**МИНИСТЕРСТВО ОБРАЗОВАНИЯ ОРЕНБУРГСКОЙ ОБЛАСТИ**

**ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ПРОФЕССИОНАЛЬНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ**

**«МЕДНОГОРСКИЙ ИНДУСТРИАЛЬНЫЙ КОЛЛЕДЖ»**

**г.МЕДНОГОРСКА ОРЕНБУРГСКОЙ ОБЛАСТИ**

**(ГАПОУ МИК)**

**МЕТОДИЧЕСКИЕ УКАЗАНИЯ И КОНТРОЛЬНЫЕ ЗАДАНИЯ**

**ПО ВЫПОЛНЕНИЮ КОНТРОЛЬНОЙ РАБОТЫ**

**ДЛЯ ОБУЧАЮЩИХСЯ ЗАОЧНОЙ ФОРМЫ ОБУЧЕНИЯ**

**Дисциплина: ИНОСТРАННЫЙ ЯЗЫК В ПРОФЕССИОНАЛЬНОЙ ДЕЯТЕЛЬНОСТИ**

Для специальности СПО

**13.02.11 Техническая эксплуатация и обслуживание электрического и электромеханического оборудования ( по отраслям)**

2021

Методические указания составлены в соответствии с программой учебной дисциплины «Иностранный язык» на основе ФГОС СПО по специальности среднего **13.02.11** Техническая эксплуатация и обслуживание электрического и электромеханического оборудования (по отраслям)

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1. Введение

Цели и задачи дисциплины.

Обучение иностранному языку представлено в программе как основной элемент системы профессионального образования, а его назначение – завершить формирование основ владения иностранным языком, начатое в средней профессиональной школе, и заложить основы практического владения иностранным языком и ориентирована на достижение следующих целей:

дальнейшее развитие иноязычной коммуникативной компетенции (речевой, языковой, социокультурной, компенсаторной, учебно-познавательной):

*речевая компетенция* – совершенствование коммуникативных умений в четырех основных видах речевой деятельности (говорении, аудировании, чтении и письме); умений планировать свое речевое и неречевое поведение;

*языковая компетенция* – овладение новыми языковыми средствами в соответствии с отобранными темами и сферами общения: увеличение объема используемых лексических единиц; развитие навыков оперирования языковыми единицами в коммуникативных целях;

*социокультурная компетенция* – увеличение объема знаний о социокультурной специфике страны/стран изучаемого языка, совершенствование умений строить свое речевое и неречевое поведение адекватно этой специфике, формирование умений выделять общее и специфическое в культуре родной страны и страны изучаемого языка;

*компенсаторная компетенция* – дальнейшее развитие умений объясняться в условиях дефицита языковых средств при получении и передаче иноязычной информации;

*учебно-познавательная компетенция* – развитие общих и специальных учебных умений, позволяющих совершенствовать учебную деятельность по овладению иностранным языком, удовлетворять с его помощью познавательные интересы в других областях знания;

* + развитие и воспитание способности и готовности к самостоятельному и непрерывному изучению иностранного языка, дальнейшему самообразованию с его помощью, использованию иностранного языка в других областях знаний; способности к самооценке через наблюдение за собственной речью на родном и иностранном языках; личностному самоопределению в отношении будущей профессии; социальная адаптация; формирование качеств гражданина и патриота.

**Методические указания по выполнению контрольной работы**

Учебно-методическое пособие предназначено для студентов – заочников выпускных курсов.

Пособие включает темы, наиболее важные для практического овладения языком.

В пособие включены контрольные работы с 10 вариантами. Вариант определяется номером студента по списку. Если в группе 17 человек, а вариантов 10, то 11-тый по списку выбирает 1 вариант, 12-тый – 2 и т.д.

 Каждая контрольная работа содержит грамматические упражнения и работу с текстом.

 Прежде чем начать выполнять письменную работу, студент должен изучить теоретический материал, указанный преподавателем, а затем приступить к работе над контрольной работой.

Контрольная работа студента должна отвечать следующим требованиям:

Оформление контрольной работы:

Контрольная работа выполняется в ученической тетради (12 листов)или на формате А4 (печатный вариант)

. На тетрадь наклеивается титульный лист и адресный бланк (выдается к каждому контрольному заданию на заочном отделении).

В тетради должны быть оставлены поля для замечаний и рекомендаций рецензента;

Работа должна быть выполнена грамотно и аккуратно, четким, разборчивым подчерком. Не допускается сокращение слов, кроме общепринятых.

Перевод текста должен осуществляться параллельно, т.е. каждому английскому предложению должно соответствовать русское предложение.

Перевод слов, словосочетаний должен производиться следующим образом: записать на английском, через тире - русский перевод. Каждое слово или словосочетание записывать с новой строки, с маленькой буквы.

Ответы на вопросы оформляются следующим образом: записывается вопрос на английском языке, переводится, после этого записывается ответ на английском языке (перевод ответа не требуется).

Между каждым заданием оставляется три клетки.

Выполненная работа высылается в колледж на рецензию.

При получении отрецензированной работы студент должен выполнить все указания рецензента. Работа над ошибками, дополнения к ответам, согласно рецензии, выполняется в этой же тетради. Контрольная работа с оценкой «не зачтено» выполняется студентом повторно и высылается в колледж на проверку вместе с не зачтенной работой.

На рецензию не принимаются работы:

\_ выполненные по не правильно выбранному варианту;

\_ переписанные у других студентов;

\_ выполненные небрежно, неразборчивым подчерком.

В случае возникновения затруднений при выполнении контрольной работы студент может получить консультацию преподавателей в установленные сроки.

Студенты, не справившиеся с контрольной работой, не допускаются к зачету.

**КОНТРОЛЬНЫЕ РАБОТЫ ДЛЯ 3 КУРСОВ( на базе 9 и 11 классов)**

**ВАРИАНТ 1**

**I. Read the text**

**THE NATURE OF ELECTRICITY**

Practical electricity is produced by small atomic particles known as electrons. It is the movement of these particles which produce the effects of heat and light.

The pressure that forces these atomic particles to move, the effects they encounter opposition and how these forces are controlled are some of the principles of electricity.

Accepted atomic theory states that all matter is electrical in structure. Any object is largely composed of a combination of positive and negative particles of electricity. Electric current will pass through a wire, a body, or along a stream of water. It can be established in some substances more readily than in others, that all matter is composed of electric particles despite some basic differences in materials. The science of electricity then must begin with a study of the structure of matter. Matter is defined as any substance which has mass (or weight) and occupies space. This definition should be broad enough to cover all physical objects in the universe. Wood, water, iron, and paper are some examples of matter. Energy is closely related to, but not to be confused with, matter. Energy does not have mass, and it does not occupy space. Heat and light are examples of energy.

The smallest particle of matter which can be recognized as an original substance was thought to be a unit called the atom. Recently scientists have found particles even smaller than atoms, but our theories are still based on the atom. The atom consists of a nucleus and a cloud of electrons. It is generally agreed that the electrons are small particles of electricity, which are negative in nature. These particles orbit the nucleus in much the same fashion that planets orbit a sun.

**II. Guess the meaning of the following international words:**

Electricity, electron, effect, structure, combination, material, mass, energy, atom, orbit

**III. Give the English equivalents for the words below:**

1) производить; 2) частица; 3) тепло и свет; 4) напряжение; 5) сила; 6) вещество; 7) положительный; 8) отрицательный; 9) электрический ток; 10) вес; 11) ядро

**IV. Translate into Russian the words and expressions from the text:**

1) atomic particle; 2) effects of heat and light; 3) encounter opposition; 4) principles of electricity; 5) composed (of); 6) pass through a wire; 7) structure of matter; 8) occupy space; 9) physical objects; 10) a cloud of electrons; 11) in the same fashion.

**V. Complete the sentences using the text:**

1. Electricity is produced by …

2. The effects of heat and light are produced by …

3. According to the accepted atomic theory all matter is …

4. Any object is composed of …

5. Matter is defined as …

6. Energy must not be confused with …

7. The atom consists of …

8. The smallest particle of matter is …

9. Most theories are based on …

10. Electrons are …

**VI. Answer the questions:**

1) What are the principles of electricity? 2) What must the science of electricity begin with? 3) Are there any differences between energy and matter? What are they? 4) What is recognized as an original substance now?

**ВАРИАНТ 2**

**I. Read the text**

**ELECTRIC CURRENT**

The electric current is a quantity of electrons flowing in a circuit per second of time. The unit of measure for current is ampere. If one coulomb passes a point in a circuit per second then the current strength is 1 ampere. The symbol for current is I.

The current which flows along wires consists of moving electrons. The electrons move along the circuit because the e .m. f. drives them. The current is directly proportional to the e. m. f.

In addition to traveling through solids, however, the electric current can flow through liquids as well and even through gases. In both cases it produces some most important effects to meet industrial requirements. Some liquids, such as melted metals for example, conduct current without any change to themselves. Others, called electrolytes, are found to change greatly when the current passes through them.

When the electrons flow in one direction only, the current is known to be d. c., that is, direct current. The simplest source of power for the direct current is a battery, for a battery pushes the electrons in the same direction all the time (i.e., from the negatively charged terminal to the positively charged terminal).

The letters a. c. stand for alternating current. The current under consideration flows first in one direction and then in the opposite one. The a. c. used for power and lighting purposes is assumed to go through 50 cycles in one second.

One of the great advantages of a. c. is the ease with which power at low voltage can be changed into an almost similar amount of power at high voltage and vice versa. Hence, on the one hand alternating voltage is increased when it is necessary for long-distance transmission and, on the other hand, one can decrease it to meet industrial requirements as well as to operate various devices at home.

Although there are numerous cases when d. c. is required, at least 90 per cent of electrical energy to be generated at present is a. c. In fact, it finds wide application for lighting, heating, industrial, and some other purposes.

**II. Guess the meaning of the following international words:**

electric, ampere, symbol, proportional, industrial, metal, electrolyte, battery, generate.

**III. Give the English equivalents for the words and word combinations below:**

a. 1) течь, протекать; 2) цепь, схема; 3) единица измерения; 4) провод; 5) электродвижущая сила; 6) твердое тело; 7) жидкость; 8) проводить (ток); 9) источник энергии; 10) постоянный ток; 11) переменный ток; 12) напряжение.

**IV. Give Russian equivalents for the following:**

b. 1) to meet industrial requirements; 2) melted metals; 3) to push in the same direction; 4) negatively (positively) charged terminal; 5) power and lightning purposes; 6) long-distance transmission; 7) to operate devices; 8) to find wide application.

**V. Say whether these sentences are true or false:**

1. The symbol for current is I.

2. The electric current can flow only through liquids.

3. The current can be of two types: direct current and alternating current.

4. The alternating current flows in one direction.

5. A battery is the simplest source of power for the direct current.

6. Direct current finds wider application than alternating current.

7. Electrolytes don’t change greatly when current passes through them.

8. One of the great advantages of alternating current is the ease with which voltage can be changed.

**VI. Fill in the blanks, using the words from the box:**

*direct current, solids, conduct, electric current, liquids, voltage, alternating current*

* A quantity of moving electrons flowing in a circuit is the a) \_\_\_\_\_\_\_ .
* The current can flow through b) \_\_\_\_\_\_\_\_ and c) \_\_\_\_\_\_\_\_ .
* Some liquids d) \_\_\_\_\_\_\_ current without any change to themselves.
* When the electrons flow in one direction only, the current is known to be e) \_\_\_\_\_\_\_ .
* The current flowing first in one direction and then in the opposite one is f) \_\_\_\_\_\_\_ .
* Such advantage of alternating current as alternating g) \_\_\_\_\_\_\_ finds wide industrial and household application.

**VII. State the questions to the underlined words:**

1. *Melted metals* conduct current without any change to themselves.

2. Alternating voltage can be changed *to operate various devices at home.*

3. A battery pushes the *electrons* in the same direction.

4. *The alternating current* is used for power and lightning purposes.

5. Alternating current accounts for *90 per cent* of electrical energy generated now.

**ВАРИАНТ 3**

**I. Read the text**

**EFFECTS PRODUCED BY A CURRENT**

The current flow is detected and measured by any of the effects that it produces. There are three important effects accompanying the motion of electric charges: the heating, the magnetic, and chemical effects, the latter is manifested under special conditions.

The production of heat is perhaps the most familiar among the principal effects of an electric current. The heating effect of the current is found to occur in the electric circuit itself. It is detected owing to an increase in the temperature of the circuit. This effect represents a continual transformation of electric energy into heat. For instance, the current which flows through the filament of an incandescent lamp heats that filament to a high temperature.

The heat produced per second depends both upon the resistance of the conductor and upon the amount of current carried through it. The thinner the wire is, the greater the developed heat is. On the contrary, the larger the wire is, the more negligible the heat produced is. Heat is greatly desirable at times but at other times it represents a waste of useful energy. It is this waste that is generally called "heat loss" for it serves no useful purposes and decreases efficiency.

The heat developed in the electric circuit is of great practical importance for heating, lighting and other purposes. Owing to it people are provided with a large number of appliances, such as: electric lamps that light our homes, streets and factories, electrical heaters that are widely used to meet industrial requirements, and a hundred and one other necessary and irreplaceable things which have been serving mankind for so many years.

The electric current can manifest itself in some other way. It is the motion of the electric charges that produces the magnetic forces. A conductor of any kind carrying an electric current, a magnetic field is set up about that conductor.

This effect exists always whenever an electric current flows, although in many cases it is so weak that one neglects it in dealing with the circuit. An electric charge at rest does not manifest any magnetic effect. The use of such a machine as the electric motor has become possible owing to the electromagnetic effect.

The last effect to be considered is the chemical one. The chemical effect is known to occur when an electric current flows through a liquid. Thanks to it a metal can be transferred from one part of the liquid to another. It may also effect chemical changes in the part of the circuit comprising the liquid and the two electrodes which are found in this liquid. Any of the above mentioned effects may be used for detecting and measuring current.

**II. Give the English equivalents for the following words:**

1. выявлять, обнаруживать; 6. лампа накаливания;

2. измерять; 7. прибор;

3. заряд; 8. потеря энергии;

4. нить накала; 9. освещать;

5. тепловой эффект; 10. обнаруживаться, проявляться.

**III. Guess the meaning of the following international words:**

transformation, temperature, chemical, magnetic, special, practical, motor, electrode.

**IV. Insert words and expressions:**

1. The current flow is (выявляется и измеряется) by any of the effects that it produces.

2. There are three important effects accompanying the motion of (электрические заряды).

3. The current which flows through the (нить накала лампы накаливания) heats that filament to a high temperature.

4. Heat represents (потерю полезной энергии) at times.

5. Electric lamps (освещать) our homes, streets and factories.

6. The electric current can (проявлять) magnetic effect.

**V. Choose the correct translation:**

*The heating effect of the current is found to occur in the electric circuit itself.*

1. Установлено, что тепловой эффект электрического тока обнаруживается в самой электрической цепи.

2. Тепловой эффект электрического тока может появляться в самой электрической цепи.

3. Установлено, что тепловой эффект электрического тока должен обнаруживаться в самой электрической цепи.

*Когда в любом проводнике появляется электрический ток, вокруг него возникает магнитное поле.*

1. A conductor of any kind carrying an electric current, a magnetic field was set up about that conductor.

2. A conductor of any kind have been carrying an electric current, a magnetic field is set up about that conductor.

3. A conductor of any kind carrying an electric current, a magnetic field is set up about that conductor.

*Последний эффект, который необходимо рассмотреть – химический эффект.*

1. The last effect is considered to be the chemical one.

2. The last effect to be considered is the chemical one.

3. The last effect would be considered the chemical one.

*Известно, что химический эффект возникает, когда электрический ток проходит через жидкость.*

1. The chemical effect is known to occur when an electric current flows through a liquid.

2. The chemical effect is famous to occur when an electric current flows through a liquid.

3. The chemical effect may be known to occur when an electric current flows through a liquid.

*Именно движение электрических зарядов порождает магнитные силы.*

1. The motion of the electric charges produces the magnetic forces.

2. It is the motion of the electric charges that produces the magnetic forces.

3. The motion of the electric charges is certain to produce the magnetic forces.

**VI. Answer the questions:**

1. What effects does the current flow produce?

2. How is the heating effect detected?

3. What does the heat produced depend upon?

4. What is called “heat loss”?

5. How is the magnetic effect set up?

6. What is the main condition of the magnetic effect existence?

7. When does the chemical effect occur?

**ВАРИАНТ 4**

**I. Read the text**

**ELECTRIC CURCUITS**

The concepts of electric charge and potential are very important in the study of electric currents. When an extended conductor has different potentials at its ends, the free electrons of the conductor itself are caused to drift from one end to the other. The potential difference must be maintained by some electric source such as electrostatic generator or a battery or a direct current generator. The wire and the electric source together form an electric circuit, the electrons are drifting around it as long as the conducting path is maintained.

There are various kinds of electric circuits such as: open circuits, closed circuits, series circuits, parallel circuits and short circuits. To understand the difference between the following circuit connections is not difficult at all. If the circuit is broken or «opened» anywhere, the current is known to stop everywhere. The circuit is broken when an electric device is switched off. The path along which the electrons travel must be complete otherwise no electric power can be supplied from the source to the load. Thus the circuit is “closed” when an electric device is switched on.

When electrical devices are connected so that the current flows from one device to another, they are said «to be connected in series». Under such conditions the current flow is the same in all parts of the circuit as there is only a single path along which it may flow. The electrical bell circuit is considered to be a typical example of a series circuit. The “parallel” circuit provides two or more paths for the passage of current. The circuit is divided in such a way that part of the current flows through one path and part through another. The lamps in the houses are generally connected in parallel.

The “short” circuit is produced when the current can return to the source of supply without control. The short circuits often result from cable fault or wire fault. Under certain conditions the short circuit may cause fire because the current flows where it was not supposed to flow. If the current flow is too great a fuse is used as a safety device to stop the current flow.

**II. Guess the meaning of the following international words:**

concept, potential, electrostatic generator, aluminum, parallel, typical, control.

**III. Give the English equivalents for the following words and word combinations:**

1) электрические цепи, 2) электрический заряд, 3) проводник, 4) сопротивление, 5) движение электронов, 6) изолятор, 7) короткое замыкание, 8) энергия.

**IV. Say whether these sentences are true or false:**

1. When an extended conductor has the same potential at its ends, free electrons are drifting from one end to another.

2. The wire and the electric source together form an electric circuit.

3. A path of any material will allow current to exist.

4. Silver, copper and gold oppose very strongly.

5. The slighter the opposition is, the better the insulator is.

6. There is only one type of electric circuit.

7. We close the circuit when we switch on our electric device.

**V. Complete the sentences using the text:**

1. The potential difference must be maintained by …

2. Materials that offer slight opposition are called …

3. The best insulators are …

4. There are various kinds of electric circuits such as …

5. We “open” the circuit when …

6. We “close” the circuit when …

7. The “short” circuit is produced when …

8. A fuse is …

**VI. Answer the questions:**

1. What concepts are very important in study of electric current?

2. What forms an electric circuit?

3. What materials are the best conductors and insulators?

4. What kinds of electric circuits do you know?

5. How can we open and close the circuit?

6. When are electrical devices connected in series?

7. What is an example of a series circuit?

8. What can you say about «parallel» circuits?

9. What does the short circuit often result from?

**ВАРИАНТ 5**

**I. Read the text**

**ALTERNATING CURRENT**

Current is defined as increment of electrons. The unit for measuring current was named in honor of A.M. Ampere, the French physicist. Thus it is called ampere. The symbol for current is I. The electric current is a quantity of electrons flowing in a circuit per second of time. The electrons move along the circuit because the e. m. f. drives them. The current is directly proportional to the e. m. f.

A steam of electrons in a circuit will develop a magnetic field around the conductor along which the electrons are moving. The strength of the magnetic field depends upon the current strength along the conductor. The direction of the field is dependent upon the direction of the current.

If the force causing the electron flow is indirect, the current is called direct (d. c.). If the force changes its direction periodically the current is called alternative (a. c.).

Alternating current is the current that changes direction periodically. The electrons leave one terminal of the power supply, flow out along the conductor, stop, and then flow back toward the same terminal. A voltage that caused current reverses its polarity periodically. This is properly called an alternating voltage. The power supply that provides the alternating voltage actually reverses the polarity of its terminals according to a fixed periodic pattern. A given terminal will be negative for a specific period of time and drive electrons out through the circuit. Then, the same terminal becomes positive and attracts electrons back from the circuit. This voltage source cannot be a battery. It must consist of some types of rotating machinery.

**II. Guess the meaning of the following international words:**

1) physicist, 2) ampere, 3) symbol, 4) second, 5) polarity, 6) period, 7) battery.

**III. Translate into Russian the words and expression from the text:**

1) increment of electrons; 2) measuring; 3) to drive; 4) directly proportional; 5) conductor; 6) strength; 7) causing force; 8) terminal; 9) to flow; 10) to reverse.

**IV. Give the English equivalents for the words below:**

1) переменный ток, 2) за секунду, 3) количество электронов, 4) поток электронов, 5) магнитное поле, 6) направление, 7) зависеть, 8) усиление, 9) источник напряжения, 10) ротационный механизм.

**V. Complete the sentences using the text:**

1. The electric current is …

2. The unit for measuring current is …

3. A steam of electrons in a circuit will develop …

4. The current is called direct if …

5. The current is called alternating if…

6. Alternating voltage is …

7. Alternating voltage source cannot be …

**VI. Answer the questions:**

1. Why do electrons move along the circuit?

2. What does the strength of the magnetic field depend upon?

3. What does the direction of the field depend upon?

4. What is the way of alternating current electrons?

5. How does the alternating voltage power supply reverse the polarity of terminals?

**ВАРИАНТ 6**

**I. Read the text**

**CONDUCTORS AND INSULATORS**

All substances have some ability of conducting the electric current, however, they differ greatly in the ease with which the current can pass through them. Solid metals conduct electricity with ease while non-metals do not allow it to flow freely. Thus, there are conductors and insulators. What do the terms "conductors" and "insulators" mean? This difference is expressed by what is called electrical conductivity of the body. It depends upon the atomic constitution of the body. Substances through which electricity is easily transmitted are called conductors. Any material that strongly resists the electric current flow is known as an insulator.

Conductance, that is the conductor's ability of passing electric charges, depends on the four factors: the size of the wire used, its length and temperature as well as the kind of material to be employed. A large conductor will carry the current more readily than a thinner one. To flow through a short conductor is certainly easier for the current than through a long one in spite of their being made of similar material. Hence, the longer the wire, the greater is its opposition, that is resistance, to the passage of current.

There is a great difference in the conducting ability of various substances. Almost all metals are good electric current conductors. The best conductors are silver, copper, gold and aluminum. Nevertheless, copper carries the current more freely than iron; and silver, in its turn, is a better conductor than copper. Copper is the most widely used conductor. The electrically operated devices are connected to the wall socket by copper wires.

A material which resists the flow of the electric current is called an insulator. The higher the opposition is, the better the insulator is. There are many kinds of insulation used to cover the wires. The kind used depends upon the purposes the wire or cord is meant for. The insulating materials generally used to cover the wires are rubber, asbestos, glass, plastics and others. The best insulators are oil, rubber and glass. Rubber covered with cotton, or rubber alone is the insulating material usually used to cover desk lamp cords and radio cords. Glass is the insulator to be often seen on the poles that carry the telephone wires in city streets. Glass insulator strings are usually suspended from the towers of high voltage transmission lines. One of the most important insulators of all, however, is air. That is why power transmission line wires are bare wires depending on air to keep the current from leaking off.

Conducting materials are by no means the only materials to play an important part in electrical engineering. There must certainly be a conductor, that is a path, along which electricity is to travel and there must be insulators keeping it from leaking off the conductor.

**II. Give the Russian equivalents for the words and word combinations below:**

1) conductors; 2) insulators; 3) transmit; 4) resistance; 5) passage of current; 6) socket; 7) to connect to; 8) cord; 9) high voltage transmission line; 10) leak off.

**III. Find in the text the sentences with the following related words and translate them:**

*conducting – conductor – conductivity – conductance*

**IV. State questions to the underlined words:**

1) *Solid metals* conduct electricity with ease.

2) Conductance depends on the *four factors*.

3) There are *many kinds of insulation* used to cover the wires.

4) *Insulators* keep electricity from leaking off the conductor.

5) *Conductors* play an important role in electrical engineering.

**V. Say whether these sentences are true or false:**

1) Electrical conductivity of a body depends upon its atomic constitution.

2) There is no difference in the conducting ability of various substances.

3) The longer the wire is the weaker its opposition is.

4) The kind of the insulating material depends upon the purpose it is meant for.

5) Conductors are substances through which electricity is easily transmitted.

6) Insulators do not allow the electric current to flow freely.

**ВАРИАНТ 7**

**I. Read the text**

**SEMICONDUCTORS**

There are materials that really occupy a place between the conductors of the electric current and the non-conductors. They are called semiconductors. These materials conduct electricity less readily than conductors but much better than insulators.

Semiconductors include almost all minerals, many chemical elements, a great variety of chemical compounds, alloys of metals, and a number of organic compounds. Like metals, they conduct electricity but they do it less effectively.

In metals all electrons are free and in insulators they are fixed. In semiconductors electrons are fixed, too, but the connection is so weak that the heat motion of the atoms of a body easily pulls them away and sets them free.

Minerals and crystals appear to possess some unexpected properties. It is well known that their conductivity increases with heating and falls with cooling.

As a semiconductor is heated, free electrons in it increase in number, hence, its conductivity increases as well.

Heat is by no means the only phenomenon influencing semiconductors. They are sensitive to light, too. Take germanium as an example. Its electrical properties may greatly change when it is exposed to light. With the help of a ray of light directed at a semiconductor, we can start or stop various machines, effect remote control, and perform lots of other useful things. Just as they are influenced by falling light, semiconductors are also influenced by all radiation.

Generally speaking, they are so sensitive that a heated object can be detected by its radiation.

Such dependence of conductivity on heat and light has opened up great possibilities for various uses of semiconductors. The semiconductor devices are applied for transmission of signals, for automatic control of a variety of processes, for switching on engines, for the reproduction of sound, protection of high-voltage transmission lines, speeding up of some chemical reactions, and so on. On the one hand they may be used to transform light and heat energy directly into electric energy without any complex mechanism with moving parts, and on the other hand, they are capable of generating heat or cold from electricity.

Russian engineers and scientists turned their attention to semiconductors many years ago. They saw in them a means of solving an old engineering problem, namely, that of direct conversion of heat into electricity without boilers or machines. Semiconductor thermocouples created in Russia convert heat directly into electricity just as a complex system consisting of a steam boiler, a steam engine and a generator does it.

**II. Give the English equivalents for the words and word combinations below:**

1) полупроводник; 2) химическое соединение; 3) сплав; 4) освобождать; 5) свойство; 6) увеличивать(ся); 7) охлаждение; 8) чувствительный к; 9) выставлять; 10) луч; 11) направлять на; 12) дистанционное управление; 13) находить, обнаруживать; 14) защита; 15) ускорение; 16) решить инженерную проблему; 17) термоэлемент.

**III. Guess the meaning of the following international words:**

element, organic, mineral, crystal, phenomenon, automatic, control, process, reproduction, conversion, boiler.

**IV. Join the beginnings and ends:**

-Semiconductors are sensitive to … conductors of the electric current and non-conductors.

-Semiconductors convert heat into … … dependence of conductivity on heat and light.

-Semiconductors occupy a place between… … heat and light.

-Semiconductors conduct electricity …into electricity without machines.

-As a semiconductor is heated … … its conductivity increases as well.

**V. Insert words and expressions:**

1) Semiconductors include a great variety of (химические соединения), (сплавы металлов).

2) Minerals and crystals appear to possess some unexpected (свойства). Their conductivity increases with (нагревание) and falls with (охлаждение).

3) With the help of a ray of light directed at a semiconductor, we can effect (дистанционное управление).

4) The semiconductor devices are applied for (автоматический контроль) of a variety of processes, for the (воспроизведение) of sound, (ускорение) of some chemical reactions.

5) (Термоэлементы) created in Russia convert heat directly into electricity.

**VI. Answer the questions:**

1) What do semiconductors include? 2) How does the atomic structure of semiconductors influence their properties? 3) What phenomena influence semiconductors? 4) What are the semiconductor devices applied for? 5) How do semiconductors help in solving engineering problems?

**ВАРИАНТ 8**

**I. Read the text**

**ELECTRICITY AND MAGNETISM**

**Text 1. Electromotive force**

When free electrons are dislodged from atoms, electrical energy is released.

Chemical reaction, friction heat and electromagnetic induction will cause electrons to move from one atom to another. Whenever energy in any form is released, a force called electromotive (e. m. f.) is developed. If the force exerts its effort always in one direction, it is called direct; and if the force changes its direction of exertion periodically, it is called alternating.

The chemical reaction in a dry cell, heat and friction are sources of a unidirectional force. Electromagnetic induction produces an alternating force. The direction of force depends on the direction in which the field is cut. Whenever an e. m. f. is developed, there is also a field of energy called an electrostatic field, which can be detected by an electroscope and measured by an electrometer.

**Text 2 Electromagnetic Induction**

An electromotive force is induced in the conductor when there is a change in the magnetic field surrounding a conductor. This induced electromotive force may be produced in several ways as follows:

a. A conductor may move in a stationary magnetic field of constant strength.

b. A stationary conductor may be exposed 'to a moving magnetic field of constant strength.

c. The strength of the field surrounding the conductor may change without any motion of conductor or magnetic circuit.

The electromotive force induced by motion of a conductor or a magnetic flux is the same when the conductor rotates and the flux is stationary or the flux rotates and the conductor is stationary. If both, conductor and flux, rotate in the same direction at the same speed, no electromotive force will be produced, if they rotate at the same speed but in opposite directions, the electromotive force induced would be twice as that which would be induced, if one of them was stationary. An electromotive force is not induced when a conductor is moved parallel to the lines of force, but only when it moves at an angle with these lines.

Any motion across the direction of the lines, however, will produce an electromotive force in the conductor. For this reason, the conductor is said to «cut» the lines of force. The actual electromotive force induced in the conductor depends upon the nature at which the flux is cut.

**Text 3 Electromotive force and resistance**

The electromotive force is the very force that moves the electrons from one point in an electric circuit towards another. In case this e. m. f. is direct, the current is direct. On the other hand, were the electromotive force alternating, the current would be alternating, too. The e. m. f. is measurable and it is the volt that is the unit used for measuring it. A current is unable to flow in a circuit consisting of metallic wires alone. A source of an e. m. f. should be provided as well. The source under consideration may be a cell or a battery, a generator, a thermocouple or a photocell, etc.

In addition to the electromotive force and the potential difference reference should be made to another important factor that greatly influences electrical flow, namely, resistance. All substances offer a certain amount of opposition, that is to say resistance, to the passage of current. This resistance may be high or low depending on the type of circuit and the material employed. Glass and rubber offer a very high resistance and, hence, they are considered as good insulators. All substances do allow the passage of some current provided the potential difference is high enough.

Certain factors can greatly influence the resistance of an electric circuit.

They are the size of the wire, its length, and type. In short, the thinner or longer the wire, the greater is the resistance offered.

**II. Give the English equivalents for the words below. Find in the text the sentences with these words and translate them**

1) трение; 2) электродвижущая сила; 3) элемент; 4) параллельное соединение; 5) сопротивление; 6) электромагнитная индукция; 7) переменный ток; 8) постоянное напряжение; 9) фотоэлемент.

**III. Guess the meaning of the following international words and translate them:**

reaction, electrostatic, electrometer, electroscope, volt, metallic.

**IV. Say whether these sentences are true or false:**

1. Alternating force always exerts its effort in one direction.

2. Alternating force is produced by electromagnetic induction.

3. The electromotive force is induced by motion of a conductor.

4. Resistance is an important factor that greatly influences electrical flow.

5. The type of the material employed doesn’t influence the resistance.

**V. Answer the questions:**

1) What factors cause the motion of electrons from one atom to another? 2) When is the electromotive force developed? 3) When does an electrostatic field appear? 4) How is the electromotive force induced? 5) What unit is used for measuring the electromotive force? 6) What are the sources of electromotive force? 7) What is called “resistance”? 8) How do the types of circuit and material influence the resistance? 9) Name the factors that influence the resistance.

**ВАРИАНТ 9**

**I. Read the text**

**DYNAMOS**

The term «dynamo» is applied to machines which convert either mechanical energy into electrical energy or electrical energy into mechanical energy by utilizing the principle of electromagnetic induction. A dynamo is called a generator when mechanical energy supplied in the form of rotation is converted into electrical energy. When the energy conversion takes place in the reverse order the dynamo is called a motor. Thus a dynamo is a reversible machine capable of operation as a generator or motor as desired.

A generator does not create electricity, but generates or produces an induced electromotive force, which causes a current to flow through a properly insulated system of electrical conductors external to it. The amount of electricity obtainable from such a generator is dependent upon the mechanical energy supplied. In the circuit external to a generator the e. m. f. causes the electricity to flow from a higher or positive potential to a lower or negative potential. In the internal circuit of a generator the e. m. f. causes the current to flow from a lower potential to a higher potential. The action of a generator is based upon the principles of electromagnetic induction.

The dynamo consists essentially of two parts: a magnetic field, produced by electromagnets, and a number of loops or coils of wire wound upon an iron core, forming the armature. These parts are arranged so that the number of the magnetic lines of force of the field threading through the armature, coils will be constantly varied, thereby producing a steady e. m. f. in the generator or a constant torque in the motor.

**II. Fill in the gaps with the words given below:**

*to convert, generator, reversible, obtainable, induction, loops*

1. The term “dynamo” is applied to machines which.....either mechanical energy into electrical or on the contrary electrical energy into mechanical energy.

2. A dynamo is a ..... machine capable of operation as a generator or motor as desired.

3. The amount of electricity ..... from such a generator is dependent upon the mechanical energy supplied .

4. The action of a generator is based upon the principles of electromagnetic ...... .

5. The dynamo consists of two parts: a magnetic field, produced by electromagnets, and a number of .....or coils of wire.

**III. Find the Russian equivalents for the following English words and word combinations:**

1) to be applied to smth.; 2) to convert smth. into smth.; 3) rotation; 4) to utilize; 5) a properly insulated system; 6) internal (external) circuit; 7) capable of operation; 8) positive (negative) potential; 9) reverse order; 10) energy conversion.

**IV. Answer the questions**

1. What term can be applied to machines converting mechanical energy into electrical?

2. What kind of machine is a dynamo?

3. What is the function of a generator?

4. What is the action of a generator based upon?

5. What parts does the dynamo consist of?

**ВАРИАНТ 10**

**I. Read the text**

**GENERATORS**

The powerful, highly efficient generators and alternators that are in use today operate on the same principle as the dynamo invented by the great English scientist Faraday in 1831. Dynamo-electric machines are used to supply light, heat and power on a large scale. These are the machines that produce more than 99.99 per cent of all the world's electric power.

There are two types of dynamos – the generator and the alternator. The former supplies d. c. which is similar to the current from a battery and the latter provides a. c. To generate electricity both of them must be continuously provided with energy from some outside source of mechanical energy such as steam engines, steam turbines or water turbines.

A generator is an electric machine, which converts mechanical energy into electric energy. There are direct-current (d. c.) generators and alternating current (a. c.) generators. Their construction is much alike. A d. c. generator consists of stationary and rotating elements. The stationary elements are: the yoke or the frame and the field structure. The yoke forms the closed circuit for the magnetic flux. The function of the magnetic structure is to produce the magnetic field.

The rotating elements are: true armature and the commutator. They are on the same shaft. The armature consists of the core and the winding. The winding is connected to the commutator. With the help of the brushes on the commutator that conduct the electric current to the line the winding is connected to the external circuit. The stationary element of an a. c. generator is called a stator. The rotating element is called a rotor. The essential difference between a d. c. generator and a. c. generator is that the former has a commutator by means of which the generated e. m. f. is made continuous, i. e. the commutator mechanically rectifies the alternating e. m. f. so that it is always of the same polarity.

D. c. generators are used for electrolytic processes such as electroplating. Large d. c. generators are employed in such manufacturing processes as steel making. The d. c. generator of small capacities is used for various special purposes such as arc welding, automobile generators, train lighting systems, etc. It also finds rather extensive use in connection with communication systems.

**II. Give the Russian equivalents for the following English words and word combinations:**

1) generator; 2) alternator; 3) steam turbine; 4) water turbine; 5) armature; 6) rotor; 7) stationary; 8) commutator; 9) stator; 10) yoke; 11) brushes; 12) core; 13) frame; 14) winding.

**III. Fill in the blanks**

1. A generator is an electric machine, which a) ----- mechanical energy into electrical energy.

2. A direct-current generator consists of b) ----- .

3. The dynamo was invented by c) ----- in 1831.

4. The d.c. generator is used for various purposes such as d) ----- .

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