Exercise-1

Marked Questions can be used as Revision Questions.

OBJECTIVE QUESTIONS

Section (A) : DefinItion of Current, Current Densities, Drift

A-1. The drift velocity of electrons in a conducting wire is of the order of 1mm/s, yet the bulb glows very quickly after the switch is put on because
(1) The random speed of electrons is very high, of the order of 10^6 m/s
(2) The electrons transfer their energy very quickly through collisions
(3) Electric field is set up in the wire very quickly, producing a current through each cross section, almost intantaneously
(4) All of above

A-2. In the presence of an applied electric field ($\vec{E}$) in a metallic conductor.
(1) The electrons move in the direction of $\vec{E}$
(2) The electrons move in a direction opposite to $\vec{E}$
(3) The electrons may move in any direction randomly, but slowly drift in the direction of $\vec{E}$.
(4) The electrons move randomly but slowly drift in a direction opposite to $\vec{E}$.

Section (B) : Resistance

B-1. Specific resistance of a wire depends on its
(1) mass (2) length (3) area of cross–section (4) None of the above

B-2. There are two wires of the same length and of the same material and radii r and 2r. The ratio of their specific resistance is
(1) 1 : 2 (2) 1 : 1 (3) 1 : 4 (4) 4 : 1

B-3. If the length and cross-section of a wire is doubled, then the resistance will
(1) become half (2) increase two times (3) remain unchanged (4) increase four times

B-4. V-i graph for an ohmic resistance is
(1) straight line (2) hyperbola (3) parabola (4) circle

B-5. When a resistance wire is passed through a die the cross–section area decreases by 1%, the change in resistance of the wire is
(1) 1% decrease (2) 1% increase (3) 2% decrease (4) 2% increase

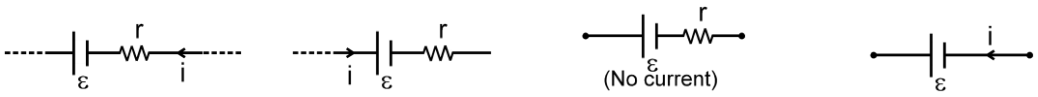
B-6. When the resistance of copper wire is 0.1 Ω and the radius is 1 mm, then the length of the wire is (specific resistance of copper is 3.14×10^{-8} ohm x m)
(1) 10 cm (2) 10 m (3) 100 m (4) 100 cm

B-7. The resistance of a wire of cross-section 'a' and length 'ℓ' is R ohm. The resistance of another wire of the same material and of the same length but cross-section '4a' will be
(1) 4R (2) $\frac{R}{4}$ (3) $\frac{R}{16}$ (4) 16 R

Section (C) : Power, Energy, Battery, emf, terminal Voltage

C-1. In an electric circuit containing a battery, the positive charge inside the battery
(1) Always goes from the positive terminal to the negative terminal
(2) May go from the positive terminal to the negative terminal
(3) Always goes from the negative terminal to the positive terminal
(4) Does not move.

C-2.



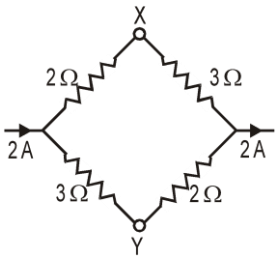
(a) (b) (c) (b)

In which of the above cells, the potential difference between the terminals of a cell exceeds its emf.

(1) a (2) b (3) c (4) d

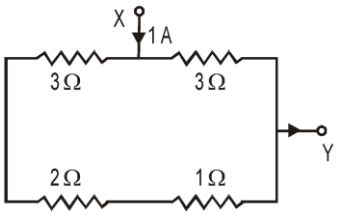
Q.C-3-C-7 For the following circuits, the potential difference between X and Y in volt is ($V_x - V_y$)

C-3.



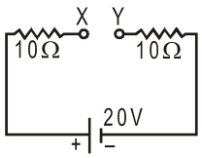
(1) 1 (2) –1 (3) 2 (4) –2

C-4.



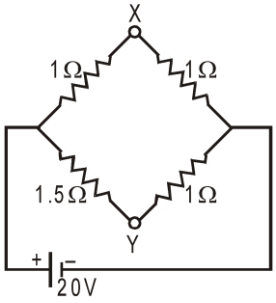
(1) 2 (2) 3 (3) 6 (4) 9

C-5.



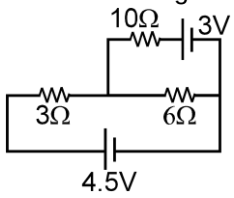
(1) 10 (2) 20 (3) 0 (4) 5

C-6.



(1) 0.1 (2) 2 (3) 0.3 (4) 0.4

C-7. Find the current through the 10 Ω resistor shown in figure

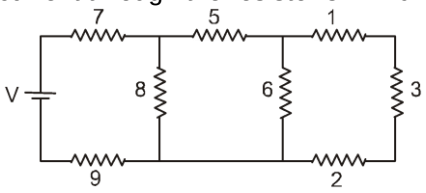


(1) zero (2) 1 A (3) 2A (4) 5 A

C-8. The resistance of P, Q, R S arms of a Wheatstone bridge are 5, 15, 20 and 60Ω. A cell of 4 volt emf and 4Ω internal resistance is connected with them, then the current flowing (in ampere) is
(1) 0.1 (2) 0.2 (3) 1 (4) 2

Section (D) : Combination of Resistance

D-1. In the ladder network shown, current through the resistor 3 Ω is 0.25 A. The input voltage 'V' is equal to



(1) 10 V (2) 20 V (3) 5 V (4) $\frac{15}{2}$ V

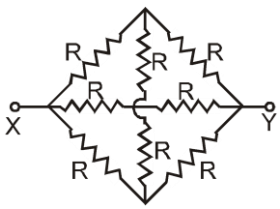
D-2. A wire has a resistance of 12 ohms. If it is bent in the form of a circle. The effective resistance between the two points on any diameter is equal to
(1) 6 Ω (2) 3 Ω (3) 9 Ω (4) 12 Ω

D-3. A wire has a resistance 12 ohms. if it is bent in the form of an equilateral triangle. The resistance between any two terminals is
(1) 8/3 (2) 3/4 (3) 4 (4) 3

D-4. There are five resistances of 1 ohm each. If the initial three resistance are joined in parallel and rest two are joined in series, then the final resistance is
(1) 3 ohm (2) 8 ohm (3) 7/3 ohm (4) 5 ohm

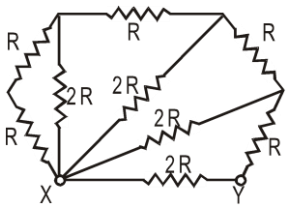
Que-D-5 to D-9. For the following circuits, the equivalent resistance between X and Y in Ω is

D-5.



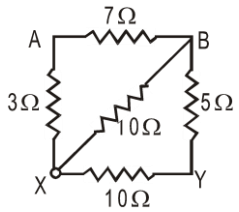
(1) 2R/3 (2) R/3 (3) 2 R (4) 3 R

D-6. (Take R = 3 Ω)



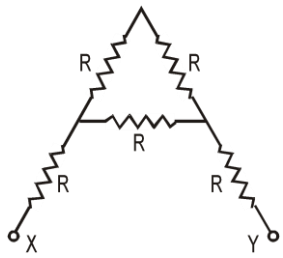
(1) R (2) 2R (3) 3R (4) R/2

D-7.



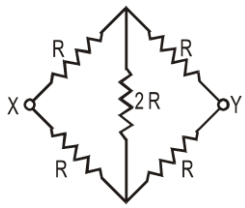
(1) 2 Ω (2) 3 Ω (3) 4 Ω (4) 5 Ω

D-8.



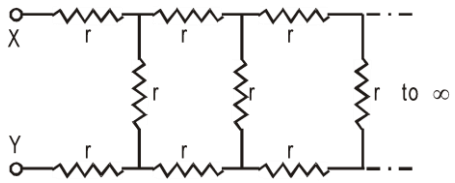
(1) 4 R (2) 8 R/3 (3) R (4) 3 R

D-9.



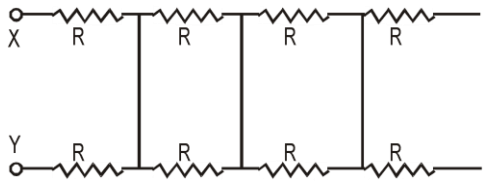
(1) R (2) 4 R (3) 5 R (4) 6 R

D-10.



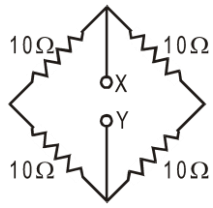
(1) $(1+\sqrt{3})r$ (2) $(\sqrt{3}-1)r$ (3) ∞ (4) 50 r

D-11.



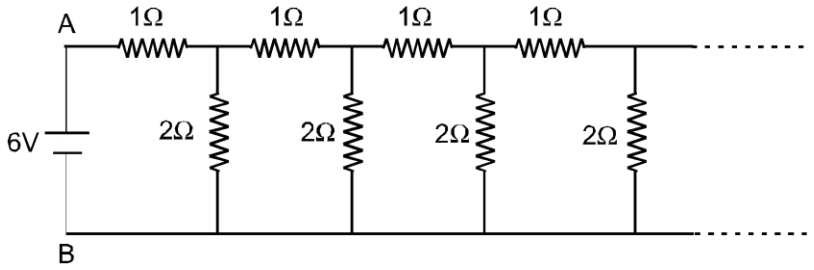
(1) R (2) 2R (3) R/2 (4) 4 R

D-12.



(1) 10 Ω (2) 20 Ω (3) 30 Ω (4) ∞ Ω

D-13. An infinite ladder network of resistance is constructed with 1Ω and 2Ω resistance, as shown in figure.



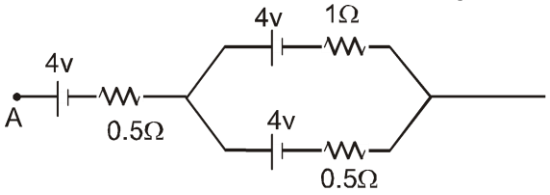
(i) What will be the effective resistance between A and B.
(1) 1Ω (2) 2Ω (3) 3Ω (4) 4Ω

(ii) What is the current that passes through the 2Ω resistance nearest to the battery ?
(1) 1A (2) 2A (3) 1.5A (4) 4A

Section (E) : Combination of Cells

E-1. Two nonideal batteries are connected in parallel. Consider the following statements
(I) The equivalent emf is smaller than either of the two emfs.
(II) The equivalent internal resistance is smaller than either of the two internal resistance.
(1) Both I and II are correct (2) I is correct but II is wrong
(3) II is correct but I is wrong (4) Each of I and II is wrong.

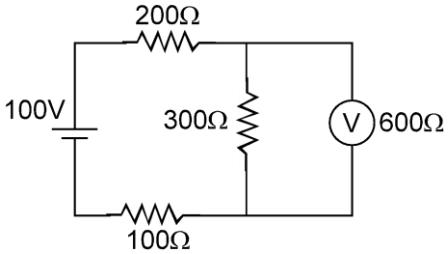
E-2. Find the equivalent emf of the three batteries as shown in the figure.



(1) 0 (2) 4 v (3) 8 v (4) 12 v

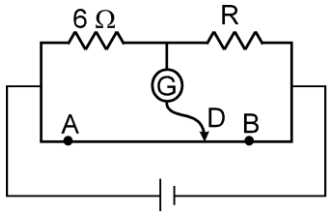
Section (F) : Instrument

F-1. The reading of voltmeter is



(1) 50V (2) 60 V (3) 40V (4) 80 V

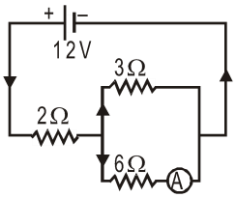
F-2. The meter-bridge wire AB shown in figure is 50 cm long. When AD = 30 cm, no deflection occurs in the galvanometer. Find R.



(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

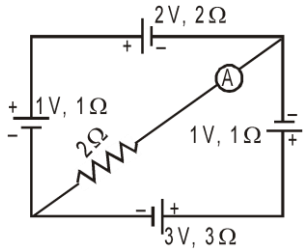
Reading of ammeter in ampere for the following circuit is (Q. F-3 to F-5)

F-3.



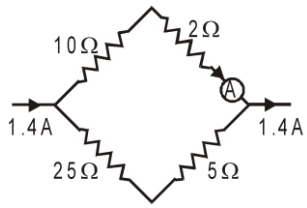
(1) 4 (2) 3 (3) 1 (4) 2

F-4.



(1) 2/15 (2) 1/13 (3) 2/11 (4) 2/17

F-5.



(1) 0.4 (2) 1 (3) 0.6 (4) 1.2

F-6. The potential gradient of a potentiometer wire is defined as
(1) the fall of potential per unit length (2) the fall of potential per unit area
(3) the fall in potential across the ends of wires (4) None of the above

F-7. The unit of potential gradient is
(1) volt (2) volt/ampere (3) volt/meter (4) volt x meter

F-8. The length of the potentiometer wire is kept larger (keeping the potential difference across same) so that the value of potential gradient will
(1) increase (2) decrease
(3) remain uniform all over the length of its wire (4) None of the above

F-9. For the same potential difference, a potentiometer wire is replaced by another one of a high specific resistance. The potential gradient then ($r = R_h = 0$)
(1) decreases (2) remains same (3) increases (4) data is incomplete

F-10. If the current in a potentiometer increases, the position of the null point will
(1) be obtained at a larger length than the previous one
(2) be equal to the previous length
(3) be obtained at a smaller length than the previous
(4) None of the above

F-11. The sensitivity of a potentiometer is increased by
(1) increasing the emf of the cell (2) increasing the length of potentiometer wire
(3) decreasing the length of potentiometer wire (4) None of the above

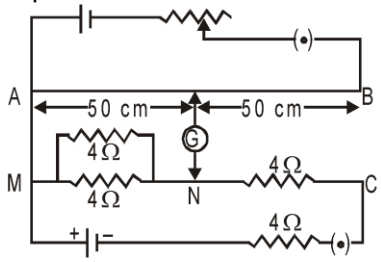
F-12. In a potentiometer wire, whose resistance is 0.5 ohm/m, a current of 2 ampere is passing. The value of potential gradient in volt/m will be
(1) 0.1 (2) 0.5 (3) 1.0 (4) 4

F-13. The potentiometer wire 10 m long and 20 ohm resistance is connected to a 3 volt emf battery and a 10 ohm resistance. The value of potential gradient in volt/m of the wire will be
(1) 1.0 (2) 0.2 (3) 0.1 (4) 0.02

F-14. The potential gradient of potentiometer is 0.2 volt/m. A current of 0.1 amp is flowing through a coil of 2 ohm resistance. The balancing length in meters for the p.d. at the ends of this coil will be
(1) 2 (2) 1 (3) 0.2 (4) 0.1

F-15. The emf of a standard cell is 1.5 volt and its balancing length is 7.5 m. The balancing length in meters for a 3.5 ohm resistance, through which a current of 0.2 A, flows will be
(1) 3.5 (2) 5.0 (3) 5.7 (4) 6.5

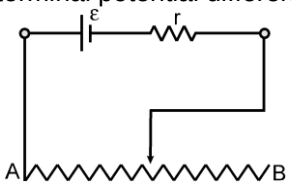
F-16. In the following figure, the p.d. between the points M and N is balanced at 50 cm length. The balancing length in cm, for the p.d. between points N and C will be



(1) 40 (2) 100 (3) 75 (4) 25

F-17. A potentio meter wire has length 10 m & resistance 10 Ω. It is connected to a battery of EMF 11 volt & internal resistance 1 Ω, then the potential gradient in the wire is:
(1) 1 v/m (2) 10 v/m (3) 0.1 v/m (4) none

F-18. Battery of internal resistor ' r ' and e.m.f. ε is connected to a variable external resistance AB. If the sliding contact is moved from A to B, then terminal potential difference of battery will :



(1) remain constant & is independent of value of external resistance
(2) increase continuously
(3) decrease continuously
(4) first increase and then will decrease.

Exercise-2

Marked Questions can be used as Revision Questions.

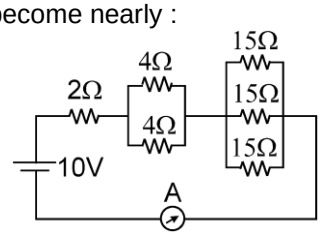
PART - I : OBJECTIVE QUESTIONS

1. Two coils connected in series have resistances 600 Ω and 300 Ω at 20°C and temperature coefficient of resistivity 0.001 k^{-1} and 0.004 k^{-1} respectively.

(a) The resistance of the combination at temperature 50°C is
(1) 426 Ω (2) 954 Ω (3) 1806 Ω (4) 214 Ω

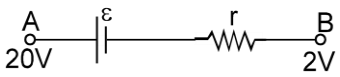
(b) The effective temperature coefficient of the combination is
(1) $\frac{1}{1000}$ degree^{-1} (2) $\frac{1}{250}$ degree^{-1} (3) $\frac{1}{500}$ degree^{-1} (4) $\frac{3}{1000}$ degree^{-1}

2. The current through the ammeter shown in figure is 1 A. If each of the 4Ω resistor is replaced by 2Ω resistor, the current in circuit will become nearly :



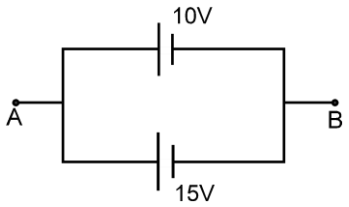
(1) $\frac{10}{9}$ A (2) $\frac{5}{4}$ (3) $\frac{9}{8}$ A (4) $\frac{9}{8}$ A

3. In the figure a part of circuit is shown :



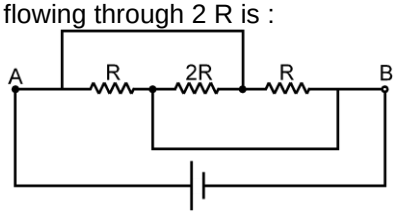
(1) current will flow from A to B
(2) current may flow from A to B
(3) current will flow from B to A
(4) the direction of current will depend on *r*.

4. Two cells of e.m.f. 10 V & 15 V are connected in parallel to each other between points A & B. The cell of e.m.f. 10 V is ideal but the cell of e.m.f. 15 V has internal resistance 1 Ω. The equivalent e.m.f. between A and B is :



(1) $\frac{25}{2}$ V (2) not defined (3) 15 V (4) 10 V

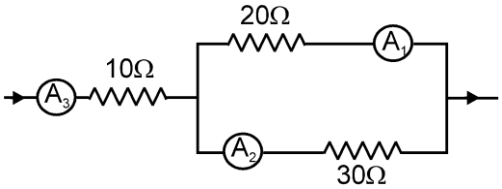
5. In the figure shown the current flowing through 2 R is :



(1) from left to right (2) from right to left (3) no current (4) None of these

6. Read the following statements carefully :
Y : The resistivity of semiconductor decreases with increase of temperature.
Z : In a conducting solid, the rate of collisions between free electrons and ions increases with increase of temperature.
Select the correct statement (s) from the following :
(1) Y is true but Z is false
(2) Y is false but Z is true
(3) Both Y and Z are true
(4) Y is true and Z is the correct reason for Y

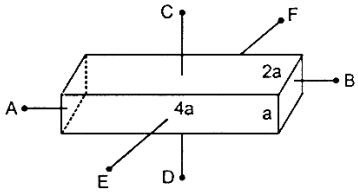
7. If the reading of ammeter A_1 in figure is 2.4 A. Neglecting the resistances of the ammeters, the reading of ammeter A_2 will be : (ammeters are ideal)



(1) 1.6 A (2) 1.2 A (3) 1 A (4) 2 A

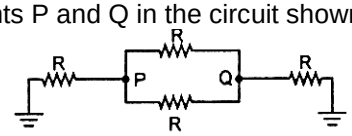
8. In the previous question the reading of ammeter A_3 will be :
(1) 1.6 A (2) 1.2 A (3) 4 A (4) 2 A

9. A conductor with rectangular cross section has dimension (a × 2a × 4a) as shown in fig. 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 > z > x (4) x > z > y

10. The net resistance between points P and Q in the circuit shown in fig. is

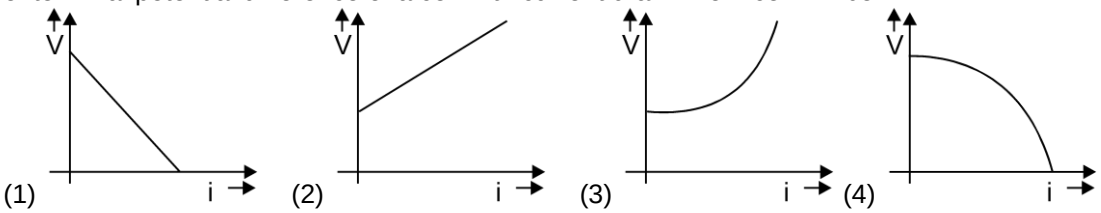


(1) R/2 (2) 2R/5 (3) 3R/5 (4) R/3

11. Two wires of same dimension but resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is

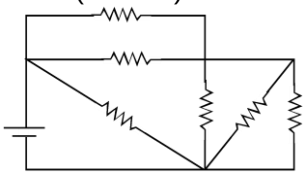
(1) $\rho_1 + \rho_2$ (2) $1/2\ (\rho_1 + \rho_2)$ (3) $\sqrt{\rho_1\rho_2}$ (4) $2(\rho_1 + \rho_2)$

12. If internal resistance of a cell is proportional to current drawn from the cell. Then the best representation of terminal potential difference of a cell with current drawn from cell will be:



13. A resistor of resistance R is connected to a cell of internal resistance 5 Ω. The value of R is varied from 1 Ω to 5 Ω. The power consumed by R:
(1) Increases continuously (2) Decreases continuously
(3) First decreases then increases (4) First increases then decreases.

14. In the figure shown each resistor is of 20 Ω and the cell has emf 10 volt with negligible internal resistance. Then rate of joule heating in the circuit is (in watts)

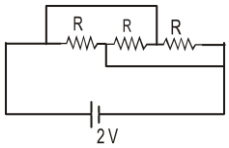


(1) 100/11 (2) 10000/11 (3) 11 (4) None of these

15. Five identical resistors each of resistance 1 Ω are initially arranged as shown in the figure by clear lines. If two resistances, similar to previous one are added as shown by the dashed lines then magnitude of change in resistance in final and initial arrangement is

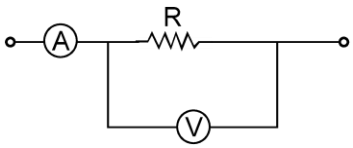
(1) 2Ω (2) 1Ω (3) 3Ω (4) 4 Ω

16. Three equal resistance each of R ohm are connected as shown in figure. A battery of 2 volts of internal resistance 0.1 ohm is connected across the circuit. Calculate the value of R for which the heat generated in the exeternal circuit is maximum.



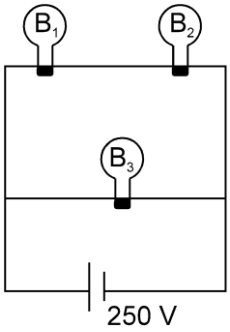
(1) 0.1 Ω (2) 0.2 Ω (3) 0.3 Ω (4) 0.4 Ω

17. In the circuit shown the readings of ammeter and voltmeter are 4A and 20V respectively. The meters are non-ideal, then R is



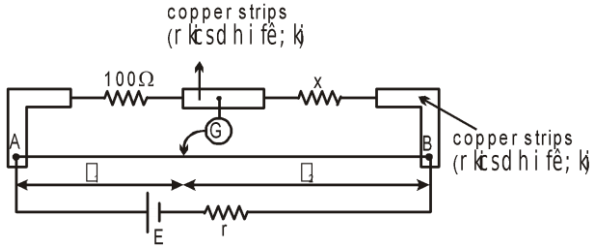
(1) 5 Ω (2) less than 5Ω
(3) greater than 5Ω (4) between 4Ω and 5Ω.

18. A 100 W bulb B_1 and two 60 W bulbs B_2 and B_3 are connected to a 250 V source as shown in the figure. Now W_1, W_2 and W_3 are the output powers of the bulbs B_1, B_2 and B_3 respectively. Then :



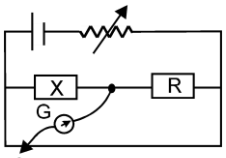
(1) $W_1 > W_2 = W_3$ (2) $W_1 > W_2 > W_3$ (3) $W_1 < W_2 = W_3$ (4) $W_1 < W_2 < W_3$

19. In a practical wheat stone bridge circuit as shown, when one more resistance of 100 Ω is connected in parallel with unknown resistance ' x ', then ratio ℓ_1/ℓ_2 become ' 2 '. ℓ_1 is balance length. AB is a uniform wire. Then value of ' x ' must be :

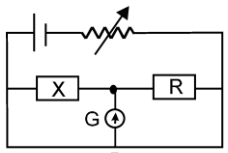


(1) 50 Ω (2) 100 Ω (3) 200 Ω (4) 400 Ω

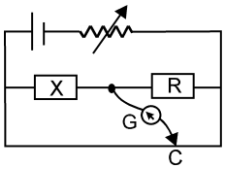
20. For the three values of resistance R namely R_1, R_2 and R_3 the balanced position of jockey are A, B, C respectively. The position that will show most accurate result for calculation of X will be :



(1) A



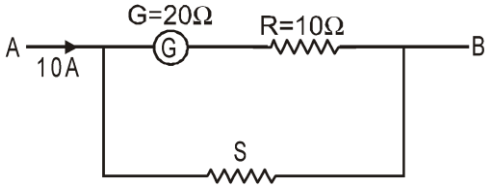
(2) B



(3) C

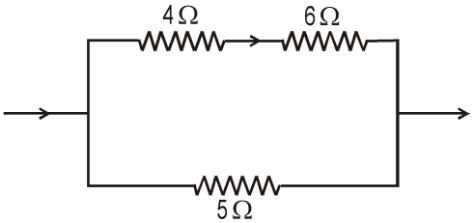
(4) none

21. Full scale deflection current for galvanometer is 1mA. What should be the value of shunt resistance (approximately) so that galvanometer shows half scale delection.



(1) 1.5mΩ (2) 3mΩ (3) 10 mΩ (4) 15 mΩ

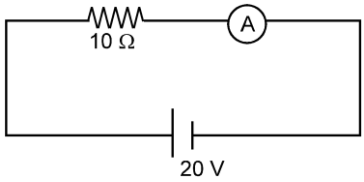
22. In the circuit shown in figure the heat produced in the 5Ω resistor due to the current flowing through it is 10 calories per second.



The heat generated in the 4Ω resistor is :

(1) 1 cal/s (2) 2 cal/s (3) 3 cal/s (4) 4 cal/s

23. The ammeter shown in figure consists of a 480 Ω coil connected in parallel to a 20 Ω shunt. Find the reading of the ammeter.

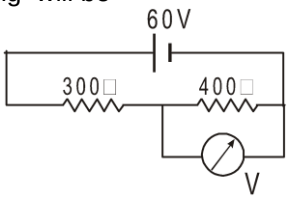


(1) $\frac{50}{73}$A (2) $\frac{40}{53}$A (3) $\frac{50}{93}$A (4) $\frac{73}{50}$A

24. When a galvanometer is shunted with a 4Ω resistance, the deflection is reduced to one - fifth. If the galvanometer is further shunted with a 2Ω wire, determine current in galvanometer now if initially current in galvanometer is I_0 (given main current remain same) .

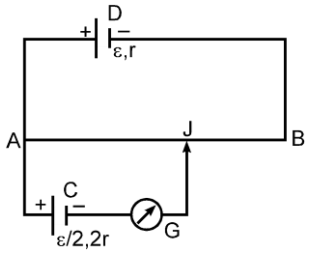
(1) $I_0/13$ (2) $I_0/5$ (3) $I_0/8$ (3) $5I_0/13$

25. In the circuit shown, reading of the voltmeter connected across 400 Ω resistance is 30 V. If it is connected across 300 Ω resistance then reading will be



(1) 45 V (2) 32.5 V (3) 22.5 V (4) 18 V

26. In the fig. the potentiometer wire AB of length L & resistance 9 r is joined to the cell D of e.m.f. Ɛ & internal resistance r. The cell C's e.m.f. is Ɛ/2 and its internal resistance is 2 r. The galvanometer G will show no deflection when the length AJ is :



(1) 4L/9 (2) 5L/9 (3) 7L/18 (4) 11L/18

PART - II : MISCELLANEOUS QUESTIONS

Section (A) : Assertion/Reasoning

A-1. **STATEMENT-1 :** The current density $\vec{J}$ at any point in ohmic resistor is in direction of electric field $\vec{E}$ at that point.
STATEMENT-2 : A point charge when released from rest in a region having only electrostatic field always moves along electric lines of force.
(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.
(5) Both statements are false

A-2. **STATEMENT-1 :** A wire of uniform cross section and uniform resitivity is connected across an ideal cell. Now the length of the wire is doubled keeping volume of wire constant. The drift velocity of electrons after stretching the wire becomes one fourth of what it was before stretching the wire.
STATEMENT-2 : If a wire (of uniform resitivity and uniform cross-section) of length ℓ_o is stretched to length $n\ell_o$, then its resistance becomes n^2 times of what it was before stretching the wire(the volume of wire is kept constant in stretching process). Further at constant potential difference, current is inversely proportional to resistance. Finally drift velocity of free electron is directly proportional to current and inversely proportional to cross section area of current carrying wire..
(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.
(5) Both statements are false

A-3. **STATEMENT–1 :** Magnitude of potential difference across the terminals of a non-ideal battery in a circuit cannot be greater than its emf.
STATEMENT–2 : When a current of magnitude I is passing through a battery of emf E and internal resistance r as shown, the magnitude of potential difference (V) across the battery is given by V = E– I r

(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.

Section (B) : Match the column

B-1. **Match the following :**
The following table gives the lengths of four copper rods at the same temperature, their diameters, and the potential differences between their ends.

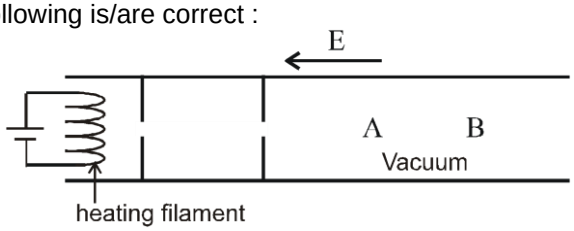
Rod	Length	Diameter	Potential Difference
1	L	3d	V
2	2L	d	3V
3	3L	2d	2V
4	3L	d	V

Correctly match the physical quantities mentioned in the left column with the rods as marked.

(1) Greatest Drift speed of the electrons.	(p) Rod 1
(2) Greatest Current	(q) Rod 2
(3) Greatest rate of thermal energy produced	(r) Rod 3
(4) Greatest Electric field	(s) Rod 4

Section (C) : One or More Than One Options Correct

C-1. A continuous beam of electrons emitted by a heating filament are accelerated in free space by an electric field as shown in figure. The two stops at the left ensure that the electron beam has a uniform cross-section. Which of the following is/are correct :



(1) Linear momentum of electron increases from A to B.
(2) The electric current is from right to left
(3) The magnitude of the current is same at A and B.
(4) The current density is same at A and B.

C-2. A current passes through a wire of non-uniform cross-section. Which of the following quantities are independent of the cross-section?
(1) the charge crossing in a given time interval (2) drift speed
(3) current density (4) free-electron density.

C-3. When no current is passed 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 the velocities of all the free electrons at an instant is zero

C-4. The current density in a wire is 10 A/cm^2 and the electric field in the wire is 5 V/cm. If ρ = resistivity of material, σ = conductivity of the material then (in S.I. units) :
(1) $\rho = 5 \times 10^{-3}$ (2) $\rho = 200$ (3) $\sigma = 5 \times 10^{-3}$ (4) $\sigma = 200$

C-5. A bulb is connected to an ideal battery of emf 10 V so that the resulting current is 10 mA. When the bulb is connected to 220 V mains (ideal), the current is 50 mA. Choose the correct alternative (s)
(1) In the first case, the resistance of the bulb is 1kΩ and in second case, it is 4.4 kΩ.
(2) It is not possible since ohm's law is not followed
(3) The increase in resistance is due to heating of the filament of the bulb when it is connected to 220 V mains
(4) None of these

Exercise-3

Marked Questions can be used as Revision Questions.
*** Marked Questions may have more than one correct option.**

PART - I : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

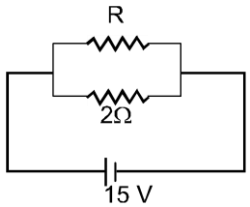
1. A wire when connected to 220 V mains supply has power dissipation P_1. Now the wire is cut into two equal pieces which are connected in parallel to the same supply. Power dissipation in this case is P_2. Then $P_2 : P_1$ is- **[AIEEE 2002, 4/300]**

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

2. If an ammeter is to be used in place of a voltmeter then we must connect with the ammeter a **[AIEEE 2002, 4/300]**

(1) Low resistance in parallel (2) High resistance in parallel
(3) High resistance in series (4) Low resistance in series

3. If in the circuit, power dissipation is 150 W then R is **[AIEEE 2002, 4/300]**

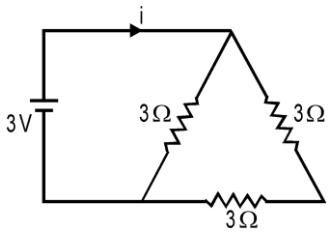


(1) 2 Ω (2) 6 Ω (3) 5 Ω (4) 4 Ω

4. A 220 volt, 1000 watt bulb is connected across a 110 volt mains supply. The power consumed will be- **[AIEEE 2003, 4/300]**

(1) 750 watt (2) 500 watt (3) 250 watt (4) 1000 watt

5. A 3 volt battery with negligible internal resistance is connected in a circuit as shown in the figure. Current i will be : **[AIEEE 2003, 4/300]**



(1) 1/3 A (2) 1 A (3) 1.5 A (4) 2 A

6. An ammeter reads upto 1 ampere. Its internal resistance is 0.81 ohm. To increase the range to 10 A the value of the required shunt is **[AIEEE 2003, 4/300]**

(1) 0.09 Ω (2) 0.03 Ω (3) 0.3 Ω (4)0.9 Ω

7. The length of a wire of a potentiometer is 100 cm, and the emf of its standard cell is E volt. It is employed to measure the emf of a battery whose internal resistance is 0.5 ohm. If the balance point is obtained at 30 cm from the positive end, the emf of the battery is **[AIEEE 2003, 4/300]**

(1) $\frac{30E}{100}$ (2) $\frac{30E}{100.5}$ (3) $\frac{30E}{(100-0.5)}$

(4) $\frac{30(E-0.5i)}{100}$, $\frac{30(E-0.5i)}{100}$, where i is the current in the potentiometer

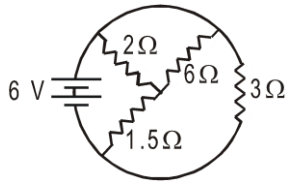
8. The length of a given cylindrical wire is increased by 100%. Due to the consequent decrease in diameter the change in the resistance of the wire will be **[AIEEE 2003, 4/300]**

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

9. Time taken by a 836 W heater to heat one litre of water from 10ºC to 40ºC is : **[AIEEE 2004, 4/300]**

(1) 50 s (2) 100 s (3) 150 s (4) 200 s

10. The total current supplied to the circuit by the battery is : **[AIEEE 2004, 4/300]**



(1) 1 A (2) 2 A (3) 4 A (4) 6 A

11. The resistance of the series combination of two resistances is S. When they are joined in parallel, the total resistance is P. If S = nP, then the minimum possible value of n is : **[AIEEE 2004, 4/300]**
(1) 4 (2) 3 (3) 2 (4) 1

12. An electric current is passed through a circuit containing two wires of the same material, connected in parallel. If the lengths and radii of the wires are in the ratio of 4/3 and 2/3, then the ratio of the currents passing through the wire will be : **[AIEEE 2004, 4/300]**
(1) 3 (2) 1/3 (3) 8/9 (4) 2

13. In a metre bridge experiment, null point is obtained at 20 cm from one end of the wire when resistance X is balanced against another resistance Y. If X < Y, then where will be the new position of the null point from the same end, if one decides to balance a resistance of 4X against Y ? **[AIEEE 2004, 4/300]**
(1) 50 cm (2) 80 cm (3) 40 cm (4) 70 cm

14. Two sources of equal emf are connected to an external resistance in series R. The internal resistances of the two sources are R_1 and $R_2(R_2 > R_1)$. If the potential difference across the source of internal resistance R_2, is zero, then : **[AIEEE 2005, 4/300]**
(1) $R = \frac{R_2 \times (R_1 + R_2)}{(R_2 - R_1)}$ (2) $R = R_2 - R_1$ (3) $R = \frac{R_1 R_2}{(R_2 + R_1)}$ (4) $R = \frac{R_1 R_2}{(R_2 - R_1)}$

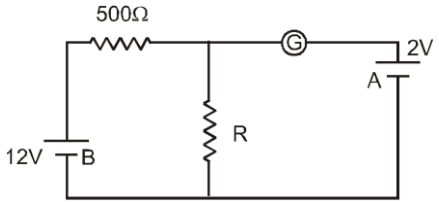
15. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be : **[AIEEE 2005, 4/300]**
(1) doubled (2) four times (3) one-fourth (4) half

16. In a potentiometer experiment the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing length becomes 120 cm. The internal resistance of the cell is : **[AIEEE 2005, 4/300]**
(1) 1 Ω (2) 0.5 Ω (3) 4 Ω (4) 2 Ω

17. The resistance of hot tungsten filament is about 10 times the cold resistance. What will be the resistance of 100 W and 200 V lamp when not in use : **[AIEEE 2005, 4/300]**
(1) 40 Ω (2) 20 Ω (3) 400 Ω (4) 200 Ω

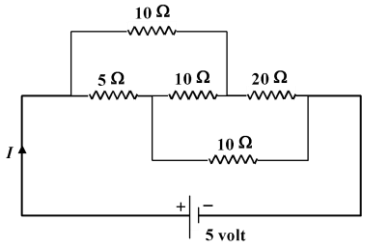
18. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 10 divisions per milli ampere and voltage sensitivity is 2 divisions per millivolt. In order that each division reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be : **[AIEEE 2005, 4/300]**
(1) 10^3 (2) 10^5 (3) 99995 (4) 9995

19. In the circuit, the galvanometer G shows zero deflection. If the batteries A and B have negligible internal resistance, the value of the resistor R will be : **[AIEEE 2005, 4/300]**



(1) 200 Ω (2) 100 Ω (3) 500 Ω (4) 1000 Ω

20. The current I drawn from the 5 volt source will be **[AIEEE 2006, 3/180]**



(1) 0.67 A (2) 0.17 A (3) 0.33 A (4) 0.5 A

21. In a Wheat stone's bridge, three resistances P, Q and R are connected in the three arms and the fourth arm is formed by two resistances S_1 and S_2 connected in parallel. The condition for the bridge to be balanced will be **[AIEEE 2006, 3/180]**

(1) $\frac{P}{Q}=\frac{R(S_1+S_2)}{2S_1S_2}$ (2) $\frac{P}{Q}=\frac{R}{S_1+S_2}$ (3) $\frac{P}{Q}=\frac{2R}{S_1+S_2}$ (4) $\frac{P}{Q}=\frac{R(S_1+S_2)}{S_1S_2}$

22. The resistance of bulb filament is 100 Ω at a temperature of 100°C. If its temperature coefficient of resistance be 0.005 per °C, its resistance will become 200 Ω at a temperature of **[AIEEE 2006, 3/180]**

(1) 500°C (2) 200°C (3) 300°C (4) 240°C

23. An electric bulb is rated 220 volt - 100 watt. The power consumed by it when operated on 110 volt will be **[AIEEE 2006, 4½/180]**

(1) 25 watt (2) 50 watt (3) 75 watt (4) 40 watt

24. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then for the two wires to have the same resistance, the ratio ℓ_A/ℓ_B of their respective lengths must be **[AIEEE 2006, 1½/180]**

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

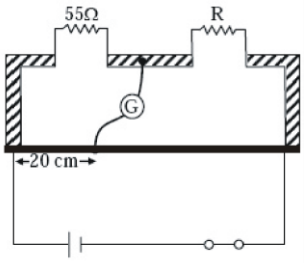
25. The Kirchhoff's first law $\left(\sum i=0\right)$ and second law $\left(\sum iR=0=\sum E\right)$, where the symbols have their usual meanings, are respectively based on **[AIEEE 2006, 1½/180]**

(1) Conservation of charge, conservation of energy
(2) Conservation of charge, conservation of momentum
(3) Conservation of energy, conservation of charge
(4) Conservation of momentum, conservation of charge

26. The resistance of a wire is 5 ohm at 50° C and 6 ohm at 100°C. The resistance of the wire at 0°C will be **[AIEEE 2007, 3/120]**

(1) 2 ohm (2) 1 ohm (3) 4 ohm (4) 3 ohm

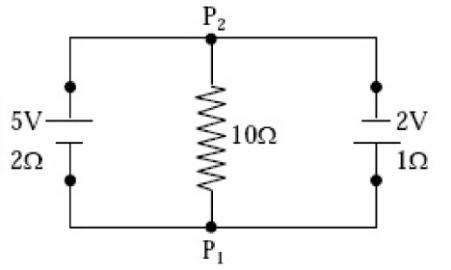
27. Shown in the figure below is a meter-bridge set up with null deflection in the galvanometer. **[AIEEE 2008, 3/105]**



The value of the unknown resistor R is

(1) 220 Ω (2) 110 Ω (3) 55 Ω (4) 13.75 Ω

28. A 5 V battery with internal resistance 2 Ω and a 2V battery with internal resistance 1Ω are connected to a 10Ω resistor as shown in the figure. **[AIEEE 2008, 3/105]**



The current in the 10 Ω resistor is -

(1) 0.03 A P_1 to P_2 (2) 0.03 A P_2 to P_1 (3) 0.27 A P_1 to P_2 (4) 0.27 A P_2 to P_1

29. Two conductors have the same resistance at 0ºC but their temperature coefficients of resistance are α_1 and α_2. The respective temperature coefficients of their series and parallel combinations are nearly **[AIEEE 2010, 8/144]**

(1) $\frac{\alpha_1+\alpha_2}{2}$, $\alpha_1+\alpha_2$ (2) $\alpha_1+\alpha_2$, $\frac{\alpha_1+\alpha_2}{2}$ (3) $\alpha_1+\alpha_2$, $\frac{\alpha_1\alpha_2}{\alpha_1+\alpha_2}$ (4) $\frac{\alpha_1+\alpha_2}{2}$, $\frac{\alpha_1+\alpha_2}{2}$

30. If a wire is stretched to make it 0.1% longer, its resistance will : **[AIEEE-2011, 1 May; 4/120, –1]**

(1) increase by 0.05% (2) increase by 0.2% (3) decrease by 0.2% (4) decrease by 0.05%

31. The current in the primary circuit of a potentiometer is 0.2 A. The specific resistance and cross-section of the potentiometer wire are 4×10^{-7} ohm metre and 8×10^{-7} m^2 respectively. The potential gradient will be equal to : **[AIEEE 2011, 11 May; 4/120, –1]**

(1) 1 V/ m (2) 0.5 V/m (3) 0.1 V/m (4) 0.2 V/m

32. Two electric bulbs marked 25W – 220V and 100W – 220 V are connected in series to a 440 V supply. Which of the bulbs will fuse ? **[AIEEE 2012; 4/120, –1]**

(1) both (2) 100W (3) 25W (4) neither

33. Resistance of a given wire is obtained by measuring the current flowing in it and the voltage difference applied across it. If the percentage errors in the measurement of the current and the voltage difference are 3% each, then error in the value of resistance of the wire is : **[AIEEE 2012; 4/120, –1]**

(1) 6% (2) zero (3) 1% (4) 3%

34. This questions has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements. **[JEE(Main)-2013; 4/120, –1]**

Statement - I : Higher the range, greater is the resistance of ammeter.

Statement - II : To increase the range of ammeter, additional shunt needs to be used across it.

(1) Statement -I is true, Statment -II is true, Statement -II is the correct explanation of Statement -I.

(2) Statement -I is true, Statment - II is true, Statement - II is not the correct explanation of Statement - I.

(3) Statement -I is true, Statment - II is false.

(4) Statement -I is false, Statment - II is true.

35. The supply voltage to room is 120 V. The resistance of the lead wires is 6 Ω. A 60 W bulb is already switched on. What is the decrease of voltage across the bulb, when a 240 W heater is switched on in parallel to the bulb ? **[JEE(Main)-2013; 4/120, –1]**

(1) zero Volt (2) 2.9 Volt (3) 13.3 Volt (4) 10.04 Volt

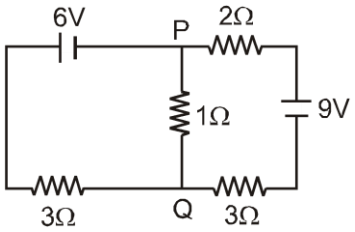
36. In a large building, there are 15 bulbs of 40W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1 kW. The voltage of the electric mains is 220 V. The minimum capacity of the main fuse of the building will be **[JEE(Main)-2014 ; 4/120. –1]**

(1) 8 A (2) 10 A (3) 12 A (4) 14 A

37. When 5V potential difference is applied across a wire of length 0.1 m, the drift speed of electrons is 2.5×10^{-4} ms^{-1}. If the electron density in the wire is 8×10^{28} m^{-3}, the resistivity of the material is close to **[JEE(Main)-2015; 4/120, –1]**

(1) 1.6×10^{-8} Ωm (2) 1.6×10^{-7} Ωm (3) 1.6×10^{-6} Ωm (4) 1.6×10^{-5} Ωm

38.



In the circuit shown, the current in the 1Ω resistor is : **[JEE(Main)-2015; 4/120, –1]**

(1) 1.3 A, from P to Q (2) 0 A

(3) 0.13 A, from Q to P (4) 0.13 A, from P to Q

39. A galvanometer having a coil resistance of 100 Ω gives a full scale deflection, when a current of 1 mA is passed through it. The value of the resistance, which can convert this galvanometer into ammeter giving a full scale deflection for a current of 10 A, is : **[JEE(Main)-2016; 4/120, –1]**

(1) 2 Ω (2) 0.1 Ω (3) 3 Ω (4) 0.01 Ω

40. The temperature dependence of resistances of Cu and undoped Si in the temperature range 300 – 400 K, is best described by : **[JEE(Main)-2016; 4/120, –1]**

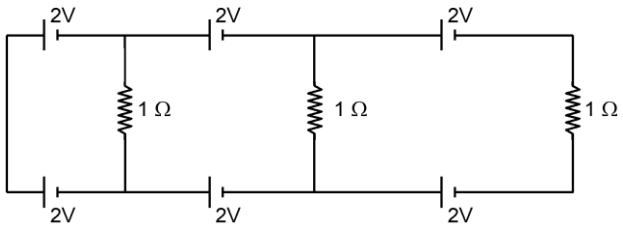
(1) Linear increase for Cu, exponential increase for Si

(2) Linear increase for Cu, exponential decrease for Si

(3) Linear decrease for Cu, linear decrease for Si

(4) Linear increase for Cu, linear increase for Si

41.



In the above circuit the current in each resistance is : **[JEE(Main)-2017; 4/120,–1]**

(1) 0 A (2) 1 A (3) 0.25 A (4) 0.5 A

42. Which of the following statements is false ? **[JEE(Main)-2017; 4/120,–1]**

(1) Krichhoff's second law represents energy conservation.

(2) Wheatstone bridge is the most sensitive when all the four resistance are of the same order of magnitude

(3) In a balanced wheatstone bridge if the cell and the galvanometer are exchanged, the null point is disturbed

(4) A rheostat can be used as a potential divider.

Which of the following statements is false ?

43. When a current of 5mA is passed through a galvanometer having a coil of resistance 15Ω, it shows full scale defection. The value of the resistance to be put in series with the galvanometer to convert it into a voltmeter of range 0 – 10 V is : **[JEE(Main) 2017; 4/120,–1]**

(1) $4.005 \times 10^3\ \Omega$ (2) $1.985 \times 10^3\ \Omega$ (3) $2.045 \times 10^3\ \Omega$ (4) $2.535 \times 10^3\ \Omega$

44. Two batteries with e.m.f 12V and 13V are connected in parallel across a load resistor of 10Ω. The internal resistance of the two batteries are 1Ω and 2Ω respectively. The voltage across the load lies between **[JEE(Main) 2018; 4/120,–1]**

(1) 11.4V and 11.5 V (2) 11.7V and 11.8V (3) 11.6V and 11.7V (4) 11.5V and 11.6V

45. In a potentiometer experiment, it is found that no current passes through the galvanometer when the terminals of the cell are connected across 52cm of the potentiometer wire. If the cell is shunted by resistance of 5 Ω, a balance is found when the cell is connected across 40 cm of the wire. Find the internal resistance of the cell. **[JEE(Main)-2018; 4/120,–1]**

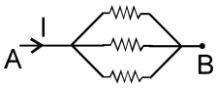
(1) 2 Ω (2) 2.5 Ω (3) 1 Ω (4) 1.5 Ω

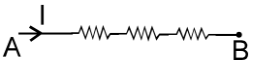
46. On interchanging the resistances, the balance point of a meter bridge shifts to the left by 10 cm. The resistance of their series combination is 1KΩ. How much was the resistance on the left slot before interchanging the resistances ? **[JEE(Main)-2018; 4/120,–1]**

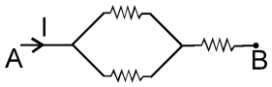
(1) 550 Ω (2) 910 Ω (3) 990 Ω (4) 505Ω

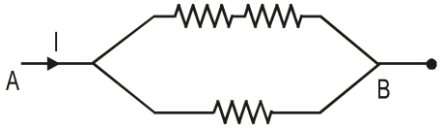
PART - II : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

1. Arrange the order of power dissipated in the given circuits, if the same current is passing through the system. The resistance of each resistor is ' r '. **[IIT-JEE(Scr.)-2003, 3/84]**

(i) 

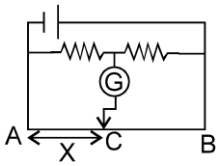
(ii) 

(iii) 

(iv) 

(A) $P_2 > P_3 > P_4 > P_1$ (B) $P_1 > P_4 > P_3 > P_2$ (C) $P_1 > P_2 > P_3 > P_4$ (D) $P_4 > P_3 > P_2 > P_1$

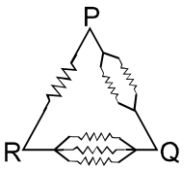
2. In the given circuit, no current is passing through the galvanometer. If the cross-sectional diameter of the wire AB is doubled, then for null point of galvanometer, the value of AC would be : **[IIT-JEE(Scr.)-2003, 3/84]**



(A) 2 X (B) X

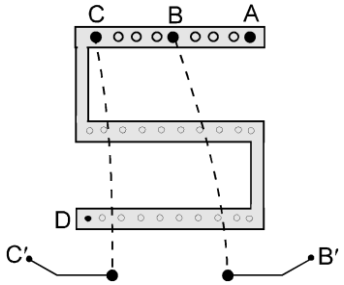
(C) $\frac{X}{2}$ (D) None

3. In the given circuit all resistors are of equal value then equivalent resistance will be maximum between the points. **[IIT-JEE(Scr.)-2004, 3/84]**



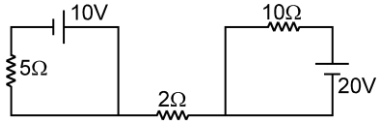
(A) PR (B) PQ (C) RQ (D) same for all

4. Between which points should the terminals of unknown resistance be connected in a post office box arrangement to get its value **[IIT-JEE(Scr.)-2004, 3/84]**



(A) A and B (B) B and C (C) C and D (D) A andD

5. In the figure shown the current through 2Ω resistor is **[IIT-JEE (Scr.)-2005, 3/84]**

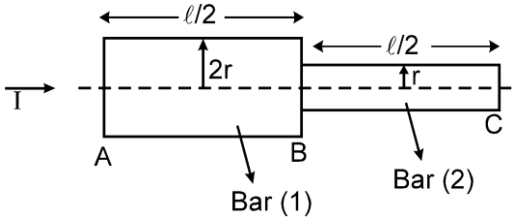


(A) 2A (B) 0 A (C) 4 A (D) 6A

6. A galvanometer has resistance 100Ω and it requires current 100μA for full scale deflection. A resistor 0.1Ω is connected in parallel to make it an ammeter. The smallest current required in the circuit to produce the full scale deflection is **[IIT-JEE (Scr.)-2005, 3/84]**

(A) 1000.1 mA (B) 1.1 mA (C) 10.1 mA (D) 100.1 mA

7. Two bars of equal resistivity ρ and radii 'r' and '2r' are kept in contact as shown. An electric current I is passed through the bars. Which one of the following is correct? **[IIT-JEE 2006; 3/184]**

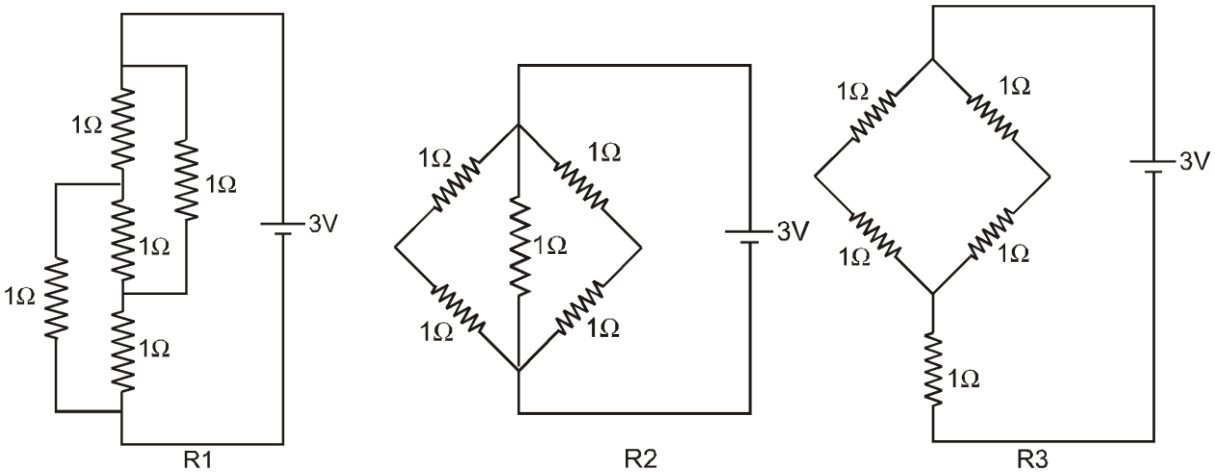


(A) Heat produced in bar (1) is 2 times the heat produced in bar (2)
(B) Electric field in both halves is equal
(C) Current density across AB is double that across BC.
(D) Potential difference across BC is 4 times that across AB.

8. A resistance of 2 Ω is connected across one gap of a metre-bridge (the length of the wire is 100 cm) and an unknown resistance, greater than 2 Ω, is connected across the other gap. When these resistances are interchanged, the balance point shifts by 20 cm. Neglecting any corrections, the unknown resistance is **[IIT-JEE 2007; Paper-1, 3/81]**

(A) 3 Ω (B) 4 Ω (C) 5 Ω (D) 6 Ω

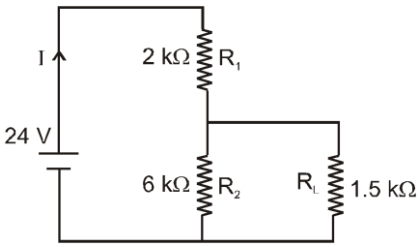
9. Figure shows three resistor configurations R1, R2 and R3 connected to 3 V battery. If the power dissipated by the configuration R1, R2 and R3 is P1, P2 and P3, respectively, then
Figure : **[IIT-JEE 2008, Paper-1, 3/163]**



(A) P1 > P2 > P3 (B) P1 > P3 > P2
(C) P2 > P1 > P3 (D) P3 > P2 > P1

10. **STATEMENT -1 :** 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.
and **[IIT-JEE 2008, Paper-1, 3/163]**
STATEMENT -2 : Resistance of a metal increases with increase in temperature.
(A) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is a correct explanation for STATEMENT-1
(B) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is NOT a correct explanation for STATEMENT -1
(C) STATEMENT-1 is True, STATEMENT-2 is False
(D) STATEMENT-1 is False, STATEMENT-2 is True.

11.* For the circuit shown in the figure **[IIT-JEE 2009; 4/160, –1]**



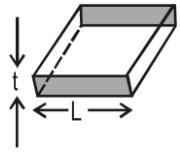
(A) the current I through the battery is 7.5 mA

(B) the potential difference across R_L is 18 V

(C) ratio of powers dissipated in R_1 and R_2 is 3

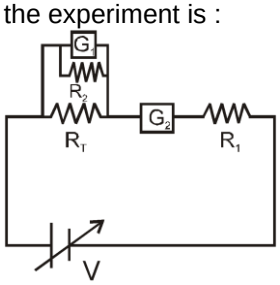
(D) if R_1 and R_2 are interchanged, magnitude of the power dissipated in R_L will decrease by a factor of 9

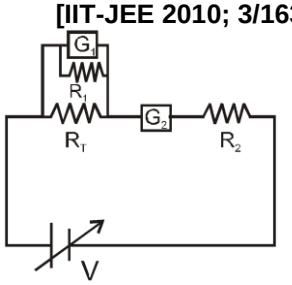
12. Consider a thin square sheet of side L and thickness t, made of a material of resitivity ρ. The resistance between two opposite faces, shown by the shaded areas in the figure is : **[IIT-JEE 2010; 3/163, –1]**

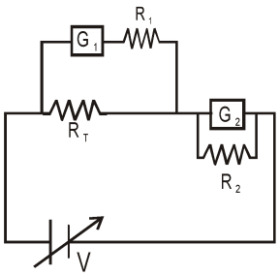


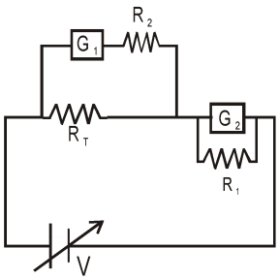
(A) directly proportional to L (B) directly proportional to t
(C) independent of L (D) independent of t

13. To verify Ohm's law, a student is provided with a test resistor R_T, a high resistance R_1, a small resistance R_2, two identical galvanometers G_1 and G_2, and a variable voltage source V. The correct circuit to carry out the experiment is : **[IIT-JEE 2010; 3/163, –1]**

(A) 

(B) 

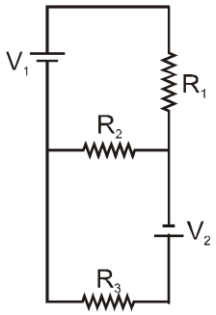
(C) 

(D) 

14.* Heater of electric kettle is made of a wire of length L and diameter d. It takes 4 minutes to raise the temperature of 0.5 kg water by 40K. This heater is replaced by a new heater having two wires of the same material, each of length L and diameter 2d. The way these wires are connected is given in the options. How much time in minutes will it take to raise the temperature of the same amount of water by 40K ? **[JEE(Advanced)-2014, 3/60, –1]**

(A) 4 if wires are in parallel
(B) 2 if wires are in series
(C) 1 if wires are in series
(D) 0.5 if wires are in parallel.

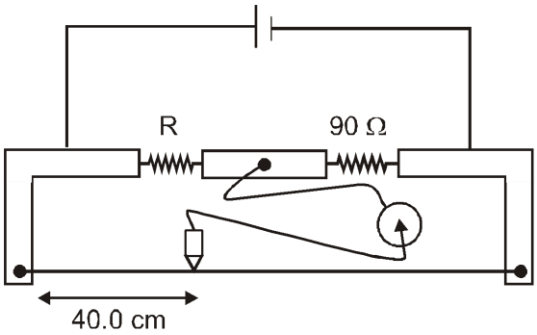
15.*# Two ideal batteries of emf V_1 and V_2 and three resistances R_1, R_2 and R_3 are connected as shown in the figure. The current in resistance R_2 would be zero if **[JEE(Advanced)-2014, 3/60, –1]**



(A) $V_1 = V_2$ and $R_1 = R_2 = R_3$
(B) $V_1 = V_2$ and $R_1 = 2R_2 = R_3$
(C) $V_1 = 2V_2$ and $2R_1 = 2R_2 = R_3$
(D) $2V_1 = V_2$ and $2R_1 = R_2 = R_3$

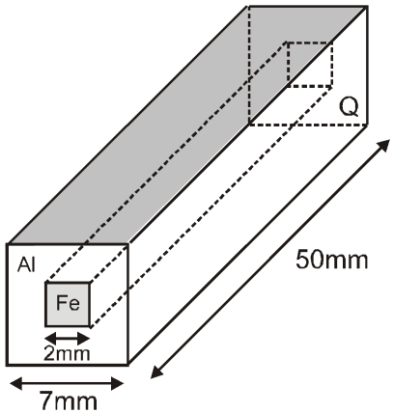
16. A galvanometer gives full scale deflection with 0.006 A current. By connecting it to a 4990 Ω resistance, it can be converted into a voltmeter of range 0-30 V. If connected to a $\frac{2n}{249}\Omega$ resistance, it becomes an ammeter of range 0-1.5 A. The value of n is. **[JEE(Advanced)-2014, 3/60]**

17. During an experiment with a metre bridge, the galvanometer shows a null point when the joceky is pressed at 40.0 cm using a standard resistance of 90 Ω, as shown in the figure. The least count of the scale used in the meter bridge is 1 mm. The unknown resistance is **[JEE(Advanced)-2014, 3/60, –1]**



(A) $60 \pm 0.15\Omega$ (B) $135 \pm 0.56\Omega$ (C) $60 \pm 0.25\Omega$ (D) $135 \pm 0.23\Omega$

18. In an aluminum (Al) bar of square cross section, a square hole is drilled and is filled with iron (Fe) as shown in the figure, The electrical resistivities of Al and Fe are $2.7\times 10^{-8}\ \Omega$ m and $1.0 \times 10^{-7}\ \Omega$ m, respectively. The electrical resistance between the two faces P and Q of the composite bar is **[JEE(Advanced)-2015 ;P-1, 4/88, –2]**



(A) $\frac{2475}{64}\mu\Omega$ (B) $\frac{1875}{64}\mu\Omega$ (C) $\frac{1875}{49}\mu\Omega$ (D) $\frac{2475}{132}\mu\Omega$

19*. Consider two identical galvanometers and two identical resistors with resistance R. If the internal resistance of the galvanometers $R_C < R/2$, which of the following statement(s) about any one of the galvanometers is(are) true ? **[JEE(Advanced)-2016; P-1, 4/62, –2]**

(A) The maximum voltage range is obtained when all the components are connected in series

(B) The maximum voltage range is obtained when the two resistors and one galvanometer are connected in series, and the second galvanometer is connected in parallel to the first galvanometer

(C) The maximum current range is obtained when all the components are connected in parallel

(D) The maximum current range is obtained when the two galvanometers are connected in series, and the combination is connected in parallel with both the resistors.

Answers

EXERCISE # 1

Section (A) :

A-1. (3) **A-2.** (4)

Section (B) :

B-1. (4) **B-2.** (2) **B-3.** (3)
B-4. (1) **B-5.** (4) **B-6.** (2)
B-7. (2)

Section (C) :

C-1. (2) **C-2.** (2) **C-3.** (1)
C-4. (1) **C-5.** (2) **C-6.** (2)
C-7. (1) **C-8.** (2)

Section (D) :

D-1. (2) **D-2.** (2) **D-3.** (1)
D-4. (3) **D-5.** (1) **D-6.** (1)
D-7. (4) **D-8.** (2) **D-9.** (1)
D-10. (1) **D-11.** (2) **D-12.** (1)
D-13. (i) (2) (ii) (3)

Section (E) :

E-1. (3) **E-2.** (3)

Section (F) :

F-1. (3) **F-2.** (4) **F-3.** (3)
F-4. (2) **F-5.** (2) **F-6.** (1)
F-7. (3) **F-8.** (2) **F-9.** (2)
F-10. (3) **F-11.** (2) **F-12.** (3)
F-13. (2) **F-14.** (2) **F-15.** (1)
F-16. (2) **F-17.** (1) **F-18.** (2)

EXERCISE # 2

PART - I

1. (a) (2) (b) (3) **2.** (1)
3. (2) **4.** (4) **5.** (2)
6. (3) **7.** (1) **8.** (3)
9. (4) **10.** (2) **11.** (2)
12. (4) **13.** (1) **14.** (3)
15. (1) **16.** (3) **17.** (3)
18. (4) **19.** (2) **20.** (2)
21. (1) **22.** (2) **23.** (1)
24. (1) **25.** (3) **26.** (2)

PART - II

Section (A) :

A-1. (3) **A-2.** (4) **A-3.** (4)

Section (B) :

B-1. (1 → q); (2 → p); (3 → p); (4 → q);

Section (C) :

C-1. (1,2,3,4) **C-2.** (1,4) **C-3.** (3,4)
C-4. (1,4) **C-5.** (1,3)

EXERCISE # 3

PART - I

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

PART - II

1. (A) **2.** (B) **3.** (A)
4. (D) **5.** (B) **6.** (D)
7. (D) **8.** (A) **9.** (C)
10. (D) **11.** (AD) **12.** (C)
13. (C) **14.** (BD) **15.** (ABD)
16. 5 **17.** (C) **18.** (B)
19. (AC)