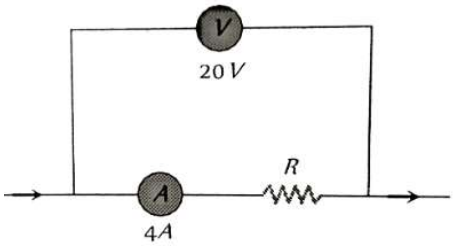
1. Three identical cells, each of 4 V and internal resistance r, are connected in series to a 6Ω resistor. If the current flowing in the circuit is 2 A. The internal resistance of each cell is:

(a) 0.11 Ω (b) 0 Ω

(c) 0.12 Ω (d) 1.1 Ω **(CBSE Sample Paper 2025)**

2. In the diagram shown, the reading of voltmeter is 20 V and that of ammeter is 4 A. The value of R should be (Consider given ammeter and voltmeter are not ideal)



(a) Equal to 5 Ω

(b)Greater from 5Ω

(c) Less than 5Ω

(d) Greater or less than 5Ω **(CBSE Sample Paper 2025)**

3. A metal rod of length 10 cm and a rectangular cross-section of 1 cm×$\frac{1}{2}$ cm is connected to a battery across opposite faces. The resistance will be:

(a) maximum when the battery is connected across 1 cm× $\frac{1}{2}$cm

(b) maximum when the battery is connected across 10 cm×1 cm faces

(c) maximum when the battery is connected across 10 cm× $\frac{1}{2}$cm faces

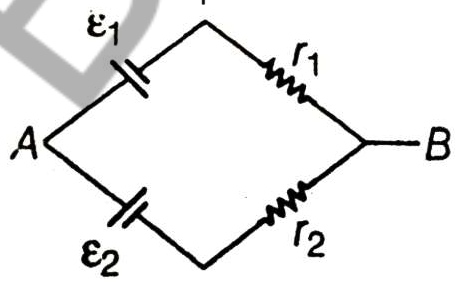
(d) Same irrespective of the three faces

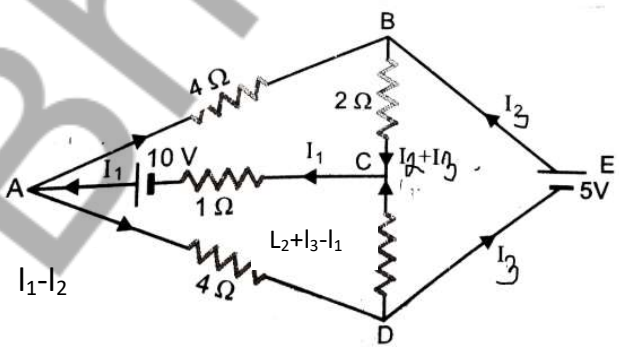
4. A copper wire is stretched to make it 0.2% longer. What is the percentage change in its resistance?

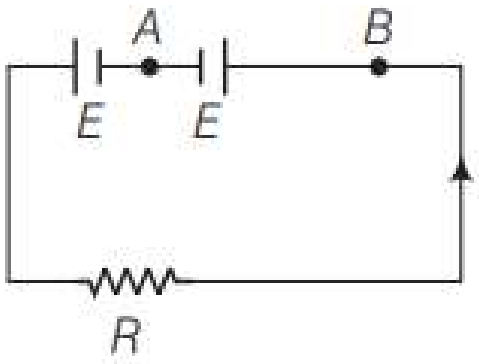
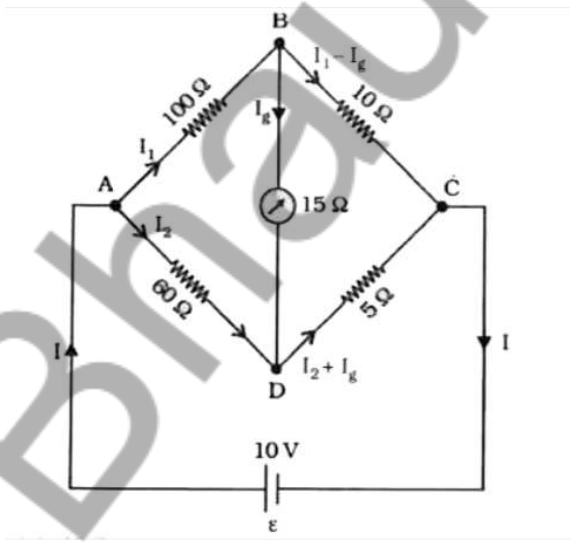
(a) 0.4% (b) 2.0%

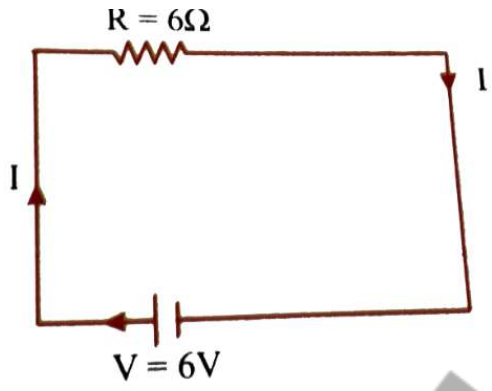
(c) 4.0% (d) none of these

5. Two batteries of emf E_1 and E_2 ($E_2 > E_1$) and internal resistances r_1 and r_2 respectively are connected in parallel as shown it figure :



	(a) The equivalent emf E_{eq} of the two cells is between E_1 and E_2 i.e. $E_1 < E_{eq} < E_2$ (b) The equivalent emf E_{eq} is smaller than E_1. (c) The E_{eq} is given by $E_{eq} = E_1 + E_2$ always. (d) E_{eq} is independent of internal resistances r_1 and r_2.
6.	Four resistors (all having resistance 5 Ω) should be connected in which way to obtain R_{eq}=5 Ω? (a) All in series (b) One in parallel to series combination of three (c) two in series are parallel to other two in series (d) two in parallel to series of other two **(CBSE Sample Paper 2024)**
	Short Answer Type Qs (2 & 3 Marks)
7.	Power P is to be delivered to a device via transmission cables having resistanceR_c. IfV is the voltage across R_c and I the current through it, find the power wasted and how an be reduced.
8.	First a set of n equal resistors of R each are connected in series to a battery of emf E and internal resistance R. A current I is observed to flow. Then, the n resistors are connected in parallel to the same battery. It is observed that the current is increased 10 times. What is 'n'?
9.	Two conductors are made of the same material and have the same length. Conductor A is a solid wire of diameter 1mm. Conductor B is a hollow tube of outer diameter 2mm and inner diameter 1mm. Find the ratio of resistanceR_A to R_B.
10.	The resistance of the platinum wire of a platinum resistance thermometer at the ice point is 5Ω and at steam point is 5.23Ω . When the thermometer is inserted in a hot bath, the resistance of the platinum wire will be 5.795Ω . Calculate the temperature of the bath.
11.	Determine the current in each branch of the network shown in the given figure. 

12.	Estimate the average drift speed of conduction electrons in a copper wire of cross - sectional area $1.0\times10^{-7}m^2$ carrying a current of 1.5 A. Assume that each copper atom contributesroughly one conduction electron. The density of copper is $9.0\times10^{3}kg/m^3$ and its atomic mass is 63.5u.
13.	Two cells of same emf E but internal resistance r_1 and r_2 are connected in series to an external resistor R (figure). What should be the value of R so that the potential difference across the terminals of the first cell becomes zero?  **(CBSE Sample Paper 2023)**
	Long Answer Type Qs (5 Marks)
14.	The four arms of a Wheatstone bridge (Fig. 3.26) have the following resistances: AB=100Ω,BC=10Ω,CD=5Ω,andDA=60Ω  A galvanometer of 15 Ω resistance is connected across BD. Calculate the current through the galvanometer when a potential difference of 10V is maintained across AC.

15.	A room has AC run for 5 hours a day at a voltage of 220V. The wiring of the room consists of Cu of 1mm radius and a length of 10m. Power consumption per day is 10 commercialunits. What fraction of its goes in the joule heating in wires? What would happen if the wiring is made of aluminium of the same dimensions?[$p_{cu}=1.7\times10^{-8}\Omega m, p_{Al}=2.7\times10^{-8}\Omega m$]
16.	(a) Consider circuit in figure. How much energy is absorbed by electrons from the initial state of no current (Ignore thermal motion) to the state of drift velocity?  (b) Electrons give up energy at the rate of RI^2 per second to the thermal energy. What time scale would one associate with energy in problem (A)? N = number of electron/volume = $10^{29}/m^3$, length of circuit = 10 cm, cross-section A = ($1mm^2$)

	HINTS AND ANSWER
1.	(b)
2.	(c)
3.	(a)
4.	(a)
5.	(a)
6.	(c)
7.	**Conceptual** In power transmission at low voltage and high current, more power is consumed. Whereas power transmission at high voltage and low current, less power is consumed.
8.	n=10
9.	3:1
10.	345.65 ^{0}C
11.	AD: 15/8A CA: 5/2A BC: 5/3A
12.	1.1×10^{-3} m/s
13.	$R = r_1 - r_2$
14.	I_g =4.87 mA
15.	0.35% So, Joule heating loss is increase for aluminium wire.
16.	(A) 1.78×10^{-17} J (B) 0.3×10^{-17}second

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