CHAPTER

Current Electricity 09

MHT CET Physics

PHYSICS CIRCLE

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MHT CET WEIGHTAGE

177 Questions

MHT CET · all years



Kirchhoff's Laws & Measuring Instruments	69	39%
Potentiometer	48	27%
Wheatstone & Metre Bridge	38	21%
Combination of Resistors	9	5%
Cells: EMF & Internal Resistance	5	3%
Ohm's Law, Resistivity & Temperature	4	2%
Electrical Power & Heating Effect	3	2%
Current, Drift Velocity & Current Density	1	1%

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01 CONCEPT Electric Current

IN ONE LINE
Electric current is the **rate of flow of charge** through any cross-section of a conductor.

9.1.1 Definition and unit

$$I = \frac{q}{t} \cdot I = \frac{dq}{dt}$$

- SI unit: ampere (A). 1 A = 1 C s^{-1}.
- 1 A means 6.25×10^{18} electrons crossing a section every second.
- Current is a **scalar**: it has a direction but adds like numbers, not by the vector law.
- Conventional current flows along E, opposite to the motion of electrons.
- The net charge on a current-carrying wire is zero.

9.1.2 Current changing with time

$$q = \int I\,dt = \text{area under the } I\text{–}t \text{ graph}$$

- If q is given as a function of t, differentiate: $I = \frac{dq}{dt}$.
- If I is given as a function of t, integrate over the time interval.

9.1.3 Current due to moving charges

$$I = \frac{nq}{t} = \frac{ne}{t}$$

- n particles, each of charge q, crossing a section in time t.
- Same wire, any section: the current is the same even if the area changes.

9.1.4 Current due to a revolving charge

$$I = qf = \frac{q}{T} = \frac{qv}{2\pi r} = \frac{q\omega}{2\pi}$$

- A charge q going round a circle of radius r at frequency f.
- Example: electron revolving in an atom.

9.1.5 What actually moves

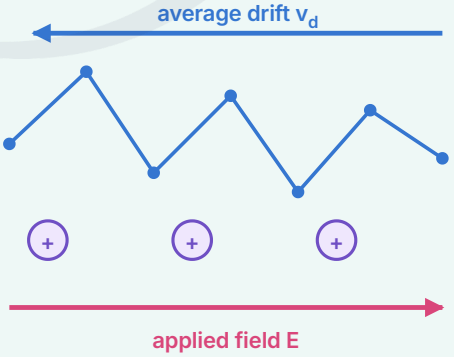
Medium	Current carriers
metals	free electrons
electrolytes	positive and negative ions
gases	positive ions and electrons
semiconductors	electrons and holes

9.1.6 Two kinds of current

- **DC**: direction stays the same (constant or pulsating); shows heating, chemical and magnetic effects.
- **AC**: magnitude and direction both change with time; chemical effect is absent.
- Rectifier: ac → dc. Inverter: dc → ac.

JEE · NEET Corner

Drift velocity

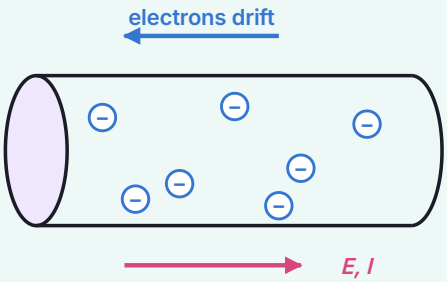


Random zig-zag motion with a slow drift opposite to E

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- Free electrons move randomly at about 10^5 m s^{-1}, but their **average** velocity is zero.
- An applied field gives them a slow average velocity opposite to E: the drift velocity v_d ($\approx 10^{-4}$ m s^{-1}).
- The bulb still glows at once: the field is set up along the wire at nearly the speed of light.

Current and drift velocity



Electrons drift opposite to E and I

$$I = neAv_d$$

$$v_d = \frac{I}{neA} = \frac{eE\tau}{m}$$

- n = free electrons per m^3, A = area of cross-section.
- Same current, different areas: $v_d \propto \frac{1}{A}$ (thinner part, faster drift).
- $v_d \propto E$; doubling the diameter at the same V does not change v_d.
- Free-electron density $n = \frac{N_A \times d}{A}$ (x free electrons per atom, d density, A atomic mass).

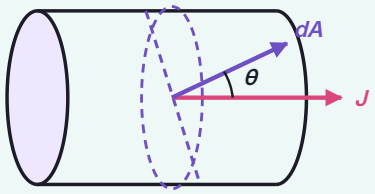
Relaxation time and mobility

- Relaxation time τ: average time between two collisions of an electron.
- τ decreases as temperature rises.

$$\text{mobility } \mu = \frac{v_d}{E} = \frac{e\tau}{m}$$

- Unit: $m^2\ V^{-1}\ s^{-1}$.

Current density



J along the current; dA normal to the area

$$J = \frac{I}{A} = nev_d$$

$$J = \sigma E = \frac{E}{\rho}$$

- J is a vector along E; unit A m^{-2}.
- Area tilted at θ: $I = JA\cos\theta$.
- Same current through a varying area: $J \propto \frac{1}{A}$ ($J_1A_1 = J_2A_2$).
- Microscopic form of Ohm's law: $J = \sigma E$.

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Solved Examples 01 Electric Current

SOLVED 1 AIPMT 1994

A flow of 10^7 electrons per second in a conducting wire constitutes a current of

(a) 1.6×10^{-12} A
(b) 1.6×10^{26} A
(c) 1.6×10^{-26} A
(d) 1.6×10^{12} A

STEP 1 $I = \frac{q}{t} = \frac{ne}{t}$
STEP 2 $I = 10^7 \times 1.6 \times 10^{-19}$ C per second
STEP 3 $I = \mathbf{1.6 \times 10^{-12}\ A}$

Answer: **(a)**

SOLVED 2 JEE Main 2025 · 4 Apr · Shift 1

Current passing through a wire as a function of time is $I(t) = 0.02t + 0.01$ A. The charge that will flow through the wire from t = 1 s to t = 2 s is

(a) 0.02 C
(b) 0.07 C
(c) 0.06 C
(d) 0.04 C

STEP 1 $q = \int I\,dt$ from 1 s to 2 s
STEP 2 $q = [0.01t^2 + 0.01t]_1^2 = (0.04 + 0.02) - (0.01 + 0.01)$
STEP 3 $q = \mathbf{0.04\ C}$

Answer: **(d)**

SOLVED 3 JEE Main 2024 · 29 Jan · Shift 1

The electric current through a wire varies with time as $I = I_0 + \beta t$, where $I_0 = 20$ A and $\beta = 3\ \frac{A}{s}$. The amount of charge crossed through a section of the wire in 20 s is

(a) 80 C
(b) 800 C
(c) 1000 C
(d) 1600 C

STEP 1 $q = \int_0^{20} (20 + 3t)\,dt$
STEP 2 $q = 20 \times 20 + 1.5 \times 20^2 = 400 + 600$
STEP 3 $q = \mathbf{1000\ C}$

Answer: **(c)**

SOLVED 4 JEE Main 2024 · 6 Apr · Shift 2

The number of electrons flowing per second in the filament of a 110 W bulb operating at 220 V is ($e = 1.6 \times 10^{-19}$ C)

(a) 1.25×10^{19}
(b) 31.25×10^{17}
(c) 6.25×10^{18}
(d) 6.25×10^{17}

STEP 1 $I = \frac{P}{V} = \frac{110}{220} = 0.5$ A
STEP 2 $n = \frac{I}{e} = \frac{0.5}{1.6} \times 10^{19}$
STEP 3 $n = 3.125 \times 10^{18} = \mathbf{31.25 \times 10^{17}\ s^{-1}}$

Answer: **(b)**

SOLVED 5 AIPMT 1991

The velocity of charge carriers of current (about 1 ampere) in a metal under normal conditions is of the order of

(a) a fraction of mm/s
(b) velocity of light
(c) several thousand $\frac{\text{metres}}{\text{second}}$
(d) a few hundred metres per second

STEP 1 $v_d = \frac{I}{neA}$ with $n \approx 10^{29}\ m^{-3}$, $A \approx 1\ mm^2$
STEP 2 $v_d \approx \frac{1}{10^{29} \times 1.6 \times 10^{-19} \times 10^{-6}} \approx 10^{-4}$ m/s
STEP 3 Order: **a fraction of mm/s**

Answer: **(a)**

SOLVED 6 JEE Main 2021 · 17 Mar · Shift 1

A current of 10 A exists in a wire of cross-sectional area 5 mm^2 with a drift velocity of 2×10^{-3} m s^{-1}. The number of free electrons in each cubic metre of the wire is

(a) 625×10^{25}
(b) 1×10^{23}
(c) 2×10^{25}
(d) 2×10^{6}

STEP 1 $n = \frac{I}{eAv_d}$
STEP 2 $n = \frac{10}{1.6 \times 10^{-19} \times 5 \times 10^{-6} \times 2 \times 10^{-3}} = \frac{10}{1.6 \times 10^{-27}}$
STEP 3 $n = 6.25 \times 10^{27} = \mathbf{625 \times 10^{25}\ m^{-3}}$

Answer: **(a)**

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Solved Examples 01 Electric Current (contd.)

SOLVED 7 NEET 2023

A copper wire of radius 1 mm contains 10^{22} free electrons per cubic metre. The drift velocity of the free electrons when a current of 10 A flows through the wire will be ($e = 1.6 \times 10^{-19}$ C)

(a) $\frac{6.25 \times 10^{4}}{\pi}$ m s^{-1}

(b) $\frac{6.25}{\pi} \times 10^{3}$ m s^{-1}

(c) $\frac{6.25}{\pi}$ m s^{-1}

(d) $\frac{6.25 \times 10^{5}}{\pi}$ m s^{-1}

STEP 1 $v_d = \frac{I}{neA}$, $A = \pi r^2 = \pi \times 10^{-6}$ m^2

STEP 2 $v_d = \frac{10}{10^{22} \times 1.6 \times 10^{-19} \times \pi \times 10^{-6}} = \frac{10}{1.6\pi \times 10^{-3}}$

STEP 3 $v_d = \mathbf{\frac{6.25}{\pi} \times 10^{3}\ m\ s^{-1}}$

Answer: **(b)**

SOLVED 8 NEET 2024

A uniform wire of diameter d carries a current of 100 mA when the mean drift velocity of electrons in the wire is v. For a wire of diameter $\frac{d}{2}$ of the same material to carry a current of 200 mA, the mean drift velocity of electrons in the wire is

(a) 4v (b) 8v

(c) v (d) 2v

STEP 1 $v_d = \frac{I}{neA} \Rightarrow v_d \propto \frac{I}{d^2}$ (same material, same n)

STEP 2 $\frac{v'}{v} = \frac{200}{100} \times (\frac{d}{0.5d})^2 = 2 \times 4$

STEP 3 $v' = \mathbf{8v}$

Answer: **(b)**

SOLVED 9 NEET 2020 · Phase 1

A charged particle having drift velocity 7.5×10^{-4} m s^{-1} in an electric field of 3×10^{-10} V m^{-1} has a mobility (in m^2 V^{-1} s^{-1}) of

(a) 2.5×10^{6} (b) 2.5×10^{-6}

(c) 2.25×10^{-15} (d) 2.25×10^{15}

STEP 1 $\mu = \frac{v_d}{E}$

STEP 2 $\mu = \frac{7.5 \times 10^{-4}}{3 \times 10^{-10}}$

STEP 3 $\mu = \mathbf{2.5 \times 10^{6}\ m^2\ V^{-1}\ s^{-1}}$

Answer: **(a)**

SOLVED 10 NEET 2022 · Phase 1

A copper wire of length 10 m and radius ($\frac{10^{-2}}{\sqrt{\pi}}$) m has an electrical resistance of 10 Ω. The current density in the wire for an electric field strength of 10 V/m is

(a) $10^{4}\ \frac{A}{m^2}$ (b) $10^{6}\ \frac{A}{m^2}$

(c) $10^{-5}\ \frac{A}{m^2}$ (d) $10^{5}\ \frac{A}{m^2}$

STEP 1 $A = \pi r^2 = 10^{-4}$ m^2; $\rho = \frac{RA}{l} = 10 \times \frac{10^{-4}}{10} = 10^{-4}\ \Omega$ m

STEP 2 $J = \sigma E = \frac{E}{\rho}$

STEP 3 $J = \frac{10}{10^{-4}} = \mathbf{10^{5}\ \frac{A}{m^2}}$

Answer: **(d)**

SOLVED 11 JEE Main 2021 · 20 Jul · Shift 1

A current of 5 A is passing through a magnesium wire of cross-section 0.04 m^2. At every point the direction of current density is at an angle of 60° with the unit vector of area of cross-section. The magnitude of the electric field at every point of the conductor is ($\rho = 44 \times 10^{-8}\ \Omega$ m)

(a) 11×10^{-5} V/m (b) 11×10^{-3} V/m

(c) 11×10^{-7} V/m (d) 11×10^{-2} V/m

STEP 1 $I = JA \cos 60° \Rightarrow J = \frac{5}{0.04 \times 0.5} = 250\ \frac{A}{m^2}$

STEP 2 $E = \rho J = 44 \times 10^{-8} \times 250$

STEP 3 $E = \mathbf{11 \times 10^{-5}\ V/m}$

Answer: **(a)**

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02 CONCEPT Resistance & Resistivity

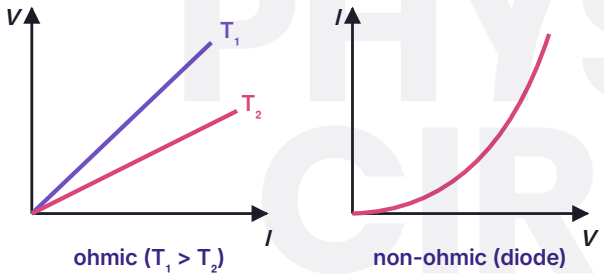
IN ONE LINE

Resistance is the opposition a conductor offers to current. It depends on the **material, length, area and temperature**.

9.2.1 V is proportional to I

$$V = IR$$

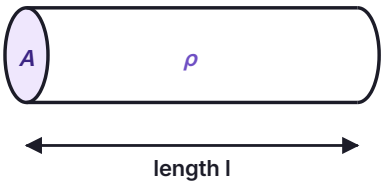
- Holds when temperature and other physical conditions stay the same.
- V–I graph of a metal: a straight line through the origin; slope of V–I = R.
- At a higher temperature the slope (R) is larger.
- Non-ohmic devices (diode, transistor, gas tube): V–I graph is not a straight line.



Ohmic and non-ohmic V–I graphs

$$1\,\Omega = \frac{1\,V}{1\,A} \cdot [R] = [ML^2T^{-3}A^{-2}]$$

9.2.2 R from shape and material



Wire of length l and area A

$$R = \rho\frac{l}{A}$$

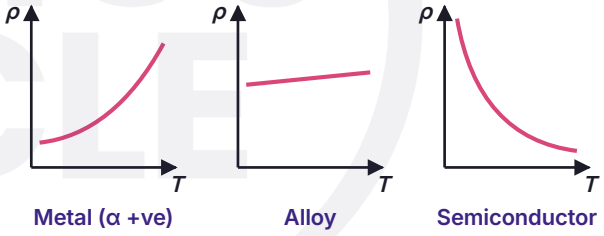
- ρ = resistivity (specific resistance), unit Ω m.
- ρ depends only on the material and temperature, not on l or A.
- $R \propto l$ and $R \propto \frac{1}{A}$.
- Silver: lowest ρ (1.6×10^{-8} Ω m); fused quartz: highest.
- $\rho_{insulator} > \rho_{alloy} > \rho_{semiconductor} > \rho_{metal}$.

$$\text{conductivity } \sigma = \frac{1}{\rho}\ (S\ m^{-1}) \cdot \text{conductance } G = \frac{1}{R}\ (S)$$

9.2.3 How R changes when heated

$$R_t = R_0(1 + \alpha t)$$

$$\alpha = \frac{R_t - R_0}{R_0\,t} \cdot \frac{R_t}{R_2} = \frac{1 + \alpha t_t}{1 + \alpha t_2}$$



ρ against T

Material	α	On heating
metals	positive	R increases
alloys (manganin, constantan, nichrome)	very small	R almost constant
semiconductors, electrolytes	negative	R decreases

- Superconductors: ρ drops to zero below a critical temperature.

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CURRENT ELECTRICITY · TOPIC 01

Electric Current, Drift Velocity & Current Density

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

17	3	1
questions	concepts	easy

CONTENTS

01	Electric Current, Drift Velocity & Current Density	Q 1–17	17 Qs
	Level 1 · Easy		17 Qs
	◆ **Current & charge flow**		6 Qs
	◆ **Drift velocity & relaxation time**		9 Qs
	◆ **Mobility & current density**		2 Qs
	Answer key		

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TOPIC 01

Electric Current, Drift Velocity & Current Density

17 PYQs · Easy 17 · Medium 0 · Difficult 0 | MHT CET 0 · NEET 6 · JEE 11

Concepts covered: Current & charge flow (6) · Drift velocity & relaxation time (9) · Mobility & current density (2)

LEVEL 1 · EASY 17 questions

◆ Current & charge flow 6 Qs

1. A flow of 10^7 electrons per second in a conducting wire constitutes a current of
AIPMT 1994
(a) 1.6×10^{-12} A (b) 1.6×10^{26} A
(c) 1.6×10^{-26} A (d) 1.6×10^{12} A

2. Current passing through a wire as function of time is given as $I(t) = 0.02t + 0.01$ A. The charge that will flow through the wire from $t = 1$ s to $t = 2$ s is
JEE MAIN 2025 · 4 APR · SHIFT 1
(a) 0.02 C (b) 0.07 C (c) 0.06 C (d) 0.04 C

3. The number of electrons flowing per second in the filament of a 110 W bulb operating at 220 V is: (Given e $= 1.6 \times 10^{-19}$C)
JEE MAIN 2024 · 6 APR · SHIFT 2
(a) 1.25×10^{19} (b) 31.25×10^{17}
(c) 6.25×10^{18} (d) 6.25×10^{17}

4. The electric current through a wire varies with time as $I = I_0 + \beta t$, where $I_0 = 20$ A and $\beta = 3$ A/s. The amount of electric charge crossed through a section of the wire in 20 s is:
JEE MAIN 2024 · 29 JAN · SHIFT 1
(a) 80 C (b) 800 C (c) 1000 C (d) 1600 C

5. A current through a wire depends on time as
i = α0t + βt2
where α_0 = 20 A/s and β = 8 As^{-}2. Find the charge crossed through a section of the wire in 15 s.
JEE MAIN 2021 · 24 FEB · SHIFT 1
(a) 2250 C (b) 2100 C (c) 260 C (d) 11250 C

6. The current in a conductor is expressed as $I = 3t^2 + 4t^3$, where I is in Ampere and t is in second. The amount of electric charge that flows through a section of the conductor during $t = 1$ s to $t = 2$ s is _____ C.
JEE MAIN 2024 · 1 FEB · SHIFT 1 *(Numerical)*

◆ Drift velocity & relaxation time 9 Qs

7. A copper wire of radius 1 mm contains 10^{22} free electrons per cubic metre. The drift velocity for free electrons when 10 A current flows through the wire will be (Given, charge on electron $= 1.6 \times 10^{-19}$C):
NEET 2023
(a) $\frac{6.25\times10^4}{\pi}$ ms^{-1} (b) $\frac{6.25}{\pi} \times 10^3$ ms^{-1}
(c) $\frac{6.25}{\pi}$ ms^{-1} (d) $\frac{6.25\times10^5}{\pi}$ ms^{-1}

8. Across a metallic conductor of non-uniform cross section a constant potential difference is applied. The quantity which remains constant along the conductor is
AIPMT 2015 · CANCELLED PAPER
(a) drift velocity (b) electric field
(c) current density (d) current

9. The velocity of charge carriers of current (about 1 ampere) in a metal under normal conditions is of the order of
AIPMT 1991
(a) a fraction of mm/sec
(b) velocity of light
(c) several thousand metres/second
(d) a few hundred metres per second

10. In a metallic conductor, under the effect of applied electric field, the free electrons of the conductor
JEE MAIN 2023 · 10 APR · SHIFT 2
(a) move in the straight line paths in the same direction
(b) move with the uniform velocity throughout from lower potential to higher potential
(c) drift from higher potential to lower potential.
(d) move in the curved paths from lower potential to higher potential

11. (A) The drift velocity of electrons decreases with the increase in the temperature of conductor. (B) The drift velocity is inversely proportional to the area of cross-section of given conductor. (C) The drift velocity does not depend on the applied potential difference to the conductor. (D) The drift velocity of electron is inversely proportional to the length of the conductor. (E) The drift velocity increases with the increase in the temperature of conductor. Choose the correct answer from the options given below:
JEE MAIN 2022 · 27 JUL · SHIFT 2
(a) (A) and (B) only (b) (A) and (D) only
(c) (B) and (E) only (d) (B) and (C) only

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12. A current of 10A exists in a wire of cross-sectional area of 5 mm2 with a drift velocity of 2×10^{-3} ms^{-}1. The number of free electrons in each cubic meter of the wire is _____.

JEE MAIN 2021 · 17 MAR · SHIFT 1

(a) 625 × 1025 (b) 1 × 1023
(c) 2 × 1025 (d) 2 × 106

13. Drift speed of electrons, when 1.5 A of current flows in a copper wire of cross section 5 mm2, is v. If the electron density in copper is 9 × 1028/m3 the value of v. in mm/s is close to (Take charge of electron to be = 1.6 × 10^{-}19C)

JEE MAIN 2019 · 9 JAN · SHIFT 1

(a) 0.02 (b) 3 (c) 2 (d) 0.2

14. The number density of free electrons in copper is nearly $8 \times 10^{28}\ \mathrm{m}^{-3}$. A copper wire has its area of cross section $= 2 \times 10^{-6}\ \mathrm{m}^{2}$ and is carrying a current of 3.2 A . The drift speed of the electrons is _____ $\times 10^{-6} \mathrm{ms}^{-1}$

JEE MAIN 2023 · 8 APR · SHIFT 2 *(Numerical)*

15. A current of 2 A flows through a wire of cross-sectional area $25.0\ \mathrm{mm}^{2}$. The number of free electrons in a cubic meter are 2.0×10^{28}. The drift velocity of the electrons is _____ $\times 10^{-6}\ \mathrm{ms}^{-1}$ (given, charge on electron $= 1.6 \times 10^{-19} \mathrm{C}$).

JEE MAIN 2023 · 8 APR · SHIFT 1 *(Numerical)*

◆ Mobility & current density 2 Qs

16. A copper wire of length 10 m and radius $\left(\frac{10^{-2}}{\sqrt{\pi}}\right)$ m has electrical resistance of 10 Ω. The current density in the wire for an electric field strength of 10 (V/m) is

NEET 2022 · PHASE 1

(a) 104 A/m2 (b) 106 A/m2
(c) 10^{-}5 A/m2 (d) 105 A/m2

17. A charged particle having drift velocity 7.5 × 10-4 ms-1 in an electric field of 3 × 10-10 Vm-1 has a mobility in m2 V-1s-1 of:

NEET 2020 · PHASE 1

(a) 2.5 × 106 (b) 2.5 × 10-6
(c) 2.25 × 10-15 (d) 2.25 × 1015

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ANSWER KEY

Shaded by level: **Easy**

01 Electric Current, Drift Velocity & Current Density

1. (a)	2. (d)	3. (b)	4. (c)	5. (d)	6. 22	7. (b)	8. (d)	9. (a)	10. (d)
11. (b)	12. (a)	13. (a)	14. 125	15. 25	16. (d)	17. (a)			

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 02

Ohm's Law, Resistivity & Temperature

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

43	5	1
questions	concepts	easy

CONTENTS

02	Ohm's Law, Resistivity & Temperature	Q 1–43	43 Qs
	Level 1 · Easy		43 Qs
	◆ **Ohm's law & V–I graphs**		3 Qs
	◆ **Resistivity: R = ρl/A**		11 Qs
	◆ **Stretching & reshaping a wire**		10 Qs
	◆ **Temperature dependence of resistance**		12 Qs
	◆ **Colour code**		7 Qs
	Answer key		

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TOPIC 02

Ohm's Law, Resistivity & Temperature

43 PYQs · Easy 43 · Medium 0 · Difficult 0 | MHT CET 3 · NEET 20 · JEE 20

Concepts covered: Ohm's law & V-I graphs (3) · Resistivity: R = ρl/A (11) · Stretching & reshaping a wire (10) · Temperature dependence of resistance (12) · Colour code (7)

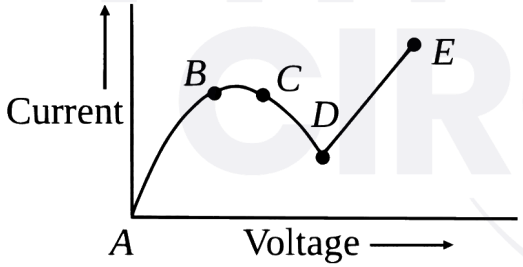
LEVEL 1 · EASY 43 questions

◆ Ohm's law & V-I graphs 3 Qs

1. For a metallic wire, the ratio of voltage to corresponding current is
MHT CET 2019 · 2 MAY · SHIFT 1
(a) independent of temperature.
(b) increases with rise in temperature.
(c) increases or decreases with rise in temperature depending upon the metal.
(d) decreases with rise in temperature.

2. The resistance of a discharge tube is
AIPMT 1999
(a) zero (b) ohmic
(c) non-ohmic (d) infinity

3. From the graph between current (I) and voltage (V) is shown below. Identify the portion corresponding to negative resistance
AIPMT 1997



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

◆ Resistivity: R = ρl/A 11 Qs

4. A certain wire A has resistance $81\ \Omega$. The resistance of another wire B of same material and equal length but of diameter thrice the diameter of A will be:
NEET 2023
(a) $81\ \Omega$ (b) $9\ \Omega$ (c) $729\ \Omega$ (d) $243\ \Omega$

5. The reciprocal of resistance is:
NEET 2022 · PHASE 2
(a) conductance (b) reactance
(c) mobility (d) conductivity

6. Two solid conductors are made up of same material, have same length and same resistance. One of them has a circular cross section of area A_1 and the other one has a square cross section of area A_2. The ratio A_1/A_2 is
NEET 2020 · PHASE 2
(a) 2 (b) 1.5 (c) 1 (d) 0.8

7. Specific resistance of a conductor increases with
AIPMT 2002
(a) increase in temperature
(b) increase in cross-section area
(c) increase in cross-section and decrease in length
(d) decrease in cross secton area.

8. In good conductors of electricity, the type of bonding that exists is
AIPMT 1995
(a) metallic (b) vander Waals
(c) ionic (d) covalent

9. A wire $50\ \text{cm}$ long and $1\ \text{mm}^2$ in cross-section carries a current of $4\ \text{A}$ when connected to a $2\ \text{V}$ battery. The resistivity of the wire is
AIPMT 1994
(a) $4 \times 10^{-6}\ \Omega\,\text{m}$ (b) $1 \times 10^{-6}\ \Omega\,\text{m}$
(c) $2 \times 10^{-7}\ \Omega\,\text{m}$ (d) $5 \times 10^{-7}\ \Omega\,\text{m}$

10. Identify the set in which all the three materials are good conductors of electricity
AIPMT 1994
(a) Cu, Hg and NaCl (b) Cu, Ge and Hg
(c) Cu, Ag and Au (d) Cu, Si and diamond

11. Consider four conducting materials copper, tungsten, mercury and aluminium with resistivity ρ_C, ρ_T, ρ_M and ρ_A respectively. Then:
JEE MAIN 2020 · 2 SEP · SHIFT 1
(a) $\rho_C > \rho_A > \rho_T$ (b) $\rho_M > \rho_A > \rho_C$
(c) $\rho_A > \rho_T > \rho_C$ (d) $\rho_A > \rho_M > \rho_C$

12. 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_B/ℓ_A of their respective lengths must be
AIEEE 2006
(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

13. 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_B/l_A of their respective lengths must be
AIEEE 2004
(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 2

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14. A rectangular parallelopiped is measured as $1\,\text{cm} \times 1\,\text{cm} \times 100\,\text{cm}$. If its specific resistance is $3 \times 10^{-7}\,\Omega\text{m}$, then the resistance between its two opposite rectangular faces will be _____ $\times 10^{-7}\,\Omega$.

JEE MAIN 2023 · 10 APR · SHIFT 2 *(Numerical)*

◆ Stretching & reshaping a wire 10 Qs

15. 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

NEET 2017

(a) $\frac{R}{n}$ (b) n2R (c) $\frac{R}{n^2}$ (d) nR

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

NEET 2013

(a) 8 Ω (b) 16 Ω (c) 2 Ω (d) 4 Ω

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

AIPMT 2008

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

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

AIPMT 2004

(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.

19. The resistance of a wire is 5 Ω. Its new resistance in ohm if stretched to 5 times of its original length will be:

JEE MAIN 2023 · 25 JAN · SHIFT 2

(a) 25 (b) 625 (c) 5 (d) 125

20. A wire of resistance R1 is drawn out so that its length is increased by twice of its original length. The ratio of new resistance to original resistance is:

JEE MAIN 2022 · 28 JUL · SHIFT 1

(a) 9: 1 (b) 1: 9 (c) 4: 1 (d) 3: 1

21. An aluminium wire is stretched to make its length, 0.4% larger. The percentage change in resistance is:

JEE MAIN 2022 · 26 JUN · SHIFT 1

(a) 0.4% (b) 0.2% (c) 0.8% (d) 0.6%

22. If a wire is stretched to make it 0.1% longer, its resistance will:

AIEEE 2011

(a) increase by 0.2% (b) decrease by 0.2%
(c) decrease by 0.05% (d) increase by 0.05%

23. 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

(a) 200% (b) 100% (c) 50% (d) 300%

24. The length of a given cylindrical wire is increased to double of its original length. The percentage increase in the resistance of the wire will be _____ %.

JEE MAIN 2022 · 25 JUN · SHIFT 2 *(Numerical)*

◆ Temperature dependence of resistance 12 Qs

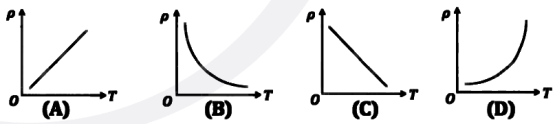
25. In case of thermistor, which one of the following statements is 'WRONG'?

MHT CET 2026 · 20 MAY · SHIFT 1

(a) Resistance of NTC thermistor decreases with increase in its temperature.
(b) Resistance of PTC thermistor decreases with increase in its temperature.
(c) NTC thermistors are commonly used as temperature sensors.
(d) PTC thermistors are generally used as resettable fuses.

26. Which of the following graph represents the temperature (T) dependence of resistivity (ρ) of a semiconductor?

MHT CET 2026 · 13 APR · SHIFT 1



(a) A (b) B (c) C (d) D

27. The resistance of platinum wire at 0°C is 2 Ω and 6.8 Ω at 80°C. The temperature coefficient of resistance of the wire is:

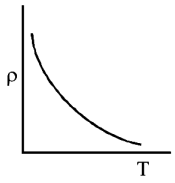
NEET 2023

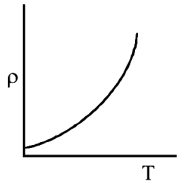
(a) $3 \times 10^{-3}\text{C}^{-1}$ (b) $3 \times 10^{-2}\text{C}^{-1}$
(c) $3 \times 10^{-10}\text{C}^{-1}$ (d) $3 \times 10^{-4}\text{C}^{-1}$

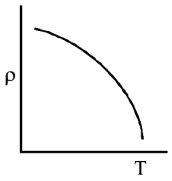
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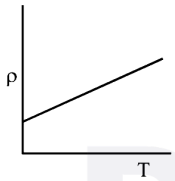
28. Which of the following graph represents the variation of resistivity (ρ) with temperature (T) for copper?

NEET 2020 · PHASE 1

(a)


(b)


(c)


(d)


29. The solids which have the negative temperature coefficient of resistance are:

NEET 2020 · PHASE 1

(a) insulators only
(b) semiconductors only
(c) insulators and semiconductors
(d) metals

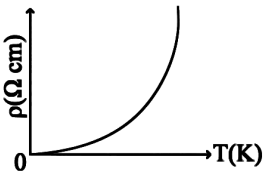
30. Copper and silicon is cooled from 300 K to 60 K, the specific resistance

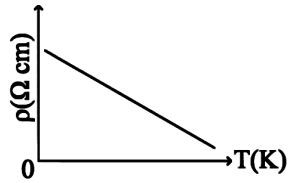
AIPMT 2001

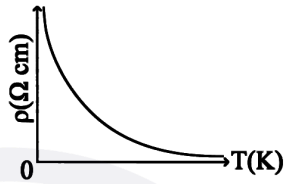
(a) decrease in copper but increase in silicon
(b) increase in copper but decrease in silicon
(c) increase in both
(d) decrease in both

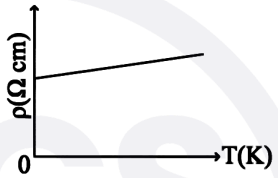
31. Which of the following resistivity (ρ) v/s temperature (T) curves is most suitable to be used in wire bound standard resistors?

JEE MAIN 2025 · 22 JAN · SHIFT 1

(a)


(b)


(c)


(d)


32. Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: Alloys such as constantan and manganin are used in making standard resistance coils. Reason R: Constantan and manganin have very small value of temperature coefficient of resistance. In the light of the above statements, choose the correct answer from the options given below.

JEE MAIN 2022 · 29 JUL · SHIFT 2

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

33. Resistance of the wire is measured as 2 Ω and 3 Ω at 10°C and 30°C respectively. Temperature co- efficient of resistance of the material of the wire is:

JEE MAIN 2022 · 28 JUN · SHIFT 2

(a) $0.033\ ^{\circ}C^{-1}$ (b) $-0.033\ ^{\circ}C^{-1}$
(c) $0.011\ ^{\circ}C^{-1}$ (d) $0.055\ ^{\circ}C^{-1}$

34. The resistance of a conductor at 15°C is 16Ω and at 100 ° C is 20 Ω . What will be the temperature coefficient of resistance of the conductor?

JEE MAIN 2021 · 27 JUL · SHIFT 2

(a) $0.010^{\circ}C^{-1}$ (b) $0.033\ ^{\circ}C^{-1}$
(c) $0.003^{\circ}\ C^{-1}$ (d) $0.042^{\circ}\ C^{-1}$

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35. Thermistors are usually made of
AIEEE 2004
(a) metal oxides with high temperature coefficient of resistivity
(b) metals with high temperature coefficient of resistivity
(c) metals with low temperature coefficient of resistivity
(d) semiconducting materials having low temperature

36. At room temperature $(27^{\circ}\mathrm{C})$, the resistance of a heating element is 50Ω. The temperature coefficient of the material is $2.4 \times 10^{-4}{}^{\circ}\mathrm{C}^{-1}$. The temperature of the element, when its resistance is 62Ω, is _____ $^{\circ}$C.
JEE MAIN 2024 · 9 APR · SHIFT 2 *(Numerical)*

◆ Colour code 7 Qs

37. Resistance of a carbon resistor determined from colour codes is $(22000 \pm 5\%)\Omega$. The colour of third band must be:
NEET 2023
(a) Green (b) Orange (c) Yellow (d) Red

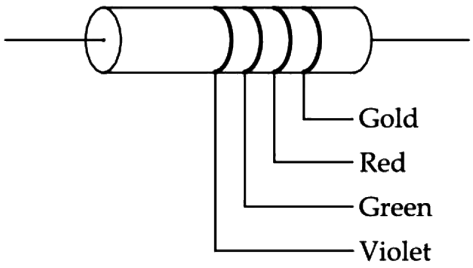
38. The color code of a resistance is given below:



The values of resistance and tolerance, respectively, are
NEET 2020 · PHASE 1
(a) 47 kΩ, 10% (b) 4.7 kΩ, 5%
(c) 470 Ω, 5% (d) 470 kΩ, 5%

39. A carbon resistor of (47 ± 4.7) kΩ is to be marked with rings of different colours for its identification. The colour code sequence will be
NEET 2018
(a) Violet – Yellow – Orange – Silver
(b) Yellow – Violet – Orange – Silver
(c) Yellow – Green – Violet – Gold
(d) Green – Orange – Violet – Gold

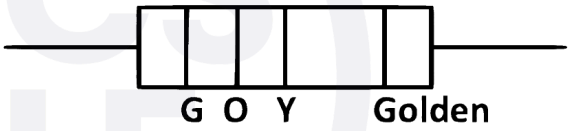
40. The Colour coding on a carbon resistor is shown in the given figure. The resistance value of the given resistor is:
JEE MAIN 2021 · 27 AUG · SHIFT 2 *(Not in current JEE/NEET syllabus)*



(a) $(5700 \pm 285)\ \Omega$ (b) $(7500 \pm 750)\ \Omega$
(c) $(5700 \pm 375)\ \Omega$ (d) $(7500 \pm 375)\ \Omega$

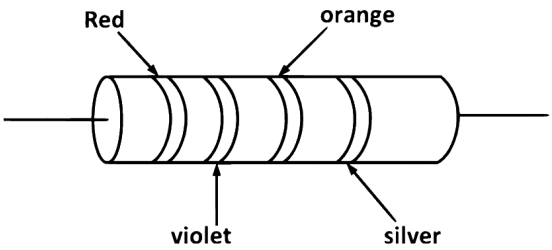
41. A 200 Ω resistor has a certain color code. If one replaces the red color by green in the code, the new resistance will be:
JEE MAIN 2019 · 8 APR · SHIFT 1 *(Not in current JEE/NEET syllabus)*
(a) 500 Ω (b) 100 Ω (c) 200 Ω (d) 300 Ω

42. A carbon resistance has a following colour code. What is the value of the resistance?
JEE MAIN 2019 · 9 JAN · SHIFT 2 *(Not in current JEE/NEET syllabus)*



(a) 530 kΩ ± 5% (b) 5.3 MΩ ± 5%
(c) 6.4 MΩ ± 5% (d) 64 kΩ ± 10%

43. A resistance is shown in the figure. Its value and tolerance are given respectively by:
JEE MAIN 2019 · 9 JAN · SHIFT 1 *(Not in current JEE/NEET syllabus)*



(a) 270 Ω, 10 % (b) 27 kΩ, 10 %
(c) 27 kΩ, 20 % (d) 270 Ω, 5 %

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ANSWER KEY

Shaded by level: **Easy**

02 Ohm's Law, Resistivity & Temperature

1. (b)	2. (c)	3. (a)	4. (b)	5. (a)	6. (c)	7. (a)	8. (a)	9. (b)	10. (c)
11. (b)	12. (a)	13. (d)	14. 3	15. (b)	16. (b)	17. (d)	18. (b)	19. (d)	20. (a)
21. (c)	22. (a)	23. (d)	24. 300	25. (b)	26. (b)	27. (b)	28. (b)	29. (c)	30. (a)
31. (d)	32. (a)	33. (a)	34. (c)	35. (a)	36. 1027	37. (b)	38. (c)	39. (b)	40. (d)
41. (a)	42. (a)	43. (b)							

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 03

Combination of Resistors

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

15	3	1
questions	concepts	easy

CONTENTS

03	Combination of Resistors	Q 1–15	15 Qs
	Level 1 · Easy		15 Qs
	◆ **Series & parallel combinations**		10 Qs
	◆ **Wires bent into loops & polygons**		4 Qs
	◆ **Networks, symmetry & infinite ladders**		1 Qs
	Answer key		

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TOPIC 03

Combination of Resistors

15 PYQs · Easy 15 · Medium 0 · Difficult 0 | MHT CET 0 · NEET 8 · JEE 7

Concepts covered: Series & parallel combinations (10) · Wires bent into loops & polygons (4) · Networks, symmetry & infinite ladders (1)

LEVEL 1 · EASY 15 questions

◆ Series & parallel combinations 10 Qs

1. A wire of resistance R is cut into 8 equal pieces. From these pieces two equivalent resistances are made by adding four of these together in parallel. Then these two sets are added in series. The net effective resistance of the combination is:
NEET 2025
(a) $\frac{R}{16}$ (b) $\frac{R}{8}$ (c) $\frac{R}{64}$ (d) $\frac{R}{32}$

2. 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is:
NEET 2023
(a) 100 (b) 1 (c) 1000 (d) 10

3. 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?
NEET 2021
(a) 4Ω (b) 0.25Ω (c) 0.5Ω (d) 1Ω

4. 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
AIPMT 2004
(a) n2R (b) R/n2 (c) R/n (d) nR

5. Two wires of the same metal have same length, but their cross-sections are in the ratio $3:1$. They are joined in series. The resistance of thicker wire is 10 Ω. The total resistance of the combination will be
AIPMT 1995
(a) 40 Ω (b) 100 Ω (c) $(5/2)$ Ω (d) $(40/3)$ Ω

6. n equal resistors are first connected in series and then connected in parallel. What is the ratio of the maximum to the minimum resistance?
AIPMT 1989
(a) n (b) $1/n^2$ (c) n^2 (d) $1/n$

7. A wire of resistance R and length L is cut into 5 equal parts. If these parts are joined parallely, then resultant resistance will be:
JEE MAIN 2024 · 27 JAN · SHIFT 1
(a) $\frac{1}{25}$R (b) $\frac{1}{5}R$ (c) 25 R (d) 5 R

8. Given below are two statements:
Statement I: The equivalent resistance of resistors in a series combination is smaller than least resistance used in the combination.
Statement II: The resistivity of the material is independent of temperature.
In the light of the above statements, choose the correct answer from the options given below:
JEE MAIN 2023 · 15 APR · SHIFT 1
(a) Statement I is true but Statement II is false
(b) Both Statement I and Statement II are true
(c) Both Statement I and Statement II are false
(d) Statement I is false but Statement II is true

9. What will be the most suitable combination of three resistors A = 2Ω, B = 4Ω, C = 6Ω so that $\left(\frac{22}{3}\right)\Omega$ is equivalent resistance of combination?
JEE MAIN 2022 · 24 JUN · SHIFT 2
(a) Parallel combination of A and C connected in series with B.
(b) Parallel combination of A and B connected in series with C.
(c) Series combination of A and C connected in parallel with B.
(d) Series combination of B and C connected in parallel with A.

10. 10 resistors each of resistance 10 Ω can be connected in such as to get maximum and minimum equivalent resistance. The ratio of maximum and minimum equivalent resistance will be _____.
JEE MAIN 2023 · 10 APR · SHIFT 1 *(Numerical)*

◆ Wires bent into loops & polygons 4 Qs

11. 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
AIPMT 2005
(a) R/4 (b) 4R (c) R/8 (d) R/2

12. Three resistances each of 4 Ω are connected to form a triangle. The resistance between any two terminals is
AIPMT 1993
(a) 12 Ω (b) 2 Ω (c) 6 Ω (d) 8/3 Ω

13. A uniform metallic wire has a resistance of 18 Ω and is bent into an equilateral triangle. Then, the resistance between any two vertices of the triangle is -
JEE MAIN 2019 · 10 JAN · SHIFT 1
(a) 12 Ω (b) 2 Ω (c) 4 Ω (d) 8 Ω

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14. A wire of resistance 9Ω is bent to form an equilateral triangle. Then the equivalent resistance across any two vertices will be _____ ohm.

JEE MAIN 2025 · 24 JAN · SHIFT 1 ***(Numerical)***

◆ Networks, symmetry & infinite ladders 1 Q

15. If you are provided a set of resistances 2Ω, 4Ω, 6Ω and $8\,\Omega$. Connect these resistances so as to obtain an equivalent resistance of $\frac{46}{3}\Omega$.

JEE MAIN 2021 · 26 AUG · SHIFT 2

(a) 4Ω and 6Ω are in parallel with 2Ω and 8Ω in series
(b) 6Ω and 8Ω are in parallel with 2Ω and 4Ω in series
(c) 2Ω and 6Ω are in parallel with 4Ω and 8Ω in series
(d) 2Ω and 4Ω are in parallel with 6Ω and 8Ω in series

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ANSWER KEY

Shaded by level: **Easy**

03 Combination of Resistors

1. (a)	2. (a)	3. (a)	4. (a)	5. (a)	6. (c)	7. (a)	8. (c)	9. (b)	10. 100
11. (a)	12. (d)	13. (c)	14. 2	15. (d)					

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 04

Cells: EMF, Internal Resistance & Combinations

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

17	3	1
questions	concepts	easy

CONTENTS

04	Cells: EMF, Internal Resistance & Combinations	Q 1–17	17 Qs
	Level 1 · Easy		17 Qs
	◆ **Terminal voltage & internal resistance**		13 Qs
	◆ **Cells in series & parallel**		1 Qs
	◆ **Maximum power transfer**		3 Qs
	Answer key		

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TOPIC 04

Cells: EMF, Internal Resistance & Combinations

17 PYQs · Easy 17 · Medium 0 · Difficult 0 | MHT CET 1 · NEET 11 · JEE 5

Concepts covered: Terminal voltage & internal resistance (13) · Cells in series & parallel (1) · Maximum power transfer (3)

LEVEL 1 · EASY 17 questions

◆ Terminal voltage & internal resistance 13 Qs

1. A voltmeter of resistance 150Ω connected across a cell of e.m.f. 3 V reads 2.5 V. What is the internal resistance of the cell?

MHT CET 2023 · 10 MAY · SHIFT 1

(a) 10Ω (b) 15Ω (c) 20Ω (d) 30Ω

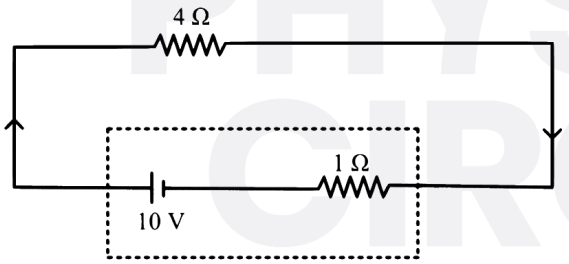
2. A resistor is connected to a battery of 12 V emf and internal resistance 2Ω. If the current in the circuit is 0.6 A, the terminal voltage of the battery is:

NEET 2026

(a) 10 V (b) 1.2 V (c) 12 V (d) 10.8 V

3. The terminal voltage of the battery, whose emf is 10 V and internal resistance 1Ω, when connected through an external resistance of 4Ω as shown in the figure is:

NEET 2024



(a) 4 V (b) 6 V (c) 8 V (d) 10 V

4. A cell of emf 4 V and internal resistance 0.5 Ω is connected to a 7.5 Ω external resistance. The terminal potential difference of the cell is

NEET 2022 · PHASE 2

(a) 0.375 V (b) 3.75 V (c) 4.25 V (d) 4 V

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

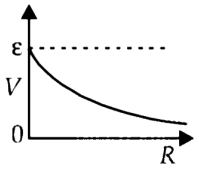
NEET 2013

(a) 0.8 Ω (b) 1.0 Ω (c) 0.2 Ω (d) 0.5 Ω

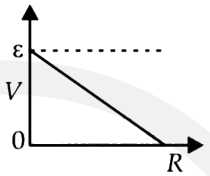
6. A cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by

AIPMT 2012 · MAINS

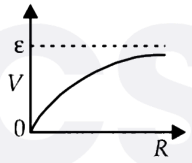
(a)



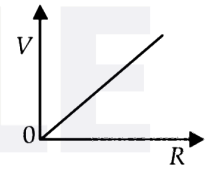
(b)



(c)



(d)



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

AIPMT 2011 · PRELIMS

(a) 0.5 Ω (b) 1/3 Ω (c) 1/4 Ω (d) 1 Ω

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

AIPMT 2009

(a) – r and ε (b) r and – ε
(c) – ε and r (d) ε and – r

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

AIPMT 2002

(a) $\frac{10}{9}\Omega$ (b) $\frac{9}{10}\Omega$ (c) $\frac{11}{9}\Omega$ (d) $\frac{5}{9}\Omega$

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10. A cell has an emf $1.5\ \text{V}$. When connected across an external resistance of $2\ \Omega$, the terminal potential difference falls to $1.0\ \text{V}$. The internal resistance of the cell is

AIPMT 2000

(a) $2\ \Omega$ (b) $1.5\ \Omega$ (c) $1.0\ \Omega$ (d) $0.5\ \Omega$

11. The internal resistance of a cell of emf $2\ \text{V}$ is $0.1\ \Omega$. It is connected to a resistance of $3.9\ \Omega$. The voltage across the cell will be

AIPMT 1999

(a) $0.5\ \text{V}$ (b) $1.9\ \text{V}$ (c) $1.95\ \text{V}$ (d) $2\ \text{V}$

12. An energy source will supply a constant current into the load if its internal resistance is

AIEEE 2005

(a) very large as compared to the load resistance
(b) equal to the resistance of the load
(c) non-zero but less than the resistance of the load
(d) zero

13. When an external resistance of 5Ω is connected across terminals of a cell, a current of 0.25 A flows through it. When the 5Ω resistor is replaced by a 2Ω resistor, a current of 0.5 A flows through it. The internal resistance of the cell is ____ Ω.

JEE MAIN 2026 · 5 APR · SHIFT 2 *(Numerical)*

◆ Cells in series & parallel 1 Q

14. Two cells of emfs 1 V and 2 V and internal resistances 2Ω and 1Ω, respectively, are connected in series with an external resistance of 6Ω. The total current in the circuit is I_1. Now the same two cells in parallel configuration are connected to same external resistance. In this case, the total current drawn is I_2. The value of $\left(\frac{\text{I}_1}{\text{I}_2}\right)$ is $\frac{x}{3}$. The value of x is_____.

JEE MAIN 2025 · 3 APR · SHIFT 2 *(Numerical)*

◆ Maximum power transfer 3 Qs

15. A battery of e.m.f $10\ \text{V}$ and internal resistance $0.5\ \Omega$ is connected across a variable resistance R. The value of R for which the power delivered in it is maximum is given by

AIPMT 1992

(a) $0.5\ \Omega$ (b) $1.0\ \Omega$ (c) $2.0\ \Omega$ (d) $0.25\ \Omega$

16. A battery with EMF E and internal resistance r is connected across a resistance R. The power consumption in R will be maximum when:

JEE MAIN 2026 · 21 JAN · SHIFT 2

(a) $R = \sqrt{2}\,r$ (b) $R = 2r$
(c) $R = \frac{r}{2}$ (d) $R = r$

17. A cell of internal resistance r drives current through an external resistance R. The power delivered by the cell to the external resistance will be maximum when :-

JEE MAIN 2019 · 8 APR · SHIFT 2

(a) R = 1000 r (b) R = r
(c) R = 2r (d) R = 0.001 r

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ANSWER KEY

Shaded by level: **Easy**

04 Cells: EMF, Internal Resistance & Combinations

1. (d)	2. (d)	3. (c)	4. (b)	5. (d)	6. (c)	7. (b)	8. (a)	9. (a)	10. (c)
11. (c)	12. (a)	13. 1	14. 4	15. (a)	16. (d)	17. (b)			

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 05

Kirchhoff's Laws & Measuring Instruments

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

66	6	1
questions	concepts	easy

CONTENTS

05	Kirchhoff's Laws & Measuring Instruments	Q 1–66	66 Qs
	Level 1 · Easy		66 Qs
	◆ **Kirchhoff's laws: basics**		13 Qs
	◆ **Multi-loop circuits**		3 Qs
	◆ **Potential difference between points**		1 Qs
	◆ **Voltmeter & ammeter in circuits**		4 Qs
	◆ **Galvanometer to ammeter / voltmeter**		42 Qs
	◆ **Galvanometer sensitivity & figure of merit**		3 Qs
	Answer key		

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TOPIC 05

Kirchhoff's Laws & Measuring Instruments

66 PYQs · Easy 66 · Medium 0 · Difficult 0 | MHT CET 30 · NEET 9 · JEE 27

Concepts covered: Kirchhoff's laws: basics (13) · Multi-loop circuits (3) · Potential difference between points (1) · Voltmeter & ammeter in circuits (4) · Galvanometer to ammeter / voltmeter (42) · Galvanometer sensitivity & figure of merit (3)

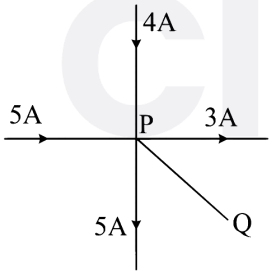
LEVEL 1 · EASY 66 questions

◆ Kirchhoff's laws: basics 13 Qs

1. Kirchhoff's voltage law and current law are based (respectively) on the conservation of
MHT CET 2025 · 26 APR · SHIFT 2
(a) momentum, charge (b) energy, charge
(c) charge, momentum (d) charge, energy

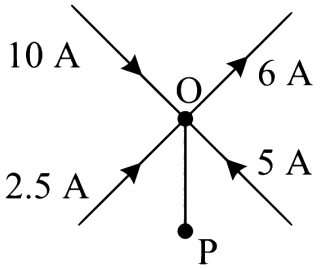
2. Kirchhoff's second law is based on the law of conservation of
MHT CET 2024 · 11 MAY · SHIFT 2
(a) charge
(b) energy
(c) momentum
(d) inter conversion of mass into energy

3. Five current carrying conductors meet at point P. What is the magnitude and direction of the current in conductor PQ?
MHT CET 2023 · 14 MAY · SHIFT 1



(a) 1 A form Q to P (b) 1 A form P to Q
(c) 3 A form P to Q (d) 2 A form Q to P

4. Five current carrying conductors meet at a point 'O' as shown in figure. The magnitude and direction of the current in conductor 'OP' is
MHT CET 2023 · 9 MAY · SHIFT 2

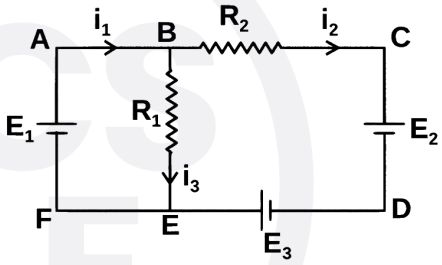


(a) 6.5 A from O to P. (b) 9 A from P to O.
(c) 10.5 A from P to O. (d) 11.5 A from O to P.

5. Kirchhoff's current and voltage law are respectively based on the conservation of
MHT CET 2021 · 22 SEP · SHIFT 2
(a) momentum, charge (b) energy, charge
(c) charge, energy (d) charge, momentum

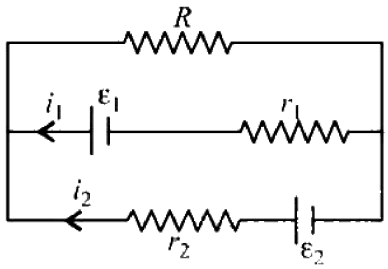
6. The Kirchhoff's current law and voltage law are respectively based upon the conservation of
MHT CET 2021 · 22 SEP · SHIFT 1
(a) charge, energy (b) charge, momentum
(c) energy, charge (d) momentum, charge

7. For the circuit given below, the Kirchoff's loop rule for the loop $BCDEB$ is given by the equation
NEET 2020 · PHASE 2



(a) $-i_2R_2 + E_2 + E_3 + i_3R_1 = 0$
(b) $-i_2R_2 + E_2 - E_3 + i_3R_1 = 0$
(c) $i_2R_2 + E_2 - E_3 - i_3R_1 = 0$
(d) $i_2R_2 + E_2 + E_3 + i_3R_1 = 0$

8. See the electrical circuit shown in this figure. Which of the following equations is a correct equation for it?
AIPMT 2009



(a) $\varepsilon_2 - i_2r_2 - \varepsilon_1 - i_1r_1 = 0$
(b) $-\varepsilon_2 - (i_1 + i_2)R + i_2r_2 = 0$
(c) $\varepsilon_1 - (i_1 + i_2)R + i_1r_1 = 0$
(d) $\varepsilon_1 - (i_1 + i_2)R - i_1r_1 = 0$

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9. Kirchhoff's first and second laws of electrical circuits are consequences of
AIPMT 2006
(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.

10. Kirchhoff's first law, i.e. $\Sigma i = 0$ at a junction, deals with the conservation of
AIPMT 1997
(a) momentum (b) angular momentum
(c) charge (d) energy

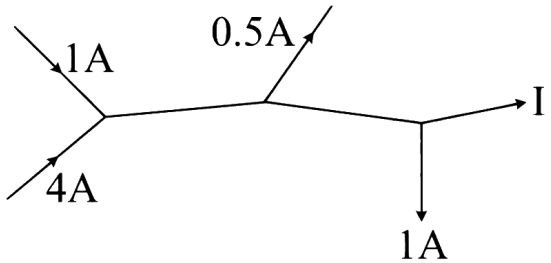
11. Kirchhoff's first law, i.e. $\Sigma i = 0$ at a junction, deals with the conservation of
AIPMT 1992
(a) momentum (b) angular momentum
(c) charge (d) energy

12. The Kirchhoff's first law $(\sum i = 0)$ and second law $(\sum iR = \sum E)$, where the symbols have their usual meanings, are respectively based on
AIEEE 2006
(a) conservation of charge, conservation of energy
(b) conservation of charge, conservation of momentum
(c) conservation of energy, conservation of charge
(d) conservation of momentum, conservation of charge

13. The Kirchhoff's first law $(\sum i = 0)$ and second law $(\sum iR = \sum E)$, where the symbols have their usual meanings, are respectively based on
AIEEE 2004
(a) conservation of charge, conservation of momentum
(b) conservation of energy, conservation of charge
(c) conservation of momentum, conservation of charge
(d) conservation of charge, conservation of energy

◆ Multi-loop circuits 3 Qs

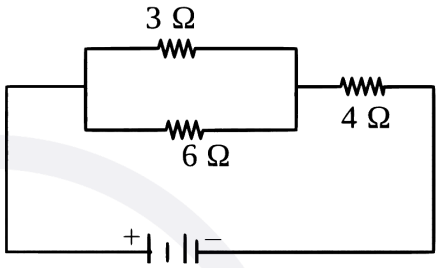
14. The figure shows currents in a part of electric circuit. Then current I is
MHT CET 2024 · 15 MAY · SHIFT 2



(a) 3.5 A (b) 1.5 A (c) 4 A (d) 2.5 A

15. Consider the following two statements.
(A) Kirchoff'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?
AIPMT 2010 · PRELIMS
(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

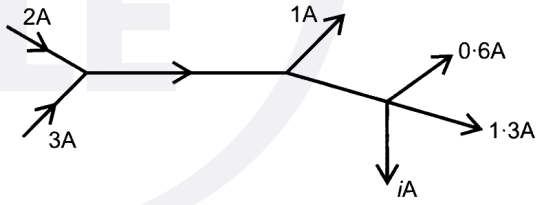
16. Current through $3\,\Omega$ resistor is 0.8 ampere, then potential drop through $4\,\Omega$ resistor is
AIPMT 1993



(a) 9.6 V (b) 2.6 V (c) 4.8 V (d) 1.2 V

◆ Potential difference between points 1 Q

17. The currents in different parts of the electric circuit are shown in following figure. The value of current i is
MHT CET 2026 · 20 APR · SHIFT 2



(a) 0.7 A (b) 1.4 A (c) 2.1 A (d) 2.8 A

◆ Voltmeter & ammeter in circuits 4 Qs

18. Which one of the following is not a measurable quantity?
JEE MAIN 2026 · 28 JAN · SHIFT 2
(a) Resistance (b) Voltage difference
(c) Displacement current (d) Voltage

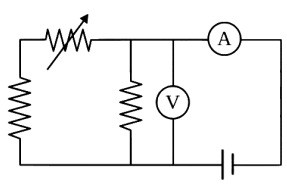
19. A circuit to verify Ohm's law uses ammeter and voltmeter in series or parallel connected correctly to the resistor. In the circuit:
JEE MAIN 2020 · 6 SEP · SHIFT 2
(a) Ammeter is always connected in series and voltmeter in parallel
(b) Both ammeter and voltmeter must be connected in series
(c) Both ammeter and voltmeter must be connected in parallel
(d) Ammeter is always used in parallel and voltmeter

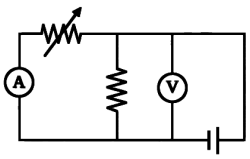
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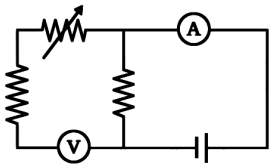
is series

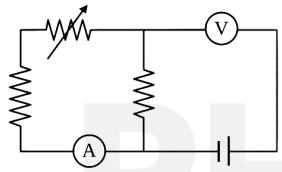
20. Correct set up to verify Ohm's law is:

JEE MAIN 2013 · 23 APR · SHIFT 1

(a) 

(b) 

(c) 

(d) 

21. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a

AIEEE 2002

(a) low resistance in parallel
(b) high resistance in parallel
(c) high resistance in series
(d) low resistance in series

◆ Galvanometer to ammeter / voltmeter 42 Qs

22. The value of the shunt resistance that allows 10% of the main current through the galvanometer of 99Ω is

MHT CET 2025 · 25 APR · SHIFT 1

(a) 9Ω (b) 11Ω (c) 13Ω (d) 15Ω

23. The voltmeter has range 10 V and its internal resistance is 50Ω. To increase the range of voltmeter to 15 V, the resistance which is to be connected is

MHT CET 2025 · 22 APR · SHIFT 1

(a) 125Ω resistance in parallel
(b) 125Ω resistance in series
(c) 25Ω resistance in parallel
(d) 25Ω resistance in series

24. If an ammeter is to be used in place of a galvanometer then we must connect

MHT CET 2025 · 21 APR · SHIFT 2

(a) low resistance in parallel.
(b) high resistance in series.
(c) high resistance in parallel.
(d) low resistance in series.

25. Only 4% of the total current in the circuit passes through a galvanometer. If the resistance of the galvanometer is G, then the shunt resistance connected to the galvanometer is

MHT CET 2025 · 20 APR · SHIFT 2

(a) $\frac{G}{25}$ (b) $\frac{G}{24}$ (c) 24 G (d) 25 G

26. If only 5% of the total current is to be passed through galvanometer of resistance G, then the resistance of the shunt will be

MHT CET 2025 · 19 APR · SHIFT 1

(a) $\frac{G}{15}$ (b) $\frac{G}{17}$ (c) $\frac{G}{19}$ (d) $\frac{G}{21}$

27. Two identical galvanometers are converted into an ammeter and into milliammeter. For the same current, the value of shunt of the ammeter as compared to that of milliammeter is

MHT CET 2024 · 16 MAY · SHIFT 2

(a) less (b) equal (c) more (d) zero

28. In an ammeter, 0.25% of main current passes through the galvanometer. If the resistance of the galvanometer is ' G ', the resistance of ammeter will be

MHT CET 2024 · 10 MAY · SHIFT 2

(a) $\frac{399}{400}$G (b) $\frac{1}{400}$G (c) $\frac{499}{500}$G (d) $\frac{1}{500}$G

29. Two identical galvanometers are converted into voltmeter and millivoltmeter. As compared to the series resistance of voltmeter, the series resistance of millivoltmeter will be

MHT CET 2024 · 9 MAY · SHIFT 2

(a) equal (b) more (c) less (d) zero

30. In an ammeter, 4% of the main current is passing through the galvanometer, If shunt resistance is 5Ω, then resistance of galvanometer will be

MHT CET 2024 · 9 MAY · SHIFT 1

(a) 60Ω (b) 120Ω (c) 240Ω (d) 480Ω

31. The range of voltmeter of resistance ' G ' Ω is ' V ' volt. The resistance required to be connected in series with it in order to convert it into a voltmeter of range ' nV ' volt, will be

MHT CET 2024 · 3 MAY · SHIFT 1

(a) (n − 1)G (b) G/n
(c) nG (d) $\frac{G}{n} - 1$

32. Only 4% of the total current in the circuit passes through a galvanometer. If the resistance of the galvanometer is G, then the shunt resistance connected to the galvanometer is

MHT CET 2023 · 13 MAY · SHIFT 2

(a) $\frac{G}{25}$ (b) $\frac{G}{24}$ (c) 24G (d) 25G

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33. A galvanometer has resistance 'G' and range 'Vg'. How much resistance is required to read voltage upto 'V' volt?

MHT CET 2023 · 10 MAY · SHIFT 2

(a) $G\left(\frac{V}{V_g}-1\right)$ (b) $G\left(\frac{V+V_g}{V}\right)$

(c) $G\left(\frac{V-V_g}{V}\right)$ (d) GV_g

34. If only 1% of total current is passed through a galvanometer of resistance 'G' then the resistance of the shunt is

MHT CET 2023 · 10 MAY · SHIFT 1

(a) $\frac{G}{25}\Omega$ (b) $\frac{G}{49}\Omega$ (c) $\frac{G}{2}\Omega$ (d) $\frac{G}{99}\Omega$

35. A galvanometer of resistance G is shunted with a resistance of 10% of G. The part of the total current that flows through the galvanometer is

MHT CET 2023 · 9 MAY · SHIFT 1

(a) $\frac{1}{11}I$ (b) $\frac{2}{11}I$ (c) $\frac{1}{10}I$ (d) $\frac{1}{5}I$

36. A galvanometer of resistance 200Ω is to be converted into an ammeter. The value of shunt resistance which allows 3% of the mains current through the galvanometer is equal to (nearly)

MHT CET 2022 · 11 AUG · SHIFT 2

(a) 6Ω (b) 7Ω (c) 10Ω (d) 5Ω

37. A galvanometer of resistance 50Ω is converted to an ammeter. After shunting, the effective resistance of ammeter is 2.5Ω. The value of shunt is

MHT CET 2021 · 20 SEP · SHIFT 1

(a) $\frac{100}{19}\Omega$ (b) $\frac{50}{19}\Omega$ (c) $\frac{25}{19}\Omega$ (d) $\frac{75}{19}\Omega$

38. A milliammeter of resistance 40Ω has a range $0-30\,\text{mA}$. What will be the resistance used in series to convert it into voltmeter of range $0-15\,\text{V}$?

MHT CET 2020 · 19 OCT · SHIFT 2

(a) 460Ω (b) 920Ω (c) 640Ω (d) 560Ω

39. In conversion of moving coil galvanometer into an ammeter of required range, the resistance of ammeter, so formed is

[S = shunt and G = resistance of galvanometer]

MHT CET 2020 · 16 OCT · SHIFT 2

(a) $\frac{S+G}{SG}$ (b) $\frac{SG}{S+G}$ (c) $\frac{S-G}{SG}$ (d) $\frac{SG}{S-G}$

40. The range of an ammeter of resistance 'G' can be increased from 'I' to 'nI' by connecting

MHT CET 2019 · 2 MAY · SHIFT 2

(a) a series resistance of $\frac{G}{n+1}\ \Omega$

(b) a shunt of $\frac{G}{n-1}\ \Omega$

(c) a shunt of $\frac{G}{n+1}\ \Omega$

(d) a series resistance of $\frac{G}{n-1}\ \Omega$

41. A galvanometer has resistance of 100Ω and a current of 10 mA produces full scale deflection in it. The resistance to be connected in series, to get a voltmeter of range 50 volt is

MHT CET 2019 · 2 MAY · SHIFT 1

(a) 3900Ω (b) 4000Ω (c) 4600Ω (d) 4900Ω

42. A galvanometer of resistance 100Ω gives full scale deflection for a current of 1 mA. It is converted into an ammeter of range $0-10$ A. The shunt required is:

NEET 2026

(a) 0.01Ω (b) 0.10Ω (c) 1.0Ω (d) 0.001Ω

43. A galvanometer having a resistance of 8 ohm is shunted by a wire of resistance 2 ohm. If the total current is 1 A, the part of it passing through the shunt will be

AIPMT 1998

(a) 0.25 A (b) 0.8 A (c) 0.2 A (d) 0.5 A

44. A voltmeter with internal resistance of $x\Omega$ can be used to measure upto 20 V. In order to increase its measuring range to 30 V, the required modification is to ____.

JEE MAIN 2026 · 4 APR · SHIFT 1

(a) connect resistor of $\frac{x}{2}\Omega$, in series with voltmeter.

(b) connect resistor of $\frac{x}{2}\Omega$, in parallel to voltmeter.

(c) connect a resistor of $x\Omega$ in series with voltmeter.

(d) connect resistor of $2x\Omega$ in parallel to voltmeter.

45. A moving coil galvanometer of resistance 100Ω shows a full scale deflection for a current of 1 mA. The value of resistance required to convert this galvanometer into an ammeter, showing full scale deflection for a current of 5 mA, is ____ Ω

JEE MAIN 2026 · 24 JAN · SHIFT 2

(a) 25 (b) 2.5 (c) 0.5 (d) 10

46. A galvanometer having a coil of resistance 30Ω need 20 mA of current for full-scale deflection. If a maximum current of 3 A is to be measured using this galvanometer, the resistance of the shunt to be added to the galvanometer should be $\frac{30}{X}\Omega$, where X is

JEE MAIN 2025 · 23 JAN · SHIFT 2

(a) 447 (b) 298 (c) 149 (d) 596

47. A galvanometer has a coil of resistance 200Ω with a full scale deflection at $20\mu\text{A}$. The value of resistance to be added to use it as an ammeter of range $(0-20)\text{mA}$ is:

JEE MAIN 2024 · 9 APR · SHIFT 1

(a) 0.40Ω (b) 0.10Ω (c) 0.20Ω (d) 0.50Ω

48. In an ammeter, 5% of the main current passes through the galvanometer. If resistance of the galvanometer is G, the resistance of ammeter will be:

JEE MAIN 2024 · 1 FEB · SHIFT 2

(a) 199 G (b) 200 G (c) $\frac{G}{20}$ (d) $\frac{G}{199}$

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49. A galvanometer has a resistance of $50\ \Omega$ and it allows maximum current of $5\ \text{mA}$. It can be converted into voltmeter to measure up to $100\ \text{V}$ by connecting in series a resistor of resistance:

JEE MAIN 2024 · 1 FEB · SHIFT 1

(a) 19500Ω (b) 5975Ω (c) 20050Ω (d) 19950Ω

50. A galvanometer having coil resistance 10Ω shows a full scale deflection for a current of $3\ \text{mA}$. For it to measure a current of $8\ \text{A}$, the value of the shunt should be:

JEE MAIN 2024 · 29 JAN · SHIFT 1

(a) $3.75 \times 10^{-3}\Omega$ (b) $3 \times 10^{-3}\Omega$
(c) $4.85 \times 10^{-3}\Omega$ (d) $2.75 \times 10^{-3}\Omega$

51. A current of $200\mu\text{A}$ deflects the coil of a moving coil galvanometer through 60°. The current to cause deflection through $\frac{\pi}{10}$ radian is:

JEE MAIN 2024 · 27 JAN · SHIFT 2

(a) $120\ \mu\text{A}$ (b) $180\ \mu\text{A}$ (c) $30\ \mu\text{A}$ (d) $60\ \mu\text{A}$

52. A $72\ \Omega$ galvanometer is shunted by a resistance of $8\ \Omega$. The percentage of the total current which passes through the galvanometer is:

JEE MAIN 2022 · 27 JUN · SHIFT 1

(a) 0.1% (b) 10% (c) 25% (d) 0.25%

53. A galvanometer of resistance G is converted into a voltmeter of range 0 – 1 V by connecting a resistance R1 in series with it. The additional resistance that should be connected in series with R1 to increase the range of the voltmeter to 0 – 2 V will be:

JEE MAIN 2020 · 5 SEP · SHIFT 1

(a) G (b) R1 (c) R1 + G (d) R1 - G

54. A galvanometer having a coil resistance $100\ \Omega$ gives a full scale deflection when a current of 1 mA is passed through it. What is the value of the resistance which can convert this galvanometer into a voltmeter giving full scale deflection for a potential difference of 10 V?

JEE MAIN 2020 · 8 JAN · SHIFT 2

(a) $8.9\ \text{k}\Omega$ (b) $10\ \text{k}\Omega$ (c) $9.9\ \text{k}\Omega$ (d) $7.9\ \text{k}\Omega$

55. A moving coil galvanometer allows a full scale current of 10–4 A. A series resistance of 2 MΩ is required to convert the above galvanometer into a voltmeter of range 0-5 V. Therefore the value of shunt resistance required to convert the above galvanometer into an ammeter of range 0-10 mA is:

JEE MAIN 2019 · 10 APR · SHIFT 1

(a) $200\ \Omega$
(b) $500\ \Omega$
(c) $100\ \Omega$
(d) None of the options are correct

56. The resistance of a galvanometer is 50 ohm and the maximum current which can be passed through it is 0.002 A. What resistance must be connected to it in order to convert it into an ammeter of range 0 – 0.5 A?

JEE MAIN 2019 · 9 APR · SHIFT 2

(a) 0.02 ohm (b) 0.2 ohm
(c) 0.002 ohm (d) 0.5 ohm

57. A moving coil galvanometer has resistance 50Ω and it indicates full deflection at 4mA current. A voltmeter is made using this galvanometer and a 5 kΩ resistance. The maximum voltage, that can be measured using this voltmeter, will be close to:

JEE MAIN 2019 · 9 APR · SHIFT 1

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

58. A galvanometer with its coil resistance 25 Ω requires a current of 1 mA for its full deflection. In order to construct an ammeter to read upto a current of 2 A, the approximate value of the shunt resistance should be:

JEE MAIN 2018 · 16 APR · SHIFT 1

(a) $2.5 \times 10^{-3}\ \Omega$ (b) $1.25 \times 10^{-2}\Omega$
(c) $1.25 \times 10^{-3}\Omega$ (d) $2.5 \times 10^{-2}\Omega$

59. When a current of 5 mA is passed through a galvanometer having a coil of resistance 15Ω, it shows full scale deflection. The value of the resistance to be put in series with the galvanometer to convert it into a voltmeter of range 0 – 10V is:

JEE MAIN 2017

(a) 4.005 × 103 Ω (b) 1.985 × 103 Ω
(c) 2.535 × 103 Ω (d) 2.045 × 103 Ω

60. A galvanometer having a coil resistance of $100\ \Omega$ gives a full scale deflection, when a currect 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

(a) $0.1\ \Omega$ (b) $3\ \Omega$ (c) $0.01\ \Omega$ (d) $2\ \Omega$

61. A shunt of resistance 1 Ω is connected across a galvanometer of 120 Ω resistance. A current of 5.5 ampere gives full scale deflection in the galvanometer. The current that will give full scale deflection in the absence of the shunt is nearly:

JEE MAIN 2013 · 9 APR · SHIFT 1

(a) 5.5 ampere (b) 0.5 ampere
(c) 0.004 ampere (d) 0.045 ampere

62. This questions has Statement - I and Statement - II. Of the four choices given after the Statements, choose the one that best describes into two Statements.

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.

JEE MAIN 2013

(a) Statement - I is true, Statement - II is true, Statement - II is the correct explanation of

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statement - I.

(b) Statement - I is true, Statement - II is true, Statement - II is not the correct explanation of statement - I.

(c) Statement - I is true, Statement - II is false

(d) Statement - I is false, Statement - II is true

63. 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

(a) $0.03\,\Omega$ (b) $0.3\,\Omega$ (c) $0.9\,\Omega$ (d) $0.09\,\Omega$

◆ Galvanometer sensitivity & figure of merit 3 Qs

64. Two galvanometers A and B require currents of 4 mA and 7 mA, respectively to produce the same deflection of 20 divisions. If S_A and S_B are their sensitivities respectively, then

MHT CET 2020 · 19 OCT · SHIFT 2

(a) $S_A < S_B$ (b) $S_A > S_B$

(c) $S_B = \frac{7}{4} = S_A$ (d) $S_A = S_B = \frac{4}{7}$

65. In moving coil galvanometer, strong horse shoe magnet of concave shaped pole pieces is used to

MHT CET 2019 · 2 MAY · SHIFT 1

(a) increase space for rotation of coil

(b) reduce weight of galvanometer

(c) produce magnetic field which is parallel to plane of coil at any position

(d) make magnetic induction weak at the centre.

66. A galvanometer is used in laboratory for detecting the null point in electrical experiments. If, on passing a current of 6 mA it produces a deflection of 2°, its figure of merit is close to:

JEE MAIN 2020 · 5 SEP · SHIFT 2

(a) 6 × 10–3 A/div (b) 666° A/div

(c) 3 × 10–3 A/div (d) 333° A/div

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ANSWER KEY

Shaded by level: **Easy**

05 Kirchhoff's Laws & Measuring Instruments

1. (b)	2. (b)	3. (b)	4. (d)	5. (c)	6. (a)	7. (c)	8. (d)	9. (c)	10. (c)
11. (c)	12. (a)	13. (d)	14. (a)	15. (d)	16. (c)	17. (c)	18. (d)	19. (a)	20. (a)
21. (c)	22. (b)	23. (d)	24. (a)	25. (b)	26. (c)	27. (a)	28. (b)	29. (c)	30. (b)
31. (a)	32. (b)	33. (a)	34. (d)	35. (a)	36. (a)	37. (b)	38. (a)	39. (b)	40. (b)
41. (d)	42. (a)	43. (b)	44. (a)	45. (a)	46. (c)	47. (c)	48. (c)	49. (d)	50. (a)
51. (d)	52. (b)	53. (c)	54. (c)	55. (d)	56. (b)	57. (d)	58. (b)	59. (b)	60. (c)
61. (d)	62. (d)	63. (d)	64. (b)	65. (c)	66. (c)				

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 06

Wheatstone Bridge & Metre Bridge

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

14	2	1
questions	concepts	easy

CONTENTS

06	Wheatstone Bridge & Metre Bridge	Q 1–14	14 Qs
	Level 1 · Easy		14 Qs
	◆ **Wheatstone bridge balance**		7 Qs
	◆ **Metre bridge**		7 Qs
	Answer key		

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TOPIC 06

Wheatstone Bridge & Metre Bridge

14 PYQs · Easy 14 · Medium 0 · Difficult 0 | MHT CET 4 · NEET 5 · JEE 5

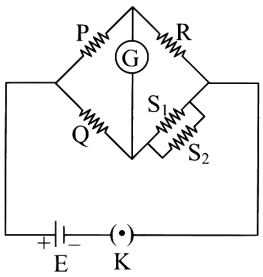
Concepts covered: Wheatstone bridge balance (7) · Metre bridge (7)

LEVEL 1 · EASY 14 questions

◆ Wheatstone bridge balance 7 Qs

1. In a Wheatstone's bridge, the resistances in four arms are as shown in the figure. The balancing condition of the bridge is

MHT CET 2024 · 4 MAY · SHIFT 2



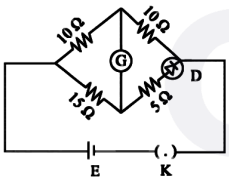
(a) $\frac{P}{Q} = \frac{R}{S_1+S_2}$ (b) $\frac{P}{Q} = \frac{R(S_1S_2)}{S_1+S_2}$

(c) $\frac{P}{Q} = \frac{R(S_1+S_2)}{2S_1S_2}$ (d) $\frac{P}{Q} = \frac{R(S_1+S_2)}{S_1S_2}$

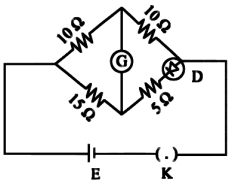
2. Choose the correct circuit which can achieve the bridge balance.

NEET 2024

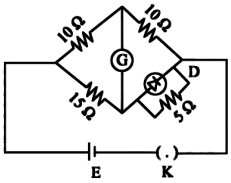
(a)



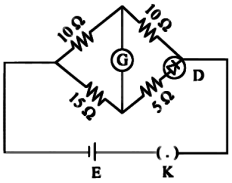
(b)



(c)

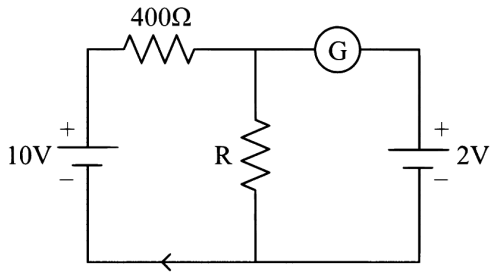


(d)



3. If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by:

NEET 2023



(a) 50 Ω (b) 100 Ω (c) 400 Ω (d) 200 Ω

4. 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

AIPMT 2003

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

5. 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

AIPMT 2001

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

6. Wheatstone bridge principle is used to measure the specific resistance (S_1) of given wire, having length L, radius r. If X is the resistance of wire, then specific resistance is; $S_1 = X\left(\frac{\pi r^2}{L}\right)$. If the length of the wire gets doubled then the value of specific resistance will be:

JEE MAIN 2024 · 27 JAN · SHIFT 2

(a) $\frac{S_1}{4}$ (b) $2S_1$ (c) $\frac{S_1}{2}$ (d) S_1

7. Which of the following statements is false?

JEE MAIN 2017

(a) Kirchhoff's second law represents energy conservation.

(b) Wheatstone bridge is the most sensitive when all the four resistances are of the same order of magnitude.

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

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

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◆ Metre bridge 7 Qs

8. A metre bridge experiment, the resistance in the left gap is $20\ \Omega$ and in the right gap is $60\ \Omega$. The bridge is balanced. The distance of the null point from the centre of the wire is

MHT CET 2026 · 16 APR · SHIFT 1

(a) 50 cm (b) 75 cm (c) 25 cm (d) 40 cm

9. In metre bridge experiment, the resistance in the left gap is $15\ \Omega$ and in the right gap is $45\ \Omega$. The bridge is balanced. The distance of the null point from the centre of the wire is

MHT CET 2026 · 15 APR · SHIFT 2

(a) 80 cm (b) 60 cm (c) 40 cm (d) 25 cm

10. The resistances in the left and right gap of a metre bridge are 40Ω and 60Ω respectively. When the bridge is balanced, the distance of the null point from the centre of the wire towards left is

MHT CET 2024 · 2 MAY · SHIFT 1

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

11. In metre-bridge the balancing length from left is found to be $20\ \text{cm}$ when standard resistance of $1\ \Omega$ is in right gap. The value of unknown resistance is

AIPMT 1999

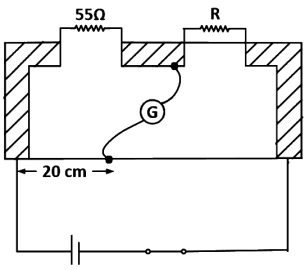
(a) $0.25\ \Omega$ (b) $0.4\ \Omega$ (c) $0.5\ \Omega$ (d) $4\ \Omega$

12. In a metre bridge experiment null point is obtained at 40 cm from one end of the wire when resistance X is balanced against another resistance Y. If X < Y, then the new position of the null point from the same end, if one decides to balance a resistance of 3X against Y, will be close to:

JEE MAIN 2013 · 9 APR · SHIFT 1

(a) 80 cm (b) 75 cm (c) 67 cm (d) 50 cm

13. Shown in the figure below is a meter-bridge set up with null deflection in the galvanometer.



The value of the unknown resister R is

AIEEE 2008

(a) 13.75Ω (b) 220Ω (c) 110Ω (d) 55Ω

14. In a meter 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 $4\ X$ against Y

AIEEE 2004

(a) $40\ cm$ (b) $80\ cm$ (c) $50\ cm$ (d) $70\ cm$

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ANSWER KEY

Shaded by level: **Easy**

06 Wheatstone Bridge & Metre Bridge

1. (d)	2. (a)	3. (b)	4. (c)	5. (a)	6. (d)	7. (c)	8. (c)	9. (d)	10. (b)
11. (a)	12. (c)	13. (b)	14. (c)						

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 07

Potentiometer

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

27	3	1
questions	concepts	easy

CONTENTS

07	Potentiometer	Q 1–27	27 Qs
	Level 1 · Easy		27 Qs
	◆ **Potential gradient**		14 Qs
	◆ **Comparison of emfs**		7 Qs
	◆ **Sensitivity & working of potentiometer**		6 Qs
	Answer key		

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TOPIC 07

Potentiometer

27 PYQs · Easy 27 · Medium 0 · Difficult 0 | MHT CET 17 · NEET 6 · JEE 4

Concepts covered: Potential gradient (14) · Comparison of emfs (7) · Sensitivity & working of potentiometer (6)

LEVEL 1 · EASY 27 questions

◆ Potential gradient 14 Qs

1. The potential gradient along the length of 1 metre wire of uniform cross section is 6 V/m. Let 'B' and 'C' be the two points at 40 cm and 60 cm marks respectively from one end. The potential difference between points B and C is

MHT CET 2026 · 19 MAY · SHIFT 1

(a) 1.2 V (b) 2.4 V (c) 3.5 V (d) 6.0 V

2. A current of 0.01 A passes through the potentiometer wire of resistivity 10^{6} Ω cm and area of cross- section 10^{-2} cm. The potential gradient is (in V/m)

MHT CET 2026 · 13 MAY · SHIFT 2

(a) 10^{9} (b) 10^{11} (c) 10^{10} (d) 10^{8}

3. A potentiometer wire is 4m long and potential difference of 3V is maintained between the ends. The e.m.f. of the cell which balances against a length of 100 cm of the potentiometer wire is

MHT CET 2026 · 16 APR · SHIFT 1

(a) 0.75 V (b) 0.5 V (c) 0.25 V (d) 1.5 V

4. A potentiometer wire is 4m long and potential difference of 2V is maintained between the ends. The e.m.f. of the cell which balances against a length of 80 cm of the potentiometer wire is

MHT CET 2026 · 15 APR · SHIFT 2

(a) 0.25 V (b) 0.30 V (c) 0.40 V (d) 0.80 V

5. A potentiometer wire is 4 m long and potential difference of 3V is maintained between the ends. The e.m.f. of the cell which balances against a length of 100 cm of the poteniometer wire is

MHT CET 2026 · 13 APR · SHIFT 1

(a) 0.25 V (b) 0.50 V (c) 0.75 V (d) 1.0 V

6. A 2.5 V battery is connected to a potentiometer wire. A cell of e.m.f. 1.08 V is balanced by the voltage drop across 2.16 m of wire. The length of the potentiometer wire is

MHT CET 2025 · 5 MAY · SHIFT 2

(a) 2.5 m (b) 3 m (c) 5 m (d) 6 m

7. The potentiometer wire is 5 m long and potential difference of 4 V is maintained between the ends. The e.m.f. of the cell which balances against a length of 200 cm of the potentiometer wire is

MHT CET 2025 · 26 APR · SHIFT 1

(a) 0.4 V (b) 0.8 V (c) 1.2 V (d) 1.6 V

8. A battery of 6 V is connected to the ends of uniform wire 3 m long and of resistance 100Ω. The difference of potential between two points 50 cm apart on the wire is

MHT CET 2024 · 11 MAY · SHIFT 2

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

9. Resistance of a potentiometer wire is $2\Omega/\text{m}$. A cell of e.m.f. 1.5 V balances at 300 cm. The current through the wire is

MHT CET 2023 · 12 MAY · SHIFT 1

(a) 2.5 mA (b) 7.5 mA (c) 250 mA (d) 750 mA

10. A 10 m long wire of resistance 20Ω is connected in series with a battery of emf 3 V and a resistance of 10Ω. The potential gradient along the wire in V/m is

MHT CET 2020 · 19 OCT · SHIFT 2

(a) 1.2 (b) 0.10 (c) 0.02 (d) 0.20

11. A potentiometer wire is 4 m long and potential difference of 3 V is maintained between the ends. The emf of the cell, which balances against a length of 100 cm of the potentiometer wire is

MHT CET 2020 · 16 OCT · SHIFT 1

(a) 0.60 V (b) 0.50 V (c) 0.25 V (d) 0.75 V

12. A 6 volt battery is connected to the terminals of a three metre 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

AIPMT 2004

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

13. If specific resistance of a potentiometer wire is 10-7Ω m and current flow through it is 0.1 amp., cross-sectional area of wire is 10 − 6 m2 then potential gradient will be

AIPMT 2001

(a) 10−2 volt/m (b) 10−4 volt/m
(c) 10−6 volt/m (d) 10−8 volt/m.

14. A potentiometer consists of a wire of length 4 m and resistance 10 Ω. It is connected to a cell of emf 2 V. The potential gradient of wire is

AIPMT 1999

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

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◆ Comparison of emfs 7 Qs

15. In a potentiometer circuit when two cells of emf 1.6 V and 1.3 V are connected to assist each other, the balancing length is 290 cm. What will be the balancing length in cm when these two cells are connected in opposition?
MHT CET 2026 · 19 MAY · SHIFT 2
(a) 70 (b) 80 (c) 65 (d) 30

16. In a potentiometer circuit when two cells of e.m.f. 1.5 volt and 1.2 volt are connected to assist each other, balancing length is 270 cm. What will be the balancing length in cm when these two cells are connected in opposition?
MHT CET 2026 · 19 APR · SHIFT 1
(a) 90 (b) 81 (c) 60 (d) 30

17. In an experiment to find emf of a cell using potentiometer, the length of null point for a cell of emf 1.5 V is found to be 60 cm. If this cell is replaced by another cell of emf E, the length of null point increases by 40 cm. The value of E is $x/10$ V.
The value of x is
MHT CET 2026 · 13 APR · SHIFT 2
(a) 20 (b) 25 (c) 28 (d) 30

18. In a potentiometer circuit a cell of EMF 1.5 V 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?
NEET 2021
(a) 62 cm (b) 60 cm (c) 21.6 cm (d) 64 cm

19. In an experiment to find emf of a cell using potentiometer, the length of null point for a cell of emf 1.5 V is found to be 60 cm. If this cell is replaced by another cell of emf E, the length-of null point increases by 40 cm. The value of E is $\frac{x}{10}V$. The value of x is _____.
JEE MAIN 2023 · 1 FEB · SHIFT 1 *(Numerical)* *(Not in current JEE/NEET syllabus)*

20. In a potentiometer arrangement, a cell of emf 1.20 V gives a balance point at 36 cm length of wire. This cell is now replaced by another cell of emf 1.80 V. The difference in balancing length of potentiometer wire in above conditions will be _____ cm.
JEE MAIN 2022 · 25 JUL · SHIFT 2 *(Numerical)* *(Not in current JEE/NEET syllabus)*

21. In a potentiometer arrangement, a cell gives a balancing point at 75 cm length of wire. This cell is now replaced by another cell of unknown emf. If the ratio of the emf's of two cells respectively is 3: 2, the difference in the balancing length of the potentiometer wire in above two cases will be _____ cm.
JEE MAIN 2022 · 24 JUN · SHIFT 1 *(Numerical)* *(Not in current JEE/NEET syllabus)*

◆ Sensitivity & working of potentiometer 6 Qs

22. In a potentiometer, the null point is obtained on 7^{th} wire. What should we do to change the null point on 9^{th} wire by keeping all other quantities same?
MHT CET 2026 · 13 MAY · SHIFT 1
(a) Decrease resistance in series with battery
(b) Increase resistance in main Circuit
(c) Decrease resistance in main circuit
(d) Increase applied e.m.f.

23. If the length of the potentiometer wire is increased by keeping constant potential difference across the wire, then
MHT CET 2025 · 20 APR · SHIFT 2
(a) the null point is obtained at shorter distance.
(b) the potential gradient is increased.
(c) the null point is obtained at larger distance.
(d) there is no change in the null point.

24. Which of the following instruments is not a direct reading instrument?
MHT CET 2020 · 16 OCT · SHIFT 2
(a) Electronic balance (b) Potentiometer
(c) Ammeter (d) Voltmeter

25. A potentiometer is an accurate and versatile device to make electrical measurements of EMF because the method involves
NEET 2017
(a) potential gradients
(b) a condition of no current flow through the galvanometer
(c) a combination of cells, galvanometer and resistances
(d) cells

26. The potentiometer is best for measuring voltage, as
AIPMT 2000
(a) it has a sensitive galvanometer and gives null deflection
(b) it has wire of high resistance
(c) it measures p.d. in closed circuit
(d) it measures p.d in open circuit.

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27. With the help of potentiometer, we can determine the value of emf of a given cell. The sensitivity of the potentiometer is

(A) directly proportional to the length of the potentiometer wire

(B) directly proportional to the potential gradient of the wire

(C) inversely proportional to the potential gradient of the wire

(D) inversely proportional to the length of the potentiometer wire

Choose the correct option for the above statements:

JEE MAIN 2023 · 29 JAN · SHIFT 2 ***(Not in current JEE/NEET syllabus)***

(a) A only (b) B and D only

(c) A and C only (d) C only

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ANSWER KEY

Shaded by level: **Easy**

07 Potentiometer

1. (a)	2. (d)	3. (a)	4. (c)	5. (c)	6. (c)	7. (d)	8. (a)	9. (c)	10. (d)
11. (d)	12. (c)	13. (a)	14. (a)	15. (d)	16. (d)	17. (b)	18. (b)	19. 25	20. 18
21. 25	22. (b)	23. (c)	24. (b)	25. (b)	26. (a)	27. (c)			

Note: *"Bonus" = no option is correct as the question is printed (dropped in the official key). Numerical questions show the numerical answer.*

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CURRENT ELECTRICITY · TOPIC 08

Electrical Power & Heating Effect

LEVEL 1 · EASY

Topic-wise Previous Year Questions

MHT CET · NEET · JEE Main

43	4	1
questions	concepts	easy

CONTENTS

08	Electrical Power & Heating Effect	Q 1–43	43 Qs
	Level 1 · Easy		43 Qs
	◆ **Power: P = VI = I²R = V²/R**		4 Qs
	◆ **Heat & electrical energy**		12 Qs
	◆ **Bulbs & heaters in combination**		18 Qs
	◆ **Chemical & thermoelectric effects**		9 Qs
	Answer key		

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TOPIC 08

Electrical Power & Heating Effect

43 PYQs · Easy 43 · Medium 0 · Difficult 0 | MHT CET 1 · NEET 22 · JEE 20

Concepts covered: Power: P = VI = I²R = V²/R (4) · Heat & electrical energy (12) · Bulbs & heaters in combination (18) · Chemical & thermoelectric effects (9)

LEVEL 1 · EASY 43 questions

◆ Power: P = VI = I²R = V²/R 4 Qs

1. 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?
AIPMT 1998
(a) $10/3$ (b) 10 (c) 30 (d) 90

2. A motor operating on 100 V draws a current of 1 A. If the efficiency of the motor is 91.6%, then the loss of power in units of cal/s is
JEE MAIN 2025 · 3 APR · SHIFT 2
(a) 6.2 (b) 2 (c) 8.4 (d) 4

3. Two equal resistances when connected in series to a battery, consume electric power of 60 W. If these resistances are now connected in parallel combination to the same battery, the electric power consumed will be:
JEE MAIN 2019 · 11 JAN · SHIFT 1
(a) 240 W (b) 60 W (c) 30 W (d) 120 W

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

◆ Heat & electrical energy 12 Qs

5. Two resistors of resistance, 100 Ω and 200 Ω are connected in parallel in an electrical circuit. The ratio of the thermal energy developed in 100 Ω to that in 200 Ω in a given time is
NEET 2022 · PHASE 1
(a) 1: 2 (b) 2: 1 (c) 1: 4 (d) 4: 1

6. 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
AIPMT 1998
(a) 16°C (b) 10°C (c) 20°C (d) 12°C

7. One kilowatt hour is equal to
AIPMT 1997
(a) 36×10^{-5} J (b) 36×10^{-4} J
(c) 36×10^{5} J (d) 36×10^{3} J

8. A current of 2 A, passing through a conductor produces 80 J of heat in 10 seconds. The resistance of the conductor in ohm is
AIPMT 1989
(a) 0.5 (b) 2 (c) 4 (d) 20

9. The H amount of thermal energy is developed by a resistor in 10 s when a current of 4 A is passed through it. If the current is increased to 16 A, the thermal energy developed by the resistor in 10 s will be:
JEE MAIN 2023 · 31 JAN · SHIFT 2
(a) $\frac{H}{4}$ (b) 16H (c) H (d) 4H

10. Ratio of thermal energy released in two resistors R and 3R connected in parallel in an electric circuit is:
JEE MAIN 2023 · 29 JAN · SHIFT 1
(a) 1: 1 (b) 1: 27 (c) 1: 3 (d) 3: 1

11. A resistor develops 500 J of thermal energy in 20 s when a current of 1.5A is passed through it. If the current is increased from 1.5A to 3A, what will be the energy developed in 20 s.
JEE MAIN 2021 · 16 MAR · SHIFT 2
(a) 1000 J (b) 2000 J (c) 1500 J (d) 500 J

12. A resistor develops 300 J of thermal energy in 15 s, when a current of 2 A is passed through it. If the current increases to 3 A, the energy developed in 10 s is _____ J.
JEE MAIN 2022 · 25 JUN · SHIFT 1 *(Numerical)*

13. A uniform heating wire of resistance 36Ω is connected across a potential difference of 240 V. The wire is then cut into half and potential difference of 240V is applied across each half separately. The ratio of power dissipation in first case to the total power dissipation in the second case would be 1: x, where x is _____
JEE MAIN 2021 · 1 SEP · SHIFT 2 *(Numerical)*

14. A resistor dissipates 192 J of energy in 1s when a current of 4A is passed through it. Now, when the current is doubled, the amount of thermal energy dissipated in 5s in _____ J.
JEE MAIN 2021 · 31 AUG · SHIFT 2 *(Numerical)*

15. The energy dissipated by a resistor is 10 mJ in 1 s when an electric current of 2 mA flows through it. The resistance is _____Ω. (Round off to the Nearest Integer)
JEE MAIN 2021 · 16 MAR · SHIFT 2 *(Numerical)*

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16. In an electrical circuit, a battery is connected to pass 20C of charge through it in a certain given time. The potential difference between two plates of the battery is maintained at 15V. The workdone by the battery is _____J.

JEE MAIN 2021 · 26 FEB · SHIFT 1 *(Numerical)*

◆ Bulbs & heaters in combination 18 Qs

17. The current flowing in a coil is 3 A and the power consumed is 108 W. If the a.c. source is of 120 V, 50 Hz, the resistance in the circuit is

MHT CET 2024 · 2 MAY · SHIFT 2

(a) 24Ω (b) 36Ω (c) 12Ω (d) 6Ω

18. A room heater is rated 400 W, 220 V. If the supply voltage drops to 200 V, what will be the power consumed (approximately)?

NEET 2026

(a) 200 W (b) 400 W (c) 331 W (d) 121 W

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

NEET 2019

(a) inductor (b) conductor
(c) switch (d) fuse

20. 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

AIPMT 2012 · PRELIMS

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

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

AIPMT 2005

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

22. 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

AIPMT 2004

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

23. 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

AIPMT 2004

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

24. 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

AIPMT 2003

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

25. Fuse wire is a wire of

AIPMT 2003

(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

26. Two bulbs of (40 W, 200 V), and (100 W, 200 V). Then correct relation for their resistances

AIPMT 2000

(a) R40 < R100
(b) R40 > R100
(c) R40 = R100
(d) no relation can be predicted.

27. A (100 W, 200 V) bulb is connected to a 160 volts supply. The power consumption would be

AIPMT 1997

(a) 100 W (b) 125 W (c) 64 W (d) 80 W

28. If two bulbs, whose resistances are in the ratio of 1 : 2 are connected in series, the power dissipated in them has the ratio of

AIPMT 1997

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

29. An electric bulb is rated 60 W, 220 V. The resistance of its filament is

AIPMT 1994

(a) 870 Ω (b) 780 Ω (c) 708 Ω (d) 807 Ω

30. An electric bulb rated 50 W – 200 V is connected across a 100 V supply. The power dissipation of the bulb is:

JEE MAIN 2024 · 4 APR · SHIFT 2

(a) 100 W (b) 50 W (c) 12.5 W (d) 25 W

31. Two identical heater filaments are connected first in parallel and then in series. At the same applied voltage, the ratio of heat produced in same time for parallel to series will be:

JEE MAIN 2023 · 11 APR · SHIFT 1

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

32. An electric bulb is rated 220 volt - 100 watt. The power consumed by it when operated on 110 volt will be

AIEEE 2006

(a) 75 watt (b) 40 watt (c) 25 Watt (d) 50 Watt

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33. 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

(a) four times (b) doubled
(c) halved (d) one fourth

34. A 220 volt, 1000 watt bulb is connected across a 110 *volt* mains supply. The power consumed will be

AIEEE 2003

(a) 750 watt (b) 500 watt
(c) 250 watt (d) 1000 watt

◆ Chemical & thermoelectric effects 9 Qs

35. A steady current of 1.5 amp flows through a copper voltameter for 10 minutes. If the electrochemical equivalent of copper is 30×10^{-5} g coulomb^{-1}, the mass of copper deposited on the electrode will be

AIPMT 2007

(a) 0.50 g (b) 0.67 g (c) 0.27 g (d) 0.40 g

36. If the cold junction of a thermocouple is kept at 0°C and the hot junction is kept at T°C, then the relation between neutral temperature (T_n) and temperature of inversion (T_i) is

AIPMT 2007

(a) $T_n = 2T_i$ (b) $T_n = T_i - T$
(c) $T_n = T_i + T$ (d) $T_n = T_i/2$

37. The temperature of inversion of a thermocouple is 620°C and the neutral temperature is 300°C. What is the temperature of cold junction?

AIPMT 2005

(a) 20°C (b) 120°C (c) -20°C (d) -120°C

38. In electrolysis the mass deposited on an electrode is directly proportional to

AIPMT 2000

(a) current (b) square of current
(c) concentration of (d) inverse of current

39. A heating coil is labelled 100 W, 220 V. The coil is cut in half and the two pieces are joined in parallel to the same source. The energy now liberated per second is

AIPMT 1995

(a) 200 W (b) 400 W (c) 25 W (d) 50 W

40. A thermocouple is made from two metals, Antimony and Bismuth. If one junction of the couple is kept hot and the other is kept cold, then, an electric current will

AIEEE 2006

(a) flow from Antimony to Bismuth at the hot junction
(b) flow from Bismuth to Antimony at the cold junction
(c) not flow through the thermocouple
(d) flow from Antimony to Bismuth at the cold junction

41. The electrochemical equivalent of a metal is $3.3 \times 10^{-7}\ kg$ per Coulomb. The mass of the metal liberated at the cathode when a $3A$ current is passed for 2 seconds will be

AIEEE 2004

(a) $6.6 \times 10^{-7}\ kg$ (b) $9.9 \times 10^{-7}\ kg$
(c) $19.8 \times 10^{-7}\ kg$ (d) $1.1 \times 10^{-7}\ kg$

42. The mass of product liberated on anode in an electrochemical cell depends on (where t is the time period for which the current is passed).

AIEEE 2002

(a) $(It)^{1/2}$ (b) It (c) I/t (d) I^2t

43. If θ_i is the inversion temperature, θ_n is the neutral temperature, θ_c is the temperature of the cold junction, then

AIEEE 2002

(a) $\theta_i + \theta_c = \theta_n$ (b) $\theta_i - \theta_c = 2\theta_n$
(c) $\frac{\theta_i + \theta_c}{2} = \theta_n$ (d) $\theta_c - \theta_i = 2\theta_n$

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ANSWER KEY

Shaded by level: **Easy**

08 Electrical Power & Heating Effect

1. (d)	2. (b)	3. (a)	4. (b)	5. (b)	6. (c)	7. (c)	8. (b)	9. (b)	10. (d)
11. (b)	12. 450	13. 4	14. 3840	15. 2500	16. 300	17. (c)	18. (c)	19. (d)	20. (c)
21. (a)	22. (d)	23. (c)	24. (d)	25. (b)	26. (b)	27. (c)	28. (d)	29. (d)	30. (c)
31. (a)	32. (c)	33. (b)	34. (c)	35. (c)	36. (d)	37. (c)	38. (a)	39. (b)	40. (d)
41. (c)	42. (b)	43. (c)							

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