

Scilab Textbook Companion for  
High Voltage Engineering  
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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

## Breakdown Mechanism of Gases Liquid and Solid Materials

Scilab code Exa 1.1 Example 1

```
1 //Chapter 1,Example 1.1 Page 51
2 clc
3 clear
4 I = 600 // micor amps
5 x = 0.5 // distance in cm
6 V = 10 // kV
7 I2 = 60 // micro amps
8 x2 = 0.1 // distance in cm
9 //Calculation 600 = I0*exp(0.5*alpha) and 60 = I0*
  exp(0.1*alpha)
10 alpha = log(600/60)/(0.5-0.1)
11 printf("Townsend's first ionising coefficient = %f
  ionizing collisions/cm", alpha)
12
13 //Answers may vary due to round of error
```

---

## Scilab code Exa 1.2 Example 2

```
1 //Chapter 1,Example 1.2 Page 52
2 clc
3 clear
4 // Referring the table in example 1.2
5 // slope between any two points (log(I/I0)/x)
6 // taking the gap between 2 and 2.5 mm
7 I1= 1.5*10^-12
8 I2= 5.6*10^-12
9 I0 = 6*10^-14
10 gi1 = log(I1/I0) // gradual increase when gap is 2
11 gi2 = log(I2/I0) // gradual increase when gap is 2.5
    //claculation in text is wrong
12 slope = (gi1-gi2)/0.05
13 printf(" Slope = %f \n", -slope)
14 //evaluvating ghama
15 e1 = exp(-slope*0.5)
16 e2 = exp(-slope*0.5) // -1 is ignored due to the
    large magnitude
17 ghama = (7*10^7-6*e1)/(e2*7*10^7)
18 printf(" Ghama for set 1= %e /cm \n ", ghama)
19 //Gap between the slope for set 2
20 alpha = log(12/8)/0.05
21 printf(" Alpha = %e collosions/cm \n", alpha)
22 e1 = exp(alpha*0.5)
23 e2 = exp(alpha*0.5) // -1 is ignored due to the
    large magnitude
24 ghama = (2*10^5-e1)/(e2*2*10^5)
25 printf(" Ghama for set 2= %e colissions/cm \n",
    ghama)
26
27 //Answers may vary due to round of error
```

---



### Scilab code Exa 1.3 Example 3

```
1 //Chapter 1,Example 1.3 Page 53
2 clc
3 clear
4 //employing equation  $Vb = K*d^n$ 
5 //88 =  $K*4^n$  ——— eq(1)   165 =  $K*8^n$  ———eq(2)
6 //dividing eq(2)/q(1)
7 Vb1 = 88
8 Vb2 = 165
9 n1 = 0.6286/0.693
10 K1 = Vb1/4^n1
11 //135 =  $K*6^n$  ——— eq(1)   212 =  $K*10^n$  ———eq(2)
12 //dividing eq(2)/q(1)
13 Vb1 = 135
14 Vb2 = 212
15 n2 = 0.4513/0.5128
16 K2 = Vb1/6^n2
17 n = (n1+n2)/2
18 K = (K1+K2)/2
19 printf (" n = %f (approx.) K = %f (approx.)",n,K)
20
21 //Answer may vary due to round of error
```

---

### Scilab code Exa 1.4 Example 4

```
1 //Chapter 1,Example 1.4 Page 53
2 // Determine (pd)min Vbmin
3 clc
4 clear
5 A = 12
6 B = 365
```

```
7 e = 2.718
8 ghama = 0.02
9 K = 51
10 pd = (e/A)*log(1+(1/ghama))
11 Vbmin = (B/A)*e*log(K)
12 printf (" (pd)min = %f Vbmin = %f Volts",pd,Vbmin)
13
14 //Answers may vary due to round of error
```

---

## Chapter 2

# Generation of High DC and AC Voltages

Scilab code Exa 2.1 Example 1

```
1 //Chapter 2,Example 2.1 Page 78
2 clc
3 clear
4 //(i) Determine volatge regulation
5 C = 0.06 // micro farad
6 I = 1 //mA
7 f = 150 //Hz
8 n = 10
9 V = (1/(f*C))*((2*n^3/3)+(n^2/2))
10 perc = (V*100)/(2*10*100)
11 printf (" (ia) Volatge regulation = %f kV \n ",V)
12 printf (" (ib) percentage volatge regulation = %f \n
    ",perc)
13 //(ii) Ripple volatge
14 delV = (1/(f*C))*(n*(n+1)/2)
15 perc = (delV*100)/(2*10*100)
16 printf (" (iia) The ripple vottage = %f kV \n ",delV)
17 printf (" (iib) percentage ripple vottage = %f \n ",
    perc)
```

```

18 //(iii) Optimum no. of stages
19 Vmax = 100
20 I = 10^-3
21 OnS = sqrt(Vmax*f*C*10^-6*10^3/I)
22 //(iv) Maximum output volatge
23 Vout = OnS*(4/3)*Vmax
24 printf (" (iii) Optimum no. of stages = %d \n ",OnS
    )
25 printf (" (iv) Maximum output volatge = %d KV\n ",
    Vout)
26
27 // Answers may vary due to round off error

```

---

#### Scilab code Exa 2.2 Example 2

```

1 //Chapter 2,Example 2.2 Page 79
2 clc
3 clear
4 // based on the circuit Fig.Ex.2.2
5 V = 100 // kVA
6 R = (1/100)*(200^2/0.1) // Resistance of transformer
7 r = (5/100)*(200^2/0.1) // reactance of transformer
8 printf (" Resistance of transformer = %d ohm \n ",R)
9 printf (" Reactance of transformer = %d ohm \n ",r)
10 rC = 400/0.5 // Reactance of capacitor
11 rI = 20 // Inductive reactance
12 ArI = rC-rI // Additional inductive reactance
13 Ic = ArI*1000/314 // inductance required
14 TrC = 8 // total reactance in cercuit in Kohm
15 I = 0.5
16 Vsec = I*TrC // Secondary voltage
17 Vp = 4*(250/200) // primary voltage
18 printf (" Reactance of capacitor = %d K ohm \n ",rC)
19 printf (" Inductive reactance = %d ohm \n ",rI)
20 printf (" Additional inductive reactance k Ohm= %d

```

```

    \n ",ArI)
21 printf (" Inductive required = %d H \n ",Ic)
22 printf (" Total reactance in cercuit = %d Kohm \n ",
    TrC)
23 printf (" Secondary voltage = %d kV \n ",Vsec)
24 printf (" Secondary voltage = %d volts \n ",Vp)
25
26 // Answers may vary due to round off error

```

---

### Scilab code Exa 2.3 Example 3

```

1 //Chapter 2,Example 2.3 Page 68
2 // based on equation 2.18
3 clc
4 clear
5 E = 30*10^3 // V/cm
6 E0 = 8.854*10^-12 // Epselon
7 b = 1
8 v = 10
9 sigma = E0*E
10 printf (" sigma = %e C/m^2 \n ",sigma)
11 I = sigma*b*v
12 printf (" I = %e Amp",I)
13 //Answers may vary due to round of error

```

---

## Chapter 3

# Generation of Impulse Voltages and Currents

Scilab code Exa 3.1 Example 1

```
1 //Chapter 3,Example 3.1 Page 104
2 clc
3 clear
4 R1 = 75 //ohms
5 R2 = 2600 //ohms
6 C1 = 25 // nF
7 C2 = 2.5 //nF
8 alpha = (10^9/2)*(1/(R2*C1)+1/(R1*C1)+1/(R1*C2))
9 beeta = (1/2)*sqrt(4*alpha^2-4*10^18/(R1*R2*C1*C2))
10 t1 = (1/(2*beeta))*log((alpha+beeta)/(alpha-beeta))
11 K = 0.7/(t1*(alpha-beeta))+1
12 t2 = K*t1
13 printf (" alpha = %e \n ",alpha)
14 printf (" beta = %e \n ",beeta)
15 printf (" K = %f \n ",K)
16 printf (" t1 = %e micro sec \n ",t1*10^6)
17 printf (" t2 = %f micro sec \n ",t2*10^6)
18
19 //Aproximating the circuit and neglecting R2
```

```

20 t1 = 3*((C1*C2*10^-18)/(C1+C2*10^-9))*R1
21 // C1 and C2 are in parallel and R1 and R2 in
    series
22 t2 = 0.7*(R1+R2)*(C1+C2)*10^-9
23 printf (" t1 = %f micro sec \n ",t1*10^9*10^6)
24 printf (" t2 = %f micro sec \n ",t2*10^6)
25 printf ("On comparison with the values obtained
    through exact formulate it is found that whereas
    wave tail time is more or less same, \n the wave
    front time as calculated through approximate
    formula is quite erroneous.")
26
27 // Answers may vary due to round off error

```

---

### Scilab code Exa 3.2 Example 2

```

1 //Chapter 3,Example 3.2 Page 106
2 clc
3 clear
4 t1 = 1.2*10^-6
5 C1 = (0.3/12)*10^3
6 C2 = 0.4
7 R1 = (C1+C2)*t1/(3*(C1*C2*10^-9))
8 t2 = 50*10^-6
9 R1R2 = t2/(0.7*(C1+C2)*10^-9) // (R1+R2)
10 R2 = R1R2-R1
11 printf (" R1 = %f ohm \n ",R1)
12 printf (" R2 = %f ohm \n ",R2)
13 // Alternative method
14 ab = 0.7*10^-6/(t2-t1) // alpha-beta
15 ghama = C1/C2 // large value therefore
16 R2 = 10^3/(C1*ab) // mentioned wrong in the text
17 // alpha = beta and based on the eq: t1 = (2/(2*
    alpha))log((2*alpha)/(alpha-beta))
18 alpha = 2.43

```

```

19 beeta = 2.415656
20 R1 = (10^3/C1)*((1/(alpha+beeta))+(62.5/(alpha+beeta
    )))
21 V0 = 125*12
22 Vmax = V0/(2*R1*C2*10^-3*beeta)
23 printf (" ghama = %f (large value)\n ",ghama)
24 printf (" R2 = %f ohm \n Since alpha aprox. equa to
    beta ",R2)
25 printf (" \n R1 = %f ohm \n ",R1)
26 printf (" Vmax = %f kV \n ",Vmax)
27
28 //Answers vary due to round of error

```

---

### Scilab code Exa 3.3 Example 3

```

1 //Chapter 3,Example 3.3 Page 107
2 clc
3 clear
4 R = 1
5 C = 15*10^-6
6 L = 2*10^-3
7 V = 125 // kV
8 v = R/2*sqrt(C/L)
9 pow = -v*asin(sqrt(1-v^2))/sqrt(1-v^2)
10 e = exp(pow)
11 Imax = 2*V*v*e
12 t1 = sqrt(L*C)*asin(sqrt(1-v^2))/sqrt(1-v^2)
13 // based on trila and error t2=1275 micro sec
14 t2 = 1275 // micro sec
15 RHS = 0.5286*sin(t2/173.2)
16 printf (" Imax = %f KA \n ",Imax)
17 printf (" t1 = %f micro sec \n ",t1*10^6)
18 printf (" t2 = %f micro sec \n ",t2)
19 printf (" RHS = %f \n ",RHS)
20 printf ("Therefore , time to 50 percent value is 1275

```



sec”)

---

# Chapter 4

## Measurement of High Voltages and Currents

Scilab code Exa 4.1 Example 1

```
1 //Chapter 4,Example 4.1 Page 144
2 clc
3 clear
4 //Determine the voltge when S=2 cm
5 S = 0.2 // cm
6 Vb = 24.22*S+6.08*sqrt(S)
7 printf (" Vb when S = 2 cm is %f kV \n ",Vb)
8 //Determine the voltge when S=1.5 cm
9 S = 1.5 // cm
10 Vb = 24.22*S+6.08*sqrt(S)
11 printf (" Vb when S = 1.5 is %f kV \n ",Vb)
12 b = 75
13 t = 35
14 D = (3.92*b)/(273+t)
15 printf (" Air density correction factor= %f \n ",D)
16
17 //Answer may vary due to round off error
```

---

### Scilab code Exa 4.2 Example 2

```
1 //Chapter 4,Example 4.2 Page 145
2 clc
3 clear
4 // Determine the potential difference
5 AP = 8^2/4 // Area of plate
6 d = 4 // mm
7 FA = 0.2*9.8*10^-3 // Force of attraction
8 V = sqrt(FA*2*36*16*10^-6/(10^-9*16*10^-4))
9 printf (" Area of plate = %f sq.cm \n ",AP)
10 printf (" V = %f V \n ",V)
11
12 //Answers may vary due to round off error
```

---

### Scilab code Exa 4.3 Example 3

```
1 //Chapter 4,Example 4.3 Page 145
2 clc
3 clear
4 d = 1 //mm
5 V = 10^3 // V
6 F = 5*10^-3 // pull between the plates in N
7 E = 1/(36) // epselon
8 A = 10^2/4 // Area of the plate
9 d1 = sqrt((1/(2*F))*E*10^-9*V^2*A*10^-4) //
    calculation done in the text is wrong
10 d21 = 1/(d1*10^4)
11 d22 = 1/(d1*10^4+d)
12 C = (V*E*10^-9*A*10^-4)*(d21-d22)
13 printf (" d = %f mm \n ",d1*10^4)
```

```

14 printf (" charge in capacitance = %f pF \n ",C
      *10^12)
15
16 //Answers may vary due to round off error

```

---

#### Scilab code Exa 4.4 Example 4

```

1 //Chapter 4,Example 4.4 Page 145
2 clc
3 clear
4 Imin = 2*10^-6 // A
5 Imax = 35*10^-6 // A
6 V = 15*10^4 // V
7 w = 2*%pi*1500/60
8 Cm = sqrt(2)*Imin/(V*w)
9 Ipeak = 2*250/15
10 printf (" Cm = %f pF \n ",Cm*10^13)
11 printf (" At 250 kV, the current indicated will be =
      %f A \n ",Ipeak)
12
13 //Answers vary due to round off error

```

---

#### Scilab code Exa 4.5 Example 5

```

1 //Chapter 4,Example 4.5 Page 146
2 clc
3 clear
4 V1 = 150*10^3 // V
5 PD = 1200 // potential divider ratio
6 I = 10^-6 // A
7 t = 8 // sec
8 V = V1/PD
9 R = V/I

```

```

10 C = t*10^6/R
11 printf (" V = %f V \n ",V)
12 printf (" R = %f M \n ",R*10^-6)
13 printf (" C = %f F \n ",C)
14
15 // Answers provided in the textbook are wrong

```

---

#### Scilab code Exa 4.6 Example 6

```

1 //Chapter 4,Example 4.6 Page 146
2 clc
3 clear
4 i = 8*10^3 // i(t)
5 V0 = 8 // V0(t)
6 I = 8*10^3 // A
7 rcI = 10^10 // rate of change of current in A/sec
8 R = 8*10^3 // ohm
9 RCbyM = i/V0 // R*C/M
10 t = I/rcI // 1/4 of cycle
11 T = t*4
12 f = 1/T
13 CR = 5/f
14 M = CR/RCbyM
15 C = CR/R
16 printf (" Time for 1/4 cycle = %e sec \n ",t)
17 printf (" Full time = %e sec \n ",T)
18 printf (" f = %e Hz \n ",f)
19 printf (" M = %e H \n ",M)
20 printf (" C = %e F \n ",C)
21 printf (" R = %e \n ",R)
22
23 // Answers may vary due to round off error

```

---

# Chapter 6

## Nondestructive Insulation Test Techniques

Scilab code Exa 6.1 Example 1

```
1 //Chapter 6,Example 6.1 Page 198
2 clc
3 clear
4 Cs = 106 // micro F
5 C2 = 0.35 // micro F
6 R2 = 318 // ohms
7 R1 = 130 // ohms
8 w = 314
9 Rs = R1*(C2/Cs)
10 Cs1 = Cs*(R2/R1)
11 tang = w*Cs1*10^-6*Rs
12 cosp = tang
13 printf (" Rs = %f ohm \n ",Rs)
14 printf (" Cs = %f F \n ",Cs1)
15 printf (" tan s = %f \n ",tang)
16 printf (" cos = %f \n ",cosp)
17
18 //Answers may vary due to round off error
```

---

### Scilab code Exa 6.2 Example 2

```
1 //Chapter 6,Example 6.2 Page 199
2 clc
3 clear
4 Cs = 106 // micro F
5 C2 = 0.35 // micro F
6 R2 = 318 // ohms
7 R1 = 130 // ohms
8 w = 314
9 Cp = Cs*(R2/R1)
10 Rp = R1/(w^2*C2*Cs*10^-12*R2^2)
11 tang = 1/(w*Rp*Cp*10^-6)
12 printf (" Rp = %f ohm \n ",Rp)
13 printf (" Cp = %f F \n ",Cp)
14 printf (" tan = %f \n ",tang)
15
16 //Answers may vary due to round off error
```

---

### Scilab code Exa 6.3 Example 3

```
1 //Chapter 6,Example 6.3 Page 199
2 clc
3 clear
4 Cs = 500*10^-12 // F
5 R1 = 800 // ohm
6 R2 = 180 // ohm
7 C2 = 0.15 // micro F
8 w = 314
9 V = 33*10^3
10 Cp = Cs*(R2/R1)
11 Rp = R1/(w^2*C2*Cs*10^-6*R2^2)
```

```

12 tang = 1/(w*Rp*Cp)
13 p1 = V^2/Rp
14 printf (" Rp = %e ohm \n ",Rp)
15 printf (" Cp = %e F \n ",Cp)
16 printf (" tan      = %f \n ",tang)
17 printf (" Power loss = %f watts \n ",p1)
18
19 //Answer may vary due to round off error

```

---

#### Scilab code Exa 6.4 Example 4

```

1 //Chapter 6,Example 6.4 Page 200
2 clc
3 clear
4 t = 60
5 C = 600*10^-12
6 V = 250
7 v = 92
8 R = t/(C*log(V/v))
9 printf (" R = %e ohm \n ",R)

```

---

#### Scilab code Exa 6.5 Example 5

```

1 //Chapter 6,Example 6.5 Page 200
2 clc
3 clear
4 Ca = 50 // pF
5 C = 190 // pF
6 loss = 0.0085 // loss angle of electrodes
7 Er = C/Ca
8 tang = 0.0085
9 Er1 = Er*tang
10 E0 = 8.854*10^-1

```



```

11 E1 = E0*Er
12 jE1 = E0*Er1
13 printf (" The dielectric constant = %f \n ",Er)
14 printf (" tan      = %f \n ",tang)
15 printf (" E = (%f - j %f ) * 10^-11 F/m \n ",E1,jE1)
16
17 //Answer may vary due to round off

```

---

#### Scilab code Exa 6.6 Example 6

```

1 //Chapter 6,Example 6.6 Page 201
2 clc
3 clear
4 w = 314
5 E0 = 8.854*10^-12
6 Er = 3.8
7 tang = 0.0085
8 E = 40*10^5
9 sigE = w*E0*Er*tang*E^2
10 printf (" E ^2 = %f Watts/m^3\n ",sigE)
11
12 //Answers may vary due to round off

```

---

#### Scilab code Exa 6.7 Example 7

```

1 //Chapter 6,Example 6.7 Page 201
2 clc
3 clear
4 //Refer Fig Ex. 6.7
5 Er = 3.8
6 v = 21 // KV/cm
7 ind = v/Er // internal discharge in kV/cm
8 V = (ind*0.9)+(v*0.1)

```

```
9 printf (" Internal discharge = %f kV/cm\n ",ind)
10 printf (" V = %f kV rms\n ",V)
11
12 //Answer may vary due to round off error
```

---

# Chapter 7

## Transients in Power Systems and Insulation Coordination

Scilab code Exa 7.1 Example 1

```
1 //Chapter 7,Example 7.1 Page 221
2 clc
3 clear
4 //(i)The natural impedance of the line
5 d = 100
6 r = 0.75
7 E0 = 10^-9/36 //Epsilon
8 L = 2*10^-7*log(d/r) // inductance per unit length
9 C = 2*E0/log(d/r) // capacitance per phase per unit
   length
10 NI = sqrt(L/C) // natural impedance
11 printf("(i) The natural impedance of the line \n")
12 printf("The natural impedance = %f ohms \n\n",NI)
13 //(ii) the line current
14 V = 11000 // V
15 R = 1000
16 Z2= 1000
17 Z1 = 294
18 I = V/(sqrt(3)*NI) // the line current
```

```

19 printf ("(ii) The line current \n")
20 printf (" The line current = %f amps \n\n",I)
21 //(iii) the rate of power consumption
22 E1 = 2*V*R/(sqrt(3)*(Z1+Z2))
23 P = 3*E1^2*1000/R
24 printf ("(iii) The rate of power consumption \n")
25 printf (" The rate of power consumption = %f kW \n",
    P*10^-6)
26 E2 = ((Z2-Z1)/(Z2+Z1))*(11/sqrt(3))
27 Er = 3*(E2^2)*1000/Z1
28 printf (" The rate of reflected energy = %f kW \n\n"
    ,Er)
29 //(iv) the rate of reflected energy
30 printf ("(iv) The rate of reflected energy \n")
31 printf (" In order that the incident wave when
    reaches the terminating resistance , \n does not
    suffer reflection , the terminating resistance
    should be equal to \n the surge impedance of the
    line , i.e.%f ohms \n\n",NI)
32 //(v) The amount of reflected and transmitted power
33 printf ("(v) The amount of reflected and transmitted
    power \n")
34 L = 0.5*10^-8
35 C = 10^-12
36 SI = sqrt(L/C) // surge impedance of the cable
37 printf (" Surge impedance of the cable = %f ohm \n",
    SI)
38 ReffV = (2*SI/(Z1+SI))*(11/sqrt(3)) // refracted
    voltage
39 Rif = ((SI-Z1)/(Z1+SI))*(11/sqrt(3)) // reflected
    voltage
40 refP = 3*ReffV^2*1000/SI
41 rifp = 3*Rif^2*1000/Z1
42 printf (" Refracted powers = %f kW \n",refP) //
    refracted powers
43 printf (" Reflected powers = %f kW \n",rifp) //
    reflected powers
44

```

45 // Answers may vary due to round off error

---

### Scilab code Exa 7.2 Example 2

```
1 //Chapter 7,Example 7.2 Page 222
2 clc
3 clear
4 Lc = 0.3*10^-3 // H
5 Cc= 0.4*10^-6 // F
6 Ll = 1.5*10^-3 // H
7 Cl = 0.012*10^-6 //F
8 V = 15 // kV
9 Ic = sqrt(Lc/Cc) // The natural impedance of the
   cable
10 Il = sqrt(Ll/Cl) // The natural impedance of the
   line
11 E = 2*Il*V/(Ic+Il)
12 printf ("The natural impedance of the cable = %f
   ohms \n",Ic) // unit failed to be mentioned
13 printf (" The natural impedance of the line = %f
   ohms \n",Il)
14 printf (" E = %f kV \n",E)
15
16 // Answers may vary due to round of error
```

---

### Scilab code Exa 7.3 Example 3

```
1 //Chapter 7,Example 7.3 Page 223
2 clc
3 clear
4 E = 100
5 Z1 = 1/600 // 1/Z1
6 Z2 = 1/800 // 1/Z2
```

```

7 Z3 = 1/200 // 1/Z3
8 E11 = (2*E*Z1)/((Z1+Z2+Z3)*10^-3)
9 Iz2 = E11*1000*Z2
10 Iz3 = E11*1000*Z3
11 printf (" E'' = %f kV \n",E11*10^-3)
12 printf (" I z 2 = %f amps \n",Iz2*10^-3)
13 printf (" I z 3 = %f amps \n",Iz3*10^-3)
14
15 //Answers may vary due to round off error

```

---

#### Scilab code Exa 7.4 Example 4

```

1 //Chapter 7,Example 7.4 Page 226
2 clc
3 clear
4 E = 500
5 t = 2*10^-6
6 Z = 350
7 C = 3000
8 E1 = 2*E*(1-exp((-t*10^12)/(Z*C)))
9 printf (" E'' = %f kV \n",E1)
10
11 //Answers may vary due to round off error

```

---

#### Scilab code Exa 7.5 Example 5

```

1 //Chapter 7,Example 7.5 Page 226
2 clc
3 clear
4 E = 500
5 Z = 350
6 L = 800
7 E1 = E*(1-exp(-(2*Z/L)*2))

```

```
8 printf (" E'' = %f kV \n",E1)
9
10 //Answers may vary due to round off error
```

---

#### Scilab code Exa 7.6 Example 6

```
1 //Chapter 7,Example 7.6 Page 228
2 clc
3 clear
4 e0 = 50
5 x = 50
6 R = 6
7 Z = 400
8 v = 3*10^5
9 //(i)Value of the voltage wave when it has travelled
   through a distance of 50 km
10 pow = (-1/2)*(6/400)*50
11 e = e0*exp(pow)
12 //(ii)The power loss and the heat loss
13 PL = e^2*1000/Z // power loss
14 t = x/v
15 i0 = e0*1000/Z
16 HL = -x*i0*Z*(exp(-0.75)-1)/(R*v) // Heat loss
17 printf (" e = %f kV \n",e)
18 printf (" Power loss = %f kW \n",PL)
19 printf (" Heat loss = %f kJ \n",HL)
20
21 // Answers may vary due to round off error
```

---

#### Scilab code Exa 7.7 Example 7

```
1 //Chapter 7,Example 7.7 Page 213
2 clc
```

```
3 clear
4 //Based on equation 7.3, 7.5 and 7.7
5 v = 1/sqrt((4/36)*10^-9*10^-7)
6 printf (" v = %e meters/sec ",v)
```

---