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Class - 12th

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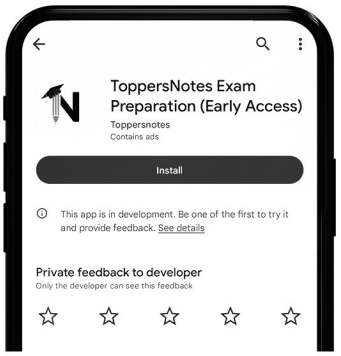

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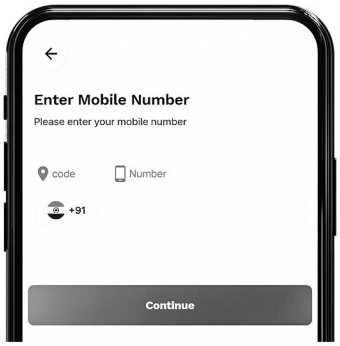

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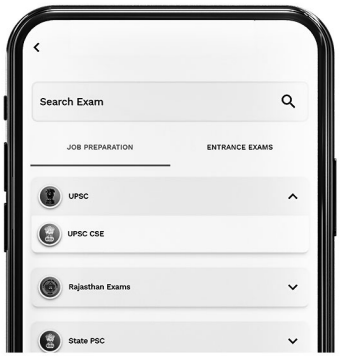

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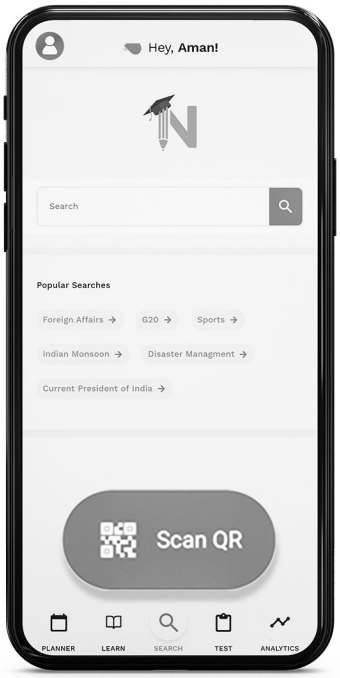

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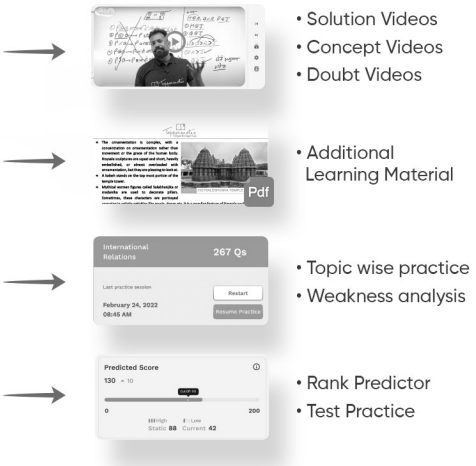

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Class - 11th

Physics

Motion in a Straight Line

Average Velocity and Average Speed

2006

Q.1 **A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is -**

(a) 10 m/s, 0 (b) 0,0

(c) 0,10 m/s (d) 10 m/s, 10 m/s.

2007

Q.2 **A car moves from X to Y with a uniform speed V_u and returns to X with a uniform speed V_d. The average speed for this round trip is -**

(a) $\sqrt{v_u v_d}$ (b) $\frac{v_d v_u}{v_d+v_u}$

(c) $\frac{v_u+v_d}{2}$ (d) $\frac{2v_d v_u}{v_d+v_u}$

2011

Q.3 **A particle covers half of it's total distance with speed V_1 and the rest half distance with speed v_2. It's average speed during the complete journey is -**

(a) $\frac{v_1+v_2}{2}$ (b) $\frac{v_1 v_2}{v_1+v_2}$

(c) $\frac{2v_1 v_2}{v_1+v_2}$ (d) $\frac{{v_1}^2{v_2}^2}{{v_1}^2+{v_2}^2}$

Instantaneous Velocity and Speeds

2005

Q.4 **The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$ where a, b, α and β are positive constants. The velocity of the particle will -**

(a) be independent of B

(b) drop to zero when α = β

(c) go on decreasing with time

(d) go on increasing with time

2006

Q.5 **A particle moves along a straight line OX. At a time (in seconds) the distance x (in meters) of the particle from O is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest?**

(a) 16 m (b) 24 m

(c) 40 m (d) 56 m

2007

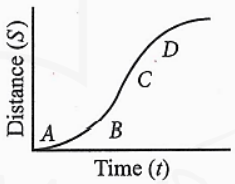
Q.6 **The position x of a particle with respect to time t along x-axis is given by $x = 9t^2 - t^3$ where x is in metres and t in seconds. What will be the position of this particle when it achieves maximum speed along the $+x$ direction?**

(a) 54 m (b) 81 m

(c) 24 m (d) 32 m.

2008

Q.7 **A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point**



(a) D (b) A

(c) B (d) C

2013

Q.8 **The displacement X (in meter) of a particle of mass'm' (in kg) moving in one dimension under the action of a force, is related to time I (in sec) by $t=\sqrt{x}+3$. The displacement of the particle when it's velocity is zero, will be -**

(a) 4 m (b) 0 m (zero)

(c) 6 m (d) 2 m

2016

Q.9 **Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $x_P(t) = (at + bt^2)$ and $x_Q(t) = (ft - t^2)$. At what time do the cars have the same velocity?**

(a) $\frac{a-f}{1+b}$ (b) $\frac{a+f}{2(b-1)}$

(c) $\frac{a+f}{2(1+b)}$ (d) $\frac{f-a}{2(1+b)}$

Q.10 **If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1 and 2 s is -**

(a) $\frac{3}{2}A + \frac{7}{3}B$ (b) $\frac{A}{2} + \frac{B}{3}$

(c) $\frac{3}{2}A + 4B$ (d) 3A+7B

Acceleration

2000

Q.11 Motion of a particle is given by equation $s = (3t^2 + 7t^3 + 14t + 8)$ m.The value of acceleration of the particle at t = 1 sec. is -

(a) 10 m/s^2 (b) 32 m/s^2
(c) 23 m/s^2 (d) 16 m/s^2

2007

Q.12 A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left[1 - \frac{t}{T}\right]$, where f_0 and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f= 0, the particle's velocity (v_x) is -

(a) $\frac{1}{2}f_0T^2$ (b) f_0T^2
(c) $\frac{1}{2}f_0T$ (c) f_0T

2010

Q.13 A particle moves a distance x in time according to equation x = (t + 5)$^{-1}$. The acceleration of particle is proportional to

(a) (velocity)$^{3/2}$
(b) (distance)^2
(c) (distance)$^{-2}$
(d) (velocity)$^{2/3}$

2012

Q.14 The motion of a particle along a straight line is described by equation x = 8 + 12t – t^3 where x is in metre and t in second. The retardation of the particle when it's velocity becomes zero is -

(a) 24 m s^{-2} (b) zero
(c) 6 m s^{-2} (d) 12 m s^{-2}

2015

Q.15 A particle of unit mass undergoes one-dimensional motion such that it's velocity varies according to v(x) = β x^{-2n}, where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by -

(a) -2β$^2x^{-2n+1}$
(b) -2nβ^2 e^{-4n+1}
(c) -2nβ^2 x^{-2n-1}
(d) -2nβ^2 x^{-4n-1}

Kinematic Equations for Uniformly Accelerated Motion

1998

Q.16 A car moving with a speed of 40 km/h can be stopped by applying brakes after at least 2 m. If the same car is moving with a speed of 80 km/h. what is the minimum stopping distance?

(a) 4 m (b) 6 m
(c) 8 m (d) 2 m

2001

Q.17 A particle is thrown vertically upward. Its velocity at half of the height is 10 m/s, then the maximum height attained by it. (g = 10 m/s^2)

(a) 8 m (b) 20 m
(c) 10 m (d) 16 m.

2003

Q.18 A man throws balls with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two balls are in the sky at any time?

(a) More than 19.6 m/s
(b) At least 9.8 m/s
(c) Any speed less than 19.6 m/s
(d) Only with speed 19.6 m/s

Q.19 If a ball is thrown vertically upwards with speed u, the distance covered during the last t seconds of it's ascent is -

(a) ut (b) $\frac{1}{2}gt^2$
(c) ut- $\frac{1}{2}$gt (d) $(u + gt)t$

2005

Q.20 A ball is thrown vertically upward. It has a speed of 10 m/sec when it has reached one half of it's maximum height. How high does the ball rise? (Take g = 10 m/s^2) I

(a) 10 m (b) 5 m
(c) 15 m (d) 20 m

2006

Q.21 Two bodies A (of mass 1 kg) and B (of mass 3 kg) are dropped from heights of 16 m and 25 m, respectively. The ratio of the time taken by them to reach the ground is -

(a) 4/5 (b) 5/4
(c) 12/5 (d) 5/12

2008

Q.22 The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}$m s^{-2}, in the third second is -

(a) $\frac{10}{3}m$ (b) $\frac{19}{3}m$

(c) 6 m (d) 4 m

Q.23 A particle moves in a straight line with a constant acceleration. It changes it's velocity from 10ms^{-1} to 20ms^{-1}. while passing through a distance 135 m in t second. The value of t is

(a) 12 (b) 9

(c) 10 (d) 1.8

2009

Q.24 A particle starts it's motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1, and that covered in the first 20 seconds is S_2, then -

(a) $S_2 = 3S_1$ (b) $S_2 = 4S_1$

(c) $S_2 = S_1$ (d) $S_2 = 2S_1$

2010

Q.25 A ball is dropped from a high rise platform at t = 0 starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v. The two balls meet at t = 18 s. What is the value of v? (Take g = 10 m/s^2)

(a) 75 m/s (b) 55 m/s

(c) 40 m/s (d) 60 m/s

2011

Q.26 A boy standing at the top of a tower of 20 m height drops a stone. Assuming g = 10 m s^{-2}, the velocity with which it hits the ground is -

(a) 10.0 m/s (b) 20.0 m/s

(c) 40.0 m/s (d) 5.0 m/s

2013

Q.27 A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1 h_2 and h_3 is -

(a) $h_2 = 3h_1$ and $h_3 = 3h_2$

(b) $h_1 = h_2 = h_3$

(c) $h_1 = 2h_2 = 3h_3$

(d) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

2020

Q.28 A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is (g = 10 m/s^2)

(a) 360 m (b) 340 m

(c) 320 m (d) 300 m

Relative Velocity

2009

Q.29 A bus is moving with a speed of 10 m s^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus ?

(a) 40 m s^{-1} (b) 25 m s^{-1}

(c) 10 ms^{-1} (d) 20 m s^{-1}

2017

Q.30 Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be -

(a) $\frac{t_1 t_2}{t_2 - t_1}$ (b) $\frac{t_1 t_2}{t_2 + t_1}$

(c) $t_1 - t_2$ (d) $\frac{t_1 + t_2}{2}$

Class - 12th

Physics

Current Electricity

Ohm's Law

2004

Q.1 **A 6 volt battery is connected to the terminals of a three meter long wire of uniform thickness and resistance of 100 ohm. The difference of potential between two points on the wire separated by a distance of 50 cm will be -**

(a) 2 volt (b) 3 volt
(c) 1 volt (d) 1.5 volt

Q.2 **The electric resistance of a certain wire of iron is R. If its length and radius are both doubled, then**

(a) The resistance will be doubled and the specific resistance will be halved.
(b) The resistance will be halved and the specific resistance will remain unchanged.
(c) The resistance will be halved and the specific resistance will be doubled.
(d) The resistance and the specific resistance, will both remain unchanged.

2008

Q.3 **A wire of a certain material is stretched slowly by ten percent. Its new resistance and specific resistance become respectively**

(a) both remain the same
(b) 1.1 times, 1.1 times
(c) 1.2 times, 1.1 times
(d) 1.21 times, same

2013

Q.4 **A wire of resistance 4Ω is stretched to twice its original length. The resistance of stretched wire would be -**

(a) 8Ω
(b) 16Ω
(c) 2Ω
(d) 4Ω

2017

Q.5 **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 -**

(a) $\frac{R}{n}$ (b) n^2R
(c) $\frac{R}{n^2}$ (d) nR

Drift of Electrons and the Origin of Resistivity

2009

Q.6 **The mean free path of electrons in a metal is 4 X 10^{-8} m. The electric field which can give on an average 2 eV energy to an electron in the metal will be in units V/m?**

(a) 5 x 10^{-11}
(b) 8 x 10^{-11}
(c) 5 x 10^{7}
(d) 8 x 10^{7}

2020

Q.7 **A charged particle having drift velocity of 7.5 x 10^{-4} ms^{-1} in an electric field of 3×10^{-10} Vm^{-1} has a mobility in $m^2V^{-1}s^{-1}$ of**

(a) 2.25 x 10^{15}
(b) 2.5 x 10^{6}
(c) 2.5 x 10^{-6}
(d) 2.25 x 10^{-15}

2021

Q.8 **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.**

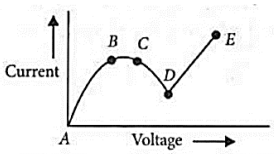
Column-I	Column-II
(A) Drift velocity	(P) $\frac{m}{ne^2\rho}$
(B) Electrical Resistivity	(Q) nev_d
(C) Relaxation Period	(R) $\frac{eE}{m}\tau$
(D) Current Density	(S) $\frac{E}{J}$

(a) (A) - (R), (B) - (Q), (C) - (S), (D) - (P)
(b) (A) - (R), (B) - (S), (C) - (P), (D) - (Q)
(c) (A) - (R), (B)-(S), (C)-(Q), (D) - (P)
(d) (A) - (R), (B) - (P), (C)-(S), (D)-(Q)

Limitations of Ohm's Law

1997

Q.9 **From the graph between current (I) and voltage (V) is shown. Identify the portion corresponding to negative resistance**



(a) CD (b) DE
(c) AB (d) BC

1999

Q.10 The resistance of a discharge tube is -
(a) non-ohmic
(b) ohmic
(c) zero
(d) both (b) and (c)

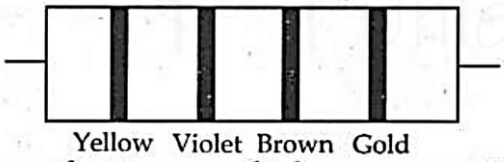
Resistivity of Various Materials

2018

Q.11 A carbon resistor of (47 ± 4.7) $k\Omega$ is to be marked with rings of different colours for its identification.
The colour code sequence will be -
(a) Violet - Yellow - Orange – Silver
(b) Yellow - Violet - Orange – Silver
(c) Yellow - Green - Violet – Gold
(d) Green - Orange - Violet – Gold

2020

Q.12 The color code of a resistance is given below



(a) 470 kΩ, 5%
(b) 47 kΩ, 10%
(c) 4.7 kΩ, 5%
(d) 470 kΩ, 5%

Temperature Dependence of Resistivity

2001

Q.13 Copper and silicon is cooled from 300 K to 60 K, the specific resistance -
(a) decreases in copper but increases in silicon
(b) increases in copper but decreases in silicon
(c) increases in both
(d) decrease in both

2002

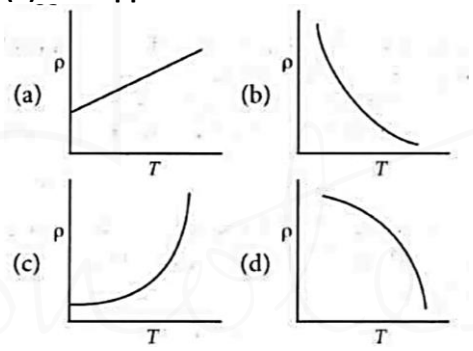
Q.14 Specific resistance of a conductor increases with
(a) increase in temperature
(b) increase in cross-section areas
(c) increase in cross-section and decrease in length
(d) decrease in cross-section area

2020

Q.15 The solids which have the negative temperature coefficient of resistance are
(a) metals
(b) insulators only
(c) semiconductors only
(d) insulators and semiconductors

2020

Q.16 Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper?



Electrical Energy, Power

1998

Q.17 A 5°C rise in temperature is observed in a conductor by passing a current. When the current is doubled the rise in temperature will be approximately
(a) 20°C (b) 16°C
(c) 10°C (d) 12°C

2000

Q.18 Two bulbs are of (40 W, 200 V) and (100 W, 200V). Then correct relation for their resistances is
(a) $R_{40} < R_{100}$
(b) $R_{40} > R_{100}$
(c) $R_{40} = R_{100}$
(d) no relation can be predicted

2003

Q.19 Fuse wire is a wire of -

(a) high resistance and high melting point
(b) high resistance and low melting point
(c) low resistance and low melting point
(d) low resistance and high melting point

2004

Q.20 In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60 W bulb for use in India is R, the resistance of a 60 W bulb for use in USA will be -

(a) R (b) 2R
(c) R/4 (d) R/2

2005

Q.21 A 5 ampere fuse wire can withstand a maximum power of 1 watt in the circuit. The resistance of the fuse wire is -

(a) 0.04 ohm (b) 0.2 ohm
(c) 5 ohm (d) 0.4 ohm

2008

Q.22 An electric kettle takes 4 A current at 220 V. How much time will it take to boil 1 kg of water from temperature 20°C ? The temperature of boiling water is 100°C.

(a) 12.6 min (b) 4.2min
(c) 6.3 min (d) 8.4 min

2012

Q.23 If voltage across a bulb rated 220 volt, 100 watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is -

(a) 20% (b) 2.5%
(c) 5% (d) 10%

2014

Q.24 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 volt and the average resistance per km is 0.5Ω. The power loss in the wire is -

(a) 19.2W (b) 19.3kW
(c) 19.2 J (d) 12.2kW

2016

Q.25 The charge flowing through a resistance R varies with time t as Q = at - bt^2, where a and b are positive constants. The total heat produced in R is -

(a) $\frac{a^3R}{2b}$ (b) $\frac{a^3R}{b}$
(c) $\frac{a^3R}{6b}$ (d) $\frac{a^3R}{3b}$

2019

Q.26 Which of the following acts as a circuit protection device?

(a) Fuse
(b) Conductor
(c) Inductor
(d) Switch

Combination of Resistors-Series and Parallel

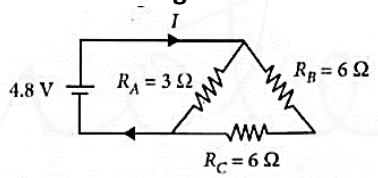
1998

Q.27 Three equal resistors connected in series across a source of emf together dissipate 10 watt of power. What will be the power dissipated in watt if the same resistors are connected in parallel across the same source of emf ?

(a) 30 (b) $\frac{10}{3}$
(c) 10 (d) 90

1999

Q.28 The current in the given circuit is -



(a) 4.9 A (b) 6.8 A
(c) 8.3 A (d) 2.0 A

2003

Q.29 Two 220 volt, 100 watt bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 volt a.c. supply line. The power drawn by the combination in each case respectively will be

(a) 50 watt, 100 watt
(b) 100 watt, 50 watt
(c) 200 watt, 150 watt
(d) 50 watt, 200 watt

Q.30 An electric kettle has two heating coils. When one of the coils is connected to an a.c. source, the water in the kettle boils in 10 minutes. When the other coil is used the water boils in 40 minutes. If both the coils are connected in parallel, the time taken by the same quantity of water to boil will be -

(a) 8 minutes (b) 4 minutes
(c) 25 minutes (d) 15 minutes

2004

Q.31 Resistance n, each of r ohm, when connected in parallel give an equivalent resistance of R ohm. If these resistances were connected in series, the combination would have a resistance in ohms, equal to

(a) n^2R (b) R/n^2
(c) $R/8n$ (d) nR

Q.32 When three identical bulbs of 60 watt, 200 volt rating are connected in series to a 200 volt supply, the power drawn by them will be

(a) 60 watt (b) 180 watt
(c) 10 watts (d) 20 watt

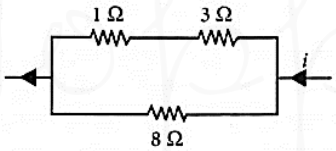
2005

Q.33 When a wire of uniform cross-section a, length l and resistance R is bent into a complete circle, resistance between any two of diametrically opposite points will be

(a) R/4 (b) 4R
(c) R/8 (d) R/2

2006

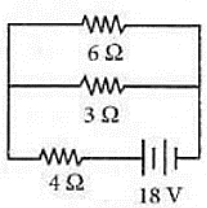
Q.34 Power dissipated across the 8Ω resistor in the circuit shown here is 2 watt. The power dissipated in watt units across the 3Ω resistor is -



(a) 3.0 (b) 2.0
(c) 1.0 (d) 0.5

2007

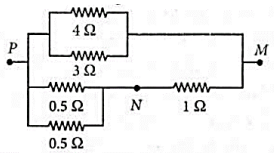
Q.35 The total power dissipated in watt in the circuit shown here is



(a) 40 (b) 54
(c) 4 (d) 16

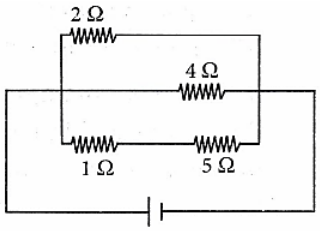
2008

Q.36 In the circuit shown, the current through the 4Ω resistor is 1 amp when the points P and M are connected to a d.c. voltage source. The potential difference between the points M and N is -



(a) 0.5 volt (b) 3.2 volt
(c) 1.5 volt (d) 1.0 volt

Q.37 A current of 3 amp. flows through the 2Ω resistor shown in the circuit. The power dissipated in the 5Ω resistor is -



(a) 1 watt (b) 5 watt
(c) 4 watt (d) 2 watt

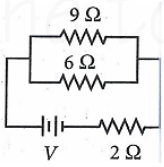
2009

Q.38 A wire of resistance 12 ohms per meter is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure is -

(a) 3Ω (b) 6πΩ
(c) 6Ω (d) 0.6π Ω

2011

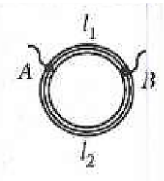
Q.39 If power dissipated in the 9Ω resistor in the circuit shown is 36 watt, the potential difference across the 2 Ω resistor is -



(a) 4 volt (b) 8 volt
(c) 10 volt (d) 2 volt]

2012

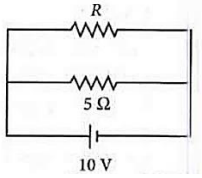
Q.40 A ring is made of a wire having a resistance R_0 = 12 Ω. Find the points A and B, as shown in the figure, at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$



(a) $\frac{l_1}{l_2} = \frac{5}{8}$ (b) $\frac{l_1}{l_2} = \frac{1}{3}$

(c) $\frac{l_1}{l_2} = \frac{3}{8}$ (d) $\frac{l_1}{l_2} = \frac{1}{2}$

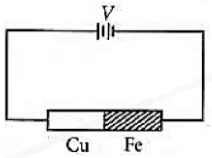
Q.41 The power dissipated in the circuit shown in the figure is 30 watts. The value of R is -



(a) 20 Ω (b) 15 Ω
(c) 10 Ω (d) 30 Ω

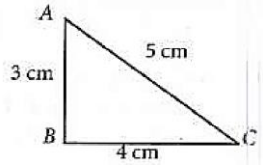
2013

Q.42 Two rods are joined end to end, as shown. Both have a cross-sectional area of 0.01cm^2. Each is 1 meter long. One rod is of copper with a resistivity of 1.7 x 10^{-6} ohm-centimeter, the other is of iron with a resistivity of 10^{-5} ohm-centimeter. How much voltage is required to produce a current of 1 ampere in the rods?



(a) 0.00145 V (b) 0.0145 V
(c) 1.7 x 10^{-6} V (d) 0.117 V

Q.43 A 12 cm wire is given a shape of a right angled triangle ABC having sides $3\ cm, 4\ cm$ and $5\ cm$ as shown in the figure. The resistance between two ends (AB, BC, CA) of the respective sides are measured one by one by a mustimeter. The resistances will be in the ratio of -



(a) 9:16:25 (b) 27:32:35
(c) 21:24:25 (d) 3:4:5

2015

Q.44 Two metal wires of identical dimensions are connected in series. If $\sigma_1$and σ_2 are the conductivities of the metal wires respectively, the effective conductivity of the combination is -

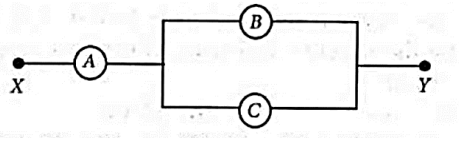
(a) $\frac{\sigma_1+\sigma_2}{\sigma_1\sigma_2}$ (b) $\frac{\sigma_1\sigma_2}{\sigma_1+\sigma_2}$

(c) $\frac{2\sigma_1\sigma_2}{\sigma_1+\sigma_2}$ (d) $\frac{\sigma_1+\sigma_2}{2\sigma_1\sigma_2}$

Q.45 A circuit contains an ammeter, a battery of $30V$ 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 -

(a) 2 A (b) 1 A
(c) 0.5 A (d) 0.25 A

Q.46 A, B and C are voltmeters of resistance R, 1.5R 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



(a) V_A=$V_B \neq V_C$ (b) $V_A \neq V_B \neq V_C$
(c) V_A= V_B = V_C (d) $V_A \neq V_B = V_C$

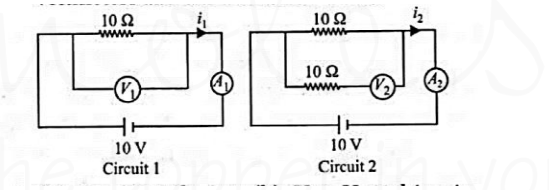
2016

Q.47 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 -

(a) 230 Ω (b) 46 Ω
(c) 26 Ω (d) 13 Ω

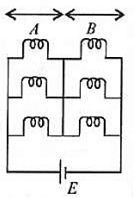
2019

Q.48 In the circuits shown below, the readings of the voltmeters and the ammeters will be -



(a) $V_2 > V_1$ and $i_1 > i_2$
(b) $V_2 > V_1$ and $i_1 = i_2$
(c) $V_2 = V_1$ and $i_1 > i_2$s
(d) $V_2 = V_1$ and $i_1 = i_2$

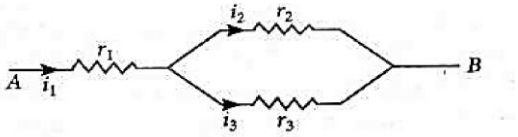
Q.49 Six similar bulbs are connected as shown in the figure with a DC source of emf E, and zero internal resistance. The ratio of power consumption by the bulbs when (i) all are glowing and (ii) in the situation when two from section A and one from section B are glowing, will be -



(a) 2:1 (b) 4:9
(c) 9:4 (d) 1:2

2021

Q.50 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 -



(a) $\frac{r_2}{r_1+r_3}$ (b) $\frac{r_1}{r_2+r_3}$

(c) $\frac{r_2}{r_2+r_3}$ (d) $\frac{r_1}{r_1+r_3}$

Q.51 The effective resistance of a parallel connection that consists of four wires of equal length, equal area of cross-section and same material is 0.25Ω. What will be the effective resistance if they are connected in series?

(a) 4Ω (b) 0.25Ω

(c) 0.5Ω (d) 1Ω

Cells, EMF, Internal Resistance

1999

Q.52 The internal resistance of a cell of emf 2V is 0.1 Ω It is connected to a resistance of 3.9Ω. The voltage across the cell will be -

(a) 1.95 V (b) 1.9 V

(c) 0.5 V (d) 2 V

2000

Q.53 A car battery of emf 12 V and internal resistance 5 x 10^{-2}Ω, receives a current of 60 amp from external source, then terminal potential difference of battery is -

(a) 12 (b) 9 V

(c) 15 V (d) 20 V

2002

Q.54 For a cell terminal potential difference is 2.2V when circuit is open and reduces to 1.8V when cell is connected to a resistance of R = 5 Ω. Determine internal resistance of cell (r).

(a) 10/9 Ω (b) 9/10 Ω

(c) 11/9 Ω (d) 5/9 Ω

2009

Q.55 A student measures the terminal potential difference (V) of a cell (of emf and internal resistance r) as a function of the current (1) flowing through it. The slope, and intercept, of the graph between V and I, then, respectively, equal

(a) -r and E (b) r and -E

(c) -E and r (d) E and -r

2011

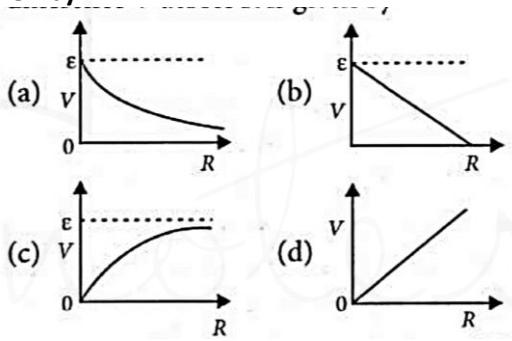
Q.56 A current of 2A flows through a 2Ω resistor when connected across a battery. The same battery supplies a current of 0.5A when connected across a 9Ω resistor. The internal resistance of the battery is -

(a) 0.5 Ω (b) 1/3 Ω

(c) 1/4 Ω (d) 1 Ω

2012

Q.57 A cell having an emf E and internal resistance r is connected across a variable external resistance R. As thse resistance R is increased, the plot of potential difference V across R is given by -



2013

Q.58 The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is

(a) 0.8 Ω (b) 1.0 Ω

(c) 0.2 Ω (d) 0.5 Ω

2018

Q.59 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 $10I$. The value of n is -

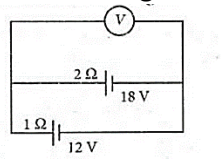
(a) 10 (b) 11

(c) 20 (d) 9

Cells in Series and in Parallel

2005

Q.60 Two batteries, one of emf 18 volts and internal resistance 2 Ω and the other of emf 12 volts and internal resistance 1Ω, are connected as shown. The voltmeter V will record a reading of -



(a) 30 volt (b) 18 volt
(c) 15 volt (d) 14 volt

2006

Q.61 Two cells, having the same e.m.f. are connected in series through an external resistance R. Cells have internal resistances r_1 and r_2 ($r_1 > r_2$) respectively. When the circuit is closed, the potential difference across the first cell is zero. The value of R is

(a) $r_1 + r_2$ (b) $r_1 - r_2$
(c) $\frac{r_1+r_2}{2}$ (d) $\frac{r_1-r_2}{2}$

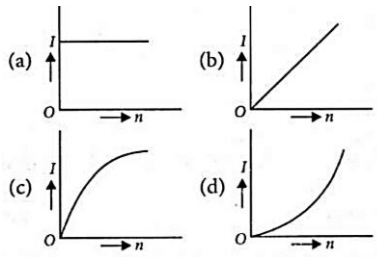
2013

Q.62 Ten identical cells connected in series are needed to heat a wire of length one meter and radius 'r' by 10°C in time 't'. How many cells will be required to heat the wire of length two meter of the same radius by the same temperature in time 't'?

(a) 20 (b) 30
(c) 40 (d) 10

2018

Q.63 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?



Kirchhoff's Rules

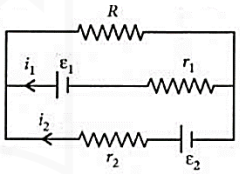
2006

Q.64 Kirchhoff's first and second laws of electrical circuits are consequences of

(a) Conservation of energy and electric charge respectively
(b) Conservation of energy
(c) Conservation of electric charge and energy respectively
(d) Conservation of electric charge.s

2009

Q.65 See the electrical circuit shown in this figure. Which of the following equations is a correct equation for it?



(a) $E_2 - i_2 r_2 - E_1 - i_1 r_1 = 0$
(b) $-E_2 - (i_1 + i_2)R + i_2 r_2 = 0$
(c) $E_1 - (i_1 + i_2)R + i_1 r_1 = 0$
(d) $E_1 - (i_1 + i_2)R - i_1 r_1 = 0$

2010

Q.66 Consider the following two statements.

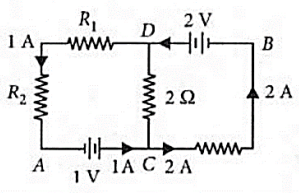
(A) Kirchhoff's junction law follows from the conservation of charge.
(B) Kirchhoff's loop law follows from the conservation of energy.

Which of the following is correct?

(a) Both (A) and (B) are wrong.
(b) (A) is correct and (B) is wrong.
(c) (A) is wrong and (B) is correct.
(d) Both (A) and (B) are correct.

2011

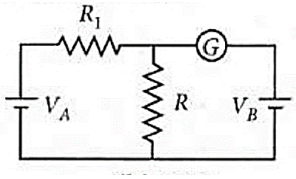
Q.67 In the circuit shown in the figure, if the potential at point A is taken to be zero, the potential at point B is -



(a) +1 V (b) -1 V
(c) +2 V (d) -2 V

2012

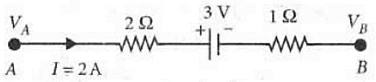
Q.68 In the circuit shown the cells A and B have negligible resistances. For V_A = 12 V, R_1= 500 Ω and R = 100 Ω the galvanometer (G) shows no deflection. The value of V_B is



(a) 4V (b) 2V
(c) 12V (d) 6V

2016

Q.69 The potential difference (V_A -V_B) between the points A and B in the given figure is

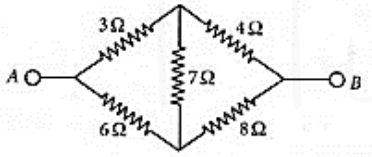


(a) - 3 V (b) +3V
(c) +6V (d) +9V

Wheatstone Bridge

2000

Q.70 The net resistance of the circuit between A and B is -



(a) $\frac{8}{3}\Omega$ (b) $\frac{14}{3}\Omega$
(c) $\frac{16}{3}\Omega$ (d) $\frac{22}{3}\Omega$

2001

Q.71 The resistance of each arm of the Wheatstone's bridge is 10 ohm. A resistance of 10 ohm is connected in series with a galvanometer then the equivalent resistance across the battery will be -

(a) 10 ohm (b) 15 ohm
(c) 20 ohm (d) 40 ohm

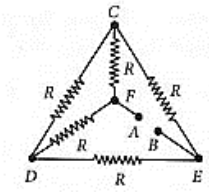
2003

Q.72 In a Wheatstone's bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is -

(a) R/4 (b) R/2
(c) R s (d) 2R

2004

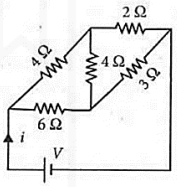
Q.73 Five equal resistances each of resistance R are connected as shown in the figure. A battery of V volts is connected between A and B. The current flowing in AFCEB will be



(a) $\frac{3V}{R}$ (b) $\frac{V}{R}$
(c) $\frac{V}{2R}$ (d) $\frac{2V}{R}$

2005

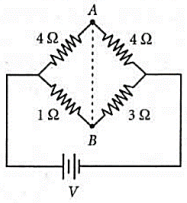
Q.74 For the network shown in the figure the value of the current I is -



(a) $\frac{9V}{35}$ (b) $\frac{18V}{5}$
(c) $\frac{5V}{9}$ (d) $\frac{5V}{18}$

2006

Q.75 In the circuit shown, if a conducting wire is connected between points A and B, the current in this wire will -



(a) Flow from B to A
(b) Flow form A to B
(c) Flow in the direction, which will be decided by the value of V
(d) Be zero

2007

Q.76 Three resistances P, Q, R each of 2Ω and an unknown resistance S form the four arms of a Wheatstone bridge circuit. When a resistance of 6Ω is connected in parallel to S the bridge gets balanced. What is the value of S?

(a) 3 Ω (b) 6 Ω
(c) 1 Ω (d) 2 Ω

2013

Q.77 The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be -

(a) 0.1 A (b) 2.0 A
(c) 1.0 A (d) 0.2 A

Metre Bridge

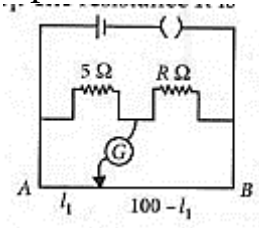
1999

Q.78 In a metre bridge, the balancing length from the left end (standard resistance of one ohm is in the right gap) is found to be 20 cm. The value of the unknown resistance is

(a) 0.8 Ω (b) 0.5 Ω
(c) 0.4 Ω (d) 0.25 Ω

2014

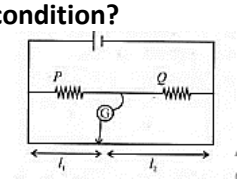
Q.79 The resistances in the two arms of the meter bridge are 5Ω and RΩ respectively. When the resistance R is shunted with an equal resistance, the new balance point is at $1.6l_1$. The resistance is -



(a) 10 Ω (b) 15 Ω
(c) 20 Ω (d) 25 Ω

2019

Q.80 The metre bridge shown is in balance position with $\frac{P}{Q} = \frac{l_1}{l_2}$. If we now interchange the positions of galvanometer and cell, will the bridge work? If yes, what will be balanced condition?



(a) yes, $\frac{P}{Q} = \frac{l_2 - l_1}{l_2 + l_1}$ (b) no, no null point

(c) yes, $\frac{P}{Q} = \frac{l_2}{l_1}$ (d) yes, $\frac{P}{Q} = \frac{l_1}{l_2}$

2020

Q.81 A resistance wire connected in the left gap of a metre bridge balances a 10Ω 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 1Ω of the resistance wire is -

(a) 1.0 x 10^{-2} m (b) 1.0 x 10^{-1} m
(c) 1.5 x 10^{-1} m (d) 1.5 x 10^{-2} m

Potentiometer

1999

Q.82 A potentiometer consists of a wire of length 4 m and resistance 10Ω. It is connected to a cell of emf, 2V. The potential difference per unit length of the wire will be -

(a) 5 V/m (b) 2 V/m
(c) 0.5 V/m (d) 10 V/m

2000

Q.83 The potentiometer is best for measuring voltage, as

(a) it has a sensitive galvanometer and gives null deflection
(b) it has wire of high resistance
(c) it measures p.d. like in closed circuit
(d) it measures p.d. like in open circuit.

2001

Q.84 If specific resistance of a potentiometer wire is 10^{-7}Ωm and current flow through it is 0.1 amp. cross-sectional area of wire is $10^{-6}m^2$ then potential gradient will be

(a) 10^{-2} volt/m (b) 10^{-4} volt/m
(c) 10^{-6} volt/m (d) 10^{-8} volt/m

2008

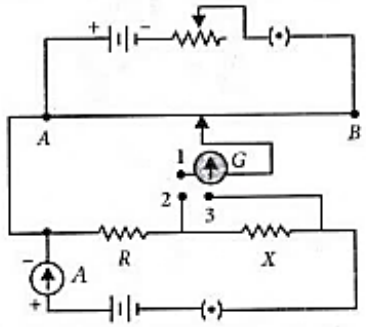
Q.85 A cell can be balanced against 110 cm and 100 cm of potentiometer wire, respectively with and without being short circuited through a resistance of 10Ω Its internal resistance is

(a) 2.0 ohm (b) Zero
(c) 1.0 ohm (d) 0.5 ohm

2010

Q.86 A potentiometer circuit set up as shown. The potential gradient, across the potentiometer wire, is k volt/cm and the ammeter, present in the circuit, reads 1.0 A when two way key is switched off. The balance points, when the key between the terminals (i) 1 and 2 (ii) 1 and

3, is plugged in, are found to be at lengths l_1 cm and l_2 cm respectively. The magnitudes of the resistors R and X, in ohms, are then, equal, respectively, to



(a) K (l_2-l_1) and Kl_2 (b) K l_1 and K (l_2-l_1)
(c) K (l_2-l_1) and Kl_1 (d) K $l_1$and Kl_2

2014

Q.87 A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4 m long. When the resistance R connected across the given cell, has values of -
(i) Infinity
(ii) 9.5Ω
the balancing lengths on the potentiometer wire are found to be 3 m and 2.85 m. respectively. The value of internal resistance of the cell is -
(a) 0.25Ω (b) 0.95 Ω
(c) 0.5 Ω (d) 0.75 Ω

2015

Q.88 A potentiometer wire of length L and a resistance r are connected in series with a battery of emf E_0 and a resistance r_1. An unknown emf E is balanced at a length l of the potentiometer wire. The em.f. E will be given by -
(a) $\frac{E_0 l}{L}$ (b) $\frac{LE_0 r}{(r+r_1)l}$
(c) $\frac{LE_0 r}{lr_1}$ (d) $\frac{E_0 r}{(r+r_1)} \cdot \frac{l}{L}$

Q.89 A potentiometer wire has length $4\,m$ and resistance 8Ω. The resistance that must be connected in series with the wire and an accumulator of e.mf. 2V, So as to get a potential gradient 1 mV per cm on the wire is
(a) 44 Ω
(b) 48 Ω
(c) 32 Ω
(d) 40 Ω

2016

Q.90 A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obtained at 50 cm and 10 cm from the positive end of the wire in the two cases. The ratio of emf's is -
(a) 3:4 (b) 3:2
(c) 5:1 (d) 5:4

2017

Q.91 A potentiometer is an accurate and versatile device to make electrical measurements of EMF because the method involves -
(a) potential gradients
(b) a condition of no current flow through the galvanometer
(c) a combination of cells, galvanometer and resistances
(d) cells

2021

Q.92 In a potentiometer circuit a cell of EMF 1.5V gives balance point at 36 cm length of wire. If another cell of EMF 2.5 V replaces the first cell then at what length of the wire, the balance point occurs?
(a) 62 cm (b) 60 cm
(c) 21.6 cm (d) 64 cm