**I. Read the text**

**DYNAMOS**

The term «dynamo» is applied to machines which convert either mechanical energy into electrical energy or electrical energy into mechanical energy by utilizing the principle of electromagnetic induction. A dynamo is called a generator when mechanical energy supplied in the form of rotation is converted into electrical energy. When the energy conversion takes place in the reverse order the dynamo is called a motor. Thus a dynamo is a reversible machine capable of operation as a generator or motor as desired.

A generator does not create electricity, but generates or produces an induced electromotive force, which causes a current to flow through a properly insulated system of electrical conductors external to it. The amount of electricity obtainable from such a generator is dependent upon the mechanical energy supplied. In the circuit external to a generator the e. m. f. causes the electricity to flow from a higher or positive potential to a lower or negative potential. In the internal circuit of a generator the e. m. f. causes the current to flow from a lower potential to a higher potential. The action of a generator is based upon the principles of electromagnetic induction.

The dynamo consists essentially of two parts: a magnetic field, produced by electromagnets, and a number of loops or coils of wire wound upon an iron core, forming the armature. These parts are arranged so that the number of the magnetic lines of force of the field threading through the armature, coils will be constantly varied, thereby producing a steady e. m. f. in the generator or a constant torque in the motor.

**II. Fill in the gaps with the words given below:**

*to convert, generator, reversible, obtainable, induction, loops*

1. The term “dynamo” is applied to machines which.....either mechanical energy into electrical or on the contrary electrical energy into mechanical energy.

2. A dynamo is a ..... machine capable of operation as a generator or motor as desired.

3. The amount of electricity ..... from such a generator is dependent upon the mechanical energy supplied .

4. The action of a generator is based upon the principles of electromagnetic ...... .

5. The dynamo consists of two parts: a magnetic field, produced by electromagnets, and a number of .....or coils of wire.

**III. Find the Russian equivalents for the following English words and word combinations:**

1) to be applied to smth.; 2) to convert smth. into smth.; 3) rotation; 4) to utilize; 5) a properly insulated system; 6) internal (external) circuit; 7) capable of operation; 8) positive (negative) potential; 9) reverse order; 10) energy conversion.

**IV. Answer the questions**

1. What term can be applied to machines converting mechanical energy into electrical?

2. What kind of machine is a dynamo?

3. What is the function of a generator?

4. What is the action of a generator based upon?

5. What parts does the dynamo consist of?

**UNIT 10**

**I. Read the text**

**GENERATORS**

The powerful, highly efficient generators and alternators that are in use today operate on the same principle as the dynamo invented by the great English scientist Faraday in 1831. Dynamo-electric machines are used to supply light, heat and power on a large scale. These are the machines that produce more than 99.99 per cent of all the world's electric power.

There are two types of dynamos – the generator and the alternator. The former supplies d. c. which is similar to the current from a battery and the latter provides a. c. To generate electricity both of them must be continuously provided with energy from some outside source of mechanical energy such as steam engines, steam turbines or water turbines.

A generator is an electric machine, which converts mechanical energy into electric energy. There are direct-current (d. c.) generators and alternating current (a. c.) generators. Their construction is much alike. A d. c. generator consists of stationary and rotating elements. The stationary elements are: the yoke or the frame and the field structure. The yoke forms the closed circuit for the magnetic flux. The function of the magnetic structure is to produce the magnetic field.

The rotating elements are: true armature and the commutator. They are on the same shaft. The armature consists of the core and the winding. The winding is connected to the commutator. With the help of the brushes on the commutator that conduct the electric current to the line the winding is connected to the external circuit. The stationary element of an a. c. generator is called a stator. The rotating element is called a rotor. The essential difference between a d. c. generator and a. c. generator is that the former has a commutator by means of which the generated e. m. f. is made continuous, i. e. the commutator mechanically rectifies the alternating e. m. f. so that it is always of the same polarity.

D. c. generators are used for electrolytic processes such as electroplating. Large d. c. generators are employed in such manufacturing processes as steel making. The d. c. generator of small capacities is used for various special purposes such as arc welding, automobile generators, train lighting systems, etc. It also finds rather extensive use in connection with communication systems.

**II. Give the Russian equivalents for the following English words and word combinations:**

1) generator; 2) alternator; 3) steam turbine; 4) water turbine; 5) armature; 6) rotor; 7) stationary; 8) commutator; 9) stator; 10) yoke; 11) brushes; 12) core; 13) frame; 14) winding.

**III. Fill in the blanks**

1. A generator is an electric machine, which a) ----- mechanical energy into electrical energy.

2. A direct-current generator consists of b) ----- .

3. The dynamo was invented by c) ----- in 1831.

4. The d.c. generator is used for various purposes such as d) ----- .

**IV. Work out the plan of the text**

**V. Speak on the following points:**

1. The construction of a generator.

2. The direct current generators and their industrial application.

**UNIT 11**

**I. Read the text**

**MAIN STRUCTURAL ELEMENTS OF A D. C. MACHINE**

A direct-current machine consists of two main parts, a stationary part, usually called the stator, designed mainly for producing a magnetic flux, and a rotating part, called the armature or the rotor. The stationary and rotating parts should be separated from each other by an air-gap. The stationary part of a d. c. machine consists of main poles, designed to create the main magnetic flux; commutating poles interposed between the main poles; and a frame. It should be noted here that sparkles operation of the machine would be impossible without the commutating poles. Thus, they should ensure sparkles operation of the brushes at the commutator.

The main pole consists of a laminated core the end of which facing the armature carries a pole shoe and a field coil through which direct current passes. The armature is a cylindrical body rotating in the space between the poles and comprising a slotted armature core, a winding inserted in the armature slots, a commutator, and a brush gear.

The frame is the stationary part of the machine to which are fixed the main and commutating poles and by means of which the machine is bolted to its bedplate. The ring shaped portion which serves as the path for the main and commutating pole fluxes is called the yoke. End-shields or frame-heads which carry the bearings are also attached to the frame. Of these main structural elements of the machine the yoke, the pole cores, the armature core and the air-gap between the armature core and the pole core are known to form the magnetic circuit while the pole coils, the armature windings, the commutator and brushes should form the electric circuit of the machine.

**II. Translate the following phrases, using the given variants of translation:**

*to consist* – состоять : to consist of a stationary part and a rotating part;

*separated* – отдельный изолированный: the stationary and rotating parts should be separated from each other by an air gap;

*to serve* – служить в качестве чего-либо: the ring shaped portion or yoke

serves as a path for the main and commutating pole fluxes.

**III. Arrange synonyms in pairs and memorize them:**

a) to consist of; to be separated from; to create; to be interposed between; to pass; to rotate;

в) to be divided with; to produce; to introduce into; to permeate; to roll; to revolve; to comprise.

**IV. Write out the names of the machine parts and describe their operational characteristics**

**UNIT 12**

**I. Read the text**

**THE ALTERNATOR**

The alternator is an electric machine for generating an alternating current by a relative motion of conductors and a magnetic field. The machine usually has a rotating field and a stationary armature. In a synchronous alternator the magnetic field is excited with a direct current. The direction of an induced e. m. f. is reversed each time when a conductor passes from a pole of one polarity to a pole at another polarity. Most machines of this type are used for lighting and power, but there are alternators with a revoking armature and a stationary field. They are used in small sizes mostly for special purposes.

Any electrical machine is reversible. When a machine is driven by a source of mechanical power, it works as a generator and delivers electrical power. If it is connected to a source of electrical power, it produces mechanical energy, and operates as a motor. The alternator may also be operated as a motor.

The a-c .generator, or alternator, does not differ in principle from the d. c. generator. The alternator consists of a field structure and an armature. The field structure is magnetized by a field winding carrying a .direct current. An electromotive force is generated in tine winding of the armature. In alternators the field is usually the rotating element and the armature is stationary. This construction has a number of advantages. Only two rings are needed with a rotating field. These rings carry only a relatively light field current, at a voltage generally of 125, and seldom exceeding 250. The insulation of such rings is not difficult. A stationary armature requires no slip rings. The leads from the armature can be continuously insulated from the armature winding to the switchboard, leaving no bare conductor. The alternator with a rotating field may be further divided into the vertical and the horizontal types.

The vertical type is usually applied for large water-wheel generators where it is desirable to mount the water turbine below the generator. The more common horizontal type is used with diesel and steam engine drive. A low speed alternator of this type is suitable for a diesel engine drive, a high speed alternator is suitable for a steam turbine drive.

**II. Form nouns, denoting devices with the help of the suffix – or. Translate them**

To alternate, to commute, to conduct, to generate

**III. Read the text and write out the key words, characterizing the alternator**

**IV. Translate the following word combinations paying attention to the Participle 2**

The leads from the armature can be continuously insulated from….., the vertical type of alternator applied for large water-wheel generator; alternators with a revoking armature and a stationary field used in small sizes mostly for special purposes; a machine driven by a source of mechanical power; the direction of an induced e. m. f. …

**V. State 5 questions to the text**

**VI. Points for discussion:**

1. The structure of the alternator;

2. The application of the alternator.