Министерство образования и науки Российской Федерации
ФГАОУ ВО «Севастопольский государственный университет»
Гуманитарно-педагогический институт

ЭЛЕКТРОЭНЕРГИЯ=ELECTRICITY

Методическое пособие к практическим занятиям
по дисциплине “Английский язык”
для студентов I курса специальности
“Электроэнергетика и электротехника”
очной формы обучения

Севастополь
2015

УДК [811.111’24 : 53] (076)
81.2 АНГЛ-923
Э45

ЭЛЕКТРОЭНЕРГИЯ=ELECTRICITY. Методическое пособие к практическим занятиям по дисциплине “Английский язык” для студентов I курса специальности “ Электроэнергетика и электротехника ” очной формы обучения /Сост. А.А.Дроздова. – Севастополь: Изд-во СГУ, 2015. – 24 с.

Основная цель методического пособия – совершенствовать приобретенные ранее знания студентов, расширить словарный запас. Материалы пособия дают представление о специфике профессиональной деятельности будущего электромеханика, расширяют знания, полученные студентами при изучении базового учебника английского языка для технических вузов.

Методическое пособие утверждено на заседании кафедры «Романская и германская филология» (протокол № 9 от 30.09.2015 г.).

Допущено учебно-методическим центром и научно-методическим советом СГУ в качестве методического пособия .

Рецензент: Пастухова С.Е., к.филол.н., доцент кафедры «Романская и германская филология»

СОДЕРЖАНИЕ

ВВЕДЕНИЕ

Данное методическое пособие предназначено для студентов 1-го курса специальности электромеханика.

Основная цель методического пособия – совершенствовать приобретенные ранее знания студентов, расширить словарный запас. Материалы пособия дают представление о специфике профессиональной деятельности будущего электромеханика, расширяют знания, полученные студентами при изучении базового учебника английского языка для технических вузов.

Методическое пособие состоит из 5 уроков, каждый из которых содержит текст, упражнения для закрепления новой лексики и грамматики. Лексический материал содержит как техническую терминологию, так и слова и словосочетания из общей лексики, которые студенты смогут использовать в разговоре на различные темы.

Методическое пособие рассчитано на 20 – 25 академических часов.

LESSON 1. WHAT IS VOLTAGE?

Exercise 1. Read new words and word combinations.
voltage – напряжение
electrical potential – электрический потенциал
headache – головная боль
relative – родственник
magnetism – магнетизм
familiar – знакомый
magnetic field – магнитное поле
to attract – притягивать
to repel – отталкивать
to force – заставлять
rod – прут
to align – выстраивать в линию
bar magnet – стержневой магнит
to sprinkle – сыпать
flux – поток
static electricity – статическое электричество
odd – странный
fiber – волокно
wool - шерсть
phenomena – явление

Exercise 2. Read and translate the text.

What is voltage?

Of several electricity concepts, the idea of "voltage" or "electrical potential" is probably the hardest to understand. It's also really tough to explain. It's a headache for both the student and the teacher. To understand voltage we should first understand a little about its nearest relative, magnetism.

Most of us are familiar with magnetic fields. Magnets are surrounded with an invisible "field" which pulls upon iron, and which can attract or repel other magnets. The magnetic field forces oblong magnetic objects (such as iron rods, or iron powder) to twist and align to follow particular directions. Put a bar magnet under a piece of paper, sprinkle on some iron filings, and the filings all line up and show the general shape of the invisible field. Obtain a small compass, and you'll see the compass pointer twist and align with the magnetic field of the earth. That's magnetism.

There is another type of invisible field besides magnetism. It is called the "electric field" or "electrostatic field" or "e-field." This second kind of field is much like magnetism. It's invisible, it has lines of flux, and it can attract and repel objects. However, it is not magnetism, it is something separate. It is voltage.

Most people know about magnetic fields but not about e-fields or "voltage fields." In part, this is because magnetism is explained in school, but for some reason voltage fields are hidden away under the name "static electricity." E-fields are never

mentioned in beginner's science textbooks. This is odd, since voltage and "static electricity" go together. Whenever a negative charge attracts a positive charge, invisible fields of voltage must exist between the charges. Voltage causes the attraction between opposite charges; the voltage fields reach across space. In reality, "static" electricity has nothing to do with motion (or with being static.) The static electricity involves high voltage. When you remove a wool thing from your clothes dryer, all the fibers stand outwards, they are following the invisible lines of voltage in the air. Fibers are the "iron filings" that make the voltage field pattern visible. And whenever the charges within a conductor are forced to flow, they only move because they're being driven along by a voltage-field which runs through the length of the wire. Voltage causes current. Another way to say it: electric currents are caused by "static electricity," and "static electricity" is not necessarily static. The connection between voltage and "static" electricity is not explained in the books, and that's one reason why voltage phenomena seem so complicated and mysterious.

Exercise 3. Answer the following questions:
1.What should we do first to understand voltage? 2. What is the magnetic field? 3. What should we do to see the general shape of the invisible field? 4. What is the second type of invisible field? 5. What does involve the static electricity? 6. What is fiber? 7. Why does voltage phenomena seem so complicated and mysterious?

Exercise 4. Give the English equivalents for the words and word combinations below.
Сложно объяснить; ближайший родственник; порошок; прокручивать; металлическая стружка; компас; указатель компаса; магнитное поле земли; притягивать предметы; отрицательный заряд; притяжение; невидимые линии; проводник; проходить через всю дину; связь; явление; нечто другое; прятать; статическое электричество.

Exercise 5. Complete the sentences using the text:
1. The static electricity involves …
2. Electric currents are caused by …
3. Whenever a negative charge attracts a positive charge …
4. Obtain a small compass, and you'll see …
5. Voltage causes the attraction …
6. Magnetism is explained in school, but for some reason voltage fields …
7. To understand voltage we should first …

Exercise 6. Say whether these sentences are true or false.
1. Magnets are surrounded with a visible "field" which pulls upon iron.
2. Most people know about "voltage fields" but not about magnetic fields.
3. There is another type of invisible field besides magnetism.
4. For some reason voltage fields are not hidden away under the name "static electricity."
5. "Static" electricity has nothing to do with motion (or with being static.)

6. Voltage causes current.
7. The connection between voltage and "static" electricity is explained in the books.
8. The static electricity involves high voltage.
9. To understand voltage we should first understand a little about thermodynamic work.

Exercise 7. State the questions to the underlined words.
1. Current can flow from lower voltage to higher voltage, but only when a source of energy is present to "push" it against the opposing electric field.
2. In a material the electric field is not the only factor determining charge flow.
3. A more convenient definition of 'voltage' can be found in the books.
4. Any two points with the same potential may be connected by a conductor and no current will flow between them.
5. The voltage in electric power transmission lines used to distribute electricity from power stations can be several hundred times greater than consumer voltages.
6. A direct voltage maintains the same polarity at all times.
7. The number of complete cycles per second is the frequency.
8. Alternating voltage exists between the terminals of a common utility outlet.
9. Voltage is a concept that is related to potential energy.

Exercise 8. Translate the following sentences from English into Russian.
1. Voltage can be caused by static electric fields, by electric current through a magnetic field, by time-varying magnetic fields, or some combination of these three.
2. The voltmeter works by measuring the current through a fixed resistor, which, according to Ohm's Law, is proportional to the voltage across the resistor.
3. Two factors considered in classifying a voltage as "high voltage" are the possibility of causing a spark in air, and the danger of electric shock by contact or proximity.
4. When you connect a device across the battery terminals a current flows through the device.
5. When a voltage is generated by a battery, or by the magnetic force according to Faraday's Law, this generated voltage has been traditionally called an "electromotive force".
6. A direct current circuit is an electrical circuit that consists of any combination of constant voltage sources, constant current sources, and resistors.
7. High voltage is used for electric power transmission to reduce the energy lost in the resistance of the wires.
8. The output voltage of a voltage divider will vary according to the electric current it is supplying to its external electrical load.
9. The greater the voltage, the greater the flow of electrical current (that is, the quantity of charge carriers that pass a fixed point per unit of time) through a conducting or semiconducting medium for a given resistance to the flow.

Exercise 9. Translate the following sentences from Russian into English.
1. Напряжение - это физическая величина, характеризующая электрическое поле и показывающая, какую работу совершает электрическое поле при

перемещении единичного положительного заряда из одной точки в другую.
2. Проходя по проводам, ток лишь слегка их нагревает, однако не совершает при этом большой работы.
3. Напряжение на участке пустого провода будет совсем небольшим, а напряжение на участке с какой-либо нагрузкой будет гораздо большим, и зависеть величина напряжения будет от величины работы, произведенной током.
4. Так как земля является проводником электрического тока, вокруг упавшего оголенного кабеля, находящегося под напряжением, может возникнуть опасное для человека шаговое напряжение.
5. Когда человек касается провода, находящегося под напряжением выше 240 В, ток пробивает кожу.
6. Если требуется измерить напряжение на источнике тока, то вольтметр присоединяют непосредственно к его зажимам.
7. Зажимы вольтметра присоединяют к тем точкам цепи, между которыми надо измерить напряжение.
8. Работа тока может быть разной на разных участках цепи, но на каждом из них она пропорциональна заряду, проходящему через него.

Exercise 10. Retell the text “What is voltage?”

LESSON 2. VOLTAGE DROP

Exercise 1. Read new words and word combinations.
reduction – понижение
overload – перегрузка
to ensure – обеспечивать
distribution – распределение
to neglect – пренебрегать
impedance – полное сопротивление
unsatisfactory – неудовлетворительный
to waste – тратить впустую
non-zero resistance - сопротивление отличное от нуля
cross-sectional area - площадь поперечного сечения
reference point – ориентир
to occur – происходить
dimension – размер
permeability – проницаемость

Exercise 2. Read and translate the text.

Voltage drop

Voltage drop is the reduction in voltage in an electrical circuit caused by overload. In electrical wiring national and local electrical codes set guidelines for

maximum voltage drop allowed in a circuit, to ensure reasonable efficiency of distribution and proper operation of electrical equipment (the maximum permitted voltage drop varies from one country to another).Voltage drop may be neglected when the impedance of the interconnecting conductors is small in relation to the other components of the circuit. For example, an electric space heater may have a resistance of ten ohms, and the wires which supply it may have a resistance of 0.2 ohms, about 2% of the total circuit resistance. This means that 2% of the supplied voltage is actually being lost by the wire itself. Excessive voltage drop will result in unsatisfactory operation of electrical equipment, and energy will be wasted in the wiring system. Voltage drop can also cause damage to electrical motors. In electronic designs for power transmission, various techniques are used to compensate for the effect of voltage drop on long circuits or where voltage levels must be accurately maintained. The simplest way to reduce voltage drop is to increase the diameter of the cable between the source and the load.**Voltage drop in direct current circuits**

A current flowing through the non-zero resistance of a practical conductor necessarily produces a voltage across that conductor. The dc resistance of the conductor depends upon the conductor's length, cross-sectional area, type of material, and temperature. If the voltage between the conductor and a fixed reference point is measured at many points along the conductor, the measured voltage will decrease gradually toward the load. The longer is the conductor the current passes through, the more of the voltage is "lost".

If the load current increases, the voltage drop in the conductor also increases.

A principle known as Kirchoff's Law states that in any circuit, the sum of the voltage drops across each component of the circuit is equal to the supply voltage.

Voltage drop in alternating current circuits

In alternating current circuits, additional opposition to current flow occurs due to the interaction between electric and magnetic fields and the current within the conductor; this opposition is called "impedance". The impedance in an alternating current circuit depends on the spacing and dimensions of the conductors, the frequency of the current, and the magnetic permeability of the conductor and its surroundings. The voltage drop in an AC circuit is the product of the current and the impedance of the circuit. Electrical impedance, like resistance, is expressed in ohms and falls under Ohm's law for direct current circuits.

Exercise 3. Answer the following questions:

1.What is voltage drop?

2. When voltage drop may be neglected? Give an example.

3.What is the simplest way to reduce the voltage drop?

4. From what does the resistance of a practical conductor depend?

5. What is said in a principle known as Kirchoff’s Law?

6. Due to what does the additional opposition to current flow occur in alternating current?

7. What is the voltage drop in AC circuit?

Exercise 4. Give the English equivalents for the words and word combinations

below.

Электрическая проводка; эффективность распределения; электрооборудование; по отношение к; электрический обогреватель; общее сопротивление цепи; чрезмерное падение напряжения; система электропроводки; повреждение; передача; уровень напряжения; диаметр кабеля; источник; постепенно уменьшаться; цепь переменного тока; магнитное поле; цепь постоянного тока.

Exercise 5. Complete the sentences using the text:

1. Voltage drop is …
2. Voltage drop may be neglected when …
3. Excessive voltage drop will result in …
4. The simplest way to reduce voltage drop is …
5. The dc resistance of the conductor depends upon …
6. The longer is the conductor the current passes through …
7. Electrical impedance, like resistance, is expressed in …
8. If the load current increases, the voltage drop …
9. The impedance in an alternating current circuit depends on …
10. The voltage drop in an AC circuit is the product of …

Exercise 6. Say whether these sentences are true or false.

1. In electronic designs for power transmission, one technique is used to compensate for the effect of voltage drop.
2. A principle known as Kirchoff's Law states that in direct current circuit, the sum of the voltage drops across each component of the circuit is equal to the supply voltage.
3. Excessive voltage drop will result in unsatisfactory operation of electrical equipment, and energy will be wasted in the wiring system.
4. The dc resistance of the conductor depends upon the conductor's length, cross-sectional area, type of material, and temperature.
5. The impedance in an alternating current circuit depends on the temperature and dimensions of the conductors, the type of material, and the magnetic permeability of the conductor and its surroundings.
6. The maximum permitted voltage drop does not vary.
7. The longer is the conductor the current passes through, the more of the voltage is "lost".
8. Voltage drop cannot be neglected when the impedance of the interconnecting conductors is small in relation to the other components of the circuit.

Exercise 7. State the questions to the underlined words.

1. Voltage drop is the reduction in voltage in an electrical circuit caused by overload.
2. Electrical impedance, like resistance, is expressed in ohms.
3. Voltage drop can also cause damage to electrical motors.
4. The voltage drop in an AC circuit is the product of the current and the impedance of the circuit.

5. Excessive voltage drop will result in unsatisfactory operation of electrical equipment, and energy will be wasted in the wiring system.
6. In alternating current circuits, additional opposition to current flow occurs due to the interaction between electric and magnetic fields and the current within the conductor.
7. In alternating current circuits, additional opposition to current flow occurs due to the interaction between electric and magnetic fields and the current within the conductor.
8. The maximum permitted voltage drop varies from one country to another.

Exercise 8. Translate the following sentences from English into Russian.

1. Voltage drop describes how the supplied energy of a voltage source is reduced as electric current moves through the passive elements (elements that do not supply voltage) of an electrical circuit.
2. In alternating-current circuits, opposition to current flow does occur because of resistance (just as in direct-current circuits).
3. The larger the resistor, the more energy used by that resistor, and the bigger the voltage drop across that resistor.
4. The voltage drop (i.e., difference between voltages on one side of the resistor and the other), not the voltage itself, provides the driving force pushing current through a resistor.
5. Measuring voltage drop is an accurate means of determining the relative resistance in a circuit that is powered up.
6. Many circuit resistance issues are only detectable when there is high current flowing in the circuit.
7. We can measure resistance directly with an ohmmeter; however, to do so, the circuit cannot have power applied to it and quite often the component in question would have to be removed from the circuit to measure resistance.
8. As a general rule, the voltage drop across a battery cable should be no more than 0.5 volts.
9. The heating causes the resistance to increase. That temperature is one of four factors that affect resistance.

Exercise 9. Translate the following sentences from Russian into English.

1. Падение напряжения – постепенное уменьшение напряжения вдоль проводника, по которому течёт электрический ток, обусловленное тем, что проводник обладает активным сопротивлением.
2. При передаче тока нагрузки происходит падение напряжения между началом цепи и местом подключения нагрузки.
3. Максимально допустимые пределы падения напряжения различны в разных странах.
4. Правильная работа нагрузки зависит от того, что напряжение на его зажимах поддерживается на уровне, близкому к номинальному значению.
5. Современные электроприборы, что используются в дачных домах, потребляют куда больше энергии, а потому электросети не справляются и не

могут дать требуемый уровень напряжения.
6. Скорость направленного движения частиц в проводниках зависит от материала проводника, массы и заряда частиц, окружающей температуры.
7. Если на участке цепи электрический ток не постоянный, то напряжение и сила тока постоянно изменяется, при этом у обычного переменного тока среднее значения напряжения и силы тока равны нулю.
8. Электрическая цепь – совокупность устройств, элементов, предназначенных для протекания электрического тока, электромагнитные процессы в которых могут быть описаны с помощью понятий сила тока и напряжение.

Exercise 10. Retell the text “Voltage drop”.

LESSON 3. ELECTRIC CIRCUITS

Exercise 1. Read new words and word combinations.
concept – понятие
potential – потенциал
to drift - дрейфовать
to maintain - поддерживать
electrostatic generator – электростатический генератор
to switch off – выключать
condition – условие
to provide – обеспечивать
fuse – предохранитель
safety - безопасность

Exercise 2. Read and translate the text.

Electric circuits

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.

Exercise 3. Answer the following questions:

1.What concepts are important in the study of electric currents?
2. By what the potential difference must be maintained?
3. What are the kinds of electric circuit?
4. Is it difficult To understand the difference between the following circuit connections?
5. What is the typical example of a series circuit?
6. How many paths does the parallel circuit provide?
7. What may the short circuit cause?

Exercise 4. Give the English equivalents for the words and word combinations below.

С одного конца в другой; источник электричества; генератор постоянного тока; электрон; электроэнергия; при таких условиях; единственный путь; делить; таким образом что; проблема с проводкой; совокупность устройств.

Exercise 5. Complete the sentences using the text:

1. If the current flow is too great a fuse is used as a …
2. The short circuit may cause fire because …
3. The circuit is divided in such a way that …
4. … they are said “to be connected in series”.
5. The “parallel” circuit provides …
6. To understand the difference between the following circuit connections …
7. The path along which the electrons travel must be …
8. There are various kinds of electric circuits such as …
9. When an extended conductor has different potentials at its ends …

Exercise 6. Say whether these sentences are true or false.

1. When electrical devices are connected so that the current flows from one device to another, they are said “to be connected in parallel”.
2. The “parallel” circuit provides one path for the passage of current.
3. 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.
4. There are two kinds of electric circuits such as: open circuits, closed circuits.
5. The potential difference must be maintained by some electric source such as electrostatic generator or a battery or a direct current generator.
6. If the current flow is too great a pencil is used as a safety device to stop the current flow.
7. When an closed conductor has different potentials at its ends, the free electrons of the conductor itself are caused to drift.

Exercise 7. State the questions to the underlined words.
1. There are various kinds of electric circuits such as: open circuits, closed circuits, series circuits, parallel circuits and short circuits.
2. The "short" circuit is produced when the current can return to the source of supply without control.
3. The potential difference must be maintained by some electric source such as electrostatic generator or a battery or a direct current generator.
4. The potential difference must be maintained by some electric source such as electrostatic generator or a battery or a direct current generator.
5. The concepts of electric charge and potential are very important in the study of electric currents.
6. If the current flow is too great a fuse is used as a safety device to stop the current flow.
7. If the current flow is too great a fuse is used as a safety device to stop the current flow.
8. Under certain conditions the short circuit may cause fire because the current flows where it was not supposed to flow.

Exercise 8. Translate the following sentences from English into Russian.
1. An electric circuit is a path in which electrons from a voltage or current source flow.
2. The load of an electrical circuit may be as simple as those that power electrical appliances like refrigerators, televisions, or microwave ovens.
3. Electronic circuits usually use low voltage direct current sources.
4. The load of an electronic circuit may be as simple as a few resistors, capacitors, and a lamp, all connected together to create the flash in a digital camera.
5. The current flowing in an electrical or electronic circuit can suddenly increase when a component part fails.
6. The user of the device could become a part of the device's electrical circuit by providing a return path for the electrons through the user's body instead of the circuit's earth ground.
7. To prevent the danger of electrical shock and the possibility of electrocution, ground fault interrupt devices detect open circuits to earth ground in attached electrical or electronic devices.
8. The loads for electrical circuits can also be quite complicated, such as the load on the output of a hydroelectric power generating station.

Exercise 9. Translate the following sentences from Russian into English.

1. Электрическая цепь – совокупность устройств, элементов, предназначенных для протекания электрического тока, электромагнитные процессы в которых могут быть описаны с помощью понятий сила тока и напряжение.
2. Большинство крупных источников электроэнергии – электростанции – построено с использованием генераторов переменного тока.
3. При передаче большой электрической мощности при низком напряжении возникают большие омические потери из-за больших значений протекающего тока.
4. Коротким замыканием называют состояние, когда сопротивление нагрузки меньше внутреннего сопротивления источника питания.
5. При параллельном соединении падение напряжения между двумя узлами, объединяющими элементы цепи, одинаково для всех элементов.
6. Как при параллельном так и при последовательном соединении резисторов, итоговая мощность будет равна сумме мощностей соединяемых резисторов.
7. Сопротивление правильно описывает свойства катушки и конденсатора только на постоянном токе.
8. В соответствии с законом Ома в источниках с одинаковым напряжением ток в одинаковой нагрузке также должен быть одинаковым.

Exercise 10. Retell the text “Electric circuits”.

LESSON 4. POLARITY

Exercise 1. Read new words and word combinations.

particle – частица
relatively – относительно
motion - движение
to exhibit – показывать, обладать
nucleus – ядро
to orbit – вращаться
to exalt – возвышать
neutral – нейтральный
excess – избыток
outward – внешний
overall – общий
ion – ион
quota – доля, квота
display – отображать
static electricity – статическое электричество
pump – насос

storage battery - аккумуляторная батарея

Exercise 2. Read and translate the text.

Polarity

All matter is basically composed of two types of electricity: positive particles and negative particles. The negative particles are relatively light in weight and in constant motion. These orbiting particles exhibit equal and opposite electrical characteristics to the heavier particles within the nucleus.

When an atom has the same number of electrons as it has protons, it exalts no outward electrical properties. This is because the positive and negative charges are exactly balanced. Such an atom is electrically stable and is said to be neutral.

When an atom takes on an excess of electrons, it exhibits outward characteristics similar to the electron. It takes an overall negative property. This condition is called a negative change, and such changed atom is not electrically stable. A charged atom is called an ion, and if the charge is negative, it is called a negative ion.

An atom which has less than its normal quota of electrons, displays a positive polarity similar to that of the proton due to the fact that it has more positive protons than it has negative electrons. This type of atom is said to assume a positive electrical charge. Such an atom is known as a positive ion while it is in this electrically unstable condition.

These charges of atoms are the simplest examples of static electricity. We stated that atoms are influenced to accept or give up electrons.

As the name dynamic electricity indicates, this is electricity in motion. The heart of the matter is electron movement.

In electrical system, electrical pressure is needed. To maintain this pressure, a device that will move electrons in a way similar to that in which the pump moves water is necessary. The most familiar is the storage battery.

Exercise 3. Answer the following questions:

1.What do exhibit the orbiting particles?
2. When does an atom exalt no outward electrical properties?
3. What atom is said to be neutral?
4. When does atom exhibit outward characteristics similar to the electron?
5. What condition is called negative charge?
6. What is ion?
7. What is the simplest example of static electricity?

Exercise 4. Give the English equivalents for the words and word combinations below.

Состоять из; относительно легкий; постоянный; вращающиеся частицы; внутри ядра; электрические свойства; точно сбалансированный; отрицательный заряд; положительная полярность; благодаря тому, что; принимать; нестабильное состояние; движение электронов; давление; при необходимости.

Exercise 5. Complete the sentences using the text:

1. The heart of the matter is …
2. … are the simplest examples of static electricity.
3. An atom which has less than its normal quota of electrons …
4. A charged atom is called …
5. When an atom has the same number of electrons as it has protons …
6. All matter is basically composed of …
7. The negative particles are relatively …
8. These orbiting particles exhibit …

Exercise 6. Say whether these sentences are true or false.

1. The negative particles are relatively light in weight and in constant motion.
2. In electrical system, electrical pressure is not needed.
3. When an ion takes on an excess of electrons, it exhibits outward characteristics similar to the electron.
4. A charged atom is called an ion, and if the charge is negative, it is called a negative ion.
5. Orbiting particles exhibit opposite electrical characteristics to the heavier particles within the matter.
6. Atoms are influenced to accept or give up electrons.
7. All matter is basically composed of two types of electricity: positive particles and negative particles.

Exercise 7. State the questions to the underlined words.

1. These charges of atoms are the simplest examples of static electricity.
2. An atom which has less than its normal quota of electrons, displays a positive polarity similar to that of the proton.
3. The negative particles are relatively light in weight and in constant motion.
4. That temperature is one of four factors that affect resistance.
5. That temperature is one of four factors that affect resistance.
6. A direct current circuit is an electrical circuit that consists of any combination of constant voltage sources, constant current sources, and resistors.
7. An electric circuit is a path in which electrons from a voltage or current source flow.

Exercise 8. Translate the following sentences from English into Russian.

1. Electrical polarity (positive and negative) is present in every electrical circuit.
2. In a direct current circuit, one pole is always negative, the other pole is always positive and the electrons flow in one direction only.
3. In an alternating current circuit the two poles alternate between negative and positive and the direction of the electron flow reverses.
4. Positively charged substances are repelled from other positively charged substances, but attracted to negatively charged substances; negatively charged substances are repelled from negative and attracted to positive.
5. The electric charge is a fundamental conserved property of some subatomic particles, which determines their electromagnetic interaction. Electrically charged matter is

influenced by, and produces, electromagnetic fields.
6. An ion is an atom (or group of atoms) that has lost one or more electrons, giving it a net positive charge, or that has gained one or more electrons, giving it a net negative charge.
7. The electric charge of a macroscopic object is the sum of the electric charges of the particles that make it up.
8. This charge is often small, because matter is made of atoms, and atoms typically have equal numbers of protons and electrons, in which case their charges cancel out, yielding a net charge of zero, thus making the atom neutral.

Exercise 9. Translate the following sentences from Russian into English.
1. Для того, чтобы создать электрическое поле, необходимо создать электрический заряд.
2. Магнитное поле можно назвать особым видом материи, посредством которого осуществляется взаимодействие между движущимися заряженными частицами или телами, обладающими магнитным моментом.
3. Стремясь повысить мощность электрических машин, изобретатели увеличивали число магнитов и катушек.
4. До того, как была открыта связь между электричеством и магнетизмом, использовались электростатические генераторы, которые работали на основе принципов электростатики.
5. Работоспособность аккумулятора может быть восстановлена путём заряда, то есть пропусканием электрического тока в направлении, обратном направлению тока при разряде.
6. Максимально возможный полезный заряд аккумулятора называется зарядной ёмкостью, или просто ёмкостью.
7. Одно из наиболее часто встречающихся в обычной жизни проявлений магнитного поля – взаимодействие двух магнитов
8. Электростатические генераторы имели низкую мощность и никогда не использовались для выработки электроэнергии в значимых для промышленности масштабах.

Exercise 10. Retell the text “Polarity”.

LESSON 5. Difference between ammeter and voltmeter

Exercise 1. Read new words and word combinations.
ammeter – амперметр
voltmeter – вольтметр
galvanometer – гальванометр
to detect – обнаруживать
milliampere – миллиампер
measurement – измерение
to unplug – отключать
application – применение

contactless – бесконтактный
hence – следовательно
to match up – совпадать
readings – показания
infinite – бесконечный

Exercise 2. Read and translate the text.

Difference between ammeter and voltmeter

There are two different ways in order to measure electricity; currents and voltages. Devices such as ammeters and voltmeters, which are based on the galvanometer, a device used to detect small currents, are used to measure electricity. While ammeters are used to measure the currents, the voltmeter is used to measure the voltage. Both the devices are different in terms of functionality and circuit placement.

An ammeter is an instrument that is used to measure the currents in a circuit. The currents are measured in amperes. Instruments used to measure smaller currents, in the milliampere or microampere range, are designated as milliammeters or microammeters. The early ammeters needed to be aligned with the Earth's magnetic field in order to work properly, though new ammeters can be mounted on any circuit in order to provide current measurements. In order to get a reading with an ammeter, the circuit must be unplugged in order to attach the ammeter to the circuit. For applications where disconnecting the circuit is problem, an alternative type of ammeter is available, known as the contactless ammeter.

In order for an ammeter to measure a current, the current must pass through the ammeter and hence it must be placed in a series mode inside the circuit. The polarities must correspond, the positive and negative polarity must match up with the positive and negative on the circuit. Though ideally, ammeters should have zero resistance, in actuality it has relatively low resistance compared to voltmeters. If the resistance is too high, it may block too much current and affect the currents in the circuit and alter the readings.

A voltmeter is an instrument that is used to measure the voltage between two points in a circuit**.** The early voltmeters were based on moving coil galvanometers and were created by inserting a resistor in series with the instrument. In order to for a voltmeter to measure the voltages, it does not require current to be passed through it. It is placed parallel to the circuits they are expected to measure. Polarity is also expected to be observed in the placement of voltmeters. Ideally voltmeters should have infinite impedance, but this is not the case with actual voltmeter; they have a finite resistance value.

Exercise 3. Answer the following questions:
1.What devices are used to measure electricity? 2. What is ammeter? 3. Why the circuit must be unplugged to get a reading with an ammeter? 4. What resistance should have the ammeter? 5. What is voltmeter? 6. How a voltmeter is placed in the circuits? 7. What impudence should have the ideal voltmeter?

Exercise 4. Give the English equivalents for the words and word combinations below.

Слабый ток; с точки зрения функциональности; размещение в цепи; обеспечивать; помещать в любую цепь; нулевое сопротивление; по сравнению с; требоваться; бесконечное сопротивление; притягивать предметы; электрические свойства; основываться на.

Exercise 5. Complete the sentences using the text:

1. Though ideally, ammeters should have …
2. Ideally voltmeters should have infinite …
3. The early ammeters needed to be aligned with …
4. Devices such as ammeters and voltmeters, which are based on …
5. An ammeter is an instrument that is used to …
6. A voltmeter is an instrument that is used to …
7. The positive and negative polarity must match up with …
8. In order to for a voltmeter to measure the voltages, it does not require …

Exercise 6. Say whether these sentences are true or false.

1. The early voltmeters were based on moving coil galvanometers and were created by inserting a resistor in series with the instrument.
2. Ideally voltmeters should have finite impedance.
3. In order for a voltmeter to measure a current, the current must pass through the ammeter and hence it must be placed in a series mode inside the circuit.
4. The polarities must correspond, the positive and negative polarity must match up with the positive and negative on the circuit.
5. There are five different ways in order to measure electricity; currents and voltages.
6. While ammeters are used to measure the voltage, the voltmeter is used to measure the currents.
7. In order to get a reading with an ammeter, the circuit must be unplugged in order to attach the ammeter to the circuit.

Exercise 7. State the questions to the underlined words.

1. Electrical polarity (positive and negative) is present in <u>every electrical circuit</u>.
2. There are <u>two different ways</u> in order to measure electricity; currents and voltages.
3. <u>A voltmeter</u> is an instrument that is used to measure the voltage between two points in a circuit**.**
4. Voltmeter is placed <u>parallel</u> to the circuits they are expected to measure.
5. The loads for electrical circuits can also be <u>quite complicated</u>, such as the load on the output of a hydroelectric power generating station.
6. High voltage is used for <u>electric power transmission</u> to reduce the energy lost in the resistance of the wires.

Exercise 8. Translate the following sentences from English into Russian.

1. The relation between electric current, magnetic fields and physical forces was first

noted by Hans Christian Oersted who, in 1820, observed a compass needle was deflected from pointing North when a current flowed in an adjacent wire.
2. Because the magnetic field is polarised, the meter needle acts in opposite directions for each direction of current.
3. Moving magnet ammeters operate on essentially the same principle as moving coil, except that the coil is mounted in the meter case, and a permanent magnet moves the needle.
4. Moving iron ammeters use a piece of iron which moves when acted upon by the electromagnetic force of a fixed coil of wire.
5. A picoammeter, or pico ammeter, measures very low electrical current, usually from the picoampere range at the lower end to the milliampere range at the upper end.
6. The majority of ammeters are either connected in series with the circuit carrying the current to be measured, or have their shunt resistors connected similarly in series. In either case, the current passes through the meter or through its shunt.
7. Moving-coil instruments with a permanent-magnet field respond only to direct current.
8. A digital voltmeter measures an unknown input voltage by converting the voltage to a digital value and then displays the voltage in numeric form.
9. Any measurement that can be converted to a voltage can be displayed on a meter that is suitably calibrated; for example, pressure, temperature, flow or level in a chemical process plant.

Exercise 9. Translate the following sentences from Russian into English.

1. Идеальный вольтметр должен обладать бесконечным внутренним сопротивлением.
2. Очень опасно пытаться использовать амперметр в качестве вольтметра (подключать его непосредственно к источнику питания), что может привести к коротким замыканиям.
3. Для увеличения предела измерений амперметр снабжается шунтом (для цепей постоянного и переменного тока), трансформатором тока (только для цепей переменного тока) или магнитным усилителем (для цепей постоянного тока).
4. Самыми точными и чувствительными являются магнитоэлектрические и электродинамические амперметры.
5. В электрической цепи амперметр соединяется последовательно с нагрузкой, а при больших токах — через трансформатор тока, магнитный усилитель или шунт.
6. Для отличия вольтметра от других электроизмерительных приборов на его шкале ставят букву V.
7. Для измерения напряжения на полюсах источника тока вольтметр подключают непосредственно к зажимам источника тока.
8. В последнее время приборы со стрелочной измерительной головкой стали вытесняться приборами с цифровым индикатором на основе жидких кристаллов и светодиодов.

Exercise 10. Retell the text “ Difference between ammeter and voltmeter ”

БИБЛИОГРАФИЧЕСКИЙ СПИСОК

1. Комолова, З. П. Популярная электроника / З. П. Комолова, В. П. Новоселецкая, Н. В. Новикова. – М.: Высш.шк., 1988. – 157 с.
2. Бахчисарайцева, М. Э. English for Power Engineering Students / М. Э. Бахчисарайцева, В. А. Каширина, А. Ф. Антипова. – М.: Высш.шк., 1983. – 155 с.
3. Четвертакова М. М. Сборник текстов по электротехнике / М. М. Четвертакова. – Санкт-Петербург, 1999. – 48 с.

Заказ № от Тираж экз.
Изд-во СГУ