

# Resistance MCQs with Answers

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

## Quick formulas to remember

$R = \rho \times l / A$  | Series:  $R = R_1 + R_2$  | Parallel (two):  $R = R_1 R_2 / (R_1 + R_2)$  |  $n$  equal in parallel:  $R / n$

$R_2 = R_1 [1 + \alpha (t_2 - t_1)]$  |  $P = I^2 R$  |  $H = I^2 R t$  | Wheatstone balance:  $P / Q = R / S$

**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. Electrical resistance is the property of a material that opposes:**

- (a) voltage
- (b) the flow of current
- (c) power
- (d) magnetic flux

**Q2. The SI unit of resistance is:**

- (a) siemens
- (b) farad
- (c) ohm
- (d) henry

**Q3. The resistance of a conductor of length  $l$ , area  $A$  and resistivity  $\rho$  is given by:**

- (a)  $R = \rho A / l$
- (b)  $R = l / (\rho A)$
- (c)  $R = \rho l A$
- (d)  $R = \rho l / A$

**Q4. The resistance of a conductor is directly proportional to its:**

- (a) length
- (b) cross-sectional area
- (c) conductivity
- (d) diameter

**Q5. The resistance of a conductor is inversely proportional to its:**

- (a) length
- (b) resistivity
- (c) cross-sectional area
- (d) temperature

**Q6. The resistivity of a material depends on:**

- (a) its length
- (b) its area
- (c) its shape
- (d) the material and its temperature

**Q7. The SI unit of resistivity is:**

- (a) ohm
- (b) ohm-metre
- (c) siemens
- (d) ohm per metre

**Q8. A wire has a resistance of  $10\ \Omega$ . If its length is tripled (same area and material), the resistance becomes:**

- (a)  $30\ \Omega$
- (b)  $3.3\ \Omega$
- (c)  $90\ \Omega$
- (d)  $13\ \Omega$

**Q9. If the radius of a wire is halved (same length and material), its resistance becomes:**

- (a) half
- (b) double
- (c) four times
- (d) unchanged

**Q10. A wire is stretched to three times its length (volume remains constant). Its resistance becomes:**

- (a) 3 times
- (b) 9 times
- (c) 6 times
- (d) one-third

**Q11. A  $16\ \Omega$  wire is cut into 4 equal parts, and the parts are connected in parallel. The resultant resistance is:**

- (a)  $4\ \Omega$
- (b)  $16\ \Omega$
- (c)  $1\ \Omega$
- (d)  $0.25\ \Omega$

**Q12. A wire is 100 m long with a cross-sectional area of  $2\ \text{mm}^2$  and resistivity  $1.7 \times 10^{-8}\ \Omega\text{m}$ . Its resistance is:**

- (a)  $8.5\ \Omega$
- (b)  $85\ \Omega$
- (c)  $0.085\ \Omega$
- (d)  $0.85\ \Omega$

**Q13. Which of the following has a positive temperature coefficient of resistance?**

- (a) Metals
- (b) Carbon
- (c) Semiconductors
- (d) Electrolytes

**Q14. Which of the following has a negative temperature coefficient of resistance?**

- (a) Copper
- (b) Carbon
- (c) Aluminium
- (d) Silver

**Q15. A resistor has  $50\ \Omega$  at  $20\ ^\circ\text{C}$  and a temperature coefficient of  $0.004$  per  $^\circ\text{C}$  at  $20\ ^\circ\text{C}$ . Its resistance at  $70\ ^\circ\text{C}$  is:**

- (a)  $50\ \Omega$
- (b)  $55\ \Omega$
- (c)  $60\ \Omega$
- (d)  $70\ \Omega$

**Q16. Which material is commonly used for standard resistors because of its very low temperature coefficient?**

- (a) Manganin
- (b) Copper
- (c) Aluminium
- (d) Iron

**Q17. Which material is commonly used for heating elements?**

- (a) Copper
- (b) Silver
- (c) Aluminium
- (d) Nichrome

**Q18. Three resistors of  $2\ \Omega$ ,  $3\ \Omega$  and  $5\ \Omega$  are connected in series. The total resistance is:**

- (a)  $10\ \Omega$
- (b)  $30\ \Omega$
- (c)  $0.97\ \Omega$
- (d)  $5\ \Omega$

**Q19. Resistors of  $12\ \Omega$  and  $4\ \Omega$  are connected in parallel. The effective resistance is:**

- (a)  $16\ \Omega$
- (b)  $8\ \Omega$
- (c)  $3\ \Omega$
- (d)  $48\ \Omega$

**Q20. Four resistors of  $8\ \Omega$  each are connected in parallel. The effective resistance is:**

- (a)  $32\ \Omega$
- (b)  $8\ \Omega$
- (c)  $4\ \Omega$
- (d)  $2\ \Omega$

**Q21. The effective resistance of resistors in parallel is always:**

- (a) less than the smallest resistor
- (b) equal to the largest resistor
- (c) equal to the sum of the resistors
- (d) equal to the average of the resistors

**Q22. In a series circuit, the current is:**

- (a) zero
- (b) the same through each resistor
- (c) divided in proportion to resistance
- (d) inversely proportional to resistance

**Q23. A 12 V supply is connected across 4  $\Omega$  and 8  $\Omega$  resistors in series. The voltage across the 8  $\Omega$  resistor is:**

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

**Q24. A 6  $\Omega$  resistor is connected in series with a parallel combination of 6  $\Omega$  and 3  $\Omega$ . The total resistance is:**

- (a) 8  $\Omega$
- (b) 12  $\Omega$
- (c) 15  $\Omega$
- (d) 4  $\Omega$

**Q25. A Wheatstone bridge has ratio arms P and Q on one side, and arms R and S on the other, with P and R connected to the same battery terminal. At balance:**

- (a)  $P \times R = Q \times S$
- (b)  $P \times Q = R \times S$
- (c)  $P / Q = R / S$
- (d)  $P + Q = R + S$

**Q26. Which instrument is used to measure insulation resistance?**

- (a) Wattmeter
- (b) Megger
- (c) Tachometer
- (d) Frequency meter

**Q27. Low resistances are accurately measured using:**

- (a) Wheatstone bridge
- (b) Megger
- (c) Kelvin double bridge
- (d) Schering bridge

**Q28. The power dissipated in a 5  $\Omega$  resistor carrying 4 A is:**

- (a) 80 W
- (b) 20 W
- (c) 40 W
- (d) 160 W

**Q29. The heat produced when 2 A flows through a 10  $\Omega$  resistor for 5 seconds is:**

- (a) 20 J
- (b) 100 J
- (c) 50 J
- (d) 200 J

**Q30. A voltmeter is connected in parallel with the circuit element and should have:**

- (a) zero resistance
- (b) very high resistance
- (c) very low resistance
- (d) resistance equal to the element

## Section B: Answer Key

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

## Section C: Answers with Explanations

### Q1. Answer: (b) the flow of current

Resistance opposes the flow of electric current.

### Q2. Answer: (c) ohm

Resistance is measured in ohms.

### Q3. Answer: (d) $R = \rho l / A$

$R = \rho \times l / A$ .

### Q4. Answer: (a) length

$R = \rho l / A$ , so  $R$  is directly proportional to length.

### Q5. Answer: (c) cross-sectional area

$R = \rho l / A$ , so  $R$  is inversely proportional to the cross-sectional area.

### Q6. Answer: (d) the material and its temperature

Resistivity is a property of the material and changes with temperature. It does not depend on length or area.

### Q7. Answer: (b) ohm-metre

$\rho = R \times A / l$ , which has the unit ohm  $\times$  m squared / m = ohm-metre.

### Q8. Answer: (a) 30 $\Omega$

$R$  is proportional to length, so  $R = 3 \times 10 = 30 \Omega$ .

### Q9. Answer: (c) four times

Area is proportional to radius squared, so area becomes one-fourth and resistance becomes 4 times.

### Q10. Answer: (b) 9 times

Length becomes 3 times and area becomes one-third, so  $R$  becomes  $3 \times 3 = 9$  times.

### Q11. Answer: (c) 1 $\Omega$

Each part is 4  $\Omega$ . Four 4  $\Omega$  resistors in parallel give  $4 / 4 = 1 \Omega$ .

### Q12. Answer: (d) 0.85 $\Omega$

$R = \rho l / A = 1.7 \times 10^{-8} \times 100 / (2 \times 10^{-6}) = 0.85 \Omega$ .

### Q13. Answer: (a) Metals

The resistance of metals increases with temperature.

### Q14. Answer: (b) Carbon

Carbon, semiconductors, electrolytes and insulators show a fall in resistance when temperature rises.

### Q15. Answer: (c) 60 $\Omega$

$R_2 = R_1 [1 + \alpha (t_2 - t_1)] = 50 [1 + 0.004 \times 50] = 50 \times 1.2 = 60 \Omega$ .

**Q16. Answer: (a) Manganin**

Manganin (and constantan) have almost constant resistance with temperature.

**Q17. Answer: (d) Nichrome**

Nichrome has high resistivity and withstands high temperature without oxidising easily.

**Q18. Answer: (a) 10  $\Omega$** 

$R_{\text{total}} = 2 + 3 + 5 = 10 \Omega$ .

**Q19. Answer: (c) 3  $\Omega$** 

$R = (12 \times 4) / (12 + 4) = 48 / 16 = 3 \Omega$ .

**Q20. Answer: (d) 2  $\Omega$** 

For  $n$  equal resistors in parallel,  $R = 8 / 4 = 2 \Omega$ .

**Q21. Answer: (a) less than the smallest resistor**

Adding parallel paths reduces the total resistance, so it is less than the smallest branch.

**Q22. Answer: (b) the same through each resistor**

A series circuit has only one path, so the same current flows through every resistor.

**Q23. Answer: (d) 8 V**

$I = 12 / 12 = 1 \text{ A}$ , so  $V = 1 \times 8 = 8 \text{ V}$ .

**Q24. Answer: (a) 8  $\Omega$** 

$6 \Omega$  in parallel with  $3 \Omega = 2 \Omega$ . Total =  $6 + 2 = 8 \Omega$ .

**Q25. Answer: (c)  $P / Q = R / S$** 

A Wheatstone bridge is balanced when  $P / Q = R / S$ , and the galvanometer shows no deflection.

**Q26. Answer: (b) Megger**

A megger applies a high voltage and measures very high insulation resistance.

**Q27. Answer: (c) Kelvin double bridge**

The Kelvin double bridge removes the effect of lead and contact resistance, which matters for low resistances.

**Q28. Answer: (a) 80 W**

$P = I^2 \times R = 16 \times 5 = 80 \text{ W}$ .

**Q29. Answer: (d) 200 J**

$H = I^2 \times R \times t = 4 \times 10 \times 5 = 200 \text{ J}$ .

**Q30. Answer: (b) very high resistance**

A high-resistance voltmeter draws very little current, so it does not disturb the circuit.

Score check: 26 to 30 - Excellent | 20 to 25 - Good, revise weak topics | Below 20 - Revise resistivity, series-parallel circuits and temperature effects, then retry.

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