



Chapter 3 : Current Electricity (50 Important MCQs)

by - Tomar Sir

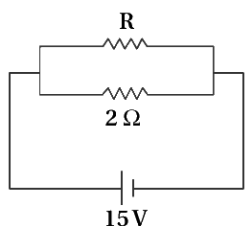
Notes

50 important MCQs from GSEB, CBSE, NEET and JEE exams · Answer key at the end

Section A — Multiple Choice Questions

Each question carries 1 mark. Choose the correct option.

Q.1 In the given circuit, the total power consumed is 150 W. Then the value of R is

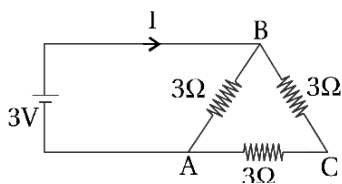


- (A) $2\ \Omega$ (B) $6\ \Omega$ (C) $5\ \Omega$ (D) $4\ \Omega$

Q.2 When the temperature of a copper strip and a germanium strip is decreased from room temperature to 80 K,

- (A) resistance of both decreases.
(B) resistance of both increases.
(C) resistance of copper increases and resistance of germanium decreases.
(D) resistance of copper decreases and resistance of germanium increases.

Q.3 A 3 V battery with negligible internal resistance is connected in a circuit as shown. The current I in the circuit will be



- (A) 1 A (B) 1.5 A (C) 2 A (D) $\frac{1}{3}$ A

Q.4 The power consumed by a bulb rated 1000 W, 220 V when connected to 110 V mains is

- (A) 750 W (B) 500 W (C) 250 W (D) 1000 W

Q.5 The equivalent resistance of two resistances connected in series is S. If they are connected in parallel, the equivalent resistance is P. If $S = nP$, what is the minimum value of n?

- (A) 4 (B) 3 (C) 2 (D) 1

Q.6 Two wires are made of the same material. The ratio of their lengths is $\frac{4}{3}$ and the ratio of their radii is $\frac{2}{3}$. If these two wires are connected in parallel, the ratio of the currents flowing through them will be

- (A) 3 (B) $\frac{1}{3}$ (C) $\frac{8}{9}$ (D) 2

Q.7 The resistance of a bulb rated 100 W, 200 V while it is being used is 10 times its resistance when not in use. The resistance of the bulb when not in use will be

- (A) 400 Ω (B) 200 Ω (C) 40 Ω (D) 20 Ω

Q.8 Two cells of equal emf are connected in series (helping) with an external resistor R. Their internal resistances are R_1 and R_2 ($R_2 > R_1$). If the potential difference between the ends of the second cell is zero, then R is

- (A) $\frac{R_1 R_2}{R_1 + R_2}$ (B) $\frac{R_1 R_2}{R_1 - R_2}$ (C) $R_2 - \frac{R_1 + R_2}{R_2 - R_1}$ (D) $R_2 - R_1$

Q.9 The resistivity of metal B is twice the resistivity of metal A. The diameter of wire B is twice the diameter of wire A. If the resistances of both wires are the same, the ratio of their lengths $\frac{l_B}{l_A}$ is

- (A) $\frac{1}{4}$ (B) 2 (C) 1 (D) $\frac{1}{2}$

Q.10 The resistance of a wire is 5 Ω at 50 $^{\circ}\text{C}$ and 6 Ω at 100 $^{\circ}\text{C}$. Its resistance at 0 $^{\circ}\text{C}$ will be

- (A) 2 Ω (B) 1 Ω (C) 3 Ω (D) 4 Ω

Q.11 Two conducting wires have equal resistance at 0 $^{\circ}\text{C}$. Their temperature coefficients of resistance are α_1 and α_2 . For series and parallel combinations, their temperature coefficients of resistance will be

- (A) $\frac{\alpha_1 + \alpha_2}{2}, \frac{\alpha_1 + \alpha_2}{2}$ (B) $\frac{\alpha_1 + \alpha_2}{2}, \alpha_1 + \alpha_2$
(C) $\alpha_1 + \alpha_2, \frac{\alpha_1 + \alpha_2}{2}$ (D) $\alpha_1 + \alpha_2, \frac{\alpha_1 \alpha_2}{\alpha_1 + \alpha_2}$

Q.12 A copper wire is stretched to make it 0.1% longer. The percentage change in its resistance is (assume the volume of the wire remains constant)

- (A) increase by 0.2% (B) decrease by 0.2%
(C) decrease by 0.05% (D) increase by 0.05%

Q.13 In a semiconductor, the ratio of the number density of electrons to that of holes is $\frac{7}{5}$, and the ratio of their currents is $\frac{7}{4}$. The ratio of their drift velocities is (AIEEE 2011)

- (A) $\frac{5}{4}$ (B) $\frac{4}{7}$ (C) $\frac{5}{8}$ (D) $\frac{4}{5}$

Q.14 Bulbs rated 25 W, 200 V and 100 W, 220 V are connected in series with a 440 V supply. Which bulb will fuse?

- (A) both bulbs (B) 100 W bulb (C) 25 W bulb (D) none of these

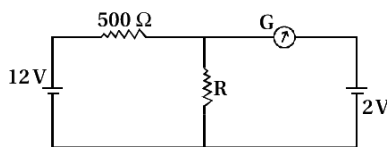
Q.15 A heater coil is cut into two equal parts and only one part is used in the heater. The heat generated (for the same supply) will now be

- (A) one fourth (B) half (C) double (D) four times

Q.16 In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1 kW. The voltage of the electric mains is 220 V. The minimum capacity of the main fuse of the building will be

- (A) 12 A (B) 14 A (C) 8 A (D) 10 A

Q.17 For which value of R in the given circuit will the galvanometer reading be zero? Neglect the internal resistance of both batteries.



- (A) $10\ \Omega$ (B) $100\ \Omega$ (C) $500\ \Omega$ (D) $200\ \Omega$

Q.18 Two electric bulbs rated (25 W, 220 V) and (100 W, 220 V) are connected in series across a 220 V source. If the 25 W and 100 W bulbs draw powers P_1' and P_2' respectively, then

- (A) $P_1' = 16\ \text{W}$, $P_2' = 4\ \text{W}$ (B) $P_1' = 16\ \text{W}$, $P_2' = 9\ \text{W}$
 (C) $P_1' = 9\ \text{W}$, $P_2' = 16\ \text{W}$ (D) $P_1' = 4\ \text{W}$, $P_2' = 16\ \text{W}$

Q.19 In a building, there are 15 bulbs of 45 W, 15 bulbs of 100 W, 15 bulbs of 10 W and 2 heaters of 1 kW. The voltage of the electric mains is 220 V. The minimum fuse capacity (rated value) of the building will be approximately

- (A) 5 A (B) 20 A (C) 25 A (D) 15 A

Q.20 In the four arms of a Wheatstone bridge, resistors of $15\ \Omega$, $12\ \Omega$, $4\ \Omega$ and $10\ \Omega$ are connected in cyclic order. What value of resistor should be connected in parallel with the $10\ \Omega$ resistance so that the bridge is balanced?

- (A) $10\ \Omega$ (B) $5\ \Omega$ (C) $15\ \Omega$ (D) $20\ \Omega$

Q.21 A battery of 3.0 V is connected to a resistor dissipating 0.5 W of power. If the terminal voltage of the battery is 2.5 V, the power dissipated within the internal resistance is

- (A) 0.125 W (B) 0.50 W (C) 0.10 W (D) 0.072 W

Q.22 A 21 V cell is connected in series with a $1\ \text{k}\Omega$ resistor, a $5\ \text{k}\Omega$ resistor and a parallel combination of three $3\ \text{k}\Omega$ resistors. Find the currents in the $5\ \text{k}\Omega$ resistor and in each $3\ \text{k}\Omega$ resistor.

- (A) 1 mA, 3 mA (B) 3 mA, 1 mA (C) 3 mA, 5 mA (D) 6 mA, 2 mA

Q.23 A conductor of length l , area of cross-section A and resistivity ρ has resistance R . It is connected across a cell of voltage V . What will be the current through it if its length is doubled and its cross-section area is halved?

- (A) $\frac{1}{4} \frac{VA}{\rho l}$ (B) $\frac{4VA}{\rho l}$ (C) $\frac{R}{4V} \frac{\rho l}{VA}$ (D) $\frac{3VA}{4\rho l}$

Q.24 Find the resistance if it dissipates 10 mJ of energy per second when a current of 1 mA passes through it.

- (A) $1\ \text{k}\Omega$ (B) $100\ \text{k}\Omega$ (C) $10\ \text{k}\Omega$ (D) $1000\ \text{k}\Omega$

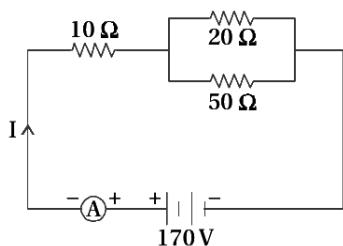
Q.25 500 J of heat is dissipated when a current of 1.5 A is passed through a resistor for 20 s. If the current is changed to 3 A, how much heat will be dissipated in the same time?

- (A) 500 J (B) 125 J (C) 2000 J (D) 1000 J

Q.26 In a metal conductor, a current of 0.1 A is flowing. The cross-section area is $5\ \text{mm}^2$. The drift velocity is $2 \times 10^{-3}\ \text{m/s}$. Find the free electron density.

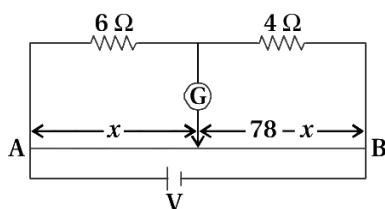
- (A) 625×10^{23} (B) 62.5×10^{23} (C) 500×10^{23} (D) 400×10^{23}

Q.27 In the given circuit, find the potential difference across the $10\ \Omega$ resistance.



- (A) 100 V (B) 70 V (C) 10 V (D) 90 V

Q.28 In the given set-up, there is no deflection in the galvanometer. Find the value of x . The total length of wire AB is 78 cm.



- (A) 46.8 cm (B) 31.2 cm (C) 39 cm (D) 50 cm

Q.29 Two identical cells, each of emf 1.5 V, are connected in parallel across a parallel combination of two resistors each of resistance $20\ \Omega$. A voltmeter connected in the circuit measures 1.2 V. The internal resistance of each cell is

- (A) $2.5\ \Omega$ (B) $4\ \Omega$ (C) $5\ \Omega$ (D) $10\ \Omega$

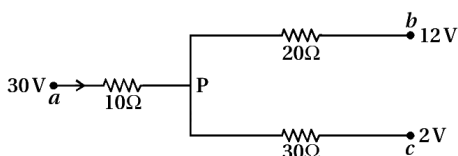
Q.30 What will be the most suitable combination of three resistors $A = 2\ \Omega$, $B = 4\ \Omega$, $C = 6\ \Omega$ so that $\frac{22}{3}\ \Omega$ is the equivalent resistance?

- (A) Parallel of A and C, in series with B (B) Parallel of A and B, in series with C
(C) Series of A and C, in parallel with B (D) Series of B and C, in parallel with A

Q.31 A $72\ \Omega$ galvanometer is shunted by a resistance of $8\ \Omega$. The percentage of the total current which passes through the galvanometer is

- (A) 0.1% (B) 10% (C) 25% (D) 0.25%

Q.32 The figure shows part of an electric circuit. The potentials at points a, b and c are 30 V, 12 V and 2 V respectively. The current through the $20\ \Omega$ resistor will be



- (A) 0.4 A (B) 0.2 A (C) 0.6 A (D) 1.0 A

Q.33 A wire of resistance R and length L is cut into 5 equal parts. If these parts are joined in parallel, the resultant resistance will be

- (A) $\frac{R}{25}$ (B) $\frac{R}{5}$ (C) $25R$ (D) $5R$

Q.34 An ideal 10 V battery is connected to a $2\ \Omega$ resistor, then a parallel combination of two $4\ \Omega$ resistors, then a $1\ \Omega$ resistor, all in series. Find the current i in each $4\ \Omega$ resistor.

- (A) 2 A (B) 1 A (C) 4 A (D) 0.5 A

Q.35 The electric current through a wire varies with time as $I = I_0 + \beta t$, where $I_0 = 20$ A and $\beta = 3$ A/s. The amount of charge crossing a section of the wire in 20 s is

- (A) 80 C (B) 1000 C (C) 800 C (D) 1600 C

Q.36 An electric toaster has a resistance of $60\ \Omega$ at room temperature (27°C). The toaster is connected to a 220 V supply. If the current flowing through it reaches 2.75 A, the temperature attained by the toaster is around ($\alpha = 2 \times 10^{-4}\ ^\circ\text{C}^{-1}$)

- (A) 694°C (B) 1235°C (C) 1694°C (D) 1667°C

Q.37 Two identical batteries, each of emf 2 V and internal resistance $1\ \Omega$, are available to produce heat in an external resistance R. The maximum power that can be developed across R using these batteries is

- (A) $\frac{8}{9}$ W (B) 1.28 W (C) 2.0 W (D) 3.2 W

Q.38 Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of the wires, the effective conductivity of the combination is

- (A) $\frac{\sigma_1\sigma_2}{\sigma_1 + \sigma_2}$ (B) $\frac{2\sigma_1\sigma_2}{\sigma_1 + \sigma_2}$ (C) $\frac{\sigma_1 + \sigma_2}{2\sigma_1\sigma_2}$ (D) $\frac{\sigma_1 + \sigma_2}{\sigma_1\sigma_2}$

Q.39 A circuit contains an ammeter, a 30 V battery and a $40.8\ \Omega$ resistance, all connected in series. If the ammeter has a coil of resistance $480\ \Omega$ and a shunt of $20\ \Omega$, the reading of the ammeter will be

- (A) 1 A (B) 0.5 A (C) 0.25 A (D) 2 A

Q.40 A current $I = 2$ A flows from A to B through a $2\ \Omega$ resistor, a 3 V cell (positive terminal towards A) and a $1\ \Omega$ resistor, all in series. The potential difference ($V_A - V_B$) is

- (A) +6 V (B) +9 V (C) -3 V (D) +3 V

Q.41 A filament bulb (500 W, 100 V) is to be used on a 230 V main supply. When a resistance R is connected in series, it works perfectly and the bulb consumes 500 W. The value of R is

- (A) $26\ \Omega$ (B) $13\ \Omega$ (C) $230\ \Omega$ (D) $46\ \Omega$

Q.42 A set of n equal resistors, each of value R, is connected in series to a battery of emf E and internal resistance R. The current drawn is I. Now the n resistors are connected in parallel to the same battery. The current drawn becomes 10I. The value of n is

- (A) 9 (B) 10 (C) 20 (D) 11

Q.43 A resistance wire connected in the left gap of a meter bridge balances a $10\ \Omega$ resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of $1\ \Omega$ of the resistance wire is

- (A) 1.0×10^{-1} m (B) 1.5×10^{-1} m (C) 1.5×10^{-2} m (D) 1.0×10^{-2} m

Q.44 A charged particle having a drift velocity of 7.5×10^{-4} m s⁻¹ in an electric field of 3×10^{10} V m⁻¹ has a mobility (in m² V⁻¹ s⁻¹) of

- (A) 2.5×10^6 (B) 2.5×10^{-6} (C) 2.25×10^{-15} (D) 2.25×10^{15}

Q.45 In a potentiometer circuit, a cell of emf 1.5 V gives a balance point at 36 cm length of wire. If another cell of emf 2.5 V replaces the first cell, at what length of the wire does the balance point occur?

- (A) 62 cm (B) 60 cm (C) 21.6 cm (D) 64 cm

Q.46 Match Column-I with Column-II for current through a metallic conductor.

Column-I	Column-II
(a) Drift velocity	(p) $\frac{m}{ne^2\rho}$
(b) Electrical resistivity	(q) nev_d
(c) Relaxation period	(r) $\frac{eE}{m}\tau$
(d) Current density	(s) $\frac{E}{J}$

(A) (a-r), (b-q), (c-s), (d-p)

(B) (a-r), (b-s), (c-p), (d-q)

(C) (a-r), (b-s), (c-q), (d-p)

(D) (a-r), (b-p), (c-s), (d-q)

Q.47 A copper wire of length 10 m and radius $\frac{10^{-2}}{\sqrt{\pi}}$ m has an electrical resistance of 10 Ω . The current density in the wire for an electric field strength of 10 V/m is

(A) 10^{-5} A/m²

(B) 10^5 A/m²

(C) 10^4 A/m²

(D) 10^6 A/m²

Q.48 Two resistors of 100 Ω and 200 Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100 Ω to that in 200 Ω in a given time is

(A) 1 : 4

(B) 4 : 1

(C) 1 : 2

(D) 2 : 1

Q.49 The resistance of a platinum wire at 0 °C is 2 Ω and 6.8 Ω at 80 °C. The temperature coefficient of resistance of the wire is

(A) 3×10^{-1} °C⁻¹

(B) 3×10^{-4} °C⁻¹

(C) 3×10^{-3} °C⁻¹

(D) 3×10^{-2} °C⁻¹

Q.50 A wire of length l and resistance 100 Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is

(A) 55 Ω

(B) 60 Ω

(C) 26 Ω

(D) 52 Ω

"Raise your knowledge to raise yourself"...

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	11	A	21	C	31	B	41	A
2	D	12	A	22	B	32	A	42	B
3	B	13	A	23	A	33	A	43	A
4	C	14	C	24	C	34	B	44	A
5	A	15	C	25	C	35	B	45	B
6	B	16	A	26	A	36	C	46	B
7	C	17	B	27	B	37	C	47	B
8	D	18	A	28	A	38	B	48	D
9	B	19	B	29	C	39	B	49	D
10	D	20	A	30	B	40	B	50	D

