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Кафедра иностранных языков

ИНОСТРАННЫЙ ЯЗЫК
ЭЛЕКТРОЭНЕРГЕТИКА И ЭЛЕКТРОТЕХНИКА

Методические указания к практическим занятиям для студентов специальности 13.03.02

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Методические указания предназначены для студентов, обучающихся по специальности 13.03.02 «Электроэнергетика и электротехника», всех направленностей и согласованы с программой по иностранному языку для студентов неязыковых вузов.

Предлагаемый материал направлен на совершенствование навыков профессионально-ориентированного чтения на английском языке. Данные методические указания включают тексты на языке оригинала, а также комплекс лексико-грамматических упражнений и заданий, способствующих развитию речевой, языковой, социокультурной и информационной компетенций студентов, необходимых для общения в сфере профессиональных интересов. Предназначены для практических занятий со студентами по английскому языку.

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ПРЕДИСЛОВИЕ

Данные методические указания предназначены для учебно-методического сопровождения курса английского языка для студентов неязыковых вузов, обучающихся по специальности 13.03.02 «Электроэнергетика и электротехника» всех направленностей.

Методические указания содержат тексты научно-технического характера по энергетике и комплекс заданий с учетом профессиональных интересов обучаемых и соблюдением принципа междисциплинарности обучения. Изучение предложенного материала направлено на развитие умений просмотрового и изучающего чтения текстов по направлению подготовки, а также их перевода на русский язык с последующим использованием полученной информации для речевой практики; совершенствование навыков и умений всех видов чтения (изучающего, ознакомительного, поискового и просмотрового) и перевода специальной научно-технической литературы для извлечения информации, ознакомление с узкоспециализированной терминологией на английском языке.

Методические указания состоят из 4 разделов, включающих разное количество текстов по энергетике и электротехнике, а также для работы предлагаются разнообразные виды упражнений. Предложенные материалы предназначены как для самостоятельной работы, так и для работы в аудитории.

UNIT I. WHAT IS YOUR FUTURE OCCUPATION?

1. Try to answer the question:

Do you think you have what it takes to become an engineer?

 I like to build new things, or improve the way things work.

 I am interested in applied mathematics and physics.

 I am creative, imaginative and consider myself an idea person.

 I am good at clearly explaining technical things to others.

 I pay special attention to detail and accuracy and am not easily distracted.

 I am a good problem solver and think quickly on my feet.

 I am a great multi-tasker.

 I have an aptitude for using specialized computer software.

 I am interested in pursuing a university education that may require at least four or more years of study.

 I am quite versatile and flexible and can work on my own or with a team.

 I have well developed communication and computer literacy skills.

 I am able to travel to and from work locations.

 I think a career as an engineer is exciting and I'm up for the challenge and adventure!

2. Insert the correct words from the brackets.

1. The _ is responsible for every _ in the factory. (engineering/engineer/engine)
2. I’m a _, but I want to become a _ engineer. (mechanical/mechanic/ mechanics)

3. The lab _ maintains all the _ equipment. (technician/technical/technology)

4. The _ repairs all the _ equipment on the rig. (electrical/electrician/electricity)

3. Match the questions on the left with the answers on the right. Act out the dialogue. What have you learnt about the man?

1. What's your job?	a. Yes, I'm getting used to the new job.
2. How long have you been doing that?	b. Ok, but it's taking longer than I expected
3. Where do you work?	c. I have an apartment just outside Oslo.
4. Where do you live?	d. I'm designing a new application.
5. What languages do you speak?	e. I'm a quality control engineer.
6. How are you getting on with the plans?	f. In a factory near Jakarta.
7. What are you working on at the moment?	g. For about eighteen months.
8. Are you settling in OK?	h. English, Dutch and Mandarin.

4. Read the text about electrician Carlos Sanches. What topics does Carlos talk about?

- his education and training,
- apprenticeship,
- safety of the job,
- his duties and responsibilities,
- the equipment he uses for troubleshooting,
- the dangers of his work,
- his company.

5. Can you guess the meaning of the highlighted words from the context? Check it with a dictionary.

I'm an electrician in the oil industry. I work for BP company. I help to install, **maintain** and **repair** electrical wiring, fixtures and control equipment. This includes troubleshooting when things go wrong. A lot of

my work is outdoors. I work in all kinds of weather. Sometimes I work in very high places. During any working week, I use all of my **personal protective equipment** (PPE): a hard hat, safety glasses with side shields, safety shoes, safety gloves, hearing protection, safety harness and breathing apparatus. I also use a special insulating **rubber matting**. I can stand or sit on it when I work. It reduces the risk of shock.

Electricity creates two main **hazards.** The first is **electrocution**. If electricity enters your body, it can burn you badly or kill you. The other hazard is a **spark**. Sparks are generally hazardous, but especially in the oil and gas industry. If there is a spark in an area with **flammable** gas, of course there can be explosion.

I work very carefully and check everything. Is the electricity switched off? Am I using the right PPE? And other electricians check my work too. We look out for each other.

6. Think and answer.

1. Would you like to do Carlos's job? Why/why not?
2. What does electrical engineering (EEng) deal with?
3. Is it a popular branch of occupation in Russia?
4. What kinds of activities do engineers with the major in EEng. perform?

7. Read the text and check the meaning of the highlighted words with a dictionary.

Electrical Engineering

1. Electrical engineering – sometimes referred to as electrical and electronic engineering – is an engineering field that deals with the study and application of electricity, electronics and electromagnetism. It became an identifiable occupation in the late of the nineteenth century after commercialization of the electric telegraph and electrical power supply. Traditionally electrical engineering deals with the problems associated with large-scale electrical systems such as power transmission and motor control, whereas electronic engineering comprises small-scale electronic systems including computers and integrated circuits. Recently the difference has not become so sharp by the growth of power electronics. Now this dynamic, hi-tech branch of engineering covers the range of fields including electric power and machinery, computers and electronics, communications and control.

2. Working in this direction you may have a specialized job doing anything from light and power to designing and installing new hardware platforms; conducting networking and automation; operating virtual enterprises, internet and fiber-optics. Typical work environments include production and manufacturing industries. There are plenty of well-paid, cutting-edge jobs there, and the diversity of jobs allows you to choose the one that suits you best.
3. Electrical engineers must have at least a Bachelor's degree with the major in electrical engineering (a Bachelor of Science, a Bachelor of Engineering) for almost all entry-level engineering jobs. The next step in the career is to get the license of Professional Engineer. You have to get the upgraded professional skill and the required working experience.
4. Companies seeking to recruit new graduates frequently take part in the «Milk round». This means they visit universities and colleges, invite students to attend presentations and conduct interviews with those who are interested in employment. There is a competition to recruit the most able students. The «virtual milk round» is where this system of recruitment is provided over the Internet.
5. Your curriculum vitae (CV) is one of the most important documents presented to a potential employer. It lists academic achievements and work experience with relevant personal information. It must be written to hold the employer's attention and provide the essential information. Employers often ask applicants to supply a covering letter with their CV. This allows the applicant to go into more details as to why they are suitable for the job and they have the opportunity to address the employer on a more personal level.

8. Decide if the statement is
a. true
b. false
c. there is no information.
1. Electrical engineering (EEng.) deals with both large-scale and small-scale systems.
2. EEng. offers great job opportunities.
3. Electrical engineers are usually concerned with using electricity to transmit energy,

while electronic engineers deal with using electricity to process information.
4. A BEng. degree is enough for carrying out skillful engineering work.
5. In the USA and Canada only a licensed engineer provides engineering work for
public and private clients.
6. A CV provides background information about an applicant.

9. Which paragraph (1, 2, 3, 4, 5) is the following idea referred to?
a. Electrical Engineering became a popular profession at the end of the nineteenth century.
b. Typical work environments include production and manufacturing branches of industry.
c. There is a competition to find the most capable students.
d. Employers often ask applicants to supply a covering letter with their CV.
e. You have to get further education.

10. Choose the answer to the question:
Why is electrical engineering considered to be one of the most prestigious branches of engineering?
1. It covers the range of hi-tech engineering fields.
2. It's used for key industries.
3. It's dynamic and it relies on science.
4. It has a wide range of applications.

11. Choose the sentence that reveals the main idea of the text.
1. Adopting the latest discoveries EEng. contributes to technical progress.
2. A Bachelor's degree in Engineering gives you a chance to find a well-paid job.
3. It's easy to promote yourself and make a career working in the field of EEng.

12. Read and translate the following interview.
ROSEMARY: Come in. Please take a seat.
CHRISTINE: Thank you.
R: I'm Rosemary Pym, by the way. Branch Manager.

C: Christine Bailey. Pleased to meet you.
R: I take it you're looking for a temporary office work.
C: That's right.
R: How old are you, Christine?
C: I'm eighteen.
R: That's rather young for the kind of responsibility we give people. What experience have you had?
C: Well, I've just left school, actually, and I'm looking for a job between now and when I go to college.
R: It doesn't sound as though we can help, Christine. You see, our clients are very demanding especially when it comes to the new office technology.
C: Oh, that's no problem. I took extra classes in office skills at school.
R: Oh, that's good. Perhaps you'd like to outline what you've been doing?
C: I started by learning keyboard skills. Then I went on to learn about word processing and database management. Would you like to see my certificates?
R: Very impressive. You seem well qualified from the technical point of view. But how well do you think you'll get along with people in an office?
C: I think I'm quite adaptable. I belonged to the drama society at school, as well as working on the school magazine. And I played a bit of sport. So, I'm used to working as part of a team.
R: Sounds promising. Let's see…. There's a request from Terry's Imports for «a bright youngster»….

13. Read the CV. Act out the job-hunting interview with this candidate discussing her strong and weak points. Then make your own CV.

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Education: *Bachelor of Arts,* ABC University, New York, NY, May 2015

Double Majors: English and Latin American Studies (Spanish)
Study Abroad: Bogota, Colombia – January 2014

Related Experience: *Library Assistant,* Cervantes Library, ABC University
Sept. 2011 – present.
Perform general administrative duties to support professional staff.
Founder and leader, Harry Potter Book Club, New York, NY
Jan. 2010 – present.
Intern, Calles y Sueños Cultural Space, Bogotá Spring 2014
Assisted in teaching complimentary English lessons to community members.
Volunteer at Community Library, Queens, NY
Jan. 2009 – May 2009.
Catalogued thousands of donated books, CDs, and DVDs.
Started weekly book group for elementary students to learn basic Spanish words through listening to children's books read aloud and translated.
Summer Counselor, NY Arts Camp.
Summer 2010 – Summer 2013.
Coordinated cultural outings for children aged 10–13 i.e. trips to the theater, musical concerts, and museums including backstage conversations with artists when possible. Helped students to plan, advertise, and hold their own artistic performances and exhibitions.

14. Think and answer.

1. Where do you study at? (University, Institute, course, major, etc.)
2. When was your major set up at the University? Who is the head of your department? What famous graduates of your department do you know?
3. What special subjects do you study?
4. Do you take part in scientific research work, conferences? What do you do? What have you done (achieved) so far?

15. Read the following text and do the tasks following it.

Dear Andrew

Don't be angry with me for my long silence, but really, I was too busy to write.

As you know, I was taking exams at the university. I'm so proud to say that I'm luckily through with them and now I'm a second-year student. I am facing a difficult term as we're going to study some special subjects that is, mechanics theory, resistance of materials, mathematical models and others.

The study gets harder and harder each year and I have to spend a lot of time getting ready for seminars and labs. I'm planning to participate in a students' research conference. Next summer we'll be taking a professional training. I'm looking forward to getting down to my major, Machinery and Equipment of Oil and Gas Industry. You must remember that I follow in my father's footsteps, so I'm greatly interested in mastering my future profession. Specialists of my qualification should conduct organization, research, technological works, as well as designing and service works in oil and gas industry. I'm sure the university provides us for all the necessary facilities. The faculty where I study, that is the oil and gas faculty, has well-equipped lecture rooms, computer classrooms and laboratories.

You know, in the 3d year we are going to spend a lot of time studying special subjects and working in specialized laboratories.

In the 4th year we'll submit a graduation paper and get a Bachelor Degree. So, according to our major we'll be able to work as mechanic engineers at oil and gas extractions, refineries and research institutes. And if I graduate successfully, I'll have a chance to apply for a job in a big international company, for example *SHELL*. That is why I'll have to study English hard not to fail the interview.

Well, that's all about me so far.

Write to me back.

Best wishes, *Max*

16. Find the English equivalents for the following words and phrases in the text.

Сдавать экзамены, успешно завершить что-либо, второкурсник, усложняться, готовиться, участвовать, исследование, практика,

стремиться, овладеть, представить выпускную работу, нефтеперерабатывающий завод, потерпеть неудачу.

17. Choose the true statements and add more information. Correct the false ones.

1. Max's speciality deals with extracting industry.
2. He is studying some special subjects this year.
3. Max has already had professional training.
4. At the university Max can take part in scientific research work.
5. It is a degree course.
6. His department is well-equipped.
7. He has to do a graduation paper at the end of the course of studies.
8. Max can easily find a well-paid job with his qualification.

18. Think and answer.

1. Why did you decide to become an electrical engineer? Did anybody advise you to choose a career in this field?
2. What is the full name of your department?
3. What subjects are taught at your faculty?
4. Do you have any specialized subjects?
5. What does engineering mean to you?
6. What can you say about the role of an electrical engineer in the industrialized society?
7. What skills and abilities should an electrical engineer have?

19. Prepare a short presentation about your future profession (10 - 15 sentences).

Useful phrases

As far as I know… To my knowledge… If you ask me… I think… In my opinion… I'd like to tell you…

20. Make up a vocabulary list of 15–20 words and phrases that you have learnt in Unit I.

UNIT II. THE NATURE OF ELECTRICITY

1.Translate the following international words:

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

2. Read and translate 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.

3.Try to give the English equivalents for the words below.

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

4. Try to complete the sentences using the text.

1. Energy must not be confused with …
2. Electricity is produced by …
3. The effects of heat and light are produced by …
4. According to the accepted atomic theory all matter is …
5. Any object is composed of …
6. Matter is defined as …
7. The atom consists of …
8. The smallest particle of matter is …
9. Electrons are …
10. Most theories are based on …

5. Translate the following text and answer the questions given above the text.

1) What is the difference between positively charged objects and negatively charged objects?
2) What is electric charge? What are the types of electric charges?
3) How does electrical activity manifest itself in the universe?
4) Is electricity a many-sided form of energy? How does it make our life comfortable?

5) What are the two forms of electric charge?
6) Can an object be uncharged?

ELECTRICITY

Electricity is one of the basic forms of energy. Electricity is associated with electric charge, a property of certain elementary particles such as electrons and protons, two of the basic particles that make up the atoms of all ordinary matter. Electric charges can be stationary, as in static electricity, or moving, as in an electric current. Electrical activity takes place constantly everywhere in the universe. Electrical forces hold molecules together. The nervous systems of animals work by means of weak electric signals transmitted between neurons (nerve cells). Electricity is generated, transmitted, and converted into heat, light, motion, and other forms of energy through natural processes, as well as by devices built by people.

Electricity is an extremely versatile form of energy. It can be generated in many ways and from many different sources. It can be sent almost instantaneously over long distances. Electricity can also be converted efficiently into other forms of energy, and it can be stored. Because of this versatility, electricity plays a part in nearly every aspect of modern technology. Electricity provides light, heat, and mechanical power. It makes telephones, computers, televisions, and countless other necessities and luxuries possible.

Electricity consists of charges carried by electrons, protons, and other particles. Electric charge comes in two forms: positive and negative. Electrons and protons both carry exactly the same amount of electric charge, but the positive charge of the proton is exactly opposite the negative charge of the electron. If an object has more protons than electrons, it is said to be positively charged; if it has more electrons than protons, it is said to be negatively charged. If an object contains as many protons as electrons, the charges will cancel each other and the object is said to be uncharged, or electrically neutral.

6. Try to match each word from the box with one of the definitions.

neuron, charge, molecule, proton, atom, energy, particle, matter,

electron, cell

1) very small piece of matter, part of an atom;
2) the smallest unit, consisting of a group of atoms, into which a substance can be divided without a change in its chemical nature;
3) very small piece of matter with a positive electric charge that forms part of the nucleus of an atom;
4) physical substance in general that everything in the world consists of;
5) a cell that carries information within the brain and between the brain and other parts of the body;
6) the smallest part of a chemical element that can take part in a chemical reaction;
7) the ability of matter or radiation to work because of its mass, movement, electric charge, etc.;
8) the smallest unit of living matter that can exist on its own;
9) very small piece of matter with a negative electric charge, found in all atoms;
10) the amount of electricity that is carried by a substance.

7. Define the function of the verb to have.

1. Electricity has many useful properties: it is clean and generates no by-products. 2. The latest laser devices have found application in medicine. 3. It has many important applications in industry as well as in our houses. 4. No other source of energy has been so widely used as electricity. 5. Electricity has provided mankind with the most efficient source of energy. 6. We have many various electric devices in our houses. 7. Our lives have been completely transformed with the appearance of electricity. 8. The generator replaced batteries that had been used before. 9. The consumption of electricity has doubled every ten years.

8. Make up dialogues on the following topics:

a) important inventions in the field of electrical engineering:
b) areas of application of electricity in the national economy and human life; c) importance of the invention of electricity.

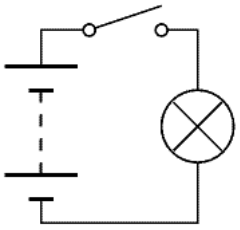
UNIT III. CURRENT AND CIRCUITS

1. Memorize the words.

battery - батарея
to break - размыкать
break - обрыв, разрыв (цепи)
broken - разомкнутый
broken circuit - разомкнутая цепь
to burn out - перегорать
cell - гальванический элемент, батарейка
charge - заряд
complete circuit - замкнутая цепь
component - элемент цепи
connection - соединение
current - (электрический) ток; сила тока
diagram - схема, чертеж
(electric) circuit - электрическая цепь
electricity - электричество
energy - энергия
flow - поток, протекание (тока)
lead - вывод (детали)
power supply - источник (электро)питания; электроснабжение
short - короткое замыкание
switch - выключатель, переключатель
voltage - напряжение
voltage source - источник напряжения
wire - проволока, провод
wrong connection - ошибочное соединение

2. Read ant translate the text.

Electricity is the flow of charge around a circuit carrying energy from the battery (or power supply) to components such as lamps and motors. Electric current can flow only if a circuit is complete. Electric current flows through wires from the battery to circuit components and back to the battery again. The diagram shows a simple circuit. The components of the circuit are a battery, wires, a switch and a lamp. The



switch works by breaking the circuit.
When the switch is open the circuit is broken, electricity cannot flow and the lamp is off. With the switch closed the circuit is complete allowing electricity to flow and the lamp is on.

What is "open circuit"?

We say "open circuit" when there is no connection. "Open circuit" is a break in some part of a circuit (for example a switch in the open or off position) or a fault (for example a broken wire or burnt-out component).

What is "short circuit"?

A "short circuit" is a connection with very low resistance such as a wire which provides a very easy way for current. A short circuit is a fault or wrong connection. For example, if the battery leads contact one another, they create a connection with very low resistance and make a short circuit. Current will flow though this short circuit instead through the circuit. This stops the circuit working. Short circuit can be the cause of a fire, because large current flows through the leads and the battery, and they will become very hot.

Voltage and current (complete circuit)

Current can flow when the switch is closed and the circuit is complete. The lamp is glowing.

Voltage but no current (open circuit)

Current cannot flow because the switch is open and the circuit is broken. The lamp is not glowing.

No voltage and no current (open circuit, no voltage source)

Current cannot flow because without the cell there is no source of voltage. The lamp is not glowing.

3. Answer the questions.

1. What is electricity?
2. What circuit is called complete?
3. What happens if a short circuit takes place in an electric circuit?
4. What are the basic components of any electric circuit?
5. In which circuit can there be voltage but no current?

4. Translate into English.

1. Когда переключатель выключен, цепь разомкнута и лампа не горит.

2. Когда переключатель включен, электричество течет по цепи и лампа горит.
3. Если лампа перегорает, цепь размыкается.
4. Электрический ток течет через провода от батареи к элементам цепи и назад к батарее.
5. Короткое замыкание может быть причиной пожара.

5. Memorize the words.
alternating - переменный (ток)
to apply - применять, прилагать
to consider - рассматривать, обсуждать
cycle - цикл
direct - постоянный (ток)
direction - направление
frequency - частота
mains electricity - сетевое электричество
necessary - необходимый, нужный
provided (that) - при условии, что
sine wave - синусоидальная волна
single-phase - однофазный
three-phase - трехфазный
to use – использовать

6. Read ant translate the text.

TYPES OF CURRENT

Current is flow of electricity through a circuit. Let us consider two main types of current: direct and alternating. Direct current (DC) flows through a conducting circuit in one direction only. It flows provided a direct voltage source is applied to the circuit. The current from a cell is direct current.

Alternating current (AC) is current that changes its direction of flow through a circuit. It flows provided an alternating voltage source is applied to the circuit. The electricity supplied to homes and other buildings – called mains electricity – is alternating current. Alternating current flows in cycles. The number of cycles per second is called the

frequency of the current. For example, in the UK, AC supply is 50 Hz – it alternates 50 times per second.

The current supplied to most homes is single-phase – it forms one sine wave. In factories and large buildings, which have powerful electrical equipment, the supply if often three-phase – effectively three currents, each with a different phase (timing). This provides a smoother supply as it reduces the gaps between the voltage peaks.

It is easy to transform AC power from one voltage to another using a transformer. Transformers are also used to step down the voltage at the receiving point of the line to the low values that are necessary for use. AC can be changed into DC but this is seldom necessary.

7. Answer the questions.

1. What is current?
2. What types of current do you know?
3. What type of current is called alternating current?
4. What type of current is called direct current?
5. What is the frequency of the current?
6. What device is used to transform AC power from one voltage to another?
7. Is it often necessary to change AC into DC?

8. Choose the correct answer.

1. DC is current that …
a) changes its direction of flow
b) flows in one direction

2. AC flows provided …
a) a direct voltage source is applied
b) an alternating voltage source is applied

3. The 50 Hz alternating current …
a) flows in one direction 50 times per second
b) flows in one direction 50 times and in the other direction 50 times per second

4. AC …

a) can be changed into DC
b) cannot be changed into DC

9. Read and translate the text given below.

to be certain	быть уверенным
as well	также, тоже
to consider	рассматривать
to decrease	уменьшать
to determine direct current	измерять постоянный ток
direction	направление
to increase	увеличивать
to appear	появляться
to meet requirements	удовлетворять требованиям
particle	частица
to require statement	требовать констатации
subject	предмет
terminal	клемма
to pass through	проходить через
wire	провод, проволока
solid	твердое вещество
both	оба, обе; и тот и другой

ELECTRIC CURRENT

Ever since Volta first produced a source of steady continuous current, men of science have been forming theories on this subject. For some time they could see no real difference between the newly-discovered phenomenon and the former understanding of static charges. Then the famous French scientist Ampere (after whom the unit of current was named) determined the difference between the current and the static charges. In addition to it, Ampere gave the current direction: he supposed it to flow from the positive pole of the source round the circuit and back again to the negative pole.

We consider Ampere to be right in his first statement but he was certainly wrong in the second, as to the direction of the current. The student is certain to remember that the flow of current is in a direction opposite to what he thought. Let us turn our attention now to the electric

current itself. The current which flows along wires consists of moving electrons. What can we say about the electron? We know the electron to be a minute particle having an electric charge. We also know that that charge is negative. As these minute charges travel along a wire, that wire is said to carry an electric current.

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 meet1ndustrial 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. A.c. finds wide application for lighting, heating, industrial, and some other purposes.

One cannot help mentioning here that Yablochkov, Russian scientist and inventor, was the first to apply a.c. in practice.

10. Translate the following sentences and define the infinitive constructions. 1. Lightning proved to be a discharge of electricity. 2. The student is certain to know that alternating voltage can be increased and

decreased. 3. Heat is known to be a form of energy. 4. We know the electrons to flow from the negative terminal of the battery to the positive one. 5. This scientist seems to have been working on the problem of splitting the atom. 6. The students saw the thermometer mercury fall, to the fixed point. 7. Coal is considered to be a valuable fuel. 8. We know many articles to have already been written on that subject. 9. The electrolytes appear to change greatly when the current passes through them.

11. Find the infinitive constructions in the text and define them.

12. Translate the following sentences using the infinitive. 1. Чтобы быть хорошим инженером, необходимо много читать и учиться. 2. Пирометр используется для измерения температуры горячих металлов. 3. Человек научился расщеплять атомы для того, чтобы получить большое количество энергии. 4. Учёные пытаются решить проблему, связанную с новыми явлениями электричества. 5. Громоотвод – металлическое приспособление для защиты зданий от молний. 6. Проводить опыты с атмосферным электричеством было очень опасно в то время. 7. Намагнитить предмет – это значит поместить в его поле магнит.

13. Form six sentences combining suitable parts of the sentence given in the columns.

1. The electric current is	1…. the energy of position.
2. Kinetic energy is	2. …electricity at rest.
3. Static electricity is	3…. the flow of moving electrons.
4. Potential energy is	4…… the energy of motion.
5. The direct current is	5…. a discharge of electricity.
6. Lightning is	6…. the flow of electrons in one direction.

14. Explain why.

1. static electricity cannot be used to light lamps, to boil water, to run electric trains and so on.
2. voltage is increased and decreased.
3. the unit of electric pressure is called the volt.
4. students must learn English.
5. Ampere was wrong as to the current direction.
6. the current is said to flow from the positive end of the wire to its negative end.

15. The following statements are not true to the fact. Correct them.

1. Electrons flow from the positively charged terminal of the battery to the negatively charged terminal. 2. Ampere supposed the current to flow from the negative pole to the positive. 3. Static electricity is used for practical purposes. 4. Static electricity is not very high in voltage and it is easy to control it. 5. To show that the charges are unlike and opposite Franklin decided to call the charge on the rubber positive and that on the glass negative. 6. Galvani thought that electricity was generated because of the contact of the two dissimilar metals used. 7. Volta took great interest in atmospheric electricity and began to carryon experiments. 8. The direct current is known to flow first in one direction and then in the opposite one. 9. The direct current used for power and lighting purposes is assumed to go through 50 cycles a second.

UNIT IV. ELECTRIC MOTORS.

1. Memorize the words to be ready to read and speak about motors.

rotary motion – вращательное движение
an appliance – прибор, приспособление

The motor produces the rotary motion which turns our machinery and various appliances.

commutator – коллектор, переключатель
a brush – щётка

The motor consists of an armature with windings, a commutator and brushes.

starting torque – пусковой момент

A very strong magnetic field is needed to provide a powerful starting torque.

a field coil – катушка обмотки возбуждения

A series field coil is used for providing a strong field necessary for starting.

a shunt field winding – шунтовая обмотка возбуждения

A shunt field winding provides the running conditions.

Small electric motors are used in household appliances.

***2. Give the English equivalents of the following words and word combinations*:**

производить, превращать, вращательное движение, якорь, коллектор, обмотка, щётка, магнитное поле, пусковой момент, последовательная обмотка возбуждения, бытовые приборы, пылесос, стиральная машина.

3. Read and translate the text.

MOTORS

We know the generator to produce electrical energy. To use this generated energy we need another machine to convert electrical energy into mechanical one. The electric motor is a machine which produces the rotary motion which turns our machinery and various appliances.

The motor consists of an armature with two windings, a commutator and brushes. A very strong magnetic field is necessary to provide a powerful starting torque. It is achieved by adding a series winding to the magnetic field. The series winding is connected in series with the armature. The heavy starting torque passing through the armature winding now passes through the series field coil. This starting torque provides a strong field necessary for starting. The shunt field winding provides the running conditions.

There is a wide variety of d.c. and a.c. motors. Direct-current motors are of three principal kinds and are named according to the manner in which their coils are connected to the armature. They are named series, shunt and compound motors.

Alternating current motors may be single-phase or polyphase ones. They may be divided into two kinds: synchronous and induction motors.

Numerous electric motors are used in industry, transport, mines, farms and even houses. They are the moving elements in various household appliances, such as vacuum cleaners, washing machines, refrigerators and the like. Motors are readily switched on, at will, and they continue running until we switch them off again. Generally speaking, the motor revolutionized industry by making use of energy that can be transmitted from great distances.

4. Answer the questions to the text using the following introductory phrases: *as far as I know; I think quite so; it is really; as far as I remember.*

1. What is the motor used for?
2. What parts does the motor consist of?
3. What is necessary to provide a powerful starting torque?
4. How is the series winding connected to the armature?
5. What winding provides the running conditions?
6. What kinds of d.c. motors are there?
7. What kinds of a.c. motors are there?
8. Where are numerous electric motors used?
9. What device revolutionized industry?

5. Agree or disagree using "That's not right, That's not true".

Модель: The transformer is used to produce the electrical energy.
That's not right. The generator is used to produce the electrical energy.

1. The generator is used to convert the electrical energy into mechanical one.
2. The motor produces the elliptical motion.
3. The motor consists of an armature with a pair of electromagnets.
4. A very weak magnetic field is needed to provide a powerful starting torque.
5. The series winding is connected in parallel with the armature.
6. Motors are used only in industry.

6. Agree with the following statements using "As far as I know" («Насколько мне известно…») и "According to the text" («Согласно тексту…»)

Модель:- The generator is used for producing electrical energy.

-That's right. As far as I know the generator is used for producing electrical energy.
1. The motor is used for converting electrical energy into mechanical one.
2. The motor produces the rotary motion which turns our machinery.
3. A strong magnetic field is provided by adding a series winding to the magnetic coil.
4. The series winding is connected in series with the armature.
5. The shunt field winding provides the running conditions.
6. There are three kinds of d.c. motors: series, shunt and compound ones.
7. Alternating current motors may be single-phase or polyphase ones.
8. There are two kinds of a.c. motors: synchronous and induction ones.
9. Electric motors are used in industry, transport, farms and even houses.

7. Translate the sentences. 1. Электрический двигатель используется для превращения электрической энергии в механическую энергию. 2. Двигатель состоит из якоря с двумя обмотками, коллектора и щёток. 3. Мощный пусковой момент обеспечивает сильное возбуждение, необходимое для пуска. 4. Существует большое разнообразие двигателей постоянного и переменного тока. 5. Электрические двигатели используются в бытовых приборах, таких как пылесосы, стиральные машины, холодильники, магнитофоны и тому подобное.

8. In the right column find the Russian equivalents of the word combinations.

1.current-carrying conductor	a) двигатель с последующим возбуждением
2. single-loop d.c. motor	b) магнитный поток
3. magnetic field system	c) ток возбуждения (намагничивание)
4. excitation current	d) двигатель с параллельным возбуждением
5. armature current	e) двигатель постоянного тока с одним контуром

6.mechanical output current	f) обратная электродвижущая сила
7. external circuit	g) проводник, несущий ток
8. back e.m.f.	h) механическая выходная мощность
9. shunt wound motor	i) ток якоря
10. series wound motor	j) линейный двигатель
11. compound wound motor	k) редукционная (замедляющая) коробка передач
12. magnetic flux	l) система магнитного поля
13. speed-reduction gearbox	m) двигатель постоянного тока со смешанным возбуждением
14. linear motor	n) внешний контур (цепь)

9. Read the text "Motor effect" without a dictionary.

MOTOR EFFECT

The motor effect can be regarded as the opposite of the generator effect. In a generator, when a conductor is moved through a magnetic field, a current is induced in the conductor (more correctly, an e.m.f. is induced in the conductor, but the outcome is usually a current in the conductor). In a motor, a current-carrying conductor which is situated in a magnetic field experiences a force which results in the conductor moving (strictly speaking, the force is on the current and not on the conductor, but the current and the conductor are inseparable).

10. Work in pairs. Agree or disagree with the following statements.

1. The motor effect can be regarded as the same as the generator effect.
2. In a generator, when a conductor is moved through a magnetic field, an e.m.f. is induced in the conductor.
3. The motor effect can be regarded as the opposite of the generator effect.
4. In a motor a current-carrying conductor experiences a force which makes the conductor move.
5. A current-carrying conductor is situated in a magnetic field.

6. The current and the conductor are separable.

11. Read and translate the text given below.

CONDUCTORS, SEMICONDUCTORS AND INSULATORS

A conductor is an electrical material (usually a metal) which offers very little resistance to electrical current. The reason that certain materials are good conductors is that the outer orbits (the valence shells) in adjacent atoms overlap one another, allowing electrons to move freely between the atoms.

An insulator (such as glass or plastic) offers a very high resistance to current flow. The reason that some materials are good insulators is that the outer orbits of the atoms do not overlap one another, making it very difficult for electrons to move through the material.

A semiconductor is a material whose resistance is midway between that of a good conductor and that of a good insulator. Commonly used semiconductor materials include silicon and germanium (in diodes, transistors and integrated circuits), cadmium sulphide (in photoconductive cells), gallium arsenide (in lasers, and light-emitting diodes), etc. Silicon is the most widely used material, and it is found in many rocks and stones (sand is silicon dioxide).

12. Agree or disagree with the following statements using introductory phrases: You are quite right; It is really so; I quite agree with you; That's wrong; On the contrary; I'm afraid you are wrong.

1. A conductor offers very little resistance. 2. Commonly used semiconductor materials are different metals. 3. Conductor materials are usually metals. 4. An insulator offers very little resistance. 5. Semiconductor materials such as silicon and germanium are used in diodes, transistors, integrated circuits. 6. It is very difficult for electrons to move through the material in insulators. 7. A semiconductor resistance is midway between that of a good conductor and that of a good insulator.8. Electrons move freely between the atoms in semiconductors. 9. Insulator materials are glass and plastic.

13. Dramatize the dialogues.

1.

– Я знаю, что ты учишься на энергетическом факультете. Объясни мне, пожалуйста, что такое проводник и диэлектрик.
– С удовольствием. Проводник – это материал, который оказывает очень маленькое сопротивление электрическому току, то есть проводит ток. А диэлектрик – это материал, который оказывает очень большое сопротивление электрическому току. Практически он ток не проводит.
– Как я понял, полупроводник – это что-то среднее между проводником и диэлектриком. Какой материал может быть хорошим проводником, диэлектриком и полупроводником?
– Металлы – хорошие проводники. Хорошие диэлектрики стекло и пластмассы. Обычно используемые полупроводниковые материалы – это кремнезем, германий, сульфид кадмия. 27

2.
– Интересно, чем это ты занимаешься?
– Готовлюсь к зачёту по электротехнике. Насколько я помню, ты уже сдал его. Проверь меня, пожалуйста.
– Хорошо. Как зависит электрический ток от напряжения?
– Ну, это просто. Чем больше напряжение источника, тем больший он имеет потенциал для производства тока в цепи.
– Правильно. А что такое разница потенциалов?
– Электрический потенциал между двумя точками в цепи известен как разница потенциалов. А напряжение, которое производит ток, – электродвижущая сила.
– А ток – это жидкость, которая течёт внутри проводов, не так ли?
– Ну, уж нет, ты меня не собьёшь. Ток в цепи появляется благодаря движению положительно заряженных частиц к отрицательно заряженному полюсу.
– Отлично! Интересно, почему же ты не сдал этот зачёт с первого раза.

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