PRE-MEDICAL

PHYSICS

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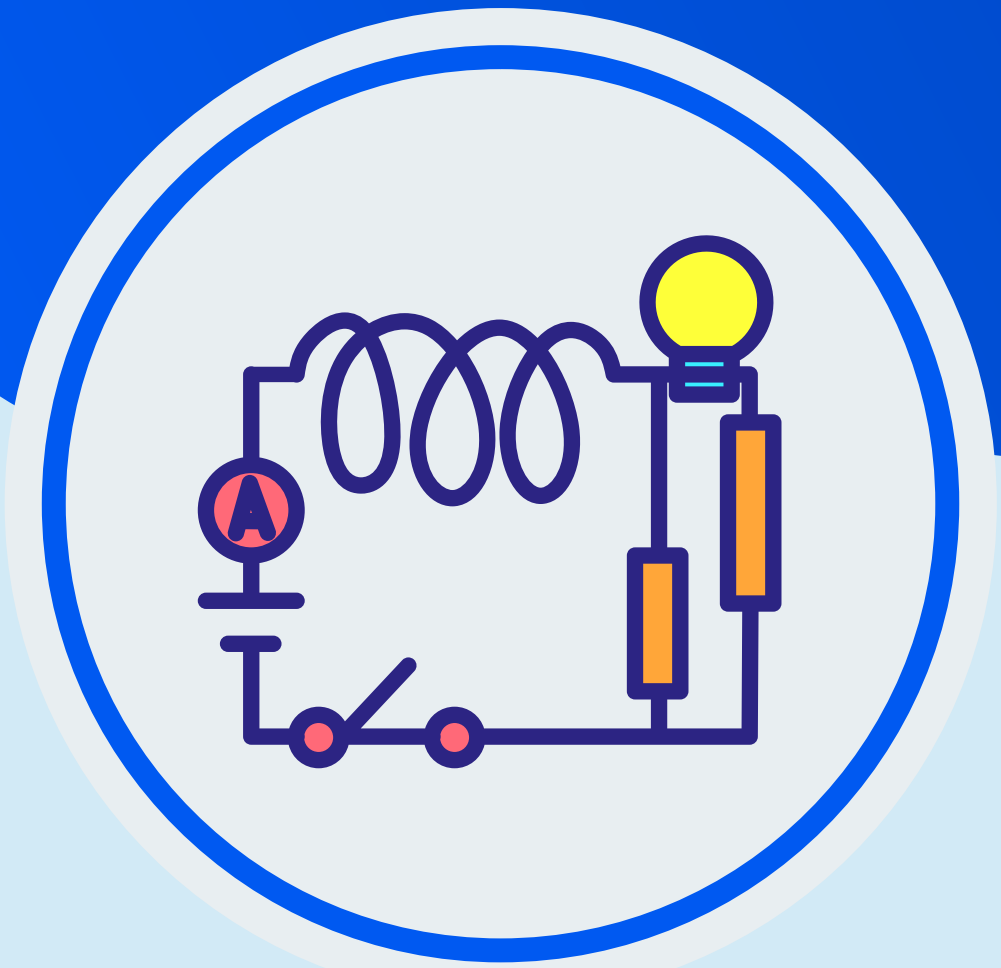


EXERCISE

Current Electricity

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) — Build Up Your Understanding

ELECTRIC CURRENT & DRIFT VELOCITY

1. If 10^6 electrons/s are flowing through an area of cross section of 10^{-4} m^2 then the current will be :–

(1) 1.6×10^{-7} A (2) 1.6×10^{-13} A

(3) 1×10^{-6} A (4) 1×10^{2} A

CE0001

2. The current in a conductor varies with time t as $I = 2t + 3t^2$ A where I is amperes and t in seconds. Electric charge flowing through a section of the conductor during t = 2 s to t = 3 s is :-

(1) 10 C (2) 24 C

(3) 33 C (4) 44 C

CE0002

3. 10,000 electrons are passing per minute through a tube of radius 1cm. The resulting current is :

(1) 10000 A (2) 0.25×10^{-16} A

(3) 10^{-9} A (4) 0.5×10^{-19} A

CE0003

4. There are 8.4×10^{22} free electrons per cm^3 in copper. The current in the wire is 0.21 A ($e = 1.6 \times 10^{-19}$ C). Then the drifts velocity of electrons in a copper wire of 1 mm^2 cross section, will be :–

(1) 2.12×10^{-5} m/s

(2) 0.78×10^{-5} m/s

(3) 1.56×10^{-5} m/s

(4) none of these

CE0004

5. There is a current of 40 amperes in a wire of 10^{-6} m^2 area of cross-section. If the number of free electrons per m^3 is 10^{29}, then the drift velocity will be

(1) 1.25×10^{3} m/s (2) 2.50×10^{-3} m/s

(3) 25.0×10^{-3} m/s (4) 250×10^{-3} m/s

CE0005

6. S.I. unit of current is :-

(1) C (2) A (3) A/s (4) N/s

CE0006

7. When no current flows through a conductor :-

(1) the free electrons do not move

(2) the average speed of a free electron over a large period of time is zero

(3) the average velocity of a free electron over a large period of time is zero

(4) the average of square of velocities of all the free electrons at an instant is zero

CE0007

8. The number of free electrons per 10 mm of an ordinary copper wire is about 2×10^{21}. The average drift speed of the electrons is 0.25 mm/s The current flowing is :-

(1) 0.8 A (2) 8 A (3) 80 A (4) 5 A

CE0009

9. In a Neon discharge tube 2.9×10^{18} Ne^+ ions move to the right each second, while 1.2×10^{18} electrons move to the left per second; electron charge is 1.6×10^{-19} C. The current in the discharge tube is :-

(1) 1 A towards right

(2) 0.66 A towards right

(3) 0.66 A towards left

(4) zero

CE0010

10. Two wires each of radius of cross section r but of different materials are connected together end to end (in series). If the densities of charge carriers in the two wires are in the ratio 1:4, the drift velocity of electrons in the two wires will be in the ratio :

(1) 1 : 2 (2) 2 : 1

(3) 4 : 1 (4) 1 : 4

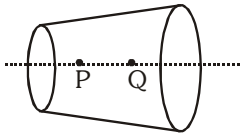
CE0011

11. A current I flows through a uniform wire of diameter d when the electron drift velocity is v. The same current will flow through a wire of diameter d/2 made of the same material if the drift velocity of the electrons is

(1) v/4 (2) v/2 (3) 2v (4) 4v

CE0012

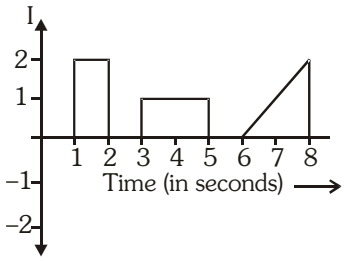
12. A wire has a non–uniform cross–section as shown in figure. A steady current flows through it. The drift speed of electrons at points P and Q is v_P and v_Q, then :-



(1) $v_P = v_Q$ (2) $v_P < v_Q$
(3) $v_P > v_Q$ (4) data is insufficient

CE0013

13. The plot represents the flow of current through a wire for different time intervals. The ratio of charges flowing through the wire corresponding to these time intervals is (see figure) :-



(1) 2 : 1 : 2 (2) 1 : 3 : 3
(3) 1 : 1 : 1 (4) 2 : 3 : 4

CE0014

OHM'S LAW & ELECTRICAL RESISTANCE

14. Three copper wires are there with lengths and cross-sectional areas as (ℓ, A); $\left(2\ell, \frac{A}{2}\right)$ and $\left(\frac{\ell}{2}, 2A\right)$. Resistance :-

(1) minimum for the wire of cross-sectional are $\frac{A}{2}$
(2) minimum for the wire of cross-sectional are A
(3) minimum for the wire of cross-sectional area 2A
(4) same for all the three cases.

CE0015

15. A wire of uniform cross-section A, length ℓ and resistance R is bent into a complete circle; the resistance between any two of diametrically opposite points will be :–

(1) $\frac{R}{2}$ (2) $\frac{R}{4}$ (3) $\frac{R}{8}$ (4) 4R

CE0016

16. The electric resistance of a certain wire of iron is R. If its length and radius both are doubled, then :–

(1) the resistance will be halved and the specific resistance will remain unchanged
(2) the resistance will be halved and the specific resistance will be doubled
(3) the resistance and the specific resistance, will both remain unchanged
(4) the resistance will be doubled and the specific resistance will be halved.

CE0017

17. When a piece of aluminium wire of finite length is drawn to reduce its diameter to half its original value, its resistance will become :-

(1) two times
(2) four times
(3) eight times
(4) sixteen times

CE0018

18. As the temperature of a metallic resistor is increased, the product of resistivity and conductivity :-

(1) increases
(2) decreases
(3) may increase or decrease
(4) remains constant.

CE0019

19. If a wire is stretched, so that its length is 20% more than its initial length, the percentage increase in the resistance of the wire is :-

(1) 40% (2) 10%
(3) 44% (4) 25%

CE0020

20. The length of a given cylindrical wire is increased by 100%. Due to the consequent decrease in diameter the change in the resistance of the wire will be :–

(1) 300% (2) 200%
(3) 100% (4) 50%

CE0021

21. On increasing the temperature, the specific resistance of a conductor and a semiconductor-

(1) both increase

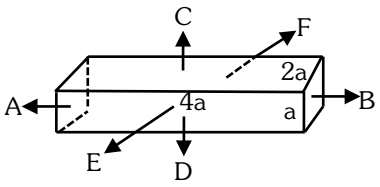
(2) both decrease

(3) increases and decreases respectively

(4) decreases and increases respectively

CE0022

22. A conductor with rectangular cross section has dimensions (a × 2a × 4a) as shown in figure. Resistance across AB is x, across CD is y and across EF is z. Then



(1) x = y = z (2) x > y > z

(3) y > x > z (4) x > z > y

CE0023

23. Specific resistance of a conductor increases with:–

(1) increase in temperature.

(2) increase in cross–sectional area

(3) increase in cross–sectional area and decrease in length.

(4) decrease in cross–sectional area.

CE0024

24. The temperature coefficient of resistance of a wire is 0.00125 per degree celcius. At 300 K its resistance is 1 ohm. The resistance of the wire will be 2 ohms at a temperature :–

(1) 1154 K (2) 1127 K

(3) 600 K (4) 1400 K

CE0025

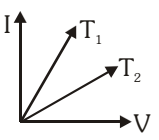
25. The current voltage graph for a given metallic conductor at two different temperatures T_1 and T_2 are as shown in the figure. Then :–

(1) $T_1 > T_2$

(2) $T_1 = T_2$

(3) nothing can be said about T_1 and T_2

(4) $T_1 < T_2$



CE0026

26. The effective resistance is $\frac{6}{5}\ \Omega$, when two wires are joined in parallel. When one of the wire breaks, the effective resistance is 2 ohms. The resistance of the broken wire was :–

(1) $\frac{3}{5}\ \Omega$ (2) $2\ \Omega$ (3) $\frac{6}{5}\ \Omega$ (4) $3\ \Omega$

CE0027

27. At what temperature will the resistance of a copper wire become three times its value at 0° C? [Temperature coefficient of resistance for copper = 4×10^{-3} per ℃] :–

(1) 400°C (2) 450° C

(3) 500° C (4) 600° C

CE0028

28. Copper and silicon are cooled from 300 K to 60 K; the specific resistance :–

(1) decreases in copper but increases in silicon

(2) increases in copper but decreases in silicon

(3) increases in both

(4) decreases in both

CE0029

29. Two resistances R_1 and R_2 are made of different materials. The temperature coefficient of the material of R_1 is α and that of the material of R_2 is $-\beta$. The resistance of the series combination of R_1 and R_2 does not change with temperature, then the ratio of resistances of the two wires at 0℃ will be :

(1) $\frac{\alpha}{\beta}$ (2) $\frac{\alpha+\beta}{\alpha-\beta}$

(3) $\frac{\alpha^2+\beta^2}{\alpha\beta}$ (4) $\frac{\beta}{\alpha}$

CE0030

COMBINATION OF RESISTANCES & KIRCHHOFF'S LAW

30. A metal wire of resistance R is cut into three equal pieces which are then connected side by side to form a new wire, the length of which is equal to one third of the original length. The resistance of this new wire is :-

(1) R (2) 3R (3) $\frac{R}{9}$ (4) $\frac{R}{3}$

CE0031

31. Three resistances of values 2 Ω, 3 Ω and 6 Ω are to be connected to yield an effective resistance of 4 Ω. This can be done by connecting :

(1) 3 Ω resistance in series with a parallel combination of 2 Ω and 6 Ω

(2) 6 Ω resistance in series with a parallel combination of 2 Ω and 3 Ω

(3) 2 Ω resistance in series with a parallel combination of 3 Ω and 6 Ω

(4) 2 Ω resistance in parallel with a parallel combination of 3 Ω and 6 Ω

CE0032

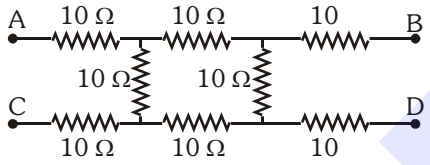
32. What will be the equivalent resistance between the points A and D ?

(1) 10 Ω

(2) 20 Ω

(3) 30 Ω

(4) 40 Ω



CE0033

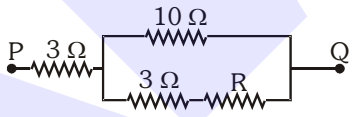
33. In the circuit shown here, what is the value of the unknown resistance R so that the total resistance of the circuit between points 'P' and 'Q' is also equal to R :–

(1) 3 Ω

(2) $\sqrt{39}\,\Omega$

(3) $\sqrt{69}\,\Omega$

(4) 10 Ω



CE0034

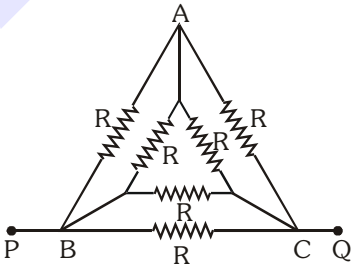
34. The resistance across P and Q in the given figure is

(1) $\frac{R}{3}$

(2) $\frac{R}{2}$

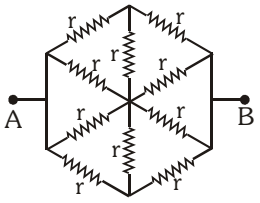
(3) 2R

(4) 6R



CE0035

35. The resistance of the circuit between A and B is :



(1) r (2) 0.5r (3) 2r (4) 3r

CE0036

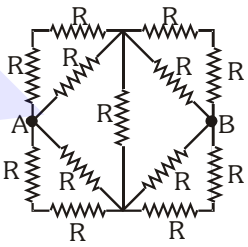
36. Thirteen resistances each of resistance R Ω are connected in the circuit as shown in the figure. The effective resistance between A and B is :-

(1) $\frac{4R}{3}\Omega$

(2) 2RΩ

(3) R Ω

(4) $\frac{2R}{3}\Omega$



CE0037

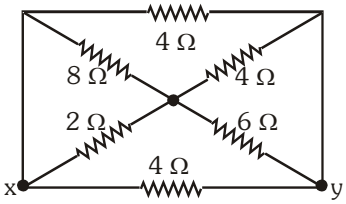
37. The total resistance between x and y in ohms is:-

(1) 1 Ω

(2) 4 Ω

(3) $\frac{4}{3}$ Ω

(4) $\frac{2}{3}$ Ω



CE0038

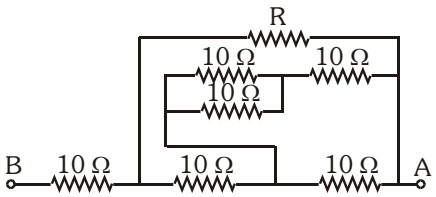
38. The resultant resistance of n wires each of resistance r ohms is R, when they are connected in parallel. When these n resistances are connected in series, the resultant resistance will be :-

(1) $\frac{R}{n}$ (2) $\frac{R}{n^2}$

(3) nR (4) n^2R

CE0039

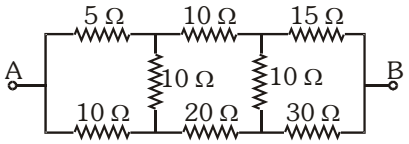
39. For the network of resistance shown in the fig. the equivalent resistance of the network between the points A and B is 18 Ω. The value of unknown resistance R is :-



(1) 8 Ω (2) 10 Ω (3) 16 Ω (4) 24 Ω

CE0040

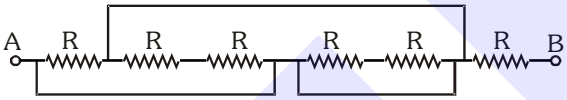
40. In the arrangment of resistances shown below, the effective resistance between points A and B is



(1) 20 Ω (2) 30 Ω (3) 90 Ω (4) 110 Ω

CE0041

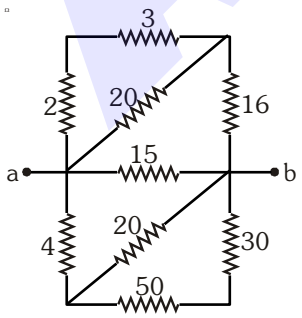
41. In the circuit shown the equivalent resistance between A and B is



(1) R (2) 2R/5 (3) R/3 (4) 2R

CE0042

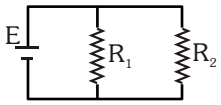
42. In the figure the numerical values denote resistances in SI units. The total resistance of the circuit between a & b will be:



(1) 12 ohms (2) 24 ohms.
(3) 15 ohms (4) 6 ohms

CE0043

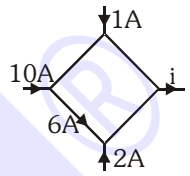
43. Resistors R_1 and R_2 have an equivalent resistance of 6 ohms when connected in the circuit shown below. The resistance of R_1 could be (in Ω) :-



(1) 1 (2) 5 (3) 8 (4) 4

CE0044

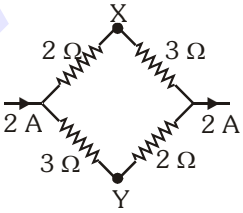
44. Value of current i in the following circuit is :-



(1) 13 A (2) 12 A
(3) 9 A (4) none of the above

CE0045

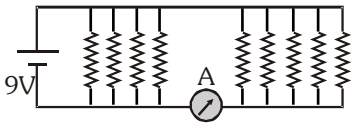
45. The potential difference between X and Y in volts is :-



(1) 1 (2) –1 (3) 2 (4) –2

CE0046

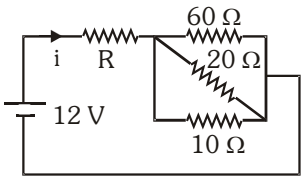
46. If each resistance in the fig. is of 9 Ω then reading of the ammeter is :–



(1) 5 A (2) 8 A (3) 2 A (4) 9 A

CE0047

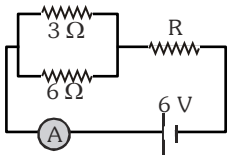
47. If i = 0.25 A in figure, then value of R is :–



(1) 48 Ω (2) 12 Ω (3) 120 Ω (4) 42 Ω

CE0048

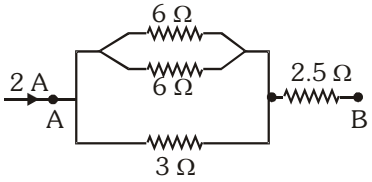
48. If the ammeter in the given circuit reads 2 A, the resistance R is :–



(1) 1 ohms (2) 2 ohms
(3) 3 ohms (4) 4 ohms

CE0049

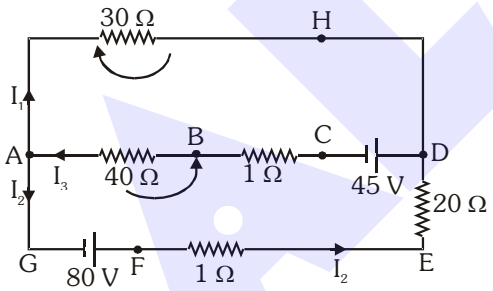
49. The equilvalent resistance and potential difference between A and B for the circuit are respectively :–



(1) 4 Ω, 8 V (2) 8 Ω, 4 V
(3) 2 Ω, 2 V (4) 16 Ω, 8 V

CE0050

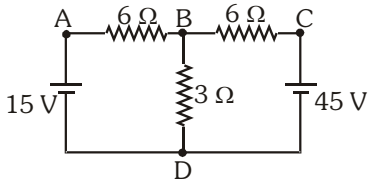
50. For the current loops shown in the figure, Kirchhoff's loop rule for the loops AHDCBA and AHDEFGA yields these equations respectively :-



(1) $-30\ I_1 - 41\ I_3 + 45 = 0$ and $-30\ I_1 + 21\ I_2 - 80 = 0$
(2) $30\ I_1 - 41\ I_3 + 45 = 0$ and $30\ I_1 - 21\ I_2 - 80 = 0$
(3) $30\ I_1 + 41\ I_3 - 45 = 0$ and $-30\ I_1 + 21\ I_2 + 80 = 0$
(4) $-30\ I_1 - 41\ I_3 - 45 = 0$ and $-30\ I_1 + 21\ I_2 - 80 = 0$

CE0051

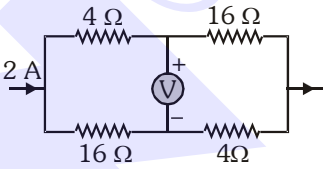
51. In the circuit shown in figure, find the current through the branch BD.



(1) 1 A (2) 5 A
(3) 3 A (4) 7 A

CE0052

52. In the circuit shown below, the reading of the voltmeter V is :-

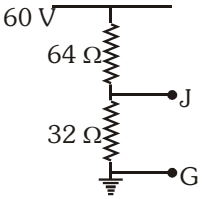


(1) 12 V (2) 8 V (3) 20 V (4) 16 V

CE0053

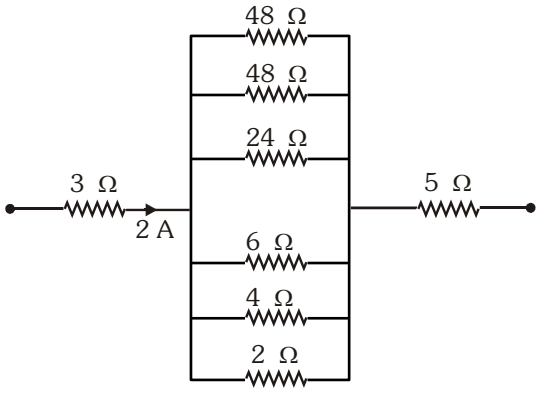
53. Find the potential of J with respect of G :-

(1) 40 V
(2) 60 V
(3) 20 V
(4) 30 V



CE0054

54. Find the potential difference across the 24 Ω :-



(1) 48 volts (2) 2 volts
(3) 4 volts (4) 1 volts

CE0055

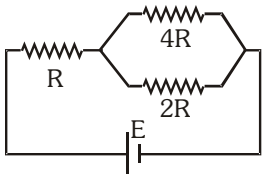
55. In a network as shown in the figure the potential difference across the resistance 2R is (the cell has an emf E with no internal resistance) :

(1) 2E

(2) $\frac{4E}{7}$

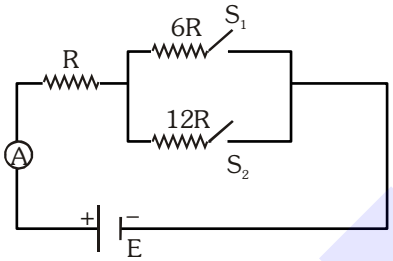
(3) $\frac{E}{7}$

(4) E



CE0056

56. The reading of ammeter is I_1 when only S_1 is closed and I_2 when only S_2 is closed. The reading is I_3 when both S_1 & S_2 are closed simultaneously then :-

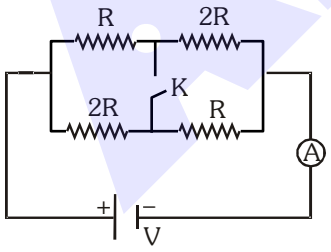


(1) $I_1 > I_2 > I_3$ (2) $I_2 > I_3 > I_1$

(3) $I_3 > I_2 > I_1$ (4) $I_3 > I_1 > I_2$

CE0057

57. How will the reading of ammeter change if the key k is closed ?



(1) Increase

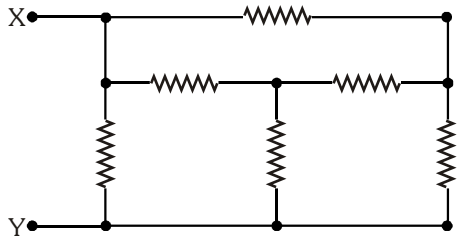
(2) Decrease

(3) Remains same

(4) Information insufficient

CE0058

58. Six resistors each of 10 Ω are connected as shown. The equivalent resistance between points X and Y is :



(1) 20 Ω (2) 5 Ω (3) 25/3 Ω (4) 10 Ω

CE0059

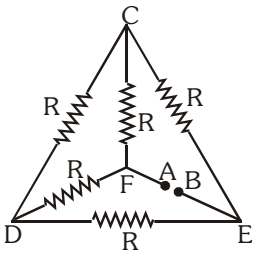
59. Five equal resistances each of resistance R are connected as shown in the Figure. A battery of voltage V is connected between A and B.The current flowing in AFCEB will be

(1) $\frac{V}{R}$

(2) $\frac{V}{2R}$

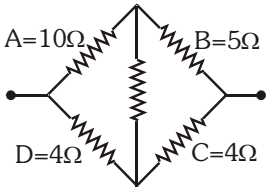
(3) $\frac{2V}{R}$

(4) $\frac{3V}{R}$



CE0060

60. In a typical Wheatstone bridge the resistance in cyclic order are A = 10 Ω, B = 5 Ω, C = 4Ω and D = 4 Ω. For the bridge to be balanced :



(a) 10 Ω should be connected in parallel with A

(b) 10 Ω should be connected in series with A

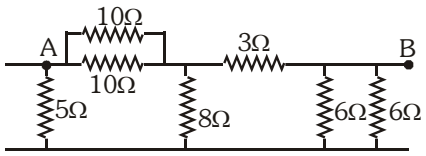
(c) 5 Ω should be connected in series with B

(d) 5 Ω should be connected in parallel with B

(1) a, b (2) b, c (3) a, c (4) all

CE0061

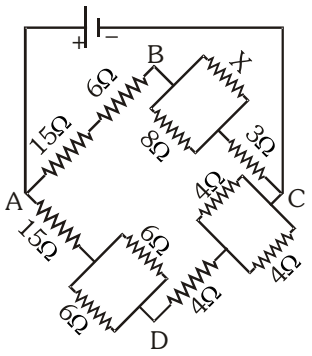
61. Seven resistances are connected as shown in the figure. The equivalent resistance between A and B is :–



(1) 3 Ω (2) 4 Ω (3) 4.5 Ω (4) 5 Ω

CE0062

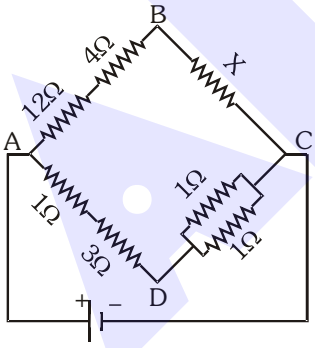
62. In the following circuit diagram the value of resistance X for the potential difference between B and D to be zero is :-



(1) 4 ohms (2) 6 ohms
(3) 8 ohms (4) 9 ohms

CE0063

63. In the arrangement of resistances shown in the circuit, the potential difference between points B and D will be zero, when the unknown resistance X is :-



(1) 4 Ω (2) 3 Ω (3) 2 Ω (4) 1 Ω

CE0064

64. The resistance of each arm of a Wheat stone bridge is 10 Ω. A resistance of 10 Ω is connected in series with the galvanometer then the equivalent resistance across the battery will be :–

(1) 10 Ω (2) 15 Ω (3) 20 Ω (4) 40 Ω

CE0065

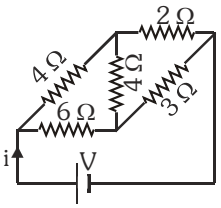
65. For the network shown in the figure the value of the current i is :–

(1) $\frac{18V}{5}$

(2) $\frac{5V}{9}$

(3) $\frac{9V}{35}$

(4) $\frac{5V}{18}$



CE0066

CELLS & COMBINATION OF CELLS, ELECTRIC POWER & ENERGY

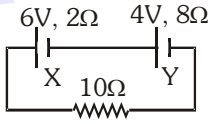
66. Two cells X and Y are connected to a resistance of 10 Ω as shown in the figure. The terminal voltage of cell Y is :-

(1) zero

(2) 2 V

(3) 4 V

(4) 10 V



CE0067

67. A battery has e.m.f. 4 V and internal resistance 'r'. When this battery is connected to an external resistance of 2 ohms, a current of 1 A flows in the circuit. What current will flow if the terminals of the battery are connected directly ?

(1) 1 A (2) 2 A
(3) 4 A (4) infinite

CE0068

68. Internal resistance of primary cell depends on :-

(1) the nature of electrolyte
(2) the area of plates immeresed in the electrolyte
(3) the concentration of electrolyte and distance between the plates
(4) all the above

CE0069

69. The potential difference between the terminals of a cell is found to be 3 volts when it is connected to a resistance of value equal to its internal resistance. The e.m.f. of the cell is :-

(1) 3 V (2) 6 V (3) 1.5 V (4) 4.5 V

CE0070

70. A current of 2 A is flowing through a cell of e.m.f. 5 V and internal resistance 0.5 Ω from negative to positive electrode. If the potential of negative electrode is 10 V, the potential of positive electrode will be :-

(1) 5 V (2) 14 V (3) 15 V (4) 16 V

CE0071

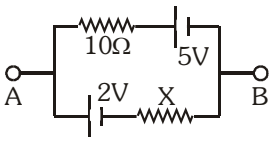
71. In the following circuit if $V_A - V_B = 4$ V, then the value of resistance X in ohms will be :-

(1) 5

(2) 10

(3) 15

(4) 20



CE0072

72. Electromotive force of a cell is basically a

(1) force (2) power

(3) work (4) current capacity

CE0073

73. The terminal voltage is $\frac{E}{2}$ when a current of 2 A is flowing through 2 Ω resistance; the internal resistance of the cell is :–

(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

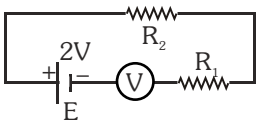
CE0074

74. When a resistance of 2 ohms is connected across the terminals of a cell, the current is 0.5 A. When the resistance is increased to 5 ohms, the current becomes 0.25 A. The e.m.f. of the cell is:-

(1) 1.0 V (2) 1.5 V (3) 2.0 V (4) 2.5 V

CE0075

75. A cell of e.m.f. 2 V and negligible internal resistance is connected to resistors R_1 and R_2 as shown in the figure. The resistance of the voltmeter, R_1 and R_2 are 80 Ω, 40 Ω and 80 Ω respectively. The reading of the voltmeter is :



(1) 1.78 V (2) 1.60 V

(3) 0.80 V (4) 1.33 V

CE0076

76. A cell supplies a current of 0.9 A through a 2 Ω resistor and a current of 0.3 A through a 7 Ω resistor. The internal resistance of the cell is :-

(1) 1.0 Ω (2) 0.5 Ω

(3) 2.0 Ω (4) 1.2 Ω

CE0077

77. A 10 V battery with internal resistance 0.5 Ω is connected across a variable resistance R. The value of R for which the power delivered to it is maximum, is equal to :-

(1) 0.5 Ω (2) 1 Ω (3) 1.5 Ω (4) 2 Ω

CE0078

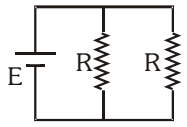
78. An electric bulb is designed to draw a power P_0 at voltage V_0. If the voltage is V, it draws a power P, then –

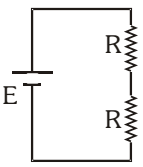
(1) $P = \left(\frac{V}{V_0}\right)P_0$ (2) $P = \left(\frac{V_0}{V}\right)P_0$

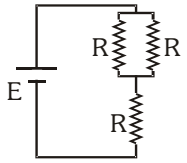
(3) $P = \left(\frac{V_0}{V}\right)^2 P_0$ (4) $P = \left(\frac{V}{V_0}\right)^2 P_0$

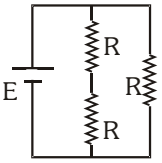
CE0079

79. Consider the four circuits shown in the figure below. In which circuit power dissipated maximum (Neglect the internal resistance of the power supply)

(1)


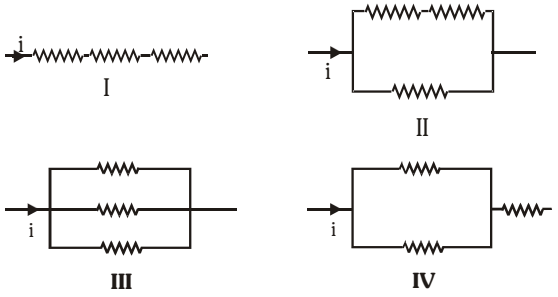
(2)


(3)


(4)


CE0080

80. Three resistances of equal value are arranged in different combinations as shown below. Arrange them in the increasing order of power dissipation:



(1) III < II < IV < I (2) II < III < IV < I

(3) I < IV < III < II (4) I < III < II < IV

CE0081

81. 25 W, 200 V and 100 W, 200 V bulbs are connected in series to a source of 400 volts. Which bulb will fuse ?

(1) 25 W

(2) 100 W

(3) Both will fuse at the same time

(4) None of the bulbs will fuse

CE0082

82. You are provided with 48 cells, each of emf 2 volts and internal resistance 4 ohms. What maximum current can flow in the circuit having an external resistance of 12 Ω ?

(1) 1 A (2) 1.2 A

(3) 0.96 A (4) 1.08 A

CE0083

83. two electric bulbs of the same power, but with different marked voltages are connected in series across a power line. Their brightness will be :-

(1) directly proportional to their marked voltages

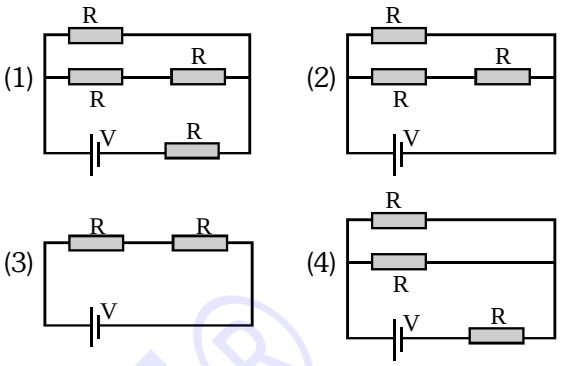
(2) inversely proportional to their marked voltages

(3) directly proportional to the squares of their marked voltages

(4) inversely proportional to the squares of their marked voltages

CE0084

84. Four circuits are shown below. All the batteries have the same voltage V and all resistors have the same resistance R. In which circuit does the battery delivers the most power?



CE0085

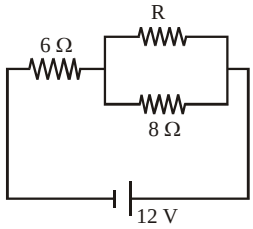
85. Two cells, each of e.m.f. E and internal resistance r, are connected in parallel across a resistor R. The power dissipated in the resistor is maximum if :

(1) R = r (2) R = 2r

(3) $R = \frac{3r}{2}$ (4) $R = \frac{r}{2}$

CE0087

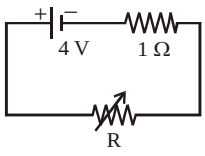
86. In the circuit shown in figure, the power which is dissipated as heat in the 6 Ω resistor is 6 W. What is the value of resistance R in the circuit ?



(1) 6 Ω (2) 10 Ω (3) 13 Ω (4) 24 Ω

CE0088

87. For different values of resistance, R power consumptions in R are given. Then which of the following values are not possible ?



(a) 2 W (b) 5 W (c) 8 W (d) 4 W

(1) Only c (2) b & c (3) a,b,c (4) All

CE0090

MEASURING DEVICES

88. An ammeter and a voltmeter are joined in series to a cell. Their readings are A and V respectively. If a resistance is now joined in parallel with the voltmeter

(1) both A and V will decrease

(2) both A and V will increase

(3) A will increase, V will decrease

(4) A will decrease, V will increase

CE0091

89. A galvanometer of 100 Ω resistance yields complete deflection when 10 mA current flows. What should be the value of shunt so that it can measure currents upto 100 mA ?

(1) 11.11 Ω (2) 9.9 Ω

(3) 1.1 Ω (4) 4.4 Ω

CE0092

90. In order to change the range of a galvanometer of G Ω resistance from V volts to nV volts what will be the value of resistance in Ω connected in series with it :–

(1) (n–1)G (2) $\frac{G}{n}$

(3) nG (4) $\frac{G}{n-1}$

CE0093

91. Resistance in the two gaps of a meter bridge are 10 ohms and 30 ohms respectively. If the resistances are interchanged, the balance point shifts by :–

(1) 33.3 cm (2) 66.67 cm

(3) 25 cm (4) 50 cm

CE0094

92. A galvanometer acting as a voltmeter will have :

(1) a high resistance in series with its coil

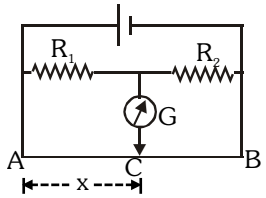
(2) a low resistance in parallel with its coil

(3) a low resistance in series with its coil

(4) a high resistance in parallel with its coil

CE0095

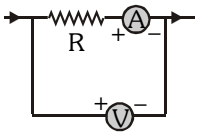
93. In the shown arrangement of the experiment of a meter bridge if AC, corresponding to null deflection of galvanometer, is x then what would be its value if the radius of the wire AB is doubled:-



(1) x (2) $\frac{x}{4}$ (3) 4x (4) 2x

CE0096

94. In the following circuit, the resistance of the voltmeter is 10,000 Ω and that of the ammeter is 20 Ω . If the reading of the ammeter is 0.1 A and that of the voltmeter is 12 V, then the value of R is :-



(1) 122 Ω

(2) 100 Ω

(3) 118 Ω

(4) 116 Ω

CE0097

95. The resistance of a galvanometer is G ohms and the range is 1 volt. The value of resistance (in Ω) used to convert it into a voltmeter of range 10 volts is :-

(1) 9 G (2) G (3) $\frac{1}{9}$ G (4) 10 G

CE0098

96. A galvanometer has 36 Ω resistance. If a 4 Ω shunt is added to this, the fraction of current that passes through the galvanometer is :-

(1) $\frac{1}{4}$ (2) $\frac{1}{9}$ (3) $\frac{1}{10}$ (4) $\frac{1}{40}$

CE0099

97. A galvanometer of resistance 100 Ω gives full deflection for a current of 10^{-5} A. The value of shunt required to convert it into an ammeter of range 1 ampere, is :-

(1) 1 Ω (2) 10^{-3} Ω

(3) 10^{-5} Ω (4) 100 Ω

CE0100

98. There are three voltmeters of the same range but of resistances 10000 Ω, 8000 Ω and 4000 Ω respectively. The best voltmeter among these is the one whose resistance is :–

(1) 10000 Ω (2) 8000 Ω

(3) 4000 Ω (4) all are equally good

CE0101

99. 20% of the main current passes through the galvanometer. If the resistance of the galvanometer is G, then the resistance of the shunt will be :-

(1) $\frac{G}{50}$ (2) $\frac{G}{4}$ (3) 50G (4) 9G

CE0102

100. An unknown resistance R_1 is connected in series with a resistance of 10 Ω. This combination is connected to one gap of a metre bridge while a resistance R_2 is connected in the other gap. The balance point is at 50 cm. Now, when the 10 Ω resistance is removed the balance point shifts to 40 cm. The value of R_1 is (in ohms) :-

(1) 20 (2) 10 (3) 60 (4) 40

CE0104

101. A 1 Ω voltmeter has a range of 1V. Find the additional resistance which has to be joined with the series in voltmeter to increase the range of voltmeter to 100 V :-

(1) 10 Ω (2) $\frac{1}{99}$ Ω

(3) 99 Ω (4) 100 Ω

CE0105

102. A galvanometer having a resistance G and current i_a flowing in it, produces full scale deflection. If S_1 is the value of shunt which converts it into an ammeter of range 0 – i and S_2 is the value of the shunt for the range 0 – 2i. Then the ratio $\frac{S_1}{S_2}$ will be :-

(1) 1 (2) 2

(3) $\frac{1}{2}\left(\frac{i-i_a}{2i-i_a}\right)$ (4) $\left(\frac{2i-i_a}{i-i_a}\right)$

CE0106

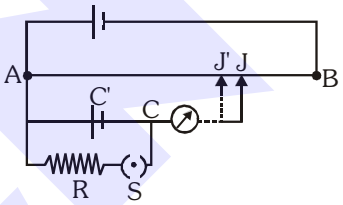
POTENTIOMETER

103. It is observed in a potentiometer experiment that no current passes through the galvanometer, when the terminals of a cell are connected across a certain length of the potentiometer wire. On shunting the cell by a 2 Ω resistance, the balancing length is reduced to half. The internal resistance of the cell is :-

(1) 4 Ω (2) 2 Ω (3) 9 Ω (4) 18 Ω

CE0108

104. In the potentiometer circuit shown in the figure, the balancing length AJ = 60 cm when switch S is open. When switch S is closed and the value of R = 5 Ω, the balancing length AJ' = 50 cm . The internal resistance of the cell C' is :-



(1) 1.2 Ω (2) 1.0 Ω (3) 0.8 Ω (4) 0.6 Ω

CE0109

105. In a potentiometer experiment when terminals of the cell are connected at distance of 52 cm on the wire, then no current flows through it. When 5 Ω shunt resistance is connected across the cell the balancing length is 40 cm. The internal resistance of the cell (in Ω) is :-

(1) 5 (2) $\frac{200}{52}$ (3) $\frac{52}{8}$ (4) 1·5

CE0110

106. A potentiometer wire has a resistance 40 Ω and its length is 10 m. It is connected to a resistance of 760 Ω in series. If emf of battery is 2 V then potential gradient is :–

(1) $0{\cdot}5 \times 10^{-6}$ V/m (2) 1×10^{-6} V/m

(3) 1×10^{-2} V/m (4) 2×10^{-6} V/m

CE0111

107. A 6 volts battery is connected to the terminals of a three metres long wire of uniform thickness and 100 ohm resistance. The potential difference between two points on the wire separated by a distance of 50 cm will be :–

(1) 3 volts (2) 1 volt (3) 1.5 volts (4) 2 volts

CE0112

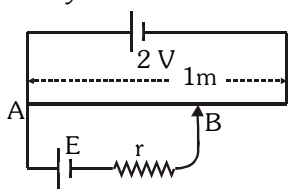
108. Potentiometer is used for measuring :
(1) potential difference (2) current
(3) internal resistance (4) All of these

CE0113

109. Length of a potentiometer wire is kept long and uniform to achive :–
(1) uniform and more potential gradient
(2) non-uniform and more potential gradient
(3) uniform and less potential gradient
(4) non-uniform and less potential gradient

CE0114

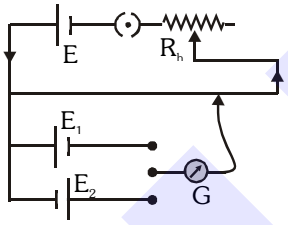
110. In figure battery E is balanced over a 55 cm length of potentiometer wire but when a resistance of 10 Ω is connected in parallel with the battery then it balances over a 50 cm length of the potentiometer wire then internal resistance r of the battery is :-



(1) 1 Ω (2) 3 Ω (3) 10 Ω (4) 5 Ω

CE0115

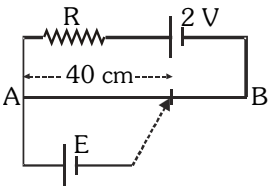
111. The following diagram shows the circuit for the comparison of e.m.f. of two cells. The circuit can be corrected by :-



(1) reversing the terminals of E
(2) reversing the terminals of E_1
(3) reversing the terminals of E_2
(4) reversing the current in R_h.

CE0116

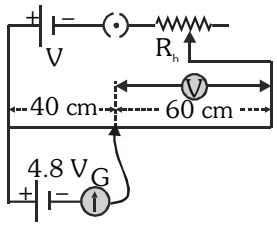
112. AB is a potentiometer wire of length 100 cm and resistance 10 ohms. It is connected in series with a resistance R = 40 ohms and a battery of e.m.f. 2 V and negligible internal resistance. If a source of unknown e.m.f. E is balanced by 40 cm length of the potentiometer wire, the value of E is :-



(1) 0.8 V (2) 1.6 V
(3) 0.08 V (4) 0.16 V

CE0117

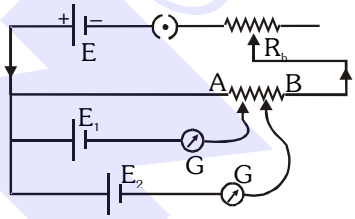
113. In the following circuit, the reading of the voltmeter will be :- (in volts)



(1) 7.2 (2) 4.8
(3) 6 (4) 4

CE0118

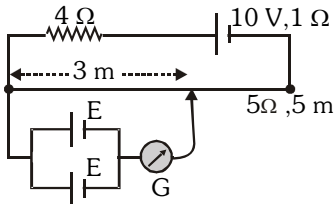
114. In the following diagram, the deflection in the galvanometer in a potentiometer circuit is zero, then :-



(1) $E_1 > E_2$ (2) $E_2 > E_1$
(3) $E_1 = E_2$ (4) $E_1 + E_2 = E$

CE0119

115. A resistance of 4 Ω and a wire of length 5 m and resistance 5 Ω are joined in series and connected to a cell of e.m.f. 10 V and internal resistance 1 Ω. A Parallel combination of two identical cells is balanced across 300 cm length of the wire. The e.m.f. E of each cell is :



(1) 1.5 V (2) 3.0 V
(3) 0.67 V (4) 1.33 V

CE0120

116. The emf of a standard cell is balanced over a 150 cm length of a potentiometer wire. When this cell is shunted by a 2 Ω resistance, the null point is obtained at 100 cm. The value of internal resistance of the cell is :-
(1) 0.1 ohms (2) 1 ohms
(3) 2 ohms (4) 0.5 ohms

CE0121

117. The sensitivity of a potentiometer is increased by
(1) increasing the emf of the cell.
(2) increasing the length of the potentiometer wire
(3) decreasing the length of the potentiometer wire
(4) none of the above.

CE0122

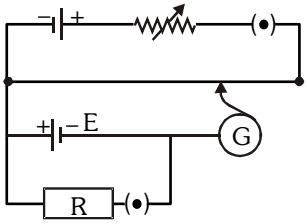
118. A potential gradient is established in the wire by a standard cell for the comparison of emf's of two cells in a potentiometer experiment. Which possibility of the following will lead to the failure of the experiment ?
(1) the emf of the standard cell is higher than that of the other cells.
(2) the diameter of the wire is equal along its length
(3) the number of wires is ten.
(4) the emf of the standard cell is less than that of either cells

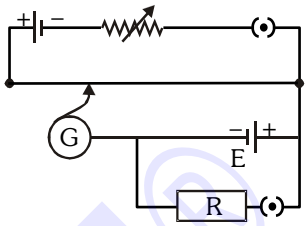
CE0123

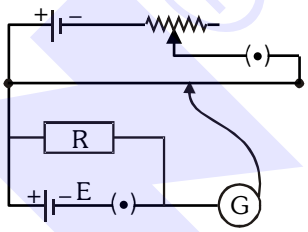
119. Potentiometer wire length is 10 m, having a total resistance of 10 Ω. If a battery of emf 2 volts (of negligible internal resistance) and a rheostat are connected to it then the potential gradient is 20 mV/m; find the resistance imparted through the rheostat :-
(1) 90 Ω (2) 990 Ω
(3) 40 Ω (4) 190 Ω

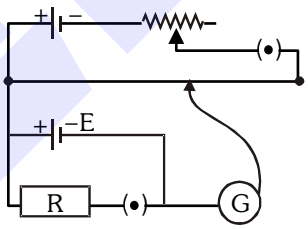
CE0124

120. The correct circuit for the determination of internal resistance of a battery by using potentiometer is :

(1)


(2)


(3)


(4)


CE0125

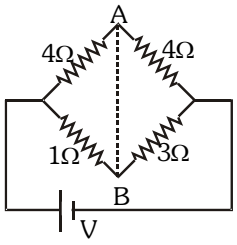
EXERCISE-I (Conceptual Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**2**	**2**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**4**	**3**	**3**	**3**	**2**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**4**	**4**	**3**	**1**	**3**	**4**	**1**	**2**	**4**	**4**	**3**	**1**	**4**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**3**	**3**	**3**	**1**	**2**	**4**	**3**	**4**	**3**	**1**	**1**	**4**	**3**	**1**	**1**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**1**	**4**	**1**	**1**	**4**	**2**	**1**	**3**	**2**	**2**	**4**	**1**	**2**	**2**	**3**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**2**	**3**	**3**	**1**	**4**	**1**	**2**	**4**	**2**	**2**	**4**	**3**	**2**	**2**	**3**
Que.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Ans.	**2**	**1**	**4**	**1**	**1**	**1**	**1**	**3**	**2**	**4**	**4**	**2**	**3**	**1**	**1**
Que.	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
Ans.	**4**	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**2**	**1**	**3**	**4**	**2**	**2**	**4**
Que.	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	**3**	**2**	**4**	**3**	**1**	**3**	**4**	**1**	**2**	**2**	**2**	**2**	**4**	**1**	**4**

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT 2006

1. In the circuit shown, if a conducting wire is connected between points A and B, the current in this wire will :-



(1) flow from A to B
(2) flow in the direction which will be decided by the value of V
(3) be zero
(4) flow from B to A

CE0126

AIPMT 2007

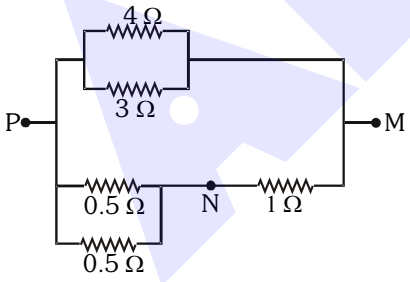
2. The resistance of an ammeter is 13 Ω and its scale is graduated for currents upto 100 A. After an additional shunt is connected to this ammeter it becomes possible to measure currents upto 750 amperes by this meter. The value of shunt-resistance is :–

(1) 2 kΩ (2) 20 Ω (3) 2 Ω (4) 0.2 Ω

CE0128

AIPMT 2008

3. In the circuit shown, the current through the 4 Ω resistor is 1 A when the points P and M are connected to a d.c. voltage source. The potential difference between the points M and N is :-



(1) 0.5 volts (2) 3.2 volts
(3) 1.5 volts (4)1.0 volt

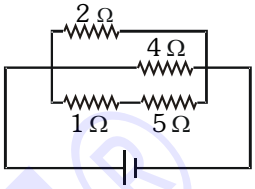
CE0129

4. A galvanometer of resistance 50 Ω is connected to a battery of 3 V alongwith a resistance of 2950 Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 divisions, the resistance in series should be :-

(1) 6050 Ω (2) 4450 Ω
(3) 5050 Ω (4) 5550 Ω

CE0130

5. A current of 3 amperes flows through the 2 Ω resistor shown in the circuit. The power dissipated in the 5 Ω resistor is :-

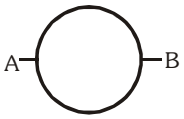


(1) 1 watt (2) 5 watts
(3) 4 watts (4) 2 watts

CE0131

AIPMT 2009

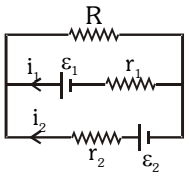
6. A wire of resistance 12 ohms per meter is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is :-



(1) 6 Ω (2) 0.6π Ω
(3) 3 Ω (4) 6π Ω

CE0132

7. See the electrical circuit shown in this figure. Which of the following equations is the correct equation for it ?



(1) $\varepsilon_1 - (i_1 + i_2)R + i_1r_1 = 0$

(2) $\varepsilon_1 - (i_1 + i_2)R - i_1r_1 = 0$

(3) $\varepsilon_2 - i_2r_2 - \varepsilon_1 - i_1r_1 = 0$

(4) $-\varepsilon_2 - (i_1 + i_2)R + i_2r_2 = 0$

CE0133

8. A galvanometer having a coil resistance of 60 Ω shows full scale deflection when a current of 1.0 A passes through it. It can be converted into an ammeter to read currents upto 5.0 A by :-

(1) putting in parallel a resistance of 15 Ω

(2) putting in parallel a resistance of 240 Ω

(3) putting in series a resistance of 15 Ω

(4) putting in series a resistance of 240 Ω

CE0134

9. A student measures the terminal potential difference (V) of a cell (of emf ε and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept of the graph between V and I, then respectively, are :-

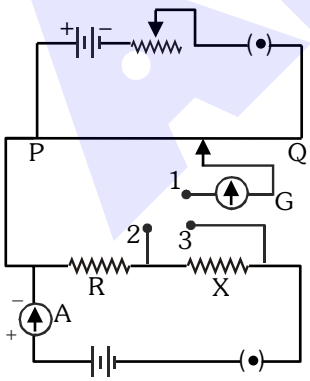
(1) $-\varepsilon$ and r (2) ε and $-r$

(3) $-r$ and ε (4) r and $-\varepsilon$

CE0135

AIPMT (Pre) 2010

10. A potentiometer circuit is set up as shown. The potential gradient, across the potentiometer wire, is k volts/cm and the ammeter, present in the circuit, reads 1.0 A when two way key is switched off. The balance points, when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths ℓ_1 cm and ℓ_2 cm respectively. The magnitudes, of the resistors R and X, (in ohms), are then, equal to respectively :-



(1) $k\ell_1$ and $k\ell_2$ (2) $k(\ell_2 - \ell_1)$ and $k\ell_2$

(3) $k\ell_1$ and $k(\ell_2 - \ell_1)$ (4) $k(\ell_2 - \ell_1)$ and $k\ell_1$

CE0136

11. A galvanometer has a coil of resistance 100 ohms and gives full scale deflection for 30 mA current. If it is to work as a voltmeter of 30 volt range, the resistance required to be added will be:-

(1) 1000 Ω (2) 900 Ω

(3) 1800 Ω (4) 500 Ω

CE0137

12. Consider the following two statements :

(A) Kirchhoff's junction law follows from the conservation of charge.

(B) Kirchhoff's loop law follows from the conservation of energy.

Which of the following is correct ?

(1) Both (A) and (B) are correct

(2) Both (A) and (B) are wrong

(3) (A) is correct and (B) is wrong

(4) (A) is wrong and (B) is correct.

CE0138

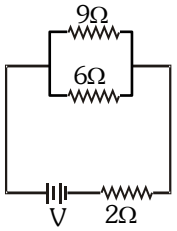
AIPMT (Pre) 2011

13. A current of 2 A flows through a 2 Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9 Ω resistor The internal resistance of the battery is :-

(1) 0.5 Ω (2) 1/3 Ω (3) 1/4 Ω (4) 1 Ω

CE0139

14. If power dissipated in the 9 Ω resistor in the circuit shown is 36 Watt, the potential difference across the 2 Ω resistor is :-

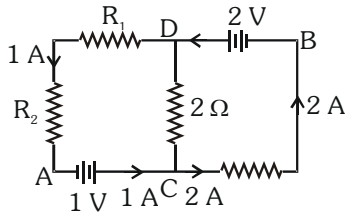


(1) 4 V (2) 8 V (3) 10 V (4) 2 V

CE0140

AIPMT (Mains) 2011

15. In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is :-



(1) +1 V (2) –1 V (3) +2V (4) –2 V

CE0141

16. A galvanometer of resistance, G, is shunted by a resistance S. To keep the main current in the circuit unchanged, the resistance to be put in series with the arrangement is :-

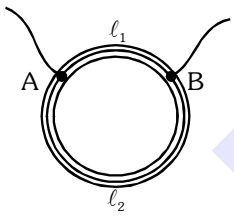
(1) $\frac{G}{(S+G)}$ (2) $\frac{S^2}{(S+G)}$

(3) $\frac{SG}{(S+G)}$ (4) $\frac{G^2}{(S+G)}$

CE0142

AIPMT (Pre) 2012

17. A ring is made of a wire having a resistance $R_0 = 12\ \Omega$. Find the points A and B as shown in the figure at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$:-



(1) $\frac{\ell_1}{\ell_2} = \frac{3}{8}$

(2) $\frac{\ell_1}{\ell_2} = \frac{1}{2}$

(3) $\frac{\ell_1}{\ell_2} = \frac{5}{8}$

(4) $\frac{\ell_1}{\ell_2} = \frac{1}{3}$

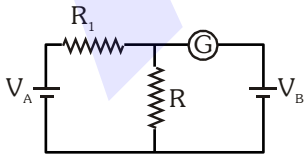
CE0143

18. If voltage across a bulb rated 220 volts 100 watts drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is :-

(1) 5% (2) 10% (3) 20% (4) 2.5%

CE0144

19. In the circuit shown the cells A and B have negligible resistances. For $V_A = 12$ V, $R_1 = 500\ \Omega$ and $R = 100\ \Omega$ the galvanometer (G) shows no deflection. The value of V_B is :-



(1) 12 V (2) 6 V (3) 4 V (4) 2 V

CE0145

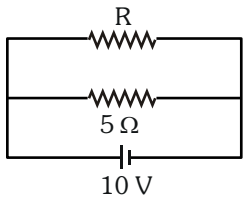
20. A milivoltmeter of 25 milivolts range is to be converted into an ammeter of 25 amperes range. The value (in ohms) of necessary shunt will be :

(1) 1 (2) 0.05 (3) 0.001 (4) 0.01

CE0146

AIPMT (Mains) 2012

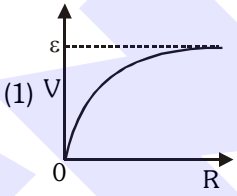
21. The power dissipated in the circuit shown in the figure is 30 watts. The value of R is :-

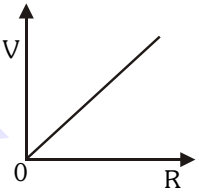


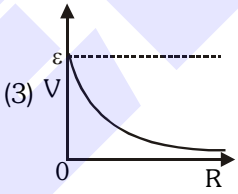
(1) 10 Ω (2) 30 Ω (3) 20 Ω (4) 15 Ω

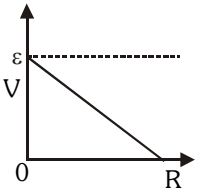
CE0147

22. A cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by :-

(1)


(2)


(3)


(4)


CE0148

NEET-UG 2013

23. A wire of resistance 4 Ω is stretched to twice its original length. The resistance of the stretched wire would be :-

(1) 16 Ω (2) 2 Ω (3) 4 Ω (4) 8 Ω

CE0151

24. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is :-

(1) 1.0 Ω (2) 0.2 Ω (3) 0.5 Ω (4) 0.8 Ω

CE0152

25. The resistances of the four arms P,Q, R and S in a Wheatstone bridge are 10 ohms, 30 ohms, 30 ohms and 90 ohms, respectively. The e.m.f. and internal resistance of the cell are 7 volts and 5 ohms respectively. If the galvanometer resistance is 50 ohms, the current drawn from the cell will be :-

(1) 2.0 A (2) 1.0 A (3) 0.2 A (4) 0.1 A

CE0153

AIPMT 2014

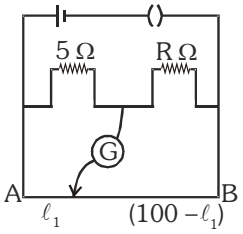
26. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volts and the average resistance per km is 0.5 Ω. the power loss in the wires is :-

(1) 19.2 W (2) 19.2 kW

(3) 19.2 J (4) 12.2 kW

CE0155

27. The resistance in the two arms of a meter bridge are 5 Ω and R Ω, respectively. When the resistance R is shunted with an equal resistance, the new balance point is at 1.6 ℓ_1. The resistance 'R' is :-



(1) 10 Ω (2) 15 Ω (3) 20 Ω (4) 25 Ω

CE0156

28. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4m long, When a resistance R, connected across the given cell, has values of,

(i) infinity (ii) 9.5 Ω

The balancing lengths on the potentiometer wire are found to be 3 m and 2.85 m respectively. The value of internal resistance of the cell is :-

(1) 0.25 Ω (2) 0.95 Ω

(3) 0.5 Ω (4) 0.75 Ω

CE0157

29. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, then resistance of ammeter will be :-

(1) $\frac{1}{499}$G (2) $\frac{499}{500}$G

(3) $\frac{1}{500}$G (4) $\frac{500}{499}$G

CE0158

Re-AIPMT 2015

30. A potentiometer wire of length L and resistance r is connected in series with a battery of e.m.f. E_0 and a resistance r_1. An unknown e.m.f. E is balanced at a length ℓ of the potentiometer wire. The e.m.f. E will be given by :

(1) $\frac{LE_0 r}{(r+r_1)\ell}$ (2) $\frac{LE_0 r}{\ell r_1}$

(3) $\frac{E_0 r}{(r+r_1)}.\frac{\ell}{L}$ (4) $\frac{E_0 \ell}{L}$

CE0159

31. Two metal wires of identical dimensions are connected in series. If σ_1 and σ_2 are the conductivities of the metal wires respectively, the effective conductivity of the combination is :-

(1) $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$ (2) $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

(3) $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$ (4) $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

CE0160

32. A circuit contains an ammeter, a battery of 30 V and a resistance 40.8 ohm all connected in series. If the ammeter has a coil of resistance 480 ohm and a shunt of 20 ohm, the reading in the ammeter will be :-

(1) 1 A (2) 0.5 A

(3) 0.25 A (4) 2 A

CE0161

AIPMT - 2015

33. Across a metallic conductor of non-uniform cross section a constant potential difference is applied. The quantity which remains constant along the conductor is :

(1) current

(2) drift velocity

(3) electric field

(4) current density

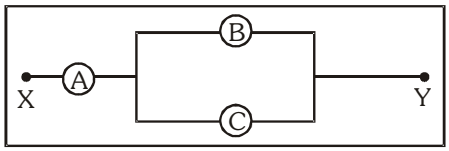
CE0162

34. A potentiometer wire has length 4 m and resistance 8Ω. The resistance that must be connected in series with the wire and an accumulator of e.m.f. 2V, so as to get a potential gradient 1 mV per cm on the wire is :

(1) 40 Ω (2) 44 Ω (3) 48 Ω (4) 32 Ω

CE0163

35. A, B and C are voltmeters of resistance R, 1.5 R and 3R respectively as shown in the figure. When some potential difference is applied between X and Y, the voltmeter readings are V_A, V_B and V_C respectively. Then :



(1) $V_A \neq V_B = V_C$ (2) $V_A = V_B \neq V_C$

(3) $V_A \neq V_B \neq V_C$ (4) $V_A = V_B = V_C$

CE0164

NEET-I 2016

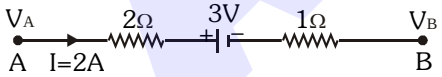
36. A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obtained at 50 cm and 10 cm from the positive end of the wire in the two cases. The ratio of emf's is :-

(1) 5 : 1 (2) 5 : 4 (3) 3 : 4 (4) 3 : 2

CE0167

NEET-II 2016

37. The potential difference ($V_A - V_B$) between the points A and B in the given figure is :-



(1) + 6 V (2) + 9 V

(3) – 3 V (4) + 3 V

CE0168

38. A filament bulb (500 W, 100 V) is to be used in a 230 V main supply. When a resistance R is connected in series, it works perfectly and the bulb consumes 500 W. The value of R is :-

(1) 26 Ω (2) 13 Ω

(3) 230 Ω (4) 46 Ω

CE0169

NEET(UG)-2017

39. The resistance of a wire is 'R' ohm. If it is melted and stretched to 'n' times its original length, its new resistance will be :-

(1) $\frac{R}{n}$ (2) n^2R (3) $\frac{R}{n^2}$ (4) nR

CE0173

40. A potentiometer is an accurate and versatile device to make electrical measurements of E.M.F. because the method involves :-

(1) Potential gradients

(2) A condition of no current flow through the galvanometer

(3) A combination of cells, galvanometer and resistances

(4) Cells

CE0174

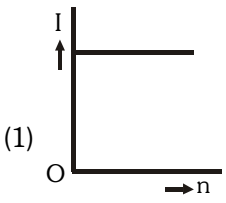
NEET(UG)-2018

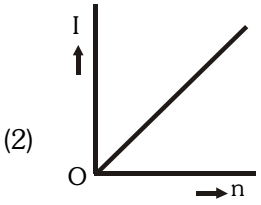
41. A set of 'n' equal resistors, of value 'R' each, are connected in series to a battery of emf 'E' and internal resistance 'R'. The current drawn is I. Now, the 'n' resistors are connected in parallel to the same battery. Then the current drawn from battery becomes 10 I. The value of 'n' is :-

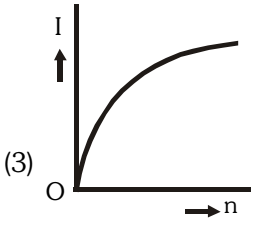
(1) 10 (2) 11 (3) 20 (4) 9

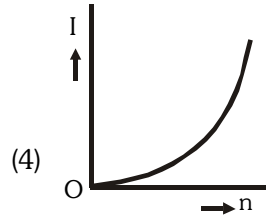
CE0177

42. A battery consists of a variable number 'n' of identical cells (having internal resistance 'r' each) which are connected in series. The terminals of the battery are short-circuited and the current I is measured. Which of the graphs shows the correct relationship between I and n ?

(1) 

(2) 

(3) 

(4) 

CE0178

43. A carbon resistor (47 ± 4.7) kΩ is to be marked with rings of different colours for its identification. The colour code sequence will be :-
(1) Violet – Yellow – Orange – Silver
(2) Yellow – Violet – Orange – Silver
(3) Yellow – Green – Violet – Gold
(4) Green – Orange – Violet – Gold

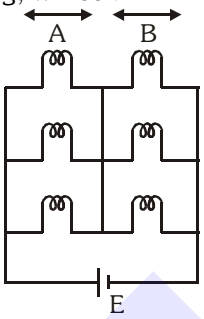
CE0179

44. Current sensitivity of a moving coil galvanometer is 5 div/mA and its voltage sensitivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is
(1) 40 Ω (2) 25 Ω (3) 250 Ω (4) 500 Ω

CE0180

NEET(UG)-2019

45. Six similar bulbs are connected as shown in the figure with a DC source of emf E, and zero internal resistance.
The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be :



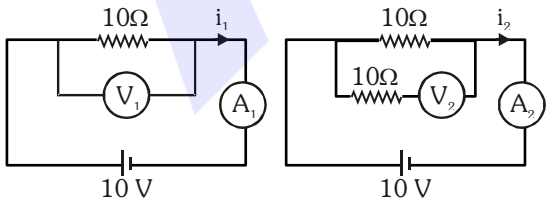
(1) 4 : 9 (2) 9 : 4 (3) 1 : 2 (4) 2 : 1

CE0247

46. Which of the following acts as a circuit protection device?
(1) conductor (2) inductor
(3) switch (4) fuse

CE0248

47. In the circuits shown below, the readings of the voltmeters and the ammeters will be :



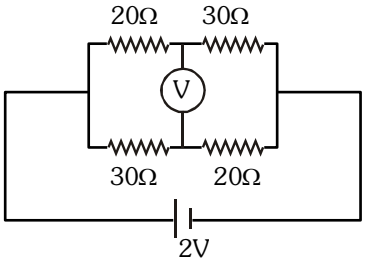
Circuit 1 Circuit 2

(1) $V_2 > V_1$ and $i_1 = i_2$
(2) $V_1 = V_2$ and $i_1 > i_2$
(3) $V_1 = V_2$ and $i_1 = i_2$
(4) $V_2 > V_1$ and $i_1 > i_2$

CE0249

NEET(UG)-2019 (Odisha)

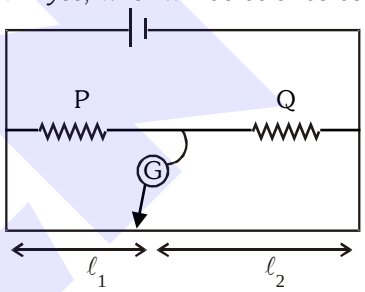
48. The reading of an ideal voltmer in the circuit shown is :



(1) 0.6 V (2) 0 V (3) 0.5 V (4) 0.4 V

CE0250

49. The metre bridge shown is in balanced position with $\frac{P}{Q} = \frac{\ell_1}{\ell_2}$. If we now interchange the positions of galvanometer and cell, will the bridge work ? If yes, what will be balance condition ?



(1) yes, $\frac{P}{Q} = \frac{\ell_2 - \ell_1}{\ell_2 + \ell_1}$ (2) no, no null point
(3) yes, $\frac{P}{Q} = \frac{\ell_2}{\ell_1}$ (4) yes, $\frac{P}{Q} = \frac{\ell_1}{\ell_2}$

CE0251

NEET(UG)-2020

50. The color code of a resistance is given below

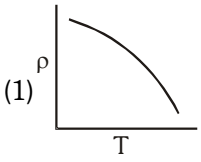
The values of resistance and tolerance, respectively, are :
(1) 470 Ω, 5% (2) 470 kΩ, 5%
(3) 47 kΩ, 10% (4) 4.7 kΩ, 5%

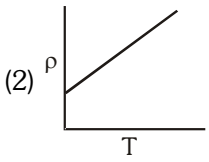
CE0252

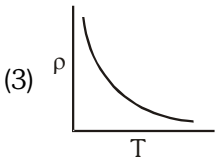
51. A charged particle having drift velocity of 7.5×10^{-4} ms^{-1} is an electric field of 3×10^{-10} Vm^{-1}, has a mobility in $m^2 V^{-1} s^{-1}$ of :
(1) 2.25×10^{-15} (2) 2.25×10^{15}
(3) 2.5×10^{6} (4) 2.5×10^{-6}

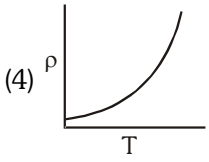
CE0253

52. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper ?

(1) 

(2) 

(3) 

(4) 

CE0254

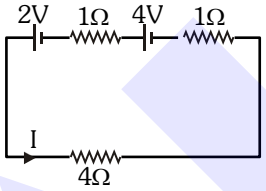
53. A resistance wire connected in the left gap of a metre bridge balances a 10 Ω resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of 1 Ω of the resistance wire is :

(1) 1.5×10^{-2} m (2) 1.0×10^{-2} m
(3) 1.0×10^{-1} m (4) 1.5×10^{-1} m

CE0255

NEET(UG)-2020 (Covid-19)

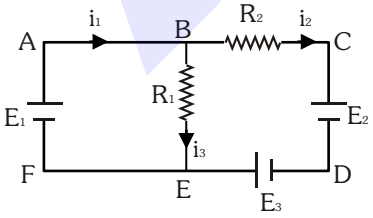
54. For the circuit shown in the figure, the current I will be



(1) 0.75 A (2) 1 A
(3) 1.5 A (4) 0.5 A

CE0256

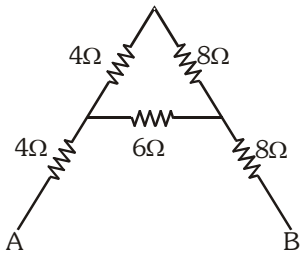
55. For the circuit given below, the Kirchoff's loop rule for the loop BCDEB is given by the equation



(1) $-i_2R_2 + E_2 - E_3 + i_3R_1 = 0$
(2) $i_2R_2 + E_2 - E_3 - i_3R_1 = 0$
(3) $i_2R_2 + E_2 + E_3 + i_3R_1 = 0$
(4) $- i_2R_2 + E_2 + E_3 + i_3R_1 = 0$

CE0257

56. The equivalent resistance between A and B for the mesh shown in the figure is



(1) 7.2 Ω (2) 16 Ω
(3) 30 Ω (4) 4.8 Ω

CE0258

57. Two solid conductors are made up of same material, have same length and same resistance. One of them has a circular cross section of area A_1 and the other one has a square cross section of area A_2. The ratio A_1/A_2 is

(1) 1.5 (2) 1
(3) 0.8 (4) 2

CE0259

NEET(UG)-2021

58. **Column-I** gives certain physical terms associated with flow of current through a metallic conductor. **Column-II** gives some mathematical relations involving electrical quantities. Match **Column-I** and **Column-II** with appropriate relations.

Column-I		Column-II	
(A)	Drift Velocity	(P)	$\frac{m}{ne^2\rho}$
(B)	Electrical Resistivity	(Q)	nev_d
(C)	Relaxation Period	(R)	$\frac{eE}{m}\tau$
(D)	Current Density	(S)	$\frac{E}{J}$

(1) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)
(2) (A)-(R), (B)-(S), (C)-(Q), (D)-(P)
(3) (A)-(R), (B)-(P), (C)-(S), (D)-(Q)
(4) (A)-(R), (B)-(Q), (C)-(S), (D)-(P)

CE0260

59. The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 0.25 Ω. What will be the effective resistance if they are connected in series ?

(1) 0.25 Ω (2) 0.5 Ω

(3) 1 Ω (4) 4Ω

CE0261

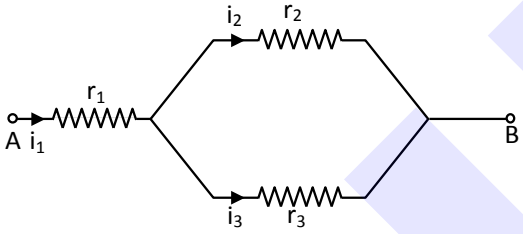
60. In a potentiometer circuit a cell of EMF 1.5 V gives balance point at 36 cm length of wire. If another cell of EMF 2.5 V replaces the first cell, then at what length of the wire, the balance point occurs?

(1) 60 cm (2) 21.6 cm

(3) 64 cm (4) 62 cm

CE0262

61. Three resistors having resistances r_1, r_2 and r_3 are connected as shown in the given circuit. The ratio $\frac{i_3}{i_1}$ of currents in terms of resistances used in the circuit is :



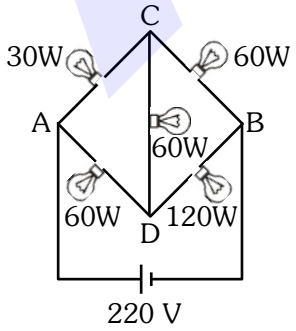
(1) $\frac{r_1}{r_2+r_3}$ (2) $\frac{r_2}{r_2+r_3}$

(3) $\frac{r_1}{r_1+r_2}$ (4) $\frac{r_2}{r_1+r_3}$

CE0263

NEET(UG)-2021 (Paper-2)

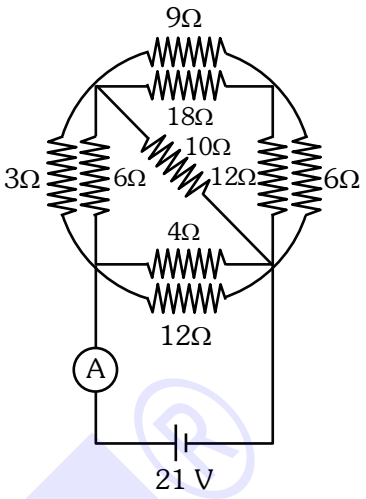
62. Five bulbs each have same voltage rating 220 V are connected as shown in the figure. The total power consumed in the circuit is



(1) 20 W (2) 40 W (3) 60 W (4)100 W

CE0264

63. In the circuit as shown, the reading of ideal ammeter is



(1) 5 A (2) 8 A (3) 9 A (4) 10 A

CE0265

64. Kirchhoff's voltage law is based on the conservation of

(1) Charge (2) Energy

(3) Momentum (4) Current

CE0266

NEET(UG)-2022

65. Two resistors of resistance, 100 Ω and 200 Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100 Ω to that in 200 Ω in a given time is :

(1) 2 : 1 (2) 1 : 4

(3) 4 : 1 (4) 1 : 2

CE0267

66. As the temperature increase, the electrical resistance :

(1) decreases for both conductors and semiconductors

(2) increases for conductors but decreases for semiconductors

(3) decreases for conductors but increase for semiconductors

(4) increases for both conductors and semiconductors.

CE0268

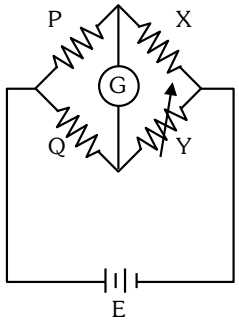
67. A copper wire of length 10 m and radius $\left(10^{-2}/\sqrt{\pi}\right)$m has electrical resistance of 10 Ω. The current density in the wire for an electric field strength of 10 (V/m) is:

(1) 10^6 A/m^2 (2) 10^{-5} A/m^2

(3) 10^5 A/m^2 (4) 10^4 A/m^2

CE0269

68. A wheatstone bridge is used to determine the value of unknown resistance X by adjusting the variable resistance Y as shown in the figure. For the most precise measurement of X, the resistances P and Q :



(1) should be approximately equal and are small

(2) should be very large and unequal

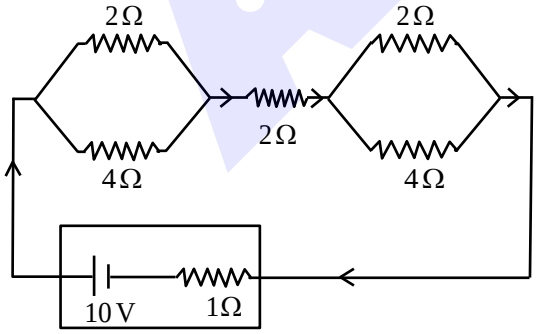
(3) do not play any significant role

(4) should be approximately equal to 2X

CE0270

NEET(UG)-2022 (Overseas)

69. A network of resistors is connected across a 10 V battery with internal resistance of 1 Ω as shown in the circuit diagram. The equivalent resistance of the circuit is:

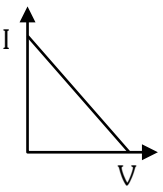


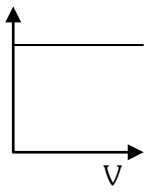
(1) $\frac{14}{3}\Omega$ (2) $\frac{12}{7}\Omega$

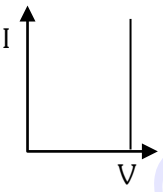
(3) $\frac{14}{7}\Omega$ (4) $\frac{17}{3}\Omega$

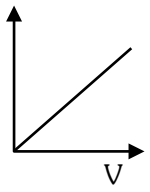
CE0271

70. The plot of current I flowing through a conductor versus the applied voltage V across the ends of a conductor is:

(1) 

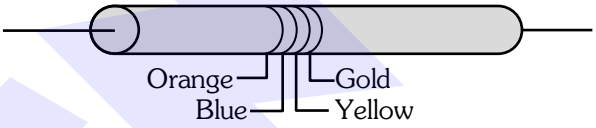
(2) 

(3) 

(4) 

CE0272

71. The value of resistance for the colour code of the given resistor is:



(1) (470 ± 47) kΩ

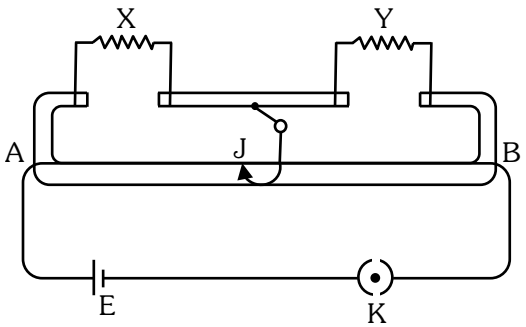
(2) (360 ± 36) kΩ

(3) (360 ± 18) kΩ

(4) (36 ± 36) kΩ

CE0273

72. In a metre bridge experiment, the null point is at a distance of 30 cm from A. If a resistance of 16Ω is connected in parallel with resistance Y, the null point occurs at 50 cm from A. The value of the resistance Y is:



(1) $\frac{40}{3}\Omega$ (2) $\frac{64}{3}\Omega$

(3) $\frac{48}{3}\Omega$ (4) $\frac{112}{3}\Omega$

CE0274

Re-NEET(UG)-2022

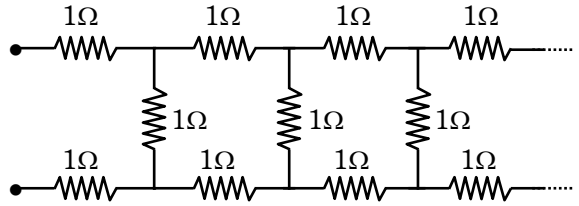
73. A cell of emf 4 V and internal resistance 0.5 Ω is connected to a 7.5 Ω external resistance. The terminal potential difference of the cell is :-

(1) 3.75 V (2) 4.25 V

(3) 4 V (4) 0.375 V

CE0275

74. The equivalent resistance of the infinite network given below is :



(1) 2 Ω (2) $(1+\sqrt{2})$ Ω

(3) $(1+\sqrt{3})$ Ω (4) $(1+\sqrt{5})$ Ω

CE0276

75. The reciprocal of resistance is :

(1) reactance

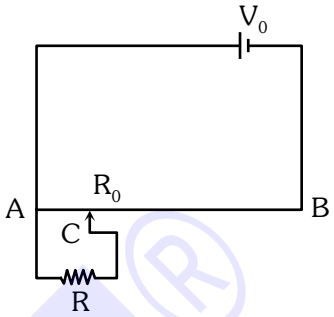
(2) mobility

(3) conductivity

(4) conductance

CE0277

76. The sliding contact C is at one fourth of the length of the potentiometer wire (AB) from A as shown in the circuit diagram. If the resistance of the wire AB is R_0, then the potential drop (V) across the resistor R is:



(1) $\frac{4V_0R}{3R_0+16R}$ (2) $\frac{4V_0R}{3R_0+R}$

(3) $\frac{2V_0R}{4R_0+R}$ (4) $\frac{2V_0R}{2R_0+3R}$

CE0278

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**4**	**3**	**2**	**2**	**2**	**2**	**2**	**1**	**3**	**3**	**2**	**1**	**2**	**3**	**1**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**2**	**1**	**4**	**3**	**1**	**1**	**1**	**3**	**3**	**2**	**2**	**3**	**3**	**3**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**2**	**2**	**1**	**4**	**4**	**4**	**2**	**1**	**2**	**2**	**1**	**1**	**2**	**3**	**2**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**3**	**4**	**4**	**1**	**3**	**4**	**3**	**2**	**2**	**2**	**2**	**1**	**4**	**1**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**2**	**3**	**4**	**2**	**1**	**2**	**3**	**1**	**4**	**4**	**3**	**2**	**1**	**3**	**4**
Que.	76														
Ans.	**1**														

EXERCISE-III (Analytical Questions) Master Your Understanding

1. When a potential difference is applied across the ends of a linear metallic conductor :-

(1) group of free electrons are accelerated continuously from the lower potential end to the higher potential end of the conductor

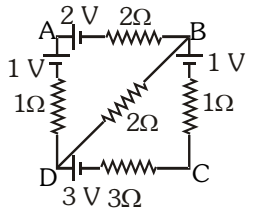
(2) group of free electrons are accelerated continuously from the higher potential end to the lower potential end of the conductor

(3) group of free electrons acquire a constant drift velocity from the lower potential end to the higher potential end of the conductor.

(4) each free electron is set in motion from their position of rest.

CE0186

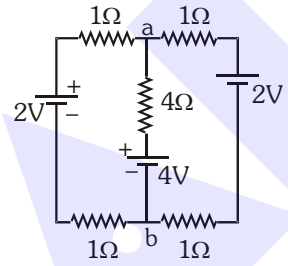
2. In the circuit shown in figure, cells of emf 2, 1, 3 and 1 V, respectively having resistances 2 Ω, 1 Ω, 3 Ω and 1 Ω are their internal resistances respectively. The potential difference between D and B. (in volts)



(1) $\frac{5}{13}$ (2) $\frac{2}{13}$ (3) $\frac{10}{13}$ (4) $\frac{7}{13}$

CE0189

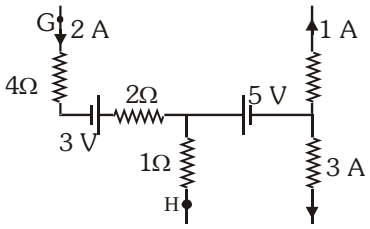
3. For the circuit shown in figure, the potential difference between points a and b is :-



(1) 2.4 V (2) 2.8 V (3) 2 V (4) 3.2 V

CE0190

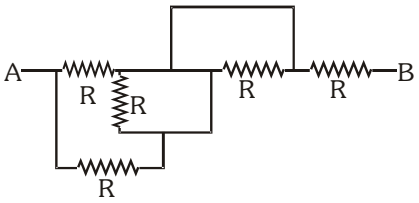
4. In the part of a circuit shown in figure, the potential different ($V_G - V_H$) between points G and H will be:-



(1) 0 (2) 15 V (3) 7 V (4) 3 V

CE0191

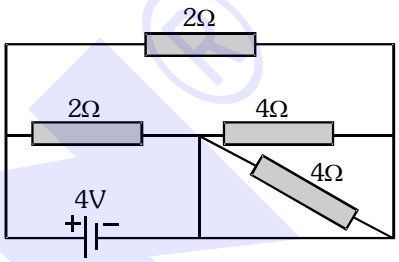
5. What is the equivalent resistance between A and B ?



(1) $\frac{3R}{2}$ (2) 2R (3) R (4) $\frac{R}{2}$

CE0192

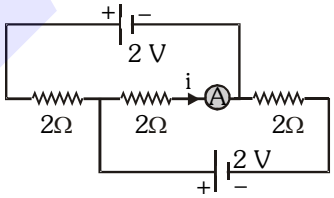
6. Electric current through the battery is :-



(1) 4 A (2) 3 A (3) 2 A (4) 0 A

CE0193

7. Reading of ammeter for the following circuit is :-



(1) 1 A (2) $\frac{1}{2}$A (3) $\frac{2}{3}$A (4) 3 A

CE0194

8. 100 cells, each of e.m.f. 5 V and internal resistance 1 Ω, are to be arranged so as to drive maximum current in a 25 Ω resistance. Each row is to contain equal number of cells. The number of rows should be :-

(1) 2 (2) 4 (3) 5 (4) 10

CE0195

9. Two nonideal batteries are connected in parallel; consider the following statements :

(A) The equivalent emf is smaller than either of the two emfs.

(B) The equivalent internal resistance is smaller than either of the two internal resistances.

(1) both A and B are correct

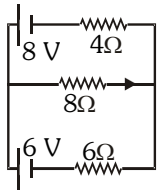
(2) A is correct but B is wrong

(3) B is correct but A is wrong

(4) both A and B are wrong

CE0196

10. The current in 8 Ω resistance is (as per given circuit)



(1) 0.69 A (2) 0.92 A
(3) 1.30 A (4) 1.6 A

CE0197

11. n identical cells, each of emf E and internal resistance r, are joined in series to form a closed circuit. One of the cell A is joined with reversed polarity. The potential difference across each cell except A, is :-

(1) $\frac{2\varepsilon}{n}$ (2) $\frac{n-1}{n}\varepsilon$
(3) $\frac{n-2}{n}\varepsilon$ (4) $\frac{2n}{n-2}\varepsilon$

CE0199

12. In the above question, the potential difference across A is :-

(1) $\frac{2\varepsilon}{n}$ (2) $\varepsilon\left(1-\frac{1}{n}\right)$
(3) $2\varepsilon\left(1-\frac{1}{n}\right)$ (4) $\varepsilon\left(\frac{n-2}{n}\right)$

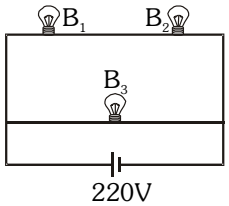
CE0200

13. A heater takes 40 minutes to boil a given amount of water. Its coil is cut and $\frac{1}{4}$th of its length is used in the heater now. How much time will it take now to boil the same amount of water using the same source ?

(1) 10 minutes (2) 12 minutes
(3) 15 minutes (4) 8 minutes

CE0201

14. A 100 W bulb B_1 and two 60 W bulbs B_2 and B_3, are connected to a 220 V source, as shown in Figure. Now P_1, P_2 and P_3 are the output powers of the bulbs B_1, B_2 and B_3 respectively. Then:

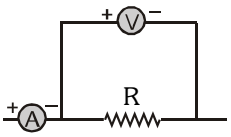


(1) $P_1 > P_2 = P_3$ (2) $P_1 > P_2 > P_3$
(3) $P_1 < P_2 = P_3$ (4) $P_1 < P_2 < P_3$

CE0202

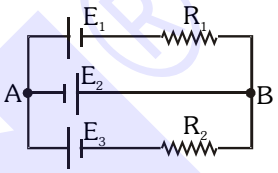
15. A student connects a voltmeter, ammeter and resistance according to the circuit given. If the voltmeter reading is 20 V and ammeter reading is 4 A, then the resistance will be

(1) equal to 5 Ω
(2) more than 5 Ω
(3) less than 5 Ω
(4) less or more depending on the material of wire



CE0204

16. In the circuit shown here, $E_1 = E_2 = E_3 = 2$ V and $R_1 = R_2 = 4$ ohms. The current flowing between points A and B through battery E_2 is :



(1) zero
(2) 2 A from A to B
(3) 2 A from B to A
(4) none of the above

CE0205

17. If specific resistance of a potentiometer wire is 10^{-7} Ω m and current flow through it is 0.1 A, cross–sectional area of wire is 10^{-6} m^2 then potential gradient will be :–

(1) 10^{-2} volt/m (2) 10^{-4} volt/m
(3) 10^{-6} volt/m (4) 10^{-8} volt/m

CE0207

18. For a cell, the terminal potential difference is 2.2 V when circuit is open which reduces to 1.8 V when it is connected to a resistance of R = 5 Ω; then internal resistance of the cell is :–

(1) $\frac{10}{9}\Omega$ (2) $\frac{9}{10}\Omega$
(3) $\frac{11}{9}\Omega$ (4) $\frac{5}{9}\Omega$

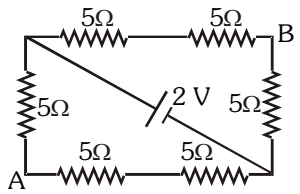
CE0208

19. n identical cells whether joined together in series or in parallel, give the same current, when connected to an external resistance 'R'. The internal resistance of each cell is :–

(1) r = nR (2) r = R
(3) r = $\frac{R}{n}$ (4) r = n^2R

CE0209

20. The potential difference between the points A and B in the following circuit shown in the figure is :-

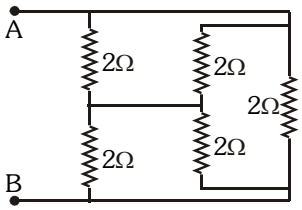


(1) $\frac{2}{3}$ volts (2) $\frac{4}{5}$ volts

(3) $\frac{8}{9}$ volts (4) 2 volts

CE0210

21. The equivalent resistance across AB is :–



(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

CE0211

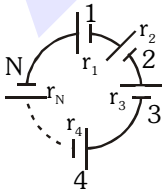
22. When a voltmeter and an ammeter are connected one by one across the terminals of a cell respectively measures 5 V and 10 A. Now all meters are removed and only a resistance of 2 Ω is connected across the terminals of the cell. The current flowing through this resistance is :-

(1) 7.5 A (2) 5.0 A

(3) 2.5 A (4) 2.0 A

CE0212

23. A group of N cells each of whose emf varies directly with the internal resistance as per the equation $E_N = 1.5\ r_N$ are connected as shown in the figure. The current in the circuit is :-



(1) 5.1 A (2) 0.51 A

(3) 1.5 A (4) 0.15 A

CE0213

24. The length of a wire of a potentiometer is 100 cm and the emf of its standard cell is E volts. It is employed to measure the e.m.f. of a battery whose internal resistance is 0.5 Ω. If the balance point is obtained at ℓ = 30 cm from the positive end, the e.m.f. of the battery is :–

(1) $\frac{30E}{100}$ (2) $\frac{30E}{100.5}$

(3) $\frac{30E}{(100-0.5)}$ (4) $\frac{30(E-0.5)}{100}$

CE0214

25. Two wires of resistance R_1 and R_2 at 0° C have temperature coefficients of resistance α_1 and α_2 respectively. These are joined in series. The effective temperature coefficient of resistance is:-

(1) $\frac{\alpha_1+\alpha_2}{2}$ (2) $\sqrt{\alpha_1\alpha_2}$

(3) $\frac{\alpha_1R_1+\alpha_2R_2}{R_1+R_2}$ (4) $\frac{\sqrt{R_1R_2\alpha_1\alpha_2}}{\sqrt{R_1^2+R_2^2}}$

CE0215

26. A battery is charged at a potential of 15 V for 8 hours when the current flowing is 10 A. The battery on discharge supplies a current of 5 A for 15 hours. The mean terminal voltage during the discharge is 14 V. The "Watt hour" efficiency of the battery is :

(1) 80% (2) 90% (3) 87.5% (4) 82.5%

CE0216

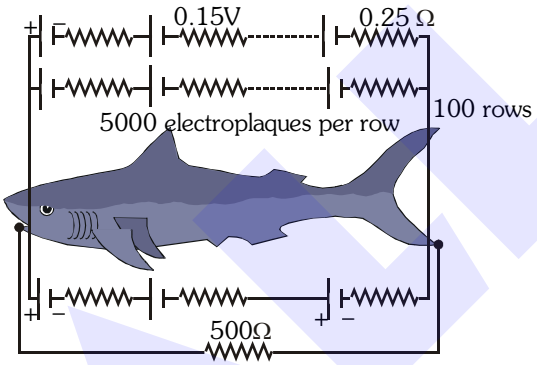
27. A galvanometer of 50 ohms resistance has 25 divisions. A current of 4×10^{-4} amperes gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 25 volts, it should be connected with a resistance of :–

(1) 2450 Ω in parallel (2) 2550 Ω in series

(3) 2450 Ω in series (4) 2500Ω in parallel

CE0217

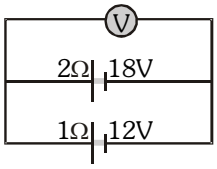
28. Eels are able to generate current with biological cells called electroplaques. The electroplaques in an eel are arranged in 100 rows,each row stretching horizontally along the body of the fish containing 5000 electroplaques. The arrangement is suggestively shown below. Each electroplaques has an emf of 0.15 V and internal resistance of 0.25 Ω. The water surrounding the eel completes a circuit between its head and its tail. If the water surrounding it has a resistance of 500 Ω, the current an eel can produce in water is about :-



(1) 1.5 A (2) 3.0 A (3) 15 A (4) 30 A

CE0218

29. Two batteries, one of emf 18 volts and internal resistance 2 Ω and the other of emf 12 volts and internal resistance 1 Ω, are connected as shown. The voltmeter V will record a reading of :–



(1) 18 volts (2) 30 volts

(3) 14 volts (4) 15 volts

CE0219

EXERCISE-III (Analytical Questions) ANSWER KEY

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