



**МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ
ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
ГРАЖДАНСКОЙ АВИАЦИИ**

Л.В. Семенова, Н.Н. Ковалева

ИНОСТРАННЫЙ ЯЗЫК

**Учебно-методическое пособие
по английскому языку**

*для студентов I курса
направления 09.03.01, 01.03.04
очной формы обучения*

**Москва
2017**

ФЕДЕРАЛЬНОЕ АГЕНТСТВО ВОЗДУШНОГО ТРАНСПОРТА

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ
БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ
ВЫСШЕГО ОБРАЗОВАНИЯ

**«МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ
УНИВЕРСИТЕТ ГРАЖДАНСКОЙ АВИАЦИИ» (МГТУ ГА)**

Кафедра иностранных языков

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Lesson 1

The Electric Current and its Properties

Грамматика: словообразование; множественное число имени существительного; глагол “to be”, конструкция “there is/are”; Present Simple, Active and Passive forms.

Ознакомьтесь с вокабуляром к тексту: “The Electric Current and its Properties”.

Постарайтесь запомнить значения слов и словосочетаний:

1. a stream	– поток
2. electric current	– электрический ток
3. a flow of charges	– поток зарядов
4. liquid	– жидкость
5. complex	– сложный
6. a particle	– частицы
7. a nucleus	– ядро
8. to move	– двигаться
9. an electromotive force	– электродвижущая сила
10. to cause, to make	– заставлять
11. a metal conductor	– металлический проводник
12. the direct current	– постоянный ток
13. the alternating current	– переменный ток
14. to heat	– нагревать
15. chemical action	– химическое действие
16. to produce	– производить
17. magnetic effect	– магнитный эффект
18. wire	– провод, проволока
19. meter	– измерительный прибор, счётчик
20. resistance	– сопротивление, резистор
21. to constitute the circuit	– составлять электрическую цепь
22. to break the circuit	– разомкнуть цепь
23. difference of potential	– разность потенциала
24. voltage	– напряжение
25. a device	– прибор
26. to oppose, to resist	– оказывать сопротивление
27. directly/inversely/proportional	– прямо/обратно/пропорционально

1. Образуйте множественное число от следующих существительных:

an electron, a stream, a current, a charge, a liquid, a gas, an ion, a particle, an atom, an effect, a device, a circuit, a conductor.

2. Запомните образования множественного числа следующих существительных:

- datum–data, phenomenon–phenomena, analysis–analyses, basis–bases, radius–radii, axis–axes, crisis–crises;
- foot–feet, tooth–teeth, child–children, man–men, woman–women.

3. Образуйте существительные от следующих глаголов с помощью суффикса –tion:

to direct, to produce, to generate, to conduct, to act, to constitute, to oppose.

4. Образуйте наречия от следующих прилагательных с помощью суффикса –ly:

usual, free, easy, direct, inverse, proportional, different, chemical, electrical, atomic.

5. Назовите существительные, которые имеют общий корень со следующими прилагательными:

electric, electronic, metallic, chemical, magnetic, proportional, different, mechanical.

6. Поставьте глагол *to be* во множественном числе, сделав при этом соответствующие изменения:

- a) This is an electron. – These are electrons.
b) That is a wire. – Those are wires.

1. This a device. That is a lamp. 2. This is a nucleus. That is a complex particle.
3. This is an atom. That is an ion. 4. This is an electric circuit. That is a generator.

7. Поставьте предложения в вопросительной и отрицательной форме.

Например: *This is an electric device.*
Is this an electric device?
This is not an electric device.

1. This is generator. 2. The generator is in the circuit. 3. Those are meters.
4. The resistance of the wire is low. 5. These are low voltage batteries.

8. Прочитайте и переведите текст:

The Electric Current and Its Properties

The stream or flow of electrons is one form of the electric current. We can easily understand the nature of the electric current on the basis of the electron theory. The current is a flow of charges. The charges are usually electrons. In liquids and gases the charges are ions.

An atom is a complex particle in which electrons move around a nucleus. Some of the electrons move freely among the atoms. These are free electrons. Usually free electrons move at random. The electromotive force causes the electrons to move through the metal conductor.

There are two types of the electric current, namely: the direct current (d. c. for short) and alternating current (a. c. for short). The electric current can heat a conductor, it can have a chemical action, or it can produce the magnetic effect.

The electric current starts to flow from a battery or a generator, passes through wires, lamps, meters and other resistances and returns to its starting point. All these devices and conductors constitute the circuit. If we break the circuit anywhere the

electric current stops flowing. The electric current flows only when there is a difference of potential or voltage between the two points in the circuit.

The conducting wires and all the devices in the circuit oppose or resist the flow of the electric current. This opposition to the current flow is the resistance. Thus, we can say that the current is directly proportional to the voltage and inversely proportional to the resistance.

9. Дайте краткие ответы на следующие вопросы:

Is the electric current a flow of electrons? – Yes, it is. / No, it isn't.

1. Is a generator an electric device? 2. Are voltmeters electric devices too? 3. Is a battery the starting point of the current flow? 4. Is the current inversely proportional to the voltage? 5. Are magnetic effects always useful?

10. Дайте полные ответы на следующие вопросы:

1. What is an atom? 2. What do tiny electrons move around? 3. How do free electrons move? 4. What force causes the electrons to move through the metal conductor? 5. What constitutes the circuit? 6. What is the resistance? 7. How does the electric current depend upon the voltage and the resistance? 8. What types of the electric current do you know?

11. Назовите три формы следующих глаголов:

to understand, to be, to take, to break, to constitute, to give, to resist, to have, to read, to write, to put, to do.

12. Переведите следующие предложения, обращая внимание на перевод конструкции: *there is, there are*, слов *they, their*.

1. There are two meters on the table. 2. If there is a difference of potential between the two points on the circuit, the electric current flows in it. 3. There are some new devices in the laboratory. They are on special stands. Their laboratory is modern. 4. There are a lot of electric devices in this shop. They are in use. 5. In a metal there is a large number of electrons which are free and can move through the metal under the action of an electric force.

13. Переведите следующие предложения, обращая внимание на перевод глаголов *cause, take* в значении *заставлять*:

1. The electromotive force causes the electrons to move through the metal conductor. 2. What makes the electrons move through the metal conductor? 3. What makes a satellite go around the earth and stay on its orbit? 4. At some distance above the earth ultra-violet radiation from the sun causes some of the molecules to dissociate from the molecular state the atomic state.

14. Составьте предложения из следующих слов:

1. Around, a nucleus, move, tiny electrons.
2. Causes, the electromotive force, to move through the metal conductor, the electrons.
3. Can, heat, a conductor, the electric current.

4. The circuit, constitute, all these devices and conductors.
5. To the voltage, is directly proportional, the current.

15. Поставьте глагол–сказуемое следующих предложений в форме “Present Indefinite”:

1. The student / to understand / the nature of the electric current well.
2. Free electrons / to move / at random.
3. The electric current / to produce / the magnetic effect.
4. The current / to start / to flow from a battery.
5. The circuit resistance / to be / rather high.
6. A conductor / to connect / the elements to the circuit.
7. Current / to pass / through the circuit.
8. Batteries / to be / electric devices.
9. The electromotive force / to cause / the electrons to move.
10. These devices / to constitute / the circuit.

16. Сделайте следующие предложения вопросительными (образуйте общие вопросы).

1. The electric current is a flow of electrons. 2. The current is directly proportional to the voltage. 3. Voltmeters are electric devices. 4. The resistance is an opposition to a current flow. 5. The charges are usually electrons. 6. There are two types of electric current. 7. The opposition to the current flow is the resistance. 8. The current is inversely proportional to the resistance. 9. An atom is a complex particle.

17. Заполните пропуски глаголами в форме Present Simple:

1. We _____ the nature of the electric current /to *understand*/.
2. A difference of electrical potential _____ a flow of electrons in conductors /to *maintain*/.
3. The direct current always _____ through a conductors in one direction /to *flow*/.
4. There _____ different types of electric current /to *be*/.
5. The stream of electrons _____ from atom to atom /to *move along*/.
6. We _____ of the existence of a current by its effects /to *know*/.

18. Задайте вопросы к подчёркнутым словам в предложении:

1. We easily understand the nature of the electric current. 2. Free electrons move at random. 3. The electromotive force causes the electrons to move through the metal conductor. 4. The electric current heats a conductor. 5. The current starts to flow from a generator. 6. The conducting wires oppose the flow of the electric current. 7. The conductors constitute the circuit.

19. Составьте план пересказа текста. Перескажите текст «The Electric Current and its Properties».

20. Прочитайте и переведите текст:

The Electric Current

In any metal there is a large number of electrons which are free. These free electrons can move through the metal under the action of an electric force. When such an electric force is applied to the metal, these electrons can move from one part of the metal to another. This flow of electrons is the electric current. A difference of electrical potential maintains a flow of electrons in conductors. There are different types of electric current, such as direct and alternating. A direct current (DC) is one which always flows through a conducting circuit in one direction, although it may vary in magnitude. An alternating current (AC) flows first in one direction and then in the other direction, that is periodically changes its direction. The time of each change of direction is constant. When this current varies with time according to a sine law, it is called sinusoidal. When necessary, AC is transformed to the DC form. An electric current is produced in many different ways. It is generated by different types of apparatus, for instance, an accumulator, a DC or AC generator, or a thermionic tube.

21. Найдите в тексте существительные, которые образованы от следующих глаголов:

to act, to flow, to direct, to accumulate, to differ, to generate.

22. Найдите в тексте глаголы, от которых образованы следующие существительные:

motion, application, maintenance, variation, change, transformation, production, generation.

23. Найдите в тексте предложения со словом *one*, которое заменяет существительное. Переведите их.

24. Найдите в тексте предложения, в которых глагол-сказуемое стоит в пассивном залоге. Переведите их.

25. Переведите предложения:

1. The production of heat by an electric current is widely used. 2. Currents of electricity can also be produced by certain chemical actions. 3. A direct current is used in the electrical system of an automobile and an airplane, in the tram, telegraph, telephone, in industry, etc.

26. Напишите 5 вопросов к тексту «The Electric Current».

Lesson 2

Atom Structure

Грамматика: словообразование; Present Progressive (Continuous), (Active and Passive form), Present Perfect

Ознакомьтесь с вокабуляром к тексту:

1. a schematic diagram	– схема-диаграмма
2. a nucleus	– ядро
3. a proton	– протон
4. a neutron	– нейтрон
5. to rotate (to revolve)	– вращаться
6. inner orbit	– внутренняя орбита
7. outer orbit	– внешняя орбита
8. to conduct	– проводить
9. to insulate	– изолировать
10. to stick tightly	– плотно прилипнуть, приклеиться
11. ring	– кольцо, орбита
12. valence-ring electrons	– валентные электроны
13. to dislodge	– смещать

1. Образуйте множественное число от следующих существительных:

a schematic diagram, a nucleus, a proton, a neutron, an orbit, an electron.

2. Образуйте существительные от следующих глаголов с помощью суффикса *-tion*:

to rotate, to conduct, to insulate, to act, to produce, to move.

3. Образуйте существительные от следующих глаголов с помощью суффиксов *-er*, *-or*:

to conduct, to direct, to produce, to generate, to act, to rotate, to insulate.

4. Образуйте наречия от следующих прилагательных с помощью суффикса *-ly*:

chemical, electrical, physical, easy.

5. Образуйте форму *-ing* от следующих глаголов:

Например: to consist – consisting.

to constitute, to produce, to act, to dislodge, to rotate, to heat, to move, to break, to flow.

6. Поставьте глагол-сказуемое в следующих предложениях в форму настоящего продолженного времени (Present Continuous Tense)

**Например: Each electron (to rotate) on its orbit.
Each electron is roaring on its orbit.**

1. The electrons (to rotate) around the nucleus.
2. The electrons of the inner orbits (to stick) tightly to the nucleus.
3. The student (to explain) the nature of the electric current of the electron theory.
4. He (to break) the circuit at this moment.
5. The valence-ring electrons (sit) loosely on their orbit.

7. Прочитайте и переведите текст:

Atom Structure

Fig. 1. shows a schematic diagram of atom structure. Each atom consists of electrons and nucleus. The nucleus consists of protons and neutrons. The electrons are rotating around the nucleus. Each electron is rotating on its orbit. The inner ring electrons are rotating on the inner orbits and the outer ring electrons are rotating on the outer orbits. The electrons on the inner orbit are sticking tightly to the nucleus. The outer ring electrons of some materials are easy to dislodge. In conductors the outer ring electrons are easy to dislodge. In insulators they are difficult to dislodge.

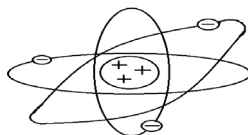


Fig. 1. A schematic diagram of atom structure.

8. Ответьте на вопросы:

1. What does each atom consist of?
2. What are the electrons rotating around?
3. What electrons are sticking tightly to the nucleus?
4. In what materials are the outer ring electrons easy to dislodge?

9. Прочитайте и переведите текст:

The Gradual Growth of our Knowledge of Electricity

As long ago as 600 B.C., the Greek philosopher Thales knew that amber rubbed with fur or wool would attract small pieces of straw and other light materials. The Greeks also knew that certain rocks of iron ore would attract small pieces of iron. This was also known to the early Chinese, who used this knowledge to make a magnetic compass – a special iron needle that is free to rotate in any horizontal direction. The needle is so attracted by the natural magnetism of the earth that it always turns to the point with a fair degree of accuracy towards the north. The compass made navigation of the ocean simpler and safer.

One of the first books showing the connection between magnetism and electricity, based upon actual experiments, was written by Dr. William Gilbert in 1600. It was generally thought that there were two different kinds of electricity: frictional and static electricity – the kind you make when you scuff your feet over a rug or when amber is rubbed with wool – and the kind stored in a cell that can be changed into an electric current. Now we know the two kinds are the same.

10. Переведите предложения, обращая внимание на временную форму глагола-сказуемого в страдательном залоге:

1. The tests of new transistors are being conducted in the laboratory. 2. At that time a new receiver for the application in this system was being tested by the engineers. 3. The operation of this system has been studied by the engineers. 4. New transmitting stations are being built in this region. 5. After important data on the Moon conditions had been obtained the scientists began to investigate this problem. 6. Lasers have been built on the basis of transistors and they are successfully used. 7. By that time the problem of long – distance communication had been solved.

Lesson 3

Conductors, Insulator, Semi-conductors

Грамматика: словообразование, степени сравнения прилагательных и наречий, частица "whether" в предложении, смысловые группы.

Ознакомьтесь с вокабуляром к тексту:

1. matter	– вещество, материя
2. to consist of	– состоять из
3. to contain	– содержать
4. quantity	– количество
5. to rotate/revolve/around	– вращаться вокруг
6. equal	– равный
7. core	– ядро
8. negative	– отрицательный
9. exact	– точный
10. opposite	– противоположный
11. separate	– отдельный
12. close to	– близкий
13. to determine	– определять
14. particular	– определенный, особый
15. loose	– слабо удерживаемый на орбите

1. Прочитайте вслух следующие слова:

electron, proton, neutron, quantity, entity, equal-equality, atom-atomic, electron-electronic, exact-exactness, nucleus, nuclear, molecule-molecular.

2. Назовите глаголы, от которых образованы следующие существительные:

conduction, rotation, separation, determination, insulation, action.

3. Назовите прилагательные, от которых образованы следующие наречия:

physically, equally, separately, exactly, oppositely, extremely, loosely, tightly, tremendously.

4. Напишите сравнительную и превосходную степени следующих прилагательных:

big, difficult, little, loose, tight, easy, large, extreme, good, bad, far.

5. Определите степени сравнения прилагательных и переведите предложения на русский язык.

1. The smallest particles that we see through a microscope are much larger than the molecules. 2. Lighter molecules move with greater speeds than heavier molecules. 3. From the earliest times people dreamed of air flight. 4. The greatest part of the matter around us is liquid or gas. 5. Zinc is cheaper than other metals. 6. Silver is one of the best conductors of electricity. 7. Lead is one of the heaviest metals. 8. If the molecules of one of the object are lighter than the molecules of the other, the lighter molecules will have the greater average speed.

6. Переведите письменно следующие предложения:

1. The ease or difficulty with which electrons dislodge from the outer orbit determines whether a particular element is a conductor insulator or semi-conductor. 2. We want to know whether the current is flowing through the wire. 3. Whether an atom is electrically neutral depends upon the number of electrons revolving around the nucleus and the number of protons inside the nucleus.

7. Прочитайте и переведите текст:

Conductors, Insulator, Semi-conductors

The atom is not the smallest particle of matter. It consists of still smaller particles such as electrons, protons and neutrons. Each atom of one element contains specific quantities of these electrical entities.

Physically the electrons rotate around the core or nucleus of the atom which contains the protons and neutrons. A carbon atom contains six each of electrons*, protons and neutrons. The six orbital electrons do not rotate at equal distances from the nucleus. They rotate on two separate rings.

The negative electric charge of the electron is exactly equal and opposite to the charge of the proton. The neutron has no charge. In an electrically balanced atom there is an equal number of electrons and protons.

Gravitational, electric, magnetic and nuclear forces all act within the atom. These forces tend to keep** the electrons on the orbits on which they revolve around the nucleus at tremendous speeds.

The electrons in the rings close to the nucleus stick tightly to their orbits and are extremely difficult to dislodge***. The outer or valence ring electrons sit loosely on their orbits and dislodge easily. The ease or difficulty with which electrons dislodge from the outer orbit determines whether a particular element is a conductor, an insulator, or a semi-conductor. Conductors are materials which have a large number of electrons which are loose on the outer orbit. Insulators are materials in which the valence ring electrons stick tightly to the nucleus. In between the limits of these two categories there is a third general class of materials, the semi-conductors.

Notes:

- *Contains six each of electrons – содержит по шесть электронов,
- **Tend to keep – стремится удержать,
- ***Difficult (easy) to dislodge – трудно (легко) смещаемый.

8. Дайте русские эквиваленты английским выражениям:

1. The smallest particle of matter
2. Specific quantities of these electrical entities
3. Rotate around the core
4. The negative electric charge
5. Is exactly equal and opposite to
6. The charge of the proton
7. An electrically balanced atom
8. These forces tend to keep
9. An equal number of electrons and protons
10. Gravitational forces
11. In the ring close to the nucleus
12. Stick tightly to
13. Extremely difficult to dislodge
14. The ease or difficulty determines
15. A particular element
16. Electrons which are loose on the orbit
17. Outer orbit
18. Valence-ring electrons
19. A third general class of materials

9. Найдите в тексте предложения с вышеуказанными выражениями и прочитайте их.**10. Ответьте на следующие вопросы:**

1. What does each atom consist of? 2. What consists of electrons and nucleus? 3. Does the nucleus consist of protons and neutrons? 4. How many electrons, protons and neutrons does a carbon atom contain? 5. What is the negative electric charge of electron exactly equal and opposite to? 6. Has the neutron a charge? 7. In what atom is there an equal number of electrons and protons? 8. What forces act within the atom? 9. What kind of materials do you know? 10. What property determines whether a particular element is a conductor, insulator or semi-conductor?

11. Напишите вопросы к подчёркнутым словам:

1. The six orbital electrons rotate on two separate rings (2).
2. A carbon atom contains six each of electrons, protons and neutrons (1).
3. The electrons revolve on the orbits at tremendous speed (2).

12. Составьте аннотацию к тексту используя слова и выражения упражнения, перескажите текст.**13. Обсудите тему: “Conductors, insulators semi-conductors and their application in industry”.**

Lesson 4

Resistance to Current Flow and Potential Difference

Грамматика: словообразование; неопределенные прилагательные some, any, no; многозначие слов.

Ознакомьтесь с вокабуляром к тексту “Resistance to Current Flow and Potential Difference”:

1. to mean	означать
2. to meet	встречать
3. a pipe	труба
4. friction	трение
5. to explain	объяснять
6. solid	твердый
7. collision	столкновение
8. magnitude	величина
9. to depend on/upon/	зависеть от
10. temperature	температура
11. to influence	влиять
12. a rise	увеличение
13. to increase	увеличивать, возрастать
14. violence	сила
15. pressure	давление
16. to be similar to	быть похожим
17. level	уровень
18. concentration	концентрация
19. amount	величина
20. to maintain	поддерживать
21. a unit	единица

1. Назовите существительные, от которых образованы следующие прилагательные:

nuclear, molecular, frictional, different, quantitative, distant.

2. Назовите глаголы, от которых образованы следующие существительные:

meaning, meeting, tendency, opposition, resistance, passage, conductance, collision, increase, pressure, heat, maintenance, explanation.

3. Назовите четыре формы следующих глаголов:

to mean, to meet, to go, to come, to be, to increase, to do, to say, to speak, to tell, to become, to buy, to cut, to hang, to keep, to know, to lead, to leave.

4. Образуйте наречия от следующих прилагательных:

general, certain, similar, opposite, necessary, electrical, peaceful.

5. Сделайте предложения вопросительными и затем отрицательными.

Например: There is some pressure in the line. Is there any pressure in the line?
There is no pressure in the line.

1. There is some potential difference between these two points. 2. The conductor releases some heat. 3. They are studying some insulating materials. 4. Current flows in some circuits 5. There are some batteries in the circuit.

6. Дайте полные ответы на следующие вопросы, употребив *no, some, any*.

Does the current meet any opposition in the conductor?

Yes, it does. The current meets any opposition in the conductor.

1. Does any electric current flow through some liquids? 2. Does any electric current flow through insulator? 3. Do semiconductors permit any flow? 4. Do conductors offer any resistance? 5. Do you know any insulating materials? 6. Does the flow of current produce any chemical action?

7. Прочитайте и переведите текст:

Resistance to Current Flow and Potential Difference

Is everyday conversation (1) the word “resistance”, generally, means anything that tends to oppose motion. Thus, when water flows through a pipe, it meets a certain opposition. This opposition is due to (2) the friction between the molecules of the water and the friction between the water and the pipe wall. In a similar manner (3), when an electric current flows through a wire, it meets some opposition, though it is not frictional opposition, as in the case of water. (4)

The electric resistance is a property of a conductor to oppose the passage of a current. We explain it easily on the basis of (5) the electron theory. In a solid conductor the resistance is due to the collision of the electrons with the atoms and molecules of that solid. The magnitude of the resistance depends on the number of free electrons available. The temperature also influences the resistance. A rise in temperature increases the kinetic thermal energy, speeds up (6) the motion of the molecules, and hence tends to increase the number and the violence of the collisions. This increases the resistance of the conductor.

Water does not flow through the pipe if there is no pressure, or if there is no difference in the level between the two ends. In a similar manner, the electric current does not flow through a conductor if there is no difference of potential between the two points of the conductor. The electric current flows from the point of higher potential to the point of lower potential. The difference of electrical potential or voltage is similar to the difference in level in hydrostatics and to the difference of temperature in heat engineering, while quantity of electricity or charge is similar to quantity of liquid and to quantity of heat. Potential is not a force. It is also not a pressure.

The magnitude of the difference of potential depends upon the concentration of the charge and not on the amount of the charge. The unit for the potential difference is the volt. The volt is 1 Joule of work which is necessary to carry 1 coulomb of

charge from one point to another. A battery or generator like a pump in hydrostatics maintains a potential difference between the ends of a conductor.

Notes:

- (1) in everyday conversation – в ежедневной (обыденной) речи;
- (2) due to – благодаря, из-за;
- (3) in a similar manner – подобным образом;
- (4) as in the case of water – как и в случае с водой;
- (5) on the basis of – на основе;
- (6) speed up – ускорять.

8. Напишите вопросы к подчеркнутым словам.

1. The magnitude of the difference of potential depends upon the concentration of the charge (2).
2. A battery maintains a potential difference between the ends of a conductor (1).
3. The amount of charge doesn't influence the magnitude of the difference of potential(1).

9. Переведите предложения.

1. Television is an important means of communication. 2. This fact means that the number of radio stations in our country will increase. 3. All technical means will be perfected in future. 4. The high precession of operation of means of communication on the ground made it possible to maintain reliable radio contacts with the astronauts. 5. Increasing the number of power stations in our country means improving living standards of the Russian people. 6. An electric current in a solid is due to the movement of "free" electrons along the solid. 7. At certain position, due to the molecular action and the electron action, the electrons may become as close to the nuclei of other atoms as their parents. 8. If a high-speed electron is projected into a gas, it will collide, with some of the molecules of that gas. 9. The collision usually occurs with the electrons in the outer orbits of gas atoms. 10. We can increase the current strength by decreasing the resistance of the circuit. 11. The transistors are successfully used for transforming heat energy into electrical energy by means of thermal elements.

10. Ответьте на вопросы.

1. What does the word "resistance" mean? 2. Does the water, flowing through the pipe, meet any opposition? 3. What is the opposition due to? 4. Is the opposition due to the friction between the water and the pipe walls? 5. Is the resistance of the conductor due to collision of the elections of the elections with the atoms and molecules of the conductor? 6. What increases the resistance of the conductor? 7. Does the electric current flow from a low potential to a high potential? 8. What does the difference of potential depend on? 9. What is the unit for potential difference? 10. What maintains the potential difference between the ends of a conductor?

11. Составьте план пересказа данной темы.

12. Обсудите темы: “Resistance and Potential Difference”.

13. Переведите предложения, обращая внимание на значение служебного слова “as”.

1) Energy is defined as the ability to do work. 2) As you know, the second, minute and hour are used as units of time. 3) As the number of electrons is equal to the number of protons in the nucleus, the number of electrons is the same as the atomic number of the element. 4) As radio waves travel away from their point of origin, they become weakened. 5) As nuclear engines are lighter in weight and can operate for very long periods of time, atomic energy will make contribution to space research.

Запомните, что слово “as” имеет значения: *как, когда, по мере того, так как (поскольку)*.

14. Прочитайте и перескажите текст. Озаглавьте его.

Resistance is a property of circuit to oppose the passage of a current. It is easily explained on the basis of the electron theory. Free electrons which constitute the electric current constantly collide with atoms and molecules as they move from a point of low potential to a point of higher potential. The actual speed of these free electrons is high, but their collisions reduce their forward motion to a comparatively low speed and they also reduce the number of free electrons that will flow through the conductor.

15. Прочитайте и переведите следующие тексты:

Electrical resistance and conductance

The **electrical resistance** of an object measures its opposition to the passage of an electric current. An object of uniform cross section has a resistance proportional to its resistivity and length and inversely proportional to its cross-section area. All materials show some resistance.

Discovered by Georg Ohm in 1827, electrical resistance shares some conceptual parallels with the mechanical notion of friction. The SI unit of electrical resistance is the ohm (Ω). Resistance’s reciprocal quantity is electrical conductance measured in siemens.

The resistance of an object can be defined as the ratio of voltage to current:

$$R = \frac{V}{I}$$

For a wide of materials and conditions, the electrical resistance R is constant for a given temperature; it does not depend on the amount of current through or the potential difference (voltage) across the object. Such materials are called Ohmic materials. For objects made of ohmic materials the definition of the resistance, with R being a constant for that resistor, is known as Ohm’s law. In the case of nonlinear conductor (not obeying Ohm’s law), this ratio can change as current or voltage

changes; the inverse slope of a chord to an I-V curve is sometimes referred to as a “chordal resistance” or “static resistance”.

Conductors and resistors



A 65- Ω resistor, as identified by electronic color code (blue-green-black). An ohmmeter could be used to verify this value. Objects such as wires that are designed to have low resistance so that they transfer current with the least loss of electrical energy are called conductors. Objects that are designed to have a specific resistance so that they can dissipate electrical energy or otherwise modify how a circuit behaves are called resistors. Conductors are made of highly conductive materials such as metals, in particular copper and aluminum. Resistors, on the other hand, are made of a wide variety of materials depending on factors such as the desired resistance, amount of energy that it needs to dissipate, precision, and cost.

DC resistance

The resistance of a given resistor or conductor grows with the length of conductor and decreases for larger cross-sectional area. The resistance R of a conductor of uniform cross section, therefore, can be computed as

$$R = \rho \frac{\ell}{A},$$

where ℓ is the length of the conductor, measured in metres [m], A is the cross-sectional area of the conductor measured in square metres [m²], and ρ is the electrical resistivity (also called *specific electrical resistance*) of the material, measured in ohm-metres (Ω m). Resistivity is a measure of the material's ability to oppose electric current.

For practical reasons, any connections to a real conductor will almost certainly mean the current density is not totally uniform. However, this formula still provides a good approximation for long thin conductors such as wires.

AC resistance

If a wire conducts high-frequency alternating current, then the effective cross sectional area of the wire is reduced because of the skin effect. If several conductors are together, then due to proximity effect, the effective resistance of each is higher than if that conductor were alone. These effects are so small for low frequency of ordinary household AC that they should ordinarily be treated as if it were DC resistance.

Measuring resistance

An instrument for measuring resistance is called an ohmmeter. Simple ohmmeters cannot measure low resistances accurately because the resistance of their measuring leads causes a voltage drop that interferes with the measurement, so more accurate devices use four-terminal sensing.

Causes of resistance

In metals

A metal consists of a lattice of atoms, each with a shell of electrons. This is also known as a positive ionic lattice. The outer electrons are free to dissociate from their parent atoms and travel through the lattice, creating a 'sea' of electrons, making the metal a conductor. When an electrical potential difference (a voltage) is applied across the metal, the electrons drift from one end of the conductor to the other under the influence of the electric field.

Near room temperatures, the thermal motion of ions is the primary source of scattering of electrons (due to destructive interference of free electron waves on non-correlating potentials of ions), and is thus the prime cause of metal resistance. Imperfections of lattice also contribute into resistance, although their contribution in pure metals is negligible.

The larger the cross-sectional area of the conductor, the more electrons are available to carry the current, so the lower the resistance. The longer the conductor, the more scattering events occur in each electron's path through the material, so the higher the resistance. Different materials also affect the resistance.

In semiconductors and insulators

In metals, the Fermi level lies in the conduction band (see Band Theory, below) giving rise to free conduction electrons. However, in semiconductors the position of the Fermi level is within the band gap, approximately half-way between the conduction band minimum and valence band maximum for intrinsic (undoped) semiconductors. This means that at 0 kelvins, there are no free conduction electrons and the resistance is infinite. However, the resistance will continue to decrease as the charge carrier density in the conduction band increases. In extrinsic (doped) semiconductors, dopant atoms increase the majority charge carrier concentration by donating electrons to the conduction band or accepting holes in the valence band. For both types of donor or acceptor atoms, increasing the dopant density leads to a reduction in the resistance. Highly doped semiconductors hence behave metallic. At very high temperatures, the contribution of thermally generated carriers will dominate over the contribution from dopant atoms and the resistance will decrease exponentially with temperature.

Lesson 5

Transportation

Грамматика: словообразование; причастие I, II, Past Simple (Indefinite), little, a little, few, a few.

1. Назовите три формы следующих глаголов:

to make, to do, to leave, to give, to begin, to break, to bring, to build, to buy, to catch, to choose, to feed, to get, to see, to write, to fly, to mean, to think

2. Образуйте существительные от следующих глаголов с помощью суффикса *-ment*:

to develop, to measure, to improve, to achieve, to establish, to govern

3. Назовите глаголы, от которых образованы следующие существительные:

discovery, appearance, development, transportation, construction, measurement, indication, creation, connection

4. Образуйте прилагательные от следующих существительных при помощи суффикса *-ful*:

success, use, colour, help, fruit, beauty, peace, meaning

5. Сделайте предложения вопросительными:

Например: Very early in history man made the discovery of the wheel.

Did man make the discovery of the wheel very early in history?

1. The steam engine appeared in the early nineteenth century. 2. The first automobiles used steam as a source of power. 3. Man constructed the airplanes powered by engines. 4. He made his first successful attempt at leaving the ground and moving through the air.

6. Раскройте скобки. Поставьте глагол-сказуемое в простом прошедшем времени:

1. He (make) an important discovery a month ago. 2. The steam engine (appear) in the early nineteenth century. 3. From that time on the automobile (begin) its development. 4. A rise in temperature (offer) some resistance to the current flow. 5. There (to be) some resistors in the circuit 6. They (connect) some batteries to the circuit. 7. That instrument (to be) a wattmeter.

7. Переведите словосочетания и предложения, обращая внимание на перевод причастия в функции определения.

- a) connected wires – connecting wires
- heated parts – heating parts
- landed plane – landing plane
- increased weight – increasing speeds of planes

b) The transported machines. The constructed engine. The work begun is easy. The method used. The material applied is not good. Vehicles pulled by animals. Boats powered by cars. The method used is very simple. The element discovered. Steam used as a source of power. Transportation not limited by the geography of the country. Airplane powered by engines. Man-made satellites.

8. Прочитайте и переведите текст:

Transportation

For a long time transportation on land was very simple. Very early in history man made the discovery of the wheel which is one of the most important discoveries. By means of all sorts of vehicles, pulled by animals, man began to move heavy loads

and to travel. It was necessary to build roads for travel. Boats were very early means of transportation along the river and later across the seas and oceans. At first people powered the boats with a large number of oars which later gave way to sailing ships.

In the early nineteenth century the steam engine appeared which was a power source in steamboats and in locomotives for railroads. From that time on the automobile began its development. The first automobiles used steam, electricity or gasoline as a source of power. Later man began to think of transportation not limited by the geography of the country. Man began to think of air transportation by means of which man could move as freely as a bird anywhere he wanted. At last man made his first successful attempts at leaving the ground and moving through the air. At first people flew in balloons filled with a light gas. At the beginning of the twentieth century man made the most important development in air transportation. He constructed the airplane powered by engines. Now people move freely from one part of the world to another.

9. Найдите в тексте слова, которые имеют общий корень со следующими словами:

to transport, simplicity, to discover, importance, necessarily, motion, to mean, appearance, to develop, a thought, success, construction, free, an engineer.

10. Найдите в тексте слова с противоположным значением к словам, приведенным ниже:

complicated, light, unnecessary, late, to disappear, to finish (to end), unsuccessful, to stay, unimportant.

11. Переведите предложения, в которых причастие I и II выполняют функции определения.

1. The discovery of the wheel made by man was one of the most important discoveries. 2. The boats powered with a large number of oars later gave way to sailing ships. 3. The steam engine appearing in the early nineteenth century was a power source in steam boats and in locomotives. 4. Steam, electricity or gasoline were a source of power used by the first automobile.

12. Перескажите текст “Transportation”

13. Прочитайте и перескажите текст:

An Airport

turboprop – турбовинтовой самолет
to take off – взлетать
to stroll – прохаживаться

This is an airport. There are airplanes there. One big turboprop airliner is ready for take-off. There is another airliner on the runway. It is preparing to take off. There are also many people in the airport. They are waiting for their airliners.

Some are standing near the barrier, some are sitting on the benches and some are strolling near them. There are many flowerbeds in front of the airport buildings.

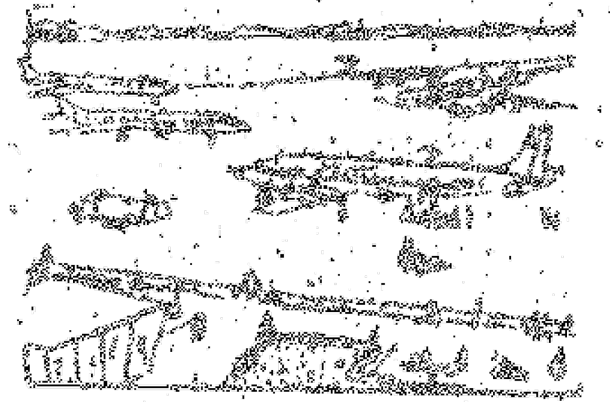


Fig. 2. A view of an airport

14. Ответьте на вопросы:

Look at the picture:

1) What is this? 2) Are there many airplanes there? 3) What is there in the airport? 4) Is there another airliner on the runway? 5) What is there on the runway? 6) Is it ready to take off? 7) Are there many people in the airport? 6) Who is there in the airport? 9) Are they waiting for their airliners? 10) What are they doing? 11) Are there people standing near the barrier? 12) Where are they standing? 13) Are there people sitting on the benches? 14) Where are they sitting?

15. Напишите вопросы к выделенным словам:

1. There are many people in the airport. (2)
2. Some people are standing near the booking-office (2)
3. A turbojet airliner is preparing to take off (2)

16. Заполните пропуски *a lot of, little, a little, few, a few, much*.

1) People use ... electricity nowadays. 2) This device consists of ... conductors. 3) The electric current develops ... heat. 4) The atom of this matter consists of ... electrons, protons and neutrons. 5) They need ... copper for wire. 6) Is this generator producing ... energy? 7) This device consumes ... electric current. 8) This apparatus contains ... resistors. 9) This hydropower station consumes ... water. 10) Does the generator need ... power for operation?

17. Переведите предложения, обращая внимание на значение слова *one*:

1) One big turboprop airliner is ready to take off. 2) One considers that the results of the experiment are of great importance for the future development of radio engineering 3) When the current is small, one should use a galvanometer. 4) A secondary cell is one which can be charged again. 5) The larger molecules are more difficult to dissolve than the smaller ones. 6) Water is one of the few substances that man knows well and uses in all of its three forms.

18. Переведите предложения, обращая внимание на перевод инфинитива в функции обстоятельства цели:

1. To find the total resistance of a series circuit you add the resistance of each part of the circuit. 2. Ammeters (including microammeters and milliammeters) are used to

measure current. 3. In order to produce the electrical oscillations which are radiated as radio waves, an oscillator is used. 4. To compare electric currents we should have certain units by means of which they are to be measured. 5. To measure the resistance of a conductor we should have some fixed standard. The practical unit of resistance is called the ohm. 6. The engineer has to control the current in order to control the heating, chemical and magnetic effects of electricity.

Lesson 6

Measurement of Electric Quantities and Measuring Devices

Грамматика: словообразование; существительное в функции определения, причастие I, II.

Ознакомьтесь с вокабуляром к тексту:

1. to measure	измерить
2. of measurement	единицы измерения
3. hour	час
4. electric quantities	электрическая величина
5. ohm	ом
6. ampere	ампер
7. volt	вольт
8. watt	ватт
9. to indicate	показывать, указывать
10. to create	создавать
11. to develop	развивать
12. scale	шкала, масштаб
13. to graduate	градуировать
14. to adsorb	поглощать
15. lead	вывод, клемма
16. in series	последовательно
17. in parallel	параллельно
18. coil	катушка
19. to consume	потреблять
20. to compare	сравнивать

1. Повторите за преподавателем:

hour, minute, meter, ohm, ampere, volt, watt, ammeter, voltmeter, wattmeter.

2. Прочитайте группы слов и переведите их:

- a) to measure–measurement–measured–measuring,
to indicate–indication–indicator–indicated–indicating,
to create–creation–creator–created–creating,
to press–pressure–pressed–pressing,
to appreciate–appreciation–appreciable–appreciably,
to compare–comparison–comparative–comparatively

- b) equal–equality–equation,
possible–possibility,
quantity–quantitative,
quality–qualitative.

3. Назовите все производные от следующих глаголов:

to absorb, to graduate, to connect, to differ, to consume, to separate.

4. Прочитайте и переведите следующие сочетания слов:

a) compressing gases – compressed gas; controlling devices – controlled devices; covering surface – covered surface; measuring instruments – measured current.

b) The current created in a conductor. The developed power. The current measured with the aid of an ammeter. The scale graduated in volts. The power absorbed by the coil. The power absorbed. The current consumed by the coil. The instrument connected in parallel is a voltmeter. The measured resistance is low. The resistance used is too high. The voltage supplied is too low.

c) a test instrument – an instrument test; a system weight – a weight system; a metal surface – a surface metal; a signal generator – a generator signal.

d) a test instrument location – an instrument test location; a surface metal quality – a metal surface conductivity.

5. Прочитайте и переведите текст:

Measurement of Electric Quantities and Measuring Devices

In our everyday life we use such terms as “hour”, “minute”, “meter” and many others. They are units of measurement. There are also some units of measurement of electric quantities. These units are the ohm, ampere, volt, and watt.

The ohm is a unit for measurement of resistance. The ampere indicates the amount of electric current.

The ampere is a unit of rate of flow of an electric current. The ampere is equal to 3,000 million electrostatic charges per second.

The volt is a unit of electrical pressure. The international volt creates a current of one international ampere in a conductor which has a resistance of one international ohm.

The watt is a unit of power, which electric devices develop. One watt is equal to a current of one ampere as a result of one volt.

We measure these electrical quantities with the help of special instruments. These instruments are measuring devices. We measure current with ammeters, voltage with voltmeters, and power with watt meters.

Ammeters measure the current flowing in a circuit and normally have scales graduated (or calibrated) in amperes, milliamperes, or microamperes. The ammeter has a low resistance coil not to absorb an appreciable amount of power, therefore, we connect the ammeter in the positive or negative lead in series.

Voltmeters measure the potential difference between the two points in a circuit. The calibration of voltmeters is usually in volts, millivolts, or microvolts. We connect

a voltmeter in parallel across the points where it is necessary to measure the difference of potential. The resistance of the voltmeter operating coil is as high as possible to limit the amount of current consumed by it.

A wattmeter combines three instruments in one. It has two separate coils. One is of a comparatively high resistance, equivalent to a voltmeter coil, and the other one is of low resistance.

6. Ответьте на вопросы:

1. What is the ohm? 2. What is the ampere? 3. What is one ampere equal to? 4. What is the volt? 5. With what do we measure electric quantities? 6. What do ammeters measure? 7. What coil has the ammeter? 8. In what units is the calibration of voltmeters? 9. How do we connect a voltmeter in the circuit? 10. What is the resistance of the voltmeter operating coil? 11. Why is the resistance of the voltmeter operating coil as high as possible? 12. How many instruments does a wattmeter combine?

7. Напишите вопросы к выделенным словам.

1. The ampere indicates the amount of electric current (2). 2. The international volt creates a current of one international ampere in a conductor which has a resistance of one international ohm (3) 3. The ammeter has a low resistance coil not to absorb an appreciable amount of power (2). 4. The ampere is equal to 3,000 million electrostatic charges per second. (2).

8. Составьте план пересказа текста.

9. Перескажите текст “Measurement of Electric Quantities and Measuring Devices”.

10. Переведите предложения, помня, что выражение “as well” имеет значение “также”

1. We should not forget that electricity is the most important source of energy in industry as well. 2. Solar as well as atomic batteries are very suitable for supplying power to the transmitters in space rockets and spaceships because of their long life. 3. Many metals are found in pure state as well as in combination. 4. The energy principle is not limited to solids. It is applied to liquids as well.

11. Прочитайте и переведите текст:

Metric System and its Origin

The idea of a universal system of measures and weights dates from long ago, but it was realized only two centuries ago. The metric and decimal system was worked out by the French Academy of Sciences in 1791.

How were the units for length and weight defined?

Two French scientists who were given the task to define these unit, took one fourth of the distance from the North Pole to the Equator on the geographical meridian which is running through Paris (the distance from Dunkirk in France to Barcelona in Spain) and divided it into ten million equal parts. One of these parts was called a

metre or “measure”. For shorter measurements the metre was divided by ten, for longer things the metre was multiplied by tens.

It was easy to use the same metre for volume. The weight of one cubic centimeter of water was called a gramme. Thus the metric system was created.

Russian scientists played a great part in the spreading of the metric system in Russia as well as in other countries.

As far as in 1887 D.I. Mendeleev addressed Russian scientists to help spread the decimal system. The project of the law about the use of the metric system in Russia was also worked out by D.I. Mendeleev.

It should be said, however, that up till the end of the 19th century different units of measurement were used in various countries. In the Soviet Union the metric system was adopted in 1918, soon after the Great October Socialist Revolution. Now it is adopted by most of the countries. None of the systems of the past can be compared in simplicity to that of our days.

Notes:

1. as far as in – еще в
2. up till – вплоть до

12. Найдите в тексте предложения, в которых глагол-сказуемое стоит в страдательном залоге. Переведите их.

13. Замените глагол-сказуемое в действительном залоге на глагол-сказуемое в страдательном залоге в следующих предложениях.

Например: The ampere indicates the amount of the electric current.

The amount of the electric current is indicated by the ampere.

- 1) We measure these electrical quantities with the help of special instruments.
- 2) We connect the ammeter in the positive or negative lead in series.
- 3) The resistance of the voltmeter operating coil limits the amount of current consumed by the coil.

14. Перескажите текст “Metric System and its Origin”.

15. Прочитайте и перескажите текст:

Elements of Physics

Physics is a science. It studies physical phenomena as, for instance, motion, sound, heat, electricity and magnetism, the structure of atoms and others. In physics there are three concepts: time, space and mass. We measure time, space and mass by means of certain systems of units. We use the second, the minute and the hour as units of time. There are two systems of units for measuring space and mass: the metric and the English systems. For instance, the English yard is equal to 0.91 (zero point ninety-one) meter. It contains 35 (thirty five) inches. The English pound (lb) is equal to 0.453 (zero point four hundred and fifty-three) kilogram and contains 16 ounces. There is a system of units for measuring angles. Degrees, minutes and seconds are the units which we use for measuring angles. We define the mass of a body as the quantity of matter in a body. The mass of a

body remains constant everywhere. But at the same time the weight of a body varies with the locality.

16. Прочитайте и переведите текст. Поставьте к нему 5 вопросов.

We can measure electricity in a number of different ways, but a few measurements are particularly important.

Voltage

The voltage is a kind of electrical force that makes electricity move through a wire and we measure it in volts. The bigger the voltage, the more current will tend to flow. So a 12-volt car battery will generally produce more current than a 1.5-volt flashlight battery.

Current

Voltage does not, itself, go anywhere: it's quite wrong to talk about voltage "flowing through" things. What moves through the wire in a circuit is electrical **current**: a steady flow of electrons, measured in amperes (or amps).

Power

Together, voltage and current give you electrical **power**. The bigger the voltage and the bigger the current, the more electrical power you have. We measure electric power in units called watts. Something that uses 1 watt uses 1 joule of energy each second.

The electric power in a circuit is equal to the voltage \times the current (in other words: watts = volts \times amps). So if you have a 100-watt (100 W) light and you know your electricity supply is rated as 120 volts (typical household voltage in the United States), the current flowing must be $100/120 = 0.8$ amps. If you're in Europe, your household voltage is more likely 230 volts. So if you use the same 100-watt light, the current flowing is $100/230 = 0.4$ amps. The light burns just as brightly in both countries and uses the same amount of power in each case; in Europe it uses a higher voltage and lower current; in the States, there's a lower voltage and higher current. (One quick note: 120 volts and 230 volts are the "nominal" or standard household voltages—the voltages you're supposed to have, in theory. In practice, your home might have more or less voltage than this, for all sorts of reasons, but mainly because of how far you are from your local power plant or power supply.)

Energy

Power is a measurement of how much energy you're using each second. To find out the total amount of energy an electric appliance uses, you have to multiply the power it uses per second by the total number of seconds you use it for. The result you get is measured in units of power \times time, often converted into a standard unit called the kilowatt hour (kWh). If you used an electric toaster rated at 1000 watts (1 kilowatt) for a whole hour, you'd use 1 kilowatt hour of energy; you'd use the same amount of energy burning a 2000 watt toaster for 0.5 hours or a 100-watt lamp for 10 hours. See how it works?

Electricity meters (like the one shown in the photo above, from my house) show the total number of kilowatt hours of electricity you've used. 1 kilowatt hour is equal to 3.6 million joules (J) of energy (or 3.6 megajoules if you prefer).

Lesson 7

Capacity and Condensers

Ознакомьтесь с вокабуляром к тексту:

1. to arrange	организовывать
2. to spread	распространяться
3. to raise	поднимать
4. capacity	ёмкость
5. condenser	конденсатор
6. to equip	оборудовать
7. amount	количество
8. to define	определять
9. to remain	оставаться
10. tin-foil	оловянная фольга
11. wireless communication	беспроводная связь
12. variable	переменная

1. Образуйте от глаголов существительные с помощью суффикса –ment:

to measure, to arrange, to develop, to achieve, to equip.

2. Переведите на русский язык группы слов:

to define–definition–defined–defining,
to increase–increase–increased–increasing,
to use–use–used–using,
to induce–induction–induced–inducing,
to receive–reception–receiver–received–receiving.

3. Назовите три формы глаголов:

to bring, to spread, to become, to receive, to give, to raise, to separate, to say, to speak, to tell, to send, to rise, to spend, to take.

4. Назовите глаголы от которых образованы существительные:

difference, arrangement, communication, induction, combination, conduction, insulation.

5. Переведите предложения, обращая внимание на перевод слов *some* (несколько, некоторый) и *same* (тот же самый, один и тот же, одинаковый).

1) The value of voltage was the same in all the elements of parallel circuits. 2) When the forces act in the same direction, the resultant is found by adding the applied forces. 3) When water flows through a pipe it meets some opposition. 4) It was found that the proton and neutron have almost the same weight but that they are much greater in mass than the electron. 5) There are some units of measurements of electric quantities in electro engineering. 6) This circuit consists of some conductors.

6. Прочитайте и переведите текст:**Capacity and Condensers**

When we bring two insulated conductors, one charged and another uncharged, into contact, the charge spreads over both conductors. The uncharged conductor becomes charged. A larger conductor receives a larger part of the charge. The potential of the two conductors becomes the same but the quantity of electricity is not the same on each. The larger portion of charge is on the larger conductor. We say that conductors have not the same capacity for electricity. The capacity of the conductor depends upon its size. We measure the capacity of the conductor by the quantity of electricity which raises its potential to a given amount. From this definition we see that if the capacity of a conductor increases, while the quantity on it remains constant, its potential becomes less.

An arrangement by which we increase the capacity of a conductor artificially is called a condenser. The most usual form of a condenser is a large number of thin sheets of tin-foil separated from each other by sheets of paraffin paper. The capacity of a condenser depends directly upon the areas of the sheets of the tin-foil. Condensers are of great practical use. We use them in some systems of telephony and telegraphy, in wireless communication and in electronic machines, and induction coils.

Condensers used in all cases of electrical and radio work are of two main types: fixed condensers and variable condensers.

7. Найдите в тексте слова, имеющие одинаковое значение со следующими словами:

to determine, amount, to raise, similar, to obtain, to utilize.

8. Найдите в тексте слова, имеющие противоположное значение следующим словам:

charged, small, fixed, to decrease, to combine.

9. Ответьте на вопросы:

1. What happens, when we bring two insulated conductors one charged and another uncharged into contact? 2. What part of the charge does the conductor receive? 3. Does the potential of the two conductors become the same? 4. Is the quantity of electricity the same on each? 5. What capacity for electricity have conductors? 6. What does the capacity of the conductor depend upon? 7. What arrangement is called a condenser? 8. What does a condenser consist of? 9. Does the capacity of a condenser depend directly upon the area of sheets of the tin-foil? 10. What types of condensers do you know? 11. Where are they used?

10. Напиши вопросы к подчеркнутым словам:

1. The capacity of the conductor depends upon its size (2).
2. This arrangement consists of thin sheets of tin-foil (2).
3. We use condensers in some systems of electronic machines (2).
4. We measure the capacity of the conductor by the quantity of electricity (2).

11. Переведите следующие предложения:

The ... the с прилагательными или наречием в сравнительной степени. Сочетание *the... the* с прилагательными в сравнительной степени переводится на русский язык союзом *чем... тем* + соответствующее прилагательное или наречие в сравнительной степени.

The more we study nature, the better we know it.

Чем больше мы изучаем природу, лучше мы её знаем.

1. The larger the water pipe is the more water passes through it. 2. The finer the filament, the greater the resistance which it offers to an electric current. 3. The greater the number of free electrons in a substance, the better that substance conducts electricity. 4. The stronger the magnetic field, the greater is the current in the armature winding. 5. The faster the molecules of a substance move, the higher is the temperature of the substance. 6. Generally, the higher the voltage used in circuit, the more necessary the use of better insulators. 7. The less stable a chemical compound, the greater is the chance of its being transformed into another or several other compounds. 8. Years ago they discovered that the heavier in weight an object is, the more force is required to start it moving or to stop it, once it is in motion.

12. Прочитайте и переведите текст. Передайте краткое содержание текста.

Capacitors

Take two electrical conductors (things that let electricity flow through them) and separate them with an insulator (a material that doesn't let electricity flow very well) and you make a capacitor: something that can store electrical energy. Adding electrical energy to a capacitor is called charging; releasing the energy from a capacitor is known as discharging.

A capacitor is a bit like a battery, but it has a different job to do. A battery uses chemicals to store electrical energy and release it very slowly through a circuit; sometimes (in the case of a quartz watch) it can take several years. A capacitor generally releases its energy much more rapidly—often in seconds or less. If you're taking a flash photograph, for example, you need your camera to produce a huge burst of light in a fraction of a second. A capacitor attached to the flash gun charges up for a few seconds using energy from your camera's batteries. (It takes time to charge a capacitor and that's why you typically have to wait a little while.) Once the capacitor is fully charged, it can release all that energy in an instant through the xenon flash bulb.

Capacitors come in all shapes and sizes, but they usually have the same basic components. There are the two conductors (known as plates, largely for historic reasons) and there's the insulator in between them (called the dielectric). The two plates inside a capacitor are wired to two electrical connections on the outside called terminals, which are like thin metal legs you can hook into an electric circuit.

You can charge a capacitor simply by wiring it up into an electric circuit. When you turn on the power, an electric charge gradually builds up on the plates. One plate gains a positive charge and the other plate gains an equal and opposite (negative)

charge. If you disconnect the power, the capacitor keeps hold of its charge (though it may slowly leak away over time). But if you connect the capacitor to a second circuit containing something like an electric motor or a flash bulb, charge will flow from the capacitor through the motor or lamp until there's none remaining on the plates.

Although capacitors effectively have only one job to do (storing charge), they can be put to all sorts of different uses in electrical circuits. They can be used as timing devices (because it takes a certain, predictable amount of time to charge them), as filters (circuits that allow only certain signals to flow), for smoothing the voltage in circuits, for tuning (in radios and TVs), and for a variety of other purposes. Large super capacitors can also be used instead of batteries.

The amount of electrical energy a capacitor can store is called its capacitance. The capacitance of a capacitor is a bit like the size of a bucket: the bigger the bucket, the more water it can store; the bigger the capacitance, the more electricity a capacitor can store. There are three ways to increase the capacitance of a capacitor. One is to increase the size of the plates. Another is to move the plates closer together. The third way is to make the dielectric as good an insulator as possible. Capacitors use dielectrics made from all sorts of materials. In transistor radios, the tuning is carried out by a large variable capacitor that has nothing but air between its plates. In most electronic circuits, the capacitors are sealed components with dielectrics made of ceramics such as mica and glass, paper soaked in oil, or plastics such as mylar.

The size of a capacitor is measured in units called farads (F), named for English electrical pioneer Michael Faraday (1791–1867). One farad is a huge amount of capacitance so, in practice, most of the capacitors we come across are just fractions of a farad typically – microfarads (millionths of a farad, written μF), nanofarads (thousand-millionths of a farad written nF), and picofarads (million millionths of a farad, written pF). Super capacitors store far bigger charges, sometimes rated in thousands of farads.

Lesson 8

Transformers

Грамматика: словообразование, Present Simple Passive; местоимения “that of”, “those of”.

Ознакомьтесь с вокабуляром к тексту:

1. case	случай
2. principle	принцип
3. primary winding	первичная обмотка
4. to wind	наматывать, обматывать
5. iron core	железный сердечник
6. to mount	устанавливать
7. a desire	желание
8. turns in the coil	витки в катушке
9. a single tapped winding	одна обмотка с ответвлениями
10. to obtain	получать

11. ratio	соотношение
12. to start a motor	запустить мотор

1. Прочитайте и переведите слова и сочетания слов:

a device, a transformer, the basic arrangement, the primary winding, the secondary winding, the amount of the voltage, the number of turns in the coil, the rate at which the magnetic field varies, relatively small voltage ratios.

2. Запомните слова и их производные:

to mean—meaning—meaningful—by means of,
 to change—change (n)—changed—changing,
 to separate—separation—separate (adj)—separated—separating,
 to wind—winding (n)—wound,
 to produce—production—product—produced—producing,
 to transform—transformation—transformer—transformed—transforming;
 to vary—variation—variant—variable.

3. Образуйте прилагательные от следующих существительных с помощью суффикса *-al*:

proportion, function, origin, addition, physics, mathematics, mechanics, education.

4. Назовите глаголы, от которых образованы следующие существительные:

transformer, arrangement, winding, operation, producer, limitation, starting, regulation, induction, action.

5. Напишите три формы следующих глаголов:

to mean, to have, to connect, to draw, to bring, to buy, to rest, to write, to show, to send, to pay, to teach, to wear, to sing.

6. Замените неопределенную форму глагола в действительном залоге на неопределенную форму глагола в страдательном залоге.

Например: *to change* – *to be changed*.

to transform, to connect, to arrange, to supply, to desire, to produce, to obtain, to limit, to induce.

7. Переведите предложения:

1) The voltage is changed by a transformer. 2) Two separate windings are mounted on the iron core. 3) One winding is connected to the a.c. supply. It is called the primary winding. 4) A desired voltage is produced by the secondary winding. 5) A voltage is produced in the coil by changes of the magnetic field passing through the coil. 6) The amount of the voltage is influenced by the number of turns in the coil. 7) The amount of the voltage is affected by the rate at which the magnetic field varies.

8. Прочитайте и переведите текст:**Transformers**

A device by means of which the voltage can be changed is called a transformer. There are many different types of transformers, still the principles of action are the same in each case.

The basic arrangement of a transformer consists of an iron core on which two separate windings are mounted. One winding is connected to a.c. supply. It is called the primary winding. The second produces a desired voltage. It is called the secondary winding. The principle of operation of a transformer is very simple. A voltage is produced in the coil, by changes of the magnetic field passing through the coil. The amount of the voltage is proportional to the number of turns in the coil and to the rate at which the magnetic field varies.

The transformer is called an auto-transformer when it operates having a single tapped winding instead of separate primary and secondary windings. By means of the auto-transformer a higher or lower voltage than the supply can be obtained. But the use of the auto-transformer is limited to relatively small voltage ratios such as a.c. voltage regulation or the low voltage starting of induction motors.

Note:

a single tapped winding – одна обмотка с отпайкой

9. Замените глагол-сказуемое в действительном залоге на глагол-сказуемое в страдательном залоге.

1. The secondary winding produces a desired voltage. 2. Changes of the magnetic field in the coil produce a voltage. 3. A generator converts mechanical energy into electrical. 4. An ammeter measures the current. 5. A voltmeter does not measure the current.

10. Переведите предложения:

1. Reduced by a transformer the voltage is supplied to the instrument. 2. The current applied is simplified by the triode. 3. Two conductors separated by a dielectric medium can store electrical energy. 4. A watt is the power produced by a current of the ampere under a pressure of one volt.

11. Переведите предложения с местоимениями *that of, those of*, которые заменяют существительные.

1. The results of these experiments are much better than those of the previous ones. 2. The devices that are identical with those described above will be used in this experiment. 3. This machine is more powerful than that operating in our laboratory. 4. The physics of bodies at rest is much simpler than that of bodies in motion. 5. Masers provide amplifiers or oscillators at frequencies which are enormously higher than those previously attainable with electronic tubes. 6. The amount of electricity of any proton is exactly the same as that of an electron. 7. Electrons at less than a million volts reach practically a constant speed, almost that of light.

12. Прочитайте и переведите текст.**The Single-Phase Transformer**

The transformer is a stationary electrical machine that transforms alternating current energy usually from one voltage to another, the frequency remaining constant. The transformer consists of two electrical circuits or windings insulated from each other and having a common magnetic path. That winding which receives energy is the primary, and that from which energy is taken is the secondary. The winding having the higher voltage is the high-voltage winding, the other is the low-voltage winding. If the secondary voltage is higher than that of the primary, the device is called a step-up transformer, if the secondary voltage is lower than that of the primary, it is called a step-down transformer. Obviously, energy may be transmitted either way through the transformer.

13. Переведите предложения с конструкцией *It is...that (which, who)*.

1. It is the electromotive force that causes the electrons to move through the metal conductor. 2. Our life can't be imagined without telephone, telegraph, and radio communication. But it is electricity that gives them life. 3. It was only in 1920 that Tsio1kovsky's book "Outside the Earth" in which he described the imaginary flight of a manned rocket ship in orbit about the earth was published and fired the imagination of other scientists in our country as well as abroad. 4. It was Juri Gagarin's flight in 1961 that began an era of manned space flights and orbital space stations. 5. It was Mendelejev who established the Periodic table of elements.

14. Прочитайте и переведите текст. Составьте план текста.**Transformers**

A transformer is an electrical device that takes electricity of one voltage and changes it into another voltage. You'll see transformers at the top of utility poles and even changing the voltage in a toy train set.

Basically, a transformer changes electricity from high to low voltage using two properties of electricity. In an electric circuit, there is magnetism around it. Second, whenever a magnetic field changes (by moving or by changing strength) a voltage is made. Voltage is the measure of the electric force or "pressure" that "pushes" electrons around a circuit. If there's another wire close to an electric current that is changing strength, the current of electricity will also flow into that other wire as the magnetism changes.

A transformer takes in electricity at a higher voltage and lets it run through lots of coils wound around an iron core. Because the current is alternating, the magnetism in the core is also alternating. Also around the core is an output wire with fewer coils. The magnetism changing back and forth makes a current in the wire. Having fewer coils means less voltage. So the voltage is "stepped-down."

Transformers on the Electrical Grid

Let's look at the electricity that comes to your home. When electricity moves from a power plant it is put into a very high voltage to be able to travel long distances. The high voltage lines can be as high 155,000 to 765,000 volts to travel many hundreds of miles.

In order for your home or a store to use the electricity, it has to be at a lower voltage than on the long-distance lines. So, the electricity is "stepped-down to a lower level using a transformer. This lower voltage electricity is put into the local electric wires at a substation. The substation breaks the larger amount of power down into smaller pieces at lower voltage. It then is stepped down again and again.

Once smaller transformers take that voltage down to usually 7,200, the power leaves this substation. In your neighborhood, a transformer on top of a utility pole, or one connected to underground wires, transforms the 7,200 volts into 220-240 volts. This is then sent into your home over three wires. The three wires go through the electric meter, which measures how much electricity you use. One of the three wires is the ground, and the other two are the positives.

Some of the electrical appliances in your home use the 220-240 volts. These are things like a water heater, stove and oven, or air conditioner. They have very special connections and plugs. Other devices, like your TV or computer only use one-half of the electricity – 110-120 volts. In a toy train set, the voltage is reduced even more from 110-120 and is changed from alternating current into direct current. Some businesses use higher voltage power to run big machines. So, they don't need to have the voltage reduced as much.

Lesson 9

Transistors

Грамматика: словообразование, имя прилагательное, инфинитивные конструкции: “именительный падеж с инфинитивом”.

Ознакомьтесь с вокабуляром к тексту:

- | | |
|------------------------------------|--|
| 1. to occupy an intermediate place | занимать промежуточное место |
| 2. technology | технология |
| 3. to make smth possible | сделать что-либо возможным |
| 4. dimension | размер |
| 5. radiant energy | лучистая энергия |
| 6. cell | батарея, элемент, ячейка |
| 7. radio engineering | радиотехника |
| 8. absence of incandescence | отсутствие накаливания |
| 9. influence | влияние |
| 10. admixture | примесь |
| 11. a brief lay out | краткое описание |
| 12. point-contact transistor | кристаллический триод с точечным контактом |
| 13. a germanium pellet | германиевая бусина |

14. plastic housing	пластиковая оболочка
15. to avoid	избегать
16. to contaminate	загрязнять
17. vacuum tube	вакуумная лампа
18. "cat whiskers"	спиральные контактные пружины, "усики", "волоски"

1. Повторите за преподавателем:

a transistor, compact small dimensioned electronic devices, on the basis of transistors, vacuum tubes, thousandths of one per cent of admixtures, hundreds of thousands of times, nuclear particles, contact, metallic wires.

2. Прочитайте числительные: 1/2, 2/5, 0.5, 2.305, 5.3.

3. Назовите глаголы, от которых образованы следующие существительные:

consideration, occupation, design, consumption, transformation, achievement, requirement, burning, breaking, provision, pressure.

4. Образуйте прилагательные от следующих существительных:

electron, industry, engineer, science, technique, atmosphere, metal, physics, technology.

5. Назовите три формы глаголов:

to make, to go, to give, to avoid, to bring, to provide, to bring, to fall, to sell, to lose, to shoot.

6. Переведите предложения с конструкцией: "Объектный падеж с инфинитивом".

Пример: 1) We know scientists to study this problem.

Мы знаем, что ученые изучают эту проблему.

2) We believe them to investigate this phenomenon.

Мы считаем, что они исследуют это явление.

1) We know a diode to consist of an emitter of electrons and a collector of electrons. 2) Every student knows two kinds of electric charges to exist. 3) The teacher expected him to make this experiment successfully. 4) M. Curie found the atomic weight of radium to be 226. 5) The engineers have shown this substance to be unique in its properties. 6) We consider nuclear energy to be the prime source of heat energy. 7) We want them to compare the results of the experiments in time. 8) We believe this system to be tested in our laboratory.

7. Переведите сочетания слов:

compact small-dimensioned electronic devices

electrical conductive properties

germanium pellet

the contaminating effects of the atmosphere

transistor operation
 intense electric field
 required high intensity field

8. Прочитайте и переведите текст.

Transistors–1

We consider semiconductors to occupy an intermediate place between metals and insulators. Academician Joffe, a famous Soviet scientist found transistors to be of great interest not only for physics but also for future technology.

Transistors made it possible to design compact, small-dimensioned electronic devices, which consume very little, power. The transistors are successfully used for direct transformation of heat energy into electrical energy by means of thermal elements. We know them to be used to transform radiant energy into electricity with the help of photocells or so-called solar batteries. In later years light sources and lasers were built on the basis of transistors.

Transistors revolutionized radio engineering and electronics. Because of their small size, the absence of incandescence and other properties, transistors make it possible to produce designs which cannot be achieved with vacuum tubes. Transistors are extremely sensitive to external influences. Even thousandths of one per cent of admixtures change their electrical conductive properties by hundreds of thousands of times. They are very sensitive to the action of light, nuclear particles, pressure, etc.

Here we are going to give a brief layout of a point-contact transistor. 1) A point contact transistor consists of two electrodes (emitter and collector) which make contact with a germanium pellet and a third electrode (the base, which is soldered to that pellet. The entire assembly is encased in a plastic housing to avoid the contaminating effects of the atmosphere. The pellet is usually N–type germanium. The emitter and collector contacts are metallic wires. Transistor operation requires an intense electric field. It is obtained by the method of the point-contact “cat whiskers “. 2) “Cat whiskers” provide the required high intensity field and at the same time save the transistor against possible burning out and breaking down by the high voltage produced in emitter and collector circuits. Transistor properties in every important respect are equivalent to those of the vacuum tube.

Notes:

- 1) point-contact transistor – кристаллический триод с точечным контактом
- 2) “cat whiskers” – спиральные контактные пружины, “усики”, ”волоски”.

9. Найдите в тексте глаголы, от которых образованы следующие существительные:

consideration, consumption, provision, achievement.

10. Найдите в тексте слова-синонимы к следующим словам:

to believe, to take place, outstanding, by means of, a supply, due to.

11. Ответьте на вопросы:

1) What is a transistor? 2) What elements does a point-contact transistor consist of? 3) What does transistor operation require? 4) Why is the entire assembly encased in plastic housing? 5) What are transistor properties equivalent to? 6) What are transistors sensitive to? 7) Where are transistors used?

12. Прочитайте текст “Transistors–2”. Найдите в тексте ответы на следующие вопросы:

1. Since what time has the transistor become well known? 2. What history did the transistor repeat? 3. What difficulties did the transistor encounter? 4. Were all assembled transistors rejected? 5. How long can the transistors be used? 6. Why are transistors used in space electronics?

Transistors–2

In the past few years the transistor, because of its many advantages, has become well known and almost commonplace.

Before 1948 the transistor was unknown and electronics was based on the vacuum tubes. The transistor development in many ways repeated the history of the vacuum tube. In the beginning great difficulties in manufacture were encountered. Over 80% of all assembled transistors were rejected. This trouble has now been mostly overcome.

Vacuum tubes wear and break. Transistors are most rugged and their probable life may be 50 years. New uses for transistors are found daily. Take, for instance, space electronics. One cannot well imagine a modern rocket or a satellite without a variety of transistors because they are shock – proof, rugged, have minimum weight and minimum dimension.

13. Переведите предложения с конструкцией “именительный падеж с инфинитивом”.

Пример: Electronics is thought to be a young science.

Считают, что электроника – молодая наука.

Электроника, как считают, является молодой наукой.

1) An electric cell is believed to consist of an electrolyte and two electrodes. 2) The electric generator is known to be a machine that converts mechanical energy into electrical energy. 3) The value of output voltage of the cell was found to depend only on the materials used. 4) Due to these experiments this substance was shown to be a good conductor. 5) The secondary coil of the transformer is assumed to have more turns than the primary one. 6) The scientist is expected to make a report on the fundamentals of radio engineering. 7) The efficiency of these tubes is sure to be perfected. 8) The engineers are said to have discovered new means of testing the equipment. 9) The students are likely to have obtained very important data on the conductivity, of a new substance.

14. Прочитайте и переведите текст. Найдите в тексте предложения с конструкцией “именительный падеж с инфинитивом”.

Electronics Today and Tomorrow

Electronics is believed to be a rather young and very promising science. It has become a powerful means of production. Electronics has widened our vision and given us the chance to see the microworld more clearly. Radio-telescopes are known to collect and to focus the radio waves emitted by celestial bodies revealing new facts about the Universe. What role will electronics play in space travel? Above all, it will give a deeper insight into the properties of outer space. Electronics is expected to enable the astronauts to locate their position in space. Space-ship will be guided automatically just as aircraft are piloted by robots today. Electronics is sure to give the space pilots easy control for soft landing on other planets. Collision warning radars will operate automatic control if there is a danger of meteor hitting the spaceship. However, a great many complicated problems will have to be solved. One problem is that of extending the range of radio communication in space. With proper refinements, radio communication is likely to be set up over distances of 100 million kilometers or even more.

Lesson 10

Rectifiers

Грамматика: словообразование, модальные глаголы *may, must, can* и их эквиваленты, независимый причастный оборот.

Ознакомьтесь с вокабуляром к тексту:

1. to rectify	выпрямлять
2. to design	проектировать, предназначать
3. diode	диод
4. to replace	заменять
5. vapour	пар
6. to rely	полагаться
7. reliable	надежный
8. to examine	рассматривать
9. full wave rectifier	двух полупериодный выпрямитель
10. half wave rectifier	однополупериодный выпрямитель
11. inherent	присущий
12. pulsating pattern	пульсирующий график
13. to discharge	разряжать
14. arrow	стрелка
15. load	нагрузка
16. center tap	отвод от центральной части втор. обмотки трансформатора

1. Образуйте существительные от следующих глаголов:

to convert, to conduct, to design, to rectify, to replace, to control, to transform, to apply, to discharge, to consider, to compose, to indicate, to connect.

2. Образуйте прилагательные от следующих глаголов с помощью суффикса –able:

to rely, to obtain, to read, to understand, to adjust.

3. Напишите предложения в прошедшем и будущем времени:

1) The students must study vacuum-tube rectifiers. 2) They may use different methods of work. 3) They can show their achievements.

4. Переведите предложения.

1) Due to the application of powerful relays we shall be able to televise programs to vast territories. 2) Before installing the new equipment the engineers were to test its performance. 3) To improve the operation of that system some tubes are to be replaced. 4) According to the design the instrument cabin of a spaceship is to house various transmitters, power sources and other equipment. 5) The pilots had to maintain direct radio contact between the planes. 6) The students were allowed to examine numerous devices installed in the laboratory. 7) In the turbojet planes the air in the cabins is to be heated but in supersonic ones it is to be cooled.

5. Укажите номера предложений, в которых инфинитив является обстоятельством цели.

To check the accuracy of the system certain tests are carried out on the received telemetry information. 2) To convert heat directly into electricity was one of the main tasks of scientists. 3) To perform an operation at moderately high temperatures silicon transistors are to be used. 4) To reduce the noise due to heating it is necessary to decrease the radio receiver temperature. 5) To determine the volume of a gas at a definite temperature is very easy. 6) To raise the cathode temperature means to increase the number of emitted electrons.

6. Переведите предложения с независимым причастным оборотом:

1) The principle of action being extremely simple, the device was widely used for various purposes. 2) Part of the energy being changed into heat, not all the chemical energy of the cell battery is transformed into electric energy. 3) Two bodies placed in contact with each other, the temperature of the hot body falls while the temperature of the cold body rises. 4) Transistors being sensitive to light, engineers have to take this property into consideration. 5) Many metals are good conductors, silver presenting one of them. 6) The temperature of a wire being raised, the random motion of the electrons increased. 7) The system operation has been improved, the main change being made in the transmitter.

7. Прочитайте и переведите следующие термины и запомните их:

vacuum diodes, output voltage, a load resistor, high-power, gas-filled and gas-control tubes, low-power rectifiers, medium power rectifying systems, reliable semiconductor rectifiers, half wave rectifiers, the transformer secondary, full-wave rectifiers, mercury vapour rectifiers, transformer output voltage, a centre-tapped secondary winding, a pulsating wave-form.

8. Прочитайте и переведите текст.

Rectifiers

Rectifiers are devices designed to convert alternating current into direct current. For this purpose devices with asymmetrical conductance such as vacuum and semiconductor diodes are used. Until the end of the twenties of XX century vacuum diodes (kenotrons) were the main rectifying devices. In the thirties high-power kenotrons were replaced by more efficient mercury vapour rectifiers. At present high-power gas-filled and gas-control tubes are used.

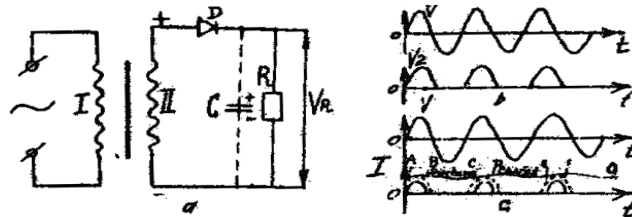


Fig. 3

Low-power rectifiers mostly used in low and medium power rectifying systems are replaced by highly efficient and reliable semiconductor rectifiers. Let us examine the simplest types of rectifiers. Look at half wave rectifiers (Fig. 3).

The load resistor R is connected in series with the transformer secondary and the semiconductor rectifying diode D . The wave-form in graph 1 shows the change in voltage across the transformer secondary. Due to inherent rectifying properties the diode conducts current only during the positive half-waves of the voltage cycles.

The current I and the output voltage V_r are of a pulsating pattern (Graph 2). To smooth these pulsations a capacitor G is connected across the load. The transformer output voltage going negative or dropping lower than the voltage applied to the capacitor, the diode does not conduct current and the capacitor is discharged through load resistor R (sections BC, DE, PG).

Full-wave rectifiers can be considered as composed of two half-wave rectifiers connected to one common load. Shown in figure 3 is a full-wave rectifier with two rectifying elements and a centre-tapped, secondary winding of the transformer. The voltage on the upper terminal of the secondary being positive with respect to the centre tap, diode D conducts current I in the direction indicated by an arrow. During the next half-wave the voltage polarity will be reversed and diode D_2 will conduct current I_2 to the common load. During both half-waves the current through the load resistor R (I_1 and I_2) is of the same direction, the output current $I = I_1 + I_2$ being of a pulsating wave-form.

9. Найдите в тексте предложение, в котором инфинитив выполняет функцию обстоятельства цели. Переведите его.

10. Найдите в тексте предложения с независимым причастным оборотом. Переведите их.

11. Поставьте 5 вопросов к тексту.

УСТНЫЕ ТЕМЫ

My Friend's Working Day

My friend's name is Victor. He is twenty years old. He is not single, he is married. He has a wife and a son. His son is two years old. His wife Ann is an economist. Victor is a student. He studies at a day-time department of the Moscow University of Civil Aviation. He is very busy, but he finds time for the cinema or for the theatre and sometimes for hockey match and exhibitions.

This is Victor's working day. He usually gets up early on weekdays, at a quarter to seven. He shaves, washes and dresses. In half an hour he is ready for breakfast. At breakfast he eats ham, cheese, eggs and bread and a butter and drinks tea, coffee or milk. At breakfast he listens to the news over the radio and reads newspapers.

At 8 o'clock Victor leaves the house and goes to University. The University is not far from the house. It takes him twenty minutes to get there on foot.

At University he attends seminars, listens to lectures, does labs (laboratory works), makes experiments. Victor does well at University.

After classes Victor has dinner and rests. In the evening he reads up for lectures and seminars. He goes to bed about twelve o'clock.

Sunday is Victor's day off. On Sunday he and his wife stay at home. They have a rest. Sometimes they take their son and go to the country, sometimes they go to the cinema or to a concert.

Ответьте на вопросы:

1. What is your friend's name? 2. How old is Victor? How old is his son? How old are you? How old are your parents? 3. What is Victor? What is his wife? What are you? What are your parents? 4. Is Victor single or married? Are you single or married? 5. Where does Victor study? Where do you study? 6. At what department do you study? 7. Is Victor busy? What is he busy with? Are you busy too? 8. Does he find time for going to the theatre (exhibition, concerts, etc.)? Do you find time for going to the theatre too? What do you find time for? 9. When does Victor get up on weekdays? When do you usually get up? Do you get up early or late on Sundays? 10. What does Victor do in the morning when he gets up? 11. What does Victor eat at breakfast? 12. Does Victor listen to the news over the radio during breakfast? When do you listen to the news in the morning or in the evening? 13. When does Victor leave the house to get to University in time? At what time do you leave the house? 14. Do you live far from the University? How do you get to the University? (By bus, by underground, on foot, etc.). How long does it take Victor to get to the University? Does Victor go to the University by bus or on foot? 15. Does Victor attend lectures? What does he do at the University? What do you do at the University? Are your lectures interesting? Do you attend the lectures with great interest? What are your favorite subjects? 16. When does Victor have dinner? When do you have dinner (supper, breakfast)? 17. When does Victor read up for lectures and seminars? When do you read up for lectures and seminars? How long does it take you to get ready for a philosophy seminar? 18. Does Victor do well at University? Do you do well at

University? 19. Sunday is your day off, isn't it? What do you do on Sundays? What does Victor do on his day off?

Расскажите:

- 1) о своем друге;
- 2) о себе.

My University

Any young man in our country has an opportunity to get higher education. A wide network of institutes, universities is at the disposal of our youth. Some of them attend day-time higher school. Others study at the evening or extra-mural departments. If you want to enter an institute or University you have to take competitive examinations first.

Now we are the students of the Moscow University of Civil aviation. Our University was founded in 1971. It trains specialists in aircraft and aircraft engine maintenance and repair, in airborne radio-equipment, in automation control systems applied in civil aviation. The University trains engineers-economists in air traffic planning and commercial international airline service as well. The University course lasts 5 years and 6 months. During the first two years of study the students are taught general subjects but starting with the third year each student can specialize in the field he gets interested in.

Most of the students of our University are engaged in scientific work. The University provides all necessary conditions for developing the students' creative activity. The laboratories at our University are supplied with modern equipment, devices and apparatus. At our University there is a computer center and term paper and graduate thesis classes. The students have every possibility to carry on research work in different student's groups and societies under professors and associate professors of the University who help the students to develop their abilities in a certain field of engineering and science. Every year there take place conferences where the participants deliver reports reflecting their activity. After graduating from the University some of the students following the recommendations of the scientific council take post-graduate courses in order to increase their knowledge in the already chosen field.

At our University not all students study in the day-time. Many students combine work with study. They attend the extra-mural (correspondence) department.

The scientists of our University carry out fundamental complex research in the field of air traffic, aircraft maintenance efficiency, radio and electrical equipment accuracy and reliability, and solve their actual problems of civil aviation. The students of our University take part in the development of these problems too.

Apart from the studies the students go in for different kinds of sports. At our University there is a good gymnasium. They play basketball, football, rugby, go in for other kinds of sports.

After graduation from the Moscow University of Civil Aviation our students get a diploma of higher education. They can work at the airports of Moscow, air terminals of our country and abroad, at scientific research institute of civil aviation.

Комментарий:

to be at the disposal	быть в распоряжении
extra-mural (correspondence) department	заочный факультет
apart from	кроме
according to	согласно, в соответствии с
post graduate courses	аспирантура
term paper and graduate thesis classes	кабинеты для курсового и дипломного проектирования

Ответьте на вопросы к тексту

1. What opportunity has any young man in our country? 2. What kinds of higher schools are there at the disposal of our youth? 3. What is competition under the present system like? 4. When was Moscow Civil Aviation University founded? 5. What specialists does our University train? 6. How long does the University course last? 7. What subjects are taught during the first two years of study? 8. When do the students begin their specialization? 9. Are the students engaged in scientific work? 10. What does our University provide? 11. What kind of equipment are the laboratories of our University supplied with? 12. Who helps the students to develop their abilities? 13. Where do the students deliver reports reflecting their activity? 14. What do some of the students do on graduating from our University? 15. What departments do the students attend if they combine their work with the study at University? 16. What researches do the scientists and the students of our University carry out? 17. Where can the graduates work?

Перескажите текст по-английски, используя вопросы как план.

1. What does one have to do to enter the University? 2. What specialists does the Moscow University of Civil Aviation train? 3. How long does the course of studies last and how are the subjects distributed? 4. How is scientific work organized at the Moscow University of Civil Aviation? 5. How do students spend their spare time? 6. Where can the graduates of the Moscow University of Civil Aviation work?

Запомните три формы следующих глаголов:

arise	arose	arisen	<i>подняться</i>
be	was, were	been	<i>быть</i>
beat	beat	beaten	<i>бить</i>
become	became	become	<i>стать, становиться</i>
begin	began	begun	<i>начать</i>
bend	bent	bent	<i>согнуть</i>
bind	bound	bound	<i>связать</i>
blow	blew	blown	<i>дуть</i>
break	broke	broken	<i>сломать</i>
bring	brought	brought	<i>принести</i>
build	built	built	<i>строить</i>
burn	burnt	burnt	<i>жечь, гореть</i>
burst	burst	burst	<i>разразиться</i>
buy	bought	bought	<i>купить</i>
come	came	come	<i>прийти</i>
cost	cost	cost	<i>стоить</i>
cut	cut	cut	<i>резать</i>
deal	dealt	dealt	<i>иметь дело</i>
do	did	done	<i>делать</i>
draw	drew	drawn	<i>тащить, рисовать</i>
drink	drank	drunk	<i>пить, выпить</i>
drive	drove	driven	<i>гнать, ехать</i>
eat	ate	eaten	<i>кушать, есть</i>
catch	caught	caught	<i>ловить, поймать</i>
choose	chose	chosen	<i>выбирать</i>
fall	fell	fallen	<i>падать</i>
feed	fed	fed	<i>кормить</i>
fight	fought	fought	<i>сражаться</i>
find	found	found	<i>находить</i>
fly	flew	flown	<i>летать</i>
forget	forgot	forgotten	<i>забыть</i>
freeze	froze	frozen	<i>мерзнуть</i>
get	got	got	<i>получить</i>
give	gave	given	<i>дать</i>
go	went	gone	<i>идти, уходить</i>
grow	grew	grown	<i>расти</i>
hang	hung	hung	<i>висеть, повесить</i>
have	had	had	<i>иметь</i>
hear	heard	heard	<i>слышать</i>
hide	hid	hidden	<i>прятать</i>
hit	hit	hit	<i>ударить, попасть</i>
hold	held	held	<i>держать</i>
keep	kept	kept	<i>хранить</i>

know	knew	known	<i>знать</i>
lay	laid	laid	<i>класть, положить</i>
lead	led	led	<i>вести</i>
leave	left	left	<i>оставить</i>
lose	lost	lost	<i>терять</i>
make	made	made	<i>делать</i>
mean	meant	meant	<i>подразумевать</i>
meet	met	met	<i>встретить</i>
pay	paid	paid	<i>платить</i>
put	put	put	<i>класть</i>
read	read	read	<i>читать</i>
ring	rang	rung	<i>звонить</i>
rise	rose	risen	<i>подняться</i>
run	ran	run	<i>бежать, течь</i>
saw	sawed	sawn	<i>пилить</i>
say	said	said	<i>говорить, сказать</i>
see	saw	seen	<i>видеть</i>
seek	sought	sought	<i>искать</i>
sell	sold	sold	<i>продавать</i>
send	sent	sent	<i>посылать</i>
set	set	set	<i>устанавливать</i>
shake	shook	shaken	<i>трясти</i>
shine	shone	shone	<i>светить, сиять</i>
shoot	shot	shot	<i>стрелять</i>
show	showed	shown	<i>показывать</i>
sing	sang	sung	<i>петь</i>
sit	sat	sat	<i>сидеть</i>
sleep	slept	slept	<i>спать</i>
spend	spent	spent	<i>тратить</i>
split	split	split	<i>расщепить(ся)</i>
spread	spread	spread	<i>распространять(ся)</i>
stand	stood	stood	<i>стоять</i>
strike	struck	struck	<i>ударить, бить, бастовать</i>
swim	swam	swum	<i>плыть</i>
take	took	taken	<i>взять, брать</i>
teach	taught	taught	<i>учить</i>
tell	told	told	<i>рассказывать, сказать</i>
think	thought	thought	<i>думать</i>
throw	threw	thrown	<i>бросить</i>
win	won	won	<i>выиграть</i>
wind	wound	wound	<i>заводить</i>
withdraw	withdrew	withdrawn	<i>отозвать, взять назад</i>
write	wrote	written	<i>писать</i>

ДЛЯ ЗАМЕТОК

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