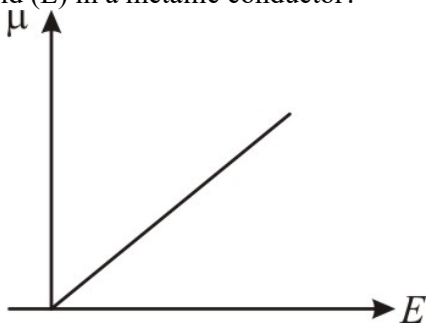
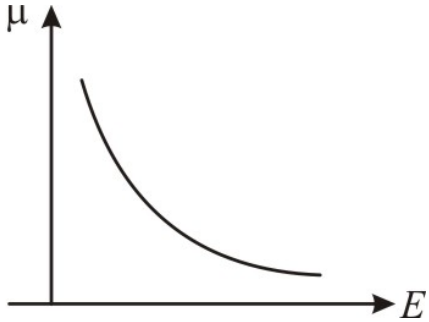
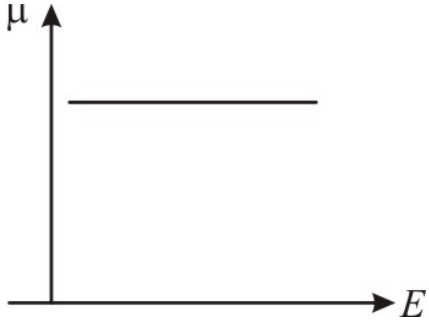
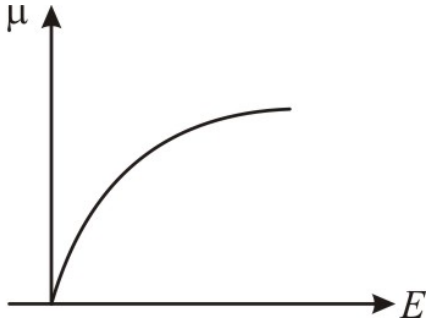
1. Which of the following graphs correctly represents the variation of mobility (μ) of electrons with applied electric field (E) in a metallic conductor?

1.


2.


3.


4.


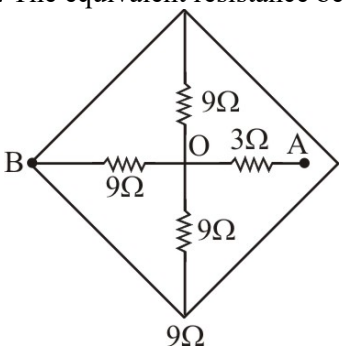
2. The drift velocity of free electrons in a conductor is 'v' when a current 'i' is flowing in it. If both the radius and current are doubled, then drift velocity will be:

1. v
2. $\frac{v}{2}$
3. $\frac{v}{4}$
4. $\frac{v}{8}$

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

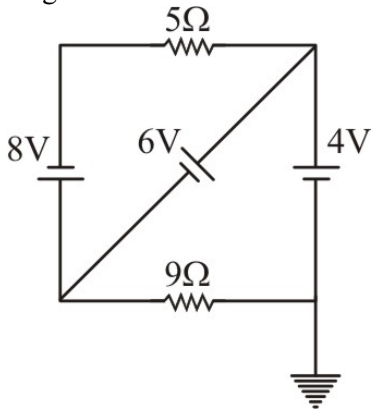
1. 1 Amp
2. 2 Amp
3. 4 Amp
4. Infinite

4. The equivalent resistance between A and B is:



1. 3Ω
2. 6Ω
3. 9Ω
4. 12Ω

5. The current through the 5Ω resistor is:

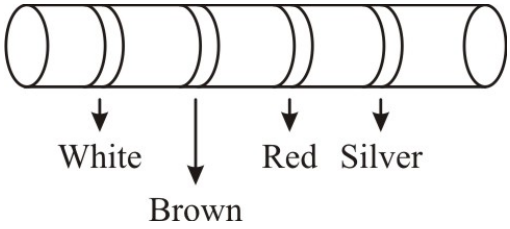


(1) 3.2 A
(2) 2.8 A
(3) 0.8 A
(4) 0.2 A

6. The current in a wire varies with time according to the relation i= (3+2t)A. The amount of charge passing a cross section of the wire in the time interval t=0 to t=4.0 sec would be (where t is time in seconds)

1. 28 C
2. 30.5 C
3. 8 C
4. 82 C

7. In the figure, a carbon resistor has bands of different colours on its body as shown. The value of the resistance is:

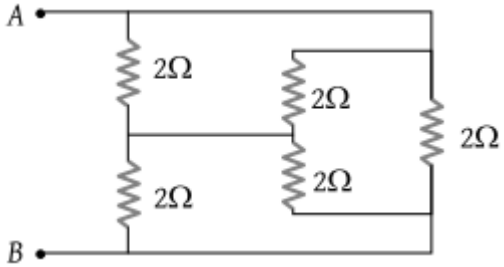


1. 2.2 KΩ
2. 3.3 KΩ
3. 5.6 KΩ
4. 9.1 KΩ

8. Drift velocity v_d varies with the intensity of electric field as per the relation
(1) $v_d \propto E$
(2) $v_d \propto \frac{1}{E}$
(3) v_d = constant
(4) $v_d \propto E^2$

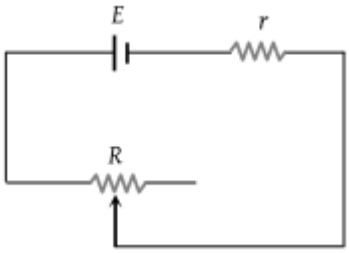
9. A metallic block has no potential difference applied across it, then the mean velocity of free electron is (T = absolute temperature of the block):
(1) proportional to T.
(2) proportional to $\sqrt{\mathrm{T}}$.
(3) zero.
(4) finite but independent of temperature.

10. Find the equivalent resistance across AB.



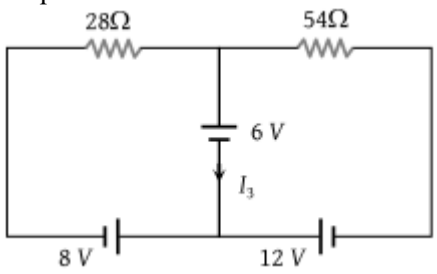
(1) 1 Ω
(2) 2 Ω
(3) 3 Ω
(4) 4 Ω

11. A battery of e.m.f. E and internal resistance r is connected to a variable resistor R as shown here. Which one of the following is true?



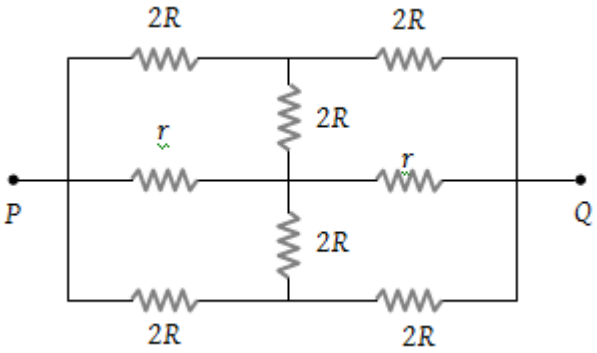
(1) Potential difference across the terminals of the battery is maximum when $R = r$.
(2) Power delivered to the resistor is maximum when $R = r$.
(3) Current in the circuit is maximum when $R = r$.
(4) Current in the circuit is maximum when $R >> r$.

12. Consider the circuit shown in the figure. The current I_3 is equal to :



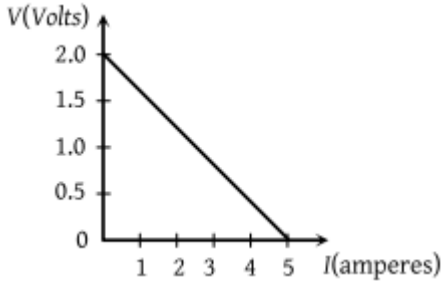
(1) 5 *amp*
(2) 3 *amp*
(3) –3 *amp*
(4) –5/6 *amp*

13. The effective resistance between points P and Q of the electrical circuit shown in the figure is:



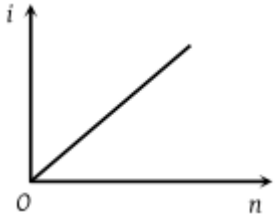
(1) $2Rr/(R+r)$
(2) $8R\,(R+r)/(3R+r)$
(3) $2r + 4R$
(4) $5R/2 \; + \; 2r$

14. For a cell, the graph between the potential difference (V) across the terminals of the cell and the current (I) drawn from the cell is shown in the figure. The e.m.f. and the internal resistance of the cell is:



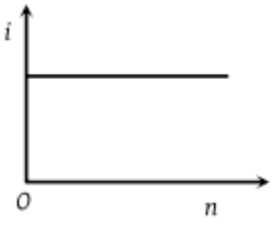
(1) 2V, 0.5 Ω
(2) 2 V, 0.4 Ω
(3) > 2 V, 0.5 Ω
(4) > 2 V, 0.4 Ω

15. A battery consists of a variable number 'n' of identical cells having internal resistances connected in series. The terminals of battery are short circuited and the current i is measured. Which of the graph below shows the relation ship between i and n

(1)


(2)


(3)


(4)


16. The resistance of a wire is R ohm. If it is melted and stretched to n times its original lenght, its new resistance will be:
(1) nR
(2) $\frac{R}{n}$
(3) n^2R
(4) $\frac{R}{n^2}$

17. 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 becomes 10I. The value of 'n' is:
1. 10
2. 11
3. 20
4. 9

18. 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

19. 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. $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$
2. $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$
3. $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$
4. $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

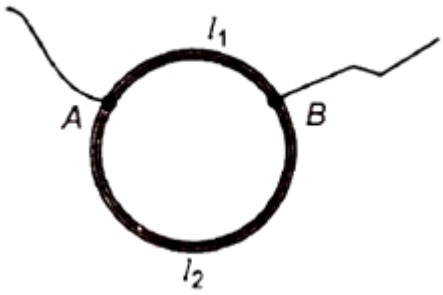
20.

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 density
2. current
3. drift velocity
4. electric field

21.
A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be:
1. 4Ω
2. 8Ω
3. 16Ω
4. 2Ω

22.
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. 0.5Ω
2. 0.8Ω
3. 1.0Ω
4. 0.2Ω

23. A ring is made of a wire having a resistance R_0= 12Ω. 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 subcircuit between these points is equal to 8/3 Ω.



1. $\frac{l_1}{l_2} = \frac{5}{8}$
2. $\frac{l_1}{l_2} = \frac{1}{3}$
3. $\frac{l_1}{l_2} = \frac{3}{8}$
4. $\frac{l_1}{l_2} = \frac{1}{2}$

24.
A student measures the terminal potential difference (V) of a cell (of emf E 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, respectively, equal to:
1. E and -r

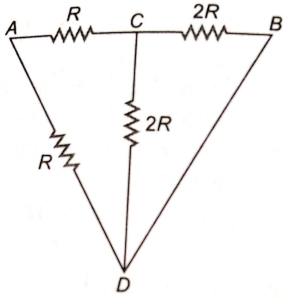
2. -r and E

3. r and -E

4. -E and r

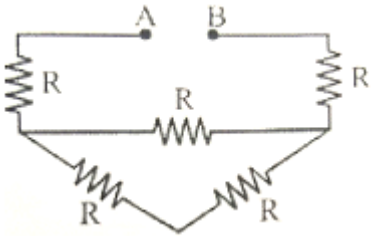
25. The current in a wire varies with time according to the equation I = 4 + 2t, where I is in ampere and t is in sec. The quantity of charge which has passed through a cross-section of the wire during the time t = 2 sec to t = 6 sec will be:
(1) 60 coulomb
(2) 24 coulomb
(3) 48 coulomb
(4) 30 coulomb

26. What is total resistance across AB in the following network?



1. R
2. 2R
3. $\frac{3R}{5}$
4. $\frac{2R}{3}$

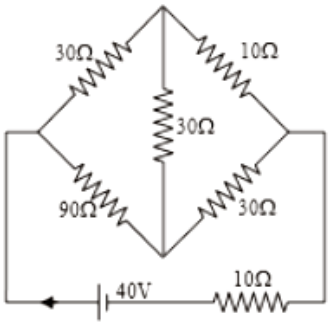
27. What is the equivalent resistance between A and B in the figure below if R = 3 Ω ?



1. 9Ω
2. 12Ω
3. 15Ω
4. None of these

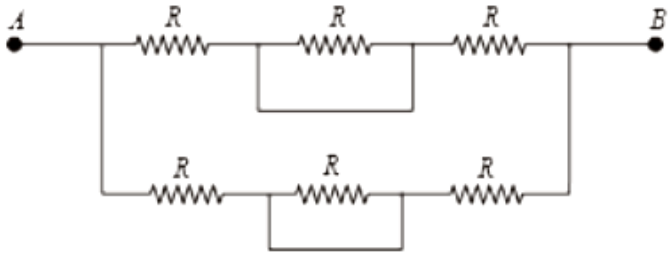
28. A battery of internal resistance r, when connected across 2Ω resistor supplies a current of 4A. When the battery is connected across a 5Ω resistor, it supplies a current of 2A. The value of r is:
1. 2Ω
2. 1Ω
3. 0.5Ω
4. zero

29. In the circuit shown in the figure, the current supplied by the battery is



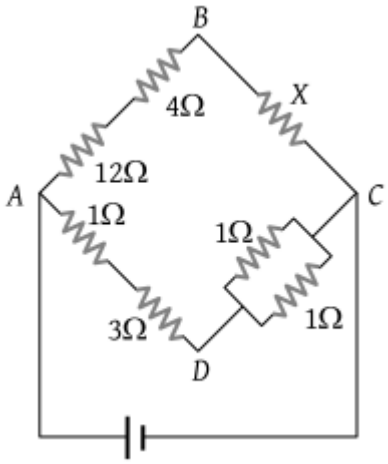
1. 2A
2. 1A
3. 0.5A
4. 0.4A

30. The equivalent resistance between points A and B in the circuit shown in the figure is:



1. 6R
2. 4R
3. 2R
4. R

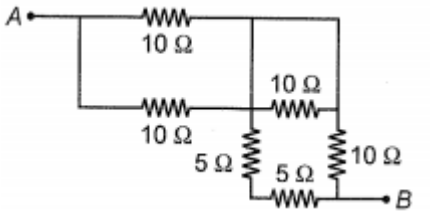
31. In the circuit shown in the adjoining figure, the potential difference between B and D is zero, the unknown resistance is:



(1) 4 Ω
(2) 2 Ω
(3) 3 Ω
(4) EMF of a cell is required to find the value of X

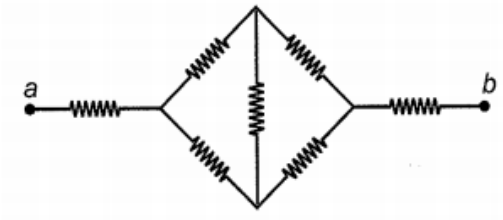
32. If the potential difference across ends of a metallic wire is doubled, the drift velocity of charge carriers will become:
1. Double
2. Halved
3. Four times
4. One-fourth

33. The resistance between terminals A and B is:



1. 5 Ω
2. 15 Ω
3. 10 Ω
4. 20 Ω

34. What is the equivalent resistance between points a and b, if the value of each resistance is R?



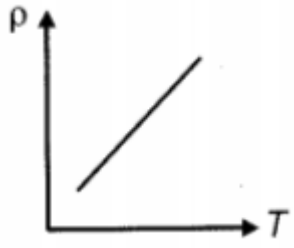
1. 7 R
2. 5 R
3. 4 R
4. 3 R

35. The current passes through a wire of variable cross-section in steady-state as shown. Then incorrect statement is:



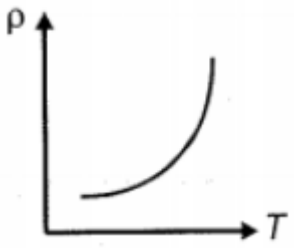
(1) Current density increases in the direction of the current.
(2) Potential increases in the direction of the current.
(3) Electric field increases in the direction of the current.
(4) Drift speed increases in the direction of the current.

36. The temperature (T) dependence of resistivity (ρ) of a semiconductor is roughly represented by:

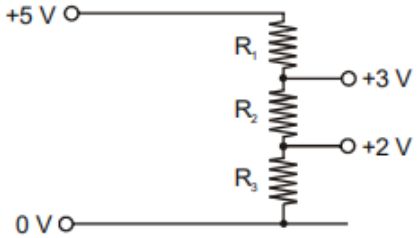
1. 

2. 

3. 

4. 

37. A potential divider is used to give outputs of 2 V and 3 V from a 5 V source, as shown in the figure.



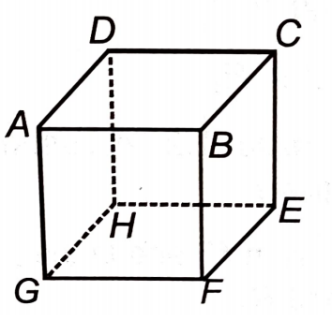
Which combination of resistances R_1, R_2, and R_3 give the correct voltages?

1. $R_1 = 1\ k\Omega,\ R_2 = 1\ k\Omega,\ R_3 = 2\ k\Omega$
2. $R_1 = 2\ k\Omega,\ R_2 = 1\ k\Omega,\ R_3 = 2\ k\Omega$
3. $R_1 = 1\ k\Omega,\ R_2 = 2\ k\Omega,\ R_3 = 2\ k\Omega$
4. $R_1 = 3\ k\Omega,\ R_2 = 2\ k\Omega,\ R_3 = 2\ k\Omega$

38. A charged particle having drift velocity of $7.5 \times 10^{-4}\ ms^{-1}$ in an electric field of $3 \times 10^{-10}\ Vm^{-1}$, has mobility in $m^2V^{-1}s^{-1}$ of:

1. 2.5×10^{6}
2. 2.5×10^{-6}
3. 2.25×10^{-15}
4. 2.25×10^{15}

39. Twelve wires of equal resistance R are connected to form a cube. The effective resistance between two diagonal ends A and E will be:

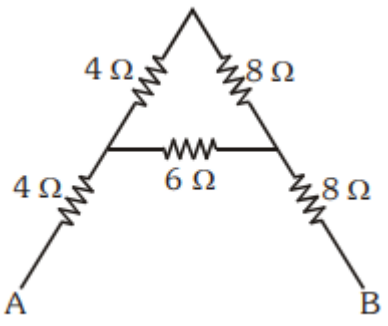


1. $\frac{5R}{6}$
2. $\frac{6R}{5}$
3. 12R
4. 3R

40. Two solid conductors are made up of the same material, have the 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:

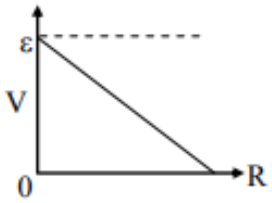
1. 1.5
2. 1
3. 0.8
4. 2

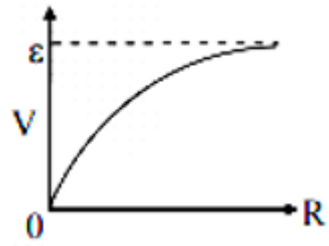
41. The equivalent resistance between A and B for the mesh shown in the figure is:

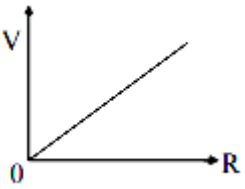


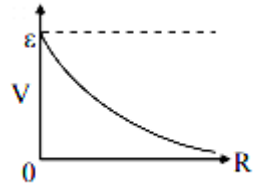
1. $7.2\ \Omega$
2. $16\ \Omega$
3. $30\ \Omega$
4. $4.8\ \Omega$

42. 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 -

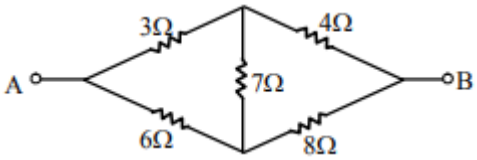
1. 

2. 

3. 

4. 

43. Calculate the net resistance of the circuit between A and B:



1. 8/3 Ω
2. 14/3 Ω
3. 16/3 Ω
4. 22/3 Ω

44. A car battery of emf 12 V and internal resistance 5×10^{-2} Ω, receives a current of 60 A from external source, then terminal voltage of battery is :
1. 12 V
2. 9 V
3. 15 V
4. 20 V

45. The terminal potential difference of a cell is greater than its emf when -
1. A battery of less emf is connected in its series
2. A battery of higher emf is connected in its series
3. A battery of higher emf is connected in its parallel
4. A battery of less emf is connected in its parallel

46. For a cell, the terminal P.D. is 2.2V when the circuit is open and reduces to 1.8V when the cell is connected to the resistance of R = 5Ω. The internal resistance of cell (r) is:
1. $\frac{10}{9}\Omega$
2. $\frac{9}{10}\Omega$
3. $\frac{11}{9}\Omega$
4. $\frac{5}{9}\Omega$

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