

R Textbook Companion for
A Textbook of Electrical Engineering Materials
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June 11, 2020

¹Funded by a grant from the National Mission on Education through ICT - <http://spoken-tutorial.org/NMEICT-Intro>. This Textbook Companion and R codes written in it can be downloaded from the "Textbook Companion Project" section at the website - <https://r.fossee.in>.

Book Description

Title: A Textbook of Electrical Engineering Materials

Author: P. L. Kapoor

Publisher: Khanna Publishers, New Delhi

Edition: 8

Year: 2010

ISBN: 81-7409-131-9

R 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)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means an R code whose theory is explained in Section 2.3 of the book.

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Chapter 2

Conducting Materials

R code Exa 2.1 Calculate the resistance

```
1 # Page No : 21
2
3 l = 300.0
4 a = 25*(10^-6)
5 d15 = 2.7
6 R15 = d15*(1/a)
7 print(R15)
8 k0 = 0.004
9 t = 15;
10 T = 50
11 k15 = k0/(1+(k0*t))
12 R50 = R15*(1+k15*(T-t))
13 print(R50)
14
15 # The answer provided in the textbook is wrong.
```

R code Exa 2.2 Calculate the resistance


```

1 # Page No : 21
2
3 R20 = 400
4 k0 = 0.0038
5 t = 20
6 T = 80
7 k1 = k0/(1+(k0*t))
8 R80 = R20*(1+k1*(T-t))
9 print(R80)

```

R code Exa 2.3 What will be the temprature

```

1 # Page no : 22
2
3 t = 15
4 R15 = 250
5 RT = 300.0
6 k0 = 0.0038
7 k1 = k0/(1+(k0*t))
8 T = (((RT/R15)-1)/k1)+t
9 print(T)

```

R code Exa 2.4 Calculate length of a heater element

```

1 # Page NO : 22
2
3 d = 0.4*(10^-3)
4 a = pi*(d^2)/4
5 p1 = 100*(10^-8)
6 R = 40
7 l1 = R*a/p1
8 print(l1)
9 d = 0.4*(10^-3)

```

```
10 a = 12.6*(10^-8)
11 p2 = 1.72*(10^-8)
12 R = 40
13 l2 = R*a/p2
14 print(l2)
15
16 # The answer may slightly vary due to rounding off
    values.
```

R code Exa 2.5 Find the resistance

```
1 # Page No : 23
2
3 R0 = 80
4 t = 40
5 k0 = 0.0043
6 R40 = R0*(1+(k0*t))
7 print(R40)
```

R code Exa 2.6 Find the temprature

```
1 # Page Number : 23
2
3 R80 = 50
4 R28 = 40
5 t = 28
6 T = 80
7 k28 = ((R80/R28)-1)/(T-t)
8 print(k28)
9 k0 = k28/(1-k28*t)
10 print(k0)
```

R code Exa 2.7 Calculate the resistance

```
1 # Page Number : 24
2
3 l = 1000
4 d = 0.09/100
5 p = 1.724*(10^-8)
6 a = pi*(d^2)/4
7 R = p*l/a
8 print(R)
9
10 # The answer may slightly vary due to rounding off
    values.
```

R code Exa 2.8 Calculate the resistance

```
1 # Page Number : 24
2
3 R20 = 50
4 T = 60
5 t = 20
6 k0 = 0.00427
7 R0 = R20/(1+(k0*t))
8 print(R0)
9 R60 = R0*(1+(k0*T))
10 print(R60)
```

R code Exa 2.9 Find the resistivity

```
1 # Page Number : 24
2
3 k20 = 1/254.5
4 p0 = 1.6*(10^-6)
5 t = 20
6 T = 50
7 k0 = k20/(1-(t*k20))
8 p50 = p0*(1+(T*k0))
9 k50 = 1/(T+(1/k0))
10 print(k0)
11 print(p50)
```

R code Exa 2.10 Determine the Temperature

```
1 # Page Number : 25
2
3 R15 = 50
4 RT = 58
5 t = 15
6 k0 = 0.00425
7 R0 = R15/(1+(k0*t))
8 T = ((RT/R0)-1)/k0
9 print(R0)
10 print(T)
11
12 # The answer may slightly vary due to rounding off
    values.
```

R code Exa 2.11 Determine the Temperature

```
1 # Page Number : 25
2
3 R25 = 50
```

```
4 R70 = 57.2
5 t = 25
6 T = 70
7 k0 = (R70-R25)/((R25*T)-(R70*t))
8 print(k0 )
```

R code Exa 2.12 Find its percentage conductivity

```
1 # Page Number : 26
2
3 R0 = 15.5
4 t = 16
5 k0 = 0.00428
6 R16 = R0*(1+(k0*t))
7 G = (R0/R16)*100
8 print(R16)
9 print(G)
```

R code Exa 2.13 Find its temprature

```
1 # Page Number : 26
2
3 RT = 144
4 R20 = 10
5 t = 20
6 k20 = 5*(10^-3)
7 T = (((RT/R20)-1)/k20)+t
8 print(T)
```

R code Exa 2.14 Find the mean temprature

```

1 # Page Number : 27
2
3 V15 = 250
4 Vt = 250
5 I15 = 5
6 It = 4
7 T = 15
8 R15 = V15/I15
9 print(R15)
10 Rt = Vt/It
11 print(Rt)
12 k0 = 0.0038
13 R0 = R15/(1+(k0*T))
14 print(R0)
15 t = ((Rt/R0)-1)/k0
16 print(t)

```

R code Exa 2.15 Calculate the resistance

```

1 # Page Number : 28
2
3 n = 100
4 c = 12
5 Lm = 300
6 a = 1.5*0.2
7 s = 1.72*(10^-6)
8 p = 4
9 t = 20
10 T = 75
11 k0 = 0.00427
12 L = n*c*Lm
13 Ls = L/p
14 s0 = s*(1-(k0*t))
15 print(s0)
16 RT = (s0*Ls)/a

```

```
17 print(RT)
```

R code Exa 2.16 Estimate its resistance

```
1 # Page Number : 28
2
3 a = 15
4 l = 100000
5 p0 = 7.6*(10^-6)
6 k0 = 0.005
7 t = 50
8 p50 = p0*(1+(t*k0))
9 R50 = p50*(1/a)
10 print(R50)
```

R code Exa 2.17 Estimate the fusing

```
1 # Page Number : 29
2
3 I2 = 27.5
4 d = 1/2
5 I1 = I2*(d^(3/2))
6 print(I1)
```

R code Exa 2.18 Compare the diameter

```
1 # Page Number : 30
2
3 sAl = 2.85*(10^-6)
4 sCu = 1.7*(10^-6)
```

```
5 gAl = 2.71
6 gCu = 8.89
7 cAl = 5000
8 cCu = 10000
9 Kd = sqrt(sAl/sCu)
10 print(Kd)
11 Km = (Kd^2)*(gAl/gCu)
12 print(Km)
13 Kc = Km*(cAl/cCu)
14 print(Kc)
```

R code Exa 2.19 Find the resistance

```
1 # Page Number : 33
2
3 R1 = 18.6
4 K1 = 5
5 Ka = 3
6 R2 = R1*K1/Ka
7 print(R2)
```

R code Exa 2.20 Determine the heat efficiency

```
1 # Page Number : 57
2
3 m = 1
4 S = 4200
5 T2 = 100
6 T1 = 15
7 H = m*S*(T2-T1)
8 print(H)
9 W = 500
10 t = 15*60
```



```
11 Hd = W*t
12 print(Hd)
13 He = (H/Hd)*100
14 print(He)
```

R code Exa 2.21 What is the time taken

```
1 # Page Number : 58
2
3 m = 3.6
4 S = 4200
5 T2 = 95
6 T1 = 15
7 H = m*S*(T2-T1)
8 print(H)
9 e = 0.84
10 Ei = H/e
11 print(Ei)
12 W = 1000
13 t = (Ei/W)/60
14 print(t)
15
16 # The answer may slightly vary due to rounding off
    values.
```

Chapter 4

Insulating Materials

R code Exa 4.1 Find the capacity of each condenser

```
1 # Page Number : 110
2 library(polynom)
3 p = polynomial(c(0.0048, -0.16, 1))
4 c1 = solve(p)[1]
5 print(c1)
6 c2 = 0.16 - c1
7 print(c2)
```

R code Exa 4.2 Calculate the capacitance

```
1 # Page Number : 110
2 n = 9;
3 Ko = 8.854*10^-12;
4 K = 5;
5 A = 12*10^-4;
6 d = 2*10^-4;
7 C = (n-1)*Ko*K*A/d
8 print(C);
```

9
10 # The answer provided in the textbook is wrong.

R code Exa 4.3 Find the heat produced

```
1 # Page Number : 110
2
3 C = 10^-6
4 V = 10000
5 E = 1/2*C*V^2
6 H = E/4.2
7 print(H)
```

R code Exa 4.4 Calculate the dielectric constant

```
1 # Page Number : 111
2
3 A = 0.02;
4 d = 0.001;
5 C = 4.5*10^-10;
6 Ko = 8.854*10^-12;
7 K = (C*d)/(Ko*A)
8 V = 15000;
9 Q = C*V
10 D = Q/A
11 print(D)
```

R code Exa 4.5 Find K2

```
1 # Page Number : 111
```

```
2
3 d = 0.003;
4 K1 = 6;
5 Ko = 8.854*10^-12;
6 d1 = 0.003;
7 d2 = 0.005;
8 K2 = (d2*K1)/(3*d-d1)
9 print(K2)
```

R code Exa 4.6 Determine the force

```
1 # Page Number : 113
2
3 q1 = 1;
4 q2 = 1;
5 Eo = 8.854*10^-12;
6 Er = 1;
7 d = 1
8 pi = 3.14;
9 F = (q1*q2)/(4*pi*Eo*Er*d^2)
10 print(F)
11
12 # The answer may slightly vary due to rounding off
    values.
```

R code Exa 4.7 Find the charge on each

```
1 # Page Number : 114
2
3 pi = 3.14;
4 d = 0.2;
5 K = 9*10^9;
6 F = 9.81*10^-1;
```

```
7 q = sqrt((F*(d^2))/K)
8 print(q)
```

Chapter 5

Dielectric Materials

R code Exa 5.1 Calculate its charge and capacity

```
1 # Page Number : 193
2
3 t = 0.25
4 I = 0.22
5 V = 220
6 Q = I*t
7 C = Q/V
8 C1 = C*(10^6)
9 print(Q)
10 print(C)
11 print(C1)
```

R code Exa 5.2 Calculate the charge on each plate

```
1 # Page Number : 193
2
3 C = 0.0002*(10^-6)
4 V = 20000
```

```
5 t = 2
6 Q = C*V
7 g = (V/t)*(1/1000)
8 print(Q)
9 print(g)
```

R code Exa 5.3 Find the energy stored

```
1 # Page Number : 194
2
3 C = 0.005*(10^-6)
4 V = 500
5 q = C*V
6 E = (1/2)*(C*V*V)
7 print(q)
8 print(E)
9 K = 2.5
10 q1 = q
11 C1 = K*C
12 E1 = (q1^2)/(2*C1)
13 print(E1)
```

R code Exa 5.4 Calculate the dielectric constant

```
1 # Page Number : 194
2
3 A = 0.02
4 d = 0.001
5 C = 4.5*(10^-10)
6 V = 15000
7 K0 = 8.854*(10^-12)
8 K = (C*d)/(K0*A)
9 q = C*V
```

```
10 D = q/A
11 print(K)
12 print(D)
```

R code Exa 5.5 Calculate the capacitance

```
1 # Page Number : 195
2
3 A = 0.2
4 t = 2.5*(10^-5)
5 K0 = 8.854*(10^-12)
6 K = 5
7 C = (K*K0*A*(10^6))/t
8 print(C)
```

Chapter 6

Magnetic Materials

R code Exa 6.1 Determine the current required

```
1 # Page Number : 212
2
3 f = 0.01
4 l = 1
5 N = 1000
6 Ur = 1000
7 Uo = 4*pi*(10^-7)
8 a = 0.001
9 I = (f*l)/(N*Uo*Ur*a)
10 print(I)
```

R code Exa 6.2 Find the relative permeability

```
1 # Page Number : 212
2
3 f = 1.2*(10^-3)
4 l = 1.4
5 N = 500
```

```
6 Uo = 4*pi*(10^-7)
7 a = 0.0012
8 I = 2
9 Ur = (f*l)/(N*I*Uo*a)
10 print(Ur)
```

R code Exa 6.3 Determine the flux Density

```
1 # Page Number : 213
2
3 l = 0.4
4 N = 200
5 Uo = 4*pi*(10^-7)
6 a = 5*(10^-4)
7 I = 6.4
8 f = 0.8*(10^-3)
9 fd = f/a
10 fi = I*N/l
11 Ur = (f*l)/(N*I*Uo*a)
12 print(fd)
13 print(fi)
14 print(Ur)
15
16 # The answer provided in the textbook is wrong.
```

R code Exa 6.4 Calculate the energy lost

```
1 # Page Number : 214
2
3 H1 = 250
4 V = 1/150
5 N = 50
6 E = H1*V*N
```

```
7 Eh = (E*3600)/1000
8 print(Eh)
```

R code Exa 6.5 Determine the core loss

```
1 # Page Number : 214
2
3 P = 4
4 N = 1600
5 f = P*N/120
6 V = 5400
7 d = 7.5
8 m = (V*d)/1000
9 L = 1.76
10 Cl = L*m
11 print(f)
12 print(Cl)
```

R code Exa 6.6 Determine the core loss

```
1 # Page Number : 214
2
3 v = 76300
4 P = 8
5 N = 375
6 f = P*N/120
7 Bmax = 12000
8 n = 0.002
9 d = 7.8
10 l = 1.7
11 Hl = n*v*f*(Bmax^1.6)*(10^-7)
12 Al = v*d*l/1000
13 Tl = Hl+Al
```

```
14 print(T1)
```

R code Exa 6.7 Find the loss of energy

```
1 # Page Number : 215
2
3 m = 12000
4 d = 7.5
5 H1 = 3000
6 N = 50
7 v = m/d
8 E = v*H1*N
9 Eh = E/(10^10)
10 print(Eh)
```

R code Exa 6.8 Separate the loss

```
1 # Page Number : 215
2
3 m = 10
4 T1 = 20
5 f1 = 50
6 T2 = 35
7 f2 = 75
8 c2 = (T2-(T1*f2/f1))/(f2^2-f1*f2)
9 c1 = (T1-c2*f1^2)/f1
10 k = c1/c2
11 H50 = T1*k/101
12 E50 = T1-H50
13 print(H50)
14 print(E50)
```

Chapter 15

Miscellaneous Solved Numerical Problems

R code Exa 15.1 Calculate the Consumer voltage

```
1 # Page Number : 392
2
3 R = 0.2
4 I = 200
5 t = 100
6 V = 240
7 c = 0.8
8 V1 = I*R
9 Vc = V-V1
10 P = I*I*R
11 E = P*t/1000
12 C = E*c
13 print(Vc)
14 print(C)
```

R code Exa 15.2 Find the resistance

```

1 # Page Number : 393
2
3 Vi = 220
4 Vo = 200
5 I = 40
6 Pi = Vi*I
7 Po = Vo*I
8 L = Pi-Po
9 R = L/(I^2)
10 t = 10
11 N = (Po*t)/1000
12 Nw = (L*t)/1000
13 print(R)
14 print(N)
15 print(Nw)

```

R code Exa 15.3 Calculate the current drawn

```

1 # Page Number : 393
2
3 M = 250000
4 h = 50
5 g = 9.81
6 WD = M*h*g
7 P = WD/3600
8 V = 500
9 Ep = 0.8
10 Em = 0.9
11 E = Em*Ep
12 I = P/(V*E)
13 print(I)

```

R code Exa 15.4 Calculate the torque

```
1 # Page Number : 394
2
3 P = 10
4 N = 600
5 a = 75
6 b = 735.5
7 Tkgm = (P*a*60)/(2*pi*N)
8 TNwm = (P*b*60)/(2*pi*N)
9 print(Tkgm)
10 print(TNwm)
```

R code Exa 15.5 Calculate the mass of oil

```
1 # Page Number : 395
2
3 P = 25
4 s = 12500
5 e = 0.35
6 P1 = P/e
7 P2 = P1*860
8 m = P2/s
9 w = 1000
10 Eg = (P*w)/m
11 print(m)
12 print(Eg)
```

R code Exa 15.10 Determine the resistance

```
1 # Page Number : 398
2
3 rho = 1.7*(10^-6)
4 l = 5
5 t = 0.005
```

```
6 D = 0.08
7 d = D-(2*t)
8 a = pi*(D^2-d^2)/4
9 R = rho*l/a
10 R1 = R/(10^-4)
11 print(R1)
```

R code Exa 15.11 Determine the conductivity

```
1 # Page Number : 399
2
3 rho = 1.7*(10^-8)
4 K = 1/rho
5 a = 0.125*(10^-4)
6 l = 2000
7 G = K*a/l
8 print(K)
9 print(G)
```

R code Exa 15.12 Determine the resistivity

```
1 # Page Number : 399
2
3 V = 0.05
4 l = 300
5 R = 0.0306
6 rho = R*V/(l^2)
7 print(rho)
```

R code Exa 15.13 Calculate the value


```
1 # Page Number : 400
2
3 rho = 0.67*(10^-6)
4 m = 39.4
5 m2 = 1525
6 rhoc = rho*m/m2
7 rho1 = rhoc/(10^-6)
8 print(rhoc)
9 print(rho1)
```

R code Exa 15.14 What is the resistance of new wire

```
1 # Page Number : 400
2
3 R1 = 0.12
4 d1 = 15
5 d2 = 0.4*d1
6 a1 = pi*(d1^2)/4
7 a2 = pi*(d2^2)/4
8 R2 = R1*((a1/a2)^2)
9 print(R2)
```

R code Exa 15.15 what will be the resistance

```
1 # Page Number : 401
2
3 lab = 10
4 Aab = 1/2
5 RHOab = 1/2
6 Ra = 2
7 Rb = (Ra*Aab)/(lab*RHOab)
8 print(Rb)
```

R code Exa 15.16 what will be the resistance

```
1 # Page Number : 402
2 RHOo = 10.3*(10^-6)
3 d = 0.0074
4 a = pi*(d^2)/4
5 Ro = 4
6 l = Ro*a/RHOo
7 alphao = 0.0038
8 t = 100
9 R100 = Ro*(1+(alphao*t))
10 print(l)
11 print(R100)
12
13 # The answer provided in the textbook is wrong.
```

R code Exa 15.17 What is the resistance

```
1 # Page Number : 403
2
3 Ra = 1
4 lab = 20
5 Aab = 1/3
6 Rb = Ra*(Aab/lab)
7 print(Rb)
```

R code Exa 15.19 Obtain the potential Difference

```
1 # Page Number : 405
```

```
2
3 I1 = 2/(2+3)
4 Vbe = 3*I1
5 I2 = 4/(5+3)
6 Vaf = 3*I2
7 V = Vbe+4-Vaf
8 print(V)
```

R code Exa 15.20 Find the current

```
1 # Page Number : 405
2 a = matrix(c(1,-1,25,15), nrow=2, byrow=TRUE)
3 b = c(20,1950)
4 I = solve(a,b)[2]
5 print(I)
```

R code Exa 15.21 Determine the herstesis power

```
1 # Page Number : 407
2
3 A = 30
4 s1 = 0.4
5 s2 = 400
6 V = 1.2*(10^-3)
7 f = 50
8 H = A*s1*s2
9 Hp = H*V*f
10 print(Hp)
```

R code Exa 15.22 Find the loss of energy

```
1 # Page Number : 407
2
3 d = 7500
4 w = 12
5 V = w/d
6 f = 25
7 N = 3600*f
8 A = 300
9 E = A*V*N
10 print(E)
```

R code Exa 15.23 Find the inductance

```
1 # Page Number : 407
2
3 l = 0.5
4 d = 0.1
5 N = 1500
6 a = pi*(d^2)/4
7 Ur = 1
8 Uo = 4*pi*(10^-7)
9 I = 8
10 L = ((N^2)*a*Uo*Ur)/l
11 E = (1/2)*L*(I^2)
12 print(L)
13 print(E)
14
15 # The answer may slightly vary due to rounding off
    values.
```

R code Exa 15.24 Calculate the flux passing

```
1 # Page Number : 408
```

```

2
3 N = 600
4 I = 2
5 l = 0.6
6 H = N*I/l
7 Ur = 1
8 Uo = 4*pi*(10^-7)
9 d = 0.025
10 a = pi*(d^2)/4
11 phi = Uo*Ur*H*a
12 print(H)
13 print(phi)

```

R code Exa 15.25 Calculate the ampere turns

```

1 # Page Number : 408
2
3 Ur = 1
4 B = 1.257
5 Uo = 4*pi*(10^-7)
6 H = B/(Uo*Ur)
7 l = 0.004
8 AT = H*l
9 print(AT)
10
11 # The answer may slightly vary due to rounding off
    values.

```

R code Exa 15.26 What is the flux through it

```

1 # Page Number : 409
2
3 D = 0.3

```

```

4 l = pi*D
5 N = 400
6 a = 0.0012
7 Ur = 1000
8 Uo = 4*pi*(10^-7)
9 I = 2
10 phi = (N*I)/(l/(Uo*Ur*a))
11 phi1 = phi/(10^-3)
12 print(phi1)

```

R code Exa 15.27 Calculate the magnetising current

```

1 # Page Number : 409
2
3 a = 0.01
4 Uo = 4*(pi)*(10^-7)
5 lf = 1.25
6 Ur = 400
7 N = 175
8 phig = 0.8*(10^-3)
9 Bg = phig/a
10 Hg = Bg/Uo
11 Lg = 0.004
12 ATg = Hg*Lg
13 phii = phig*lf
14 Bi = phii/a
15 Hi = Bi/(Uo*Ur)
16 Li = 1.5
17 ATi = Hi*Li
18 AT = ATi+ATg
19 I = ATg/N
20 print(I)

```

R code Exa 15.28 Calculate its charge and capacity

```
1 # Page Number : 411
2
3 SI = 0.2
4 t = 0.2
5 Q = SI*t
6 V = 220
7 C = Q/V
8 C1 = C*(10^6)
9 print(Q)
10 print(C1)
```

R code Exa 15.29 Find the heat produced

```
1 # Page Number : 411
2
3 C = 2*(10^-6)
4 V = 10000
5 E = (1/2)*C*(V^2)
6 H = E/4.2
7 print(H)
```

R code Exa 15.30 Calculate the dielectric constant

```
1 # Page Number : 411
2
3 V = 15*(10^3)
4 A = 0.02
5 d = 0.001
6 C = 4.5*(10^-10)
7 Ko = 8.854*(10^-12)
8 K = (C*d)/(Ko*A)
```

```
9 q = C*V
10 D = q/A
11 print(q)
12 print(D)
```

R code Exa 15.31 Calculate the resistance

```
1 # Page Number : 412
2
3 m = 0.6
4 S = 4200
5 T1 = 100
6 T2 = 10
7 t = 5*60
8 V = 230
9 H = m*S*(T1-T2)
10 e = 0.78
11 Ei = H/e
12 Ei1 = Ei/(100*3600)
13 W = Ei/t
14 R = (V*V)/W
15 print(R)
```

R code Exa 15.32 How long will it take

```
1 # Page Number : 413
2
3 m1 = 120
4 m2 = 20
5 S1 = 1
6 S2 = 0.095
7 T1 = 10
8 T2 = 60
```



```
9 H = (m1*S1*(T2-T1))+(m2*S2*(T2-T1))
10 H1 = H*4200
11 e = 0.8
12 E = H1/e
13 E1 = E/(1000*3600)
14 r = 3
15 t = E1/r
16 print(t)
```

R code Exa 15.33 Determine the frequency of supply

```
1 # Page Number : 414
2
3 rho = 5*(10^-5)
4 U = 1
5 d = 0.15
6 f = (rho*(10^9))/(U*d*d*4*(pi^2))
7 f1 = f/1000
8 print(f1)
```

R code Exa 15.34 Determine the power required

```
1 # Page Number : 414
2
3 v = 50*20*2
4 Mw = 0.56
5 m = Mw*v/1000
6 S = 0.35
7 t = 15/60
8 f = 30*(10^6)
9 t2 = 150
10 t1 = 30
11 H = m*S*(t2-t1)
```

```

12 Hw = H*1000/860
13 P = Hw/t
14 e = 0.5
15 Pi = P/e
16 Ko = 8.854*(10^-12)
17 K = 5
18 A = 0.5*0.2
19 i = 0.02
20 C = Ko*K*A/i
21 Xc = 1/(2*pi*f*C)
22 cosx = 0.05
23 tanx = 19.97
24 R = Xc*tanx
25 V = sqrt(Pi*R)
26 Ic = V/Xc
27 print(Pi)
28 print(V)
29 print(Ic)

```

R code Exa 15.35 Estimate the efficiency

```

1 # Page Number : 416
2
3 m = 2
4 t1 = 15
5 t2 = 660
6 S = 0.212
7 L = 78.8
8 H = (m*S*(t2-t1))+(m*L)
9 i = 5
10 E = i*(1000*10*60)
11 E1 = E/4180
12 e = H*100/E1
13 print(e)
14

```

15 # The answer may slightly vary due to rounding off values.

R code Exa 15.36 Find the cost of using the motor

```
1 # Page Number : 417
2
3 O = 5*735.5
4 e = 0.85
5 c = 2
6 I = O/e
7 t = 4
8 E = I*t/1000
9 C = c*E
10 print(C)
11
12 # The answer may slightly vary due to rounding off values.
```

R code Exa 15.37 How many electrons pass through

```
1 # Page Number : 417
2
3 I = 2.5*(10^-3)
4 t = 30*(10^-3)
5 Q = I*t
6 e = 1.602*(10^-19)
7 N = Q/e
8 print(N)
```

R code Exa 15.38 Find the resistance

```
1 # Page Number : 417
2
3 l = 1
4 a = 2.5*(10^-2)*0.05*(10^-2)
5 rho = 1.724*(10^-8)
6 R = rho*l/a
7 l1 = 0.05*(10^-2)
8 a1 = 2.5*(10^-2)*1
9 R1 = rho*l1/a1
10 print(R)
11 print(R1)
```

R code Exa 15.39 Calculate the resistance

```
1 # Page Number : 418
2
3 m = 2
4 t2 = 98
5 t1 = 15
6 s = 1
7 V = 200
8 H = m*s*(t2-t1)
9 H1 = H*4200
10 e = 0.85
11 E = H1/e
12 E1 = E/(1000*3600)
13 c = 35
14 C = c*E1
15 t = 10/60
16 W = E1*1000/t
17 R = V*V/W
18 print(R)
19 print(C)
```

20

21 # The answer may slightly vary due to rounding off
values.

R code Exa 15.40 Calculate the value of exciting current

```
1 # Page Number : 418
2
3 phi = 70000/(10^8)
4 d = 0.03
5 a = pi*d*d/4
6 B = phi/a
7 Lg = 0.002
8 Ls = (pi*0.2)-Lg
9 Uo = 4*pi*(10^-7)
10 Ur = 800
11 Hg = B/Uo
12 Hs = B/(Uo*Ur)
13 AT = (Hg*Lg)+(Hs*Ls)
14 N = 500
15 I = AT/N
16 print(I)
```
