**STUDY READING**

**VARIANT II**

**Задание 1. Убедитесь, что Вы правильно произносите следующие слова. Проверьте себя по словарю.**

Capacitance; capacitor; circuit; to dissipate; medium; unidirectional; dielectric; various; value; voltage; area; inductance; approximately; source; high; waxed; convenient; determine; conductor; pulses; characteristic; microfarad.

**Задание 2. Переведите следующие интернациональные слова и словосочетания.**

Accumulate; electric; factor; conductor; temperature; active/ passive; physical characteristics; electronic component; resistor; practical; terminal; constant; material; energy; mechanism; symbol; voltage; indicator; instrument; phase; battery.

**Задание 3.\* Сгруппируйте слова согласно их частям речи и переведите их.**

а) - n / существительные, б) - v / глаголы,

в) - adj / прилагательные, г) - adv / наречия.

1. dissipate; 2. approximately; 3. property; 4. unidirectional; 5. internally; 6. lead; 7. oppose; 8. restrict; 9. conductive; 10. large; 11. practical; 12. accumulate; 13. produce; 14. high; 15. approximately; 16. greater.

1. **V 2 - adv 3 –n 4– adj 5– adv 6–v 7–v 8 – v 9-adj 10 – adj 11. Adj 12-v 13-v 14-adj 15 adv 16-n**

**Задание 4. Подготовьте чтение и перевод текста.**

**TEXT I**

|  |  |
| --- | --- |
| amount  capacitance  capacitor  inductance coil  conductor  medium  plate  property  unit  value  affect  store (syn. accumulate)  unidirectional  approximately  because of  buildup | величина, количество  емкость  конденсатор  катушка индуктивности  проводник  среда  обкладка (конденсатора)  свойство  единица (измерения)  величина  воздействовать, влиять  накапливать, аккумулировать  однонаправленный  приблизительно  из-за, вследствие  накопление |

**Passive Еlements of a Circuit (~ 4060)**

(1)Let's begin by looking1 at how the key passive elements found in most electronic circuits work.

(2)A *passive element* is considered to be an electrical component that does not generate power, but instead dissipates, stores, and/or releases it. (3)Passive elements include resistors, capacitors, and coils (also called2 inductors). (4)In most circuits, they are connected to active elements, typically semiconductor devices such as amplifiers and digital logic chips.

(5)A passive component of a circuit is an electronic component containing3 no source of power, in contrast to active components. (6)Resistance, capacitance and inductance are considered to be important properties of an electric circuit.

(7)The property of an electric conductor to dissipate4 energy is termed *resistance*. (8)Resistance is said to depend upon a number of factors: size and shape of a conductor and the material used. (9)The larger the length of wire, the greater its resistance. (10)The resistance of any given type of a conductor varies directly with its cross-sectional area. (11)Resistance is known also to be affected by the temperature of the conductor. (12)The unit of resistance is ohm.

(13)*A resistor* is a primary type of physical component that is used in electronic circuits. (14)Resistor is an electric device possessing resistance. (15)Every resistor has a certain amount of inductance and capacitance associated with it.

(16)It has two (interchangeable) leads. (17)The material placed5 internally between the two leads of a resistor opposes (restricts) the flow of current. (18)The amount of that opposition is called its resistance, which is measured in ohms (Ω). (19)Resistors are used to control6 the various currents in areas of a circuit and to voltage levels at different points therein by producing7 voltage drops. (20)When a voltage is applied across a resistor, current flows through it.

(21)Ohm's law for resistors is E = IR, where E is the voltage across the resistor, R is the resistance of the resistor, and I is the current flowing through the resistor. (22)That current is proportional to the applied8 voltage, and inversely proportional to the resistance. (23)Thus, as resistance goes up, the current through the element comes down, so that at high resistances the current is very small.

(24)Ohm's law makes it possible to calculate9 any one of three circuit values (current, voltage, or resistance) from the other two.

(25)*A capacitor* proved to be another primary type of physical component used in electronic circuits. (26)It has two leads and is used to store and release electric charge. (27)A capacitor's ability to store10 charge is referred to as its capacitance, measured in farads (F).

*(28)Capacitance* is always present because of the capacitance between terminals, between various parts of a resistor and terminals, and between parts of the resistor.

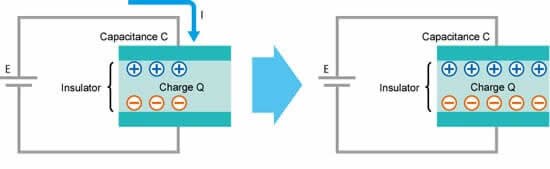
(29)The property of a conductor to accumulate electric charge is termed11 capacitance. (30)Devices possessing the “capacity” to store a charge are called capacitors. (31)The general form of a capacitor is that of two parallel conducting plates, containing12 between them a non-conducting medium called dielectric. (32)Common dielectrics are air, glass, oil and waxed paper.

(33)Capacitance is measured in farads, microfarads and picofarads. (34)A capacitance of one farad is very large and for practical purposes not used. (35)The microfarad is more convenient.

(36)A typical capacitor takes the form of two conductive plates separated by an insulator (dielectric). (37)This type of circuit elements cannot pass direct current (DC) because electrons cannot flow13 through the dielectric. (38)However, a capacitor does pass alternating current (AC) because an alternating voltage causes the capacitor to repeatedly charge and discharge, storing14 and releasing energy. (39)Indeed, one of the major uses of capacitors is to pass alternating current while blocking direct current.

(40)When a direct current flows into a capacitor, a positive charge rapidly builds up on the positive plate and a corresponding negative charge fills the negative plate (see Figure 1).

(41)The buildup continues until the capacitor is fully charged—i.e., when the plates have accumulated as much charge (Q) as they can hold15. (42)This amount is determined by the capacitance value (C) and the voltage applied across the component: (Q = CV). (43)At that point, current stops flowing (see Figure 2).



*Figure 1*: The capacitor is charging / Figure 2: The capacitor is charged (and stable)

(44)The *inductance* is known to be the property of an electric circuit that opposes a change in the value of the current. (45)Inductance depends on the physical characteristics of the conductor. (46)Inductance is measured in Henrys.

(47)*An inductance coil* is also considered to be an important component of a circuit. (48)Induction coil is a device using electromagnetic induction to produce a series of pulses of high potential and approximately unidirectional current.

**Задание 5.\* Определите часть речи и синтаксическую функцию подчеркнутых слов.**

**Задание 6.\*Укажите номера предложений с CS.**

**Я выделила по тексту желтым цветом**

**Задание 7.\* Письменно ответьте на вопросы.**

1. What is a passive component?(2)
2. What do passive elements comprise?(3)
3. What is resistance?(7)
4. What factors does resistance depend on?(8)
5. What device is called resistor?(13)
6. What is resistance affected by?(11)
7. What are resistors used for?(19)
8. What does Ohm's law permit to calculate?(24)
9. What is capacitance?(27)
10. What is a capacitor?(30)
11. What parts does a capacitor consist of?(31)
12. What are common dielectrics?(32)
13. What is the major usage of capacitors?(39)
14. What is inductance?(44)
15. What is an induction coil? (48)

**Задание 7.\*Сгруппируйте синонимы:**

**Даю пары синонимов их нужно перемешать**

1. Comprise - include

2. element - component

3. usually - typically

4. feature - property

5. several – a number of

6. main - primary

7. different – various

8. creating - producing

9.through – over

10. Used - applied

11. probable - possible

12. evaluate - calculate

13. isolated - separated

14. rapidly - quickly

15. transformation - change

16. nearly - approximately

**Задание 8.\* Сопоставьте термины (А) с их определениями (Б).**

|  |  |
| --- | --- |
| **А** | **Б** |
| 1. A passive element is … | 1. … the property of an electric conductor to dissipate energy. |
| 2. Resistor is … | 2. … the property of a conductor to accumulate electric charge. |
| 3. Resistance is… | 3. … proportional to the applied voltage, and inversely proportional to the resistance. |
| 4. Capacitance is… | 4…. an electrical component that does not generate power, but instead dissipates, stores, and/or releases it. |
| 5. The inductance is … | 5. |
|  | 6. … the property of an electric circuit that opposes a change in the value of the current. |
|  | 7. … an electric device possessing resistance. |

1-4; 2-7; 3-1; 4-2; 5- 6

**Задание 9.\* Закончите предложения.**

|  |  |
| --- | --- |
| 1. Passive elements include … | 1. … the flow of current. |
| 2. Passive elements are connected to … | 2. … electromagnetic induction to produce a series of pulses of high potential and approximately unidirectional current. |
| 3. Resistance depends upon … | 3. … the form of two conductive plates separated by an insulator. |
| 4. The resistance of any given type of a conductor varies directly … | 4. … manage voltage levels at different points therein by producing voltage drops. |
| 5. Resistance is also affected by … | 5. … resistors, capacitors, and inductors. |
| 6. The material placed internally between the two leads of a resistor restricts… | 6. … the physical characteristics of the conductor. |
| 7. Resistors are used to … | 7. … a number of factors: size and shape of a conductor and the material used. |
| 8. A typical capacitor takes … | 8. … the temperature of the conductor. |
| 9. Inductance depends on … | 9. … with its cross-sectional area. |
| 10. Inductance coil is a device using … | 10. … active elements such as amplifiers and digital logic chips. |

1-5; 2-10; 3-7; 4-9; 5-8; 6-1; 7- 4; 8-3; 9-6; 10-2

**AVERAGE READING**

**VARIANT I**

**Задание 1. Просмотрите текст и выберите к нему заглавие из предложенных Вам.**

a) Passive components.

b) Application of passive components.

c) **Specifications of** [**electronic components**](https://www.arrow.com/en/products).

**Задание 2. Определите главную идею статьи из предложенных Вам вариантов.**

a) The article deals with passive components statistics.

b) The article is about passive components applications.

c) The aim of the article is to provide the reader with some facts on the differences b**etween active and passive components**.

d) **The article is devoted to specifications, abilities and values of active and passive components in electrical circuits.**

**Задание 3. Просмотрите список вопросов. На какие вопросы Вы можете ответить, не читая текст? Просмотрите текст и ответьте на данные вопросы.**

1. What aspect distinguishes types of [electronic components](https://www.arrow.com/en/products)? (1)

2. What elementsregulate or vary electrical signals? (3)

3. What elements operate without an external power source? (5)

4. What do these components demand? (7)

5. Can passive components enlarge the electrical signal? (9)

6. Passive component consumes the power, doesn’t it? (10)

7. Can passive components modify the waveform of electrical energy? (11)

8. What components are Passive? (12)

9. Are all possible electrical components active ones? (13)

10. How many types of elements are needed to model any electrical component or circuit? (14)

11. What is each element is defined by? (15)

12. Which source produces a current in a conductor? (17)

13. What does current generator indicates? (22)

14. Does the time integral of voltage depend on the nature of the voltage source? (23)

15. How is the ability to restrict the flow of electric current called? (29)

16. How are capacitor conductors often called? (36)

17. Why are inductors used in electronic circuits?  (42)

**(~ 3 700)**

(1)One key factor that differentiates types of [electronic components](https://www.arrow.com/en/products) from each other is whether they are passive or active. (2)However, many people are unsure of exactly what that difference involves.

**(3)*Active components*** are parts of a circuit that rely on an external power source to control or modify electrical signals. (4)Active components such as transistors and silicon-controlled rectifiers (SCRs) use electricity to control electricity.

**(5)*Passive components*** like resistors, transformers, and [diodes](https://www.arrow.com/en/categories/diodes-transistors-and-thyristors) don’t need an external power source to function. (6)These components use some other property to control the electrical signal. (7)As a result, they only require the current traveling through the connected circuit. (8)Resistors impede the flow of electrons without introducing more electricity into the system.

(9)Passive components can’t process and can’t amplify the electrical signal. (10)Passive component don’t supply or control the power, it consumes the power. (11)Those elements can’t change the waveform of electrical energy, called Passive elements.

(12)Example – Resistor (R), Inductor (L), and Capacitor are Passive components. (13)All possible electrical components except R, L and C are active components.

(14)Only nine types of elements (memristor\* not included), five passive and four active, are required to model any electrical component or circuit. (15)Each element is defined by a relation between the state variables of the network: current, voltage, charge, and magnetic flux.

(16)There are two sources: current source and voltage source. (17)Current source, measured in amperes – produces a current in a conductor. (18)It affects charge according to the relation. (19)Voltage source, measured in volts – produces a potential difference between two points. (20)It affects magnetic flux\* according to the relation.

(21)This relationship does not necessarily represent anything physically meaningful. (22)In the case of the current generator, the time integral of current, represents the quantity of electric charge physically delivered by the generator. (23)Here is the time integral of voltage that represents a physical quantity and depends on the nature of the voltage source. (24)For a voltage generated by magnetic induction it is meaningful, but for an electrochemical source, or a voltage that is the output of another circuit, no physical meaning is attached to it. (25)Both these elements are necessarily non-linear elements.

(26)Three passive elements:

*Resistance*, measured in ohms – produces a voltage proportional to the current flowing through the element. (27)Relates voltage and current according to the relation.

(28)[Resistors](http://www.physics-and-radio-electronics.com/electronic-devices-and-circuits/passive-components/resistors/resistors.html)are the passive components used in the electrical circuits to reduce the flow of electric current to certain level. (29)The ability to restrict the flow of electric current is called resistance. (30)The resistors with high resistance value will restrict large amount of electric current whereas the resistors with low resistance value will restrict only a small amount of electric current.

(31)*Capacitance,* measured in farads – produces a current proportional to the rate of change of voltage across the element. (32)Relates charge and voltage according to the relation.

(33)A capacitor (formerly known as condenser) is a passive electronic component consisting of a pair of conductors separated by a dielectric (insulator). (34)When a potential difference (voltage) exists across the conductors, an electric field is present in the dielectric. (35)This field stores energy and produces a mechanical force between the conductors. (36)The effect is greatest when there is a narrow separation between large areas of conductor, hence capacitor conductors are often called plates.

(37)*Inductance*, measured in henries – produces the magnetic flux proportional to the rate of current change through the element. (38)Relates flux and current according to the relation.

(39)An inductor's ability to store magnetic energy is measured by its [inductance](http://www.newworldencyclopedia.org/entry/Inductance). (40)The inductance of a coil is directly proportional to the number of turns in the coil. (41)Inductance also varies with the coil's radius and the material (or "core") around which the coil is wound.

(42)Inductors are used in electronic circuits to reduce or oppose the change in electric current.  (43)In a DC circuit, an inductor looks like a wire. (44)It has no affect when the current is constant. (45)Inductance only has an effect when the current is changing as in an AC circuit.

\*memristor = memory resistor - мемристор, запоминающий резистор

\*flux - поток

**Задание 4. Укажите номера абзацев, куда могут быть включены данные ниже части текста.**

**Например, а) - № 5**

a) It is characterized by a single constant value. This is the ratio of the electric charge on each conductor to the potential difference between them. In practice, the dielectric between the plates passes a small amount of leakage current. Capacitors are widely used in electronic circuits to block the flow of direct current while allowing alternating current to pass, to filter out interference, to smooth the output of power supplies, and for many other purposes. They are used in resonant circuits in radio frequency equipment to select particular frequencies from a signal with many frequencies. (26)

b) The electronic devices we encounter all around us are driven and controlled by the flow of electrical current through electronic circuits. Each circuit is an arrangement of electrical elements designed to perform specific functions. Circuits can be engineered to carry out a wide variety of operations, from simple actions to complex tasks, according to the job(s) the system must perform. Let’s begin by looking at how the key passive elements found in most electronic circuits work.(1)

~ 923

**Задание 5. Сопоставьте термины (А) с их определениями (Б).**

|  |  |
| --- | --- |
| **А** | **Б** |
| 1. **Active components** are… | 1. … a current proportional to the rate of change of voltage across the element. |
| 2.Resistance produces… | 2. … the magnetic flux proportional to the rate of change of current through the element. |
| 3.Capacitance produces … | 3. …parts of a circuit that rely on an external power source to control or modify electrical signals. |
| 4. A capacitor is … | 4. … the current traveling through the connected circuit. |
| 5.Inductance produces … | 5. … the quantity of electric charge physically delivered by the generator. |
|  | 6. … a passive electronic component consisting of a pair of conductors separated by a dielectric. |
|  | 7. … a voltage proportional to the current flowing through the element. |

1-2; 2-7; 3-1; 4-6; 5-2;

**Задание 6.\* Закончите предложения.**

|  |  |
| --- | --- |
| 1. Active components such as transistors and silicon-controlled rectifiers use … | 1. … process and can’t amplify the electrical signal. |
| 2.**Passive components** like resistors, transformers, and [diodes](https://www.arrow.com/en/categories/diodes-transistors-and-thyristors) don’t …. | 2. … to model any electrical component or circuit. |
| 3. Resistors impede … | 3. … a potential difference between two points. |
| 4. Passive components can’t … | 4. … need an external power source to function. |
| 5. Only nine types of elements five passive and four active, are required … | 5. … the conductors, an electric field is present in the dielectric. |
| 6. Each element is defined by … | 6. … the flow of electrons without introducing more electricity into the system. |
| 7. Current source, measured in amperes produces … | 7. … large amount of electric current whereas the resistors with low resistance value will restrict only a small amount of electric current. |
| 8. Voltage source, measured in volts produces … | 8. … a current in a conductor. |
| 9. The resistors with high resistance value will restrict … | 9. … electricity to control electricity. |
| 10. When a potential difference (voltage) exists across … | 10. … a relation between the state variables of the network: current, voltage, charge, and magnetic flux. |

1-9; 2-4; 3-6; 4-1; 5-2; 6-10; 7-8; 8-3; 9-7; 10-5.