

Scilab Textbook Companion for
Electronic Measurements And Instrumentation
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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.

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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 R1e1=0.5 //limiting error for R1(in %)
8 R2=900 //resistance of arm wheatstone bridge(in ohm)
9 R1e2=0.8 //limiting error for R2(in %)
10 R3=825 //resistance of arm wheatstone bridge(in ohm)
11 R1e3=0.6 //limiting error for R3(in %)
12 Rx=(R2*R3)/R1
13 disp(Rx, 'unknown resistance(in ohm)=')
14 dR1=(R1*R1e1)/100
15 dR2=(R2*R1e2)/100

```

```
16 dR3=(R3*R1e3)/100
17 dR=((dR2/R2)+(dR3/R3)+(dR1/R1))*100
18 disp(dR,'relative limiting error(in %)=')
19 Le=(dR*Rx)/100
20 disp(Le,'limiting error(in ohm)=')
```

Scilab code Exa 2.4 Find limiting error

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

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

```
1 //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

```

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

```

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

```

1 //caption:Find limiting error when measured voltage
  is (a)V1(b)V2
2 //Ex2.9
3 clc
4 clear
5 close
6 Ar=0.01//magnitude of accuracy(in V)
7 V1=50//measured voltage(in V)
8 V2=25//measured voltage(in V)
9 Vmax=100//maximum range of voltage
10 dA=Ar*Vmax
11 er1=(dA/V1)*100
12 disp(er1,'limiting error when measured voltage is V1
  (in %)=')
13 er2=(dA/V2)*100
14 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
```

```

4 clear
5 close
6 P=100//resistance of arm of wheatstone bridge(in ohm
   )
7 ep=0.5//error in P(in %)
8 Q=50//resistance of arm of wheatstone bridge(in ohm)
9 eq=0.5//error in Q(in %)
10 S=75.5//resistance of arm of wheatstone bridge(in
    ohm)
11 es=0.5//error in S(in %)
12 X=(P*S)/Q
13 disp(X,'unknown resistance (in ohm)=')
14 xo1=ep+es-eq
15 disp(xo1,'percent error when Q is taken positive(in
    %)=')
16 ex1=(xo1*X)/100
17 disp(ex1,'error in ohm(in ohm)=')
18 xo2=ep+es+eq
19 disp(xo2,'percent error when Q is taken negative(in
    %)=')
20 ex2=(xo2*X)/100
21 disp(ex2,'error in ohm(in ohm)=')

```

Scilab code Exa 2.12 Find arithmetic mean

```

1 //caption:Find arithmetic mean
2 //Ex2.12
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 X=(x1+x2+x3+x4+x5)/5
12 disp(X, 'arithmetic mean(in W)=')
```

Scilab code Exa 2.13 Find deviation

```
1 //caption:Find deviation
2 //Ex2.13
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 X=(x1+x2+x3+x4+x5)/5
12 d1=x1-X
13 disp(d1, 'deviation=')
14 d2=x2-X
15 disp(d2, 'deviation=')
16 d3=x3-X
17 disp(d3, 'deviation=')
18 d4=x4-X
19 disp(d4, 'deviation=')
20 d5=x5-X
21 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
algebraic sum of deviation d average deviation e standard deviation

```
1 //caption:Find(a) arithmetic mean(b) deviation of each
    value(c) algebraic 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) algebraic 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
23 disp(D, '(c) average deviation=')
24 S=((d1^2+d2^2+d3^2+d4^2+d5^2)/(n-1))^(0.5)
25 disp(S, '(d) standard deviation (in V)=')
26 V=S^2
27 disp(V, '(e) variance (in V)=')
28 P=0.6745*V
29 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(0, '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
```

```

6 V=5//LVDT connection voltage(in V)
7 Vo=2//output voltage of LVDT(in mV)
8 D=0.5//displacement(in mm)
9 A=250//amplification factor
10 Do=100//divisions of scale
11 Ds=0.2//reading capacity of LVDT division
12 S=Vo/D
13 disp(S, '(a) sensitivity of LVDT(in mV/mm)=')
14 So=A*S
15 disp(So, '(b) sensitivity of entire setup(in mV/mm)=')
16 C=V/Do
17 M=Ds*C
18 R=M/S
19 disp(R, '(c) resolution of the instrument(in mm)=')

```

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

```

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

```
3 clc
4 clear
5 close
6 I=0.01//current through LDR(in A)
7 R=15//Resistance of LDR(in ohms)
8 V=9//supply voltage(in V)
9 Vo=I*R
10 Vp=V-Vo
11 R=Vp/I
12 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//uncertainty of first arm (in ohm)
8 R2=1000//resistance of arm of wheatstone bridge(in
   ohm)
9 dR2=0.5//uncertainty of second arm(in ohm)
10 R3=600//resistance of third arm of wheatstone bridge
   (in ohm)
11 dR3=0.5//uncertainty 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
    centigrade)
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
```



```

3  clc
4  clear
5  close
6  R=1000//resistance of all the arms ofwheatstone
    bridge(in ohm)
7  a=10//temperature coefficient of thermistor(in ohm/
    degree centigrade)
8  Eth=0.05//thevenin voltage(in V)
9  V=20//input voltage(in V)
10 T=50//temperature(in degree centigrade)
11 Ro=1000//resistance of thermometer(in ohm)
12 dR=(Eth*4*R)/V
13 To=T-1
14 disp(To,'temperature at which thevenin voltage is 50
    mV(in degree centigrade)=')

```

Scilab code Exa 4.4 Find deflection of the galvenometer

```

1  //caption:Find deflection of the galvenometer
2  //Ex4.4
3  clc
4  clear
5  close
6  R1=80//resistance of first arm(in ohm)
7  R2=800//resistance of second arm(in ohm)
8  R3=160//resistance of third arm(in ohm)
9  R4=1605//resistance of fourth arm(in ohm)
10 E=4//battery voltage(in V)
11 S=8//galvenometer sensitivity(in milimeter per micro
    ampere)
12 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
```

```

3  clc
4  clear
5  close
6  R1=220//resistance of first arm(in ohm)
7  C1=0.22*10^-6//capacitance of first arm(in F)
8  R2=1000//resistance of second arm(in ohm)
9  R3=1000//resistance of third arm(in ohm)
10 f=1000//frequency of arm(in Hz)
11 w=2*%pi*f
12 R=(R2*R3)/R1
13 disp(R, 'resistance (in ohm)=')
14 L=R2*R3*C1
15 disp(L, 'inductance (in H)=')
16 Q=w*R1*C1
17 disp(Q, 'Q value of the bridge=')

```

Scilab code Exa 4.8 find relative permittivity of specimen

```

1 //caption:find relative permittivity of specimen
2 //Ex4.8
3 clc
4 clear
5 close
6 C1=120//capacitance of first arm without specimen(in
   pF)
7 C3=150//capacitance of third arm without specimen(in
   pF)
8 R1=5000//resistance of first arm without specimen(in
   ohm)
9 R2=5000//resistance of second arm without specimen(
   in ohm)

```

```

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

```

Scilab code Exa 4.9 Find equivalent parallel resistance and capacitance

```

1 //caption:Find equivalent parallel resistance and
    capacitance.
2 //Ex4.9
3 clc
4 clear
5 close
6 R1=3.1 //resistance(in kilo ohm)
7 R2=25 //resistance(in kilo ohm)
8 C1=5.2*10^-6 //capacitance(in F)
9 R4=100 //resistance(in kilo ohm)
10 f=2500 //frequency (in Hz)
11 w=2*%pi*f
12 R3=(R4/R2)*((R1)+1/(w^2)*R1*(C1^2))
13 disp(R3,'equivalent parallel resistance(in kilo ohm)
    =')
14 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

```

```

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

```

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

```

1 //caption:find value of frequency of the bridge arm
  resistance of arm AD
2 //Ex4.13
3 clc
4 clear
5 close
6 R1=1000//resistance of arm AB(in ohm)
7 C1=0.159*10^-6//capacitance of arm AB(in F)
8 R2=1000//resistance of arm BC(in ohm)
9 C3=0.636*10^-6//capacitance of arm BC(in F)
10 R4=500//resistance of arm BC(in ohm)
11 R3=R1*((R4/R2)-(C1/C3))
12 disp(R3,'resistance of the arm AD(in ohm)=')
13 f=1/(2*pi*sqrt(C1*C3*R1*R3))
14 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 variable load are a 100 ohm
b) 10 ohm

```
1 //caption:Find load current when variable 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 Z11=100//load impedance(in ohm)
8 Z12=10//load impedance(in ohm)
9 Is=10//current source value(in A)
10 I11=(Is/(1+(Z11/Zs)))
11 disp(I11, '(a)load current when variable load is 100
   ohm(in ohm)=')
12 I12=(Is/(1+(Z12/Zs)))
13 disp(I12, '(b)load current when variable load is 10
   ohm(in ohm)=')
```

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

```

1 //caption:Find equivalent 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,'equivalent voltage source of the ac
  current source(in V)=')

```

Scilab code Exa 5.4 Find equivalent current source

```

1 //caption:Find equivalent 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,'equivalent 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 R1=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 V1=(R1/(S1+R1))*Vi
12 Vo=R*S1
13 Rth=((R1*Vo)/(R1+Vo))
14 V1=(Rth/(R1+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=((R1*Vc)/(R1+Vc))
20 V2=(Rt/(R1+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


```

1 //caption:Find R1 and Rsh
2 //Ex5.12
3 clc
4 clear
5 close
6 Ifsd=0.001//current value(in A)
7 Rm=100//resistance(in ohm)
8 E=3//voltage(in V)
9 Rh=1//deflection resistance(in ohm)
10 Im=Ifsd/2
11 Ish=Im*((Rm-Rh)/Rh)
12 Rsh=(Im*Ish)/(Ish)
13 disp(Rsh,'value of Rsh(in ohm)=')
14 It=2*Im*(Rm/Rh)
15 R1=(E-Im*Rm)/It
16 disp(R1,'value of R1(in ohm)=')
```

Scilab code Exa 5.13 Find value of required multiplier resistance

```

1 //caption:Find value of required multiplier
  resistance
2 //Ex5.13
3 clc
4 clear
5 close
6 Iav=100*10^-6//current value(in A)
7 Rm=100//internal resistance(in ohm)
8 Vrms=100//maximum rms range(in V)
9 Rs=0.45*(Vrms/Iav)-Rm
10 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)
```

```
9 Sdc=1/Ifsd
10 Sac=0.9*Sdc
11 Rs=Sac*Vrms-Rm
12 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*28+0*27+1*26+1*25+0*24+1*23+1*22+1*21+1*20)
```

```
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 inverter

```

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
```



```

6 Vref=5//reference voltage(in V)
7 t1=0.2//countts when input voltage is applied(in sec)
8 R=100*10^3//resistance(in ohm)
9 C=10^-6//capacitance(in F)
10 t2=R*C
11 Vin=(t2/t1)*Vref
12 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

```

1 //caption:Find(a)output voltage after 1 sec(b)fall
   time of reference voltage waveform
2 //Ex6.11
3 clc
4 clear
5 close
6 R=100000//resistance of DVM(in ohm)
7 C=10^-6//capacitance(in F)
8 Vin=1//input voltage(in V)
9 t1=1//rise time of reference voltage waveform at
   output of integrator(in second)
10 Vref=5//reference voltage(in V)
11 Vo=Vin*(t1/(R*C))
12 disp(Vo,'(a)output voltage after 1sec(in V)=')
13 t2=(Vin/Vref)*t1
14 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
```

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

Scilab code Exa 7.3 convert 1E hexadecimal into decimal

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

Scilab code Exa 7.20 Find input frequency applied to the system

```
1 //caption:Find input frequency applied to the system
2 //Ex7.20
3 clc
4 clear
5 close
6 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=(1*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 //caption: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
```

```

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

Scilab code Exa 8.8 Find frequency of horizontal signal

```

1 //caption:Find frequency of horizontal signal
2 //Ex8.8
3 clc
4 clear
5 close
6 Y=2//number of Y peaks
7 X=1//number of X peaks
8 fv=2//vertical signal frequency(in kilo Hz)
9 fh=(X/Y)*fv
10 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 microcond/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)=')
```
