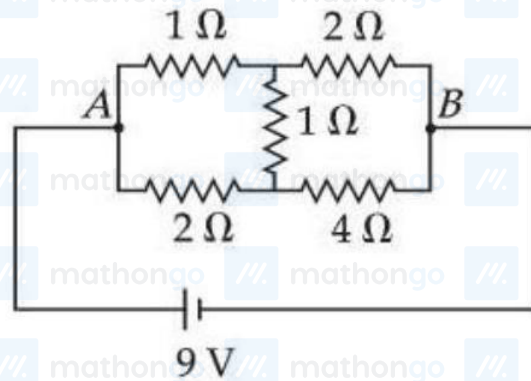


Q1. 21 January Shift 1

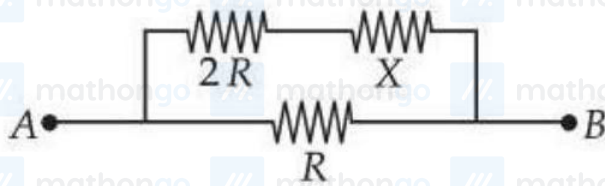
The heat generated in 1 minute between points A and B in the given circuit, when a battery of 9 V with internal

resistance of 1Ω is connected across these points is ____ J.



Q2. 21 January Shift 2

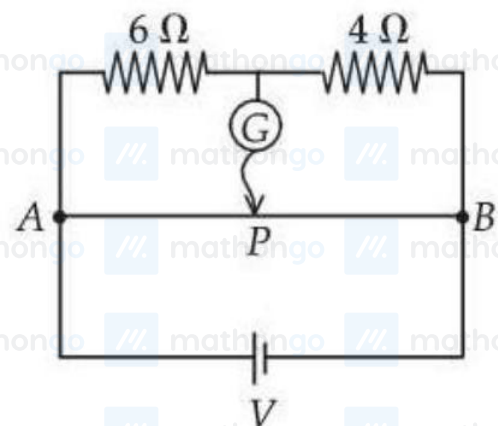
Two known resistances of $R\Omega$ and $2R\Omega$ and one unknown resistance $X\Omega$ are connected in a circuit as shown in the figure. If the equivalent resistance between points A and B in the circuit is $X\Omega$, then the value of X is ____ Ω .



- (1) $(\sqrt{3} - 1)R$ (2) $2(\sqrt{3} - 1)R$ (3) $(\sqrt{3} + 1)R$ (4) R

Q3. 21 January Shift 2

The total length of potentiometer wire AB is 50 cm in the arrangement as shown in figure. If P is the point where



the galvanometer shows zero reading then the length AP is ____ cm.

- (1) 25 (2) 30 (3) 20 (4) 15

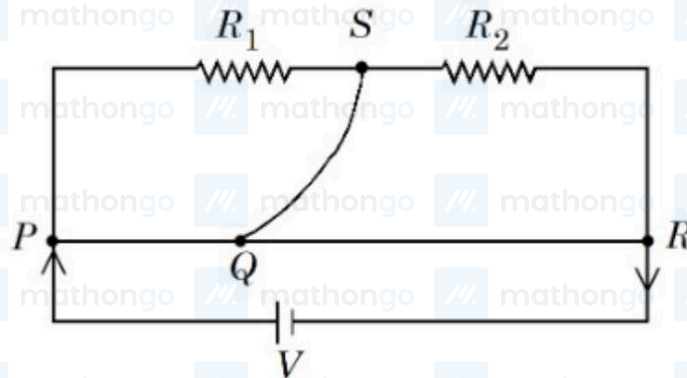
Q4. 21 January Shift 2

A battery with EMF E and internal resistance r is connected across a resistance R . The power consumption in R will be maximum when :

- (1) $R = 2r$ (2) $R = r/2$ (3) $R = r$ (4) $R = \sqrt{2}r$

Q5. 22 January Shift 1

A meter bridge with two resistances R_1 and R_2 as shown in figure was balanced (null point) at 40 cm from the point P . The null point changed to 50 cm from the point P , when 16Ω resistance is connected in parallel to R_2 . The



values of resistances R_1 and R_2 are _____.

- (1) $R_2 = 4\Omega, R_1 = \frac{4}{3}\Omega$ (2) $R_2 = 16\Omega, R_1 = \frac{16}{3}\Omega$
(3) $R_2 = 12\Omega, R_1 = \frac{12}{3}\Omega$ (4) $R_2 = 8\Omega, R_1 = \frac{16}{3}\Omega$

Q6. 22 January Shift 2

An electric power line having total resistance of 2Ω , delivers 1 kW of power at 250 V. The percentage efficiency of transmission line is _____.

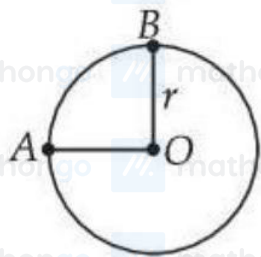
- (1) 100 (2) 92.5 (3) 96.9 (4) 86.5

Q7. 22 January Shift 2

A cylindrical conductor of length 2 m and area of cross-section 0.2 mm^2 carries an electric current of 1.6 A when its ends are connected to a 2 V battery. Mobility of electrons in the conductor is $\alpha \times 10^{-3} \text{ m}^2/\text{V} \cdot \text{s}$. The value of α is : (electron concentration = $5 \times 10^{28}/\text{m}^3$ and electron charge = $1.6 \times 10^{-19}\text{C}$)

Q8. 23 January Shift 1

A wire of uniform resistance $\lambda\Omega/\text{m}$ is bent into a circle of radius r and another piece of wire with length $2r$ is connected between points A and B (AOB) as shown in figure. The equivalent resistance between points A and B is



- _____ Ω .
 (1) $\frac{3\pi\lambda r}{8}$ (2) $\frac{6\pi\lambda r}{3\pi+16}$ (3) $2\pi\lambda r$ (4) $(\pi + 1)2r\lambda$

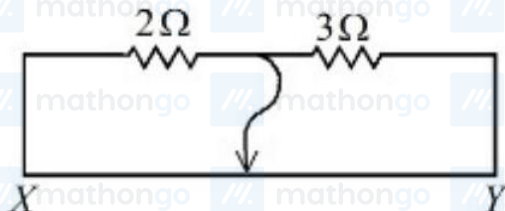
Q9. 23 January Shift 2

To compare EMF of two cells using potentiometer the balancing lengths obtained are 200 cm and 150 cm. The least count of scale is 1 cm. The percentage error in the ratio of EMFs is _____.

- (1) 1.65 (2) 1.45 (3) 1.75 (4) 1.55

Q10. 24 January Shift 1

Two resistors 2Ω and 3Ω are connected in the gaps of bridge as shown in figure. The null point is obtained with the contact of jockey at some point on wire XY . When an unknown resistor is connected in parallel with 3Ω resistor, the null point is shifted by 22.5 cm toward Y . The resistance of unknown resistor is _____ Ω .



- (1) 2 (2) 1 (3) 4 (4) 3

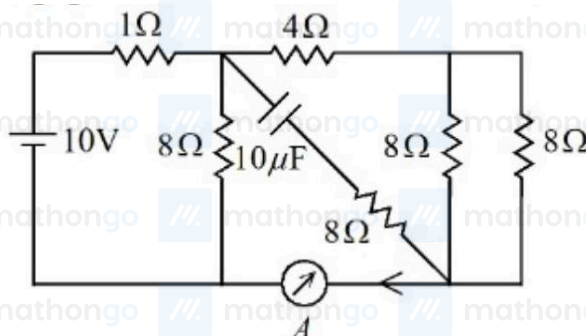
Q11. 24 January Shift 1

Two resistors of 100Ω each are connected in series with a 9 V battery. A voltmeter of 400Ω resistance is connected to measure the voltage drop across one of the resistors. The voltmeter reading is _____ V.

- (1) 2 (2) 3 (3) 4 (4) 4.5

Q12. 24 January Shift 2

The reading of the ammeter (A) in steady state in the following circuit (assuming negligible internal resistance of



the ammeter) is ____ A.

- (1) 1 (2) $1/2$ (3) 0 (4) 2

Q13. 24 January Shift 2

A moving coil galvanometer of resistance 100Ω shows a full scale deflection for a current of 1 mA. The value of resistance required to convert this galvanometer into an ammeter, showing full scale deflection for a current of 5 mA, is ____ Ω

- (1) 0.5 (2) 2.5 (3) 10 (4) 25

Q14. 24 January Shift 2

A regular hexagon is formed by six wires each of resistance $r\Omega$ and the corners are joined to the centre by wires of same resistance. If the current enters at one corner and leaves at the opposite corner, the equivalent resistance of the hexagon between the two opposite corners will be

- (1) $\frac{3}{4}r$ (2) $\frac{4}{5}r$ (3) $\frac{3}{5}r$ (4) $\frac{5}{8}r$

Q15. 24 January Shift 2

In a meter bridge experiment to determine the value of unknown resistance, first the resistances 2Ω and 3Ω are connected in the left and right gaps of the bridge and the null point is obtained at a distance l cm from the left. Now when an unknown resistance $x\Omega$ is connected in parallel to 3Ω resistance, the null point is shifted by 10 cm to the right of wire. The value of unknown resistance x is ____ Ω .

Q16. 28 January Shift 1

For the two cells having same EMF E and internal resistance r , the current passing through the external resistor 6Ω is same when both the cells are connected either in parallel or in series. The value of internal resistance r is ____ Ω .

- (1) 6 (2) 3 (3) 4 (4) 9

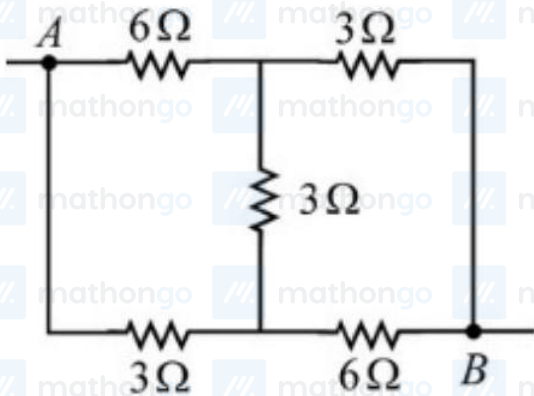
Q17. 28 January Shift 1

In the potentiometer, when the cell in the secondary circuit is shunted with 4Ω resistance, the balance is obtained at the length 120 cm of wire. Now when the same cell is shunted with 12Ω resistance, the balance is shifted to a length of 180 cm. The internal resistance of cell is ____ Ω

- (1) 4 (2) 12 (3) 6 (4) 3

Q18. 28 January Shift 1

The equivalent resistance between the points A and B in the following circuit is $\frac{x}{5}\Omega$. The value of x is ____.



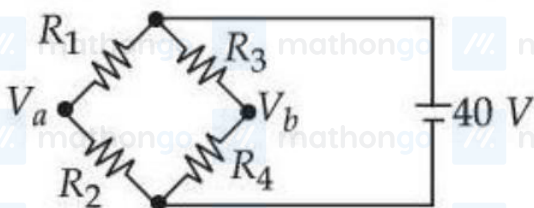
Q19. 28 January Shift 2

Which one of the following is not a measurable quantity?

- (1) Voltage (2) Resistance (3) Displacement current (4) Voltage difference

Q20. 28 January Shift 2

A Wheatstone bridge is initially at room temperature and all arms of the bridge have same value of resistances ($R_1 = R_2 = R_3 = R_4$). When R_3 resistance is heated to some temperature, its resistance value has gone up by 10%. The potential difference ($V_a - V_b$) (after R_3 is heated) is ____ V.



- (1) 1.05 (2) 0.95 (3) 0 (4) 2

ANSWER KEYS

- | | | | | | | | |
|---------|---------|---------|---------|---------|---------|-------|---------|
| 1. 1080 | 2. (1) | 3. (2) | 4. (3) | 5. (4) | 6. (3) | 7. 1 | 8. (1) |
| 9. (4) | 10. (1) | 11. (3) | 12. (1) | 13. (4) | 14. (2) | 15. 6 | 16. (1) |
| 17. (1) | 18. 21 | 19. (1) | 20. (2) | | | | |