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УПРАВЛЕНИЕ ДИСТАНЦИОННОГО ОБУЧЕНИЯ И ПОВЫШЕНИЯ
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Учебное пособие

по обучению чтению текстов по специальности

«Конструкторско- технологическое обеспечение машиностроительных производств»

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Аннотация

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UNIT 1

1. Прочтите текст и переведите его на русский язык.

THE CONCEPT OF ELECTRICAL CURRENT

In the beginning of the 17th century Sir William Gilbert discovered that many substances could be electrified by friction. Gilbert named this effect "electric" after the word "electron" — the Greek name for amber. In 1756 the great Russian scientist M. V. Lomonosov was the first to make theoretical analysis of electrical phenomena. At present the nature of electrification is explained by the electron theory. According to the modern theory all matter is composed of atoms or tiny particles. There are many kinds of atoms. Each atom consists of a nucleus, a small positively charged mass and a number of lighter negatively charged particles called electrons, which revolve around the nucleus. Normally each atom of a substance is electrically neutral, or it has equal amounts of negative and positive charges, i.e. produces no electrical effects. If the number of negative charges is not equal to the number of positive charges, the matter will produce electrical effects. When an electric charge is at rest it is spoken of as static electricity, but when it is in motion it is referred to as an electric current. In most cases, an electric current is described as a flow of electric charges along a conductor. Not all substances are good conductors of electricity, as a general rule metals are good conductors of electricity, whereas nonmetals are poor conductors. The poorest of conductors are commonly called insulators or nonconductors. There are a large number of substances that are neither good conductors of electricity nor good insulators. These substances are called semiconductors. An electric current which flows in the same direction through a conductor or a current which does not change its polarity is called a direct current or a continuous current. Its abbreviation is D. C. An alternating current (A. C.) flows first in one direction and then in the other. An electric circuit is a path through which an electric current flows. This is a complete path along which electrons can transmit their charges. An electric circuit includes a battery, generator, or magnetic means for producing current flow. Some portion of the circuit is made to do useful work. The circuit is said to be open when no



charges can move due to a break in the path. The circuit is said to be closed when no break exists — when switches are closed and all connections are properly made.

2. Найдите в тексте и выпишите:

1.интернационализмы; 2.термины по электричеству.

3. Дайте краткие определения следующих понятий на англ.яз.:

an atom, static electricity, electric current, direct current, alternating current, an electric circuit, an open circuit, a closed circuit.

4.Найдите в тексте предложения отражающие главную мысль и переведите их.

5.Выпишите из текста ключевые слова и словосочетания.

6.Составьте аннотацию к тексту на английском языке(6-7 предложений).



UNIT 2

1. Прочтите текст и передайте его содержание на русском языке.

BATTERIES

Batteries as sources of electrical energy are the result of a long series of experiments which started with the discoveries of Alessandro Volta, an Italian scientist, more than one hundred years ago. Today battery cells are manufactured in two common forms: A) dry cells, used in flashlights, portable radios, etc., and B) wet cells, used in automobiles, airplanes, boats, etc. The voltaic cell is composed of three parts, a pair of dissimilar metal plates called electrodes, a dilute acid solution called the electrolyte, and a nonconducting container called the cell. In a glass container filled with sulphuric acid there are two plates: one copper and the other zinc. If the two plates are connected by a copper wire, electricity will flow through it from the copper plate to the zinc plate. This may be shown by the wire becoming hot. If an ammeter is connected between the plates or electrodes, as they are now called, it will indicate that an electric current is flowing. The electrode from which electricity flows is termed the positive electrode and the receiving electrode is termed the negative electrode. Thus for the voltaic cell the copper plate is the positive electrode and the zinc plate the negative electrode. A copper wire will convey electricity and is called an electrical conductor. Copper, aluminium and silver are outstandingly good conductors. Conductors must be surrounded by protective material which does not conduct electricity and prevent it to leak away. Materials which do not conduct electricity are called electrical insulators; there are many common examples—glass, wood, rubber, some plastics, "insulation" tape. Remember that faulty insulation is dangerous and leads to unwanted electrical flow and probably to local overheating. If two or more cells are connected together, they form what is called a battery. In this diagram the battery is composed of four dry cells connected in series. By series connection it is meant that the (+) terminal of one cell is connected to the (—) terminal of the next. The purpose in connecting two or more cells in series is to obtain a higher emf than that available with one



cell alone. Each cell produces an emf of 1.5 volts, so that if the voltmeter is disconnected to the points, it will indicate 1.5 volts between A and 5, 30 volts between A and C, 4.5 volts between A and D and 6 volts between A and E. The common flashlight contains several dry cells connected in series.

2. Выпишите из текста интернационализмы.

3. Проанализируйте состав следующих слов:

flashlight, airplane, dissimilar, nonconducting, outstanding, unwanted, overheating, zinc-coated, container.

4. Переведите словосочетания:

battery cell, dry cell, wet cell, metal plate, glass container, copper wire, zinc plate, a round carbon rod, liquid electrolyte, a dilute acid solution.

5. Подберите существительные к глаголам:

to be composed, to produce plates, to connect electricity, to conduct acid solution, to contain batteries, to consist of an electrolyte (electrodes), to manufacture.

6. Переведите на английский язык сочетания слов и предложения:

Источник электрической энергии; состоит из трех частей; наполненный серной кислотой; электрод называется положительным, если...; медная проволока проводит электричество.; Материалы, которые не проводят электричество, называется изоляционными.; Чем больше элемент, тем больше электрический ток.; Элементы, соединенные последовательно.

7. Вставьте пропущенные слова и выражения:

1. A battery is a source of..... 2. Battery cells are manufactured in..... 3. The voltaic cell is composed of..... 4. Dissimilar metal plates..... 5. A dilute acid solution.....



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6. If an ammeter is connected..... 7. The positive electrode is..... 8. The negative electrode is..... 9. are good conductors. 10. are called electrical insulators. 11. Cells connected together form..... 12. Series connection means.....



UNIT 3

1. Прочитайте текст и передайте его содержание на русском языке.

POWER TRANSMISSION

A transformer is an electrical device by which the electromotive force of a source of alternating current may be increased or decreased. They are widespread in long-distance power transmission as well as in telephones, radio transmitters and receivers, television and etc. Nearly all transformers come under one of the two following classes: step-up, and step-down transformers. In the transmission of electrical energy over wires for long distance, transformers are practically indispensable. At the power house in the distant mountains, for example, electric current is generated by huge alternating current generators at the relatively low voltage of several thousand volts. If an attempt were made to transmit this electrical energy, at a voltage of say 2,200 volts, over many miles of wire cable to a distant city, the current would be so large that nearly all of the energy would be consumed in heating the power line. The heat generated (it should be remembered) is proportional to the square of the current ($\text{heat} = 0.24/2 R I^2$). To avoid large heat losses, transformers at the power house step the voltage up to some 220,000 volts before switching the current onto the power line. Since the voltage in the case cited is increased one-hundred fold, the current drops by the same proportion to one-hundredth. Since the square of $1/100$ is $1/10,000$ the heat loss along the transmission line is only one ten thousandth of what it would have been had the transformer not been used. At the city end of the power line, a transformer substation steps the voltage down to something like its original value of 2,200 volts. From there branch lines distribute the power to various sections of the city where smaller transformers, one near each group of several houses, step it down again to the relatively safe voltage of 110 to 220 volts.



2.Переведите следующие словосочетания:

long- distance power transmission, radio transmitter, alternating current generators, wire cable, heat losses, power line, transmission line, at the city end.

3.Сгруппируйте синонимы:

to step up, part, to step down, to increase, to decrease ,not far, too, as, since, as well as, section, different, near, various.

4.Образуйте с помощью суффиксов слова однокоренные с данными: (например: possess-possession).

generate, relate, transmit, transform, receive, distant, consume.

5.Найдите в тексте предложения отражающие главную мысль и переведите их.

6. Составьте аннотацию к тексту(6-7 предложений) на английском языке.



UNIT 4

1. Прочтите текст и передайте его содержание на русском языке.

A DIESEL ENGINE

A Diesel engine is a machine which produces power by burning oil in air which has been quickly compressed to a high pressure by a piston moving in a closed cylinder. As it moves upwards it compresses the air above it into a smaller and smaller volume. If the final volume of the air is one twenty-fifth of its original volume, the engine is said to have a compression ratio of 25. Here the air in the cylinder is highly compressed and is also very hot. (Have you not noticed how your bicycle-pump gets hot when you pump up your tyres?) At this stage of the cycle of operation oil is injected into the hot air. The oil ignites instantaneously. The heat of its combustion raises the temperature of the air still higher and so the pressure of the enclosed air is very much increased also. The piston is therefore forced down again violently. This second stroke of the piston is called the working-stroke. After reaching the bottom of its working-stroke the piston begins to rise again. Its purpose now is to sweep the products of combustion from the cylinder. So a valve is opened to let the spent gases escape to the exhaust pipe as the piston rises to the top of its third stroke. The fourth stroke of the piston is downwards again. The exhaust valve is closed and an inlet valve is opened to allow fresh air to refill the cylinder. After four strokes, two up and two down, the cylinder is again in the condition we began with. We say that it has completed its four-stroke cycle. A Diesel engine usually has four cylinders which fire in turn. The four pistons are connected to a rotating crankshaft so that the working-stroke of one piston is always available to drive the three simultaneously non-working-strokes of the other pistons. The remaining energy of the working-stroke is available for the external work the Diesel engine has to do.

2. Ответьте на вопросы к тексту:

1. How does a Diesel engine produce power? 2. When is the



engine said to have a compression ratio of 25? 3. What happens to the air in the cylinder when the piston is at its highest position? 4. How does the oil ignite? 5. When is the piston forced down again? 6. What is the second stroke of the piston called? 7. When does the piston begin to rise again? 8. How does fresh air refill the cylinder? 9. How are the four pistons connected to the rotating crankshaft?

3.Образуйте производные от слов (например: complete-completion):

press, inject, work, produce, burn, operate.

4.Составьте предложения, употребив следующие группы слов:

to produce power..... ; the piston moves up (down)..... ; to compress the air..... ; if we say that the engine has a compression ratio of..... , we mean..... ; oil is injected into..... ; the oil ignites..... ; during the working-stroke..... ; the exhaust valve is opened during..... ; in order..... ; the exhaust valve is closed and the.... is opened..... ; the four pistons of the Diesel engine are connected to.....

5.Проанализируйте в тексте все ing - формы и определите функции слов с окончанием - ed.

6.Переведите на русский язык следующие термины и словосочетания:

a Diesel engine, a compression stroke, a compression ratio, bicycle-pump, working-stroke, exhaust-pipe, exhaust-valve, inlet-valve, the four-stroke cycle, rotating crankshaft, non-working-stroke, a petrol engine, induction coil, piston, cylinder.

7.Составьте аннотацию к тексту на английском языке (6-7 предложений).



UNIT 5

1. Прочтите текст и передайте его содержание на русском языке.

PRESSURE MEASUREMENTS. PRESSURE GAUGES

The various types of pressure gauges cover pressures up to 10,000 p.s.i.; also vacuum, differential and absolute pressures. For low pressure ranges from 0—2V w.g. up to 0—10 p.s.i. balanced, non-corrodible metal diaphragm movement is used, and these instruments are specially recommended for precise indication of low pressures or draught in boiler plant. For pressures from 0—10 p.s.i. a phosphor bronze or tempered steel Bourdon tube is employed. The dial type can be of 4", 6" or 9" diameter and the edgewise type has a 9" or 6" curved scale. A servo-operated positioning mechanism is available to operate indicating, recording and/or controlling instruments on ranges down to 0—0.2" w.g.

PRESSURE RECORDERS

Pressures, vacuum or suction, or combined vacuum and pressure, absolute or differential pressure can be recorded on two types of recorders—the disc chart type and the strip chart type. The maximum pressure that may be recorded is 10,000 p.s.i.

LEVEL, DEPTH, VOLUME OR FLOW MEASUREMENT

A special adaptation of a pressure gauge is produced for the indication of depth, level or volume of oil, water or other liquid in tanks, both for land or marine use, or the depth of water in rivers, harbours, dams, waterworks, etc. In the principle employed, air is pumped by a compressor or hand-pump into a stand-pipe and/or diving-bell and the liquid is forced out. The pressure of air which displaces the liquid is a measure of the head of the liquid. By the use of a manifold cock, readings can be made on one indicator of the levels in a number of tanks. Alternatively a pressure bulb may be coupled direct to the instrument to give continuous readings. Differential gauges can be calibrated in terms of flow, recording gauges having square



law charts. A differential pressure gauge can also be used to measure the difference between two liquid levels. It may be used for the determination of the specific gravity of a liquid. A recorder may be used to provide a continuous and permanent record on a chart of any of these variables.

2. Ответьте на вопросы к тексту:

1. What types of pressure gauges are used? 2. What is the difference in the appearances of the dial type and the edgewise type pressure gauges? 3. What maximum pressure can be recorded by means of a pressure recorder? 4. What else can a pressure gauge indicate? 5. What is the principle employed in the operation of the pressure gauge? 6. What types of differential gauges are available? 7. What can a differential pressure gauges measure?

3. Закончите предложения:

1. Pressure gauges are used to measure..... 2. There are the following types of..... 3. 10.000 p.s.i. is the..... 4. Special pressure gauges are used for.....

4. Дайте русский эквивалент следующих слов:

non-corrodible, servo-operated, edgewise, hand-pump, water-works, stand-pipe, diving-bell, displace.

5. Составьте предложения со следующими сочетаниями слов:

pressure gauges, to measure pressure, to determine the specific gravity, the ranges of pressure, to be available.

6. Найдите в тексте предложения, отражающие главную мысль.

7. Составьте аннотацию к тексту(6-7 предложений).



ADDITIONAL TEXTS.

TEXT 1.

A. S. POPOV — INVENTOR OF THE RADIO

The wireless receiving set or radio is one of the greatest achievements of human genius. Priority in the invention of radio belongs to the Russian scientist Popov. On the 7th of May we celebrate Radio Day because on that day in 1895 the Russian scientist Alexander Popov demonstrated his first radio set to a meeting of the Russian Physical and Chemical Society. A. S. Popov was born in 1859 in the Urals. While at school he spent all his free time on physics and mathematics. He studied at St. Petersburg University and graduated from it with honours, but was not satisfied with the conditions of the laboratories of the University and accepted the post of teacher in the Mining School¹ in Kronstadt. There he began his research in electrical engineering. The greater part of his life he devoted to the problem of the application of electromagnetic waves to wireless communication. Popov worked on a sensitive receiving set which could pick up² even the weakest radio waves. The year of 1895 is considered to be³ the date of the invention of the radio when Popov demonstrated his radio receiving set in operation. By the end of the year he improved his apparatus. It was the first radio receiving set in the world. Since then, the art of radio communication has progressed a great deal.⁴ Many scientists and inventors made their contributions. The radio has brought great changes to our life. At present Russia produce equipment for powerful broadcasting and television centres, and for radio-relay stations, electronic computers, radar stations, telecontrol and telemetric systems, and other purposes.

TEXT 2.

MARIE CURIE AND RADIUM

A French physicist, Henri Becquerel discovered that a metal called uranium gave off a kind of radiation, which later Marie Curie called radioactivity. But where did this radiation come from and what was it like? Here was a secret of nature which she decided to discover.



er. She made experiments again and again. There was failure, success, more failure, a little success, a little more success. All proved that in the mineral which she was examining there was some form of radiation which man knew nothing about. Life was rather hard. Marie wrote: "Life is not easy for any of us. We must work, and above all we must believe in ourselves." At this time her husband Piere Curie left his own laboratory work, in which he was successful, and joined with her in her search for this unknown radiation. In 1898 they declared that they believed there was something in nature which gave out radioactivity. To this something, still unseen, they gave the name radium. All this was very interesting, but it was against the beliefs of some of the scientists of that day. These scientists were very polite to the two Curies, but they could not believe them. The common feeling among them was: "Show us some radium, and we will believe you." There was an old building at the back of the school where Piere Curie had worked, with walls and the roof made of wood and glass. There were some old tables, a blackboard and an old stove in it. It was not much better than a shed. The Curies moved in and set up their laboratory and workshops. Here for four very difficult years they worked, weighing and boiling and measuring and calculating and thinking. The shed was hot in summer and cold in winter, when it rained, water dropped from the ceiling. But in spite of all these discomforts, the Curies worked on. For them these were the four happiest years of their lives. One evening in 1902 they went to their laboratory again. They opened the door. "Don't light the lamps," said Marie. "Look! ... look!" And there, glowing with faint blue light in the glass test-tubes on the tables, was the mysterious something which was so hard to find: Radium.

TEXT 3.

THE FATHER OF ASTRONAUTICS

Konstantin Tsiolkovsky was a cheerful, eccentric, self-educated genius. Deaf from scarlet fever¹ at childhood, he had no formal schooling. But he was a natural mathematician, a practical inventor who made his own laboratory equipment, a writer of science fiction and a research worker. He was born in 1857 in Kaluga. In March,



1883 Tsiolkovsky completed an extraordinary accurate work *Free Space*, on how it was possible to orbit a sputnik around the Earth. This was probably the first use of the word "sputnik". *Free Space* was published in 1954 though he quoted some parts of it in his *Dreams of Heaven and Earth* published in Moscow in 1895. He wrote: "An Earth sputnik, similar to the Moon, but nearer to our planet, just about 300 versts from the Earth's surface, will represent a very small mass free from the pull of gravitation." He discussed how to create sputniks and the speed (скорость) of their movement in orbit. Sixty-two years later, when the first sputnik was launched, it orbited at a height of about 300 versts and its speed reached eight versts a second, as the old scientist had told. This self-taught scientist—most of his learning came from library shelves—was not interested only in the theory of space travel³.

In 1878 he constructed a primitive centrifuge to test—on chickens and mice—the effect of acceleration and overloading on living organisms. At this time, too, he sketched instruments which could simulate conditions of weightlessness on the ground. Now all these sketches and manuscripts are in his museum-home at Kaluga, about 100 miles west of Moscow. The results of his tests in the centrifuge with chickens were the following: it was found that they could stand loads of 5 to 6 Gs, but die when the G-load⁴ reached 10. This was contained in the work *The Mechanics of Living Organisms* which was read by a famous Russian physiologist of that time Sechenov. Sechenov was so impressed by the scientific arguments that he recommended the un-schooled Tsiolkovsky for membership of the Academy of Sciences, the recommendation was unanimously (единогласно) accepted. In his work on the effects of speed he developed the principle of hermetically sealed space capsules similar to the one used by Gagarin. Experiment on stresses on the human body is still carried today. In 1903 Tsiolkovsky published the *Scientific Review on Space Research by Jet Engines*, a work which is widely read today by specialists in this field. In his modest cottage at Kaluga, in the time he could spare from teaching mathematics at a local school, he carried out his scientific work, but he was poorly paid⁵ and had no money to finance experiments. His life changed with the revolution, and practi-



cally everything he wrote saw the light of day. The principles for multi-stage rockets were described by Tsiolkovsky. On his 75th birthday meetings were held throughout the Soviet Union to honour him as "the father of astronautics". The government awarded him the "Red Banner of Labour". He died in 1935 confident that his lifetime's work would be realized.

TEXT 4.

MARS. THEORIES AND PROBABILITIES OF LIFE ON THE PLANET

The Russian Space programme for future years includes investigations of Mars and Venus. There are so many unknowns about these planets. Scientists say that it is impossible to make definite plans until a great deal more is revealed (to reveal — обнаруживать) by instruments. Today Russian scientists are studying closely every kind of theory that has ever been published about Mars and Venus. One of the most interesting problems about Mars is whether life exists or doesn't on the planet. Typical is the support for the most starting theory about Mars— that it has two big artificial satellites in orbit around it put there by beings who are, or were, far more advanced than us, scientifically. Professor I. S. Shklovsky, physics and mathematics expert, is quite certain about this. He bases his belief on new evidence that the two satellites—plainly visible to observatories—were not in existence more than one hundred years ago. Called Phobos and Deimos (Fear and Terror) they were discovered in 1877 by an American astronomer, Hall.

Phobos is in orbit at a distance of about 6,000 km. from Mars and completes one revolution of its mother planet every 7 hours 39 minutes. Deimos moves in a circular orbit with a radius of 23,500 km. and circuits in 30 hours 18 minutes. Both move in the plane of the Martian equator. They are approximately sixteen and eight kilometres across—the smallest satellites of any known planet. "Arid this is just about all we know of them," says Shklovsky. What makes them so interesting?—"Firstly," he says, "their size and proximity (близость) to their planet; an absolutely unique phenomenon in our solar system is that the period of revolution of Phobos is shorter than that of its own



parent Mars". The scientists don't know how to explain the origin of these two. If we think, for instance, that they are asteroids, accidentally "captured" by Mars, then why are they moving in circular orbits lying precisely on the equatorial plane? An American astronomer Sharpies discovered in 1945 that Phobos had changed its position. Deviation from its proper orbit was as much as 2.5° (degrees) a sensational finding. It means that Phobos drew nearer to the surface of Mars. This is exactly the behaviour of the artificial satellites of the Earth, atmospheric resistance slows up their movement, they progressively descend and at the same time their speed is accelerated. The changes in the nature of movement are so great that we can confidently say that we are witnessing the slow agony of a celestial body. It means that in just 15 million years Phobos will fall on Mars, astronomically speaking, this is a very short period indeed. The assumption that Phobos is hollow inside—is a cosmic impossibility. Shklovsky believes that Phobos is not a natural creation but an artificial satellite, and so, probably, is Deimos. Then it is known, for example, that asteroids whose size in some cases is much bigger than Phobos and Deimos, are not as a rule round, for they are mostly odd-shaped fragments of rock. Their revolution in space around a centre of gravity produces changes in appearance to the scientists and astronomer in an observatory; sometimes they are very bright, sometimes very dark, according to which surface is visible. If the brightness of Mars' satellites should prove constant, it would confirm their spherical shape. One thing that Earth telescopes will never see, however, is whether life exists on Mars itself—that much loved theory of science fiction writers.

Professor G. Tikhov in lectures and scientific papers challenged the beliefs of Sir James Jeans who denied the existence of life anywhere else except on Earth. Tikhov as a scientist in astrobiology showed, that even on Earth there are plants which have adapted (приспосабливаться) themselves to a lack (недостаток) of oxygen and some even can live on ammonia gas. Tikhov and his pupils demonstrated that the optical properties of the Martian "seas" bear a great resemblance to earth plants living in hard climatic conditions. The famous canals discovered in 1877 by an Italian scientist Schiapa-



reli and the theory of canals developed by the American Lowell offer a lot for the intelligence of scientists. There are many breathtaking assumptions about life on Mars: in 1952 astronomers suddenly discovered an unfamiliar green patch (пятно) on Mars—a new "sea". This odd formation darkens every year, though it stays the same shape, in 1937, 1951, 1954 curious, brilliant point flashes on Mars' surface were observed. It is hard to guess what they represent. And then the Tungus mystery! This was an unexplained, gigantic explosion in Siberia in 1908. Theories were at once put forward that the cause was a visit from another planet by a spaceship. To support this, it was claimed that the soil in the area remained radioactive, though no trace of meteorites had been found. Many fantastic novels were written on this subject. However, an expedition in the summer of 1960 definitely proved that the explosion was caused by a comet colliding with the Earth.