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
PCE001

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
PCE002

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
PCE003

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
PCE004

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
PCE005

6. S.I. unit of current is :-
(1) C (2) A (3) A/s (4) N/s
PCE006

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
PCE007

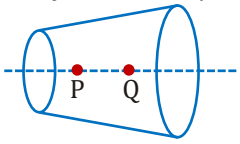
8. The number of free electrons per 10 mm of an ordinary copper wire is about 2×10^{21}. The average drift speed of the electrons is 0.25 mm/s The current flowing is :-
(1) 0.8 A (2) 8 A (3) 80 A (4) 5 A
PCE008

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
PCE009

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
PCE010

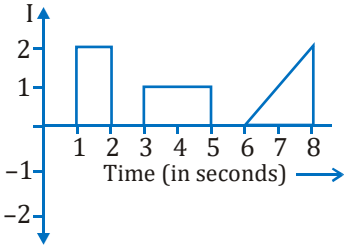
11. A current I flows through a uniform wire of diameter d when the electron drift velocity is v. The same current will flow through a wire of diameter d/2 made of the same material if the drift velocity of the electrons is
(1) v/4 (2) v/2 (3) 2v (4) 4v
PCE011

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
PCE012

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

PCE013

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.

PCE014

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

PCE015

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.

PCE016

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

PCE017

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.

PCE018

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%

PCE019

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%

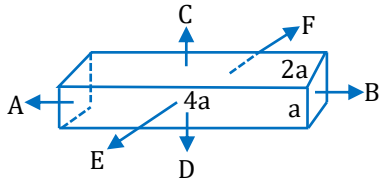
PCE020

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

PCE021

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

PCE022

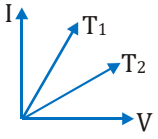
23. Specific resistance of a conductor increases with:–
(1) increase in temperature.
(2) increase in cross–sectional area
(3) increase in cross–sectional area and decrease in length.
(4) decrease in cross–sectional area.

PCE023

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

PCE024

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) $T_1 < T_2$

PCE025

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) $3\ \Omega$

PCE026

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 °C] :–
(1) 400° C (2) 450° C
(3) 500° C (4) 600° C

PCE027

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

PCE028

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°C will be :

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

PCE029

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 :-

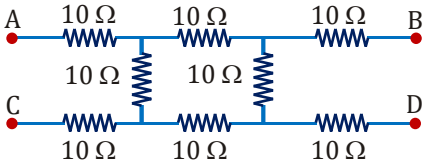
(1) R (2) 3R (3) $\frac{R}{9}$ (4) $\frac{R}{3}$

PCE030

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

PCE031

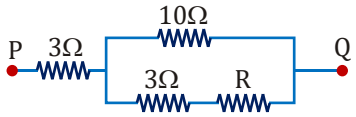
32. What will be the equivalent resistance between the points A and D?



(1) 10 Ω (2) 20 Ω
(3) 30 Ω (4) 40 Ω

PCE032

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 :–

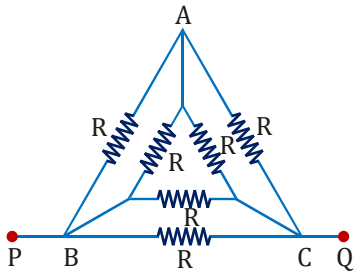


(1) 3 Ω (2) $\sqrt{39}\,\Omega$

(3) $\sqrt{69}\,\Omega$ (4) 10 Ω

PCE033

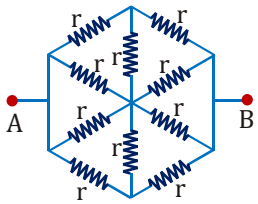
34. The resistance across P and Q in the given figure is



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

PCE034

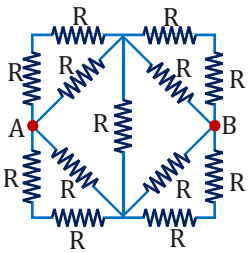
35. The resistance of the circuit between A and B is :



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

PCE035

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 :-

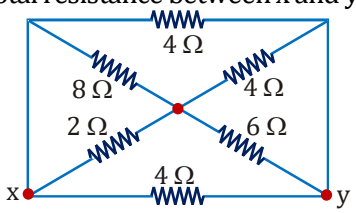


(1) $\frac{4R}{3}\Omega$ (2) 2RΩ

(3) R Ω (4) $\frac{2R}{3}\Omega$

PCE036

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

PCE037

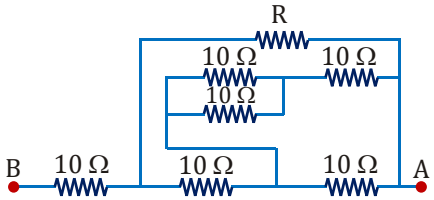
38. The resultant resistance of n wires each of resistance r ohms is R, when they are connected in parallel. When these n resistances are connected in series, the resultant resistance will be :-

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

(3) nR (4) n^2R

PCE038

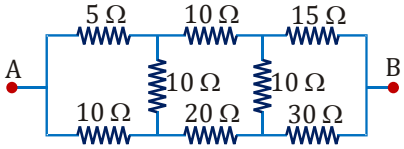
39. For the network of resistance shown in the fig. the equivalent resistance of the network between the points A and B is 18 Ω. The value of unknown resistance R is :-



(1) 8 Ω (2) 10 Ω (3) 16 Ω (4) 24 Ω

PCE039

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

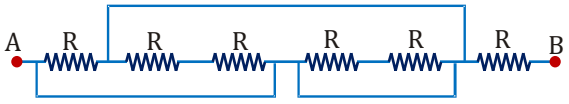


(1) 20 Ω (2) 30 Ω

(3) 90 Ω (4) 110 Ω

PCE040

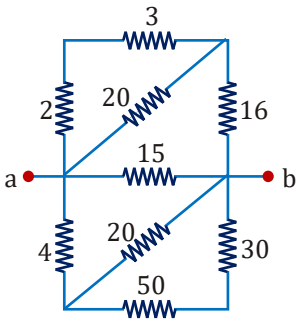
41. In the circuit shown the equivalent resistance between A and B is



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

PCE041

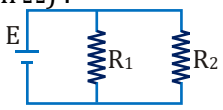
42. In the figure the numerical values denote resistances in SI units. The total resistance of the circuit between a & b will be:



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

PCE042

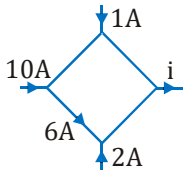
43. Resistors R_1 and R_2 have an equivalent resistance of 6 ohms when connected in the circuit shown below. The resistance of R_1 could be (in Ω) :-



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

PCE043

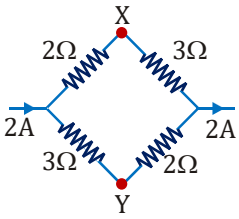
44. Value of current i in the following circuit is :-



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

PCE044

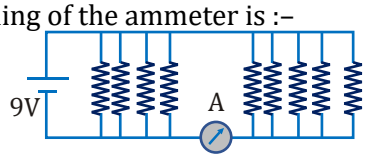
45. The potential difference between X and Y in volts is :-



(1) 1 (2) –1 (3) 2 (4) –2

PCE045

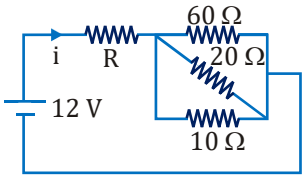
46. If each resistance in the fig. is of 9 Ω then reading of the ammeter is :–



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

PCE046

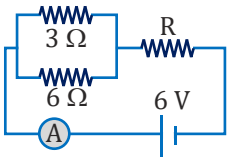
47. If i = 0.25 A in figure, then value of R is :–



(1) 48 Ω (2) 12 Ω (3) 120 Ω (4) 42 Ω

PCE047

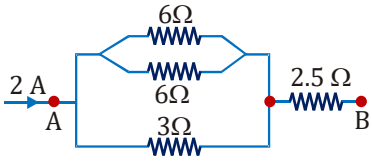
48. If the ammeter in the given circuit reads 2 A, the resistance R is :–



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

PCE048

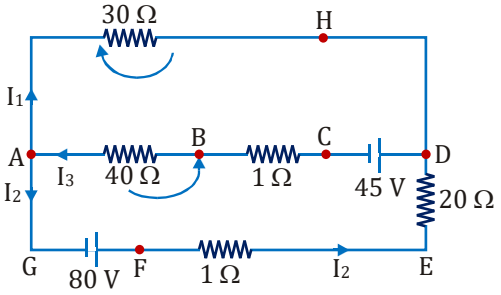
49. The equivalent resistance and potential difference between A and B for the circuit are respectively :–



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

PCE049

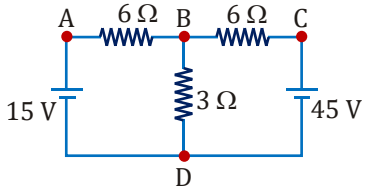
50. For the current loops shown in the figure, Kirchhoff's loop rule for the loops AHDCBA and AHDEFGA yields these equations respectively :-



(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 $-30\ I_1 + 21\ I_2 - 80 = 0$

PCE050

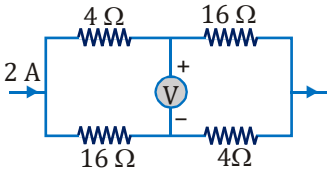
51. In the circuit shown in figure, find the current through the branch BD.



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

PCE051

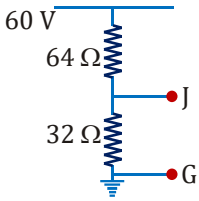
52. In the circuit shown below, the reading of the voltmeter V is :-



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

PCE052

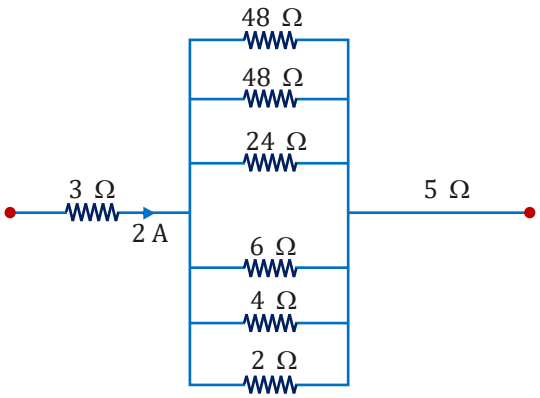
53. Find the potential of J with respect of G :-



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

PCE053

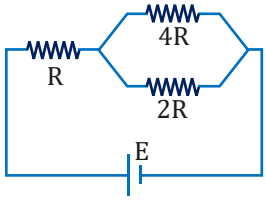
54. Find the potential difference across the 24 Ω :-



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

PCE054

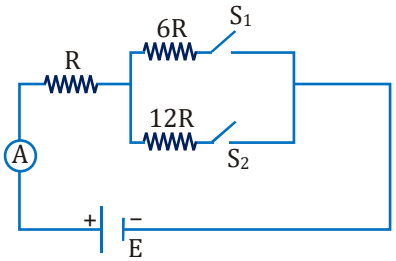
55. In a network as shown in the figure the potential difference across the resistance 2R is (the cell has an emf E with no internal resistance) :



(1) 2E (2) $\frac{4E}{7}$ (3) $\frac{E}{7}$ (4) E

PCE055

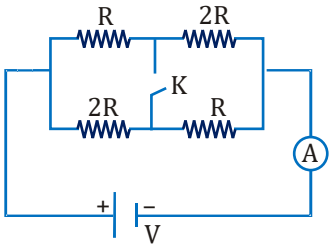
56. The reading of ammeter is I_1 when only S_1 is closed and I_2 when only S_2 is closed. The reading is I_3 when both S_1 & S_2 are closed simultaneously then :-



(1) $I_1 > I_2 > I_3$ (2) $I_2 > I_3 > I_1$
(3) $I_3 > I_2 > I_1$ (4) $I_3 > I_1 > I_2$

PCE056

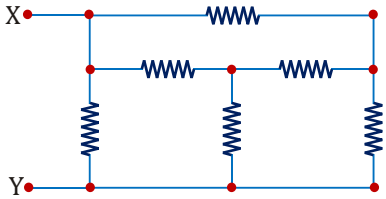
57. How will the reading of ammeter change if the key k is closed?



(1) Increase
(2) Decrease
(3) Remains same
(4) Information insufficient

PCE057

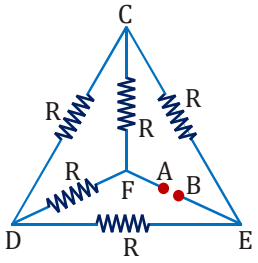
58. Six resistors each of 10 Ω are connected as shown. The equivalent resistance between points X and Y is :



(1) 20 Ω (2) 5 Ω (3) 25/3 Ω (4) 10 Ω

PCE058

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

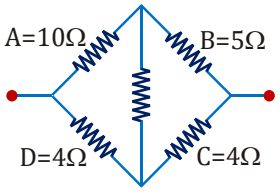


(1) $\frac{V}{R}$ (2) $\frac{V}{2R}$

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

PCE059

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 :

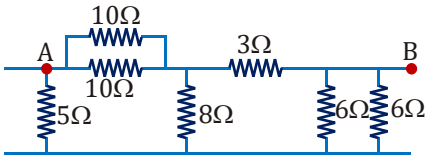


(a) 10 Ω should be connected in parallel with A
(b) 10 Ω should be connected in series with A
(c) 5 Ω should be connected in series with B
(d) 5 Ω should be connected in parallel with B

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

PCE060

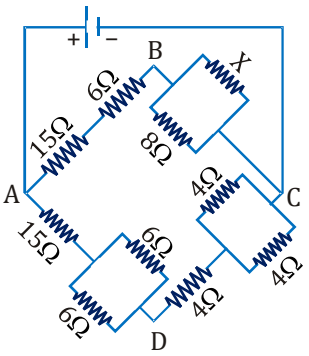
61. Seven resistances are connected as shown in the figure. The equivalent resistance between A and B is :–



(1) 3 Ω (2) 4 Ω
(3) 4.5 Ω (4) 5 Ω

PCE061

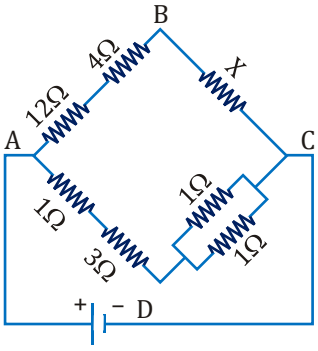
62. In the following circuit diagram the value of resistance X for the potential difference between B and D to be zero is :-



(1) 4 ohms (2) 6 ohms
(3) 56 ohms (4) 9 ohms

PCE062

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

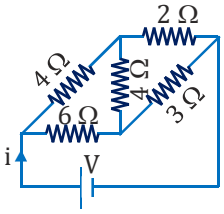
PCE063

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

PCE064

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

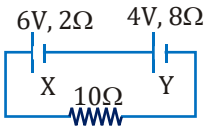


(1) $\frac{18V}{5}$ (2) $\frac{5V}{9}$ (3) $\frac{9V}{35}$ (4) $\frac{5V}{18}$

PCE065

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

PCE066

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

PCE067

68. Internal resistance of primary cell depends on :-

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

PCE068

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

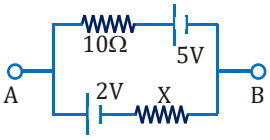
PCE069

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

PCE070

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

PCE071

72. Electromotive force of a cell is basically a

(1) force (2) power
(3) work (4) current capacity

PCE072

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

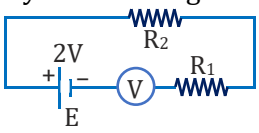
PCE073

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

PCE074

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

PCE075

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

PCE076

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

PCE077

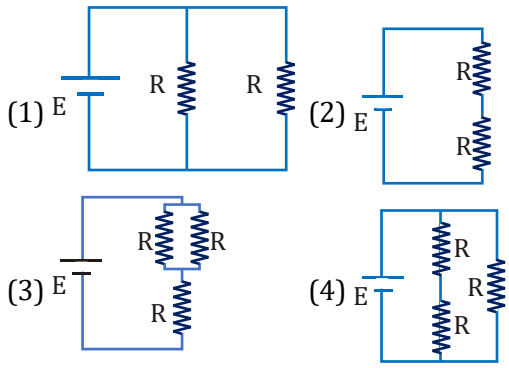
78. An electric bulb is designed to draw a power P_0 at voltage V_0. If the voltage is V, it draws a power P, then –

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

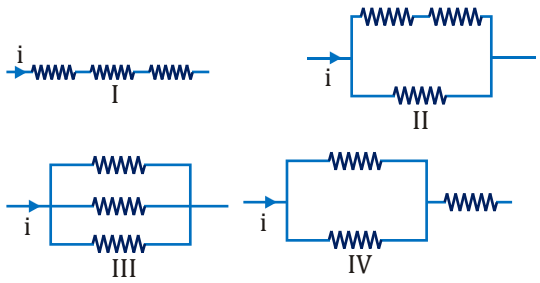
PCE078

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



PCE079

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

PCE080

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

PCE081

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

PCE082

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

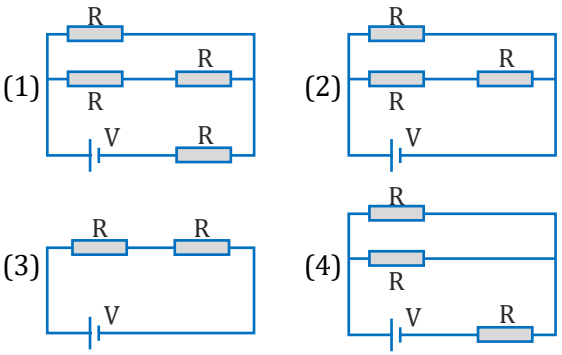
(2) inversely proportional to their marked voltages

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

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

PCE083

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?



PCE084

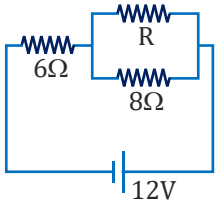
85. Two cells, each of e.m.f. E and internal resistance r, are connected in parallel across a resistor R. The power dissipated in the resistor is maximum if :

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

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

PCE085

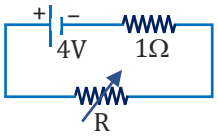
86. In the circuit shown in figure, the power which is dissipated as heat in the 6 Ω resistor is 6 W. What is the value of resistance R in the circuit?



(1) 6 Ω (2) 10 Ω (3) 13 Ω (4) 24 Ω

PCE086

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

PCE087

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

PCE088

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

PCE089

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) $\frac{G}{n-1}$

PCE090

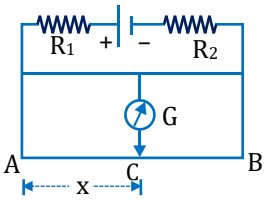
91. Resistance in the two gaps of a meter bridge are 10 ohms and 30 ohms respectively. If the resistances are interchanged, the balance point shifts by :–
(1) 33.3 cm (2) 66.67 cm
(3) 25 cm (4) 50 cm

PCE091

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

PCE092

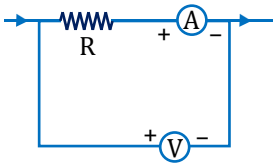
93. In the shown arrangement of the experiment of a meter bridge if AC, corresponding to null deflection of galvanometer, is x then what would be its value if the radius of the wire AB is doubled:-



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

PCE093

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

PCE094

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

PCE095

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) $\frac{1}{40}$

PCE096

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

PCE097

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

PCE098

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

PCE099

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

PCE100

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

PCE101

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

PCE102

EXERCISE-I (Conceptual Questions) ANSWER KEY

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

Exercise - II (Previous Year Questions) AIPMT/NEET

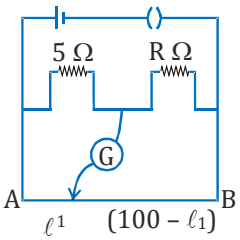
AIPMT 2014

1. 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

PCE146

2. 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

PCE147

3. 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

PCE149

Re-AIPMT 2015

4. 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) $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$

PCE151

5. 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

PCE152

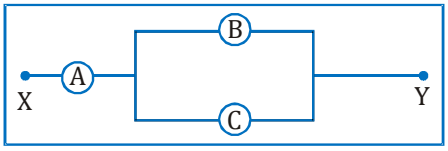
AIPMT - 2015

6. 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

PCE153

7. 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 :

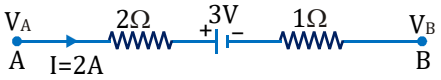


(1) $V_A \neq V_B = V_C$ (2) $V_A = V_B \neq V_C$
(3) $V_A \neq V_B \neq V_C$ (4) $V_A = V_B = V_C$

PCE155

NEET-II 2016

8. 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

PCE157

9. 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

PCE158

NEET(UG)-2017

10. 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

PCE159

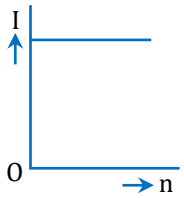
NEET(UG)-2018

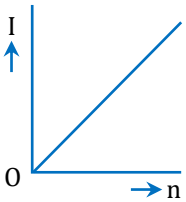
11. A set of 'n' equal resistors, of value 'R' each, are connected in series to a battery of emf 'E' and internal resistance 'R'. The current drawn is I. Now, the 'n' resistors are connected in parallel to the same battery. Then the current drawn from battery becomes 10 I. The value of 'n' is :-

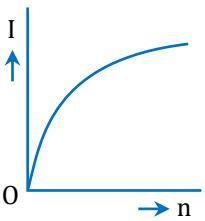
(1) 10 (2) 11 (3) 20 (4) 9

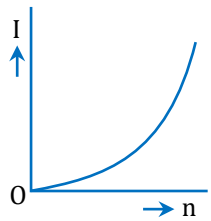
PCE161

12. 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) 

PCE162

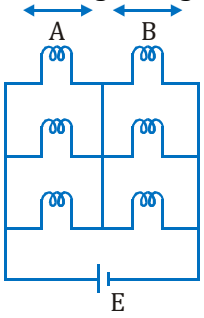
13. Current sensitivity of a moving coil galvanometer is 5 div/mA and its voltage sensitivity (angular deflection per unit voltage applied) is 20 div/V. The resistance of the galvanometer is

(1) 40 Ω (2) 25 Ω
(3) 250 Ω (4) 500 Ω

PCE164

NEET(UG)-2019

14. 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

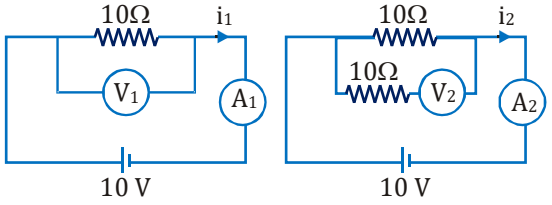
PCE165

15. Which of the following acts as a circuit protection device?

(1) conductor (2) inductor
(3) switch (4) fuse

PCE166

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

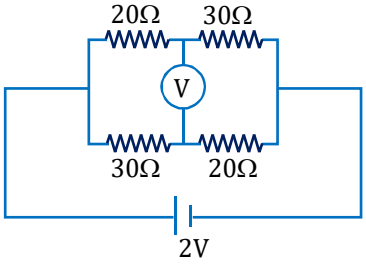


(1) $V_2 > V_1$ and $i_1 = i_2$
(2) $V_1 = V_2$ and $i_1 > i_2$
(3) $V_1 = V_2$ and $i_1 = i_2$
(4) $V_2 > V_1$ and $i_1 > i_2$

PCE167

NEET(UG)-2019 (Odisha)

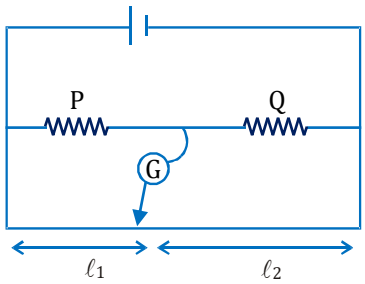
17. The reading of an ideal voltmeter in the circuit shown is :



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

PCE168

18. 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, $\frac{P}{Q}=\frac{\ell_1}{\ell_2}$

PCE169

NEET(UG)-2020

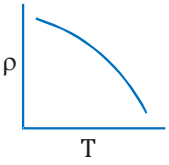
19. A charged particle having drift velocity of 7.5×10^{-4} ms^{-1} is an electric field of 3×10^{-10} Vm^{-1}, has a mobility in m^2 V^{-1} s^{-1} of :

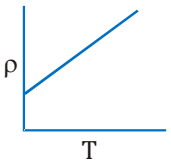
(1) 2.25×10^{-15} (2) 2.25×10^{15}

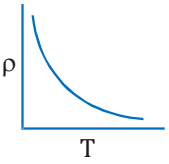
(3) 2.5×10^{6} (4) 2.5×10^{-6}

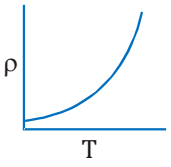
PCE171

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

(1) 

(2) 

(3) 

(4) 

PCE172

21. 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 :

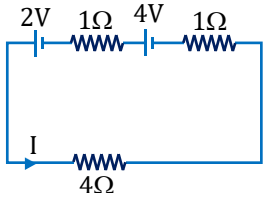
(1) 1.5×10^{-2} m (2) 1.0×10^{-2} m

(3) 1.0×10^{-1} m (4) 1.5×10^{-1} m

PCE173

NEET(UG)-2020 (Covid-19)

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

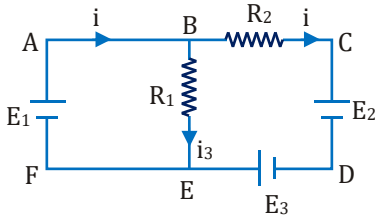


(1) 0.75 A (2) 1 A

(3) 1.5 A (4) 0.5 A

PCE174

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



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

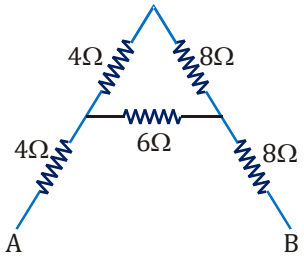
(2) $i_2R_2 + E_2 - E_3 - i_3R_1 = 0$

(3) $i_2R_2 + E_2 + E_3 + i_3R_1 = 0$

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

PCE175

24. 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

PCE176

25. 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

PCE177

NEET(UG)-2021

26. **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)	$\frac{E}{J}$

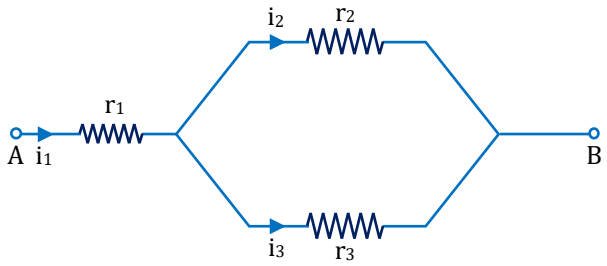
(1) (A)-(R), (B)-(S), (C)-(P), (D)-(Q)
(2) (A)-(R), (B)-(S), (C)-(Q), (D)-(P)
(3) (A)-(R), (B)-(P), (C)-(S), (D)-(Q)
(4) (A)-(R), (B)-(Q), (C)-(S), (D)-(P)

PCE178

27. 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

PCE179

28. 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) $\frac{r_2}{r_1+r_3}$

PCE181

NEET(UG)-2022

29. Two hollow conducting spheres of radii R_1 and R_2 ($R_1 >> R_2$) have equal charges. The potential would be :
(1) more on smaller sphere
(2) equal on both the spheres
(3) dependent on the material property of the sphere
(4) more on bigger sphere

PCE182

30. 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

PCE183

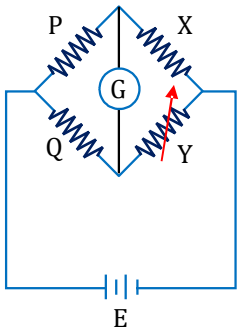
31. As the temperature increase, the electrical resistance :
(1) decreases for both conductors and semiconductors
(2) increases for conductors but decreases for semiconductors
(3) decreases for conductors but increase for semiconductors
(4) increases for both conductors and semiconductors.

PCE184

32. 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

PCE185

33. 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

PCE186

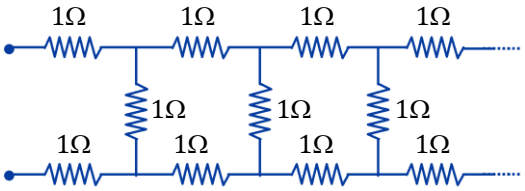
RE-NEET(UG)-2022

34. 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

PCE187

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



(1) 2 Ω (2) $(1+\sqrt{2})$ Ω
(3) $(1+\sqrt{3})\Omega$ (4) $(1+\sqrt{5})\Omega$

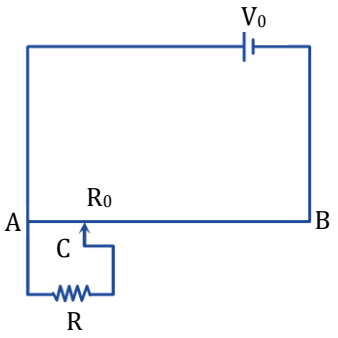
PCE188

36. The reciprocal of resistance is :

(1) reactance (2) mobility
(3) conductivity (4) conductance

PCE189

37. 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:

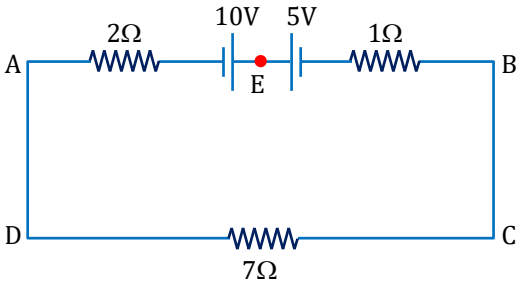


(1) $\frac{4V_0R}{3R_0+16R}$ (2) $\frac{4V_0R}{3R_0+R}$
(3) $\frac{2V_0R}{4R_0+R}$ (4) $\frac{2V_0R}{2R_0+3R}$

PCE190

NEET(UG)-2023

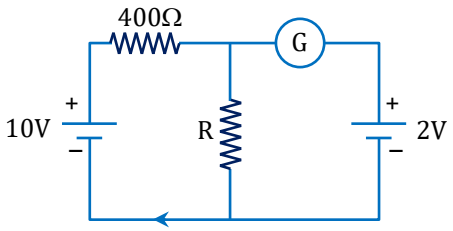
38. The magnitude and direction of the current in the following circuit is :-



(1) 0.5 A from A to B through E
(2) $\frac{5}{9}$ A from A to B through E
(3) 1.5 A from B to A through E
(4) 0.2 A from B to A through E

PCE223

39. If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



(1) 50 Ω (2) 100Ω
(3) 400 Ω (4) 200 Ω

PCE224

40. The resistance of platinum wire at 0°C is 2Ω and 6.8Ω at 80°C. The temperature coefficient of resistance of the wire is :

(1) $3 \times 10^{-3}\,°C^{-1}$ (2) $3 \times 10^{-2}\,°C^{-1}$

(3) $3 \times 10^{-1}\,°C^{-1}$ (4) $3 \times 10^{-4}\,°C^{-1}$

PCE225

41. 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is: -

(1) 100 (2) 1 (3) 1000 (4) 10

PCE226

RE-NEET(UG)-2023

42. A certain wire A has resistance 81 Ω. The resistance of another wire B of same material and equal length but of diameter thrice the diameter of A will be :

(1) 81 Ω (2) 9 Ω

(3) 729 Ω (4) 243 Ω

PCE227

43. A copper wire of radius 1 mm contains 10^{22} free electrons per cubic metre. The drift velocity for free electrons when 10 A current flows through the wire will be (Given, charge on electron = 1.6×10^{-19} C) :

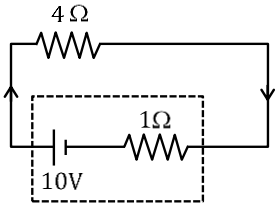
(1) $\frac{6.25\times10^{4}}{\pi} ms^{-1}$ (2) $\frac{6.25}{\pi}\times10^{3} ms^{-1}$

(3) $\frac{6.25}{\pi} ms^{-1}$ (4) $\frac{6.25\times10^{5}}{\pi} ms^{-1}$

PCE228

NEET(UG)-2024

44. The terminal voltage of the battery, whose emf is 10V and internal resistance 1Ω, when connected through an external resistance of 4Ω as shown in the figure.



(1) 4V (2) 6V (3) 8V (4) 10V

PCE229

45. A wire of length 'ℓ' and resistance 100Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is:

(1) 26Ω (2) 52Ω (3) 55Ω (4) 60Ω

PCE230

46. Two heaters A and B have power rating of 1 kW and 2 kW, respectively. Those two are first connected in series and then in parallel to a fixed power source. The ratio of power outputs for these two cases is :

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

PCE231

RE-NEET(UG)-2024

47. A uniform wire of diameter d carries a current of 100 mA when the mean drift velocity of electrons in the wire is v. For a wire of diameter $\frac{d}{2}$ of the same material to carry a current of 200 mA, the mean drift velocity of electrons in the wire is:

(1) 4 v (2) 8 v (3) v (4) 2 v

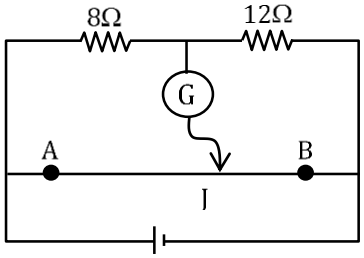
PCE232

48. A uniform metal wire of length ℓ has 10 Ω resistance. Now this wire is stretched to a length 2ℓ and then bent to form a perfect circle. The equivalent resistance across any arbitrary diameter of that circle is:

(1) 10Ω (2) 5Ω (3) 40Ω (4) 20Ω

PCE233

49. The given circuit shows a uniform straight wire AB of 40 cm length fixed at both ends. In order to get zero reading in the galvanometer G, the free end of J is to be placed from B at :



(1) 32 cm (2) 8 cm

(3) 16 cm (4) 24 cm

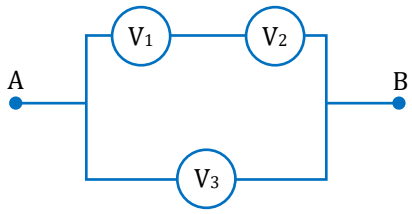
PCE234

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	2	3	2	2	1	4	2	1	2	1	1	3	2	4
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	4	4	3	4	3	2	2	2	2	1	4	2	1	1
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	2	3	1	1	3	4	1	1	2	2	1	2	2	3	2
Question	46	47	48	49											
Answer	2	2	1	4											

Exercise - III (Analytical Questions) Master Your Understanding

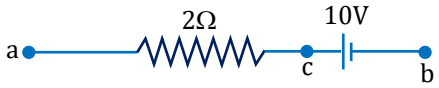
1. Three voltmeters all having different resistance, are joined as shown. When some potential difference is applied across A and B, their readings are V_1, V_2 and V_3. Then



(a) $V_1 = V_2$ (b) $V_1 \neq V_2$
(c) $V_1 + V_2 = V_3$ (d) $V_1 + V_2 > V_3$
(1) only a is correct
(2) only b is correct
(3) only c is correct
(4) only b & c are correct

PCE191

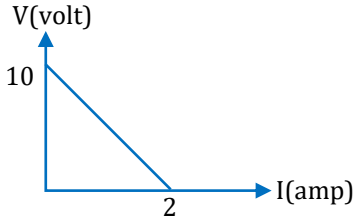
2. In the circuit shown in figure it is given that $V_b - V_a = 2$ volt. Choose the correct options.



(a) Current in the wire is 6 A
(b) Direction of current is from a to b
(c) $V_a - V_c = -12$ volt
(d) $V_c - V_a = -12$ volt
(1) only a & b (2) only b & c
(3) only a & c (4) all

PCE192

3. A battery of e.m.f E and internal resistance r is connected to a resistance R which can be adjusted to any value greater than or equal to zero. A graph is plotted between the current passing through the resistance (I) and potential difference (V) across it. Select the correct alternatives



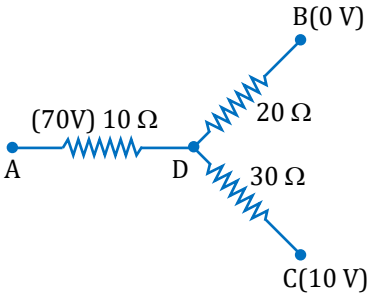
(a) Internal resistance of the battery is 5Ω
(b) emf of the battery is 10 V
(c) maximum current which can be taken from the battery is 2A
(d) V-I graph can never be a straight lines as shown in the figure
(1) only a & b (2) a, b & c
(3) only b & c (4) all

PCE193

4. Two heaters designed for the same voltage V have different power ratings. When connected individually across a source of voltage V, they produce H amount of heat each in times t_1 and t_2 respectively. When used together across the same source, they produce H amount of heat in time t. Then correct option is
(a) If they are in series, $t = t_1 + t_2$
(b) If they are in series, $t = 2(t_1 + t_2)$
(c) If they are in parallel, $t = \frac{t_1 t_2}{(t_1 + t_2)}$
(d) If they are in parallel, $t = \frac{t_1 t_2}{2(t_1 + t_2)}$
(1) only a & c (2) only a & b
(3) only c & d (4) all

PCE195

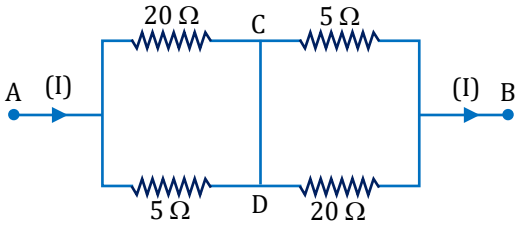
5. In the network shown in figure, points A, B and C are at potentials of 70 V, 0 and 10 V respectively.



(a) Point D is at a potential of 40V.
(b) The currents in the sections AD, DB, DC are in the ratio 3:2:1
(c) The currents in the sections AD, DB, DC are in the ratio 1:2:3.
(d) The network draws a total power of 200 W.
(1) only a is correct
(2) a and c are correct
(3) a, b, d are correct
(4) None of these

PCE196

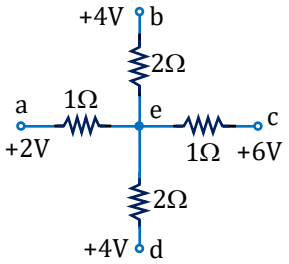
6. When some potential difference is maintained between A and B, current I enters the network at A and leaves at B see figure.



(a) The equivalent resistance between A and B is 8Ω
(b) C and D are at the same potential.
(c) No current flows between C and D
(d) Current 3I/5 flows from D to C.
(1) a, b, d are correct
(2) a, d are correct
(3) a, c, d are correct
(4) all are correct

PCE197

7. For the circuit shown in figure, match the two columns.

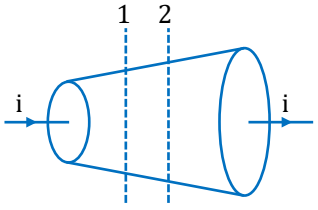


	Column-I		Column-II
(a)	Current in wire ae	(p)	1 A
(b)	Current in wire be	(q)	2 A
(c)	Current in wire ce	(r)	0.5 A
(d)	Current in wire de	(s)	Zero

(1) a-q, b-s, c-q, d-s (2) a-q, b-q, c-s, d-p
(3) a-p, b-r, c-s, d-q (4) a-q, b-r, c-p, d-s

PCE198

8. Current i is flowing through a wire of non-uniform cross section as shown. Match the following two columns.

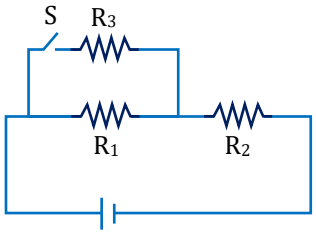


	Column-I		Column-II
(a)	Current density	(p)	is more at 1
(b)	Electric field	(q)	is more at 2
(c)	Resistance per unit length	(r)	is same at both sections 1 and 2
(d)	Potential difference per unit length	(s)	data insufficient

(1) a-p, b-p, c-p, d-p (2) a-q, b-r, c-s, d-p
(3) a-q, b-q, c-p, d-p (4) a-p, b-q, c-r, d-s

PCE199

9. In the circuit shown in figure, after closing the switch S, match the following two columns.



	Column-I		Column-II
(a)	Current through R_1	(p)	will increase
(b)	Current through R_2	(q)	will decrease
(c)	Potential difference across R_1	(r)	will remain same
(d)	Potential difference across R_2	(s)	data insufficient

(1) a-p, b-q, c-r, d-s (2) a-p, b-r, c-s, d-q
(3) a-p, b-r, c-s, d-p (4) a-q, b-p, c-q, d-p

PCE200

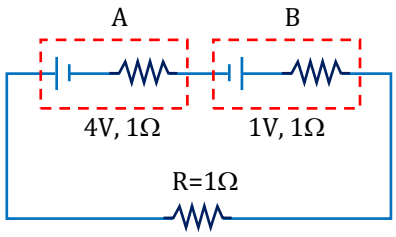
10. Match the following two columns.

	Column-I		Column-II
(a)	Electrical resistance	(p)	$[ML^3T^{-3}A^{-2}]$
(b)	Electrical potential	(q)	$[ML^2T^{-3}A^{-2}]$
(c)	Specific resistance	(r)	$[ML^2T^{-3}A^{-1}]$
(d)	Specific conductance	(s)	None of these

(1) a-q, b-s, c-r, d-p (2) a-q, b-r, c-p, d-s
(3) a-p, b-q, c-s, d-r (4) a-p, b-r, c-q, d-s

PCE201

11. In the circuit shown in the figure, match the following two columns:



	Column-I		Column-II (In SI units)
(a)	Potential difference across battery A	(p)	Zero
(b)	Potential difference across battery B	(q)	1
(c)	Net power consumed by R	(r)	2
(d)	Potential difference across R	(s)	3

(1) a-p, b-q, c-r, d-s (2) a-s, b-q, c-r, d-p
(3) a-s, b-r, c-q, d-q (4) a-q, b-r, c-s, d-s

PCE202

12. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Drift velocity of electron in a metallic wire will decrease if temperature of wire is increased

Reason (R) : On increasing temperature conductivity of metallic wire decreases.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE203

13. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Resistance of ammeter is less than resistance of milliammeter, (If made from same galvanometer)

Reason (R) : Value of shunt resistance in case of ammeter is more than a milliammeter.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE204

14. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Electric field is present inside the current carrying wire.

Reason (R) : The principle of conservation of charge is followed, when charges are in motion.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE205

15. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : In balanced Wheatstone bridge, the current through cell depends on resistance of galvanometer.

Reason (R) : At balanced condition current through galvanometer is zero.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE206

16. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : In series combination of electrical bulb, lower power rating bulb emits more light than that of higher power rating bulb.

Reason (R) : The lower power rating bulb in series gets more current than the higher power rating bulb.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE207

17. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : When an external resistor of resistance R (connected across a cell of internal resistance r) is varied, power consumed by resistance R is maximum when R = r.

Reason (R) : Power consumed by a resistor of constant resistance R is maximum when current through it is maximum.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE208

18. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Ohm's law holds only for small currents in metallic wire not for high currents.

Reason (R) : For metallic wire resistance increases with increase in temperature.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE209

19. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : In a Meter Bridge experiment, null point for an unknown resistance is measured. Now, the unknown resistance is put inside an enclosure maintained at a higher temperature. The null point can be obtained at the same point as before by decreasing the value of the standard resistance.

Reason (R) : Resistance of a metal increases with increase in temperature.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

PCE210

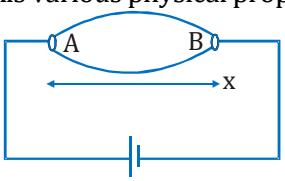
20. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A) : Kirchoff's loop law represents conservation of energy
Reason (R) : If the sum of "Potential Differences" around a closed loop is zero, unlimited energy could be gained by repeatedly carrying a charge around a loop
In the light of the above statements, choose the most appropriate answer from the options given below:
(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

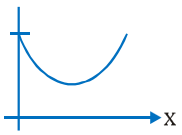
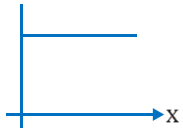
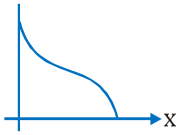
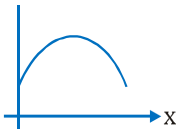
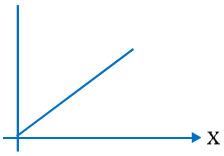
PCE211

21. If the current in resistance of uniform cross section is doubled then, (assume temperature to be approximately constant).
(A) the current density is doubled
(B) the conduction electron density is doubled
(C) the mean time between collision is constant
(D) the electron drift speed is doubled
(1) A, C, D (2) B, C, D
(3) A, B, C (4) A, B, C, D

PCE213

22. A resistor of varying cross–section is attached with a battery as shown. Variation of area from both ends are similar and areas are same at ends and maximum at centre. Match the approximate graphical representation of various physical properties in columns, where x axis represents position from end A of resistor and y–axis various physical properties.

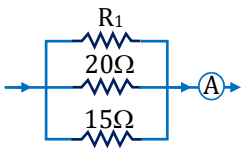


Column I	Column II
(A) i (current)	(P) 
(B) j (current density)	(Q) 
(C) E (electric field)	(R) 
(D) V_d (potential)	(S) 
	(T) 

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

PCE214

23. In the given circuit the current flowing through the resistance 20 ohms is 0.3 ampere while the ammeter reads 0.9 ampere. What is the value of R_1(in ohms).



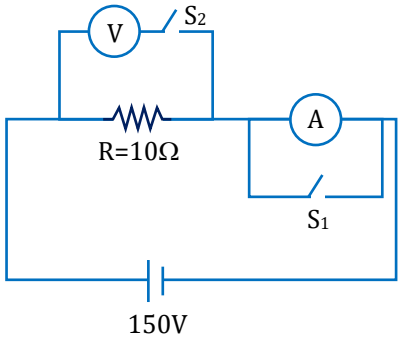
(1) 20Ω (2) 15Ω (3) 30Ω (4) 60Ω

PCE215

24. **Statement 1**: Voltage across a battery is always less than its emf.
and
Statement 2 : There is always some loss of energy due to internal resistance of the battery.
(1) Statement–1 is True, Statement–2 is True; Statement–2 is a correct explanation for Statement–1.
(2) Statement–1 is True, Statement–2 is True; Statement–2 is not a correct explanation for Statement–1.
(3) Statement–1 is True, Statement–2 is False.
(4) Statement–1 is False, Statement–2 is True.

PCE216

25. Voltmeter of resistance 10Ω and ammeter of resistance 10Ω are attached in the following circuit with switches S_1 and S_2



Column I (switch position)	Column II (reading of voltmeter & ammeter)
(A) S_1 open, S_2 closed	(P) 0, 7.5 A
(B) S_1 closed, S_2 open	(Q) 50 V, 10A
(C) S_1 open, S_2 open	(R) 0, 0
(D) S_1 closed, S_2 closed	(S) 150 V, 0

Options :-

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

PCE219

26.

	Column-I (Situration)		Column-II (Values in MKS units)
(A)	Magnitude of electric field at (1,1,1) if potential is given by $V=-\frac{1}{x}-\frac{1}{y}-\frac{1}{z}$, is	(P)	0.4
(B)	The charge flowing through a resistance 6Ω varies with t as Q = 4t – 2t². The total heat produced in resistance till the current reach to zero.	(Q)	$\sqrt{3}$
(C)	A milliammeter of range 10mA has a coil of resistance 0.99 Ω. To use it as an ammeter of range 1A, the required shunt must have a resistance of	(R)	0.01
(D)	Two unlike point charges of same magnitude 10 mC are placed on x-axis at a separation of 8 cm. If both charges placed symmetrically about origin in external electric field $\vec{E}=500\text{Vm}^{-1}\,\hat{i}$. Then potential energy of the system may be [Assume potential energy to be zero when dipole is perpendicular to electric field]	(S)	32

Options :-

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

PCE220

27. **Statement-1** : In real battery total chemical energy lost in the battery can not be obtained at load resistance.
Statement-2 : Two heaters with different resistance are connected in parallel. Higher resistance heater will glow more.

(1) Statement–1 is True, Statement–2 is True; Statement–2 is a correct explanation for Statement–1.
(2) Statement–1 is True, Statement–2 is True; Statement–2 is not a correct explanation for Statement–1.
(3) Statement–1 is True, Statement–2 is False.
(4) Statement–1 is False, Statement–2 is True.

PCE221

EXERCISE-III (Analytical Questions) ANSWER KEY

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