121. 1 ohm and 2 ohm are connected in series across the left gap of a metre-bridge. The balancing length is 60 cm. If the resistors were connected in parallel instead of in series, the balancing length would be (in cm)
1) 25 2) 20 3) 40 4) 75

POTENTIOMETER

122. A cell of emf 2 V and negligible resistance is connected in series with a resistance of 5 ohm, and a potentiometer wire of resistance 10 ohm. What is the potential drop per cm if the length of the potentiometer wire is 10 m. The emf a cell which is balanced by 750 cm long wire is
1) $\frac{1}{1500}\frac{V}{cm}$ 0.5V 2) $\frac{1}{750}\frac{V}{cm}$,1V
3) $\frac{1}{1250}\frac{V}{cm}$,0.6V 4) $\frac{1}{250}\frac{V}{cm}$, 1V

123. In a potentiometer using two cells in series gave a balance length 600cm. When the same cells are connected opposing each other then balance length is 100cm. The ratio of emfs of the cells is
1) 7 : 5 2) 5 : 7 3) 6 : 1 4) 1 : 6

124. In a potentiometer the balance length with standard cadmium cell is 509 cm. The emf of a cell which when connected in the place the standard cell gave a balance length of 750 cm is (emf of standard cell is 1.018V)
1) 1.5V 2) 0.5V 3) 1.08V 4) 1.2V

125. A potentiometer having a wire of 4m length is connected to the terminals of a battery with a steady voltage. A leclanche cell has a null point at 1m. If the length of the potentiometer wire is increased by 1m, The position of the null point is
1) 1.5m 2) 1.25m 3) 10.05m 4) 1.31m

126. A potentiometer wire is 10m long and a potential difference of 6V is maintained between its ends. The emf of a cell which balances against a length of 180 cm of the potentiometer wire.
1) 1.8 V 2) 1.1 V 3) 1.08 V 4)1.2 V

127. A 10m long wire of resistance 15 ohm is connected in series with a battery of emf 2V (no internal resistance) and a resistance of 5 ohm. The potential gradient along the wire is
1) 0.15 Vm^{-1} 2) 0.45V m^{-1}
3) 1.5 Vm^{-1} 4) 4.5 Vm^{-1}

128. A cell of emf ε_1 in the secondary circuit gives null deflection for 1.5m length of potentiometer of wire length 10m. If another cell of emf ε_2 is connected in series with ε_1 then null deflection was obtained for 2.5 m length. Then $\varepsilon_1 : \varepsilon_2$ is
1) 3 : 5 2) 5 : 3 3) 3 : 2 4) 2 : 3

129. The potential gradient along the length of a uniform wire is 10 volt/m B and C are two points at 30 cm and 60 cm in a scale fitted along the wire. The pd between B and C is
1) 3V 2) 0.4V 3) 7V 4) 4V

130. In a potentiometer experiment, the balancing length with a cell in the secondary circuit is found to be 480 cm. When a resistor of 8 ohm is connected in parallel to the cell, the balancing length is found to be 420cm. The internal resistance of the cell is
1) 1.14Ω 2) 2Ω 3) 4.12 Ω 4) 56 Ω

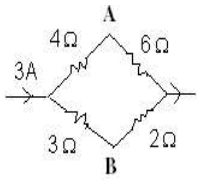
131. In a potentiometer whose wire resistance is 10Ω, the potential fall per cm is V volts. To reduce it to V/4 V/cm, the resistance that must be connected in series with the potentiometer wire is
1) 40Ω 2) 30Ω 3) 20Ω 4)10Ω

KEY

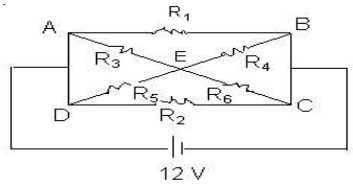
1.4	2.3	3.2	4.1	5.1
6.1	7.2	8.3	9.1	10.3
11.4	12.4	13. 4	14.3	15.2
16.4	17.3	18.2	19.1	20.1
21.2	22.4	23.4	24.1	25.2
26.1	27.1	28.3	29.3	30.4
31.1	32.1	33.4	34.3	35. 2
36.2	37.4	38.3	39.4	40.4
41.3	42.1	43.1	44.1	45.1
46.1	47.4	48.1	49.3	50.3
51.2	52.3	53.4	54.1	55.3
56.1	57.2	58.3	59.1	60.1
61.4	62.3	63.1	64.4	65.3
66.4	67.4	68.2	69.4	70.4
71.3	72.2	73.4	74.2	75.1
76.3	77.4	78.3	79.2	80.1
81.1	82.4	83.3	84.4	85.2
86.4	87.1	88.3	89.2	90.4
91.2	92.1	93.3	94.2	95.1
96.1	97.3	98.1	99.1	100.2
101.1	102.1	103.3	104.2	105.1
106.1	107.3	108.3	109.4	110.3
111.3	112.4	113.4	114.2	115.2
116.3	117.2	118.3	119.1	120.2
121.1	122.2	123.1	124.1	125.2
126.3	127.1	128.3	129.1	130.1
131.2				

LEVEL - II

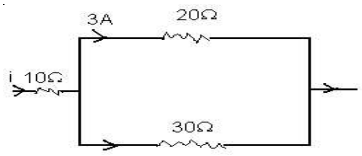
1. A 4 Ω resistor in series with 8 Ω resistance and they are connected to 12V supply if another resistor of 8 Ω is connected across the 8 Ω resistor the current drawn from source would increase or decrease?
   1) Increases by 25% 2) Decreases by 5%
   3) Increases by 50% 4) Decreasesby 50%
2. The resultant resistance of two resistors when connected in series is 48 ohm. The ratio of their resistances is 3 : 1. The value of each resistance is
   1) 20 Ω 28 Ω 2) 32 Ω, 16 Ω
   3) 36 Ω, 12 Ω 4) 24 Ω, 24 Ω
3. Four resistances of each 20 ohm are connected to form a square A, B, C, D. The resultant resistance between the corners AC and the resistance between AB are
   1) 40 Ω, 15 Ω 2) 15 Ω, 40 Ω
   3) 15 Ω, 20 Ω 4) 20 Ω, 15 Ω
4. The mass of a wire of resistance 20 ohm is 50 gram. The resistance of the same wire of mass 10 gram is
   1) 4 Ω 2) 5 Ω 3) 100 Ω 4) 80 Ω
5. The resultant resistance of two resistors when connected in series is 9 ohm. When they are connected in parallel, the resistance is 2 ohm. The resistances of these resistors are
   1) 7 Ω, 2 Ω 2) 6 Ω, 3 Ω
   3) 5 Ω, 4 Ω 4) 8 Ω, 1 Ω
6. Three resistances are connected to form the sides of triangle. ABC. The resistance of the side AB is 40 ohm of the side BC is 60 ohm and its side CA is 100 ohm. The effective resistance between points A and B is
   1) $\frac{80}{3}$ Ω 2) 20 Ω 3) 32 Ω 4) 16 Ω
7. When three identical resistances are connected to form a triangle the resultant resistance between any two corners is 30 Ω. The value of each resistance is
   1) 90 Ω 2) 54 Ω 3) 15 Ω 4) 45 Ω
8. Four conductors of same resistance connected to form a square. If the resistance between diagonally opposite corners is 8 ohm, the resistance between any two adjacent corners is
   1) 32 ohm 2) 8 ohm 3) 1/6 ohm 4) 6 ohm
9. A current of 3A flows in a circuit shown in the figure. The potential difference between A and B is



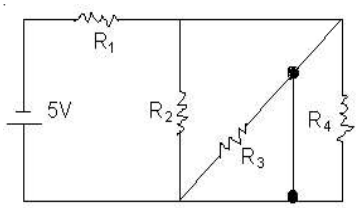
   1) 4V 2) 3V 3) 2V 4) 1V
10. In the circuit each resistance is equal to 12 ohm. The potential difference between A and E is



    1) 12V 2) 2V 3) 4V 4) 6V
11. When a current of 0.5A is passed through two resistors in series, the pd between the ends of the series arrangement is 12.5V. On connecting them in parallel and passing a current of 1.5A, the pd across them is 6V. The two resistances in ohms are
    1) 5, 20 2) 5,15 3) 5,10 4) 15,20
12. Three conductors draw respectively currents of 1A, 2A and 4A, when connected in turn across an ideal battery. If they are connected in series across the same battery, then the current drawn will be
    1) 2/7A 2) 3/7A 3) 4/7A 4) 5/7A
13. In the figure the current through 10Ω is



    1) 1A 2) 5A 3) 3A 4) 2A
14. The current through R_1 is
    (R_1=100Ω, $R_2 = R_3 = R_4$= 30Ω)



    1) 0.05A 2) 0.045A 3) 0.04A 4) 0.001 A
15. An electric current of 5 A is divided in three branches forming a parallel combination. The lengths of the wires in the three branches are in the

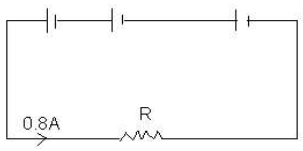
ratio 2 : 3 : 4. Their diameters are in the ratio 3 : 4 : 5. If the wires are of the same material then the current in shorter wire is

1) 1.4 A 2) 2.4 A 3) 0.4 A 4) 1.6 A

16. When a resistance of 2 ohm is placed across a battery the current is 1A and when the resistance across the terminals is 17 ohm, the current is 0.25A. the emf of the battery is

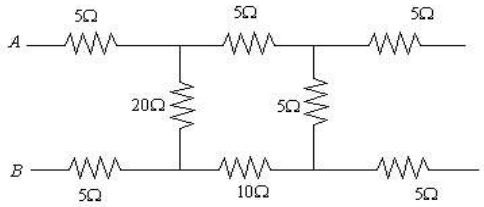
1) 4.5 V 2) 5 V 3) 3 V 4) 6 V

17. All the cells are identical. When one cell is reversed, the current decreased to 0.7 A. The total umber of cells is



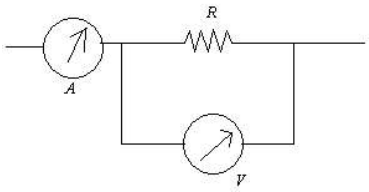
1) 12 2) 16 3) 20 4) 8

18. The resistance of the network between the terminals A and B is



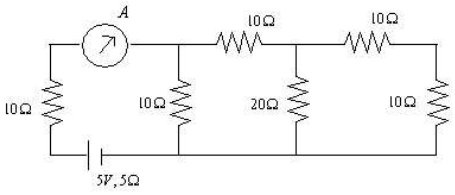
1) 30Ω 2) 20Ω 3) 50Ω 4) 60Ω

19. In the following diagram ammeter reading is 4A, voltmeter reading is 20V, the value of R is



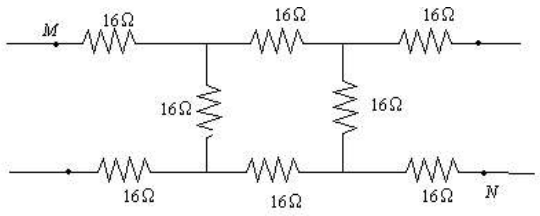
1) $> 5\Omega$ 2) $> 5\Omega$ 3) $= 5\Omega$ 4) None

20. In the circuit shown, the reading of the ammeter is



1) 1/2 A 2) 1/3 A 3) 1/4 A 4) 3/13A

21. The resistance between points M and N in the circuit is

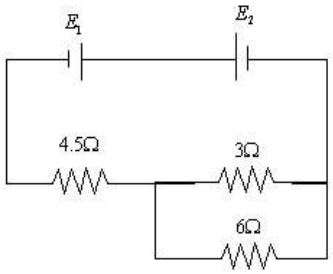


1) 24Ω 2) 48Ω 3) 64Ω 4) 4Ω

22. Two batteries of different emf and internal resistances connected in series with each other and with an external load resistor. The current is 3.0 A. When the polarity of one battery is reversed, the current becomes 1.0 A. The ratio of the emf of the two batteries is

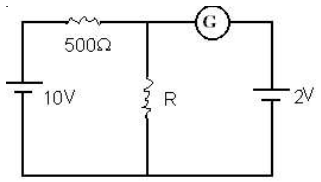
1) 2.5 : 1 2) 2 : 1 3) 3 : 2 4) 1 : 1

23. In the circuit given below, the cells E_1 and E_2 have e.m.fs 4V and 8V and internal resistance 0.5Ω and 1Ω respectively. The potential difference across E_1 and E_2 will be respectively



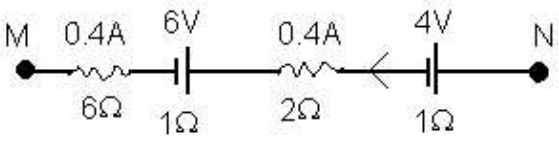
1) 4V and 8 V 2) 3.75V and 8.5V
3)4.25V and 7.5V 4) 4.25V and 8.5V

24. If the galvanometer G_0, reads zero, the value of R is



1) 25W 2) 75W 3) 100W 4) 125W

25. The pd between M and N is



1) 6 V 2) –10V 3) –6 V 4) 2V

26. A uniform resistance wire of 5 ohm is cut into two parts. 'P' and Q which are then connected in the gaps of a metre-bridge. If the balancing length is 70 cm, the difference between the resistances of P and Q is (in ohm)

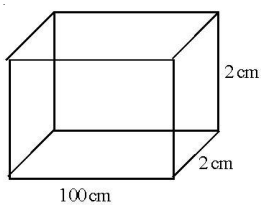
1) 1 2) 1.5 3) 2.5 4) 2

27. A wire of resistance 40Ω is bent into a square
a) resistance between opposite corners is 20Ω
b) resistance between adjucent corners is 7.5Ω
c) resistance between mid points of opposite sides is 10Ω
d) resistance between mid points of adjacent sides is 15Ω
1) a and d are correct 2) b and d are correct
3) b and c are correct 4) a and b are correct

28. Two resistances 10Ω and 15Ω are connected in series. A cell of e.m.f. 1.5V of negligible resistance is connected between their ends. Then
a) current flowing through 15Ω resistance is 60mA
b) P.d across 10Ω resistance 0.9V
c) P.d across 15Ω resistance is 0.9V
d) resultant resistance is 6Ω
1) a and c are true 2) b and d are true
3) a and d are true 4) b and c are true

29. In a potentiometer experiment, the balancing length of potentiometer of a cell of e.m.f 1.5V in the secondary is 440 cm. A resistance 5Ω is connected between the terminals of cell, the balancing length is 400 cm. then
a) internal resistance of the cell is 0.5Ω
b) terminal voltage of the cell is 15/11V
c) Potential gradient of the potentiometer wire is $\frac{1.5}{440}V/cm$
d) potential difference across the potoentiometer wire of length 10m is nearly 3.4V
1) a,b are correct
2) a, b and c are correct
3) a, b and d are correct
4) a, b, c and d are correct

30 Dimensions of a metal block The ratio of $100cm \times 2cm \times 2cm$ resistances between square faces and rectangular faces is
1) 1 : 1 2) 25 : 1 3) 2500 : 1 4) 50 : 1



KEY

1. 3	2. 3	3. 4	4. 1	5. 2
6. 3	7. 4	8. 4	9. 3	10. 4
11. 1	12. 3	13. 2	14. 1	15. 1
16. 2	17. 2	18. 2	19. 1	20. 4
21. 2	22. 2	23. 3	24. 4	25. 3
26. 4	27. 3	28. 1	29. 4	30. 3

HINTS

1. Initial current $= \frac{12}{12} = 1A$

Final current $= \frac{12}{8} = 1.5$ A

2. $R_1 + R_2 = 48$ ohm $\quad \frac{R_1}{R_2} = 3$

Solve for R_1 and R_2.

3. Resultant resistance in the first case $= \frac{40 \times 40}{80}$

Resultant resistance in the second case $= \frac{(20)(60)}{80}$

4. $\frac{R_1}{R_2} = \frac{m_1}{m_2}$

5. $R_1 + R_2 = 9$ ohm

$\frac{R_1 R_2}{R_1 + R_2} = 2$ ohm

6. $R = \frac{R_1 R_2}{R_1 + R_2}$

7. $\frac{(2R)(R)}{3R} = 30$ ohm

8. $\frac{(2R)(2R)}{4R} = 8$

Find R. Then $R_{eff} = \frac{(3R)(R)}{4R}$

9. $V_A - V_B$ = pd across 6 ohm - pd across 2 ohm.

10. Write the equivalent circuit.

11. $0.5 = \frac{12.5}{R_1 + R_2}$ $\quad 1.5 = \frac{6(R_1 + R_2)}{R_1 R_2}$

12. $R_1 = \frac{E}{1}; R_2 = \frac{E}{2}; R_3 = \frac{E}{4}$

$i = \frac{E}{R_1 + R_2 + R_3}$