Ohms law, Current, voltage, Power and energy

1. An electric current of 10 A is the same as _____
   a) 10 J/C
   b) 10 V/C
   c) 10C/sec
   d) 10 W/sec

Ans C

2. Consider a circuit with two unequal resistances in parallel, then _____
   a) large current flows in large resistor
   b) current is same in both
   c) potential difference across each is same
   d) smaller resistance has smaller conductance

Ans C

3. In which of the following cases is Ohm's law not applicable?
   a) Electrolytes
   b) Arc lamps
   c) Insulators
   d) AC bridges

Ans C

4. Which of the following bulbs will have high resistance?
   a) 220V, 60W
   b) 220V,100W
   c) 115V,60W
   d) 115V,100 W

Ans a

5. Ohm's law is not applicable to _____
   a) dc circuits
   b) high currents
   c) small resistors
   d) semi-conductors

Ans d

6. Conductance is expressed in terms of _____
   a) mho
   b) mho/m
   c) ohm/m
   d) m/ohm

Ans a

7. In a current-voltage relationship graph of a linear resistor, the slope of the graph will indicate _____
   a) conductance

b) resistance
c) resistivity
d) a constant

Ans b

8. Which of the following type of circuits in electrical engineering cannot be analyzed using Ohm's law?
a) Unilateral
b) Bilateral
c) Linear
d) Conductors

Ans a

9. When a bulb uses 0.25A from a 24V battery source, what is its Resistance (R) ?
a) 50Ω
b) 96Ω
c) 95Ω
d) 72Ω

Ans

10. The Tungsten filament in a light bulb has a resistance of-
a) Linear
b) Non-Linear
c) Fixed
d) a & b are correct

Answer- B

11. Open circuit resistance is
a) low
b) Infinitely High
c) Zero
d) a & b are correct

Ans b

12. Short circuit resistance is
a) low
b) Infinitely High
c) Zero
d) a & b are correct

Ans C

13. A kilowatt-hour (kWh) is a big unit of _____ electricity.
a) work
b) energy
c) conductance
d) power

Answer- B

14. In a conductor, if 6-coulomb charge flows for 2 seconds. The value of electric current will be
a) 3 ampere
b) 3 volts
c) 2 amperes
d) 2 volts

Ans a

15. Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?
a) Capacitors
b) Inductors
c) Transistors
d) Resistance

Ans C

16. Which of the following is correct about the power consumed by R_1 and R_2 connected in series if the value of R_1 is greater than R_2?
a) R_1 will consume more power
b) R_2 will consume more power
c) R_1 and R_2 will consume the same power
d) The relationship between the power consumed cannot be established

Ans a,
$P = I^2*R$. When two resistors are connected in series the current flowing through the resistors is the same and thus, power consumed by the larger resistor will be more.

17. What kind of quantity is an Electric potential?
a) Vector quantity
b) Tensor quantity
c) Scalar quantity
d) Dimensionless quantity

Answer: c
Explanation: Electric potential refers to the work done to bring a unit positive charge from a point with higher potential to a point with lower potential. Since electric potential only has magnitude but no direction, it is a scalar quantity.

Series and Parallel circuit

1. A certain circuit is composed of two parallel resistors. The total resistance is 1,403 Ω. One of the resistors is 2 Ω. The other resistor value is

a) 1,403 Ω
b) 4.7 kΩ
c) 2 kΩ
d) 3,403 Ω

Answer: (b) 4.7 kΩ

Q2: A voltage divider consists of two 100 kΩ resistors and a 12 V source. What will the voltage be if a load resistor of 1 MΩ is connected to the output?

a) 0.57 V
b) 6 V
c) 12 V
d) 5.7 V

Answer: (d) 5.7 V

3: A Voltage divider consists of two 68 kΩ resistors and a 24 V source. The voltage across one of the resistor is

a) 12 V
b) 24 V
c) 0 V
d) 6 V

Answer: (a) 12 V

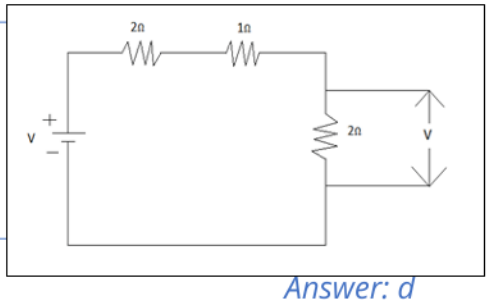
4: Two 3.3 kΩ resistors are in series combination are in parallel with a 4.7 kΩ resistor. What will be the voltage across the 4.7 kΩ resistors if the voltage across one of the 3.3 kΩ resistors is 12 V

a) 24 V
b) 12 V
c) 0 V
d) 6 V

Answer: (a) 24 V

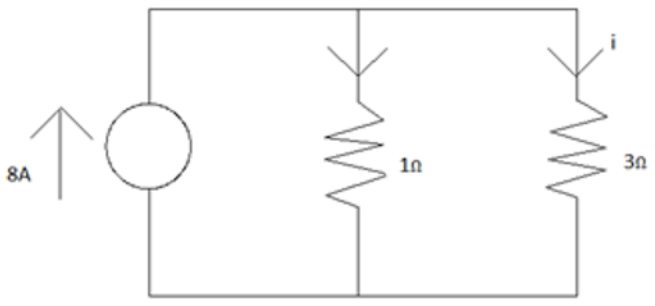
5. Calculate Voltage across 2Ω Resistor where supply v= 10volts.

a) 2V
b) 3V
c) 10V
d) 4V



Answer: d
Explanation: I = 10/5 = 2A
V2 = 10(2)
V2 = I.R2
= 2(2)
4V.

6. Calculate i =?



a) -1A
b) +2A
c) 8A
d) -5A

Answer: b

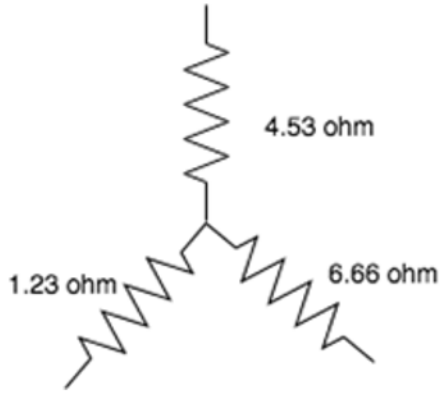
7 For a parallel connected resistor R1, R2 with total current I and a voltage of V volts. Current across the first resistor (R1) is given by

a) I R1
b) I R2
c) I R1 / R1 + R2
d) I R2 / R1 + R2

Answer: d

Star Delta Transformation

1. Find the equivalent delta circuit.



a) 9.69 ohm, 35.71 ohm, 6.59 ohm
b) 10.69 ohm, 35.71 ohm, 6.59 ohm
c) 9.69 ohm, 34.71 ohm, 6.59 ohm
d) 10.69 ohm, 35.71 ohm, 7.59 ohm

Answer: a
Explanation: Using the star to delta conversion:
R1 = 4.53+6.66+4.53*6.66/1.23 = 35.71 ohm
R2 = 4.53+1.23+4.53*1.23/6.66 = 6.59 ohm
R3 = 1.23+6.66+1.23*6.66/4.53 = 9.69 ohm.

---

2. Which, among the following is the correct expression for star-delta conversion?
a) R1=Ra*Rb/(Ra+Rb+Rc), R2=Rb*Rc/(Ra+Rb+Rc), R3=Rc*Ra/(Ra+Rb+Rc)b)
b) R1=Ra/(Ra+Rb+Rc), R2=Rb/(Ra+Rb+Rc), Rc=/(Ra+Rb+Rc)
c) R1=Ra+Rb+Ra*Rb/Rc, R2=Rc+Rb+Rc*Rb/Ra, R3=Ra+Rc+Ra*Rc/Rb
d) R1=Ra*Rb/Rc, R2=Rc*Rb/Ra, R3=Ra*Rc/Rb

Answer: c
*Explanation: After converting to delta, each delta connected resistance is equal to the sum of the two resistance it is connected to+product of the two resistances divided by the remaining resistance. Hence R1=Ra+Rb+Ra*Rb/Rc, R2=Rc+Rb+Rc*Rb/Ra, R3=Ra+Rc+Ra*Rc/Rb.*

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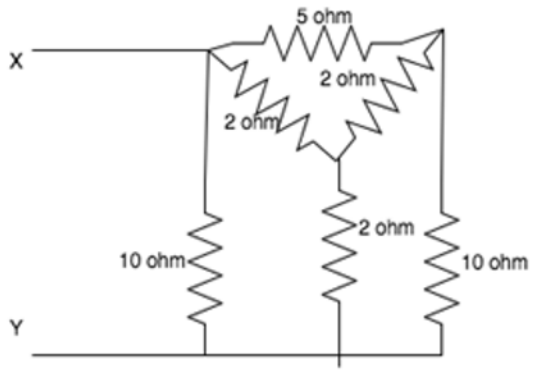
3. Find the equivalent resistance between X and Y.



a) 3.33 ohm
b) 4.34 ohm
c) 5.65 ohm

d) 2.38 ohm

Answer: d
*Explanation: The 3 2ohm resistors are connected in star, changing them to delta, we have R1=R2=R3= 2+2+2*2/2=6 ohm.*
The 3 6ohm resistors are connected in parallel to the 10 ohm 5 ohm and 10ohm resistors respectively.
This network can be further reduced to a network consisting of a 3.75ohm and 2.73ohm resistor connected in series whose resultant is intern connected in parallel to the 3.75 ohm resistor.

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4. Delta connection is also known as_____
a) Y-connection
b) Mesh connection
c) Either Y-connection or mesh connection
d) Neither Y-connection nor mesh connection

Answer: b
Explanation: Delta connection is also known as mesh connection because its structure is like a mesh, that is, a closed loop which is planar.

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5. Ra is resistance at A, Rb is resistance at B, Rc is resistance at C in star connection. After transforming to delta, what is resistance between B and C?
a) Rc+Rb+Rc*Rb/Ra
b) Rc+Rb+Ra*Rb/Rc
c) Ra+Rb+Ra*Rc/Rb
d) Rc+Rb+Rc*Ra/Rb

Answer: a
*Explanation: After converting to the delta, each delta connected resistance is equal to the sum of the two resistances it is connected to+product of the two resistances divided by the remaining resistance. Hence, resistance between B and C = Rc+Rb+Rc*Rb/Ra.*

---

6. Ra is resistance at A, Rb is resistance at B, Rc is resistance at C in star connection. After transforming to delta, what is resistance between A and C?
a) Ra+Rb+Ra*Rb/Rc
b) Ra+Rc+Ra*Rc/Rb
c) Ra+Rb+Ra*Rc/Ra
d) Ra+Rc+Ra*Rb/Rc

Answer: b
*Explanation: After converting to the delta, each delta connected resistance is equal to the sum of the two resistances it is connected to+product of the two resistances divided by the remaining resistance. Hence, resistance between A and C = Ra+Rc+Ra*Rc/Rb.*

---

7. Ra is resistance at A, Rb is resistance at B, Rc is resistance at C in star connection. After transforming to delta, what is resistance between A and B?
a) Rc+Rb+Ra*Rb/Rc
b) Ra+Rb+Ra*Rc/Rb
c) Ra+Rb+Ra*Rb/Rc
d) Ra+Rc+Ra*Rc/Rb

Answer: c
*Explanation: After converting to the delta, each delta connected resistance is equal to the sum of the two resistances it is connected to+product of the two resistances divided by the remaining resistance. Hence, resistance between A and B = Ra+Rb+Ra*Rb/Rc.*

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8. If a 1ohm 2ohm and 32/3ohm resistor is connected in star, find the equivalent delta connection.
a) 34 ohm, 18.67 ohm, 3.19 ohm
b) 33 ohm, 18.67 ohm, 3.19 ohm
c) 33 ohm, 19.67 ohm, 3.19 ohm
d) 34 ohm, 19.67 ohm, 3.19 ohm

Answer: a
Explanation: Using the formula for delta to star conversion:
Using the formula for delta to star conversion:
*R1=1+2+1*2/(32/3)*
R2=1+32/3+1(32/3)/2*
R3=2+32/3+2(32/3)/1.*

---

9. If an 8/9ohm, 4/3ohm and 2/3ohm resistor is connected in star, find its delta equivalent.
a) 4ohm, 3ohm, 2ohm
b) 1ohm, 3ohm, 2ohm
c) 4ohm, 1ohm, 2ohm
d) 4ohm, 3ohm, 1ohm

Answer: a
Explanation: Using the formula for the star to delta conversion:
R1=8/9+4/3+(8/9)(4/3)/(2/3)*
R2=8/9+2/3+(8/9)(2/3)/(4/3)*
R3=2/3+4/3+(2/3)(4/3)/(8/9).*

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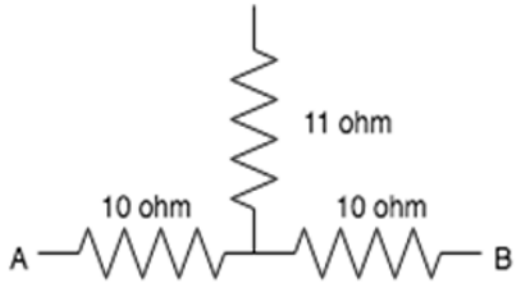
10. Find the equivalent resistance between A and B.



a) 32ohm
b) 31ohm

c) 30ohm
d) 29ohm

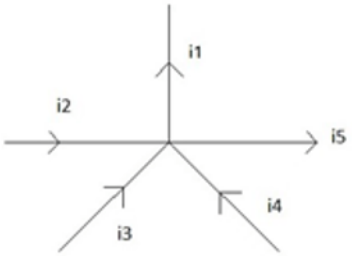
Answer: d
Explanation: The equivalent resistance between node 1 and node 3 in the star connected circuit is R=(10×10+10×11+11×10)/11=29ohm.

Kirchhoff's Laws

1. KCL is based on the fact that
   a) There is a possibility for a node to store energy.
   b) There cannot be an accumulation of charge at a node.
   c) Charge accumulation is possible at node
   d) Charge accumulation may or may not be possible.

Answer: b
Explanation: Since the node is not a circuit element, any charge which enters node must leave immediately.

2. Relation between currents according to KCL is



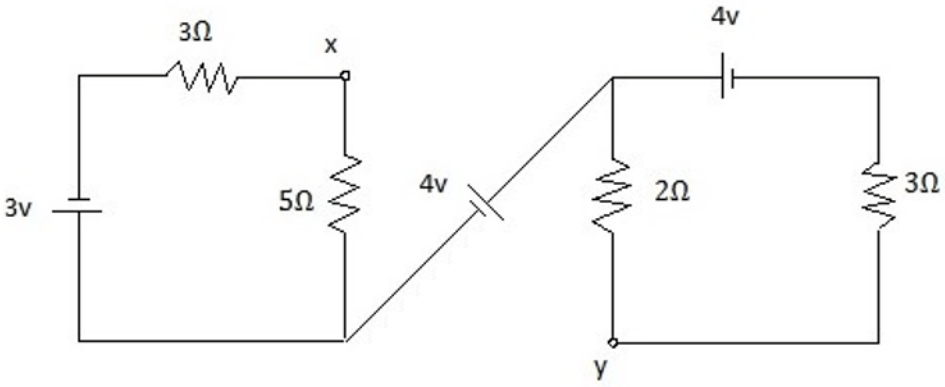
   a) $i_1=i_2=i_3=i_4=i_5$
   b) $i_1+i_4+i_3=i_5+i_2$
   c) $i_1-i_5=i_2-i_3-i_4$
   d) $i_1+i_5=i_2+i_3+i_4$

Answer: d
Explanation: According to KCL, entering currents=leaving currents.

3. The algebraic sum of voltages around any closed path in a network is equal to _____
   a) Infinity
   b) 1
   c) 0
   d) Negative polarity

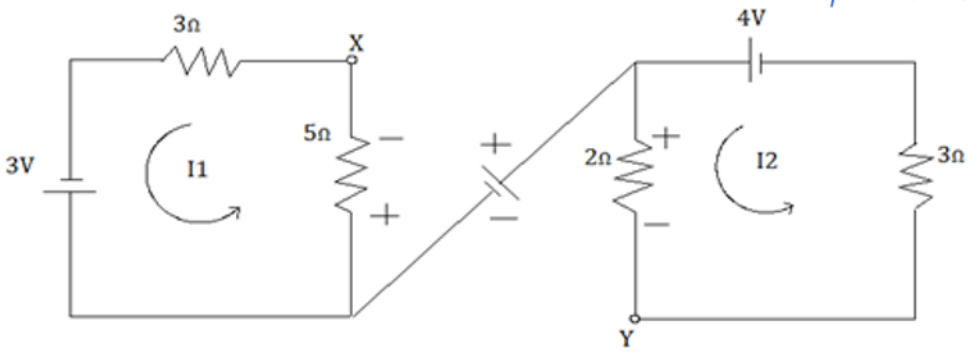
Answer: c
Explanation: According to KVL, the sum of voltages around the closed path in a network is zero

4. Calculate potential difference between x and y



a) 4.275v
b) -4.275v
c) 4.527v
d) -4.527v

Answer: b
Explanation:



$I_1 = 3/(3+5) = 3/8 = 0.375\Omega$
$I_2 = 4/5 = 0.8\Omega$
$V_{xy} = v_x - v_y$
$V_x + 5I_1 + 4 - 2I_2 - v_y = 0$
$V_x - v_y = 2I2 - 4 - 5I_1 = -4.275\Omega$

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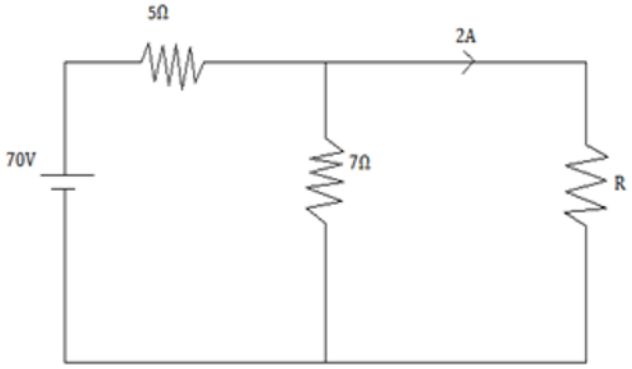
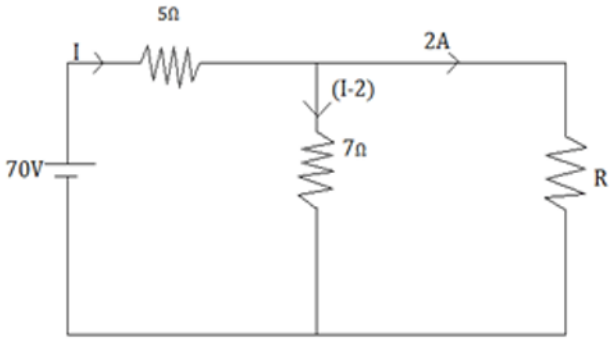
5. Find R-value from the below circuit?



a) 17.5 Ω
b) 17.2 Ω
c) 17.4 Ω
d) 17.8 Ω

Answer: a
Explanation:



KVL: 70 – 5I – 7(I – 2) = 0
I = 7A
KVL to 2nd loop: 7(I – 2) – 2R = 0
R=17.5Ω

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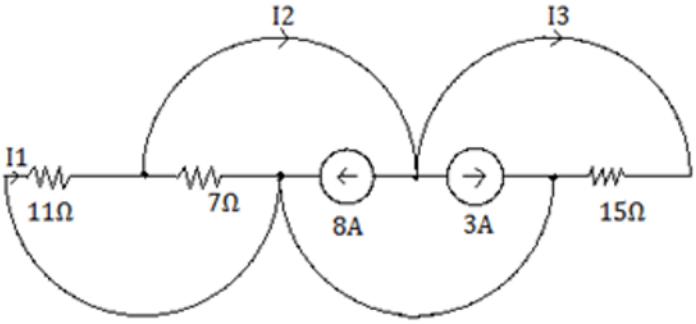
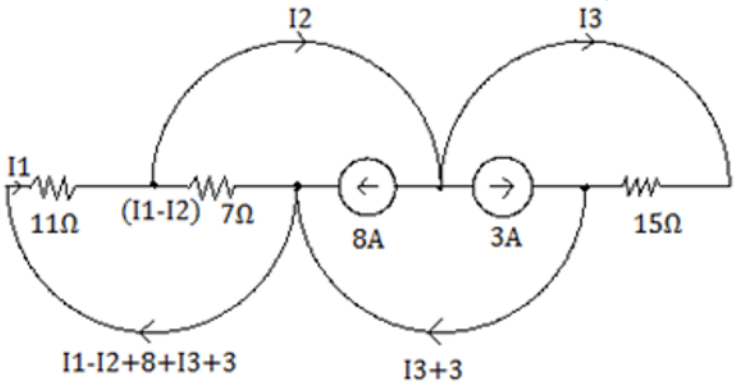
6. Determine currents I_1 , I_2 and I_3.



a) -3.3A, -8.5A, 2.4A
b) 3A, -8A, 2A
c) 3.3A, 8.5A, -2.4A
d) 3.2A, 8.6A, 2.3A

Answer: c
Explanation:



$I_1 = I_1 – I_2 + 8 + I_3 + 3$
$I_2 – I_3 = 11$ 1
And -11 I1 – 7($I_1 – I_2$) = 0
-18 I_1 + 7 I_2 = 0 2

And -11 I_1 – 15 I_3 =0 3
Solving I_1 = 3.32A I_2 = 8.5A I_3 = -2.4A.

---

7. All _____ are loops but _____ are not meshes
   a) Loops, Meshes
   b) Meshes, loops
   c) Branches, loops
   d) Nodes, Branches

Answer: b
Explanation: A mesh cannot be divided further in loops.

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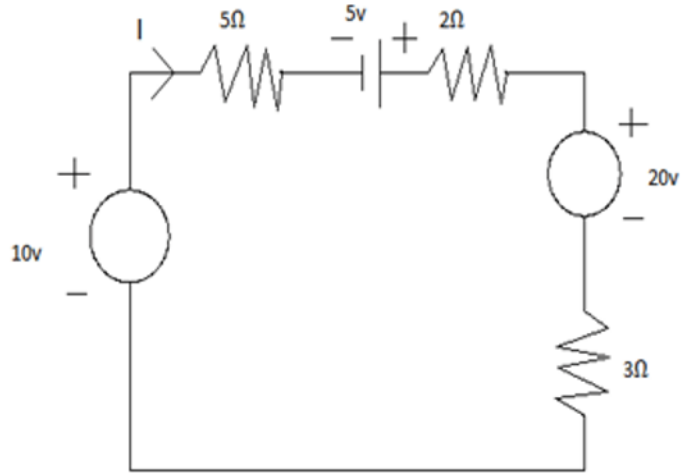
8. Solve and find the value of I.



   a) -0.5A
   b) 0.5A
   c) -0.2A
   d) 0.2A

Answer: a
Explanation: V_{eq} = 10 + 5 -20 = -5u
R_{eq} = 5 + 2 + 3 = 10Ω
I = V/R = -5/10 = -0.5A.

---

9. The basic laws for analyzing an electric circuit are :-
   a) Einstein's theory
   b) Newtons laws
   c) Kirchhoff's laws
   d) Faradays laws

Answer: c
Explanation: Kirchhoff's laws are used for analyzing an electric circuit.

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10. A junction where two (or) more than two network elements meet is known as a _____

a) Node
b) Branch
c) Loop
d) Mesh

Answer: a

Explanation: Node is a junction where two or more than two network elements meet.