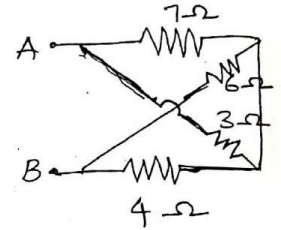
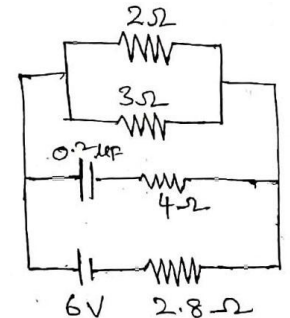


Single Correct Answer Type:

1. The equivalent resistance between A & B (of the circuit) is _____
 (A) 4.5Ω (B) 12Ω
 (C) 5.4Ω (D) 20Ω



2. When a resistor of 20Ω is connected across a battery, the current is 0.5 A. When a resistor of 10Ω is connected across the same battery, the current is 0.8 A. The emf and internal resistance of the battery are
 (A) $10 \text{ V}, \frac{10}{3} \Omega$ (B) $20 \text{ V}, \frac{20}{3} \Omega$ (C) $\frac{40}{3} \text{ V}, \frac{10}{3} \Omega$ (D) $\frac{40}{3} \text{ V}, \frac{20}{3} \Omega$
3. A potentiometer wire of length 100 cm has a resistance of 10Ω . It is connected in series with a resistance & an accumulator of emf 2 V and of negligible internal resistance. A source of emf 10 mv is balanced against a 40 cm length of the potentiometer wire. The value of the external resistance is
 (A) 395Ω (B) 790Ω (C) 405Ω (D) 810Ω
4. If a wire is stretched to make it 0.1 % longer, the percentage change in its resistance would be
 (A) zero (B) 0.1 % (C) 0.2 % (D) 0.4 %
5. In the given circuit the steady state current through the 2Ω resistor is
 (A) 0.6 A (B) 0.9 A
 (C) 1.2 A (D) 1.5 A



6. The external resistance of a circuit is n times higher than the internal resistance of the source. The ratio of the potential difference across the terminals of the source to its emf is
 (A) $\frac{1}{n}$ (B) n (C) $\frac{1+n}{n}$ (D) $\frac{n}{1+n}$
7. Two wires of the same material and the same length are connected to the two gaps of a meter bridge. The balancing length measured from left is 25 cm. The ratio radius of the wire is the left gap to that in the right gap is
 (A) 1.73 (B) 3 (C) 0.577 (D) $\frac{1}{3}$
8. Two wires of the same metal has the same length but their cross sections are in the ratio 3:1. They are joined in series. The resistance of the thicker wire is 10Ω . The total resistance of the combination will be
 (A) 40Ω (B) $\frac{40}{3} \Omega$ (C) $\frac{5}{2} \Omega$ (D) 100Ω

9. A cell develops the same power across two resistors r_1 & r_2 , when connected separately. If 'r' is the internal resistance of the cell then

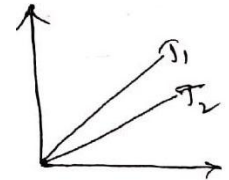
- (A) $r = \frac{1}{2}\sqrt{r_1 r_2}$ (B) $r = \sqrt{r_1 + r_2}$ (C) $r = \frac{1}{2}\sqrt{r_1 + r_2}$ (D) $r = r_1 + r_2$

10. Masses of three wires of copper are in the ratio 1 : 3 : 5 & their lengths in the ratio 5 : 3 : 1 the ratio of their electrical resistance is

- (A) 1 : 3 : 5 (B) 5 : 3 : 1 (C) 1 : 15 : 125 (D) 125 : 15 : 1

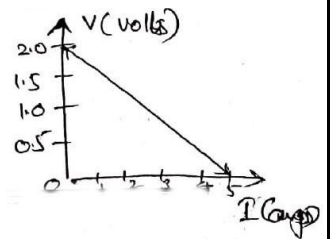
11. The voltage 'V' & current 'I' graph for a conductor at two different temperatures T_1 & T_2 are shown in figure. The relation between T_1 & T_2 is

- (A) $T_1 > T_2$ (B) $T_1 < T_2$
 (C) $T_1 = T_2$ (D) $T_1 \approx T_2$



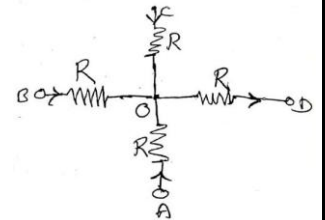
12. For a cell the graph between the potential difference (v) across the terminals of the cell and the current (I) drawn from the cell is shown in the figure. The e.m.f and the internal resistance of the cell are

- (A) 2V, 0.5Ω (B) > 2V, 0.5Ω
 (C) 2V, 0.4Ω (D) > 2V, 0.4Ω



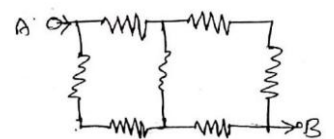
13. The given four terminal network is part of larger circuit. The points A, B, C are at the same potential. The Potential difference between any one of A, B or C and D is 40 V. The potential difference between A & O is

- (A) 10 V (B) 15 V
 (C) 18 V (D) 20 V



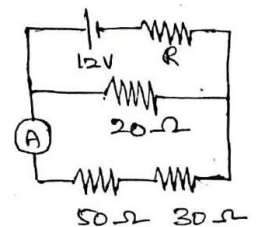
14. Seven resistors each of value 5Ω are connected as shown. The equivalent resistance between the points A & B is

- (A) 5Ω (B) 7Ω (C) 14Ω (D) 35Ω



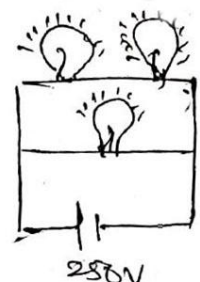
15. In the given circuit, the ammeter A, assumed to have negligible resistance, reads 0.1 A, the value of 'R' is

- (A) 6 Ω (B) 16 Ω
 (C) 8 Ω (D) 20 Ω



16. A 100 W bulb B_1 and two 60 W bulbs B_2 & B_3 are connected to a 250 V source as shown in fig. Now W_1 , W_2 & W_3 are the output powers of the bulbs

- B_1, B_2 & B_3 respectively then,
 (A) $W_1 > W_2 = W_3$ (B) $W_1 > W_2 > W_3$
 (C) $W_1 < W_2 = W_3$ (D) $W_1 < W_2 < W_3$



17. The charge flowing through a resistor 'R' varies as $Q(t) = \alpha t - \beta t^2$. The total heat produced in 'R' is

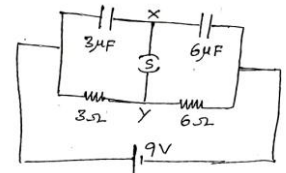
- (A) $\frac{\alpha^3 R}{\beta}$ (B) $\frac{\alpha^3 R}{2\beta}$ (C) $\frac{\alpha^3 R}{3\beta}$ (D) $\frac{\alpha^3 R}{6\beta}$

18. A $4 \mu\text{F}$ capacitor, a resistance of $2.5 \text{ M}\Omega$ is in series with 12 V battery. Find the time after which the potential difference across the capacitor is 3 times the potential difference across the resistor (Given $\log(2) = 0.693$)

- (A) 13.86 S (B) 6.93 S (C) 7 S (D) 14 S

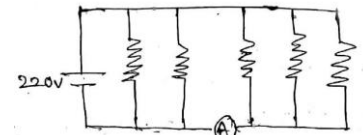
19. A circuit is connected as shown in fig. with the switch 'S' open. When the switch is closed, the total amount of charge that flows from y to x is

- (A) ZERO (B) $54 \mu\text{C}$
(C) $27 \mu\text{C}$ (D) $81 \mu\text{C}$



20. Five identical resistors each of value 1100Ω , are connected to a 220 V battery as shown, the reading of the ideal ammeter 'A' is

- (A) $\frac{1}{5} \text{ A}$ (B) $\frac{2}{5} \text{ A}$ (C) $\frac{3}{5} \text{ A}$ (D) $\frac{4}{3} \text{ A}$

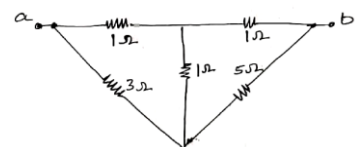


Numerical Based:

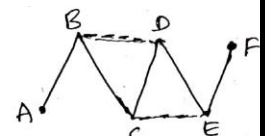
21. An aluminium wire having a cross-sectional area of $4 \times 10^{-6} \text{ m}^2$ carries a current of 5 A. Find the drift speed of electrons in the wire, in $\mu \text{ ms}^{-1}$. The density of aluminium is 2.7 gcm^{-3} . Assume that one conduction electron is supplied by each atom.

22. For the network shown in the fig, show that the resistance $R_{ab} = \left(1 + \frac{x}{17}\right) \Omega$.

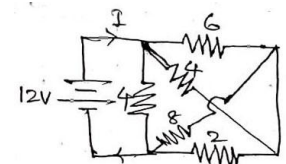
Find x.



23. What will be the change in the resistance, In ohm of a circuit between A & F consisting of five identical conductors each of resistance 2Ω if two similar conductors added shown by the dashed line in figure.



24. Compute the value of battery current I , in ampere, shown in figure, All resistances are in ohm.



25. An electric bulb rated for 500 W at 100 V is used in a circuit having a 200 V supply. Calculate the resistance 'R' that one must be put in series with the bulb, so that the bulb delivers 500 W . Give your answer in ohm.

KEY

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|---------|--------|-------|-------|--------|
| 1. A | 2. D | 3. B | 4. C | 5. B |
| 6. D | 7. A | 8. A | 9. B | 10. D |
| 11. A | 12. C | 13. A | 14. B | 15. C |
| 16. D | 17. D | 18. A | 19. C | 20. C |
| 21. 130 | 22. 10 | 23. 4 | 24. 6 | 25. 20 |