KCET

Ultimate KCET Crash Course 2026

PHYSICS

DPP: 2

CURRENT ELECTRICITY

Q1 Specific resistance of a metallic wire depends on its:

(A) mass

(B) length

(C) area of cross section

(D) nature of material

Q2 Two bulbs rated as $25\ \mathrm{W}, 220\ \mathrm{V}$ and $100\ \mathrm{W}, 220\ \mathrm{V}$ are connected in series with a emf source of $440\mathrm{Volt}$, which of the bulbs will fuse

(A) $100\ \mathrm{W}, 220\ \mathrm{V}$

(B) $25\ \mathrm{W}, 220\ \mathrm{V}$

(C) Neither

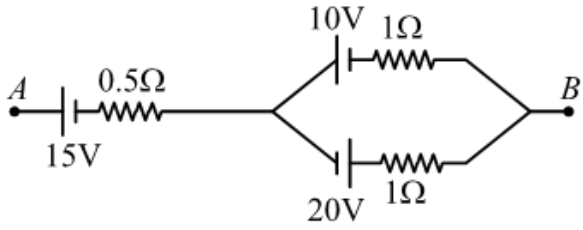
(D) Both

Q3 A cylindrical rod is reformed to half of its original length keeping volume constant. If its resistance before this change were R, then the resistance after reformation of rod will be

(A) R (B) $R/4$

(C) $3R/4$ (D) $R/2$

Q4 The equivalent emf between *A* and *B* in the given electric circuit is:



(A) 15 V (B) 10 V

(C) 25 V (D) 5 V

Q5 A current of 5 A passes through a copper conductor (resistivity $= 1.7 \times 10^{-8}\Omega - \mathrm{m}$) of radius of cross-section $\(5\)\ \mathrm{mm}$. Find the mobility of the charges, if their drift velocity is $1.1 \times 10^{-3}\ \mathrm{m/s}$

(A) $1.5\ \mathrm{m^2/V-s}$

(B) $1.0\ \mathrm{m^2/V-s}$

(C) $1.3\ \mathrm{m^2/V-s}$

(D) $1.8\ \mathrm{m^2/V-s}$

Q6 Electrical current is passing through a solid conductor *PQ* from *P* to *Q*. The electric current densities at *P* and *Q* are in the ratio:

(A) 1 : 2 (B) 2 : 1

(C) 1 : 4 (D) 4 : 1

Q7 A 25 watt, 220 volt bulb and a 100 watt, 220 volt bulb are connected in parallel across a 220 volt line. Which bulb will glow more brightly

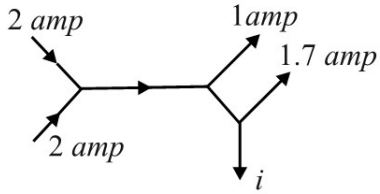
(A) 25 watt bulb

(B) 100 watt bulb

(C) Both will have same brightness

(D) First 25 watt then 100 watt

Q8 The figure below shows current in a part of electric circuit. The current *i* is:



(A) 1.7 amp (B) 3.7 amp

(C) 1.3 amp (D) 1 amp

Q9 The power dissipated in the circuit shown in the figure is 30 watts. The value of *R* is:

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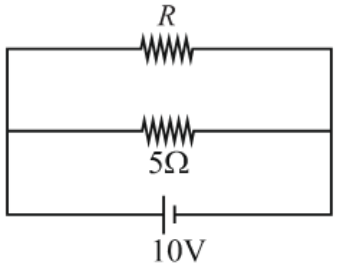
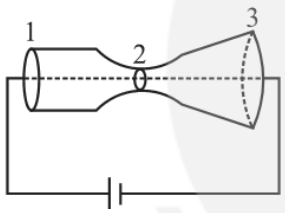


(A) 10 Ω (B) 30 Ω
(C) 20 Ω (D) 15 Ω

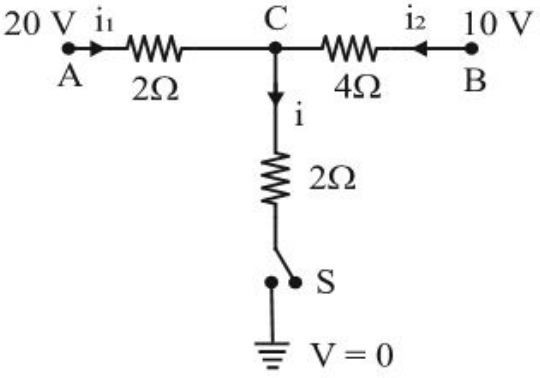
Q10 When two identical cells are connected either in series or in parallel across 2ohm resistor they send the same current through it. The internal resistance of each cell is
(A) 2ohm
(B) 1.2ohm
(C) 12ohm
(D) 21ohm

Q11 For given conductor the drift speed of electrons at cross section (1), (2) and (3) are v_1, v_2 and v_3, then;



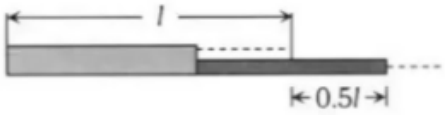
(A) $v_1 = v_2 = v_3$
(B) $v_1 < v_2 < v_3$
(C) $v_2 > v_1 > v_3$
(D) $v_2 > v_3 > v_1$

Q12 When the switch S in the circuit shown is closed, then the value of current i will be



(A) 4A (B) 3A
(C) 2A (D) 5A

Q13 In crder to quadruple the resistance of a uniform wire, a part of its length was uniformly stretched till the final length of the entire wire was 1.5 times the original length, the part of the wire was fraction equal to

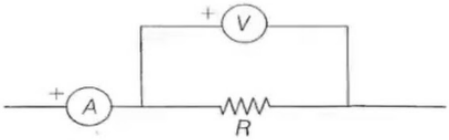


(A) $1/8$ (B) $1/6$
(C) $1/10$ (D) $1/4$

Q14 The resistance of a wire is 20ohm. It is so stretched that the length becomes three times, then the new resistance of the wire will be
(A) 6.67ohm
(B) 60.0ohm
(C) 120ohm
(D) 180.0ohm

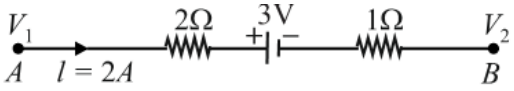
Q15 When current flows through a conductor, then the order of drift velocity of electrons will be
(A) $10^{10}\ \text{m/sec}$
(B) $10^{-2}\ \text{cm/sec}$
(C) $10^{4}\ \text{cm/sec}$
(D) $10^{-1}\ \text{cm/sec}$

Q16 An ammeter A, a voltmeter V and a resistance R are connected as shown in the figure. If the voltmeter reading is $1.6\ \text{V}$ and the ammeter reading is $0.4\ \text{A}$, then R is



(A) Equal to 4Ω
(B) Greater than 4Ω
(C) Less than 4Ω
(D) Between 3Ω and 4Ω

Q17 The potential difference ($V_A - V_B$) between the points A and B in the figure is:



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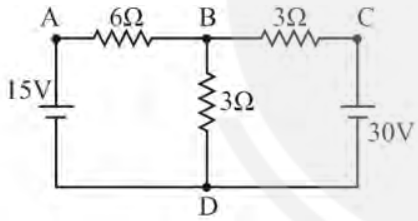
(A) –5V (B) +3V
(C) +6V (D) +9V

Q18 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) 4*v*
(B) 8*v*
(C) *v*
(D) 2*v*

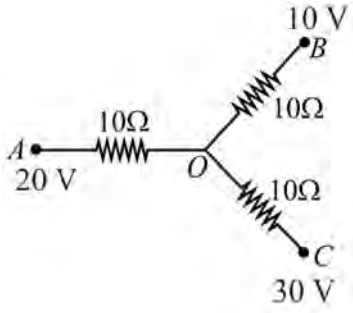
Q19 In a wire of circular cross-section with radius r, free electrons travel with a drift velocity V when a current I flows through the wire. What is the current in another wire of half the radius and of the same material when the drift velocity is $2\ \mathrm{V}$
(A) $2I$ (B) I
(C) $I/2$ (D) $I/4$

Q20 In the circuit shown in figure, find the current through the branch *BD*.



(A) 5 A (B) 0 A
(C) 3 A (D) 4 A

Q21 Current through the branch *AO* is: Prasd

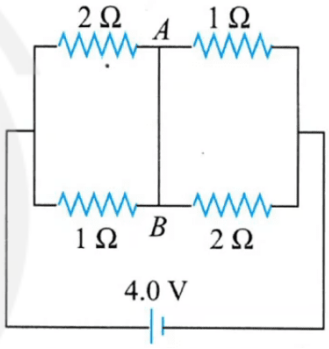


(A) 2 A
(B) 4 A
(C) 1 A
(D) Zero

Q22 Two bulbs one of 200 volts, 60 watts & the other of 200 volts, 100 watts are connected in series to a 200 volt supply. The power consumed will be
(A) 37.5 watt
(B) 160 watt
(C) 62.5 watt
(D) 110 watt

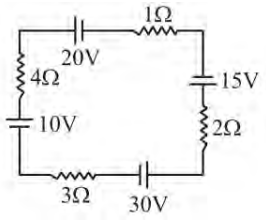
Q23 The internal resistance of a cell of e.m.f. $2\ \mathrm{V}$ is 0.1Ω. It is connected to a resistance of 3.9Ω. The voltage across the cell will be
(A) 1.95 V (B) 1.9 V
(C) 0.5 V (D) 2 V

Q24 In figure, points A and B are connected by a perfectly conducting wire. Calculate the current through AB



(A) $2\ \mathrm{A}$
(B) $1\ \mathrm{A}$
(C) $1.5\ \mathrm{A}$
(D) 2.5 A

Q25 Find current in the circuit.



(A) 2.0 A (B) 2.5 A
(C) 3.0 A (D) 4.0 A

Q26 A piece of wire is cut into four equal parts and the pieces are bundled together side by side to form a thicker wire. Compared with that of the original wire, the resistance of the bundle is:

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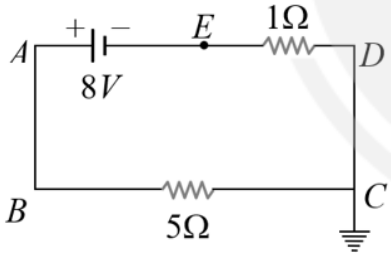
(A) The same
(B) $\frac{1}{16}$ as much
(C) $\frac{1}{8}$ as much
(D) $\frac{1}{4}$ as much

Q27 A current of 10 *A* exists in a wire of cross-sectional area of 5 mm^2 with a drift velocity of 2 × $10^{-3} ms^{-1}$. The number of free electrons in each cubic meter of the wire is
(A) 2×10^{25}
(B) 1×10^{23}
(C) 625×10^{25}
(D) 2×10^{6}

Q28 A coil of wire has a resistance of $25.00\ \Omega$ at $20^{\circ}\mathrm{C}$ and a resistance of resistance of $25.17\ \Omega$ at $35^{\circ}\mathrm{C}$. What is its temperature coefficient of resistance?
(A) $4.5 \times 10^{-4\circ}\mathrm{C}^{-1}$
(B) $5 \times 10^{-4\circ}\mathrm{C}^{-1}$
(C) $0.5 \times 10^{-4\circ}\mathrm{C}^{-1}$
(D) $4.0 \times 10^{-4\circ}\mathrm{C}^{-1}$.

Q29 In the given circuit, the potential of the point *E* is:



(A) Zero
(B) –8 *V*
(C) –4/3 *V*
(D) 4/3 *V*

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Answer Key

Q1 (D)
Q2 (B)
Q3 (B)
Q4 (D)
Q5 (B)
Q6 (C)
Q7 (B)
Q8 (C)
Q9 (A)
Q10 (A)
Q11 (C)
Q12 (D)
Q13 (A)
Q14 (D)
Q15 (B)
Q16 (B)
Q17 (D)
Q18 (B)
Q19 (C)
Q20 (A)
Q21 (D)
Q22 (A)
Q23 (A)
Q24 (B)
Q25 (B)
Q26 (B)
Q27 (C)
Q28 (A)
Q29 (C)

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Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Specific resistance depends only on the material of the wire.

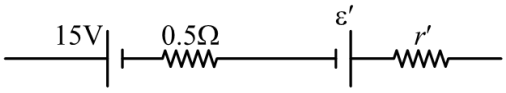
Video Solution:

Q2 Video Solution:

Q3 Video Solution:

Q4 Text Solution:

Equivalent emf.



$\varepsilon' = \frac{\frac{20}{1} - \frac{10}{1}}{\frac{1}{1} + \frac{1}{1}} = 5\text{V}$

$r' = \frac{1}{2} = 0.5\,\Omega$

$\varepsilon_{net} = 15 - 5 = 10V$

Video Solution:

Q5 Video Solution:

Q6 Text Solution:

Current density $J = I/A$.

$$A_P = \pi(2R)^2 = 4\pi R^2,$$
$$A_Q = \pi(R)^2 = \pi R^2.$$

$$J_P = \frac{I}{4\pi R^2}, \quad J_Q = \frac{I}{\pi R^2} = 4J_P.$$

Hence

$$J_P : J_Q = 1 : 4.$$

Video Solution:

Q7 Text Solution:

For parallel combination $P_{\text{Consumed}} \propto$ Brightness $\propto P_{\text{Rated}}$

Video Solution:

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Q8 **Text Solution:**

(3)

By KCL

$\Sigma I = 0$

$2 + 2 - 1 - 1.7 - i = 0$

$i = 1.3\ A$

Video Solution:

Q9 **Text Solution:**

(A)

$P_{\text{Total}} = \frac{V^2}{\text{R}_{\text{eq}}} So\ \text{R}_{\text{eq}} = \frac{V^2}{P_{\text{Total}}} = \frac{10\times10}{30} = \frac{10}{3}$

As $\text{R}_{\text{eq}} = \frac{R_1 R_2}{R_1+R_2} \Rightarrow \frac{10}{3} = \frac{5R}{5+R} \Rightarrow R = 10\ \Omega$

Video Solution:

Q10 **Video Solution:**

Q11 **Text Solution:**

$v_d \propto \frac{1}{A}$ for $i =$ constant

Video Solution:

Q12 **Text Solution:**

5A

Video Solution:

Q13 **Video Solution:**

Q14 **Video Solution:**

Q15 **Text Solution:**

$10^{-2}\ \text{cm/sec}$

Video Solution:

Q16 **Video Solution:**

Q17 Text Solution:

(D)

$$V_A - 2 \times 2 - 3 - 2 = V_B$$

$$\boxed{V_A - V_B = 9\text{V}}$$

Video Solution:

Q18 Text Solution:

$$I = neAV_d$$

$$V_d = \frac{I}{neA} = \frac{I}{ne\pi\frac{d^2}{4}}$$

$$V_d = \frac{4I}{\pi d^2 ne}$$

$$V_d \propto \frac{I}{d^2}$$

$$\frac{V'_d}{V_d} = \frac{I'}{I} \times \left(\frac{d}{d'}\right)^2 = \frac{200}{100} \times \left(\frac{d}{d/2}\right)^2$$

$$V'_d = 8V_d$$

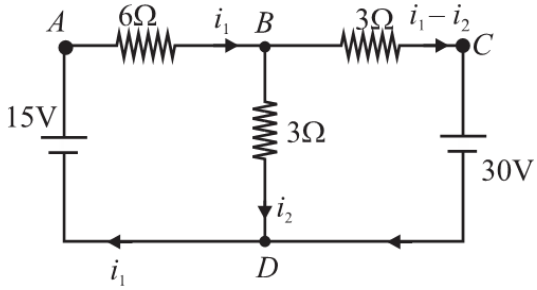
Video Solution:

Q19 Video Solution:

Q20 Text Solution:

(1)

The current in the circuit are assumed as shown in the figure.



Applying KVL along the loop *ABDA*, we get

$-6i_1 - 3\,i_2 + 15 = 0$ or $2i_1 + i_2 = 5$ ...(i)

Applying KVL along the loop *BCDB*, we get

$-3(i_1 - i_2) - 30 + 3i_2 = 0$ or $-i_1 + 2i_2 = 10$ ...(ii)

Solving equation (i) and (ii) for i_2, we get $i_2 = 5$ *A*

Video Solution:

Q21 Text Solution:

$V_0 = 20$

$$I = \frac{0}{10} = 0$$

Video Solution:

Q22 Video Solution:

Q23 Video Solution:

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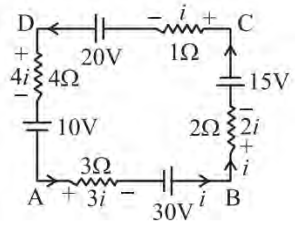
Q24 **Video Solution:**

Q25 **Text Solution:**

(2)



All the elements are connected in series current in all of them will be same.

Let current = i

Applying kirchhoff voltage law in ABCDA loop

$10 + 4i - 20 + i + 15 + 2i - 30 + 3i = 0$

$10i = 25$

$i = 2.5$ A

Video Solution:

Q26 **Video Solution:**

Q27 **Text Solution:**

$\because \quad V_d = \frac{I}{Ane}$

$n = \frac{I}{AeV_d}$

$= \frac{10}{5\times10^{-6}\times1.6\times10^{-19}\times2\times10^{-3}} = 625 \times 10^{25}$

Video Solution:

Q28 **Video Solution:**

Q29 **Text Solution:**

(C)

The current in the circuit = $\frac{8}{5+1} = \frac{4}{3}$

Now $V_C - V_E = \frac{4}{3} \times 1 \Rightarrow V_E = -\frac{4}{3}V$

Video Solution: