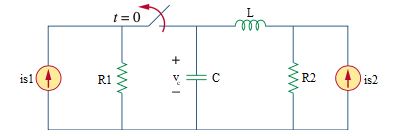
8.33 Main question



Given is1 = 3 A, is2 = 4u(t) A, r1= 10 Ω, r2= 5 Ω, c = 4 F, l= 1 H

Find

Variables

Random variables

is = {1:10};

r1 = {1:20};

Global variables

#is1 = 3; r1 = 10; r2 = 5; c = 4;

l = 1; time = 1;

# t = 0-

vc0 = (is1\*r1)\*(r2/(r1+r2));

il0 = (is1\*r1)/(r1+r2);

# t = 0+

alpha = r2/(2\*l);

w0 = 1/sqrt(l\*c);

s1 = -alpha+sqrt(alpha\*alpha - w0\*w0);

s2 = -alpha-sqrt(alpha\*alpha - w0\*w0);

A1 = (-il0/c-s2\*sv0+4\*r2\*s2)/(s1-s2);

A2 = (-il0/c-s1\*sv0+4\*r2\*s1)/(-s1+s2);

vct = 4\*r2 + A1\*exp(s1\*time) + A2\*exp(s2\*time);

Part (กรอกคำตอบ)

1. *vc*(0-) = vc0 = 10 V

2. *vc*(0+) = vc0 = 10 V

3. *α* = alpha = 2.5 s^-1

4. *ω*0 = w0 = 0.5 rad/s

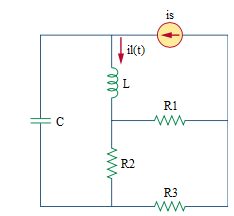
At *t* > 0

5. *vc*(*t*) = (4\*r2) + A1\*exp(s1\*t) + A2\*exp(s2\*t)

= 20+0.2052\*exp(-4.949t)-10.205\*exp(-0.05t) V

6. *vc*(time*τ*) = vct = 10.2942 V

8.38 Main question



Given is = 2(1-u(t)) A, r1= 10 Ω, r2= 5 Ω, r3= 10 Ω, c = 1/3 F, l= 3/4 H

Find

Variables

Random variables

r1 = {1:20};

Global variables

#r1 = 10; r2 = 5; r3 = 10; c = 1/3;

l = 3/4; time = 1;

# t = 0-

il0 = 2;

vc0 = r2\*((r1\*il0)/(r1+r2+r3));

# t = 0+

req = (r2\*(r1+r3))/(r1+r2+r3);

alpha = req/(2\*l);

w0 = 1/sqrt(l\*c);

s1 = -alpha+sqrt(alpha\*alpha - w0\*w0);

s2 = -alpha-sqrt(alpha\*alpha - w0\*w0);

A1 = ((1/l)(-req\*il0+vc0)-(s2\*il0))/(s1-s2);

A2 = ((1/l)(-req\*il0+vc0)-(s1\*il0))/(-s1+s2);

ilt = A1\*exp(s1\*time) + A2\*exp(s2\*time);

Part (กรอกคำตอบ)

1. *vc*(0-) = vc0 = 4 V

2. *vc*(0+) = vc0 = 4 V

3. *α* = alpha = 8/3 s^-1

4. *ω*0 = w0 = 2 rad/s

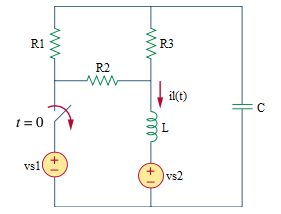
At *t* > 0

5. *il*(*t*) = A1\*exp(s1\*t) + A2\*exp(s2\*t)

= exp(-4.431t)+exp(-0.903t) A

6. *il*(time*τ*) = ilt = 0.4137 A

8.37 Main question



Given vs1 = 45 V, vs2 = 15 V, r1= 6 Ω, r2= 6 Ω, r3= 6 Ω, c = 1/8 F, l= 1/2 H

Find

Variables

Random variables

r1 = {1:20};

Global variables

#vs1 = 45; vs2 = 15; r1 = 6; r2 = 6; r3 = 6; c = 1/8;

l = 1/2; time = 1;

# t = 0-

il0 = ((vs1-vs2)/r2)/(1-r2/(r1+r2+r3));

vc0 = vs2+r2\*((vs1-vs2)/r2)/((r1+r2+r3)/r2-1)

# t = 0+

req = (r3\*(r1+r2))/(r1+r2+r3);

alpha = req/(2\*l);

w0 = 1/sqrt(l\*c);

A1 = -il0/c+alpha\*A2;

A2 = vc0-vs2;

vct = (A2+A1\*time)\*exp(-alpha\*time);

dvct/dt = -alpha\*(A2+A1\*time)\*exp(-alpha\*time)+ A1\*exp(-alpha\*time);

ict = c\*dvct/dt

ilt = -ict

Part (กรอกคำตอบ)

1. *il*(0-) = il0 = 7.5 A

2. *il*(0+) = il0 = 7.5 A

3. *α* = alpha = 4 s^-1

4. *ω*0 = w0 = 4 rad/s

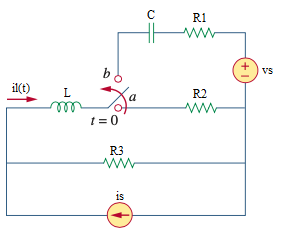
At *t* > 0

5. *il*(*t*) = -(A2+A1\*t)\*exp(-alpha\*t)

= 7.5\*exp(-4t) A

6. *il*(time*τ*) = ilt = 0.1374 A

8.40 Main question



Given vs = 12 V, is = 4 A, r1= 14 Ω, r2= 2 Ω, r3= 6 Ω, c = 0.02 F, l= 2 H

Find

Variables

Random variables

vs = {10:20};

is = {1:10};

r2 = {1:20};

Global variables

#vs = 12; is = 4; r1 = 14; r2 = 2; r3 = 6; c = 0.02;

l = 2; time = 1;

# t = 0-

il0 = (r3/(r3+r2))\*is;

vc0 = 0;

# t = 0+

alpha = (r1+r3)/(2\*l);

w0 = 1/sqrt(l\*c);

A1 = il0/c+alpha\*A2;

A2 = vc0-is\*r3+vs;

vct = (A2+A1\*time)\*exp(-alpha\*time);

dvct/dt = -alpha\*(A2+A1\*time)\*exp(-alpha\*time)+ A1\*exp(-alpha\*time);

ict = c\*dvct/dt

ilt = ict

Part (กรอกคำตอบ)

1. *vc*(0-) = vc0 = 0 V

2. *vc*(0+) = vc0 = 0 V

3. *α* = alpha = 5 s^-1

4. *ω*0 = w0 = 5 rad/s

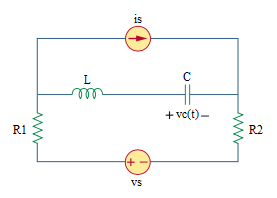
At *t* > 0

5. *il*(*t*) = c\*(-alpha\*(A2+A1\*t)\*exp(-alpha\*t)+ A1\*exp(-alpha\*t))

= 0.02\*(-5\*(-12+90t)\*exp(-5t)+90\*exp(-5t)) V

6. *il*(time*τ*) = ilt = -0.0404 V

8.32 Main question



Given vs = 50u(t) V, is = 2u(-t) A, r1= 4 Ω, r2= 2 Ω, c = 0.04 F, l= 1 H

Find

Variables

Random variables

vs = {10:30};

r1 = {2:5};

Global variables

#vs = 50; is = 2; r1 = 4; r2 = 2; c = 0.04;

l = 1; time = 1;

# t = 0-

il0 = 0;

vc0 = -is\*(r1+r2);

# t = 0+

alpha = (r1+r2)/(2\*l);

w0 = 1/sqrt(l\*c);

wd = sqrt(w0\*w0-alpha\*alpha);

A1 = vc0-vs;

A2 = (il0/c+alpha\*A1)wd;

vct = vs + (A1\*cos(wd\*time) + A2\*sin(wd\*time))\*exp(-alpha\*time);

Part (กรอกคำตอบ)

1. *vc*(0-) = vc0 = -12 V

2. *vc*(0+) = vc0 = -12 V

3. *α* = alpha = 3 s^-1

4. *ω*0 = w0 = 5 rad/s

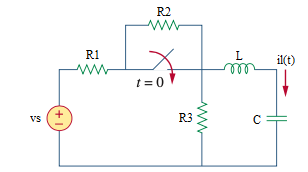
At *t* > 0

5. *vc*(*t*) = vs + (A1\*cos(wd\*t) + A2\*sin(wd\*t))\*exp(-alpha\*t)

= 50+(-62\*cos(4\*t)-46.5\*sin(4\*t))\*exp(-3\*t) V

6. *vc*(time*τ*) = vct = 53.7697 V

8.41 Main question



Given vs = 100 V, r1 = 20 Ω, r2 = 5 Ω, r3 = 5 Ω, c = 1/25 F, l= 1 H

Find

Variables

Random variables

vs = {50:100};

r1 = {2:5};

Global variables

#vs = 100; r1 = 20; r2 = 5; r3 = 5; c = 1/25;

l = 1; time = 1;

# t = 0-

il0 = 0;

vc0 = r3/(r1+r2+r3)\*vs;

# t = 0+

Req = (r1\*r3)/(r1+r3);

alpha = req/(2\*l);

w0 = 1/sqrt(l\*c);

wd = sqrt(w0\*w0-alpha\*alpha);

A1 = vc0-(vs/r1\*req);

A2 = (il0+alpha\*A1)/wd;

ilt = c\*(-alpha)\*((A1\*cos(wd\*time)+A2\*sin(wd\*time))\*exp(-alpha\*time))+c\*wd\*((-A1\*sin(wd\*time)+A2\*cos(wd\*time))\*exp(-alpha\*time))

Part (กรอกคำตอบ)

1. *vc*(0-) = vc0 = 50/3 V

2. *vc*(0+) = vc0 = 50/3 V

3. *α* = alpha = 2 s^-1

4. *ω*0 = w0 = 5 rad/s

At *t* > 0

5. *il*(*t*) = c\*(-alpha)\*((A1\*cos(wd\*t)+A2\*sin(wd\*t))\*exp(-alpha\*t))+c\*wd\*((-A1\*sin(wd\*t)+A2\*cos(wd\*t))\*exp(-alpha\*t))

= 0.727\*sin(4.5826\*t)\*exp(-2\*t) A

6. *il*(time*τ*) = ilt = 0.418 A