QUESTIONS FROM COMPETITIVE EXAMS

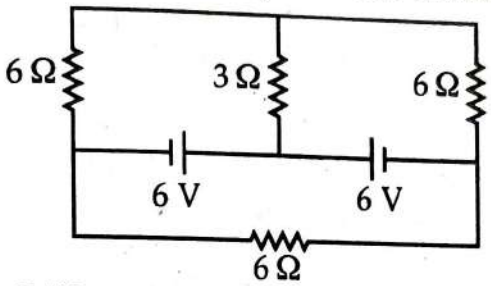
3.1 Kirchhoff's Laws

(MHT-CET 2001)

The terminal potential difference for a cell is 9.5 V when current is 2 A and 9 V when current is 1.5 A. What is the internal resistance of the cell?

a) 4 Ω b) 2 Ω c) 3 Ω d) 1 Ω

In the given circuit, find the power dissipated in 3 Ω resistance.



a) 6 W b) 7 W c) 3 W d) 2 W

(MHT-CET 2002)

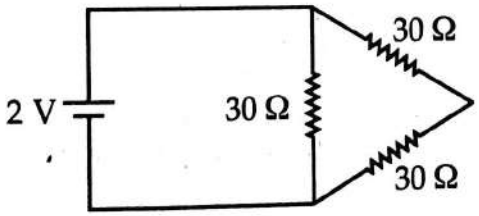
If length of a conductor is doubled by keeping volume constant, then what is its new resistance if initial were 4 Ω ?

a) 16 Ω b) 8 Ω c) 4 Ω d) 2 Ω

Effective resistance of parallel combination is 6/5 Ω. If one of the resistances is broken, then the resultant resistance becomes 2 Ω. Then other resistance is

a) 4 Ω b) 3 Ω c) 6 Ω d) 5 Ω

Current supplied by the cell in the adjoining figure is



a) 1.5 A b) 1 A c) 0.1 A d) 0.5 A

(MHT-CET 2003)

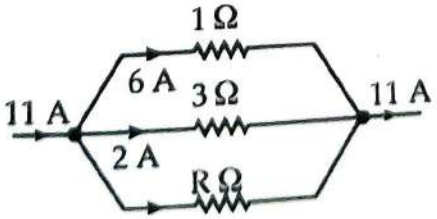
A wire of resistance 4 Ω is stretched to four times of its original length. Resistance of wire now becomes

a) 4 Ω b) 8 Ω c) 64 Ω d) 16 Ω

An electric bulb is marked 100 Ω. If it operates at 220 V, the resistance of bulb will be

a) 200 Ω b) 100 Ω c) 484 Ω d) 450 Ω

In the circuit shown in figure, the value of R is



a) 1 Ω b) 2 Ω c) 3 Ω d) 4 Ω

(MHT-CET 2004)

9. When length of wire is increased by 10%, then percentage increase in resistance is
a) 10% b) 21% c) 25% d) 35%

(MHT-CET 2005)

10. For two wires, length ratio is 1 : 4, radius ratio is 1 : 2, specific resistance ratio is 3 : 1. Compare their resistances.
a) 1 : 3 b) 1 : 2 c) 3 : 2 d) 3 : 1

(MHT-CET 2006)

11. If the length of wire is increased by 10%, its resistance increases by
a) 10% b) 20% c) 40% d) 21%

(MHT-ECET 2009)

12. S.I. unit of specific resistance is
a) Ω cm b) Ω m c) Ω / cm d) Ω / m

(MHT-CET 2014)

13. The masses of three copper wires are in the ratio 1 : 3 : 5 and their lengths are in the ratio 5 : 3 : 1. The ratio of their resistances is
a) 15 : 1: 125 b) 1 : 125 : 15 c) 125 : 1 : 15 d) 125 : 15 : 1

(MH-CET 2018)

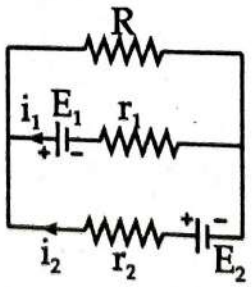
14. A conducting wire has length 'L_1' and diameter 'd_1'. After stretching the same wire length becomes 'L_2' and diameter 'd_2'. The ratio of resistances before and after stretching is
a) $d_2^4 : d_1^4$ b) $d_1^4 : d_2^4$ c) $d_2^2 : d_1^2$ d) $d_1^2 : d_2^2$

(MHT-CET 2013)

15. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω, is
a) 0.2 Ω b) 0.5 Ω c) 0.8 Ω d) 1.0 Ω

(MHT-CET 2019)

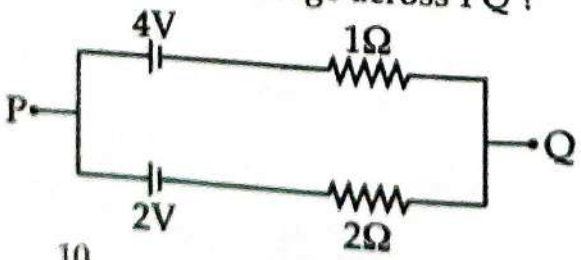
16. In the given electrical circuit one of the following equations is a correct equation :



a) $E_1 - (i_1 + i_2) R + i_1 r_1 = 0$
b) $-E_2 - (i_1 + i_2) R + i_2 r_2 = 0$
c) $E_2 - i_2 r_2 - E_1 - i_1 r_1 = 0$
d) $E_1 - (i_1 + i_2) R - i_1 r_1 = 0$

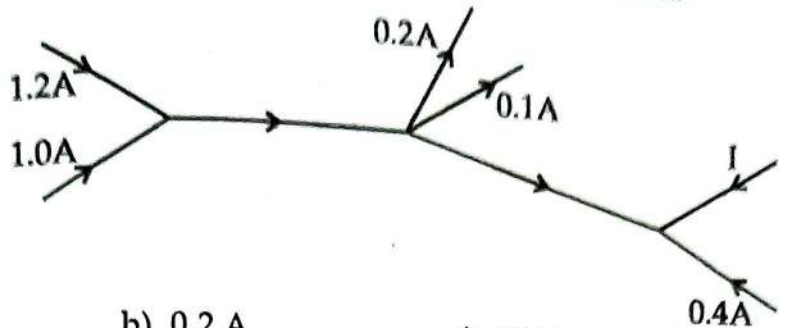
(MHT-CET 2020)

17. In the following circuit, what is the voltage across PQ ?



a) $\frac{5}{3}$ V b) $\frac{10}{3}$ V c) $\frac{11}{3}$ V d) $\frac{8}{3}$ V

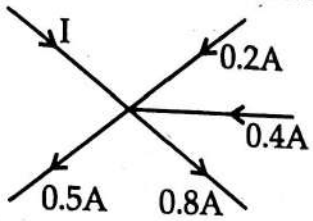
The value of current 'I' in the given current distribution is



a) 2.2 A b) 0.2 A c) 1.9 A d) 1.5 A

(MHT-CET 2022)

The value of current (I) in the given current distribution is

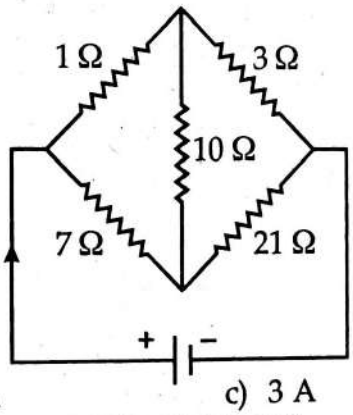


a) 0.6 A b) 0.4 A c) 0.7 A d) 0.5 A

3.2 Wheatstone's Network

(MHT-CET 2001)

In the circuit shown, the current drawn from the battery is 4 A. If 10Ω resistor is replaced by 20Ω resistor, the current drawn from the circuit will be



a) 1 A b) 2 A c) 3 A d) 4 A

(MHT-CET 2006)

In Wheatstone bridge, the resistances in four arms are 10 Ω, 10 Ω, 10 Ω and 20 Ω. To make the bridge balanced, resistance connected across 20 Ω is

a) 10 Ω b) 5 Ω c) 20 Ω d) 40 Ω

(MHT-ECET 2009)

Four resistances arranged to form a Wheatstone's network are 8 Ω, 12 Ω, 6 Ω and 27 Ω. The resistance that should be connected across 27 Ω resistance to balance the bridge is

a) 13.5 Ω b) 15.5 Ω c) 27 Ω d) 12 Ω

(MHT-CET 2012)

In a Wheatstone's network the positions of the battery and the galvanometer are interchanged. The balance condition

a) remains unaltered
b) alters
c) may or may not get altered depending on the resistance of the galvanometer and the battery
d) none of these

(MH-CET 2015)

32. The resistances in left and right gaps of a meter bridge are 20 Ω and 30 Ω respectively. When the resistance in the left gap is reduced to half its value, the balance point shifts by
a) 15 cm to the right b) 15 cm to the left c) 20 cm to the right d) 20 cm to the left

(MH-CET 2016)

33. In balanced metre bridge, the resistance of bridge wire is 0.1 Ω/cm. Unknown resistance 'X' is connected in left gap and 6 Ω in right gap, null point divides the wire in the ratio 2 : 3. Find the current drawn from the battery of 5 V having negligible resistance.
a) 1 A b) 1.5 A c) 2 A d) 5 A

(MH-CET 2017)

34. Two unknown resistances are connected in two gaps of a meter-bridge. The null point is obtained at 40 cm from left end. When a 30 Ω resistance is connected in series with the smaller of the two resistances, the null point shifts by 20 cm to the right end. The value of smaller resistance in Ω is
a) 12 b) 24 c) 36 d) 48

(MHT-CET 2020)

34. Two wires A and B of equal lengths are connected in left and right gaps respectively of a meter bridge, null point is obtained at 40 cm from left end. Diameters of the wires A and B are in the ratio 3 : 1 respectively, the ratio of specific resistance of A to that of B is
a) 2 : 1 b) 6 : 1 c) 4 : 1 d) 8 : 1

(MHT-CET 2021)

35. Two resistances 30 Ω and 40 Ω are connected in left and right gaps of the meterbridge respectively. The resistance of bridge wire is 7 Ω. The battery of e.m.f. 7 volt is connected to two ends of the wire. Then the current through cell will be (Internal resistance of battery is neglected)
a) 0.4 A b) 0.5 A c) 1.1 A d) 0.9 A

(MHT-CET 2022)

36. In metre bridge experiment, null point is obtained at 20 cm from left end of the wire, when resistance X is balanced against another resistance Y (X < Y). To balance a resistance 4 X against Y, the new position of the null point from the same end will be
a) 40 cm b) 60 cm c) 50 cm d) 80 cm

3.4 Potentiometer

(MHT-CET 2001)

37. A cell of e.m.f. 2 V and internal resistance 0.5 Ω is connected across a resistor R. The current that flows is same as that when a cell of e.m.f. 1.5 V and internal resistance 0.3 Ω is connected across the same resistor. Then
a) R = 0.3 Ω b) R = 0.6 Ω c) R = 0.5 Ω d) R = 0.75 Ω

(MHT-CET 2005)

38. A potentiometer wire has a resistivity of 10^9 Ω cm and area of cross section 10^{-2} cm^2. If current of 0.01 mA passes through the wire, potential gradient is
a) 10^9 V/m b) 10^{-9} V/m c) 10^8 V/m d) 10^6 V/m

(MHT-CET 2007)

39. In potentiometer experiment, a cell is balanced by length 120 cm. When the cell is shunted by resistance of 5 Ω, the balancing length is 80 cm. The internal resistance of cell is
a) 2.5 Ω b) 3 Ω c) 4 Ω d) 5 Ω

(MHT-CET 2021)

In potentiometer experiment, the balancing length with a cell 'E_1' is 'l_1' cm. By shunting the cell with a resistance 'R' equal to half the internal resistance of the cell, the balancing length 'l_2' will be (E.M.F. of driver cell $E > E_1$)

a) $l_2 = \frac{l_1}{3}$ b) $l_2 = \frac{l_1}{4}$ c) $l_2 = l_1$ d) $l_2 = \frac{l_1}{2}$

(MHT-CET 2022)

In a potentiometer experiment, the null point is obtained on 7^{th} wire for a given cell. To shift the null point on 9^{th} wire for the same cell what should we do ?

A) Attach resistance in series with the cell.

B) Decrease applied e.m.f.

C) Decrease resistance in main circuit.

D) Increase resistance in main circuit.

a) A or D b) B or C c) B or D d) C or D

3.5 Moving Coil Galvanometer

(MHT-CET 2005)

Three moving coil galvanometers A, B and C are made of coils of three different materials having torsional constants 1.8×10^{-8}, 2.8×10^{-8} and 3.8×10^{-8} respectively. If the three galvanometers are identical in all other respects, then which galvanometer has maximum sensitivity ?

a) A b) B

c) C d) constant in each case

3.6 Ammeter

(MHT-CET 2001)

Resistance of galvanometer is 500 Ω. Effective resistance of ammeter with shunt is 25 Ω. What is the value of shunt ?

a) $\frac{500}{19}\ \Omega$ b) $\frac{250}{19}\ \Omega$ c) $\frac{1000}{19}\ \Omega$ d) $\frac{125}{19}\ \Omega$

(MHT-CET 2003)

If galvanometer is shunted by $(1/n)^{th}$ of its value, then fraction of total current passing through the galvanometer is

a) 1/n b) n c) 1/(1 + n) d) n – 1

(MHT-CET 2005)

When galvanometer of unknown resistance is connected across a series combination of two identical batteries each of 1.5 V, the current through the resistor is 1 A. When it is connected across a parallel combination of the same batteries, the current through it is 0.6 A. The internal resistance of each battery is

a) 1/5 Ω b) 1/4 Ω c) 1/3 Ω d) 1/2 Ω

In an ammeter, 4% of the main current is passing through the galvanometer. If shunt resistance is 5 Ω, then resistance of galvanometer will be

a) 60 Ω b) 120 Ω

c) 240 Ω d) 480 Ω