**Тема:** «Электрогенераторы»

**Цель:** Повторить грамматический материал по теме, продолжить изучать глоссарий по теме проф.блока «электричество»

**Задачи:** Отработать навык работы (в т.ч. перевода) с профессиональной лексикой по теме профессионального блока, повторить тематический материал, актуализировать имеющиеся знания.

**Специальность:** ОГСЭ.03

**Время выполнения:** 180 минут

1. **Learn your glossary**
2. **Read the text**
3. **Do the tasks**

**Generators**

In [electricity generation](https://en.wikipedia.org/wiki/Electricity_generation), a generator is a device that converts motive power ([mechanical energy](https://en.wikipedia.org/wiki/Mechanical_energy)) into [electrical power](https://en.wikipedia.org/wiki/Electrical_power) for use in an external [circuit](https://en.wikipedia.org/wiki/Electrical_circuit). Sources of mechanical energy include [steam turbines](https://en.wikipedia.org/wiki/Steam_turbine), [gas turbines](https://en.wikipedia.org/wiki/Gas_turbine), [water turbines](https://en.wikipedia.org/wiki/Water_turbine), [internal combustion engines](https://en.wikipedia.org/wiki/Internal_combustion_engine), [wind turbines](https://en.wikipedia.org/wiki/Wind_turbine) and even hand [cranks](https://en.wikipedia.org/wiki/Crank_(mechanism)). The first electromagnetic generator, the Faraday disk, was invented in 1831 by British scientist [Michael Faraday](https://en.wikipedia.org/wiki/Michael_Faraday). Generators provide nearly all of the power for [electric power grids](https://en.wikipedia.org/wiki/Electric_power_grid). The reverse conversion of electrical energy into mechanical energy is done by an [electric motor](https://en.wikipedia.org/wiki/Electric_motor), and motors and generators have many similarities. Many motors can be mechanically driven to generate electricity and frequently make acceptable manual generators.

**Direct current generators**

This large belt-driven high-current [dynamo](https://en.wikipedia.org/wiki/Dynamo) produced 310 amperes at 7 volts. Dynamos are no longer used due to the size and complexity of the [commutator](https://en.wikipedia.org/wiki/Commutator_(electric)) needed for high power applications. A coil of wire rotating in a magnetic field produces a current which changes direction with each 180° rotation, an [alternating current](https://en.wikipedia.org/wiki/Alternating_current) (AC). However many early uses of electricity required [direct current](https://en.wikipedia.org/wiki/Direct_current) (DC). In the first practical electric generators, called [*dynamos*](https://en.wikipedia.org/wiki/Dynamo), the AC was converted into DC with a [commutator](https://en.wikipedia.org/wiki/Commutator_(electric)), a set of rotating switch contacts on the armature shaft. The commutator reversed the connection of the armature winding to the circuit every 180° rotation of the shaft, creating a pulsing DC current. One of the first dynamos was built by [Hippolyte Pixii](https://en.wikipedia.org/wiki/Hippolyte_Pixii" \o "Hippolyte Pixii) in 1832.

The "dynamo-electric machine" employed self-powering electromagnetic field coils rather than permanent magnets to create the stator field. Wheatstone's design was similar to Siemens', with the difference that in the Siemens design the stator electromagnets were in series with the rotor, but in Wheatstone's design they were in parallel. The use of electromagnets rather than permanent magnets greatly increased the power output of a dynamo and enabled high power generation for the first time.

The dynamo machine that was developed consisted of a stationary structure, which provides the magnetic field, and a set of rotating windings which turn within that field. On larger machines the constant magnetic field is provided by one or more electromagnets, which are usually called field coils.

### Synchronous generators (alternating current generators)

### Through a series of discoveries, the dynamo was succeeded by many later inventions, especially the AC [alternator](https://en.wikipedia.org/wiki/Alternator), which was capable of generating [alternating current](https://en.wikipedia.org/wiki/Alternating_current). It is commonly known to be the Synchronous Generators (SGs). The synchronous machines are directly connected to the grid and need to be properly synchronized during startup. Moreover, they are excited with special control to enhance the stability of the power system.

Large two-phase alternating current generators were built by a British electrician, [J.E.H. Gordon](https://en.wikipedia.org/wiki/James_Edward_Henry_Gordon), in 1882. The first public demonstration of an "alternator system" was given by [William Stanley, Jr.](https://en.wikipedia.org/wiki/William_Stanley,_Jr.), an employee of [Westinghouse Electric](https://en.wikipedia.org/wiki/Westinghouse_Electric_(1886)) in 1886.

The early alternators produced frequencies between 100 and 300 [Hz](https://en.wikipedia.org/wiki/Hertz). Ferranti went on to design the [Deptford Power Station](https://en.wikipedia.org/wiki/Deptford_Power_Station) for the London Electric Supply Corporation in 1887 using an alternating current system. On its completion in 1891, it was the first truly modern power station, supplying high-voltage AC power that was then "stepped down" for consumer use on each street. This basic system remains in use today around the world.

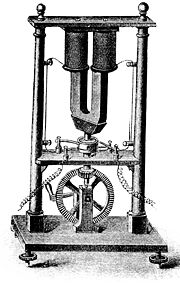
1. **Translate into Russian lines given in Italics**
2. **Answer the questions:**
3. What is a generator?
4. What type of generators do you know?
5. What is the main principle of generator functioning?
6. Give the sources of mechanical energy.
7. **Match the word with it’s definition:**

|  |  |
| --- | --- |
| 1. Electric power grids | 1. describes the number of waves that pass a fixed place in a given amount of time. |
| 1. Frequency | 1. is a [rotating](https://en.wikipedia.org/wiki/Rotating) [machine element](https://en.wikipedia.org/wiki/Machine_element), usually circular in cross section, which is used to [transmit](https://en.wikipedia.org/wiki/Transmit) power from one part to another, or from a machine which produces power to a machine which absorbs power. |
| 1. Shaft | 1. the energy (in the form of steam, electricity, etc.) used to drive machinery. |
| 1. External circuit | 1. the electrical power system network comprised of the generating plant, the transmission lines, the substation, transformers, the distribution lines and the consumer. |
| 1. Motive power | 1. is composed of all the connected components within an electrolytic cell to achieve desired conditions. These can include resistors, connecting wires, capacitors and lamps. |

1. **Fill in the gaps with the given words**: Electric power grids; motive power; melt; fuse; feeder transformer; converting ; permanent; proper.
2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the most important part for any block. Thousands of people will angry if their electricity disappears.
3. We have to be more reliable as a company, and we must give a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_supervision to our objects, or our rivals will have our clients.
4. If the storm breaks the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, our district will be completely powered down! But still, we’ve got nothing to do with the nature.
5. Who has bypassed the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_with the chewing gum wrap? The whole circuit has burnt!
6. Aluminum is easy to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that’s why we don’t use it for working with high temperatures
7. Steam, wind or solar energy can be used as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. How could you solve this task without \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_the given unit into kilohertz?
9. You need to find a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_capacitor and an original resistor for this model
10. **Translate into Russian:**

**Armature winding** of dc machines may be of the lap or the wave type. The difference in the two types is in the manner of connecting the armature coils to the commutator. A coil is the portion of the armature winding between successive connections to the commutator. In the lap type of winding the two ends of a coil are connected to adjacent commutator segments. In the wave type of winding the two ends of a coil are connected to commutator segments that are displaced from each other by approximately 360 electrical degrees.

1. **Sign every component according to the description:**

 [Hippolyte Pixii](https://en.wikipedia.org/wiki/Hippolyte_Pixii)'s dynamo. The *commutator* is located on the *shaft* below the *spinning magnet.* The shaft is connected with *springs* and a *handle,* attached to the *wheel*. The whole construction is put into a *frame*.