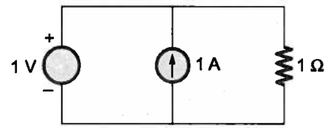
1 Basics

Multiple Choice Questions

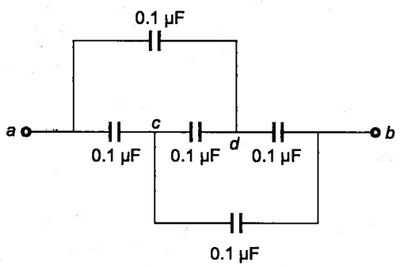
Q.1 What will be the power by the voltage source, current source and resistance respectively?



(a) 1 W, 1 W, 2 W (b) 0 W, 1 W, 1 W
(c) 1 W, 0 W, 1 W (d) 0 W, 0 W, 0 W

[ESE-1991]

Q.2 The equivalent capacitance across ab will be :

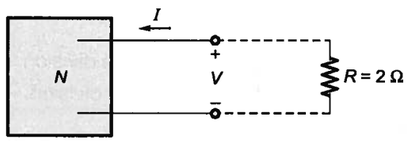


(a) 0.2 μF (b) 0.1 μF
(c) 0.5 μF (d) 0 [ESE-1992]

Q.3 The number of 2 μF, 400 V capacitors needed to obtain a capacitance value of 1.5 μF rated for 1600 V is
(a) 12 (b) 8
(c) 6 (d) 4

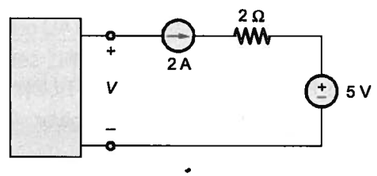
[ESE-1994]

Q.4 The *V-I* relation for the network shown in the given box is : $V = 4I - 9$. If now a resistor $R = 2\ \Omega$ is connected across it, then the value of I will be



(a) –4.5 A (b) –1.5 A
(c) 1.5 A (d) 4.5 A [ESE-1995]

Q.5 The voltage *V* in figure is always equal to



(a) 9 V (b) 5 V
(c) 1 V (d) None of the above

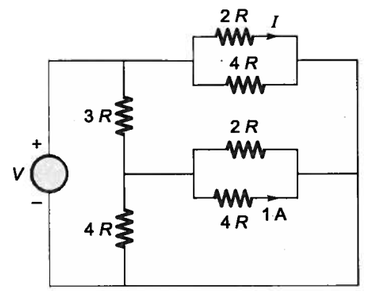
[GATE-1997]

Q.6 When a resistor *R* is connected to a current source, it consumes a power of 18 W. When the same *R* is connected to a voltage source having the same magnitude as the current source, the power absorbed by is 4.5 W. The magnitude of the current source and the value of R are

(a) $\sqrt{18}$ A and 1Ω (b) 3 A and 2 Ω
(c) 1 A and 18 Ω (d) 6 A and 0.5 Ω

[GATE 1999]

Q.7 For the circuit shown in the figure, the current '*I*' is

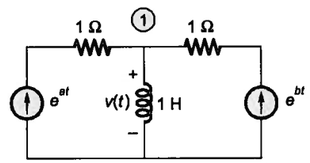


(a) indeterminable due to inadequate data
(b) zero
(c) 4 A
(d) 8 A

[ESE-1999]

Q.8 A network contains only independent current sources and resistors. If the values of all resistors are doubled, the values of the node voltages
(a) will become half
(b) will remain unchanged
(c) will become double
(d) cannot be determined unless the circuit configuration and the values of the resistors are known [ESE-2000]

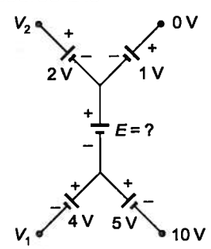
Q.9 In the circuit of the figure, the voltage $v(t)$ is



(a) $e^{at} - e^{bt}$ (b) $e^{at} + e^{bt}$
(c) $ae^{at} - be^{bt}$ (d) $ae^{at} + be^{bt}$

[GATE-2000]

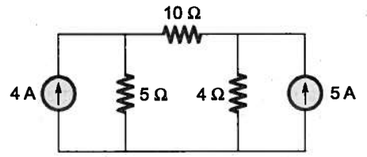
Q10 In the circuit of the figure, the value of the voltage source *E* is



(a) –16 V (b) 4 V
(c) –6 V (d) 16 V

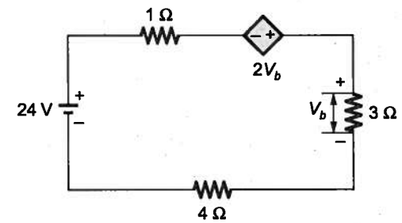
[GATE-2000]

Q.11 In the circuit shown in the given figure, power dissipated in the 5 Ω resistor is



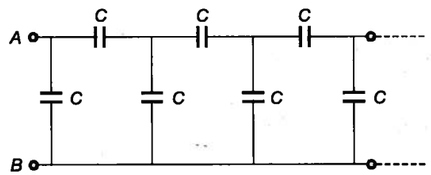
(a) zero (b) 80 W
(c) 125 W (d) 405 W [ESE-2001]

Q.12 The current in the given circuit with a dependent voltage source is



(a) 10 A (b) 12 A
(c) 14 A (d) 16 A [ESE-2001]

Q.13 The effective capacitance across AB of the infinite ladder shown in the below figure is



(a) $(1+\sqrt{3})C$ (b) $(1+\sqrt{7})C$
(c) $(1+\sqrt{5})C$ (d) $\frac{(1+\sqrt{5})}{2}C$

[ESE-2012]

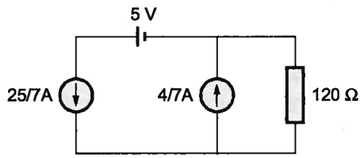
Q.14 If each branch of a Delta circuit has impedance $\sqrt{3}z$, then each branch of the equivalent Wye circuit has impedance.

(a) $\frac{Z}{\sqrt{3}}$ (b) $3Z$
(c) $3\sqrt{3}Z$ (d) $\frac{Z}{3}$ [GATE-2001]

Q.15 Two incandescent light bulbs of 40 W and 60 W rating are connected in series across the mains. Then
(a) the bulbs together consume 100 W
(b) the bulbs together consume 50 W
(c) the 60 W bulb glows brighter
(d) the 40 bulb glows brighter

[GATE 2001]

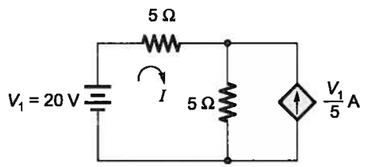
Q.16 The current through 120 ohm resistor in the circuit shown in the figure is



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

[ESE-2002]

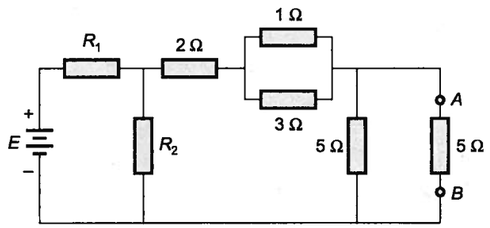
Q.17 The dependent current source shown in the figure



(a) delivers 80 W (b) absorbs 80 W
(c) delivers 40 W (d) absorbs 40 W

[GATE-2002]

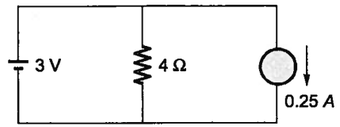
Q.18 In the circuit shown above, the voltage across 2 Ω resistor is 20 V. The 5 Ω resistor connected between the terminals A and B can be replaced by an ideal



(a) Voltage source of 25 V with + terminal upward
(b) Voltage source of 25 V with + terminal downward
(c) Current source of 2 A upward
(d) Current source of 2 A downward

[ESE-2003]

Q.19 The current flowing through the voltage source in the below circuit is



(a) 1.0A (b) 0.75A
(c) 0.5A (d) 0.25A **[ESE-2003]**

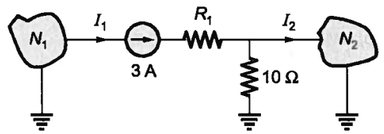
Q.20 Twelve 1 Ω resistance are used as edges to form a cube. The resistance between two diagonally opposite corners of the cube is

(a) $\frac{5}{6}\Omega$ (b) 1 Ω

(c) $\frac{6}{5}\Omega$ (d) $\frac{3}{2}\Omega$

[GATE-2003]

Q.21 Consider the following circuit:



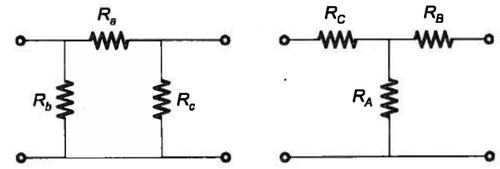
In the above circuit, the current I_2 is 2 A when the value of R_1 is 20 Ω. What will be the value of I_2, when R_1 is changed to 10 Ω?
(a) 1 A (b) 2 A
(c) 3 A (d) 4 A

[ESE-2004]

Q.22 Which one of the following statements is correct?
In a four-branch parallel circuit, 50 mA current flows in the each branch. If one of the branches opens, the current in the other branches
(a) increase (b) decrease
(c) are unaffected (d) double

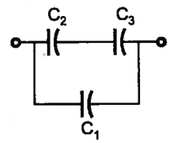
[ESE-2004]

Q.23 Consider a delta connection of resistors and its equivalent star connection as shown below. If all elements of the delta connection are scaled by a factor k, $k > 0$, the elements of the corresponding star equivalent will be scaled by a factor of



(a) k^2 (b) k
(c) $1/k$ (d) $\sqrt{k}$ **[GATE-2013]**

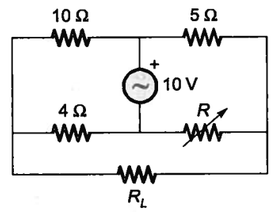
Q.24 Three capacitors C_1, C_2 and C_3 whose values are 10 μF, 5 μF, and 2 μF respectively, have breakdown voltages of 10 V, 5 V and 2 V respectively. For the interconnection shown below, the maximum safe voltage in volts that can be applied across the combination, and the corresponding total charge in μC stored in the effective capacitance across the terminals are, respectively



(a) 2.8 and 36 (b) 7 and 119
(c) 2.8 and 32 (d) 7 and 80

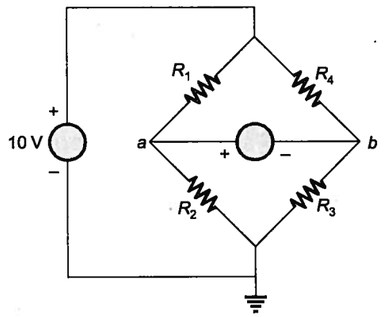
[GATE-2013]

Q.25 For the circuit shown below, the value of R is adjusted, so as to make the current in R_L equal to zero. What is the value of R?



(a) 1 Ω (b) 2 Ω
(c) 3 Ω (d) 4 Ω **[ESE-2005]**

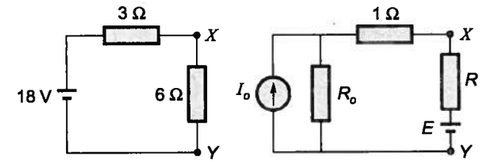
Q.26 If $R_1 = R_2 = R_4 = R$ and $R_3 = 1.1\,R$ in the bridge circuit shown in the figure, then the reading in the ideal voltmeter connected between a and b is



(a) 0.238 V (b) 0.138 V
(c) – 0.238 V (d) 1 V

[GATE-2005]

Q.27 If the two circuits shown below are equivalent, then which of the following is/are correct?

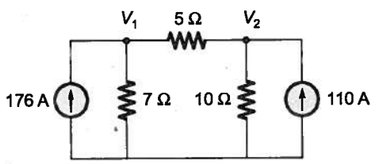


1. $E = 2$ V, $R = 5\,\Omega$ 2. $E = 4$ V, $R = 4\,\Omega$
3. $E = 6$ V, $R = 3\,\Omega$ 4. $E = 10$ V, $R = 1\,\Omega$

Select the correct using the code given below:
(a) Only 1 and 2 (b) Only 3
(c) 1, 2, 3 and 4 (d) None

[ESE-2006]

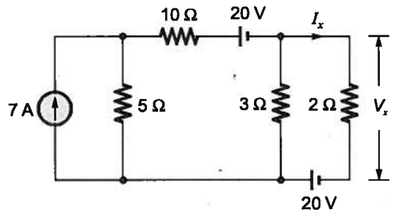
Q.28 In the circuit shown below, what is the voltage across 5 Ω resistor ($V_1 - V_2$)?



(a) –30 V (b) 30 V
(c) 1250 V (d) –1250 V

[ESE-2006]

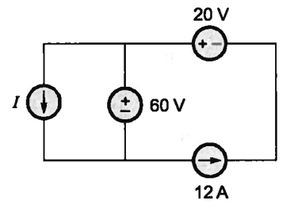
Q.29 The currents I_x and V_x in the below circuit are respectively



(a) 5 A; 10 V (b) 10 A; 20 V
(c) 6 A; 12 V (d) 4 A; 8 V

[ESE-2009]

Q.30 In the interconnection of ideal sources shown in the figure, it is known that the 60 V source is absorbing power.



Which of the following can be the value of the current source I?

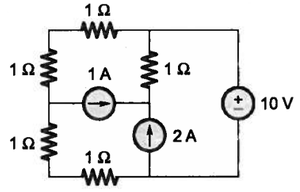
(a) 10 A (b) 13 A
(c) 15 A (d) 18 A

[GATE-2009]

Q.31 How many 200 W/220 V incandescent lamps connected in series would consume the same total power as a single 100 W/220 V incandescent lamp?

(a) not possible (b) 4
(c) 3 (d) 2 [GATE-2009]

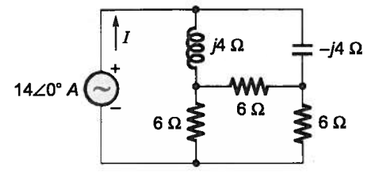
Q.32 In the circuit shown, the power supplied by the voltage source is



(a) 0 W (b) 5 W
(c) 10 W (d) 100 W

[GATE-2010]

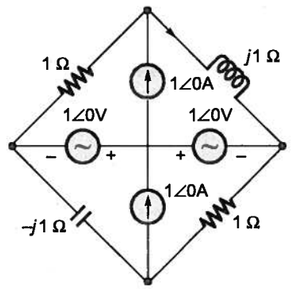
Q.33 In the circuit shown below, the current I is equal to



(a) 1.4∠0° A (b) 2.0∠0° A
(c) 2.8∠0° A (d) 3.2∠0° A

[GATE-2011]

Q.34 In the circuit shown below, the current through the inductor is



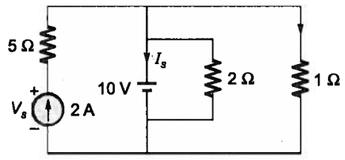
(a) $\frac{2}{1+j}$ A (b) $\frac{-1}{1+j}$ A

(c) $\frac{1}{1+j}$ A (d) 0 A

[GATE 2012]

Common Data for Questions (35 and 36):

Consider the following figure:



Q.35 The current I_s in Amps in the voltage source, and voltage V_s in volts across the current source respectively, are

(a) 13, –20 (b) 8, –10
(c) –8, 20 (d) –13, 20

[GATE-2013]

Q.36 The current in the 1 Ω resistor in Amps is

(a) 2 (b) 3.33
(c) 10 (d) 12

[GATE-2013]

Q.37 A capacitor of 100 μF stores 10 mJ of energy. What is the amount of charge (in Coulomb) stored in it?

(a) 1.414×10^{-6} (b) 1.414×10^{-3}
(c) 2.303×10^{-6} (d) 2.303×10^{-3}

[ESE-2014]

Q.38 A network N consists of resistors, dependent and independent voltage and current sources. If the current in one particular resistance is I A, it will be doubled if the values of all the

(a) independent voltage sources are doubled
(b) independent current sources are doubled
(c) dependent and independent voltage and current sources are doubled
(d) independent voltage and current sources are doubled

[ESE-2014]

Q.39 Consider the following statements:
Any element is redundant if connected in

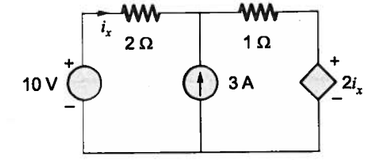
1. series with an ideal current source
2. parallel with an ideal current source
3. series with an ideal voltage source
4. parallel with an ideal voltage source

Which of the above statements are correct?

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

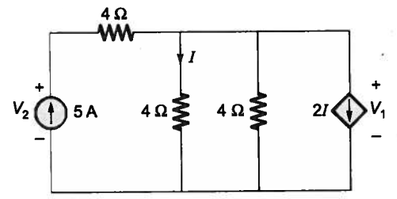
[ESE-2014]

Q.40 In the circuit the value of i_x is



(a) 2 A (b) –0.6 A
(c) 2.6 A (d) 1.4 A [ESE-2015]

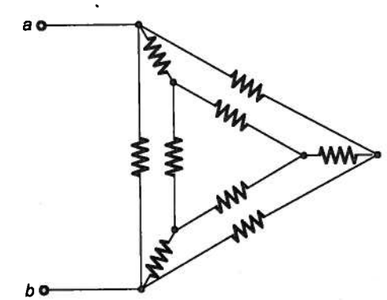
Q.41 In the given circuit, the values of V_1 and V_2 respectively are



(a) 5 V, 25 V (b) 10 V, 30 V
(c) 15 V, 35 V (d) 0 V, 20 V

[GATE-2015]

Q.42 In the given circuit, each resistor has a value equal to 1 Ω.



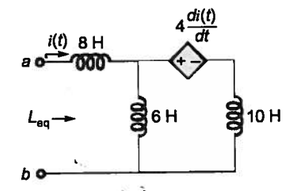
What is the equivalent resistance across the terminals a and b?

(a) 1/6 Ω (b) 1/3 Ω
(c) 9/20 Ω (d) 8/15 Ω

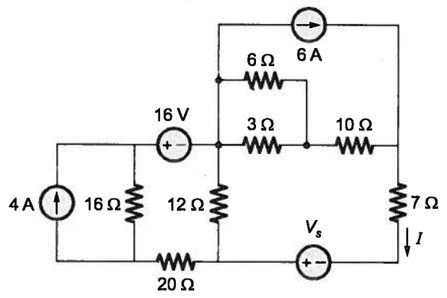
[GATE-2016]

Numerical Data Type Questions

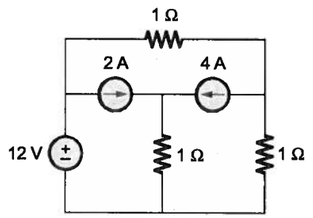
Q.43 The equivalent inductance L_{eq} at terminals a-b in the network shown below is _____ H.



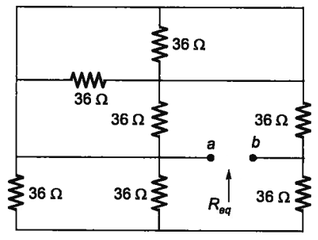
Q.44 If $I = 5$ A in the circuit below, then what is the value of voltage source V_s (in volts)?



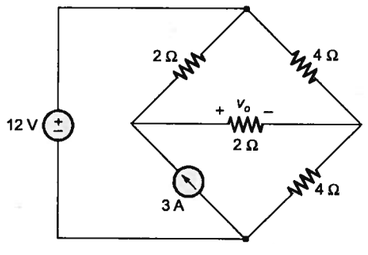
Q.45 The power delivered by 12 V source in the given network is _____ watts.



Q.46 In the following network equivalent resistance seen at terminal a-b is _____ Ω.



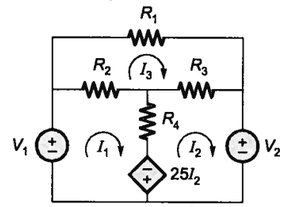
Q.47 Consider the given bridge network. The voltage V_0 is equal to _____ Volts.



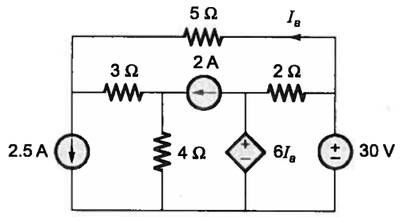
Q.48 The mesh equation for the following circuit are

$$\begin{bmatrix} 20 & -40 & -5 \\ -15 & 65 & -25 \\ -5 & -25 & 35 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} V_1 \\ -V_2 \\ 0 \end{bmatrix}$$

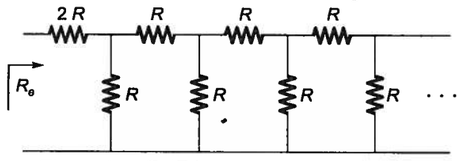
The value of R_4 is _____ Ω.



Q.49 The power being dissipated in the 2 Ω resistor in the following circuit is _____ watts.



Q.50 The equivalent resistance in the infinite ladder network shown in the figure, is R_e.

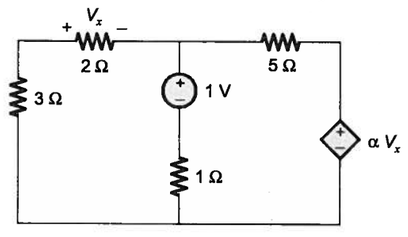


The value R_e/R is _____.

[GATE-2014]

Try Yourself

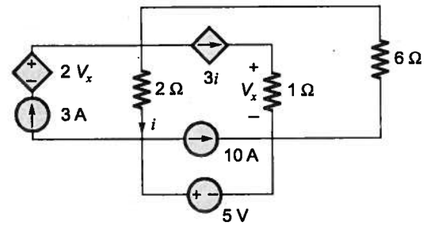
T1. In the following circuit voltage V_x is given by



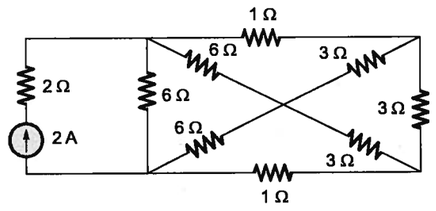
(a) $\frac{4}{35-2\alpha}$ (b) $\frac{10}{35-2\alpha}$

(c) $\frac{10}{25-2\alpha}$ (d) $\frac{4}{25+2\alpha}$

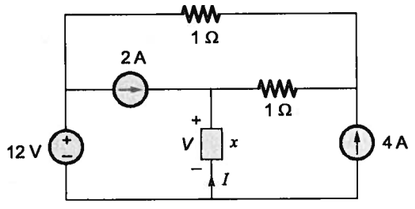
T2. Find the value of i



T3. Find the power delivered by current source



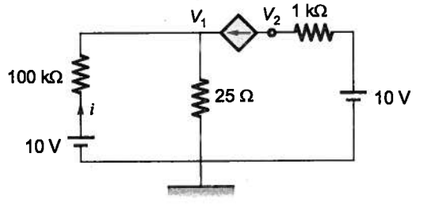
T4. The V-I relation of the unknown element 'x' in the given network is $V = AI + B$. The value of A (ohms) and B (in volts) respectively are



(a) 2, 8 (b) 2, 20

(c) $\frac{1}{2}$, 4 (d) $\frac{1}{2}$, 16

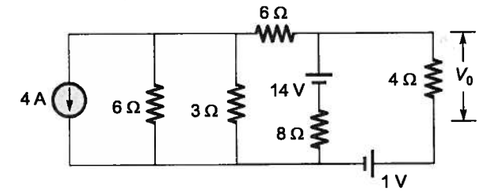
T5. Find 'V_2' in the circuit shown



(a) 0.125 (b) 22

(c) 5.16 (d) 3.25

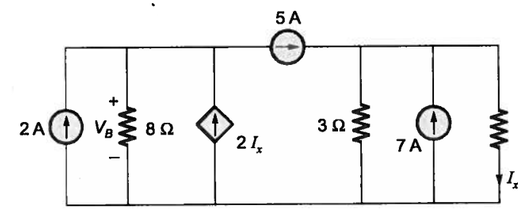
T6. Find 'V_0' of the circuit shown



(a) 1 V (b) 2 V

(c) 3 V (d) 4 V

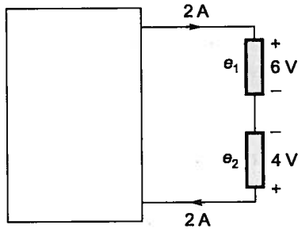
T7. In the circuit shown. Find I_x and V_B



(a) 3 A, 24 V (b) 3 A, 15 V

(c) 4 A, 18 V (d) 6 A, 10 V

T8. In the circuit of figure, voltage and current of elements e_1 and e_2 have been measured and indicated. Powers absorbed by elements e_1 and e_2 are respectively.



(a) 12 W, 8 W (b) −12 W, −8 W

(c) −12 W, 8 W (d) 12 W, −8 W