Class: XII
Subject: Physics
Topic: Current Electricity
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

1. SQUID is a device used to
A. measure magnetic field changes with precision
B. measure electric field changes with precision
C. measure superconductivity
D. measure photo conductivity

Anss A

2. The dimensions of voltage (pd or emf) is
A. ML2 T-3 I-2
B. ML2 T-3 I-1
C. ML2 T3 I
D. ML2 T-2 I-1

Ans. B

Solution:

$$[V] = \frac{[W]}{[Q]} = \frac{ML^2 T^{-2}}{IT} ML^2 T^{-3} I^{-1}.$$

3. Heating coil must have
A. high melting point & high resistance
B. high melting point & low resistance
C. low melting point & low resistance
D. low melting point & high resistance

Ans. A

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4. A 20 W, 120 V light bulb and a 60 W, 120 V light bulb are connected in series across a 240V line. Assuming that the resistance of each bulb does not vary with current, the current through the bulbs is
A. 1 A
B. 1/3 A
C. 1/4A
D. None

Ans. C
Solution:

$$\text{Resistanáe of I bulb} = \frac{(120)^2}{20} = 720\Omega$$

$$\text{Resistance of II bulb} = \frac{(120)^2}{60} = 240\Omega$$

$$\text{Current through the bulb} = \frac{240}{720+240} = \frac{240}{960} = \frac{1}{4}A$$

5. Carbon resistors used in electronic circuits are marked for their resistance value and tolerance by a colour scheme. A given resistor has a color scheme brown, black, blue and gold. Its value in ohm is
A. 1.0 × 103 ± 5%
B. 3.2 × 105 ± 5%
C. 1.0 × 106 ± 10%
D. 10 × 106 ± 5%

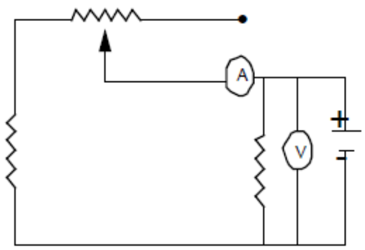
Ans. D
Solution:
Brown - black - blue &gold
10´106 ± 5%

6. A resistor is in the left gap and a (NTC) semiconductor is in the right of a meterbridge. Balancing length is noted(l)Both are heated so that change of resistance in them is the same. Now balancing length is
A. equal to
B. greater than
C. less than
D. depends on temperature change

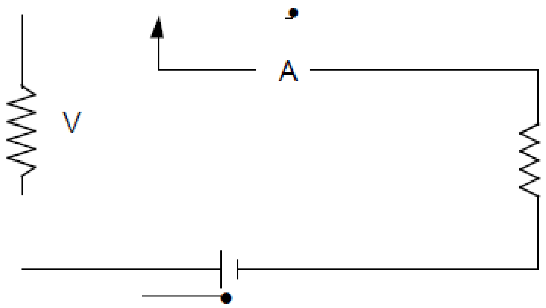
Ans.B
Solution:
Resistance of resistor in the left gap increases. Resistance of NTCin the right gap

decreases. Balancing length adjacent to resistor increases. Thus balancing point shifts to right. So it is greater th an l

7. Which of the following circuit is correct for the verification of ohm's law?



A.



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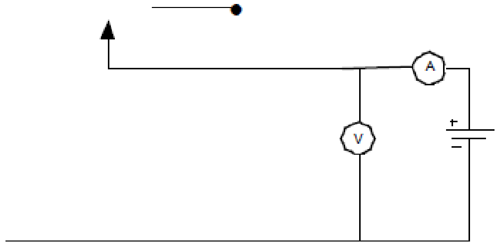
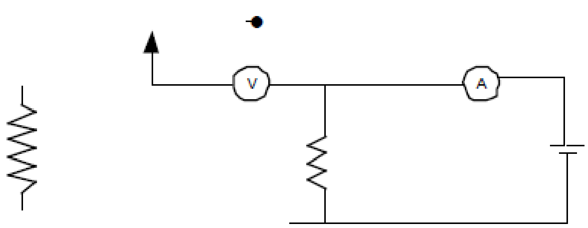


C.



D.

Ans. A
To verify Ohm’s law, ammeter is connected in series and voltmeter is connected in parallel with one of the resistance which is varied
by changing the resistance.

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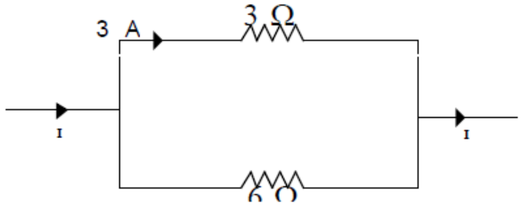
8. Calculate the current I in the circuit shown



A. 9A
B. 4.5A
C. 3A
D. 1.5A

Ans. B
Solution:

$$\text{Current in one branch} = \frac{\text{Main current} \times \text{Resistance of other branch}}{\text{sum of resistances}}$$

$$3 \times \frac{I \times 6}{9} \Rightarrow I = \frac{27}{6} = 4.5A$$

9. Four resistances 15, 12, 4 & 10 Ω are connected in cyclic order to form wheatstone network. The resistance to be connected in,parallel with 10 Ω to balance the network is
A. 5 Ω
B. 10 Ω
C. 8 Ω
D. 20 Ω

Ans. B
Solution:
X is the resistance connected in parallel with 10 Ω

$$\frac{P}{Q} = \frac{R_p}{S} \qquad \frac{15}{12} = \frac{R_p}{4} \qquad R_p = \frac{15 \times 4}{12} = 5$$

$$\frac{10x}{10+x} = 5 \qquad 10x = 50 + 5x \qquad x = 10\Omega$$

10. An example of a non-ohmic device is
A. potentiometer wire
B. platinum resistance thermometer
C. thermistor
D. copper wire
Ans. C

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11. A platinum wire has a resistance of 10 Ω at 0ºC and 20 Ω at 273ºC. Then the value of temperature coefficient of platinum is

A. 273 ºC

B. $\left(\frac{1}{273}\right)^{\circ}C$

C. $\left(\frac{1}{273}\right)^{\circ}C^{-1}$

D. (273) K^{-1}

Ans. C

Solution:

$$\alpha = \frac{R - R_o}{R_o\theta} = \frac{10}{10 \times 273} = \left(\frac{1}{273}\right)\ ^{\circ}C^{-1}$$

12. The resistance of 10 m potentiometer wire is 20 Ω. A resistance box is connected in series with a cell of emf 2 V & internal resistance 1Ω to the ends of potentiometer wire. The value of resistance to be unplugged in resistance box so that there is a fall of potential 0.01 mV/cm

A. 1979 Ω

B. 2979 Ω

C. 4000 Ω

D. 3979 Ω

Ans.D

Solution:

R be resistance of potentiometer wire & R' to be resistance unplugged;

Fall of potential across potentiometer wire

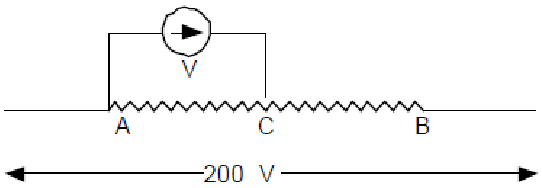
$$= \text{Curent} \times \text{resistance of potentiometer wire} = \frac{E}{R + R' + r} \times R.$$

$$\text{Fall of potential / cm} = \frac{1}{1000}\left[\frac{ER}{R + R' + r}\right]$$

$$0.01 \times 10^{-3} = \frac{1}{1000}\left[\frac{2 \times 20}{20 + R' + 1}\right] 0.01 = \frac{40}{21 + R'}$$

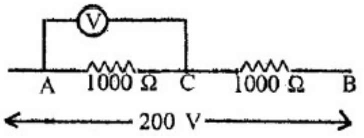
$$21 + R' = 4000 \qquad R' = 3979\Omega$$

13. AB is a uniform wire of resistance 2000 ohm and C is the midpoint of AB. A voltmeter of resistance 1000 ohm is connected between A and C. Then the reading of the voltmeter, when the P.D. applied across AB is 200 V is



A. 66.6 V
B. 33.3 V
C. 133. 2 V
D. 200 V

Ans.A
Solution:



$$I = \frac{\text{Total emf}}{\text{Total resistance}} = \frac{200}{R_p + 100(}$$

$$= \frac{200}{1500} = 2/15A$$

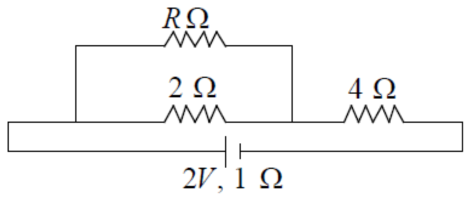
Voltmeter reading $V = I \times R_{eff}$

$$= \frac{2}{15} \times 500 = \frac{200}{3} = 66.6\ V$$

14. A carbon composition resistor has the following colour code: Green, Blue, Yellow, Silver. Its resistance is
A. 560 ± 56 kΩ
B. 560 ± 28 kΩ
C. 56 × 105 5.6 Ù
D. 5.6 ± 2.8 kΩ

Ans,A

15. A current of1/3 A flows in the main circuit. Now, the resistance R is disconnected and then connected across the 4 Ω resistance. The current in the circuit now is



A. $\frac{1}{2}$ A
B. 4 A
C. $\frac{2}{9}$ A
D. $\frac{6}{13}$ A

Ans. D
Solution:

$$\text{Current } I = \frac{\text{Total emf}}{\text{Total residence}}$$

$$\frac{1}{3} = \frac{2}{\frac{2R}{R+2}+4+1} \Rightarrow 6 = \frac{2R}{R+2}+5 \Rightarrow 2R = R+2 \Rightarrow R = 2\Omega$$

$\therefore$ When $R = 2\Omega$ is connected across 4 Ω

$$I = \frac{2}{2+1+\frac{4\times R}{4+R}} = \frac{2}{3+\frac{8}{6}} = 6/13 \;\; A$$

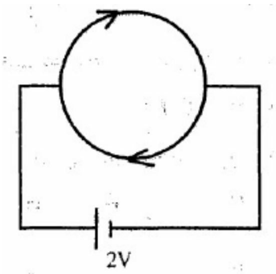
16. Consider 6 branches of 10 identical cells connected in series the emf and the internal resistance of each cell being 1.5 volts and 1 ohm respectively. If the group of cells sends a current I through an external resistance of 20 ohms, then the value of this current (in amperes) in
A. 0.25
B. 0.14
C. 0.70
D. 0.85
Ans. C

Solution:

$$I = \frac{mnE}{mR+nr} = \frac{6\times 10\times 1.5}{6\times 20+10\times 1} = \frac{90}{130} = 0.69A = 0.70A$$

17. A Wire of length 40 cm of resistance 0.1 Ω/cm is bent into the form of a circle. A cell of emf 2 V and negligible internal resistance is connected across 2 diagonally opposite points. The current in each branch is
A. 3A
B. 2A
C. 1A
D. 4A

Ans.



Resistance of each branch $= 20 \times 0.1 = 2\Omega$

$$\text{Total current} = \frac{2}{R_{eff}} = \frac{2}{1} = 2A$$

$$\therefore \text{Current in each branch} = \frac{2}{2} = 1A$$

18. Two resistors 400 Ω and 800 Ω are connected in series with a 6 V battery. An ammeter of 10 Ω resistance connected in series in the circuit reads

A. 5.96 A
B. 6.96 A
C. 4.96 mA
D. 10 mA

Ans.C
Solution:

$$I = \frac{V}{R} = \frac{6}{800 + 400 + 10} = \frac{6}{1210} = 4.96mA$$

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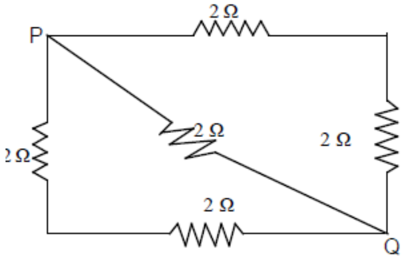
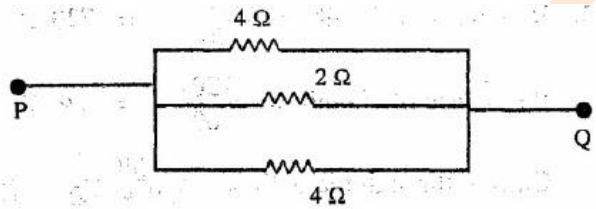
19. The resistance between P and Q in the figure shown is



A. 1 Ω
B. 3/2 Ω
C. 6 Ω
D. 4 Ω

Ans. A
Solution:



$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{2} + \frac{1}{4}$$

$$\frac{1}{R_p} = \frac{1+2+1}{4} = 1\Omega$$

$$\therefore R_p = 1\Omega$$

20. Good resistance coils are made of
A. Gold
B. Silver
C. Copper
D. Manganin

Ans. D
Fact