9 Translate into English.

искусственное электрическое освещение, электрическая дуга, использовать выключатель, разряд в газе (газовый разряд), источник света, завоевать всемирное признание, знаменитый американский ученый, лампа накаливания, угольная нить накаливания, применение электричества в нашем быту, электрические приборы, самый важный источник энергии, радиосвязь, научно-исследовательская лаборатория, ядерная энергия, сделать большой вклад.

Reading Practice

Read the text for 15 minutes using skimming reading. Choose the right topic out of the three given below.

1 Atmospheric Electricity.
2 Early History of Electricity.
3 Electric Current Serves us in a Thousand Ways.

Text A

1 Electricity is the power that made possible the engineering progress of today. Wherever we look around us we can find this power serving us in some way.

When we use a switch and have our room instantly flooded with light, we seldom think of what is happening to make it possible. Probably the most important use of electricity in the modern home is producing light.

2 Do you know that the first ever man-made electric light illuminated the laboratory of the St. Petersburg physicist Vasily Petrov in 1802? He had discovered the electric arc, a form of the gas discharge. But in Petrov's experiments the arc flame lasted for only a short time.

3 In 1876 Pavel Yablochkov invented an arc that burned like a candle for a long time and it was called 'Yablochkov's candle'. The source of light invented by Yablochkov won world-wide recognition. But while he and several other inventors were improving the arc light, some engineers were working along entirely different line. They sought to develop an incandescent lamp. It was a young Russian engineer Alexander Lodygin who made the first successful incandescent lamp. The famous American inventor Thomas Edison improved the lamp having used a carbon filament. But it was again Lodygin who made another important improvement in the incandescent lamp, having invented a lamp with a tungsten filament, the lamp we use today.

4 The uses of electricity in the home do not end with lighting. There are more and more electric devices helping us in our homework.

But we should not forget that electricity is the most important source of energy in industry as well.

5 Automation, which is one of the main factors of technical progress today, is impossible without electricity.

Our life can't be imagined without telephone, telegraph and radio communications. But it is also electricity that gives them life. In recent years electricity has made a great contribution to radio communication between the spaceships and also between the astronauts and the earth.

6 Little could be done in modern research laboratory without the aid of electricity. Nearly all of the measuring devices used in developing nuclear power for the use of mankind are electrically operated.

Exercises

1 Which of these statements are related to the content of the third paragraph?

1 Our life can't be imagined without telephone.
2 Automation is one of the main factors of electrical progress.
3 Vasily Petrov discovered the electric arc.
4 Artificial daylight lamps are much cheaper than incandescent lamps.
5 Electricity is the most important source of energy.

2 Are these statements true or false?

1 In Petrov's experiment the arc flame lasted for a long time.
2 The source of light invented by Yablochkov won world-wide recognition.
3 Thomas Edison invented a lamp with a tungsten filament.
4 Automation is quite possible without electricity.
5 Nearly all the measuring devices are electrically operated.

3 Which paragraph contains the answer to the question?

Who made the first successful incandescent lamp?

4 Arrange these statements in the proper order.

1 In recent years electricity has made a great contribution to radio communication.
2 In 1876 Pavel Yablochkov invented an arc.
3 In Petrov's experiment the arc flame lasted for only a short time.
4 The uses of electricity in the home do not end with lighting.
5 Little could be done in modern research laboratory without the aid of electricity.

5 Do agree with the following statements? Use: 'You are right'; 'Your statement is wrong'; 'I am afraid you are wrong... '.

1 Our life can be imagined without telegraph.
2 Thomas Edison improved the lamp having used a carbon filament.

3 The uses of electricity in the home end with lighting.
4 Electricity is the power that has made possible the engineering progress of today.
5 Vasily Petrov discovered the electric arc.
6 The source of light invented by Yablochkov did not win world-wide recognition.

7 *Answer the following questions.*
1 What was called 'Yablochkov's candle'?
2 Who made the first successful incandescent lamp?
3 What lamp do we use today?

8 *Read the text once more. Try to retell it.*

Text B

Read the text; try to define the main problem being spoken about.

Electrical Engineering

1 Electrical engineering is the science dealing with the techniques of utilizing electrical and magnetic phenomena for practical purposes. One of the main branches of electrical engineering is electrical power engineering concerned with the production of electrical energy from other forms of energy, power transmission over long distances, distribution among consumers, and reconversion of power for ultimate utilization into mechanical, thermal, chemical, and other forms of energy.

2 Electrical engineering has made the noteworthy contribution to the technological advances in many professional branches. It enables engineers to promote the integrated mechanization and automation of production processes, put into operation more and more automatic transfer lines, shops and plants. Electrical engineering forms the basis for electrothermic and electrolytic methods of metal production and treatment. Electrical energy is easily convertible and therefore finds wide use in electric welding, high frequency steel hardening, and in many other applications. Mechanical, chemical, civil, and structural engineers use the products of electrical engineering for remote metering, process control, heating, refrigeration, power distribution within buildings, etc.

3 Modern electronics offers the possibility of fabrication of miniature devices for computers and various automatic apparatuses designed for control over production processes.

Automation of production processes relies on a wide range of vacuum, gas-filled, and semiconductor devices. Rapid development in computer engineering makes it possible to elaborate automatic control systems and to

solve important economic problems. Electrical devices intended to collect, process, transmit, and display information are the vital means of automatic control systems.

Exercises

1 Give a heading to each paragraph of the text. Explain why you have given such a heading.

2 Are these statements true or false?

1 Electrical power engineering is one of the main branches of electrical engineering.
2 Electrical energy is easily convertible.
3 Power engineering is concerned with the production of electrical energy from other forms of energy.
4 Electrical engineering finds wide use in electric welding, high-frequency steel hardening and so on.
5 Rapid development in computer engineering makes it possible to solve important economic problems.

3 Define the key words and expressions in the text, read these out.

4 Locate topic sentences in paragraphs 2 and 3.

5 Give a short summary of the text.

Additional Material for Out-of-Class Work

Text C

Energy can be defined briefly as the capacity for doing work. A wound-up windup toy is more charged with energy than when it has run its little course, awaiting the next infusion of energy at your hand. A boulder poised at the edge of cliff has capacity for doing a great deal of work, albeit of a destructive nature.

In each case, we are observing energy in transition from one state to another: from the potential state (Latin *potens*, having power) to the kinetic state (Greek *kinetos*, moving). Think of it as money in the bank turning into money being spent.

1) Mechanical Energy. A hammer in action is a huge mass of molecules – steel head and wooden handle – all engaged in a single concerted motion. Molecules in motion possess mechanical energy (Greek *mekhanikos*, machine, contrivance). When the hammer head strikes a nail, the mechanical

energy is passed along to the nail, which moves. A rubber band, too, is a large mass of molecules. Stretch a rubber band and release it. The vibrating twanging band delivers a special form of mechanical energy, called sound, to the air. In fluids (liquids and gases) the molecules aren't bound together like the molecules of a steel hammer head or a rubber band, but they, too, have mechanical energy when they move together. A stream of water strikes the blades of a waterwheel. A stream of air strikes the blades of a windmill. The mechanical energy in moving streams is passed along to the blades, and they move.

2) Heat Energy. We've seen that masses of molecules in concerted motion exhibit mechanical energy. Now let's look at the separate motions of individual molecules. Place your palm against your forehead. Palm and forehead probably feel equally warm or nearly so. Then rub your hands briskly together for a half a minute. Again, place a hand against your forehead and observe that this time the hand feels warmer. The molecules of your hand, your forehead, and of everything else in the universe are in motion all the time. They jiggle back and forth, up and down, colliding and rebounding constantly. This endless random motion is called heat. When you rubbed your hands together, you increased the rate of vibration. Faster vibration results in more heat.

3) Chemical Energy. Masses of molecules moving together exhibit mechanical energy. Separate molecules moving randomly create heat energy. Molecules are made of atoms, and the energy related to molecules and atoms joining, arranging, and separating is chemical energy. An iron nail rusting away is a good example of chemical energy. The factory-fresh grey nail gradually takes on a reddish colour. A chemical change is taking place, in which atoms of iron in the nail combine with atom of oxygen from the air to form molecules of iron oxide, or rust. This chemical change is accompanied by a discharge of heat energy.

4) Electrical Energy. A copper wire consists of copper atoms. Each copper atom has 29 electrons whirling around a central portion, the *nucleus*, which contains 29 *protons*. A single proton can hold one electron in place. Thus 29 protons can hold on to 29 electrons; we say the atom is electrically balanced. Suppose we force an extra electron, number 30, into a copper atom at the end of the wire. The extra electron disturbs the balance of the nearest atom, which reacts by forcing on of its own electrons into the next nearest atom, and so on, down the length of the wire. Actually, you pay the electricity board for doing exactly this – forcing electrons through wires. The electric generator sets up a stream of electrons from atom to atom. The stream is an *electric* current. When you switch on a 100 watt-bulb, about 300 trillion (300×10^{18}) electrons flow through the wire in the bulb every second.