Continuing Education Course #315
Introduction to Electrical Theory and DC Circuits
For Engineers of All Disciplines

1. Silicon is an example of a _____.
- a. Insulator
- b. Conductor
- c. Semiconductor
- d. Superconductor

2. Electrostatic force between two charged particles is calculated using which formula?
- a. Coulomb's law
- b. Ohm's law
- c. Faraday's law
- d. None of the above

3. Two charges, each with a magnitude of 4 μC, are 3.5 cm apart. What is the force of repulsion between the two charges?
- a. 1.2 N
- b. 87.6 N
- c. 117.4N
- d. 210.4 N

4. What is the SI unit for current?
- a. Coulomb
- b. Ampere
- c. Ohm
- d. Hertz

5. A wire carries a current of 3 A. How much charge moves through a cross-section in 2 seconds?
- a. 1.5 C
- b. 3 C
- c. 4.5 C
- d. 6 C

6. A round copper wire is 1.2 cm in diameter and has a length of 800 meters. What is its resistance (in ohms) at a temperature of 20°C?
- a. 0.56
- b. 0.32
- c. 0.12
- d. 0.05

7. At 50°C, a piece of aluminum wire has a resistance of 80 Ω. When the wire is placed in a liquid bath, the resistance decreases to 75 Ω. What is the approximate temperature of the liquid bath?

- a. 18°C
- b. 34°C
- c. 50°C
- d. 66°C

8. The reciprocal of resistance is known as conductance, which has SI units of siemens.

- a. True
- b. False

9. A carbon composition resistor has a resistance of $14 \cdot 10^3$ Ω ±10%. What color is the second band on the resistor?

- a. Red
- b. Blue
- c. Yellow
- d. Green

10. A carbon composition resistor has color bands brown, green, gold, and silver. What is the resistance?

- a. 1500 Ω ± 20%.
- b. 15 Ω ± 20%.
- c. 150 Ω ± 10%.
- d. 1.5 Ω ± 10%

11. A copper wire has a radius of 0.05 mm and is 2 meters long. If a potential difference of 10 V is maintained across the wire, what is the current in the wire?

- a. 1.7 A
- b. 2.3 A
- c. 3.5 A
- d. 4.3 A

12. The resistance of a wire is equal to 30 ohms. How much current does the wire carry when connected to a 120 V source?

- a. 4 A
- b. 6 A
- c. 8 A
- d. 10 A

13. An electrical device carries a current of 6 A when connected to a 120 V source. What is its resistance?

- a. 10 Ω
- b. 20 Ω
- c. 30 Ω
- d. 40 Ω

14. A nickel wire has a radius of 0.15 cm and a length of 10 meters. At 20°C the wire is connected to a 12 V supply and a current of 109 A. What is the approximate resistivity of nickel?

- a. $7.8 \cdot 10^{-8} \Omega \cdot m$
- b. $1.1 \cdot 10^{-8} \Omega \cdot m$
- c. $7.8 \cdot 10^{-4} \Omega \cdot m$
- d. $1.1 \cdot 10^{-4} \Omega \cdot m$

15. What would be the resistance in a lightbulb rated at 120 V and 100 W?

○ a. 120 Ω
○ b. 100 Ω
○ c. 83 Ω
○ d. 144 Ω

16. An appliance operates at 20 A and 220 V for 3 hours. What is the cost to operate the appliance if electricity costs 13 cents per kilowatt-hour?
○ a. $1.05
○ b. $1.58
○ c. $1.72
○ d. $2.16

17. Household circuits are wired such that each device operates independently (when one is switched off the others remain on) and each device operates on the same voltage. Therefore, the lights and appliances are connected in _____.
○ a. Series
○ b. Parallel

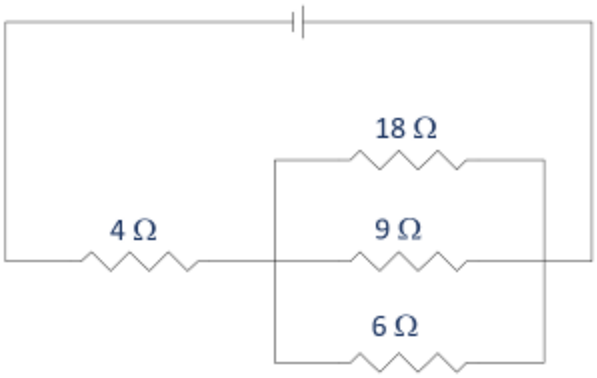
18. A series circuit has a power supply of 100 V and three resistors in series. The resistance values are 350 Ω, 600 Ω, and 420 Ω. What is the voltage drop across the 420 Ω resistor?
○ a. 30.6 V
○ b. 25.5 V
○ c. 43.8 V
○ d. 51.3 V

19. Two lamps are connected in series across a 120 V supply. Lamp 1 has a rating of 75 W at 100 V, and lamp 2 has a rating of 60 W at 100 V. What is the voltage drop for lamp 2?
○ a. 33.3 V
○ b. 44.4 V
○ c. 55.6 V
○ d. 66.7 V

20. What is the equivalent resistance of three 60 Ω resistors arranged in parallel?
○ a. 180 Ω
○ b. 40 Ω
○ c. 20 Ω
○ d. 0.05 Ω

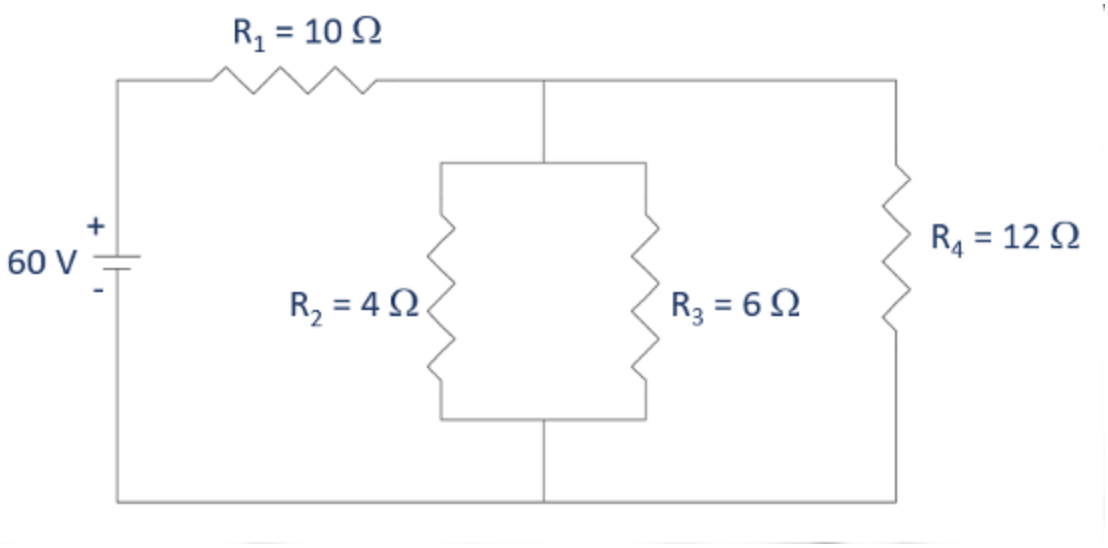
21. Three resistors are arranged in parallel and has an equivalent resistance of 4 Ω. Which of the following resistors cannot be in the circuit?
○ a. 18 Ω
○ b. 10 Ω
○ c. 2 Ω
○ d. Any of these resistors could be in the circuit

22. Determine the equivalent resistance for the circuit shown.



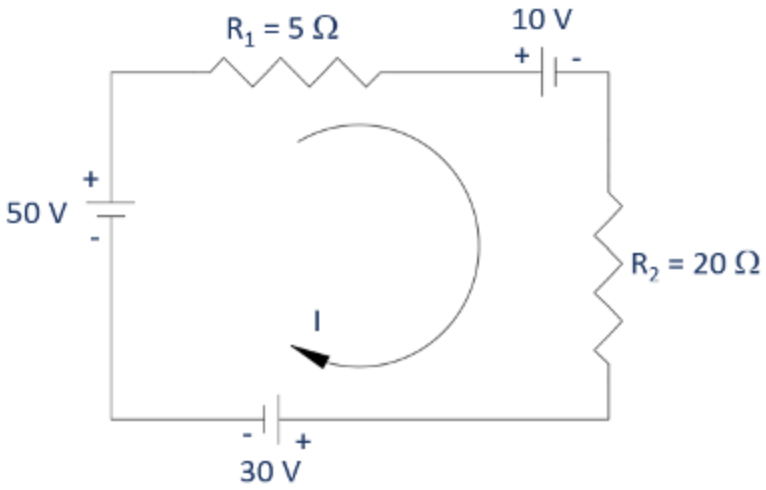
- a. 24 ohms
- b. 16 ohms
- c. 7 ohms
- d. 2 ohms

23. What is the total power supplied by the 60 V source?



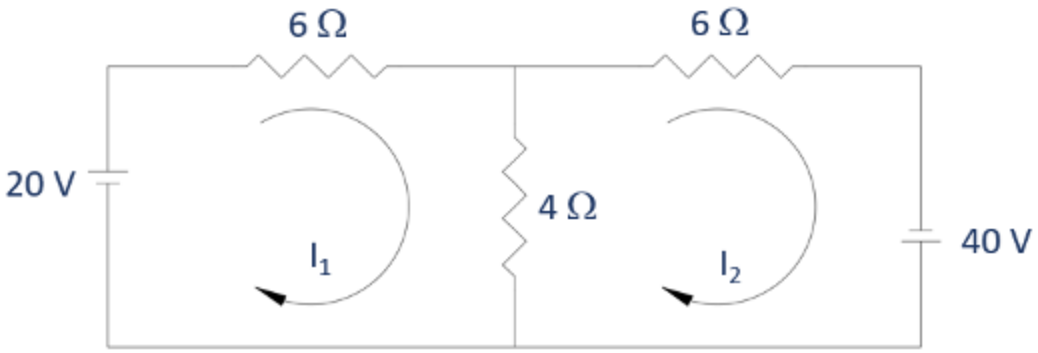
- a. 120 W
- b. 300 W
- c. 360 W
- d. 1800 W

24. What is the current I in the circuit shown?



a. 0.4 A
b. 0.7 A
c. 1.2 A
d. 2.6 A

25. What is current I_1 for the circuit shown?



a. 3.17 A
b. 4.29 A
c. 6.46 A
d. None of the above