PRACTICE PAPER - MCQ

CLASS - X

Experiment No. 3

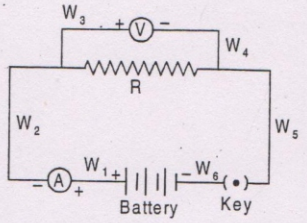
OBJECTIVE

To study the dependence of potential difference (V) across a resistor on the current (I) passing through it and determine its resistance. Also plot a graph between V and I.

➢ **Multiple Choice Questions** **(1 Mark)**

Choose the correct answer :

1. A student sets up the circuit, for studying the dependence of current (I) flowing, on the applied potential difference (V), in the manner shown. The ammeter and the voltmeter, in his circuit, have been checked and found to be correct. On closing the key K, he observes a deflection in the ammeter but no deflection in the voltmeter. This could be due to a loose connection, or break, in the wire : *[Delhi 2010]*



(*a*) W_1 or W_2 (*b*) W_3 or W_4

(*c*) W_5 or W_6 (*d*) W_6 or W_1

2. Three students X, Y and Z, while performing the experiment to study the dependence of current on the potential difference across a resistor, connects the ammeter (A), the battery (B), the key (K) and the resistor (R), in series, in the following three different orders.

X ⟶ B, K, R, A, B

Y ⟶ B, A, K, R, B

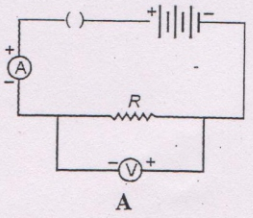
Z ⟶ B, R, K, A, B *[Delhi 2010]*

Who has connected them in the correct order ?

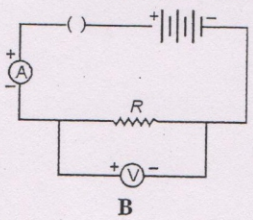
(*a*) X (*b*) Y .

(*c*) Z (*d*) All of them

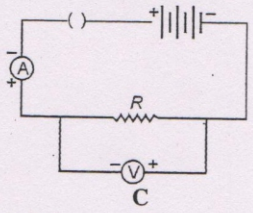
3. Out of the four given circuits for studying the dependence of the current on the potential difference across a resistor, the circuit that has been correctly drawn, is circuit *[Foreign 2010]*



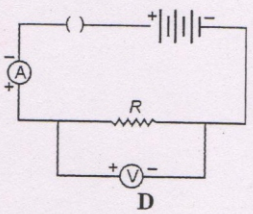
A



B



C

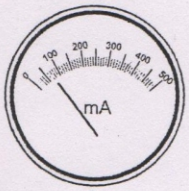


D

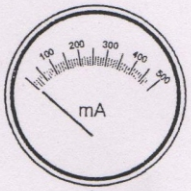
(*a*) A (*b*) B

(*c*) C (*d*) D

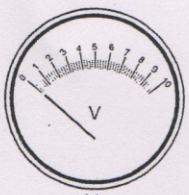
4. The positions of the pointer of the two ammeters A_1 and A_2, and two voltmeters V_1 and V_2 available in the laboratory are shown in the given figure. For an experiment to study the dependence of the current on the potential difference across a resistor, the student would prefer *[CBSE Sample Paper 2009]*



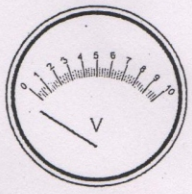
A_1



A_2



V_1



V_2

(*a*) ammeter A_1 and voltmeter V_1

(*b*) ammeter A_2 and voltmeter V_1

(*c*) ammeter A_1 and voltmeter V_2

(*d*) ammeter A_2 and voltmeter V_2.

5. The following apparatus is available in a laboratory.

Cell : Adjustable from 0 to 1.5 volt

Resistor : 4 Ω and 12 Ω

Ammeters : A_1 of Range 0 to 3 A; Least Count 0.01 A

: A_2 of Range 0 to 1 A; Least Count 0.05 A

Voltmeters : V_1 of Range 0 to 10 V; Least Count 0.5 V
: V_2 of Range 0 to 5 V; Least Count 0.1 V

The best combination of voltmeter and ammeter for finding the equivalent resistance of the resistors in parallel would be [*CBSE Sample Paper 2009*]

(*a*) ammeter A_1 and voltmeter V_1.
(*b*) ammeter A_1 and voltmeter V_2.
(*c*) ammeter A_2 and voltmeter V_1.
(*d*) ammeter A_2 and voltmeter V_2.

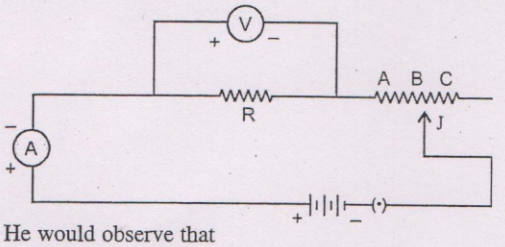
6. In an experiment to study dependence of current on the potential difference across a given resistor, four students P, Q, R and S kept the plug key in the circuit closed for time t_1 and then open for time t_2 as given in the table below. [*CBSE Sample Paper 2009*]

Student	Closed time t_1 seconds	Open time t_2 seconds
P	30	60
Q	60	30
R	60	15
S	45	15

The best choice of open and closed time is that of student

(*a*) P (*b*) Q
(*c*) R (*d*) S.

7. To study the dependence of current (I) flowing on the applied potential difference (V) across a resistor, a student sets-up his apparatus as shown. He puts the sliding contact J, in the positions A, B and C, one by one and notes the three readings of the voltmeter as V_A, V_B, V_C and that of the ammeter as I_A, I_B and I_C. [*Delhi 2009C*]



He would observe that

(*a*) $V_A = V_B = V_C$ but $I_A \neq I_B \neq I_C$
(*b*) $V_A \neq V_B \neq V_C$ but $I_A = I_B = I_C$
(*c*) $V_A < V_B < V_C$ but $I_A < I_B < I_C$
(*d*) $V_A > V_B > V_C$ but $I_A > I_B > I_C$

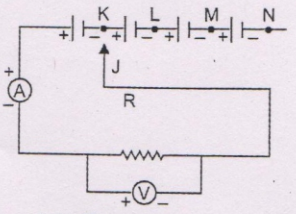
8. The following 'precautions' were listed by a student in the experiment on study of 'Dependence of current on potential difference'. [*Delhi 2009*]

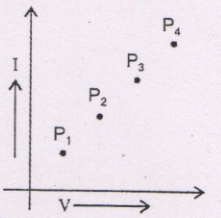
(A) Use copper wires as thin as possible for making connections.
(B) All the connections should be kept tight.
(C) The positive and negative terminals of the voltmeter and the ammeter should be correctly connected.
(D) The 'zero error' in the ammeter and the voltmeter should be noted and taken into consideration while recording the measurements.
(E) The 'key' in the circuit, once plugged in, should not be taken out till all the observations have been completed.

The 'precautions' that need to be corrected and revised are :

(*a*) (A), (C) and (E) (*b*) (C) and (E)
(*c*) (B) and (E) (*d*) (A) and (E)

9. A student performs an experiment on studying the dependence of the current (I) flowing through a conductor on the potential difference (V) applied across it by setting up his circuit as shown. He records four values of 'I' by keeping the sliding contact J, in the positions K, L, M and N, one by one. The corresponding points on his V-I graph are labelled as P_1, P_2, P_3 and P_4. The point P_3, would correspond to the case when the sliding contact, J, is in the position : [*AI 2009*]



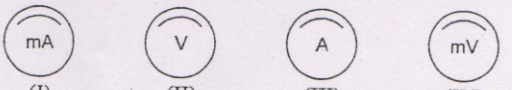


(*a*) K (*b*) L
(*c*) M (*d*) N

10. In an experiment on studying the dependence of the current (I), flowing through a given resistor, on the potential difference (V) applied across it, a student is to change the value of the current. For doing this, he can change the

(*a*) number of cells used or by setting the battery eliminator
(*b*) resistor itself
(*c*) ammeter used in the circuit
(*d*) voltmeter used in the circuit. [*Foreign 2009*]

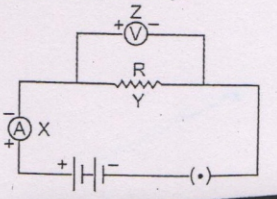
11. Four different measuring instruments are shown below. Out of these, the instrument that can be used for measuring current is/are the instruments labelled as [*CBSE*]



(I)	(II)	(III)	(IV)
Range 0-50 mA	Range 0-3 V	Range 0-3 A	Range 0-10 mV
L.C. = 1 mA	L.C. = 0.1 mV	L.C. = 0.2 mA	L.C. = 0.1 mV

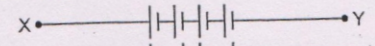
(*a*) I and III with III more reliable of the two
(*b*) I and IV with IV more reliable of the two
(*c*) II and III with II more reliable of the two
(*d*) II and IV with IV more reliable of the two

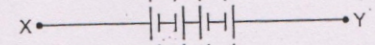
12. A student draws the following circuit diagram for the experiment on studying the dependence of current (I) on p.d. (V) across a resistor. The parts labelled X, Y and Z, in this diagram are, respectively, [*CBSE*]

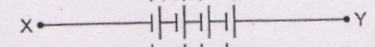


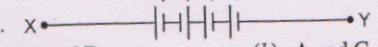
(*a*) a resistor, a voltmeter and a milliammeter.
(*b*) a voltmeter, a resistor and a milliammeter.
(*c*) a milliammeter, a resistor and a voltmeter.
(*d*) a resistor, a milliammeter and a voltmeter.

13. Four identical cells, of emf 1.5 V each, were connected in four different ways as shown. The potential difference, between the points X and Y, would be equal to 6.0 V, in case/cases [*Delhi, AI 2008C*]

A. 

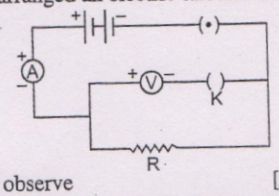
B. 

C. 

D. 

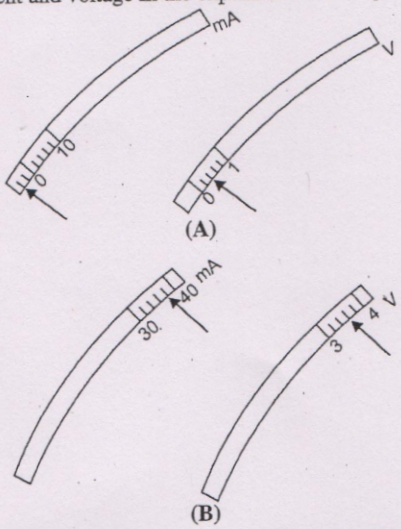
(*a*) A and B (*b*) A and C
(*c*) A and D (*d*) A only

14. A student arranged an electric circuit as shown below.



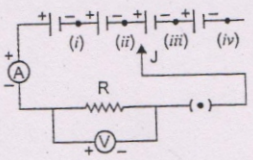
He would observe [*Delhi, AI 2008C*]
(*a*) no reading in either the ammeter or the voltmeter
(*b*) no reading in the voltmeter but a finite reading in the ammeter
(*c*) no reading in the ammeter but a finite reading in the voltmeter
(*d*) a finite reading in both the ammeter and the voltmeter

15. The rest positions of the needles in a milliammeter and voltmeter not in use are as shown in Fig. A. When a student uses these in his experiment, the readings of the needle are in the positions shown in Fig. B. The corrected values of current and voltage in the experiment are [*Delhi 2008*]

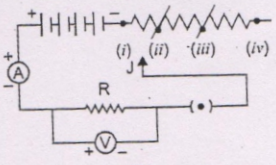


(*a*) 42 mA and 3.2 V (*b*) 42 mA and 4.0 V
(*c*) 34 mA and 3.2 V (*d*) 34 mA and 4.0 V

16. To study the dependence of current (I) on the potential difference (V) across a resistor R, two students used the two set ups shown in Figure A and B respectively. They kept the contact point J in four different positions, marked (*i*), (*ii*), (*iii*) and (*iv*) in the two figures. [*Delhi, AI and Foreign 2008*]



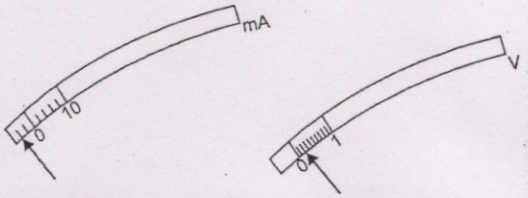
(A)



(B)

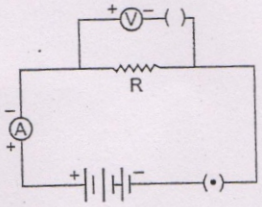
For the two students, the ammeter and voltmeters readings will be maximum when the contact J is in the position
(*a*) (*iv*) in both the set ups
(*b*) (*i*) in both the set ups
(*c*) (*iv*) in set up A and (*i*) in set up B
(*d*) (*i*) in set up A and (*iv*) in set up B

17. The rest positions of the needles in a Milliammeter and Voltmeter when not being used in a circuit are as shown in the figure. The 'zero error' and 'least count' of these two instruments are : [*AI, Foreign 2008*]



(*a*) (+4 mA, –0.2 V) and (1 mA, 0.1 V) respectively
(*b*) (+4 mA, –0.2 V) and (2 mA, 0.2 V) respectively
(*c*) (–4 mA, +0.2 V) and (2 mA, 0.2 V) respectively
(*d*) (–4 mA, +0.2 V) and (2 mA, 0.1 V) respectively

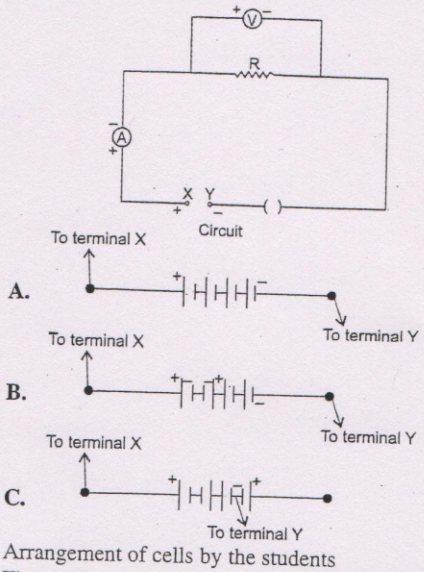
18. For the circuit arrangement, shown below, the student would observe [*Delhi 2007C*]



(*a*) some reading in both the ammeter and the voltmeter
(*b*) no reading in either the ammeter or the voltmeter
(*c*) some reading in the ammeter but no reading in the voltmeter
(*d*) some reading in the voltmeter but no reading in the ammeter.

19. To the terminals marked as X and Y in the given circuit, three students connect 4 cells of voltage 1.5 V each in three different manners shown below.

3



Arrangement of cells by the students

The readings of the voltmeter, for the three students, are likely to be (nearly) [*Delhi, AI 2008, Delhi 2007C*]

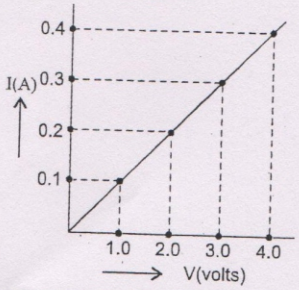
(*a*) $V_A = 6.0$ V; $V_B = 3.0$ V; $V_C = 0$ V

(*b*) $V_A = 6.0$ V; $V_B = 1.5$ V; $V_C = 3.0$ V

(*c*) $V_A = 3.0$ V; $V_B = 6.0$ V; $V_C = 1.5$ V

(*d*) $V_A = 3.0$ V; $V_B = 1.5$ V; $V_C = 6.0$ V

20. In an experiment to study the dependence of current on potential difference across a resistor, a student obtained the graph as shown in the diagram. [*AI 2007C*]

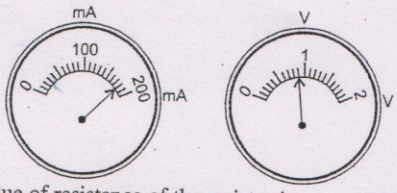


The value of resistance of the resistor is

(*a*) 0.1 ohm (*b*) 1.0 ohm

(*c*) 10 ohm (*d*) 100 ohm

21. The current flowing through a resistor and the potential difference developed across its ends are shown in the given diagrams :



The value of resistance of the resistor is [*AI 2007C*]

(*a*) 0.5 ohm (*b*) 5.0 ohm

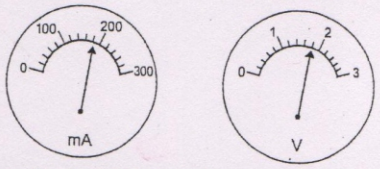
(*c*) 50 ohm (*d*) 500 ohm

22. An ammeter has 20 divisions between mark 0 and mark 2 on its scale. The least count of the ammeter is [*Delhi 2007*]

(*a*) 0.02 A (*b*) 0.01 A

(*c*) 0.2 A (*d*) 0.1 A

23. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends are shown in the given diagrams :

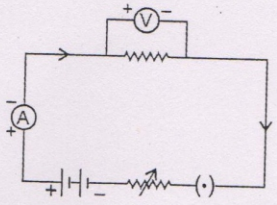


The value of resistance of the resistor in ohms is

(*a*) 25 (*b*) 20 [*CBSE, Delhi, AI 2007*]

(*c*) 15 (*d*) 10

24. The following circuit diagram shows the experimental set-up for the study of dependence of current on potential difference. Which two circuit components are connected in series ? [*AI 2007*]



(*a*) Battery and voltmeter (*b*) Ammeter and voltmeter

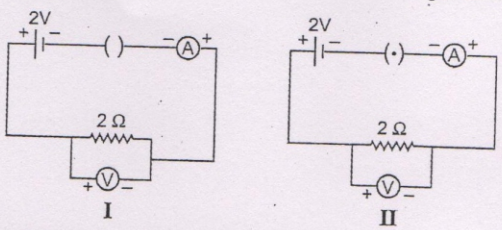
(*c*) Ammeter and rheostat (*d*) Resistor and voltmeter

25. In a voltmeter, there are 20 divisions between the 0 mark and 0.5 V mark. The least count of the voltmeter is [*AI 2007*]

(*a*) 0.020 V (*b*) 0.025 V

(*c*) 0.050 V (*d*) 0.250 V

26. For the circuits shown in figures I and II, the voltmeter reading would be [*AI 2007*]



(*a*) 2 V in circuit I and 0 V in circuit II

(*b*) 0 V in both circuits

(*c*) 2 V in both circuits

(*d*) 0 V in circuit I and 2 V in circuit II

27. The slope of V-I graph gives :

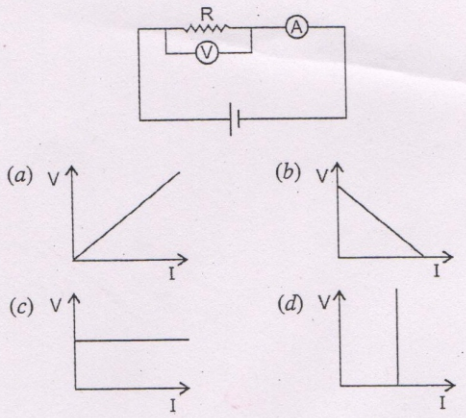
(*a*) Resistance (*b*) Current

(*c*) Potential difference (*d*) Conductivity

28. The use of a plane mirror in the meters is to :
   (*a*) Avoid parallax error.
   (*b*) Make the meter look good.
   (*c*) Give brightness to the reading.
   (*d*) Get accurate value.

29. Varying current without much loss of energy can be possible in :
   (*a*) Rheostat (*b*) Voltmeter
   (*c*) A variable resistor (*d*) A variable source

30. Using the adjoining circuit, current and potential difference are measured and plotted in a graph. The best suited graph is :



Scoring Key for Experiment No. 3

Q. No.	Correct Choice	Explanation / Remarks
1.	(*b*)	Only the voltmeter is not connected properly as there is a deflection in the ammeter.
2.	(*d*)	Where they are connected does not matter. They should be in series for the flow to be observed.
3.	(*b*)	Ammeter and voltmeter are connected with correct polarities.
4.	(*b*)	We should select instruments without any zero error.
5.	(*d*)	The overall range of the voltage is from 0 to 1.5 V and that of current is from 0 to 1.5/3 A = 0.5 A. We, therefore, prefer, instruments that cover these ranges and also have a better least count.
6.	(*a*)	We must keep the circuit closed for a relatively shorter time and open for a relatively longer time.
7.	(*d*)	The current at A is greater than that at the positions B and C . *i.e.*, $I_A > I_B > I_C$. So V_A for A $V_A > A_B > V_C$.
8.	(*d*)	Irrespective of the dimension I-V relation can be studied. The key has to be removed once the reading is taken as longer passage of current will rise its temperature.
9.	(*c*)	As J is shifted from K → N, V increases with increasing current I.
10.	(*a*)	Higher the potential applied, more will be the current flow in a given resistor.
11.	(*a*)	Option with 4 and 2 is wrong as they are with voltmeters. Option 1 is nearest. The best option may be I and III with III more accuracy of the two since L.C. is less.
12.	(*d*)	Heating changes resistance.
13.	(*b*)	Only in these two connections, the cells are in series.
14.	(*b*)	**Question is ambiguous.. Use of (·) for key will create confusion.** It is not given whether the keys are closed or not. If key K is closed and the other key in the main circuit is closed, both the metres will work. Otherwise considering the key K to be open, voltmeter will show no reading.
15.	(*a*)	Milliammeter has negative error. Voltmeter has positive error.
16.	(*c*)	With J at (*iv*) the potential difference is more in (A) and with J at (*i*) the p.d. is maximum and the equivalent resistance is least in (B).
17.	(*d*)	Zero error → – 4 mA, 0.2 volt Least count → $\frac{10-0}{5} = 2$ mA, $\frac{1-0}{10} = 0.1$ volt.

18.	(*c*)	Key in series with the voltmeter is not closed. So it will not show any value.
19.	(*a*)	A : All cells in order $V_A = 4 \times 1.5 = 6$ volt. B : One cell is not in order. So $V_B = (4 \times 1.5) - (2 \times 1.5) = 3$ V C : Two cells are connected wrong. So $V_C = 0$ volt
20.	(*c*)	$\text{Slope} = \frac{\text{Change in I}}{\text{Change in V}} = \frac{0.3-0.1}{3.0-1.0} = \frac{0.2}{2.0}$ Resistance = Reciprocal of the slope of the graph between V and I. $= \frac{2.0}{0.2} = 10\ \Omega$
21.	(*b*)	$R = \frac{V}{I} = \frac{0.9 \text{ volt}}{180 \text{ mA}} = \frac{0.9 \times 10^3}{180} = \frac{900}{180} = 5\ \Omega$
22.	(*d*)	$\text{Least count} = \frac{\text{Range}}{\text{Total divisions}} = \frac{2}{20} = \frac{1}{10} = 0.1$ A
23.	(*d*)	$R = \frac{V}{I} = \frac{1.8 \text{ V}}{180 \text{ mA}} = \frac{1.8 \times 10^3}{180} = \frac{1800}{180} = 10\ \Omega$
24.	(*c*)	One common point only exists between ammeter, cell and rheostat.
25.	(*b*)	$\text{Least count} = \frac{\text{Range}}{\text{No. of divisions}} = \frac{0.5-0}{20} = 0.025$ V
26.	(*d*)	0 V in circuit I as key open and 2 V in circuit II.
27.	(*a*)	Resistance $R = \frac{V}{I}$
28.	(*a*)	To avoid parallax error with our eye.
29.	(*a*)	Rheostat
30.	(*a*)	V = IR follows a straight line variation dependent on I.