

Series Resistors MCQs with Answers

KSEB Sub Engineer Exam | 30 Questions | Electrical Engineering | Prepared by Entri

Quick formulas to remember

Series: $R = R_1 + R_2 + R_3$ | Same current in all | $V = V_1 + V_2 + V_3$ | n equal resistors: nR

Voltage divider: $V_1 = V \times R_1 / R_{\text{total}}$ | Power: $P = I^2 R$ | Multiplier: $R_s = V / I_m - R_m$

Instructions: Choose the correct option for each question. Attempt all 30 questions first, then check the answer key and explanations at the end. Try to finish within 20 minutes.

Section A: Questions

Q1. The _____ is the same through all resistors connected in series.

- (a) voltage
- (b) power
- (c) resistance
- (d) current

Q2. The equivalent resistance of resistors connected in series is:

- (a) $R = R_1 + R_2 + R_3$
- (b) $1/R = 1/R_1 + 1/R_2 + 1/R_3$
- (c) $R = R_1 \times R_2 \times R_3$
- (d) $R = R_1 - R_2$

Q3. In a series circuit, the voltage drop across each resistor is:

- (a) inversely proportional to its resistance
- (b) directly proportional to its resistance
- (c) independent of its resistance
- (d) proportional to the square of its resistance

Q4. The total voltage applied to a series circuit:

- (a) is the average of the drops
- (b) is equal to the largest drop
- (c) equals the sum of the individual voltage drops
- (d) is always zero

Q5. The equivalent resistance of resistors in series is always:

- (a) less than the smallest resistor
- (b) equal to the average resistance
- (c) equal to the largest resistor
- (d) greater than the largest resistor

Q6. Resistors of 4 Ω , 6 Ω and 10 Ω are connected in series. The equivalent resistance is:

- (a) 20 Ω
- (b) 2.4 Ω
- (c) 240 Ω
- (d) 10 Ω

Q7. Six resistors of $3\ \Omega$ each are connected in series. The equivalent resistance is:

- (a) $0.5\ \Omega$
- (b) $18\ \Omega$
- (c) $9\ \Omega$
- (d) $3\ \Omega$

Q8. A 12 V supply is connected across $4\ \Omega$ and $8\ \Omega$ resistors in series. The current is:

- (a) 3 A
- (b) 2 A
- (c) 1 A
- (d) 0.5 A

Q9. In the same circuit (12 V across $4\ \Omega$ and $8\ \Omega$ in series), the voltage across the $8\ \Omega$ resistor is:

- (a) 4 V
- (b) 12 V
- (c) 6 V
- (d) 8 V

Q10. A current of 1 A flows through $10\ \Omega$ and $20\ \Omega$ resistors in series. The total power dissipated is:

- (a) 30 W
- (b) 10 W
- (c) 20 W
- (d) 300 W

Q11. In a series circuit, the resistor that dissipates the maximum power is the one with:

- (a) the smallest resistance
- (b) the largest resistance
- (c) all resistors dissipate equal power
- (d) the middle resistance

Q12. Three bulbs of 40 W , 60 W and 100 W , all rated for 230 V , are connected in series across 230 V . Which bulb glows brightest?

- (a) 100 W bulb
- (b) 60 W bulb
- (c) 40 W bulb
- (d) All glow equally

Q13. If one resistor in a series circuit burns out (open circuit), the current in the circuit:

- (a) becomes zero in the entire circuit
- (b) increases
- (c) doubles
- (d) flows only in the other resistors

Q14. If one resistor in a series circuit is short-circuited, then:

- (a) the current decreases
- (b) the current becomes zero
- (c) nothing changes
- (d) the total resistance decreases and the current increases

Q15. A 30 V supply is connected across 10 Ω and 20 Ω resistors in series. The voltage across the 20 Ω resistor is:

- (a) 10 V
- (b) 20 V
- (c) 15 V
- (d) 30 V

Q16. Resistors of 100 Ω , 200 Ω and 300 Ω are connected in series across 120 V. The voltage across the 300 Ω resistor is:

- (a) 20 V
- (b) 40 V
- (c) 60 V
- (d) 120 V

Q17. Two 100 Ω , 1 W resistors are connected in series. The maximum voltage that can be applied across the combination without exceeding the power rating is:

- (a) 10 V
- (b) 200 V
- (c) 2 V
- (d) 20 V

Q18. Two resistors in series have a resistance ratio of 1 : 3. If 24 V is applied, the voltage across the larger resistor is:

- (a) 6 V
- (b) 8 V
- (c) 18 V
- (d) 12 V

Q19. An ammeter is connected in series with the circuit and should have:

- (a) very high resistance
- (b) very low resistance
- (c) infinite resistance
- (d) resistance equal to the load

Q20. A LED needs 2 V and 20 mA. It is to be run from a 5 V supply using a series resistor. The resistor value is:

- (a) 150 Ω
- (b) 100 Ω
- (c) 250 Ω
- (d) 15 Ω

Q21. A voltmeter has a full-scale range of 10 V and an internal resistance of 1 k Ω . The series multiplier needed to extend its range to 100 V is:

- (a) 1 k Ω
- (b) 10 k Ω
- (c) 9 k Ω
- (d) 100 k Ω

Q22. Resistors of $3\ \Omega$ and $6\ \Omega$ are connected in series. The conductance of the combination is:

- (a) $9\ \text{S}$
- (b) $0.5\ \text{S}$
- (c) $2\ \text{S}$
- (d) $0.111\ \text{S}$

Q23. A $230\ \text{V}$ supply is connected across $100\ \Omega$ and $130\ \Omega$ resistors in series. The current is:

- (a) $2.3\ \text{A}$
- (b) $1\ \text{A}$
- (c) $0.5\ \text{A}$
- (d) $230\ \text{A}$

Q24. In a series circuit with unequal resistors, which quantity is different for each resistor?

- (a) Current
- (b) Charge flowing per second
- (c) Voltage drop
- (d) None of these

Q25. Ten identical lamps, each rated $24\ \text{V}$, are connected in series across a $240\ \text{V}$ supply. The voltage across each lamp is:

- (a) $24\ \text{V}$
- (b) $240\ \text{V}$
- (c) $12\ \text{V}$
- (d) $2.4\ \text{V}$

Q26. Resistors of $5\ \Omega$, $10\ \Omega$ and $15\ \Omega$ in series carry $2\ \text{A}$. The supply voltage is:

- (a) $30\ \text{V}$
- (b) $60\ \text{V}$
- (c) $15\ \text{V}$
- (d) $120\ \text{V}$

Q27. A $20\ \text{V}$ supply is connected across $4\ \Omega$ and $6\ \Omega$ resistors in series. The power dissipated in the $6\ \Omega$ resistor is:

- (a) $24\ \text{W}$
- (b) $40\ \text{W}$
- (c) $16\ \text{W}$
- (d) $60\ \text{W}$

Q28. Two $2\ \Omega$ resistors are connected in series, and this combination is connected in parallel with a $4\ \Omega$ resistor. The equivalent resistance is:

- (a) $2\ \Omega$
- (b) $8\ \Omega$
- (c) $4\ \Omega$
- (d) $0.5\ \Omega$

Q29. A load is connected to a source through a long cable. The cable resistance is in series with the load, so:

- (a) the load gets the full source voltage
- (b) the load receives less than the source voltage due to the voltage drop in the cable
- (c) the current becomes zero
- (d) the load voltage is higher than the source voltage

Q30. The internal resistance of a battery acts in series with the load, so the terminal voltage on load is:

- (a) greater than the EMF
- (b) equal to the EMF
- (c) zero
- (d) less than the EMF

Section B: Answer Key

1 - (d)	2 - (a)	3 - (b)	4 - (c)	5 - (d)
6 - (a)	7 - (b)	8 - (c)	9 - (d)	10 - (a)
11 - (b)	12 - (c)	13 - (a)	14 - (d)	15 - (b)
16 - (c)	17 - (d)	18 - (c)	19 - (b)	20 - (a)
21 - (c)	22 - (d)	23 - (b)	24 - (c)	25 - (a)
26 - (b)	27 - (a)	28 - (a)	29 - (b)	30 - (d)

Section C: Answers with Explanations

Q1. Answer: (d) current

A series circuit has a single path, so the same current flows through every resistor.

Q2. Answer: (a) $R = R_1 + R_2 + R_3$

In series, resistances add directly.

Q3. Answer: (b) directly proportional to its resistance

$V = I \times R$ with the same I , so a larger resistor takes a larger share of the voltage.

Q4. Answer: (c) equals the sum of the individual voltage drops

This follows from Kirchhoff's Voltage Law.

Q5. Answer: (d) greater than the largest resistor

The sum of all resistances is greater than any single resistance.

Q6. Answer: (a) 20 Ω

$R = 4 + 6 + 10 = 20 \Omega$.

Q7. Answer: (b) 18 Ω

For n equal resistors in series, $R = n \times R = 6 \times 3 = 18 \Omega$.

Q8. Answer: (c) 1 A

$I = V / R = 12 / (4 + 8) = 1 \text{ A}$.

Q9. Answer: (d) 8 V

$V = I \times R = 1 \times 8 = 8 \text{ V}$ (the 4Ω resistor drops 4 V, and $8 + 4 = 12 \text{ V}$).

Q10. Answer: (a) 30 W

$P = I^2 \times R = 10 \text{ W} + 20 \text{ W} = 30 \text{ W}$. Total power is the sum of individual powers.

Q11. Answer: (b) the largest resistance

With the same current, $P = I^2 \times R$ is largest for the largest resistance.

Q12. Answer: (c) 40 W bulb

$R = V^2 / P$, so the 40 W bulb has the highest resistance. In series it dissipates the most power and glows brightest.

Q13. Answer: (a) becomes zero in the entire circuit

A series circuit has only one path, so an open circuit anywhere stops the current everywhere.

Q14. Answer: (d) the total resistance decreases and the current increases

The shorted resistor drops out of the circuit, so total resistance falls and current rises.

Q15. Answer: (b) 20 V

Voltage divider: $V = 30 \times 20 / (10 + 20) = 20 \text{ V}$.

Q16. Answer: (c) 60 V

$I = 120 / 600 = 0.2 \text{ A}$, so $V = 0.2 \times 300 = 60 \text{ V}$.

Q17. Answer: (d) 20 V

Maximum current per resistor = $\sqrt{P / R} = \sqrt{1 / 100} = 0.1 \text{ A}$. Maximum voltage = $0.1 \times 200 = 20 \text{ V}$.

Q18. Answer: (c) 18 V

Voltages are in the same ratio 1 : 3, so the larger takes $24 \times 3 / 4 = 18 \text{ V}$.

Q19. Answer: (b) very low resistance

A low-resistance ammeter adds very little extra resistance in series, so it does not disturb the circuit current.

Q20. Answer: (a) 150 Ω

$R = (5 - 2) / 0.02 = 150 \Omega$.

Q21. Answer: (c) 9 k Ω

Full-scale current = $10 / 1000 = 10 \text{ mA}$. $R_s = 100 / 0.01 - 1000 = 9000 \Omega = 9 \text{ k}\Omega$.

Q22. Answer: (d) 0.111 S

$R = 9 \Omega$, so $G = 1 / 9 = 0.111 \text{ S}$.

Q23. Answer: (b) 1 A

$I = 230 / (100 + 130) = 1 \text{ A}$.

Q24. Answer: (c) Voltage drop

The current is common, but the voltage drop is proportional to each resistance.

Q25. Answer: (a) 24 V

Identical lamps share the supply equally: $240 / 10 = 24 \text{ V}$.

Q26. Answer: (b) 60 V

$V = I \times R_{\text{total}} = 2 \times 30 = 60 \text{ V}$.

Q27. Answer: (a) 24 W

$I = 20 / 10 = 2 \text{ A}$, so $P = I^2 \times R = 4 \times 6 = 24 \text{ W}$.

Q28. Answer: (a) 2 Ω

Series: $2 + 2 = 4 \Omega$. Parallel: 4Ω and 4Ω give 2Ω .

Q29. Answer: (b) the load receives less than the source voltage due to the voltage drop in the cable

Part of the voltage is dropped in the cable resistance, leaving less for the load.

Q30. Answer: (d) less than the EMF

Terminal voltage = $E - I r$, which is less than E when current flows.

Score check: 26 to 30 - Excellent | 20 to 25 - Good, revise weak topics | Below 20 - Revise series circuits, the voltage divider rule and power in resistors, then retry.

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