QUIZ – ANSWER KEY

QUIZ NO: 158

TOPIC: ELECTRICAL ENGINEERING

DATE: 26/01/2023

1. In series connection of resistors, what happens to the current across each resistor?

   [A] Increases

   [B] Decreases

   [C] Remain the same

   [D] Initially increases and then decreases

   Answer: C
   Explanation: When the resistors are connected in series, and current is passed through them, the current passing through each of the resistor is the same. This is because, the resistors are connected end to the end and, therefore, there is only one path for the current to flow through.

2. Identify the combination which is not a series connection ?

   [A] Resistance box

   [B] Decorative bulbs

   [C] Fuses

   [D] Domestic appliances

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Answer: D

Explanation: Domestic appliances in a house are connected in parallel combinations, and not in series combinations. This arrangement is done so that each of the appliances can switched on and off independently, which is essential in a house's wiring.

3. Pick out the correct statement from the following about parallel combination of resistors ?

   [A] The current across the resistors are the same

   [B] The resistance offered by all resistors are the same

   [C] The potential difference is same across each resistor

   [D] The equivalent overall resistance is larger than the largest resistor

   Answer: C

   Explanation: In parallel combination, the resistors are connected together at one end, and are also all connected together at the other end. So, the potential difference across the resistors will not change and thus, remains the same.

4. Two wires of the same material have the same length but their radii are in the ratio of 5:3. They are combined in series, where the resistance of the thicker wire is 12 ohms. Calculate the total resistance of the combination ?

   [A] 40

   [B] 12

   [C] 32

   [D] 20

   Answer: C

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Explanation:

The given ratio of radii = 5:3; R2/R1=5/3 → R2 = (5/3) R1
R1 = 12 ohms (given); R2 = (5/3) × 12 = 20 ohms. So, R1 = 12 ohms and R2 = 20 ohms
Therefore, total resistance (R) = R1 + R2 (since they are combined in series)
= 12 + 20
= 32 ohms
Thus, the total resistance of the combination is 32 ohms.

5. Three resistors each of 5 ohms are connected in the form of a triangle. What is the resistance between the vertices?

[A] 3/10

[B] 10/3

[C] 15/50

[D] 2/5

Answer: B

Explanation:

Equivalent resistance = 5 + 5 + 1/5 (since first two are in series, and they are in parallel to the third in case of a triangular arrangement)
1/R = 10 + 1/5=(5+10)/5×10=15/50=3/10
Thus, R = 1/(3/10)=10/3 ohms
Therefore, the equivalent resistance is 10/3 ohms.

6. Two resistors are connected in parallel, whose resistance values are in the ratio 3:1. Find the ratio of power dissipated ?

[A] 1:3

[B] 3:1

[C] 1:2

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[D] 2:1

Answer: A

Explanation:

We can consider the relation that includes power and resistance, i.e. Power = voltage^2/resistance. Since, the resistors are connected in parallel, the voltage across them will be the same. From this relation, power and resistance are inversely proportional to each other.
Thus, P1/P2=R2/R1=1/3
So, the power dissipated is in the ratio is 1:3

7. A set up is such that there are three similar resistors, each of 20 ohms resistance. Two of them are connected in parallel, and this combination is connected in series with the third one. The maximum power that can be consumed by each resistor is 30 W. Then, what is the maximum power that can be consumed by the combination of all three resistors?

[A] 30
[B] 20
[C] 35
[D] 45

Answer: D

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Explanation:

The equivalent overall resistance of the parallel combination is:
$1/R1=1/20+1/20=2/20=1/10 \rightarrow R_1 = 10$ ohms.
R1 is in series with R2; So, R3 = R1 + R2 = 10 + 20 = 30 ohms.
Now, we can employ the method of cross-multiplication:
For 20 ohms resistor → 30 W power consumed
For 30 ohms resistor combination → x
$20x = 30 \times 30$
$x = 30 \times 30/20$
$x = 45$
Therefore, the power consumed by the parallel combination is 45 ohms.

8. The internal resistance of a cell does not depend on :

[A] Area of the electrodes
[B] Distance between electrodes
[C] Concentration of electrolyte
[D] E.m.f of the cell

Answer: D

Explanation:

The dependency of internal resistance of a cell –

1. It is directly proportional to the distance between electrodes
2. It is inversely proportional to area of the electrode
3. It is directly proportional to concentration of electrolyte
4. It is inversely proportional to temperature of electrolyte

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9. Identify the correct statement from the following about discharging of a cell ?

[A] The direction of current in the cell is from positive to negative terminal

[B] Terminal potential difference is greater than emf of the cell

[C] Terminal potential difference is lesser than emf of the cell

[D] The current increases and decreases frequently

Answer: C

Explanation: During discharging of a cell terminal potential difference, the terminal potential difference is lesser than the emf of the cell. The direction of current inside the cell is from negative terminal to positive terminal.

10. A current of 3 A passes through an electric circuit for 5 minutes and does a work of 900J. What is the emf of the source?

[A] 3V

[B] 1V

[C] 5V

[D] 10V

Answer: B

Explanation:

Current = 3 A; Time taken = 5 minutes = 300 seconds
Work done = 900 J; Power = Work done / Time taken=900/300 = 3 W
Power = Voltage (emf) x Current → Emf = Power / Current=3/3 = 1V
Therefore, the emf of the source is 1 volt.