d3,d2,d1,'(b)value of deviation=')
20 d=d1+d2+d3+d4+d5
21 disp(d,'(c)algebric sum of deviation=')
22 D=((d1)+(d2)+(-d3)+(d4)+(-d5))/n//taking mod of
     deviation value
23 disp(D,'(d)average deviation=')
24 S=((d1^2+d2^2+d3^2+d4^2+d5^2)/(n-1))^(0.5)
```

```
25 disp(S,'(e)standard deviation=')
```

Scilab code Exa 2.17 find a arithmetic mean b deviation from mean c average deviation d standard deviation e variance f probable reading of one error

```
1  //caption:find(a)arithmetic mean(b)deviation from
       mean(c)average deviation(d)standard deviation(e)
       variance(f)probable reading of one error
2  //Ex2.17
3  clc
4  clear
5  close
6  x1=12.8//first reading(in V)
7  x2=12.2//second reading(in V)
8  x3=12.5//third reading(in V)
9  x4=13.1//fourth reading(in V)
10 x5=12.9//fifth reading(in V)
11 x6=12.4//sixth value(in V)
12 n=6//number of reading
13 x=(x1+x2+x3+x4+x5+x6)/n
14 disp(x,'(a)arithmetic mean(in V)=')
15 d1=x1-x
16 d2=x2-x
17 d3=x3-x
18 d4=x4-x
19 d5=x5-x
20 d6=x6-x
21 disp(d6,d5,d4,d3,d2,d1,'(b)value of deviation(in V)=
       ')
22 D=((d1)+(-d2)+(-d3)+(d4)+(d5)+(-d6))/n//taking mod
```

```
    of deviation value
disp(D,'(c)average deviation=')
S=((d1^2+d2^2+d3^2+d4^2+d5^2)/(n-1))^(0.5)
disp(S,'(d)standard deviation(in V)=')
V=S^2
disp(V,'(e)variance(in V)=')
P=0.6745*V
disp(P,'(f)probable error of one reading(in V)=')
```

Chapter 3

Transducers

Scilab code Exa 3.2 Find change in resistance

```
1 //caption:Find change in resistance
2 //Ex3.2
3 clc
4 clear
5 close
6 G=2//gauge factor
7 S=500//stress applied(in Kg/cm^2)
8 v=2*10^6//modulus of elasticity(in Kg/cm^2)
9 e=(S/v)
10 R=(e*G)*100
11 disp(R,'change in resistance(in %)=')
```

Scilab code Exa 3.3 Find output voltage of an ac LVDT for a minus point 3 inch b minus point 25 inch

```
1 //caption:Find output voltage of an ac LVDT for (a)
     -0.3 inch(b)-0.25 inch
2 //Ex3.3
3 clc
4 clear
5 close
6 R=-0.5//range of core displacement(in inch)
7 V=-5.2//output voltage(in V)
8 D1=-0.3//displacement(in inch)
9 D2=-0.25//displacement(in inch)
10 V1=(D1/R)*V
11 disp(V1,'(a)output voltage at -0.3 inch(in V)=')
12 V2=(D2/R)*V
13 disp(V2,'(b)output voltage at -0.25 inch(in V)=')
```

Scilab code Exa 3.4 Find sensitivity of LVDT

```
1 //caption:Find sensitivity of LVDT
2 //Ex3.4
3 clc
4 clear
5 close
6 R=1.2//rms value of output voltage(in V)
7 d=0.6//displacement(in micro meter)
8 S=(R/d)
9 disp(S,'sensitivity of LVDT(in volt per micro meter)
    =')
```

Scilab code Exa 3.5 Find output voltage

```
1 //caption:Find output voltage
2 //Ex3.5
3 clc
4 clear
5 close
6 V=5//secondary voltage(in V)
7 d=10//displacement(in mm)
8 D=8//displcement at which output voltage to be
     calculated(in mm)
9 S=(V/d)
10 O=S*D
11 disp(O,'output voltag(in V)=')
```

Scilab code Exa 3.6 Find a Sensitivity of LVDT b sensitivity of entire setup c resolution of the instrument

```
1 //caption:Find (a)Sensitivity of LVDT(b)sensitivity
     of entire setup(c)resolution of the instrument
2 //Ex3.6
3 clc
4 clear
5 close
```

```
V=5//LVDT connection voltage(in V)
Vo=2//output voltage of LVDT(in mV)
D=0.5//displacement(in mm)
A=250//amplification factor
Do=100//divisions of scale
Ds=0.2//reading capacity of LVDT division
S=Vo/D
disp(S,'(a)sensitivity of LVDT(in mV/mm)=')
So=A*S
disp(So,'(b)sensitivity of entire setup(in mV/mm)=')
C=V/Do
M=Ds*C
R=M/S
disp(R,'(c)resolution of the instrument(in mm)=')
```

Scilab code Exa 3.7 Find value of capacitance after application of pressure

```
//caption:Find value of capacitance after
   application of pressure
//Ex3.7
clc
clear
close
A=600*10^-6//area of plates(in meter square)
D=2.5*10^-3//sepration of distance(in meter)
C=400*10^-12//capacitance(in F)
Do=0.5*10^-3//deflection(in mm)
e=(C*D)/A
d=D-Do
Co=(e*A)/d
```

```
13 disp(Co,'capacitance(in F)=')
```

Scilab code Exa 3.8 Find thermoelectric sensitivity and emf developed

```
1 //caption:Find thermoelectric sensitivity and emf
    developed
2 //Ex3.8
3 clc
4 clear
5 close
6 T=50//temperature difference(in degree centigrate)
7 Scp=7.4*10^-6//sensitivity of copper against
    platinum(in Voli per degree centigrate)
8 Sccp=-34.8*10^-6//sensitivity of constantan against
    platinum(in Voli per degree centigrate)
9 Sccc=(Scp)-(Sccp)
10 disp(Sccc,'sensitivity(in Volt per degree centigrate
    )=')
11 E=Sccc*T
12 disp(E,'emf developed(in V)=')
```

Scilab code Exa 3.9 Find value of protection resistance

```
1 //caption:Find value of protection resistance
2 //Ex3.9
```

```
clc
clear
close
I=0.01//current through LDR(in A)
R=15//Resistance of LDR(in ohms)
V=9//supply voltage(in V)
Vo=I*R
Vp=V-Vo
R=Vp/I
disp(R,'value of protection resistance(in ohm)=')
```

Chapter 4

Bridge measurement

Scilab code Exa 4.1 Find value of unknown resistance and fractional uncertainty in its value

```
1 //caption:Find value of unknown resistance and
     fractional uncertainty in its value
2 //Ex4.1
3 clc
4 clear
5 close
6 R1=500//resistance of first arm of wheatstone bridge
     (in ohm)
7 dR1=0.5//uncertanity of first arm (in ohm)
8 R2=1000//resistance of arm of wheatstone bridge(in
     ohm)
9 dR2=0.5//uncertanity of second arm(in ohm)
10 R3=600//resistance of third arm of wheatstone bridge
     (in ohm)
11 dR3=0.5//uncertanity of third arm(in ohm)
12 R4=(R2*R3)/R1
13 disp(R4,'unknown resistance(in ohm)=')
14 d4=((dR1/R1)^2+(dR2/R2)^2+(dR3/R3)^2)^1/2
```

```
15 dR4=R4*d4
16 disp(dR4,'fractional uncertainty(in ohm)=')
```

Scilab code Exa 4.2 Find output voltage

```
1 //caption:Find output voltage
2 //Ex4.2
3 clc
4 clear
5 close
6 R1=1000//resistance of first arm(in ohm)
7 R2=1000//resistance of second arm(in ohm)
8 R3=1000////resistance of third arm(in ohm)
9 V=10//applied voltage(in V)
10 T=20//temperature of thermometer(in degree
    centigrate)
11 Ro=1020//resistance of thermometer(in ohm)
12 V1=(R2/(R1+R3))*V
13 V2=(Ro/(R2+Ro))*V
14 Vo=V2-V1
15 disp(Vo,'output voltage(in V)=')
```

Scilab code Exa 4.3 Find temperature at which thevenin voltage is 50mV

```
1 //caption:Find temperature at which thevenin voltage
    is 50mV
2 //Ex4.3
```

```
clc
clear
close
R=1000//resistance of all the arms ofwheatstone bridge(in ohm)
a=10//temperature coefficient of thermistor(in ohm/degree centigrate)
Eth=0.05//thevenin voltage(in V)
V=20//input voltage(in V)
T=50//temperature(in degree centigrate)
Ro=1000//resistance of thermometer(in ohm)
dR=(Eth*4*R)/V
To=T-1
disp(To,'temperature at which thevenin voltage is 50 mV(in degree centigrate)=')
```

Scilab code Exa 4.4 Find deflection of the galvenometer

```
//caption:Find deflection of the galvenometer
//Ex4.4
clc
clear
close
R1=80//resistance of first arm(in ohm)
R2=800//resistance of second arm(in ohm)
R3=160//resistance of third arm(in ohm)
R4=1605//resistance of fourth arm(in ohm)
E=4//battery voltage(in V)
S=8//galvenometer sensitivity(in milimeter per micro ampere)
Ro=80//internal resistance of the galvenometer(in
```

```
    ohm)
13 Eth=E*(R1/(R1+R3)-R2/(R2+R4))
14 Rth=R1*R3/(R1+R3)+R2*R4/(R2+R4)
15 Ig=Eth/(Rth+Ro)
16 D=S*Ig
17 disp(D,'deflection of the galvenometer(in m)=')
```

Scilab code Exa 4.5 Find limiting value of unknown resistance

```
1  //caption:Find limiting value of unknown resistance
2  //Ex4.5
3  clc
4  clear
5  close
6  R1=100//value of resistance(in ohm)
7  R2=100//value of resistance(in ohm)
8  R3=230//value of standard arm resistance(in ohm)
9  dR1=0.02//ratio arms accuracy range(in %)
10 dR2=0.02//ratio arms accuracy range(in %)
11 dR3=0.01//standard ratio arm accuracy range(in %)
12 Rx=(R2*R3)/R1
13 dRx=dR1+dR2+dR3
14 Rx1=R3-((R3*dRx)/100)
15 Rx2=R3+((R3*dRx)/100)
16 disp(Rx1,'lower value of limiting resistance(in ohm)
     =')
17 disp(Rx2,'upper value of limiting resistance(in ohm)
     =')
```

Scilab code Exa 4.6 Find magnitude and phase angle of Z4 arm

```
1 //caption:Find magnitude and phase angle of Z4 arm
2 //Ex4.6
3 clc
4 clear
5 close
6 Z1=200//impedance of first arm(in ohm)
7 Za=30//phase angle of first arm(in degree)
8 Z2=250//impedance of second arm(in ohm)
9 Zb=-40//phase angle of second arm(in degree)
10 Z3=150//impedane of third arm(in ohm)
11 Zc=0//phase angle of third arm(in degree)
12 Z4=(Z2*Z3)/Z1
13 disp(Z4,'magnitude of Z4 arm(in ohm)=')
14 Zd=Zb+Zc-Za
15 disp(Zd,'phase angle of Z4 arm(in degree)=')
```

Scilab code Exa 4.7 find value of unknown inductance resistance and Q for maxwell bridge

```
1 //caption:find value of unknown inductance,
    resistance and Q for maxwell bridge
2 //Ex4.7
```

```
clc
clear
close
R1=220//resistance of first arm(in ohm)
C1=0.22*10^-6//capacitance of first arm(in F)
R2=1000//resistance of second arm(in ohm)
R3=1000//resistance of third arm(in ohm)
f=1000//frequency of arm(in Hz)
w=2*%pi*f
R=(R2*R3)/R1
disp(R,'resistance(in ohm)=')
L=R2*R3*C1
disp(L,'inductance(in H)=')
Q=w*R1*C1
disp(Q,'Q value of the bridge=')
```

Scilab code Exa 4.8 find relative permittivity of specimen

```
//caption:find relative permittivity of specimen
//Ex4.8
clc
clear
close
C1=120//capacitance of first arm without specimen(in
    pF)
C3=150//capacitance of third arm without specimen(in
    pF)
R1=5000//resistance of first arm without specimen(in
    ohm)
R2=5000//resistance of second arm without specimen(
   in ohm)
```

```
C1o=200//capacitance of first arm with specimen(in
    pF)
C3o=900//capacitance of third arm with specimen(in
    pF)
R1o=5000//resistance of first arm with specimen(in
    ohm)
R2o=5000//resistance of second arm with specimen(in
    ohm)
Cs=(C3*R1)/R2
Css=(C3o*R1o)/R2o
er=Css/Cs
disp(er,'relative permittivity of the specimen=')
```

Scilab code Exa 4.9 Find equivalent parallel resistance and capacitance

```
//caption:Find equivalent parallel resistance and
    capacitance.
//Ex4.9
clc
clear
close
R1=3.1//resistance(in kilo ohm)
R2=25//resistance(in kilo ohm)
C1=5.2*10^-6//capacitance(in F)
R4=100//resistance(in kilo ohm)
f=2500//frequency (in Hz)
w=2*%pi*f
R3=(R4/R2)*((R1)+1/(w^2)*R1*(C1^2))
disp(R3,'equivalent parallel resistance(in kilo ohm)
    =')
C3=1/((w^2)*C1*R1*R3)
```

```
15 disp(C3,'equivalent parallel capacitance(in F)=')
```

Scilab code Exa 4.10 find value of arm CD

```
1  //caption:find value of arm CD
2  //Ex4.10
3  clc
4  clear
5  close
6  R1=2000//resistance of arm AB(in ohm)
7  C1=0.047*10^-6//capacitance of arm AB(in F)
8  R2=1000//resistance of arm BC(in ohm)
9  C2=0.47*10^-6//capacitance of arm BC(in F)
10 C3=0.5*10^-6//capacitance of arm AD(in F)
11 f=1000//frequency of bridge(in Hz)
12 w=2*%pi*f
13 Y1=(1/R1)+(%i*w*C1)
14 Z2=R2-(%i/(w*C2))
15 Z3=-%i/(w*C3)
16 Z4=Y1*Z2*Z3
17 disp(Z4,'value of arm CD=')
```

Scilab code Exa 4.11 find value of arm CD

```
1  //caption:find value of arm CD
```

```
2  //Ex4.11
3  clc
4  clear
5  close
6  C1=0.2*10^-6//capacitance of arm AB(in F)
7  R2=500//resistance of arm BC(in ohm)
8  R3=300//resistance of arm BC(in ohm)
9  C3=0.1*10^-6//capacitance of arm AD(in F)
10 f=1000//frequency of bridge(in Hz)
11 w=2*%pi*f
12 Z1=-%i/(w*C1)
13 Z2=R2
14 Z3=1/((1/R3)+%i*w*C3)
15 Z4=(Z2*Z3)/Z1
16 disp(Z4,'value of arm CD=')
```

Scilab code Exa 4.12 find value of arm AD

```
1  //caption:find value of arm AD
2  //Ex4.12
3  clc
4  clear
5  close
6  R1=1000//resistance of arm AB(in ohm)
7  C1=0.5*10^-6//capacitance of arm AB(in F)
8  R3=1000//resistance of arm BC(in ohm)
9  C3=0.5*10^-6//capacitance of arm BC(in F)
10 R4=200//resistance of arm BC(in ohm)
11 L4=30*10^-3//inductance of arm(in henery)
12 f=1000//frequency of bridge(in Hz)
13 w=2*%pi*f
```

```
Z1=1/((1/R1)+(%i*w*C1))
Z3=R3+(1/(%i*w*C3))
Z4=R4+(%i*w*L4)
Z2=(Z1*Z4)/Z3
disp(Z2,'value of arm CD=')
```

Scilab code Exa 4.13 find value of frequency of the bridge arm resistance of arm AD

```
//caption:find value of frequency of the bridge arm
   resistance of arm AD
//Ex4.13
clc
clear
close
R1=1000//resistance of arm AB(in ohm)
C1=0.159*10^-6//capacitance of arm AB(in F)
R2=1000//resistance of arm BC(in ohm)
C3=0.636*10^-6//capacitance of arm BC(in F)
R4=500//resistance of arm BC(in ohm)
R3=R1*((R4/R2)-(C1/C3))
disp(R3,'resistance of the arm AD(in ohm)=')
f=1/(2*%pi*sqrt(C1*C3*R1*R3))
disp(f,'frequency of the bridge(in Hz)=')
```

Chapter 5

Analog meters

Scilab code Exa 5.1 Find terminal voltage when load impedance is a 10 ohm b 20 ohm c 40 ohm

```
1 //caption:Find terminal voltage when load impedance
    is(a)10 ohm(b)20 ohm(c)40 ohm
2 //Ex5.1
3 clc
4 clear
5 close
6 Vs=5//source voltage(in V)
7 Zi=10//internal imedance of load(in ohm)
8 Z1=10//load impedance(in ohm)
9 Z2=20//load impedance(in ohm)
10 Z3=40//load impedance(in ohm)
11 Vt1=(Vs/(Zi+Z1))*Z1
12 disp(Vt1,'(a)internal voltage at load impedance 10
    ohm(in ohm)=')
13 Vt2=(Vs/(Zi+Z2))*Z2
14 disp(Vt2,'(b)internal voltage at load impedance 20
    ohm(in ohm)=')
15 Vt3=(Vs/(Zi+Z3))*Z3
16 disp(Vt3,'(c)internal voltage at load impedance 40
    ohm(in ohm)=')
```

Scilab code Exa 5.2 Find load current when varible load are a 100 ohm b10 ohm

```
1 //caption:Find load current when varible load are(a)
    100 ohm(b)10 ohm
2 //Ex5.2
3 clc
4 clear
5 close
6 Zs=100//current source impedance(in ohm)
7 Zl1=100//load impedance(in ohm)
8 Zl2=10//load impedance(in ohm)
9 Is=10//current source value(in A)
10 Il1=(Is/(1+(Zl1/Zs)))
11 disp(Il1,'(a)load current when variable load is 100
    ohm(in ohm)=')
12 Il2=(Is/(1+(Zl2/Zs)))
13 disp(Il2,'(b)load current when variable load is 10
    ohm(in ohm)=')
```

Scilab code Exa 5.3 Find equivalant voltage source of the ac current source

```
1 //caption:Find equivalant voltage source of the ac
    current source
2 //Ex5.3
3 clc
4 clear
5 close
6 Is=1//current value(in A)
7 Zs=100//source impedance(in ohm)
8 Veq=Is*Zs
9 disp(Veq,'equivalant voltage source of the ac
    current source(in V)=')
```

Scilab code Exa 5.4 Find equivalant current source

```
1 //caption:Find equivalant current source
2 //Ex5.4
3 clc
4 clear
5 close
6 Vs=5//source voltage(in V)
7 Rs=1//source resistance(in ohm)
8 I=Vs/Rs
9 disp(I,'equivalant current source(in A)=')
```

Scilab code Exa 5.5 Find value of shunt resistance for ammeter

```
1 //caption:Find value of shunt resistance for ammeter
```

```
2 //Ex5.5
3 clc
4 clear
5 close
6 Im=2//ammeter current(in mA)
7 I=50//max range of ammeter(in mA)
8 Rm=100//internal ammeter resistance(in ohm)
9 Rs=(Rm/((I/Im)-1))
10 disp(Rs,'shunt resistance(in ohm)=')
```

Scilab code Exa 5.6 Find value of shunt resistance for the range a 0 to 1A b 0 to 5A c 0 to 10A

```
1 //caption:Find value of shunt resistance for the
    range(a)0-1A(b)0-5A(c)0-10A
2 //Ex5.6
3 clc
4 clear
5 close
6 Im=0.001//meter current(in A)
7 I1=1//maximum range(in A)
8 I2=5//maximum range(in A)
9 I3=10//maximum range(in A)
10 R=100//internal resistance(in ohm)
11 Rs1=(R/((I1/Im)-1))
12 disp(Rs1,'(a)shunt resistance(in ohm)=')
13 Rs2=(R/((I2/Im)-1))
14 disp(Rs2,'(b)shunt resistance(in ohm)=')
15 Rs3=(R/((I3/Im)-1))
16 disp(Rs3,'(c)shunt resistance(in ohm)=')
```

Scilab code Exa 5.8 Find the value of multiplier resistance for the range a 0 to 10V b 0 to 50V c 0 to 100V d 0 to 200V

```
1  //caption:Find the value of multiplier resistance
       for the range(a)0-10V(b)0-50V(c)0-100V(d)0-200V
2  //Ex5.8
3  clc
4  clear
5  close
6  V1=10//maximum voltage range(in V)
7  V2=50//maximum voltage range(in V)
8  V3=100//maximum voltage range(in V)
9  V4=200//maximum voltage range(in V)
10 I=0.002//deflection current(in A)
11 R=100//internal resistance(in ohm)
12 Rt1=V1/I
13 R1=Rt1-R
14 disp(R1,'(a)multiplier resistance(in ohm)=')
15 Rt2=V2/I
16 R2=Rt2-(R1+R)
17 disp(R2,'(b)multiplier resistance(in ohm)=')
18 Rt3=V3/I
19 R3=Rt3-(R2+R1+R)
20 disp(R3,'(c)multiplier resistance(in ohm)=')
21 Rt4=V4/I
22 R4=Rt4-(R1+R2+R3+R)
23 disp(R4,'(d)multiplier resistance(in ohm)=')
```

Scilab code Exa 5.9 Find the value of multiplier resistance for the range a 0 to 10V b 0 to 50V c 0 to 100V d 0 to 200V using sensitivity method

```
1 //caption:Find the value of multiplier resistance
    for the range(a)0-10V(b)0-50V(c)0-100V(d)0-200V
    using sensitivity method
2 //Ex5.9
3 clc
4 clear
5 close
6 V1=10//maximum voltage range(in V)
7 V2=50//maximum voltage range(in V)
8 V3=100//maximum voltage range(in V)
9 V4=200//maximum voltage range(in V)
10 I=0.002//deflection current(in A)
11 R=100//internal resistance(in ohm)
12 S=1/I
13 R1=(S*V1)-R
14 disp(R1,'(a)multiplier resistance(in ohm)=')
15 R2=(S*V2)-(R1+R)
16 disp(R2,'(b)multiplier resistance(in ohm)=')
17 R3=(S*V3)-(R2+R1+R)
18 disp(R3,'(c)multiplier resistance(in ohm)=')
19 R4=(S*V4)-(R1+R2+R3+R)
20 disp(R4,'(d)multiplier resistance(in ohm)=')
```

Scilab code Exa 5.10 Find reading of voltmeter and percentage error when a sensitivity of voltmeter is 100 kilo ohm per volt b sensitivity of voltmeter is 500 kilo ohm per volt

```
1 //caption:Find reading of voltmeter and percentage
    error when(a)sensitivity of voltmeter is 100 kilo
     ohm per volt(b)sensitivity of voltmeter is 500
    kilo ohm per volt
2 //Ex5.10
3 clc
4 clear
5 close
6 Rl=50000//load resistance(in ohm)
7 S1=10000//sensitivity (in kilo ohm per volt)
8 S2=50000//sensitivity (in kilo ohm per volt)
9 Vi=10//input voltage(in V)
10 R=5//range of voltmeter(in V)
11 Vl=(Rl/(S1+Rl))*Vi
12 Vo=R*S1
13 Rth=((Rl*Vo)/(Rl+Vo))
14 V1=(Rth/(Rl+Rth))*Vi
15 disp(V1,'(a)reading of voltmeter(in V)=')
16 e=((R-V1)/R)*100
17 disp(e,'(a)error(in %)=')
18 Vc=R*S2
19 Rt=((Rl*Vc)/(Rl+Vc))
20 V2=(Rt/(Rl+Rt))*Vi
21 disp(V2,'(b)reading of voltmeter(in V)=')
22 eo=((R-V2)/R)*100
23 disp(eo,'(b)error (in %)=')
```

Scilab code Exa 5.11 Find a value of R1 and R2 b change in value of R2 c half scale deflection

```
1 //caption:Find (a)value of R1 and R2(b)change in
     value of R2(c)half scale deflection
2 //Ex5.11
3 clc
4 clear
5 close
6 Ifsd=0.001//current(in A)
7 Rm=100//internal resistance(in ohm)
8 E=9//battery voltage(in V)
9 Rh=5000//half scale deflection(in ohm)
10 R1=Rh-((Ifsd*Rm*Rh)/E)
11 disp(R1,'(a)value of R1(in ohm)=')
12 R2=(Ifsd*Rm*Rh)/(E-Ifsd*Rh)
13 disp(R2,'(a)value of R2(in ohm)=')
14 Eo=E-0.9
15 Ro=(Ifsd*Rm*Rh)/(Eo-Ifsd*Rh)
16 disp(Ro,'(b)change in value of R2(in ohm)=')
17 Rh2=R1+((Ro*Rm)/(Ro+Rm))
18 disp(Rh2,'(c)half scale deflection(in ohm)=')
```

Scilab code Exa 5.12 Find R1 and Rsh

```
//caption:Find R1 and Rsh
//Ex5.12
clc
clear
close
Ifsd=0.001//current value(in A)
Rm=100//resistance(in ohm)
E=3//voltage(in V)
Rh=1//deflection resistance(in ohm)
Im=Ifsd/2
Ish=Im*((Rm-Rh)/Rh)
Rsh=(Im*Ish)/(Ish)
disp(Rsh,'value of Rsh(in ohm)=')
It=2*Im*(Rm/Rh)
R1=(E-Im*Rm)/It
disp(R1,'value of R1(in ohm)=')
```

Scilab code Exa 5.13 Find value of required multiplier resistance

```
//caption:Find value of required multiplier
   resistance
//Ex5.13
clc
clear
close
Iav=100*10^-6//current value(in A)
Rm=100//internal resistance(in ohm)
Vrms=100//maximum rms range(in V)
Rs=0.45*(Vrms/Iav)-Rm
disp(Rs,'value of multiplier resistance(in ohm)=')
```

Scilab code Exa 5.14 Find value of multiplier resistance

```
1 //caption:Find value of multiplier resistance
2 //Ex5.14
3 clc
4 clear
5 close
6 Vrms=10//rms voltage of the voltmeter(in V)
7 Ifsd=2*10^-3//ammeter reading(in A)
8 Rm=100//internal resistance(in ohm)
9 Sdc=1/Ifsd
10 Rs=(Sdc*0.45*Vrms)-Rm
11 disp(Rs,'value of multiplier resistance(in ohm)=')
```

Scilab code Exa 5.15 Find value of multiplier resistance

```
1 //caption:Find value of multiplier resistance
2 //Ex5.15
3 clc
4 clear
5 close
6 Vrms=20//voltmeter range(in V)
7 Ifsd=2*10^-3//ammeter reading(in A)
8 Rm=500//internal resistance(in ohm)
```

```
Sdc=1/Ifsd
Sac=0.9*Sdc
Rs=Sac*Vrms-Rm
disp(Rs,'value of multiplier resistance(in ohm)=')
```

Chapter 6

data converters

Scilab code Exa 6.1 Find output voltage for a binary input a 1111 b 1100

```
1 //caption:Find output voltage for a binary input(a)
     1111(b)1100
2 //Ex6.1
3 clc
4 clear
5 close
6 N=4//bit of D/A convertor
7 Rlsb=16//resistance at LSB position(in kilo ohm)
8 Vref=5//reference voltage(in V)
9 Ro=1//feedback resistance(in kilo ohm)
10 R=Rlsb/(2^(N-1))
11 Va=-(Ro/R)*Vref*(2^0*1+2^-1*1+2^-2*1+2^-3*1)
12 disp(Va,'(a)output voltage(in V)=')
13 Vb=-(Ro/R)*Vref*(2^0*1+2^-1*1+2^-2*0+2^-3*0)
14 disp(Vb,'(b)output voltage(in V)=')
```

Scilab code Exa 6.2 Find output voltage

```
1 //caption:Find output voltage
2 //Ex6.2
3 clc
4 clear
5 close
6 Lo=0//input voltage logic0(in V)
7 L1=20//input voltage logic1(in V)
8 V1msb=L1/2
9 V2msb=L1/4
10 V3msb=L1/8
11 V4msb=L1/16
12 Va=V1msb+V2msb+V3msb+V4msb
13 disp(Va,'output voltage(in V)=')
```

Scilab code Exa 6.3 Find output voltage if input is 101101111

```
1 //caption:Find output voltage if input is 101101111
2 //Ex6.3
3 clc
4 clear
5 close
6 V=10.3*10^-3//input voltage of DAC convertor(in V)
7 Vo=(V)
   *(1*2^8+0*2^7+1*2^6+1*2^5+0*2^4+1*2^3+1*2^2+1*2^1+1*2^0)
```

```
8 disp(Vo,'output voltage(in V)=')
```

Scilab code Exa 6.4 Find values of a LSB b MSB c full scale output

```
1 //caption:Find values of(a)LSB(b)MSB(c)full scale
    output
2 //Ex6.4
3 clc
4 clear
5 close
6 N=8//bit of the DAC convertor
7 Rmin=0//minimum range(in V)
8 Rmax=10//maximum range(in V)
9 LS=1/(2^N)
10 LSB=Rmax*LS
11 disp(LSB,'(a)LSB(in V)=')
12 MSB=Rmax/2
13 disp(MSB,'(b)MSB(in V)=')
14 F=Rmax-LSB
15 disp(F,'(c)full scale output(in V)=')
```

Scilab code Exa 6.5 Find resolution and voltage

```
1 //caption:Find resolution and voltage
```

```
2 //Ex6.5
3 clc
4 clear
5 close
6 N=3//bit of D/A convertor
7 V=5//full scale voltage(in V)
8 A=0.001//magnitude of accuracy
9 R=1/2^N
10 disp(R,'resolution(in V)=')
11 Ac=A*V
12 disp(Ac,'accuracy(in V)=')
```

Scilab code Exa 6.6 Find conversion time required for invertor

```
1 //caption:Find conversion time required for
     cinvertor
2 //Ex6.6
3 clc
4 clear
5 close
6 N=8//bit of A/D convertor
7 Vr=2.56//clock voltage(in V)
8 Vin=1.728//input voltage(in V)
9 F=100*10^3//clock frequency(in Hz)
10 P=173//steps required for conversion
11 Po=1/F
12 T=P*Po
13 disp(T,'total conversion time(in second)=')
```

Scilab code Exa 6.9 Find total number of pulses and display reading

```
1 //caption:Find total number of pulses and display
     reading
2 //Ex6.9
3 clc
4 clear
5 close
6 V=10//input voltage(in V)
7 S=0.001//ramp slope(in V/second)
8 F=1000000//clock frequency(in Hz)
9 T=1/F
10 t=V*S
11 P=t/T
12 disp(P,'total number of pulses=')
13 disp(P,'display reading=')
```

Scilab code Exa 6.10 Find input voltage

```
1 //caption:Find input voltage
2 //Ex6.10
3 clc
4 clear
5 close
```

```
Vref=5//reference voltage(in V)
t1=0.2//coumts when input voltage is applied(in sec)
R=100*10^3//resistance(in ohm)
C=10^-6//capacitance(in F)
t2=R*C
Vin=(t2/t1)*Vref
disp(Vin,'input voltage(in V)=')
```

Scilab code Exa 6.11 Find a output voltage after 1 sec b fall time of reference voltage waveform

```
//caption:Find(a)output voltage after 1 sec(b)fall
   time of reference voltage waveform
//Ex6.11
clc
clear
close
R=100000//resistance of DVM(in ohm)
C=10^-6//capacitance(in F)
Vin=1//input voltage(in V)
t1=1//rise time of reference voltage waveform at
   output of integrator(in second)
Vref=5//reference voltage(in V)
Vo=Vin*(t1/(R*C))
disp(Vo,'(a)output voltage after 1sec(in V)=')
t2=(Vin/Vref)*t1
disp(t2,'(b)fall time reference voltage waveform(in
   second)=')
```

Chapter 7

Display devices and digital systems

Scilab code Exa 7.1 convert 1101 into decimal

```
1 //caption:convert 1101 into decimal
2 //Ex7.1
3 clc
4 clear
5 close
6 decimal=1*2^3+1*2^2+0*2^1+1*2^0
7 disp(decimal,'decimal conversion=')
```

Scilab code Exa 7.2 convert 17 octal into decimal

```
1 //caption:convert 17 octal into decimal
2 //Ex7.2
```

```
clc
clear
close
decimal=1*8^1+7*8^0
disp(decimal,'decimal conversion=')
```

Scilab code Exa 7.3 convert 1E hexadecimal into decimal

```
//caption:convert 1E hexadecimal into decimal
//Ex7.3
clc
clear
close
E=14
decimal=1*16^1+E*16^0
disp(decimal,'decimal conversion=')
```

Scilab code Exa 7.20 Find input frequency applied to the system

```
//caption:Find input frequency applied to the system
//Ex7.20
clc
clear
close
F=1//frequency of crystal oscillator(in kilo Hz)
```

```
7 p=10//pulses
8 f=F*p
9 disp(f,'input frequency applied to the system(in
    kilo Hz)=')
```

Scilab code Exa 7.21 find frequency of the system

```
1 //caption:find frequency of the system
2 //Ex7.21
3 clc
4 clear
5 close
6 n=45//reading of digital frequency counter
7 T=10*10^-3//gate time period(in second)
8 F=1/T
9 f=n*F
10 disp(f,'frequency of the system(in Hz)=')
```

Scilab code Exa 7.22 find frequency time period of the system

```
1 //caption:find frequency time period of the system
2 //Ex7.22
3 clc
4 clear
5 close
```

```
6  n=30//reading of digital frequency counter
7  F=10^6//gate time period(in second)
8  T=1/F
9  t=n*T
10 disp(t,'frequency time period of the system(in
       second)=')
```

Scilab code Exa 7.23 Find a resolution of the voltmeter b display of point 6368 in voltmeter on the 10V range c display of point 6368 in voltmeter on the 1V range

```
1  //caption:Find (a)resolution of the voltmeter(b)
       display of 0.6368 in voltmeter on the 10V range(c
       )display of 0.6368 in voltmeter on the 1V range
2  //Ex7.23
3  clc
4  clear
5  close
6  n=4//precise digit value of voltmeter
7  Va=10//range(in V)
8  Vb=1//range(in V)
9  R=1/10^n
10 disp(R,'(a)resolution of the voltmeter(in V)=')
11 Vo=Va*R
12 d=0.636
13 disp(d,'(b)display of 0.6368 in voltmeter on the 10V
       range(in V)=')
14 V=Vb*R
15 do=0.6368
16 disp(do,'(c)display of 0.6368 in voltmeter on the 1V
       range(in V)=')
```

Scilab code Exa 7.24 Find a resolution of the voltmeter b display of 16 point 58 in voltmeter on the 10V range c display of point 7254 in voltmeter on the 1V and 10V range

```
1 //caption:Find (a)resolution of the voltmeter(b)
    display of 16.58 in voltmeter on the 10V range(c)
    display of 0.7254 in voltmeter on the 1V and 10V
    range
2 //Ex7.24
3 clc
4 clear
5 close
6 n=4//precise digit value of voltmeter
7 Va=10//range(in V)
8 Vb=1//range(in V)
9 R=1/10^n
10 disp(R,'(a)resolution of the voltmeter(in V)=')
11 Vo=Va*R
12 d=16.58
13 disp(d,'(b)display of 16.58 in voltmeter on the 10V
    range(in V)=')
14 V=Vb*R
15 do=0.7254
16 disp(do,'(c)display of 0.7254 in voltmeter on the 1V
    range(in V)=')
```

Scilab code Exa 7.25 find out range of measured reading

```
1 //caption:find out range of measured reading
2 //Ex7.25
3 clc
4 clear
5 close
6 V=50//reading of voltmeter(in V)
7 A=0.02//accracy magnitude
8 Vo=V*A
9 Rmin=V-Vo
10 Rmax=V+Vo
11 disp(Rmax,Rmin,'range(in V)=')
```

Chapter 8

cathode ray oscilloscope

Scilab code Exa 8.1 find deflection sensitivity of CRO

```
1 //caption:find deflection sensitivity of CRO
2 //Ex8.1
3 clc
4 clear
5 close
6 l=20*10^-3//axial length of deflection plate(in
    meter)
7 L=0.2//distance from the centre of the deflection
    plates to the screen(in meter)
8 s=5*10^-3//spacing between two plates(in meter)
9 V=2500//accelerating voltage(in Volt)
10 S=(l*L)/(2*s*V)
11 disp(S,'deflection sensitivity of CRO(in m/V)=')
```

Scilab code Exa 8.2 Find peak to peak amplitude of the signal and frequency of the signal

```
1 //caption:Find peak to peak amplitude of the signal
     and frequency of the signal
2 //ex8.2
3 clc
4 clear
5 close
6 V=0.5//vertical attenuation(in V/division)
7 n=4//number of divisions of vertical axis
8 P=V*n
9 disp(P,'peak to peak amplitude of the signal(in V)='
     )
10 T=P*n
11 f=1/T
12 disp(f,'frequency of the signal(in Hz)=')
```

Scilab code Exa 8.3 Find amplitude of the waveform

```
1 //caption:Find amplitude of the waveform
2 //ex8.3
3 clc
4 clear
5 close
6 V=5//vertical attenuation(in V/division)
7 n=2.5//number of divisions/cycle
8 P=V*n
9 disp(P,'amplitude of the waveform(in V)=')
```

Scilab code Exa 8.4 Find rms value of signal under test

```
1 //caption:Find rms value of signal under test
2 //ex8.4
3 clc
4 clear
5 close
6 S=100//Y sensitivity(in mV/division)
7 n=5//number of divisions of vertical axis
8 P=S*n
9 Vrms=P/(2*sqrt(2))
10 disp(Vrms,'rms value of signal under test(in V)=')
```

Scilab code Exa 8.5 Find value of current

```
1 //cption:Find value of current
2 //Ex8,5
3 clc
4 clear
5 close
6 V=10//voltage across resistor(in V)
7 R=1000//resistance(in ohm)
8 i=V/R
9 disp(i,'value of current(in A)=')
```

Scilab code Exa 8.6 Find value of current

```
1 //caption:Find value of current
2 //ex8.6
3 clc
4 clear
5 close
6 S=100//Y sensitivity(in mV/division)
7 n=5//number of divisions of vertical axis
8 R=4.7*10^3
9 P=S*n
10 Vrms=P/(2*sqrt(2))
11 i=Vrms/R
12 disp(i,'value of current(in A)=')
```

Scilab code Exa 8.7 Find peak amplitude and frequency of the signal

```
1 //caption:Find peak amplitude and frequency of the
    signal
2 //Ex8.7
3 clc
4 clear
5 close
```

```
V=0.5//vertical attenuator(in V/division)
Vo=10^-6//horizontal attenuator(in second/division)
n=6//number of divisions on vertical axis
N=5//number of division for complete one cycle
V1=V*n
Vp=V1/2
disp(Vp,'peak amplitude(in V)=')
T=Vo*N
f=1/T
disp(f,'frequency of the signal(in Hz)=')
```

Scilab code Exa 8.8 Find frequency of horizontal signal

```
//caption:Find frequency of horizontal signal
//Ex8.8
clc
clear
close
Y=2//number of Y peaks
X=1//number of X peaks
fv=2//vertical signal frequency(in kilo Hz)
fh=(X/Y)*fv
disp(fh,'frequency of horizontal signal(in kilo Hz)=
    ')
```

Scilab code Exa 8.9 Find frequency of the waveform

```
1 //caption:Find frequency of the waveform
2 //Ex8.9
3 clc
4 clear
5 close
6 t=0.5//time base(in microecond/division)
7 d=2//divisions/cycle
8 T=t*d
9 F=1/T
10 disp(F,'frequency of the waveform(in MHz)=')
```

Scilab code Exa 8.10 what will be the setting of time base knob

```
1 //caption:what will be the setting of time base knob
2 //Ex8.10
3 clc
4 clear
5 close
6 f=1//frequency of sine wave(in kHz)
7 n=10//number of divisions in a cycle
8 T=1/f
9 To=T/n
10 disp(To,'setting of time base knob(in ms)=')
```

Scilab code Exa 8.11 Find ratio of frequencies of vertical and horizontal signals

```
1 //caption:Find ratio of frequencies of vertical and
     horizontal signals
2 //Ex8.11
3 clc
4 clear
5 close
6 P1=1//positive Y peaks in pattern
7 P2=1//positive X peaks in pattern
8 f1=P1/P2
9 disp(f1,'ratio of frequencies of vertical and
     horizontal signals=')
10 P3=1//positive Y peaks in pattern
11 P4=3//positive X peaks in pattern
12 f2=P3/P4
13 disp(f2,'ratio of frequencies of vertical and
     horizontal signals=')
14 P5=4.5//positive Y peaks in pattern
15 P6=1//positive X peaks in pattern
16 f3=P5/P6
17 disp(f3,'ratio of frequencies of vertical and
     horizontal signals=')
```

Scilab code Exa 8.12 find phase angle

```
1 //caption: find phase angle
2 //Ex8.12
3 clc
4 clear
5 close
6 Y1=4//vertical pattern
7 Y2=8//vertical pattern
8 o=Y1/Y2
9 Y=asind(o)
10 disp(Y,'phase angle(in degree)=')
11 Y3=4//vertical pattern
12 Y4=4//vertical pattern
13 oo=Y3/Y4
14 Ya=asind(oo)
15 disp(Ya,'phase angle(in degree)=')
```

Scilab code Exa 8.13 Find bandwidth of CRO

```
1 //caption:Find bandwidth of CRO
2 //Ex8.13
3 clc
4 clear
5 close
6 tr=20*10^-9//rise time(in second)
```

```
7 B=0.35/tr
8 disp(B,'bandwidth of CRO(in Hz)=')
```