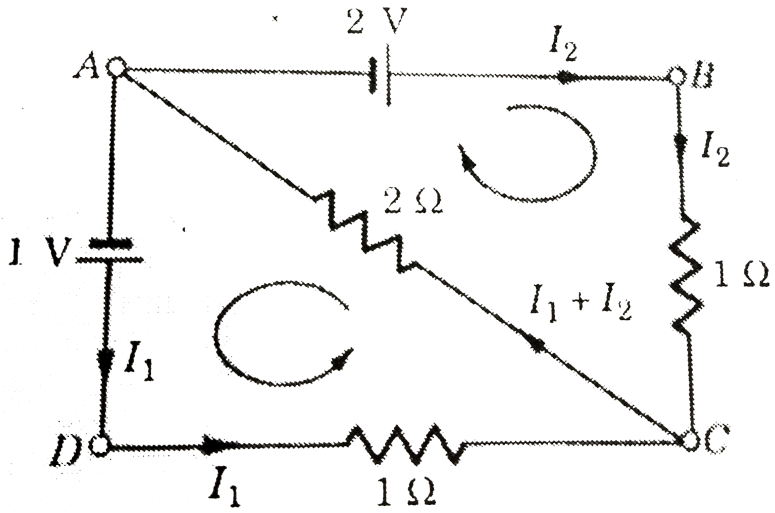
PHYSICS

BOOKS - DHANPAT RAI & CO PHYSICS (HINGLISH)

ELECTRICAL INSTRUMENTS

Example



1.

In the circuit shown in figure. Calculate the current in each resistance. The internal resistnaces of the cells are negligible.

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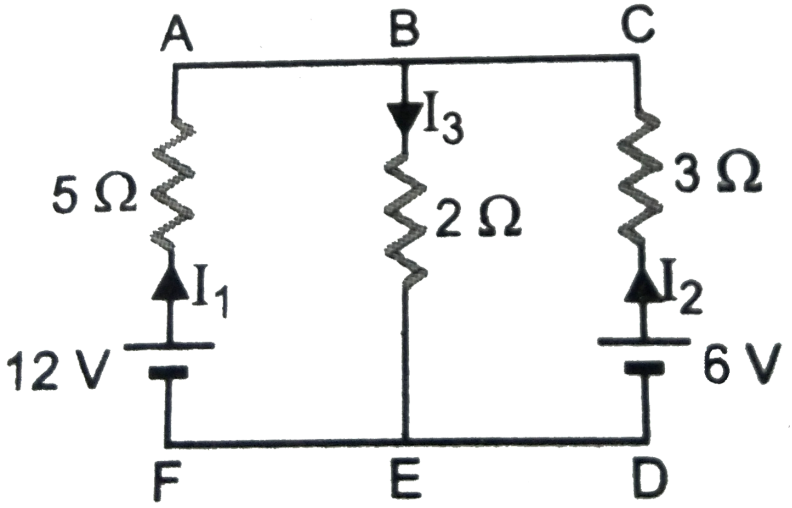
2. Using Kirchoff's laws in the electrical net work shown in figure, calculate the values of I_1, I_2 and I_3.



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3. Two cells of emfs 1.5 V and 2.0V internall resistance 1Ω and 2Ω are connected in parallel so as to send current in the same direction through an external resistance of 5Ω.

(i) Draw the circuit diagram. (ii) Using Kirchhoff's rules, calculate.

(a) current through each branch of the circuit (b) potential difference across the 5Ω resistance.

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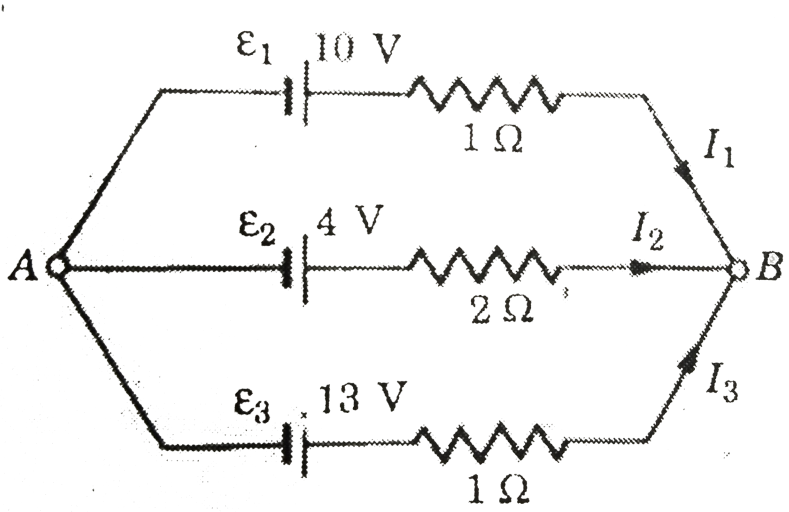

4.

Find the current flowing through each cell in the circuit shown in figure. Also calculate the potential difference across the terminals of each cell.

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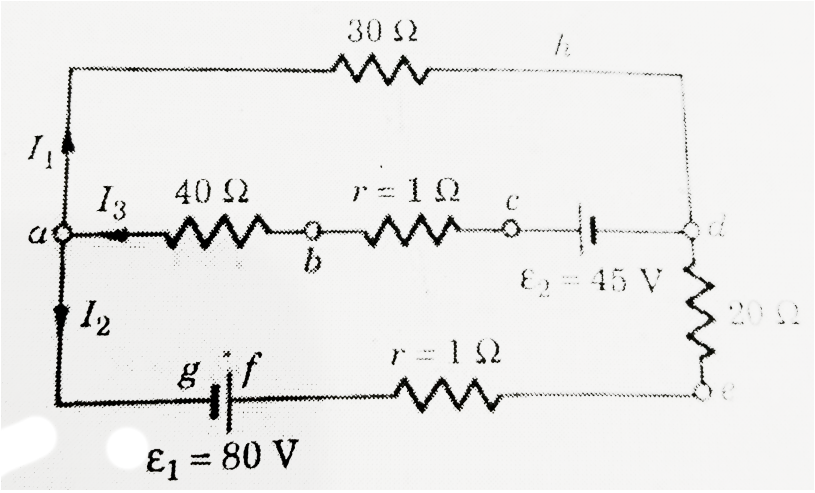
5. 

Determine the currents I_1, I_2 and I_3 from the network shown in figure.

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6. Determine current in each branch of the network shown in figure

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7. Determine current in each branch of the network shown in figure

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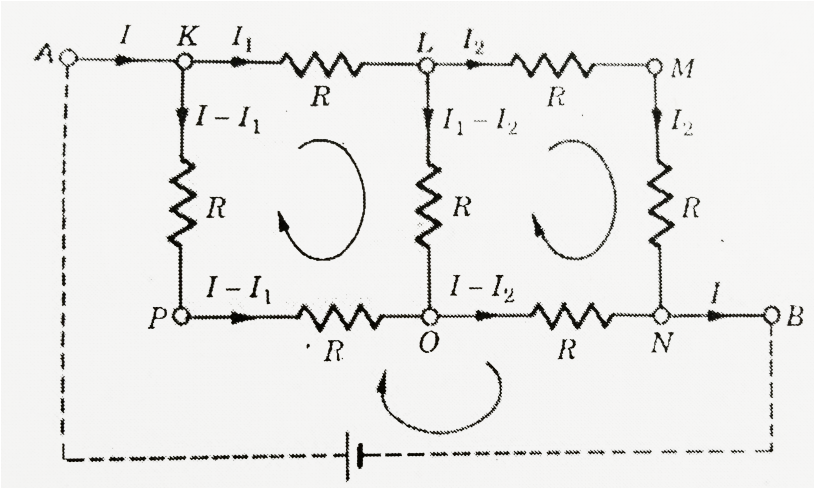
8. 

Find the equivalent resistance between the terminals A and B in the network shown figure. Given each resistor R of 10Ω.

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9. Two squares ABCD and BEFC have the side BC in common. The sides are of conducting wires with resistances as follows: AB,BE,FC and CD each 2Ω: AD, BC, EF each 1Ω. A cell of e.m.f. 2V and internal resistance 2Ω is joined across AD. Find the currents in various branches of the circuit.

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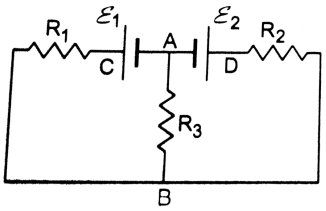
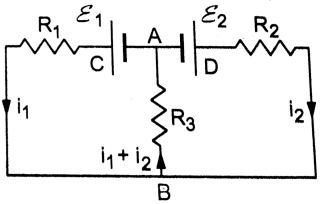
10. Find the currents going through the three resistors `R_(v),R_(2)andR_(3) in the circuit of figure.



(a)



(b)

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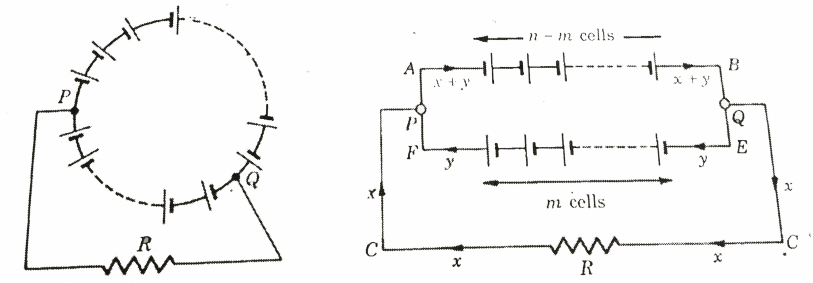
11. n' cells , each of emf 'e' and internal resistance 'r' are connected in a closed circuit so that the positive terminal of a cell is joined to the negative terminal of the next, as shown in figure. Any two points of the circuit are connected by an external resistance R. Find the current in R.



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12. Eleven equal wires each of resistance r form the edges of a incomplete cube. Find the total resistance from one end of the vacant edge of the cube to the other.

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13. A galvanometer coil has resistance of 30Ω and the meter shows full scale deflection for the current of 2.0 mA. Calculate the value of resistance requried to convert it into an ammeter of range 0 to 1A. Also calculate the resistance of the ammter.

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14. A galvanometer with a coil of resistnace 12.0Ω shows full scale deflection for a current of 25 mA. How will you convert the meter into:

(i). An ammeter of range 0 to 7.5 A.

(b). A voltmeter of range 0 to 10.0 V

Determine the net resitance of the meter in each case. when an ammeter is put in a circuit, does it read (slightly) less or more than the actual current in the original circuit? when a voltmeter is put across a part of the circuit, does it read (slightly) less or more than the original voltage drop? Explain.

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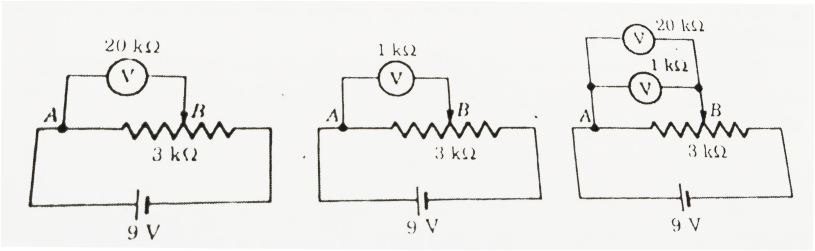
15. 

A battery of emf 9 V and negligible internal resistance is connected to a 3 k Ω resistor. The potential drop across a part of the resistor (between points A and B in the figure) is measured by (i) a 20 k Ω voltmeter, (ii) a 1 k Ω voltmeter. in (iii). both the voltmeter are connected across AB. in which case would you get the (a) highest, (b) lowest reading?

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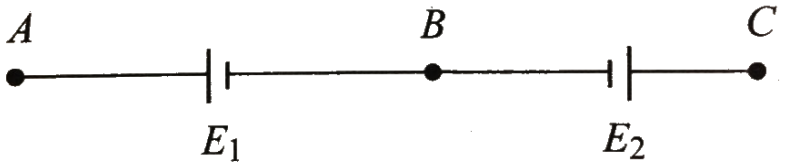
16. Two cells of emfs E_1 and $(E_2(E_1 > E_2)$ are connected as shows in Fig. 6.45.



When a potentiometer is connected between A and B, the balancing length of the potentiometer wire is $300cm$. On connecting the same potentiometer between A and C, the balancing length is $100cm$. The ratio E_1 / E_2 is

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17. A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells of emfs ε_1 and ε_2 are connected in series first to support one another and then in opposition. The balance points were obtaind at 60 cm and 12 cm from the same end of the wire in the two cases. find the ratio of the emfs.

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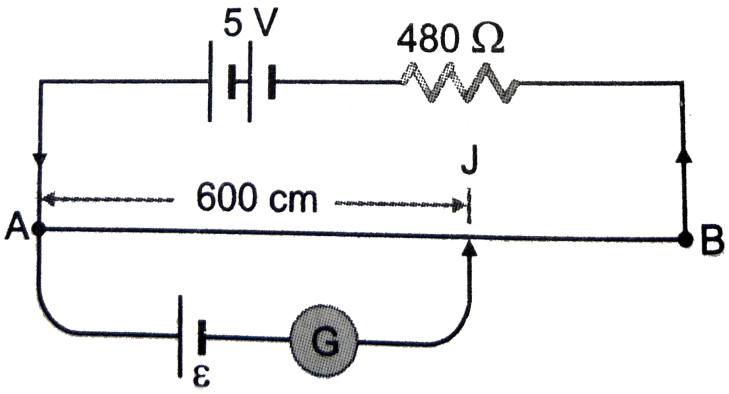
18. A 10 meter long wire of uniform cross section of 20Ω resistance is used as a potentiometer wire. This wire is connected in series with a battery of $5V$ along with an external resistance of 480Ω if an unknown emf ε is balanced at $600cm$ of this wire , calculate (i) the potential gradient of the potentiometer wire and (ii) the value of the unknown emf ε.



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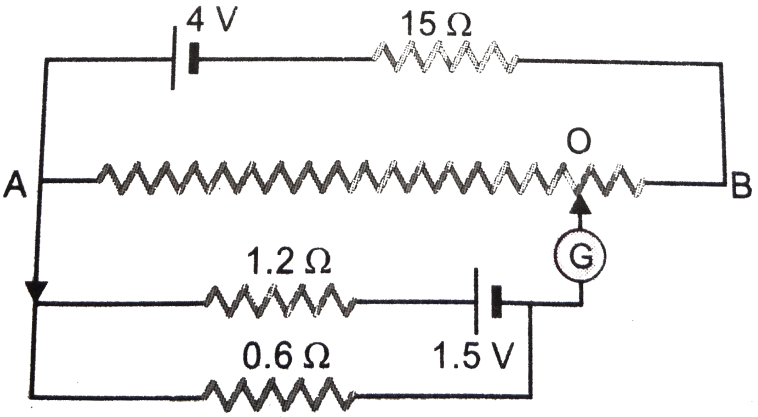
19. AB is 1 meter long uniform wire of 10Ω resistance. Other data are shown in the diagram. Calculate (i) potential gradient along AB (ii)

length AO when galvanometer shown deflection



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20. In an experiment with a potentiometer, the null point is obtained at a distance of $60cm$ along

the wire from the common terminal with a leclanche cell. When a shunt resistance of 1Ω is

connected across the cell, the null point shifts to a distance of $30cm$ from the common terminal. what is the

internal resistance of the cell?

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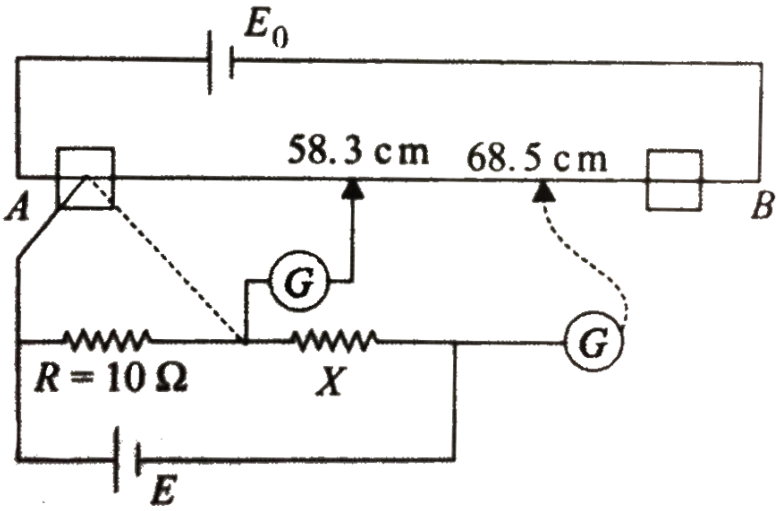
21. Figure 6.12 shows a potentiometer circular for comparison of two resistances. The balance point with a standard resistor $R = 10.0Omeag$ is found to be $58.3cm$, while that with the unknows resistance X is $68.5cm$. Determine the value of X. What would you do if you fail to find a balance point with the given cell E?



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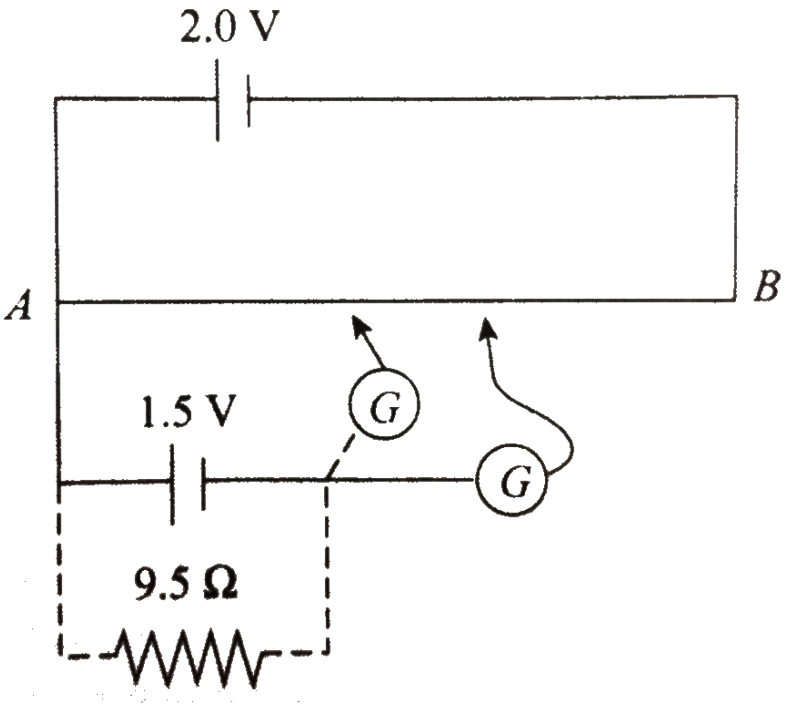
22. Figure 6.13 shows a $2.0V$ potentiometer used for the determination of internal resistance of a $1.5V$ cell. The balance point of the cell in open circuit is $76.3cm$. Whan a resistor of 9.5Ω is used in the external circuit of

the cell, the balance point shifts to $64.8cm$, length of the potentiometer. Dentermine the internal resistance of the cell.



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23. P,Q,R and S are the resistances taken in cyclic order in a wheatstone bridge network. P and Q are the ratio coils, S is unknown resistance and R is a 10Ω coil. A balance is obtained when R is shunted with a resistance of 190Ω. When P and Q are interchanged, the balance is restored by altering the shunt across R to 265Ω. find the resitance of S and the ratio P:Q?

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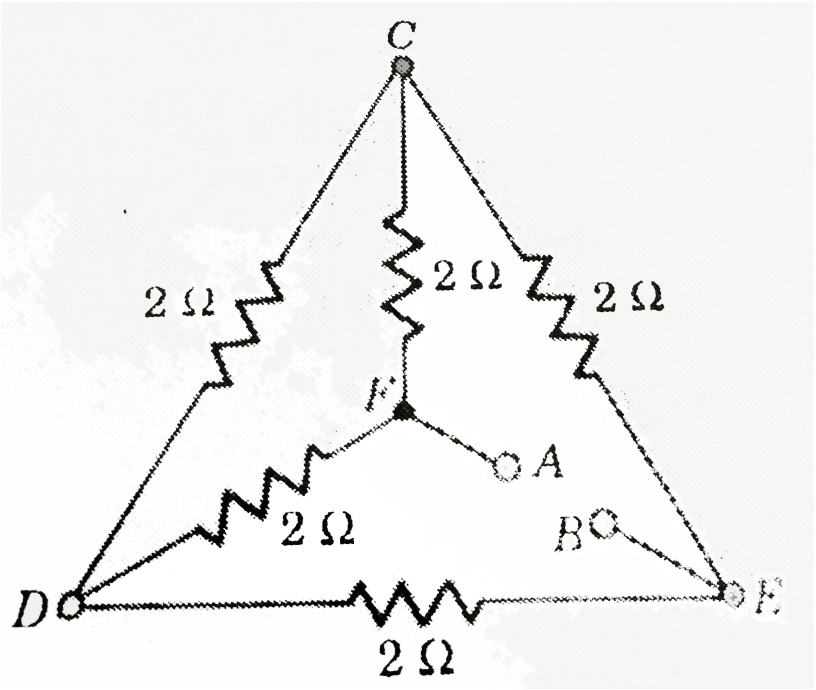

24.

In figure. $P = 3\Omega, Q = 2\Omega, R = 6\Omega, S = 4\Omega$ and $X = 5\Omega$. Calculate the current I.

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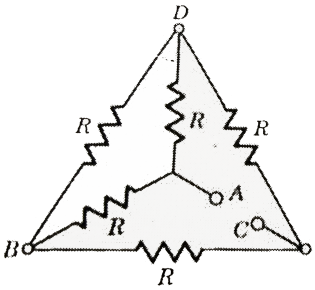
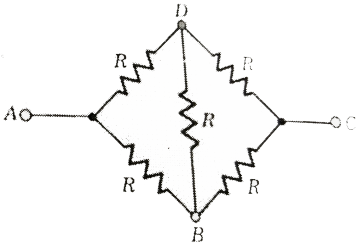
25.





Each of the resistances in the network shown in figure (a) equals R. find the resitance between two terminals A and C.

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26.

Each resistor r shown in figure. Has a resistance of 10Ω and the battery has an emf of 6V. Find the current supplied by battery.

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27. In the following circuit, a metre bridge is shown in its balanced state. The metre bridge wire has a resistance of 1 ohm/cm. calculate the value of

the unknown resistance X and the current drawn from the battery of negligible internal resistance.

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28. An unknown resistance 'X' is placed in the left gap and and a known resistance of 60Ω is plaecd in the right gap of metre bridge. The null point is obtained at 40 cm from the left end fo the bridge. Fid the unknown resistance.

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29. (i) In a metre bridge, the balance point is found to be at 39.5 cm from the end A, when the resistor Y is of 12.5Ω. Determine the resistance of X. Made of thick copper strips?

(ii). Determine the balance point of the bridge above if X and Y are interchanged.

(iii). what happens if the galvanometer and cell are interchanged at the balance point of the bridge ? Would the galvanometer show any current?

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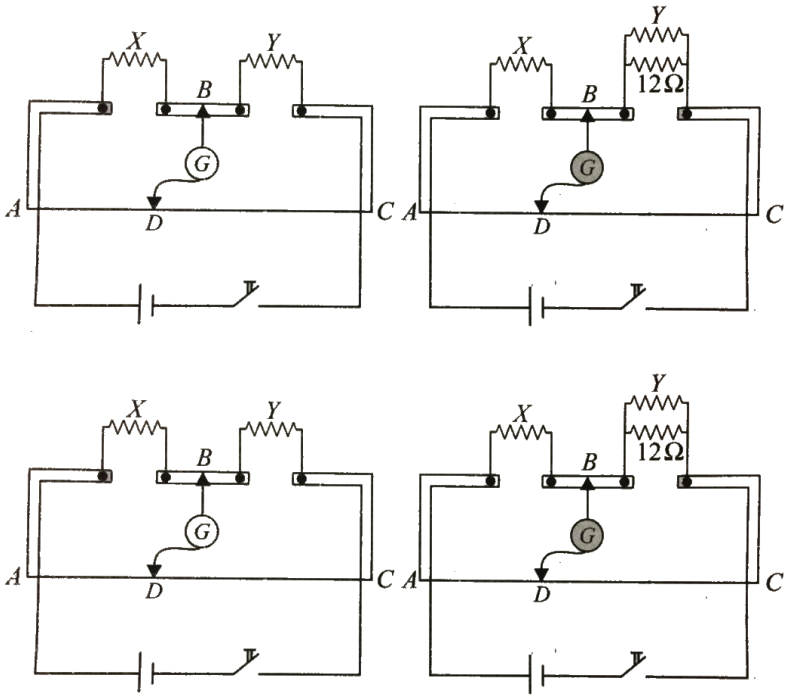
30. Figure 6.32 shows a meter bridge in the (which is nothing but a particle wheastone bridge), consisting of two resistors X and Y together in parellel with a meter long constantan wire of uniform cross section.



with the help of a movable contact d, one can change the ratio of resistance of the two segments of the wire until a sensitive galvanometer G connected across b and D shows no deflection. The null point is found to be at a distance of $33.7cm$. The resistor Y is shunted by a resistance of

12Ω, and the null point is found to shift by a distance of $18.2cm$. Determine the resistance of X and Y.

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31. In the metre-bridge experiment with uknown resistance X in the left gap and a known resistance of 60Ω in the right gap, null point is obtained at l cm from left. If the unknown resistance X is shunted by an equal resistance, what should be the value of the known resistance in the right gap in order to get the null point at the same position?.

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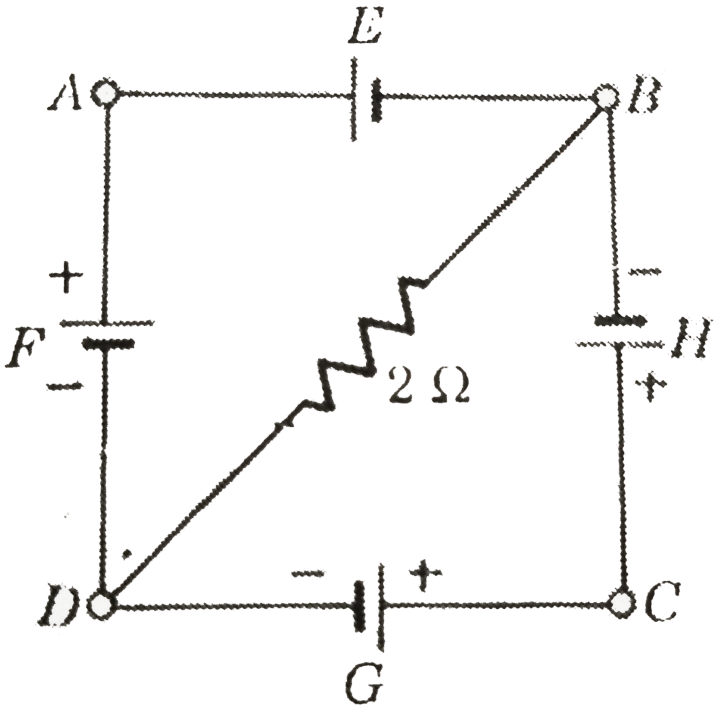
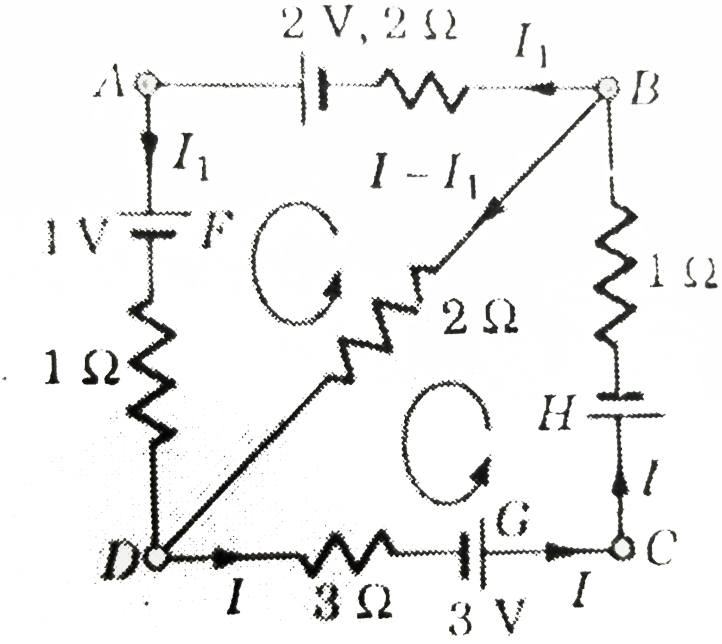
Problem From Competitive Examinations



1.

In the circuit shown in figure. The cells E,F,G and H have e.m.f's 2,1,3 and 1 V and internal resistance 2,1,3 and 1Ω respectively. Find the potential differences between points B and D, and across the terminals of the cells

G and H.



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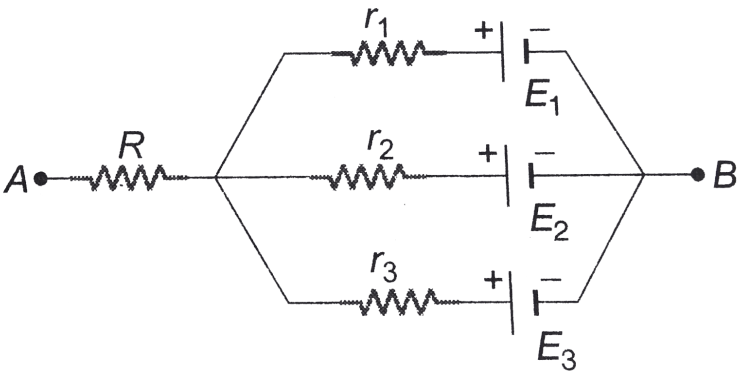
2. In the circuit in figure $E_1 = 3V, E_2 = 2V, E_3 = 1V$ and $R = r_1 - r_2 - r_3 = 1\Omega$



a. Find the potential differece between the points A and B and the currents through each branch.

b. If r_2 is short circuited and the point A is connected to point B, find the currents through E_1, E_2, E_3 and the resistor R

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3.

A part of the circuit in a steady state along with the currents flowing in the branches, the values of resistance, etc. is shown in the figure. Calculate the energy stored in the capacitor.

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4.

In the circuit shown in figure. $\varepsilon_1 = 3, \varepsilon_2 = 2, \varepsilon_3 = 6V, R_1 = 2, R_4 = 6\Omega, R_3 = 2, R_2 = 4\Omega$ and $C = 5\mu$. Find the current in the resistor R_3 and the electrical energy stored in the capacitor C.

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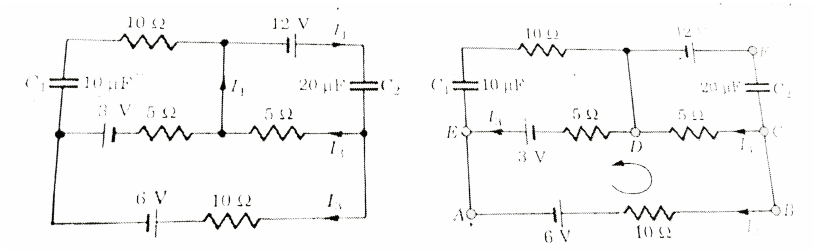
5.



Find currents I_1, I_2 and I_3 and the energy stored in the capacitors C_1 and C_2 in the circuit shown in figure.

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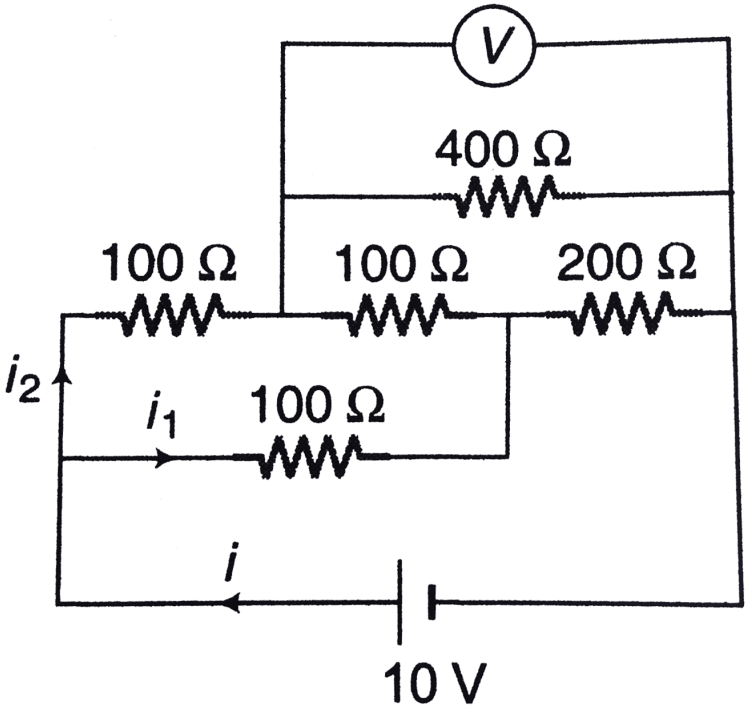
6. An electrical circuit is shown in figure. Calculate the potential difference across the resistor of 400Ω as will be measured by the voltmeter Vof

resistance 400Ω either by applying Kirchhoff's rules or otherwise.



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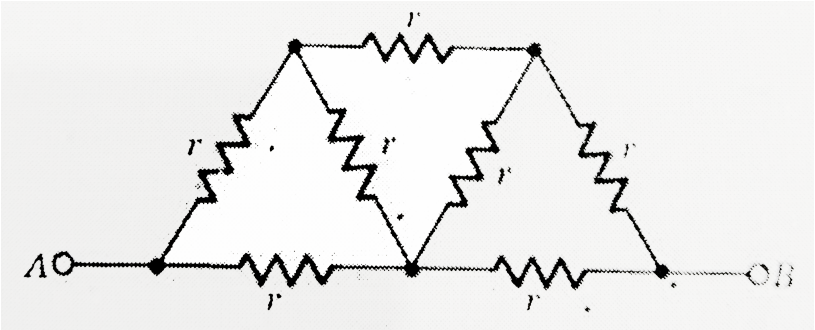
7. 

In the network as shown in figure. Each resistance r is of 2Ω find the effective resistance between points A and B.

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8. A galvanometer having 30 divisions has a current sensitivity of 20 $\mu A/\text{division}$. It has a resistance of 20Ω. How will you convert it into an ammeter measuring upto 1 ampere? How will you convert this ammeter into voltmeter reading upto 1 volt?

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9. A potentiometer wire of length 100 cm has a resistance of 100Ω it is connected in series with a resistance and a battery of emf 2 V and of negligible internal resistance. A source of emf 10 mV is balanced against a length of 40 cm of the potentiometer wire. what is the value of the external resistance?

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10. In the arrangement of resistances shown in figure. Find the value of unknown resistance X if the potential difference between B and D is zero.

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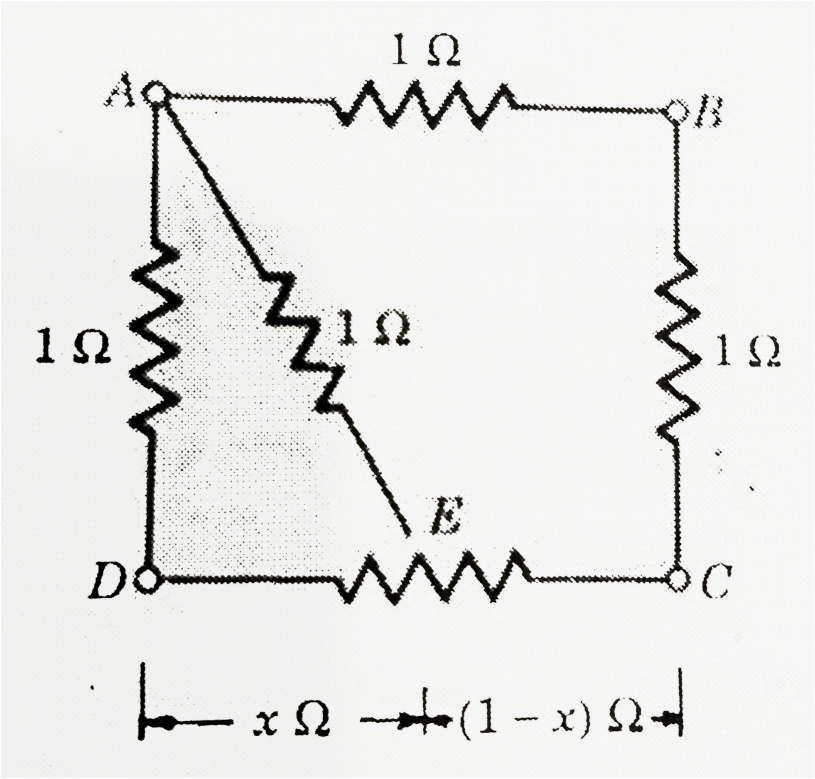
11. 

In figure. ABCD is a square where side is a uniform wire of resistance 1Ω. Find the a point E on CD such that if a uniform wire of resistance 1Ω is connected across AE and a constant potential differene is applied across A and C the points B and E are equipotential.

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Problem For Self Practice

1. A cell of emf 2 V and internal resistance 1Ω has its terminals joined by resistanecs of 5 and 10Ω in paralle. Using kirchhoff's laws, find the current through the cell and the current drawn through each resistance.

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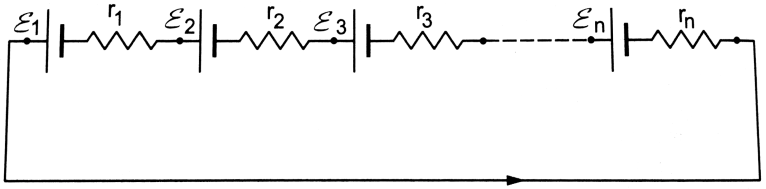
2. Shown n batteries connected to form a circuit. The resistances donote the internal resistances of the batteries which are related to the emf's as $r_i = k(\varepsilon)_i$where K is a constant. The solid dits represent the terminals of the batteries. Find (a)the current through the circuit and (b) the potential difference between the terminals of the ith battery.



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3. Two cells of emfs 1.5 V and 2.0V internall resistance 1Ω and 2Ω are connected in parallel so as to send current in the same direction through an external resistance of 5Ω.

(i) Draw the circuit diagram. (ii) Using Kirchhoff's rules, calculate.

(a) current through each branch of the circuit (b) potential difference across the 5Ω resistance.

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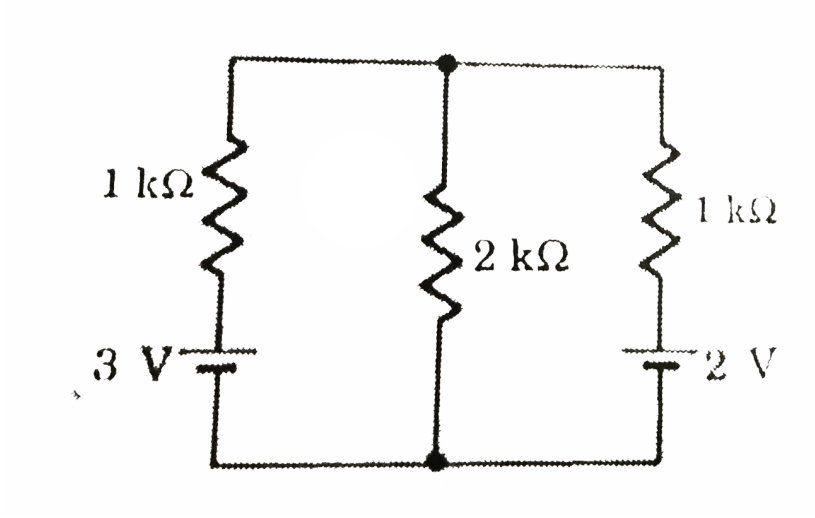

4.

Calculate the potential difference across the 2k Ω resistor in the circuit shown in figure. The internal resistance of the cells are negligible.

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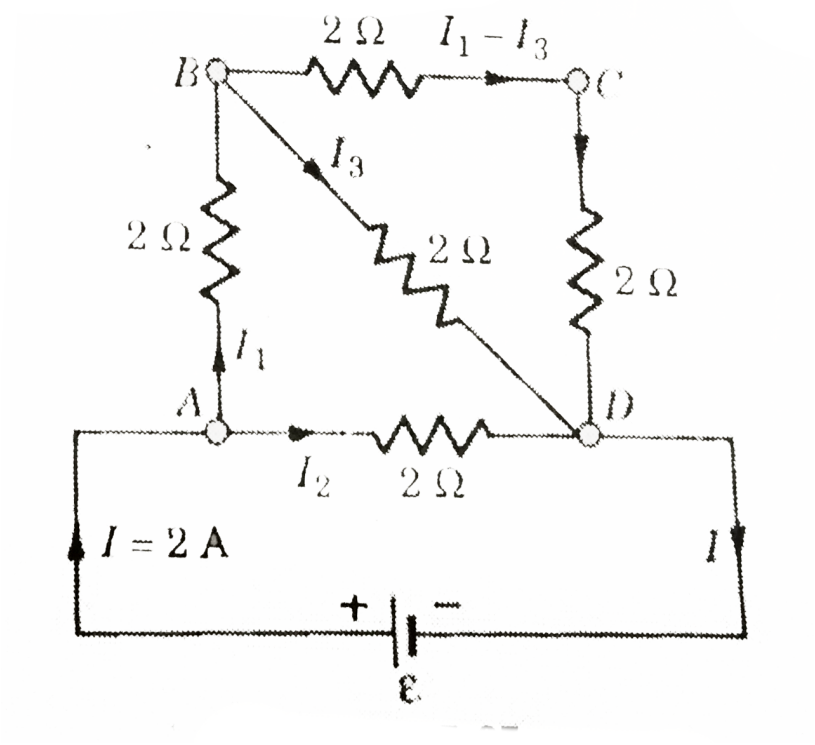

5.

A network of resistors is connected to a battery of negligible internal resistance, as shown in figure. Calculate the equivalent resistance between the point A and D, and the value of the current I_3.

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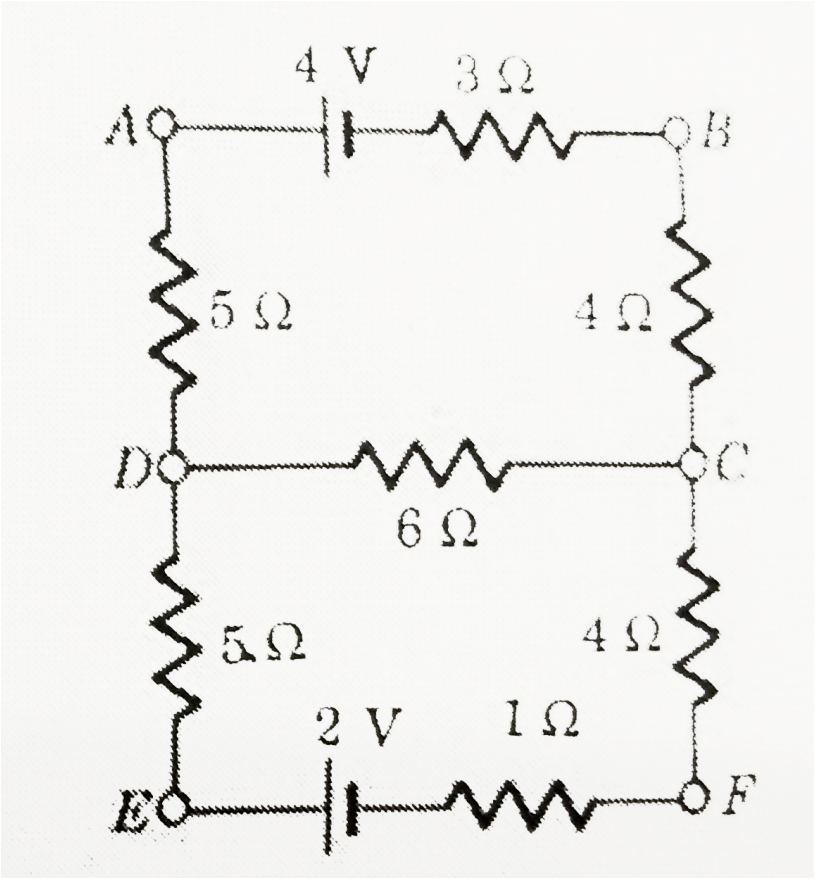
6. 

Calculate (i) current in the 6Ω resistor, (ii) terminal voltage across the 4V cell in the circuit shown in figure.

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7. Three cells are connected in parallel with their like poles connected together with wires of negligible resistance. If the emfs of the cells are 2,

1 an 4 V respectively and their internal resistances are 4,3 and 2Ω respectively, find the current through each cell.

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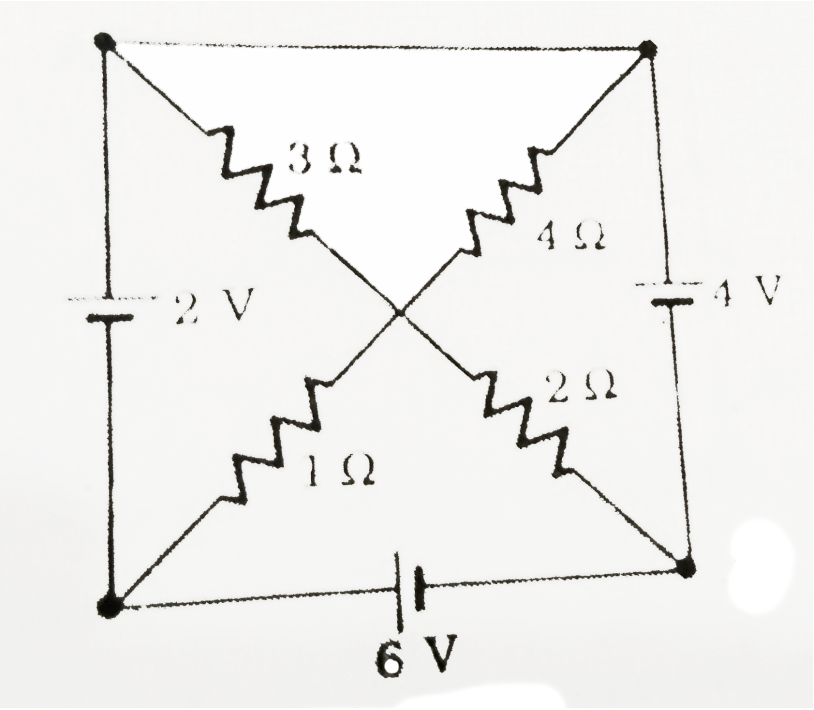
8.



In the network shown in figure. (i) calculate the current of the 6V battery and (ii) determine the potential difference between the points A and B.

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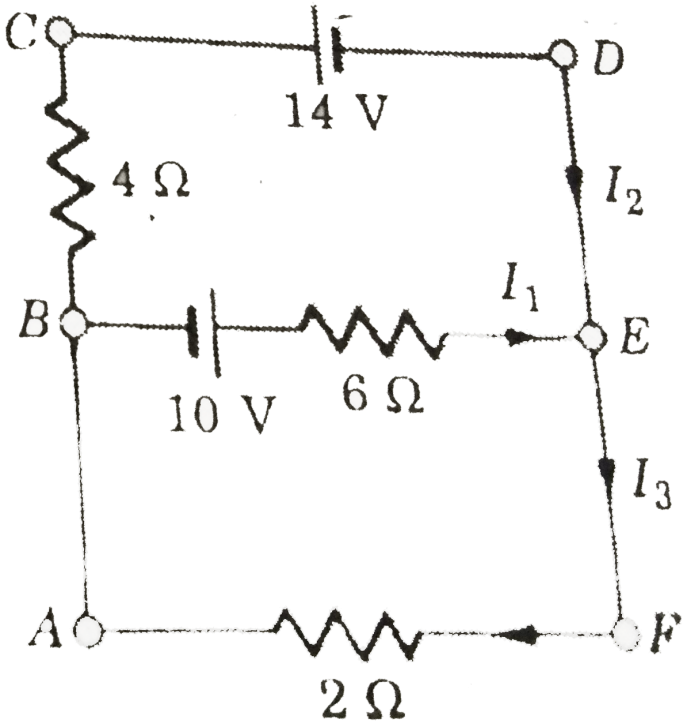

9.

In the network shown in figure. Find (i) the currents I_1, I_2 and I_3 and (ii) the potential difference between the points B and F.

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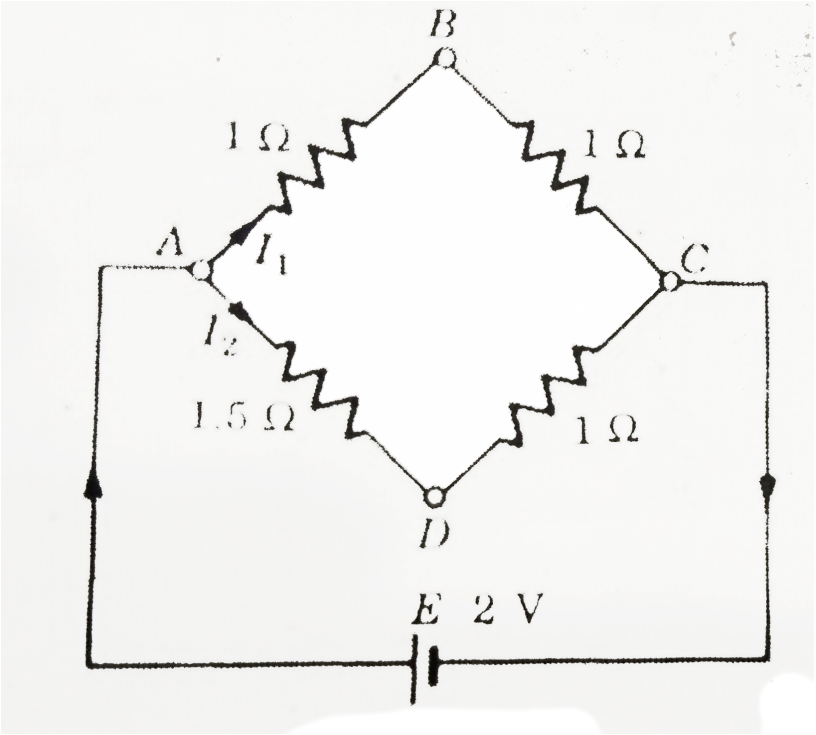
10. 

Calculate the potential difference between the junctions B and D in the wheatstone's bridge shown in figure.

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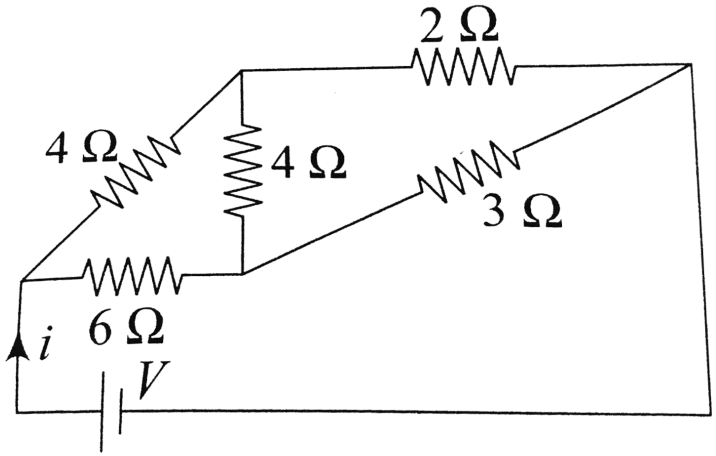
11. For the network shown in the figure, the value of the current i is



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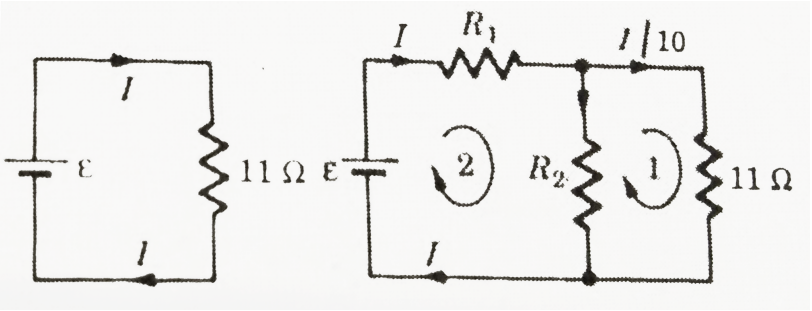
12.



What does the ammeter A read in the circuit shown in figure? What if the positions of the cell and the ammeter are interchanged?

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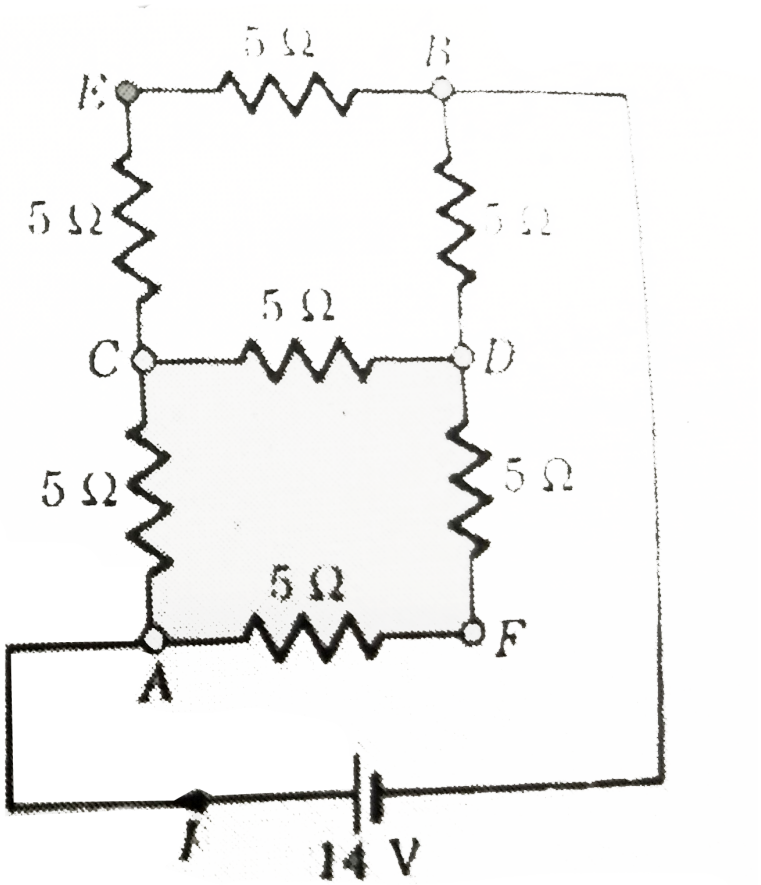

13.

In the circuit shown in figure. Determine the current in the resistance CD and equivalent resistance between the points A and B. the iternal resistance of the cell is negligible.

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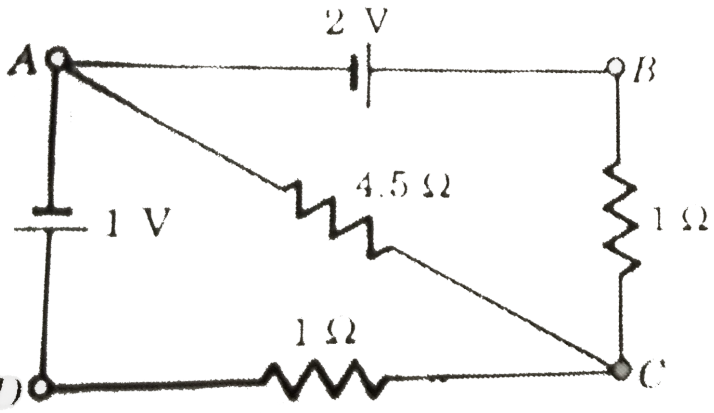

14.

calculate the current flowing in each of the resistances of the network shown in figure. The internal resistance of each cell is negligible.

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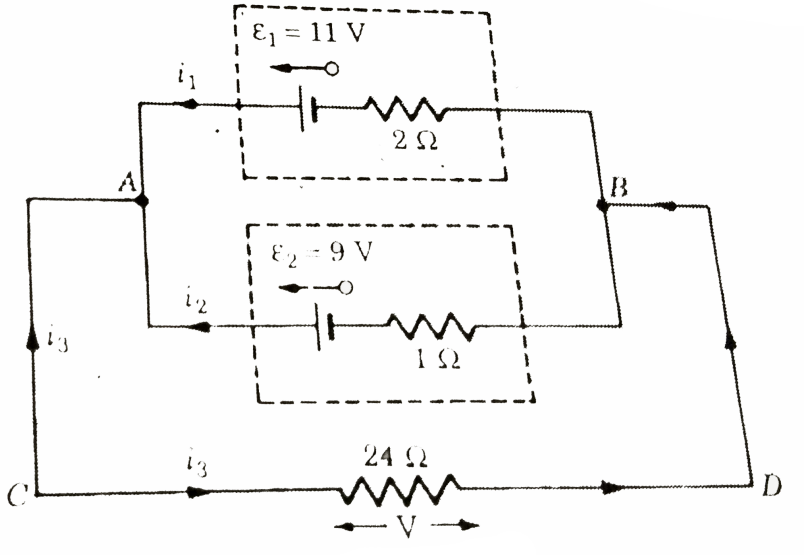

15.

Compute the values of i_1, i_2, i_3 and V in the circuit, shown in figure. The emf and the internal resistance of the upper cell are 11V and 2Ω, and of the lower cell are 9 V and 1Ω.

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16. A certain length of a uniform wire of resistance 12Ω is bent into a circle and two points, a quarter of circumference apart, are connected to a battery of emf 4 V and internal resistance 1Ω. Find the current in the different parts of the circuit.

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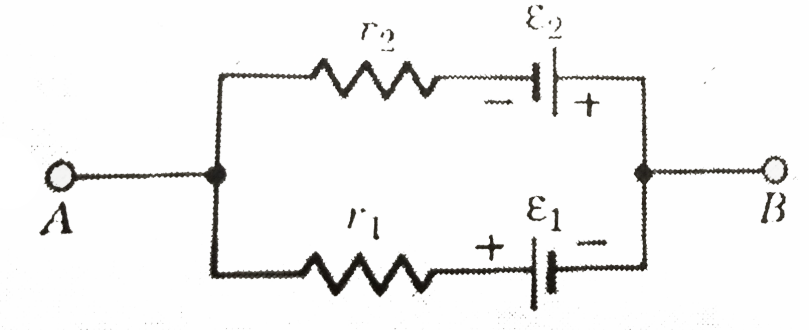
17. 

find the emf (ε_0) and internal resistance (r_0) if a battery which is equivalent to a parallel combination of two batteries of emfs ε_1 and ε_2 and internal resistances r_1 and r_2 respectively, with polarities as shown in figure.

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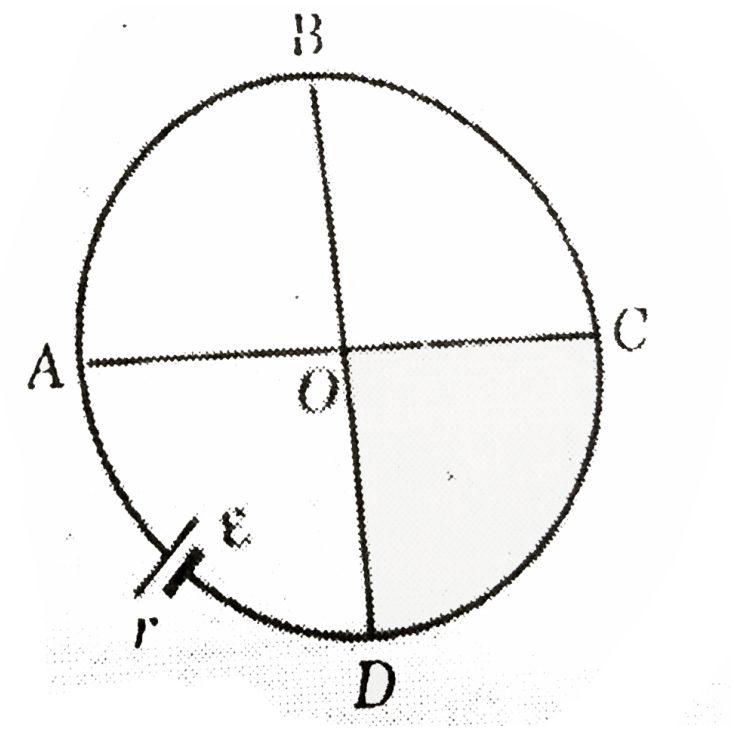

18.

In figure. ABCDA is a uniform circular wire of resistance 2Ω, AOC and BOD are two wires along two perpendicular diameters of the circle, each having ame resistance 1Ω. A battery of emf ε and internal resistance r is connected between the point A and D. Calculate the equivalent resistance of the network

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19. Three batteries of emf 4,5 and 6V and internal resistances 1,2 and 3Ω respectively are connected in parallel with each other and the combination sends a current through an external resistance of 4Ω. Find current drawn through each battery.

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20. One ampere of current enters the junction A of a wheatstone bridge ABCD with $AB = 2\Omega, BC = 2\Omega, AC = 4\Omega, CD = 2\Omega$ and $R_g = 4\Omega$. Find the current through the galvanometer.

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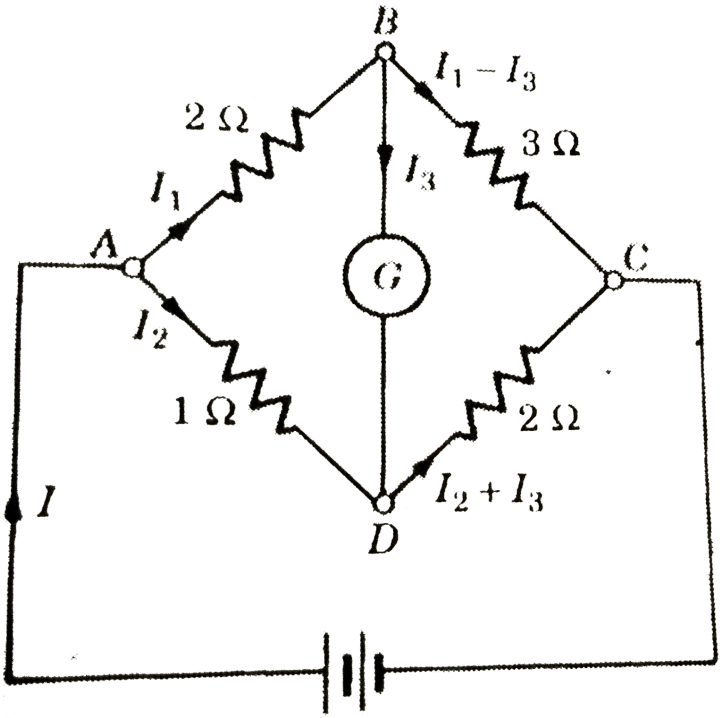

21.

In the circuit shown in figure. Find the currents I, I_1, I_2 and I_3 given that emf of th battery=2V, internal resistance of the battery $= 2\Omega$ and resistance of the galvanomter $= 4\Omega$.

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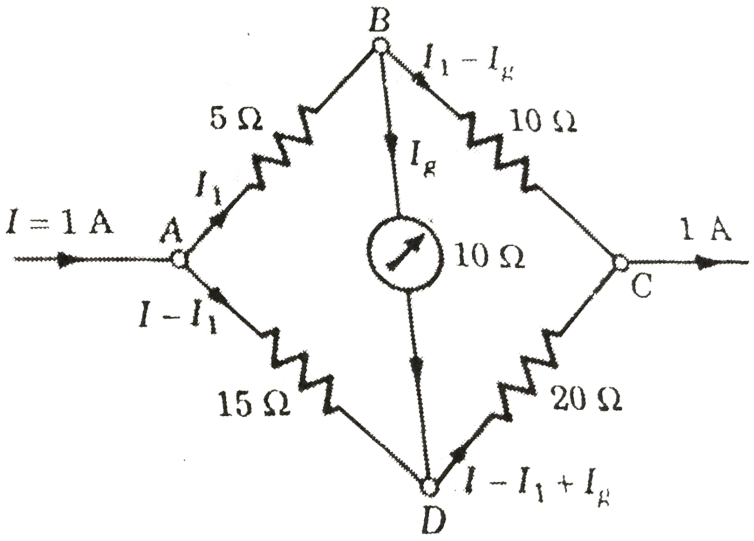
22. Determine the current flowing through the galvanometer G of the Wheatstone bridge shown in figure.



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23. A current of 0.1 A enters a Wheatstone bridge consisting of three arms of 10Ω each and one of 11Ω. What is the current in galvanometer f its resistance is 100?

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24. The terminals of a battery of emf 3 V and internal resistance 2.5Ω are joined to the diagonally opposite corners of a cubical skeleton frame of

12 wires, each of resistance 3Ω. Find the current in the battery.

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25. Twelve identical wires each of resistance 6Ω are arranged to from a skelence cube. A current of $40mA$ is led cube at the current and out at the diagonally opposite corner. Calculate the potential difference development across these current and the effective resistance of the network

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26. Twelve equal wires each of resistance $r\Omega$ form a cube. The effective resistance between the corners of the same edge of the cube is

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27. A galvanometer has a resistance of 49Ω.If 2% of the main current is to be passed through the meter, The value of the shunt will be

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28. how will you convert a 1mA full scale deflection meter of resistance 100Ω into an ammeter to read into 1.0A?

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29. Calculate the value of resistance needed to convert a galvanometer of resistance 200Ω, which gives a full scale deflection for a current of 5 mA, into a voltmeter of 0-10V range.

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30. A galvanometer with a coil of resistance 10.0Ω shows full scale deflection for a current of 50mA. How will you convert the galvanometer into

(i). An ammeter of range 0 to 0.5 A and

(ii). A voltmeter of range 0 to 5V?

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31. A galvanometer has an internal resistance 1.0Ω. It given maximum deflection for a current of 50 mA. Show how this instrument can be converted into (i) a voltmeter with a maximum reading of 2.5 V and (ii) an ammeter with a maximum reading of 2.5 A

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32. A galvanometer has a resistance of 15.0Ω and the meter shows full scale deflection for a current of 2.0 mA. How will you convert this meter

into (i) an ammeter of range 0-5.0A and (ii) a voltmeter of range 0 to 15.0V? Also determine the resistance of the meter in each case.

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33. In galvanometer of resistance 20Ω gives a deflection of one division when a potential difference of 4mV is applied across its terminals. Calculate the resistance of the shut if the current of 10A is to be measured by it. The galvanometer has 25 divisions.

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34. In a galvanometer there is a deflection of one divisions per mA. The internal resistance of the galvanometer is 80Ω. If a shunt of 2.5Ω is connected to the galvanometer and there are 50 divisions in all, one the scale of the galvanometer, what maximum current can this galvanometer read?

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35. A galvanometer of resistanece 40Ω gives a deflection of 5 divisions per mA. There are 50 divisions on the scale. Calculate the maximum current that can pass through it when a shunt resistance of 2Ω is connected.

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36. It is intended to measure a maximum current of 25 A with an ammeter of range 2.5 A and resistance 0.9Ω. How will you do it? What will be the combined resistance?

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37. A galvanometer has a resistance of 30Ω and a current of 2 mA is needed to give full scale deflection. What is the resistance needed and how is it to be connected to convert the galvanometer (i) into an ammeter of 0.3 A range and (ii) into a voltmeter of 0.2 V range?

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38. A galvanometer has a resistance of 100Ω. A difference of potential of 1.0 V between its terminals gives a full scale deflection. Calculate the shunt resistance which will enable the instrument to read upto 2A.

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39. When a galvanometer having 20 divisions scale and 50Ω resistance is connected in series to a cell of emf $1.5V$ through a resistance of 100Ω, its shows full scale deflection. Find the figure of merit of the galvanometer.

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40. A galvanometer has a sensitivity of 60 division/ampere. When a shunt is used its sentivity becomes 10 divisions/ampere. What is the value of shunt used if the resistance of the galvanometer is 20Ω?

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41. A galvanometer of resistance 3663Ω gives full scale deflection for a certain current i_g. Calculate the resistance of the shunt which when joined to the galvanometer coil will result in 1/34 of the total current passing through the galvanometer. also finid the total resistnace of the galvanometer and the shunt.

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42. A shunt of 6Ω is connected across a galvanometer of resistance 294Ω. Find the fraction of the total current passing through the galvanometer.

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43. A galvanometer is shunted by 1/n th of its resistance. Find the fraction of the total current passing through the galvanometer.

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44. If a galvanometer is connected in series with a high resistance so that potential drop across the galvanometer is 1/n th of the total applied voltage, then show that the combined resistance of the galvanometer and the series resistor is n times the resistance of the galvanometer i.e.,

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45. A galvanometer has current sensitivity of 5 divisions/mA and a voltage sensitivity of 2 division/mV. If the instrument has 30 divisions, how will you use it to measure (i) a current of 3 A, and (ii) a voltage of 15V?

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46. A $250\mu A$ meter has 50 divisions and it needs 250 mV for full scale deflection. How will you convert it to read (i) 05 mA/division and (ii) 0.5 V/division?

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47. It is required to pass only one-tenth of the main current through a galvanometer having a resistanec of 27Ω. Calculate the length of the wire of specific resistance $48 \times 10^{-6}\Omega cm$ and area of cross-section $0.2mm^2$ required to make a shunt for this purpose.

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48. With a potentiometer, null points were obtained at 140 cm and 180 cm with cells of emf 1.1 volt and one of unknown value respectively. Calculate the unknown emf.

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49. In a method for comparing emfs by a potentiometer a balance point is found to be 50 cm with a Daniel cell of emf 1.1 volt. Where will you get the balance point with a Leclanche cell of emf 1.5 volt?

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50. In a potentiometer with a cell of unknown emf the balance point was obtained at 60 cm and with a cell of emf 1.5 volt at 45 cm from the same end. Calculate the unknown e.m.f. of the cell.

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51. A potentiometer having a wire 10 m long stretched on it, is connected to accumulator havig a steady voltage. A leclanche cell gives a null point at 750 cm. if the length of the potentiometer wire is increased by 100 cm, find the new position of the null point.

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52. With a certain cell, the balance point is obtained at 60 cm from the zero end of the potentiometer wire. With another cell whose emf differs from that of the first cell by 0.1 V, the balance point is obtained at 50 cm mark. Calculate the emf of the two cells.

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53. With a cell of emf 1.5 V, the balance point is obtained at a distance of 60 cm from one end of the potential wire. Calculate the potential difference between two ends of the potentiomter wire if its total length is 100 cm.

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54. A 10 metre long potentiometer wire carries a steady current. A 1.018 volt standard cell is balanced at a length of 850 cm. find (i) the potential gradient along the wire and (ii) the maximum emf that can be measured.

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55. A potentiometer wire has a potential gradient of 0.0025 volt/cm along its length. Calculate the length of the wire at which null-point is obtained

for a 1.025 volt standard cell. Also, find the emf of another cell for which the null-point is obtained at 860 cm length

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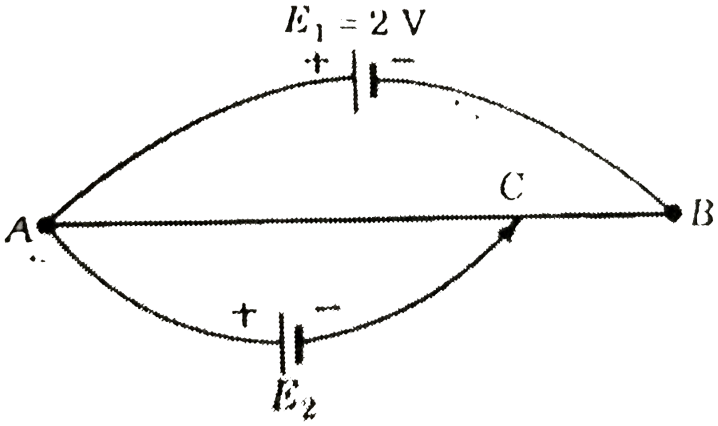

56.

AB is a potentiometer wire of length 100 cm. when a cell ε_2 is connected across AC, where AC=75cm, no current flows from ε_2. Find (i) the potential gradient along AB and (ii) emf of the cell ε_2. the internal resistance of the cell ε_1 is negligible.

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57. A potentiometer is being used to determine the internal resistance of a primary cell. The balance point for the cell in an open circuit is at 76.3 cm. when the cell sends a current in a resistor of 9.5Ω, the balance point shifts to 64.8cm. Find the internal resistance of the cell.

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58. A cell can be balanced against 110 cm and 100 cm of potentiometer wire respectively when in open circuit and shorted through a resistance of 10Ω. Find the internal resistance of the cell.

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59. A potentiometer wire of length 100 cm has a resistance of 10Ω. It is connected in series with a resistance and an accumulator of emf 2V and negligible internal resistance. A source of emf 10 mV is balanced against a length of 40 cm of the potentiometer wire. what is the value of the external resistance?

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60. The resistance of a potentiometer wire is 18Ω. A high resistance box and a 2 V accumulator are connected in series with it. What should be the value of the resistance in the box, if it is desired to have a potential drop of $1\mu V/mm$?

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61. A standard cell of emf 1.08 V is balanced by the potential difference across 91 cm of a meter long wire supplied by a cell of emf 2 V through a series resistor of resistance 2Ω. The internal resistance of the cell is zero. Fnd the reistance per unit length of the potentiometer wire.

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62. In an experiment with a potentiometer to measure the internal resistance of a cell, when the secondary circuit is shunted by 5Ω, the null

point is at 220 cm. when the cell is shunted by 20Ω, the null point is at 300 cm. calculate the internal resistance of the cell.

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63. Four resistances of 15Ω, 12Ω, 4Ω and 10Ω respectively are connected in cyclic order to form a wheatstone bridge. Is the network balanced? If not, calculate the resistance to be connected in parallel with the resistance of 10Ω to balance the network

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64. Four coils resistances 3,6,9 and 30Ω respectively are arranged to form a wheatstone bridge. Determine the value of the resistance with which the coil of 30Ω should be shunted so as to balance the bridge.

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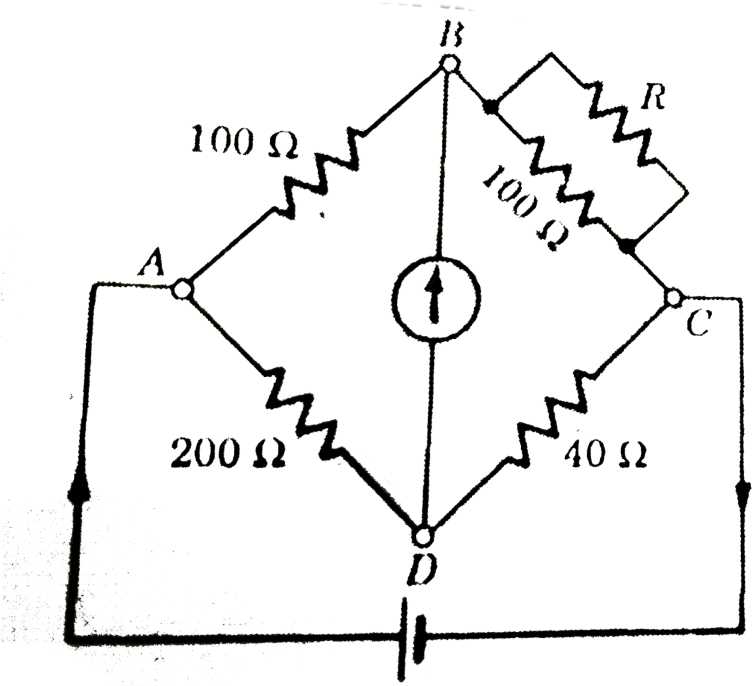

65.

The wheatstone's bridge of figure. Is showing no deflection in the galvanometer joined between the points B and D. compute the value of R.

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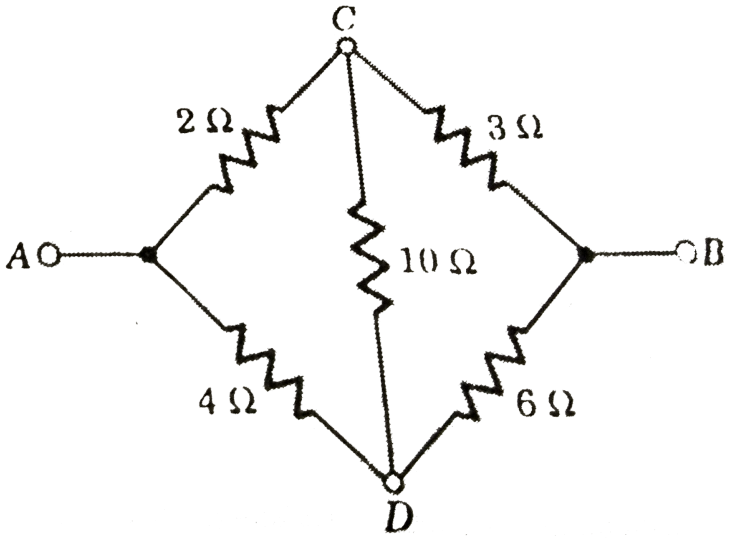

66.

Five resistances are connected as shown in figure. What is the effective resistance between points A and B?

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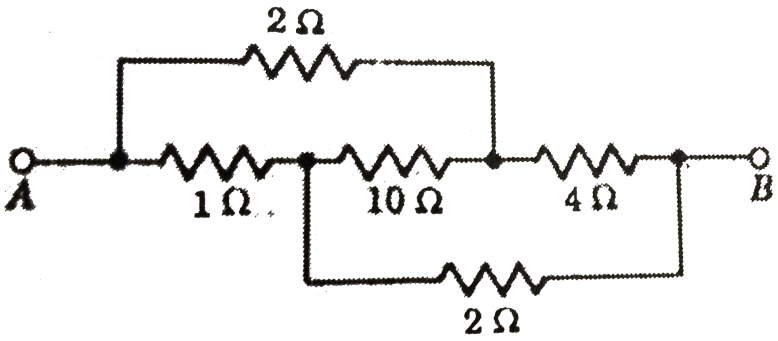

67.

Calculate the equivalent resistance between points A and B of the

network shown in figure.

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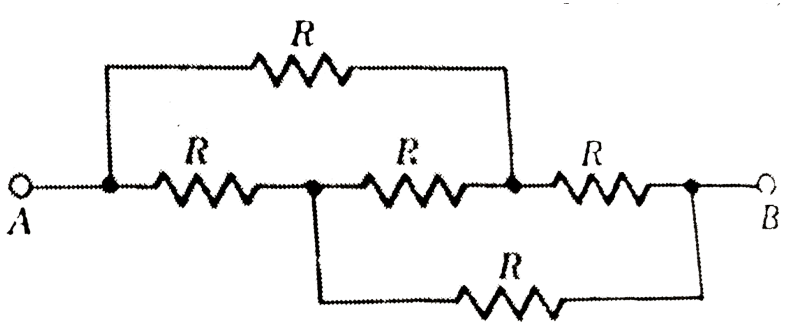

68.

Calculate the equivalent resistance between the points A and B of the network shown in figure.

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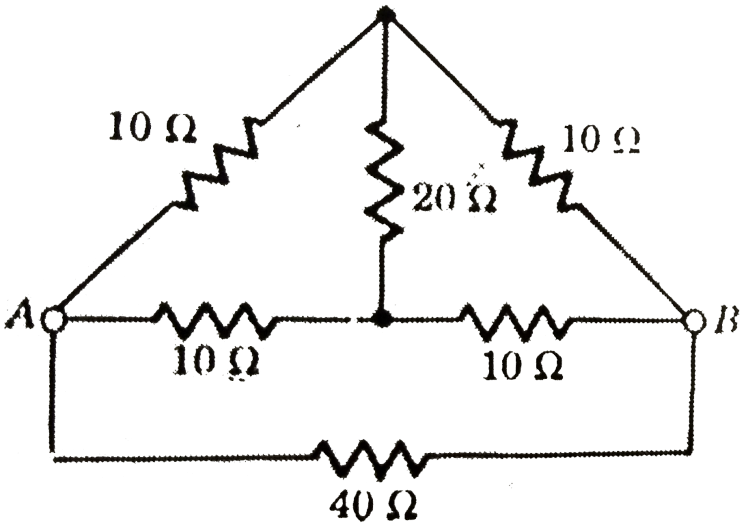

69.

Calculate the resistance between the points A and B of the network shown in figure.

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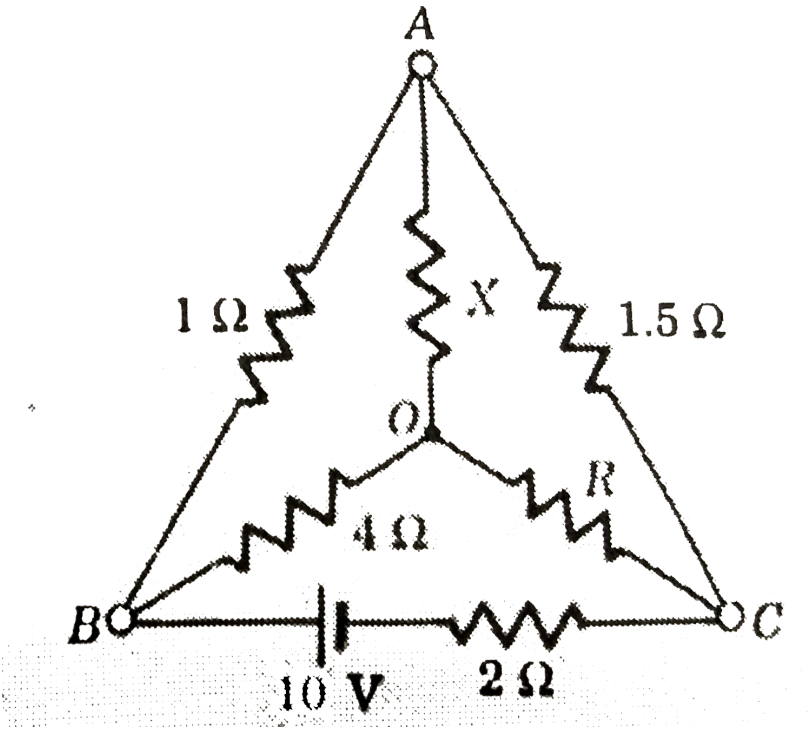
70. 

for the network shown in figure, determine the value of R and the current through it, if the current through the branch AO is zero.

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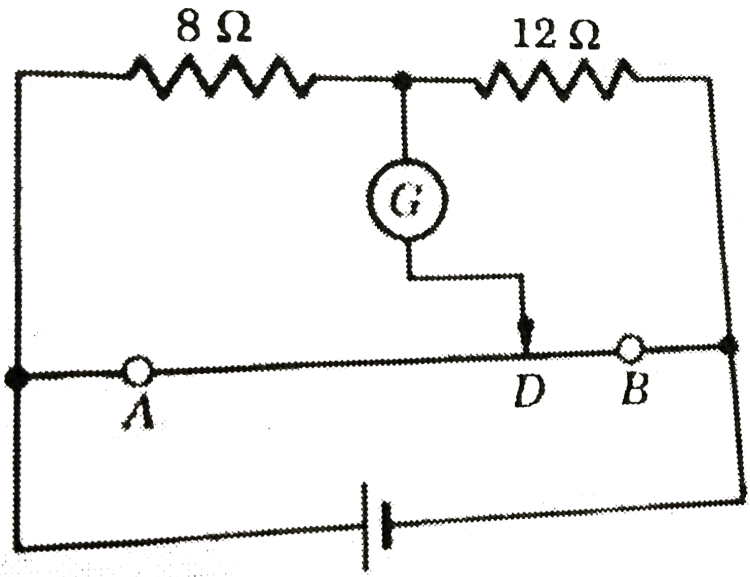

71. The potentiometer wire AB shown in figure. Is 40 cm long. Where should the free end of the galvanometer be connected on AB so that the galvanometer may show zero deflection?

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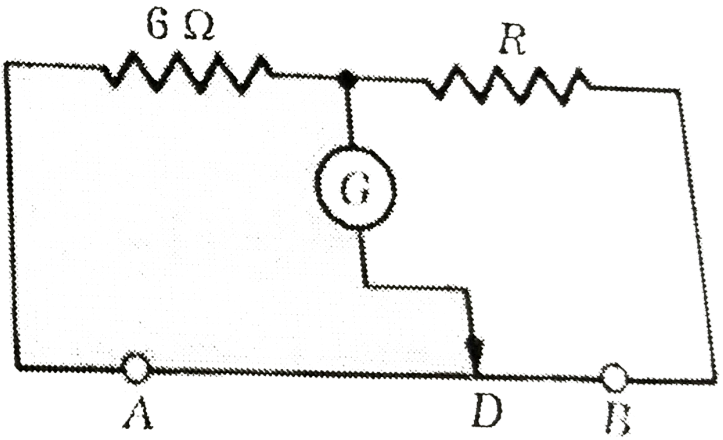

72.

The potentiometer wire AB shown in figure. Is 50 cm long. When $AD = 30cm$, no deflection occurs in the galvanometer. Find R

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73. In an experiment with post office box, the ratio arms are $1000 : 10$. If the value of third resistance is 870Ω, find the unknown resistance.

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74. P,Q,R and S are the resistances taken in the cyclic order in a wheatstone bridge network. P and Q are ratio coils, S is the unknown resistance and R is a 20Ω coil. A balance is obtained when R is shunted with a resistance of 350Ω. When P and Q are interchanged, the balance is restored by altering the shunt across R to 498Ω. find the resistance of S and the ratio P:Q.

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75. A resistance of 5Ω is connected in one gap of a metre bridge and 15Ω in the other gap. Calculate the position of the balancing point.

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76. In a metre bridge the length of the wire is 100 cm. At what point will the balance point be obtained if the two resistances are in the ratio of $4:5$.

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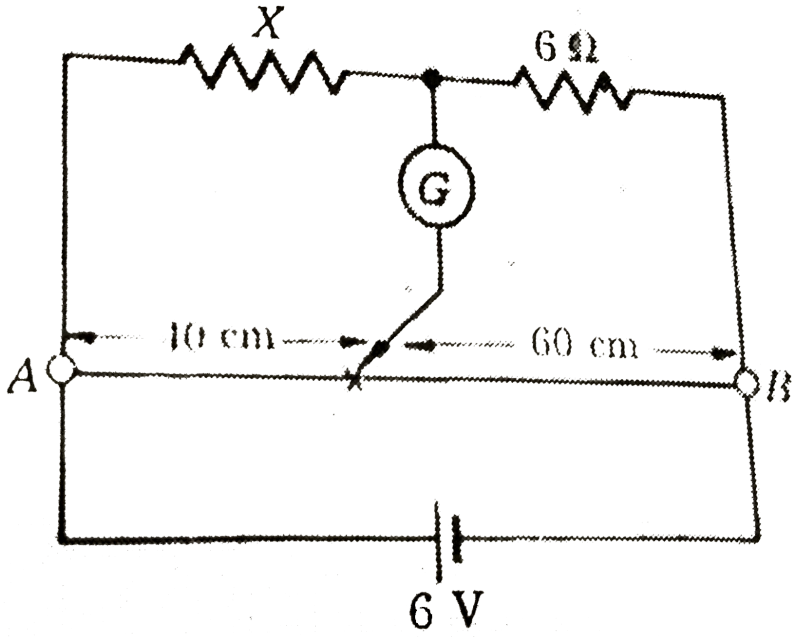

77.

In the circuit shown in figure. A metre bridge is shown in its balanced state. The metre bridge wire has a resistance of a 4 ohm/cm. calculate the value of the unknown resistance X and the current drawn from the battery of negligible resistance.

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78. In a metre bridge when the resistance in the left gap is 2Ω and an unknown resistance in the right gap, the balance point is obtained at 40 cm from the zero end. On shunting the unknown resistance with 2Ω, find the shift of the balance poiont on the bridge wire.

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79. In comparing the resistance of two coils P and Q with the help of a metre-bridge arrangement, a balance point is obtained when the sliding contact is 50 cm from the zero end of the wire. The resistances P and Q are then interchanged and balance point is obtained at 120 cm from the zero end. Deduce the ratio of the resistances P and Q and the length of the wire.

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80. In a meter-bridge experiment, two resistances P and Q are connected in series in the left gap. When the resistance in the right gap is 50Ω, the

balance point is at at the centre of the slide wire. If P and Q are connected in parallel in the left gap, the resistance in the right gap has to be changed to 120Ω so as to obtain the balance point at the same position. find P and Q.

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81. In a meter-bridge experiment with a resistance R_1 in left gap and a resistance X in a right gap. null point is obtained at $40cm$ from the left emf. With a resistance R_2 in the left gap, the null point is obtainned at $50cm$ from left hand. Find the position of the left gap is containing R_1 and R_2 (i) in series and (ii) in parallel.

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