PHYSICS

BOOKS - SARAS PUBLICATION

CURRENT ELECTRICITY

Example

1. A car moves from X to Y with a uniform speed v_u and returns to Y with a uniform

speed ν_d .The average speed for this round trip is:

A. $\frac{\nu_u + \nu_d}{2}$

B. $\frac{2\nu_d\nu_u}{\nu_d + \nu_u}$

C. $\sqrt{\nu_u\nu_d}$

D. $\frac{\nu_d\nu_u}{\nu_d + \nu_u}$

Answer:

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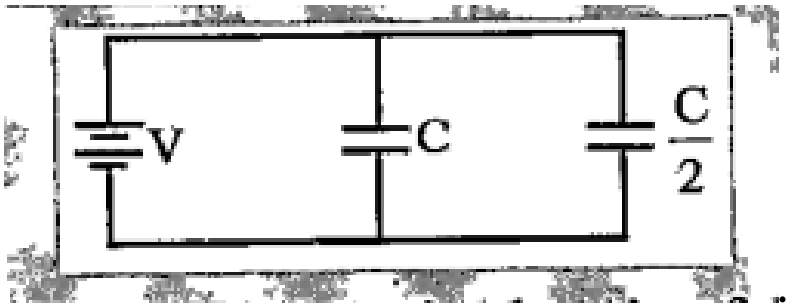
2. Two condenser,one of capacity C and the other of capacity $\frac{C}{2}$ are connected to a V-volt battery, as shown. The work done in charging fully both the condensers is :



A. $\frac{1}{2}CV^2$

B. $2CV^2$

C. $\frac{1}{4}CV^2$

D. $\frac{3}{4}CV^2$

Answer:

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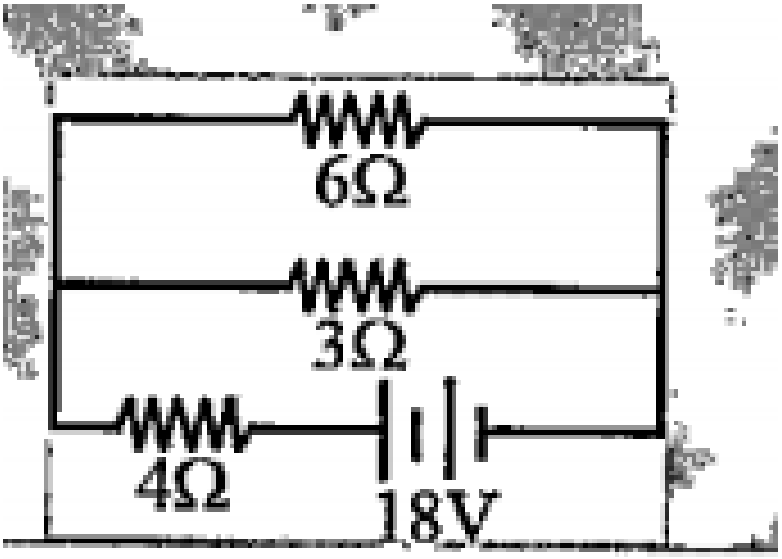
3. The total power dissipated in watts in the circuit shown here is :



A. 4

B. 16

C. 40

D. 54

Answer:

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4. Three resistances P,Q,R each of 2Ω and 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. 1Ω

B. 2Ω

C. 3Ω

D. 6Ω

Answer:

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5. The resistance of an ammetre is 13Ω and its scaleis graduated for a current upto 100 amps.After and additional shunt has been connected to this ammeter it becomes possible to measure currents upto 750 amperes by this meter.The value of shunt resistance is:

A. 2kΩ

B. 20Ω

C. 2Ω

D. 0.2Ω

Answer:

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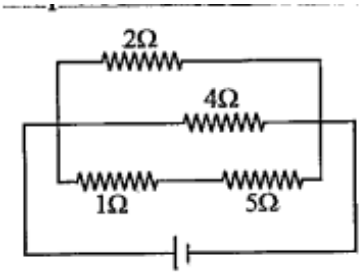
6. A current of 3 amp flows through the 2Ω resistor shown in the circuit.The power dissipated in the 5Ω resistor is:



A. 4 watt

B. 2 watt

C. 1 watt

D. 5 watt

Answer:

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

A. 1.2 times,1.1 times

B. 1.21 times,same

C. both remain the same

D. 1.1 times,1.1 times

Answer:

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8. A particle of mass 1 mg has the same wavelength as an electron moving with a

velocity of$3 \times 10^{6} ms^{-1}$. The velocity of the particle is:(Mass of electron=9.1×10^{-31}kg)

A. $2.7 \times 10^{-18} ms^{-1}$

B. $9 \times 10^{-2} ms^{-1}$

C. $3 \times 10^{-31} ms^{-1}$

D. $2.7 \times 10^{-21} ms^{-1}$

Answer:

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

A. 1.0 ohm

B. 0.5 ohm

C. 2.0 ohm

D. zero

Answer:

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10. A transistor is operated in common - emitter configuration at V_c=2 such that a change in the base current from 100 μA to 200 μA produces a change in the collector current from 5mA to 10 mA.The current gain is:

A. 100

B. 150

C. 50

D. 75

Answer:

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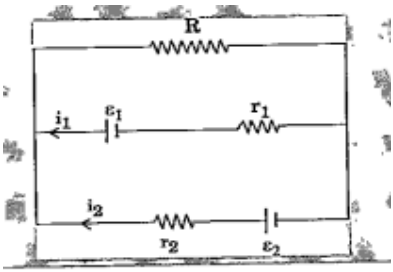
11. See the electric circuit shown in this Figure. Which of the following equations is a correct equation for it?



A. $\varepsilon_2 - i_2 r_2 \varepsilon_1 i_1 r_1 = 0$

B. $-\varepsilon_2 - (i_2 r_2) R + i_2 r_2 = 0$

C. $\varepsilon_1 - (i_1 + i_2) R + i_1 r_1 = 0$

D. $\varepsilon_1 - (i_1 + i_2) R - i_1 r_1 = 0$

Answer:

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12. A wave in a string has an amplitude of 2cm.The wave travels in the +ve direction of x axis with a speed of $128 m / \sec$.and it is noted

that 5 complete waves fit in 4m length of the string. The equation describing the wave is:

A. $y=(0.02)\ m\ \sin(15.7x-2010t)$

B. $y=(0.02)\ m\ \sin(15.7x+2010t)$

C. $y=(0.02)\ m\ \sin\ (7.85x-1005t)$

D. $y=(0.02)\ m\ \sin\ (7.85x+1005t)$

Answer:

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13. A student measurres the terminal potential difference (V) of a cell (of emf $\in$ and internal resistancer) as a function of the current (I) flowing through it.The slope, and intercept, of the graph between V and I, then, respectively, equal:

A. -r and $\in$

B. r and - $\in$

C. - $\in$ and r

D. $\in$ and -r

Answer:

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14. Consider the following two statements: (A) Kirchoffs junction law follows from the conversation of charge.(B) Kirchoffs loop law follows from the conversation 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

Answer:

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15. Four charges, each of value q, are placed at the four corners of a square of side a. What is the potential at the centre of the square

A. zero

B. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\sqrt{5}\right)$

C. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1+\frac{1}{\sqrt{5}}\right)$

D. $\frac{1}{4\pi\varepsilon_0}\frac{2q}{L}\left(1-\frac{1}{\sqrt{5}}\right)$

Answer:

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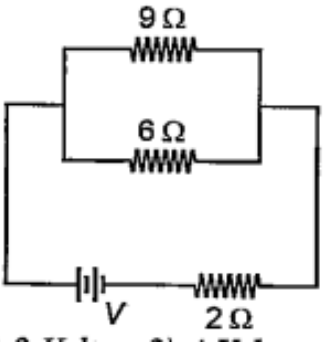
16. If power dissipaited the 9Ω resistor is shown is 36 watt,the potential difference

across the 2Ω resistor is



A. 2 Volt

B. 4 Volt

C. 8 Volt

D. 10 Volt

Answer:

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

A. 1Ω

B. 0.5Ω

C. $\frac{1}{3}\Omega$

D. $\frac{1}{4}\Omega$

Answer:

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18. A uniform elecric field and a uniform magenetic field are acting along the same direction in certain region.If an electron is projected in the region such that its velocity is pointed along directions of fields, then the electron

A. Will turn towards left of direction of motion

B. Will turn towards right of direction of motion

C. Speed will decrease

D. Speed will increase

Answer:

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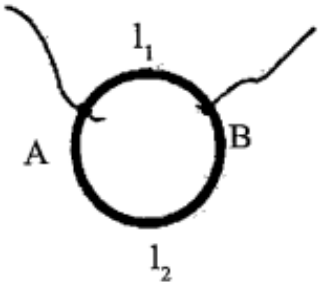
19. A ring is made of wire having a distance $R_0 = 12\Omega$. Find the points A and B as shown in figure,at which a current carrying conductor should be connected so that the resistance R of the sub circuit between these points is equal to $\frac{8}{3}\Omega$



A. $\frac{I_1}{I_2} = \frac{1}{2}$

B. $\frac{I_1}{I_2} = \frac{3}{8}$

C. $\frac{I_1}{I_2} = \frac{1}{3}$

D. $\frac{I_1}{I_2} = \frac{5}{8}$

Answer:

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20. A particle has initial velocity $\left(2\vec{i} + 3\vec{j}\right)$ and acceleration $\left(0.3\vec{i} + 0.2\vec{j}\right)$. The magnitude of velocity after 10 seconds will be

A. $5\sqrt{2}$ units

B. 5 units

C. 9 units

D. $9\frac{X_L}{R}$ units

Answer:

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

A. 2Ω

B. 4Ω

C. 8Ω

D. 16Ω

Answer:

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22. The internal resistance of a 2.1v cell which gives a current of 0.2 A through a resistance of 10Ω is

A. 0.2Ω

B. 0.5Ω

C. 0.8Ω

D. 1.0Ω

Answer:

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23. The resistance 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. 1.0 A

B. 0.2 A

C. 0.1 A

D. 2.0 A

Answer:

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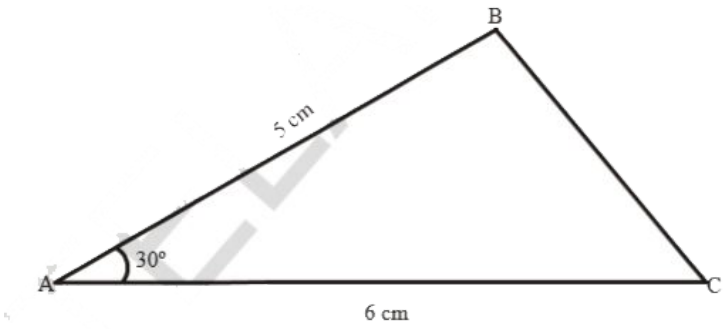
24. In the adjacent figure. AC = 6 cm, AB = 5 cm and $\angle BAC = 30^\circ$. Find the area of the triangle.



A. $3:4:5$

B. $9:16:25$

C. $27:32:35$

D. $21:24:25$

Answer:

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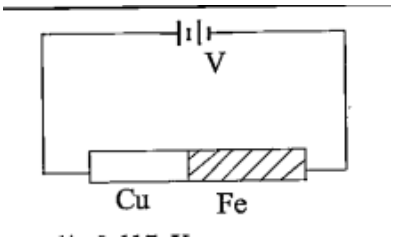
25. Two rods are joined end to end as shown. Both have a cross-sectional area of$0.01cm^2$. Each is 1 m long. One rod is a copper with resistivity of$1.7x10^{-6}$ ohm -centimetre, the other is of iron with a resistivity of 10^-5` ohm-centimeter. How much voltage is required to

produce a current of 1 ampere in the rods?



A. 0.117 V

B. 0.00145 V

C. 0.0145 V

D. 1.7×10^{-6} V

Answer:

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26. A conducting sphere of radius R is given a charge Q.The electric potential and the electric field at the centre of the sphere respectively are

A. zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$

B. $\frac{Q}{4\pi\varepsilon_0 R}$ and zero

C. $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$

D. Both are zero

Answer:

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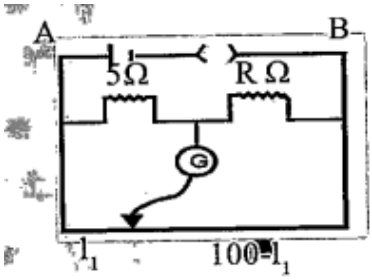
27. The resistances in the two arms of the metre bridge are 5Ω and R Ω respectively. When resistance R is shunted with an equal resistance, the new balance point is at $1.6l_1$ .The resistance R, is:



A. 10Ω

B. 15Ω

C. 20Ω

D. 25Ω

Answer:

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28. A potentiometer circuit has been set up for finding the internal resistance of a given cell.The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance.The

potentiomter were itself is 4m long.When the resistance, R, connected across the given cell, has values of (i) Infinity (ii)9.5Ω the'balancing lengths', on the potentiometerwire are found to be 3m and 2.85m, respectively. The value of internal resistance of cell is

A. 0.25Ω

B. 0.95Ω

C. 0.5Ω

D. 0.75Ω

Answer:

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

A. $\frac{LE_0r}{r+r_1l}$

B. $\frac{LE_0r}{lr_2}$

C. $\frac{E_0r}{r+r_1}.\frac{l}{L}$

D. $\frac{E_0 l}{L}$

Answer:

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

A. current

B. drift velocity

C. electric field

D. current density

Answer:

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31. A potentiometre wire has length 4m resistance 8Ω. The resistance that must be connected in series with the wire and an

accumulator of e.m.f. 2v, so as to get a potential gradient 1 mV per cm on the wire is:

A. 40Ω

B. 44Ω

C. 48Ω

D. 32Ω

Answer:

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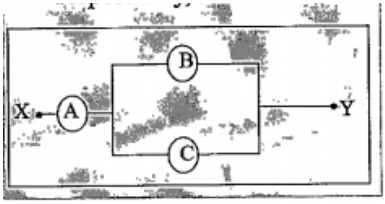
32. A,B and C are voltmetres of resistance R, 1.5R and 3R as shown in the figure. When some potential difference is applied between X and Y the voltmetre readings are V_A,V_B and V_C respectively , Then:



A. $V_A \neq V_B = V_C$

B. $V_A = V_B \neq V_C$

C. $V_A \neq V_B \neq V_C$

D. $V_A = V_B = V_C$

Answer:

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33. An inductor 20 mH , a capacitor 50μ F and a resistor 40 are connected in series across a source of emf V=10 sin 340 t. The power loss in A.C. circuit is

A. 0.89 W

B. 0.51 W

C. 0.67 W

D. 0.76 W

Answer:

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34. A potentiometre 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 two cases. The ration of emf's is

A. $3:2$

B. $5:1$

C. $5:4$

D. $3:4$

Answer:

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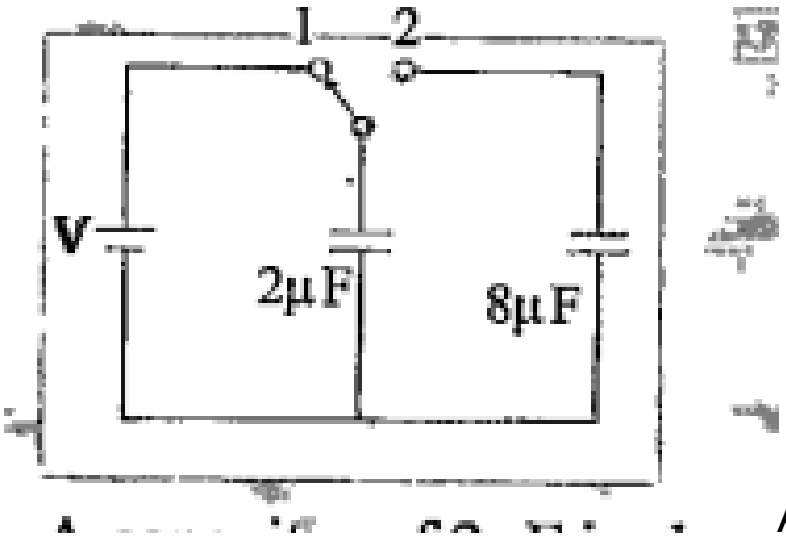
35.



A capacitor of 2μ F is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:

A. 80%

B. 0%

C. 20%

D. 75%

Answer:

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36. If the velocity of a particle is $\nu = At + Bt^2$, where A and B are constants, then the distance tavelled by it between 1s and 2s is

A. $\frac{A}{2} + \frac{B}{3}$

B. $\frac{3}{2}A + 4B$

C. 3A + 7B

D. $\frac{3}{2}A + \frac{7}{3}B$

Answer:

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37. 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. (a^3R)/b

B. (a^3R)/6b

C. (a^3R)/3b

D. (a^3R)/2b

Answer:

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38. A filament bulb (500W, 100V)is to be used in a 230v main supply. When a resistance R is

connected in series, it works perfectly and the bulb consumes 500W. The value of R is

A. 26 Ω

B. 13 Ω

C. 230 Ω

D. 24 Ω

Answer:

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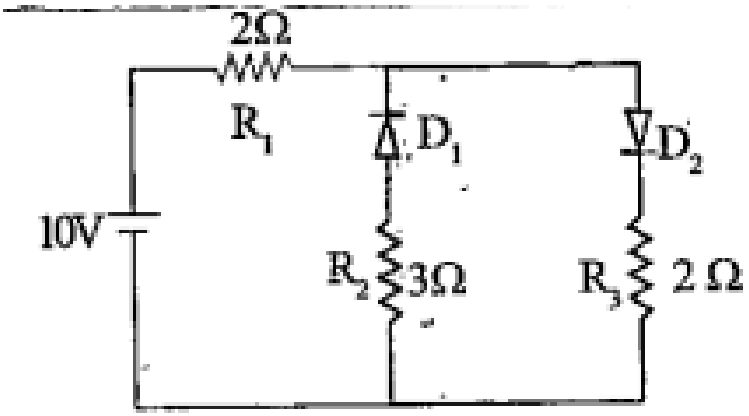
39. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be



A. 1.43 A

B. 3.13 A

C. 2.5 A

D. 10.0 A

Answer:

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40. The temperature inside a refrigator is t_2° C and the room temperature is $t_1^\circ C$. The amount of heat delivered to the room for each joule of electrical energy consumed ideally will be

A. $\frac{t_2 + 273}{t_1 - t_2}$

B. $\frac{t_1 + t_2}{t_1 + 273}$

C. $\frac{t_1}{t_1 - t_2}$

D. $\frac{t_1 + 273}{t_1 - t_2}$

Answer:

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41. 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

Answer:

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42. A potentiometer is an accurate and versatile device to make electrical

measurements of E.M.F because the method involves:

A. potential gradients

B. condition of no current flow through the galvanometer

C. a combination of cells, galvanometer and resistances

D. cells

Answer:

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