CLASS XII-----WORKSHEET

CURRENT ELECTRICITY 2020---2021

1. The drift velocity of the electrons in a copper wire of length 2m under the applicatioı of a potential difference of 200 V is $0.5\, ms^{-1}$. Their mobility is (in $m^2\, V^{-1}\, s^{-1}$)

A. 2.5×10^{-3} B. 2.5×10^{-2}

C. 5×10^{2} D. 5×10^{-3}

2. A constant potential difference is applied between the ends of the wire. If the length of the wire is elongated 4 times, then the drift velocity of electrons will

A. increase 4 times B. decrease 4 times

C. increase 2 times D. decrease 2 times

3. An electric cell of e.m.f. E is connected across a copper wire of diameter d and length l. The drift velocity of electrons in the wire is v_d. If the length of the wire is changed to $2l$, the new drift velocity of electrons in the copper wire will be

A. v_d B. $2v_d$

C. $\frac{v_d}{2}$ D. $\frac{v_d}{4}$

4. For two resistance wires joined in parallel, the resultant resistance is $6/5\ \Omega$. When one of the resistance wire breaks the effective resistance between 2Ω. Find the resistance of the broken wire.

A. 3Ω B. $4\ \Omega$

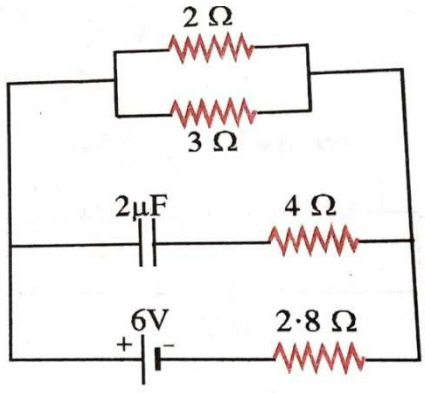
C. 2Ω D. 0

5. If a wire of radius r`is drawn to another wire of radius $2r$, the new resistance of the wire will be:

A. $2R$ B. $R/2$

C. $4R$ D. $R/16$

6. In the figure shown, the capacity of a condenser C is $2\mu F$. The current is 2 Ω resistor is



A. $9A$ B. $0.9\ A$

C. $\frac{1}{9}$`A D. $\frac{1}{0.9}\ A$

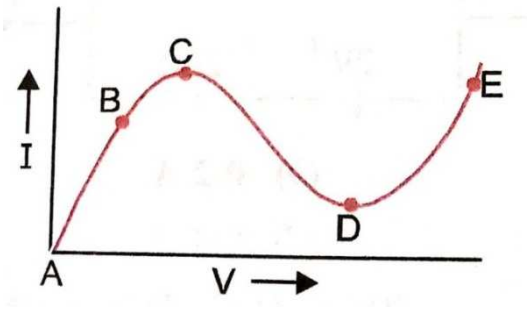
7. The conducting wire is marked with three colour strips red, red and orange. The

value of its resistance is

A. 22 Ω B. 220 Ω

C. 2200Ω D. 22000 Ω

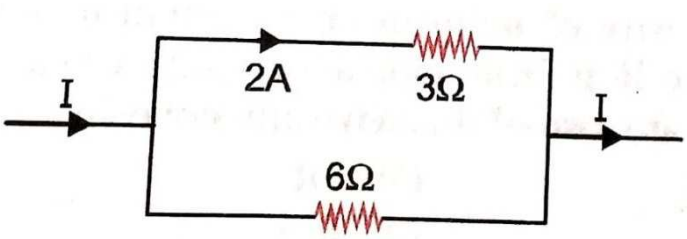
8. From the graph between current (I) and voltage (V) as shown in figure, identify the portion corresponding to negative resistance



A. AB B. BC

C. CD D. DE

9. The current in the given circuit is



A. $1A$ B. $3A$

C. $6A$ D. $12A$

10. A wire of length L is drawn such that its diameter is reduced to half of its original diameter. If the initial resistance of the wire were 10 Ω, its new resistance would be

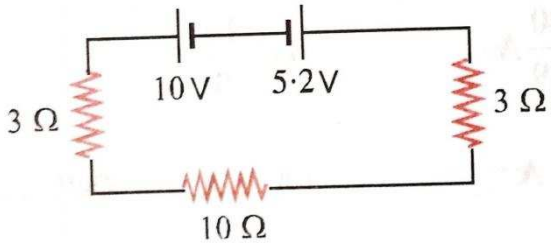
A. 40Ω B. 80Ω

C. 120Ω D. 160Ω

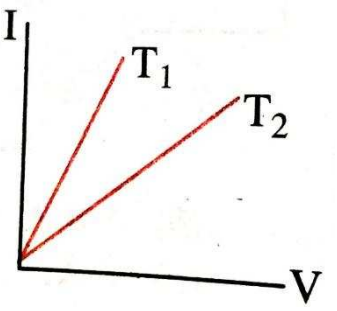
11. Calculate current I in circuit:

A. $0.1\ A$ B. $0.2A$

C. $0.4A$ D. $0.3A$



12. Current voltage graphs for a given metallic wire at two different temperatures T_1 and T_2 are shown in figure. Which of the temperature T_1 and T_2 is greater?



A. $T_1 > T_2$ B. $T_1 = T_2$

C. $T_1 < T_2$ D. $T_1 > T_2$

13. The resistance of series combination of 2 resistors is S. When they are joined in parallel the total resistance is P. If $S = nP,$ then miniumum possible value of n is:

A. 4 B. 3

C. 2 D. 1

14. A material B has twice the specific resistance of A. A circular wire made of B has twice the diameter of a wire made of A. Then for the two wires to have the same resistance, the ratioI_B / I_A of their respective lengths muse be:

A. 2 B. 1

C. $\frac{1}{2}$ D. $\frac{1}{4}$

15. Consider a thin square sheet of side L and thickness $t,$ made of a material of resistivity ρ. The resistance between two opposite faces of the sheet is

A. directly proportional to L B. directly proportional to t

C. independent of L D. independent of 't'

16. An electric cell of e.m.f. E is connected across a copper wire of diameter d and length l. The drift velocity of electrons in the wire is v_d. If the length of the wire is changed to $2l,$ the new drift velocity of electrons in the copper wire will be

A. v_d B. $2v_d$

C. $\frac{v_d}{2}$ D. $\frac{v_d}{4}$

17. Two copper wires, one of length $1m$ and the other of length $9m$ have the same resistance. The diameter in the ratio

A. 3:1 B. 1:3

C. 9:1` D. 1:9

18. Two bulbs of wattages 25 and 100 respectively each rated at $220\ V$ are connected in series with the supply of $440\ V$. Which bulb will fuse?

A. $160\ W$ B. $25\ W$

C. Both of them D. None of them

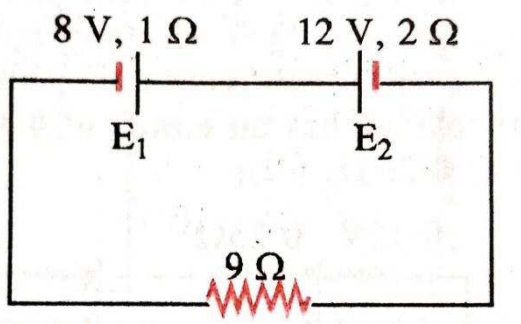
19. An electric kettle has two heating elements. When one element is connected to an a.c. source, the water boils in 10 min. When the other element is used the water boils in 40 min. If both elements are connected in parallel, the time taken by same quantity of water to boil is:

A. 4 min B. 25 min
C. 15 min D. 8 min

20. If two identical heaters each rated as $(1000\ W, 200\ V)$ are connected in parallel to $220\ V$, then the total power consumed is

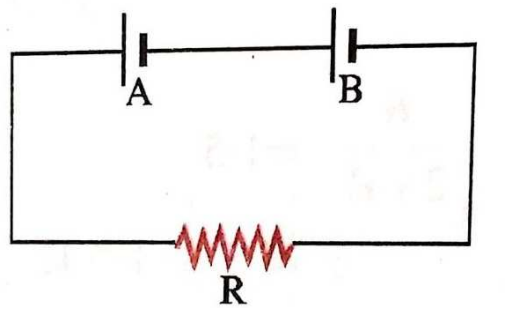
A. $200\ W$ B. $250\ W$
C. $2000\ W$ D. $2500W$

21. In the figure shown below, the terminal voltage across E_2 is



A. $12\ V$ B. $12.66\ V$
C. $11.34\ V$ D. $11.66\ V$

22. Two batteries A and B each of e.m.f. $2V$ are connected in series to an external resistance $R=1\Omega$. If the internal resistance of battery A is 1.9Ω and that of $B$is $0.9\ \Omega$. What is the potential difference between the terminals of battery A?



A. $2\ V$ B. $3.8\ V$
C. Zero D. None of these

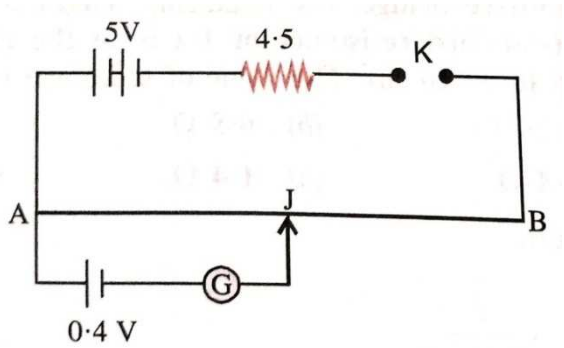
23. A battery of $6\ V$ and internal resistance $2\ \Omega$ is connected to a sliver voltameter. If the current of $1.5\ A$ flows through the circuit, the resistance of the voltameter is

A. $4\ \Omega$ B. $2\ \Omega$
C. $6\ \Omega$ D. $1\ \Omega$

24. In a metre bridge, the balancing length from the left end (standard resistance of 1Ω is in the right gap) is found to be $20\ cm$. The value of unknown resistance is

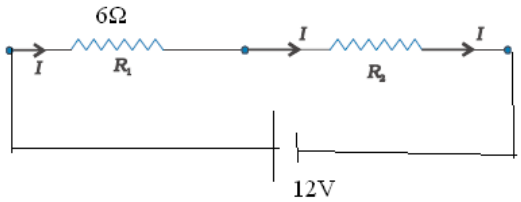
A. $0.25\ \Omega$ B. $0.5\ \Omega$
C. $0.8\ \Omega$ D. $1.4\ \Omega$

25. In figure, the potentiometer wire AB has a resistance of $5\ \Omega$ and length $10\ m$. The balancing length AJ for the e.m.f. of $0.4\ V$ is



A. $0.4\ m$ B. $0.8\ m$
C. $1.52\ m$ D. $4\ m$

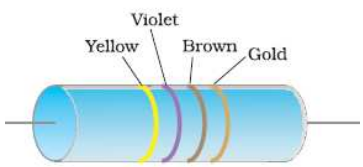
26) A battery of voltage E is connected to a cell of emf ε and internal resistance r are connected through external resistance R. The expression for terminal voltage across the cell while charging is
A. V= ε – Ir B. V = ε +IR C. V= I r D. V= ε + Ir
27) A bulb is marked with 200 W, 200V is connected to a 100 V source. The power delivered by the bulb now is
A. 200W B. 100W C. 25W D. 400W
28) The correct relation relating current density and EF E is
A. J= σ E B.J = E/σ C. J= σ E/l D. J = σ E/ A
29) If number density of electron increases then
(a) Resistivity increases (b) Conductivity increases (c) Mobility increases
(d) Resistance increases
30) When the temperature of semiconductor increases then
1) Resistivity increases, τ decreases 2) Resistivity increases, τ increases
3) Resistivity decreases, τ increases 4) Resistivity decreases, τ has no effect
31) A 12Kw heater is working for 10 minutes then energy consumed in commercial unit is
1) 120 2) 2 3) 1.2 4) 20
32) If pd across 6 Ω resistor is 9V,the value of R_2 is ----



33) A storage battery of emf 8.0 V and internal resistance 0.5 Ω is being charged by a 120 V dc supply using a series resistor of 15.5 Ω ,the value of current in the circuit is
1) 120/8 A 2) 8/0.5A 3) 112/16A 4) 128/16 A

Fill in the blanks

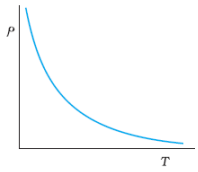
1) The average time between successive collisions of electron when electric field applied is -------
2) The SI unit of mobility is ------



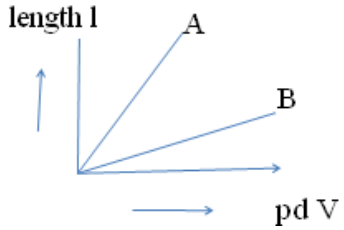
3) The value of resistance of the resistor is ------
4.Meter bridge works on the principal of ------

Questions

1)What is the random velocity and give its value?
2) What is drift velocity of electron and give its value?
3) Plot a graph to show the variation of drift velocity of electron and current density of a conductor
4) Why do you prefer manganin to make standard resistance coil?
5) The sign of the temperature coefficient of resistivity of the substance for which P Vs T graph is plotted ,is ----

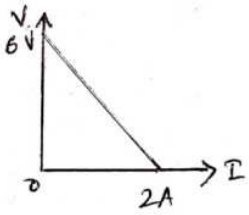


6) Why do you call potentiometer as ideal voltmeter?
7) Which potentiometer is preferred to measure emf accurately? Why?

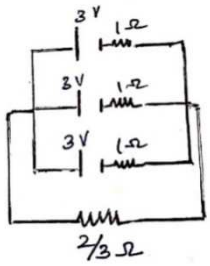


8) R_t $R_{o,}$ $R_{100}$are the resistance of a platinum wire which is immersed in bath of t° C, 0 ° C and 100 ° C respectively. The temperature t is given by -----

9) Expression for effective emf of two non identical cells of each emf ε 1 and ε 2 and interna resistance r1 and r 2 respectively is -----
10) Three identical cells each emf ε and internal resistance ‘r’ is connected in series with an external resistor R. Graph show the variation of V versus I. The value of emf of each cell is ---



11. Current flowing through 2/3Ωresistor is ---



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12.As the temperature of metallic wire increases then mobility of electron-----

NUMERICALS

1. How many electrons pass through a lamp in one minute if the current is 300A?

2. A wire of resistance 5Ω is drawn out so that is length is increased to twice its length. Calculate new resistance?

3. The density of free electrons is nearly is $3.5x10^{28}/m^3$ under the action of electric field provided by a source EMF. The electron in a copper wire of area of cross section $10^{-6}m^2$ acquires an average velocity of 10^{-4}m/s. What is the current in the wire?

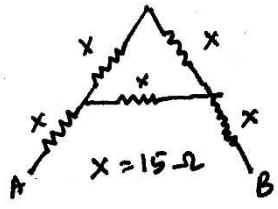
4. An aluminium wire of diameter 0.24cm is connected in series to a copper wire of diameter 0,16cm. The wires carry an electric current of 10A. Find current density in the aluminium wire, drift velocity of electrons the copper wire. (n in cu is $8.4x10^{28}$)

5.Three resistors 3Ω, 4Ω, 6Ω are connected parallel. The combination is connected to a cell of emf 2V and internal resistance 2/3Ω. Find the current drawn from the cell and through 3Ωresistance.

6. A uniform wire of resistance 12Ωis cut into 3 pieces in the ratio of 1:2:3 and the 3 pieces are connected to form a triangle. A cell of emf, 8V r=1Ωis connected across the highest of those resistors. Calculate the current through each part of the circuit.

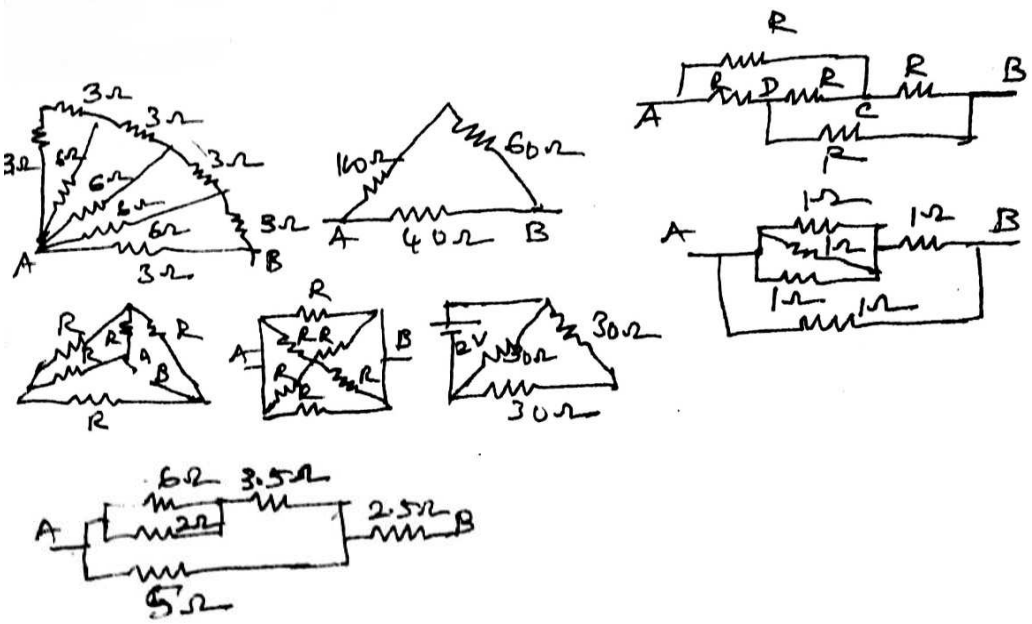
7. Six equal resistors of 1Ω are connected to form the sides of a hexagon. Calculate the resistance offered by the combination across the diagonally opposite ends.

8.Five resistances of 15Ωeach are connected as shown in the diagram.Calculate the equivalent resistance across A and B.



9.Two lamps of resistance 30 and 20 are connected in series to a 110V circuit. Calculate the voltage drop across each lamp.

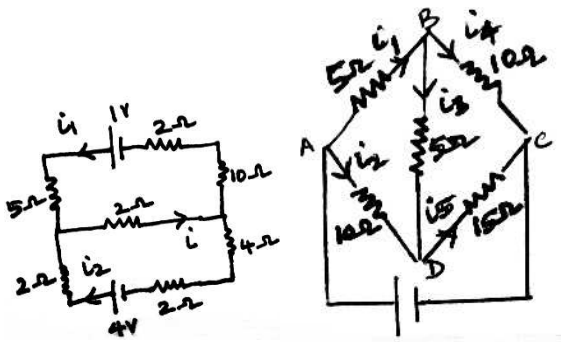
10. Find equivalent resistance between A and B



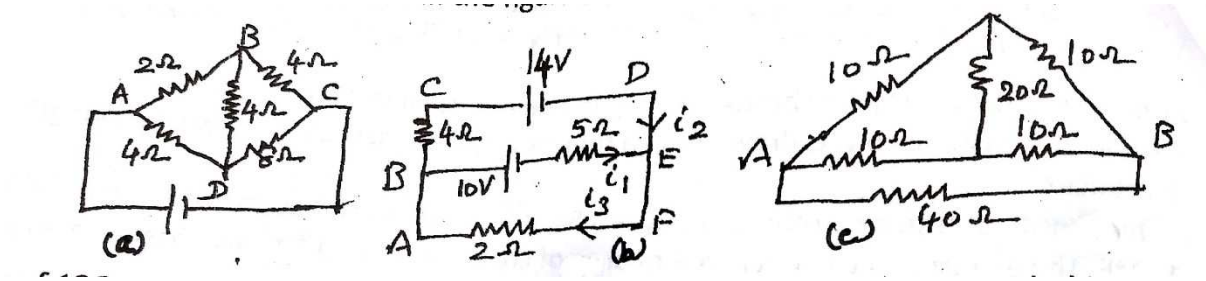
11.Two wires of same material having lengths1:2 ratio and diameter in the ratio of 2:3 are connected in series with an accumulator. Compare the ratio of PD across the two ends of the resistor.

12.In how many equal parts a wire a of resistance 100Ω is cut so that we may obtain a resistance of 1Ω by connecting them in parallel.

13. Find the current in each branch



14.Calculate the current in branch ABC and ADC in the figures a,b, and effective resistance in figure c



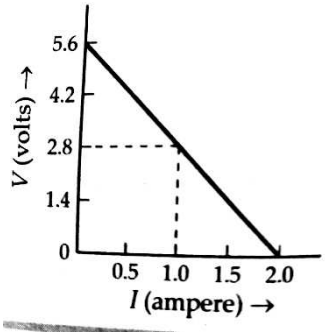
15. Three resistances of 12Ω, 6 Ω and 20Ω are connected in parallel. What is the resistance with this combination in series to get a total resistance of 25Ω.

16. Four cells of identical emf Ɛ, internal resistance ‘r’are connected in series to a variable resistor, The following graph shows the variation of terminal voltage of the combination with current output.

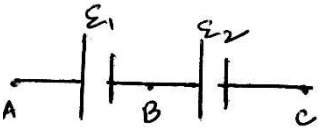
(i)What is the emf of each cell used?

(ii)For what current from the cells, does maximum power dissipation occur in the circuit?

(iii)Calculate the internal resistance of each cell.



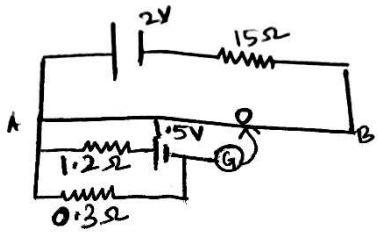
17.Two cells of emf $\mathcal{E}_1$ and $\mathcal{E}_2$ ($\mathcal{E}_1 > \mathcal{E}_2$) when the potentiometer is connected between A and B the balancing length is 300cm. On connecting the potentiometer between A and C the balancing length is 100cm. Calculate the ratio of their emfs.



18.A wire of resistance 0.1Ω/cm is bent to form a square ABCD of side 10cm. A similar wire is connected between corner B and D to form diagonal BD. Calculate their effective resistance of the combination between A and C.

19.A potentiometer having a wire 10m long stretched on it is connected to a battery having a steady voltage. A leclanche cell gives a null point 750cm. If the length the potentiometer wire is increased by 100cm. Find the new position of the null of point.

20.AB is a potentiometer wire of length 10m and resistance 10Ω. Calculate its potential gradient along AB and the length AO when the galvanometer reads zero.



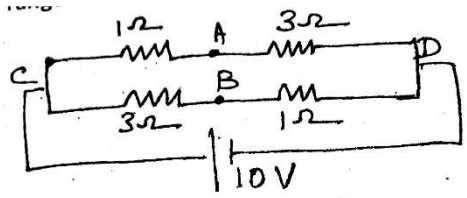
23.A potentiometer wire of length 100cm has a resistance of 10Ω. It is connected in series with a resistance and an accumulator of emf 2V and negligible internal resistance. A source of emf 10mV is balanced against a length of 40cm of the potentiometer wire. What is the resistance of the external resistor?

24. With certain resistance in the left gap of the slide wire bridge the balancing point is obtained when a resistance of 10Ωis taken out from the resistance box. On increasing the resistance box by 12.5Ω the balance point shifts by 20cm. Find the value of unknown resistance.

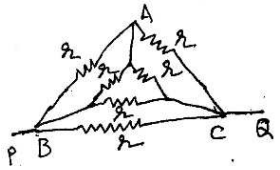
25. In a meter bridge when the resistance in left gap is 2Ω and the unknown resistance in the right gap the balancing point is obtained from the end A at 40cm on the wire. Find the balance point when the unknown resistance is shunted with 2Ω.

26. 20 cell of internal resistance 0.5Ω and emf 1.5V each are used to sent a current through an external resistance of (i) 500Ω (ii)0.005Ω (iii)2.5Ω. How will you arrange them to get the maximum current in each case? Find the value of current in each case.

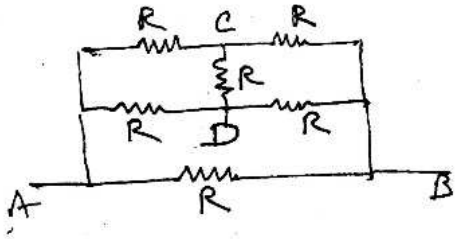
27.A battery of emf 10V is connected to resistance as shown. Find the potential difference between A and B.



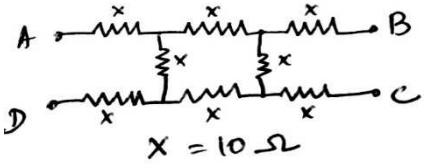
28.Find the resistance between P and Q



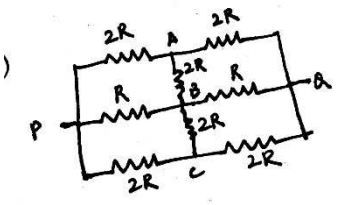
29. Find the resistance between A and B



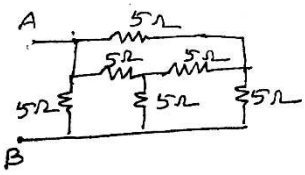
30.Find the resistance between the points (i) A and B and (ii) A and C of the network shown in the figure.



31. Find the resistance between P and Q



32.Find the effective resistance across AB, current drawn when battery is connected across AB



33.Potentiometer wire PQ of 1m length is connected to a standard cell $\mathcal{E}_1$. Another cell $\mathcal{E}_2$ofemf 1.02V is connected as shown in the circuit with a resistor 'r' and a switch S. With switch S open, null position is obtained at a distance of 51cm from P. Calculate (i) potential gradient of the potentiometer wire (ii)emf of the cell $\mathcal{E}_1$ (iii)When the switch S is closed will the null point move toward P or Q?