

4. An **air** core transformer is used for **high**-frequency currents
5. In a **step-up** transformer the number of turns of the **secondary** winding... .
is greater than the number of turns of the **primary** winding

5. Pair work. Put these questions to your groupmate and ask him/her to answer them.

1. What is a transformer used for?
2. What does a transformer consist of?
3. What is the function of the primary winding?
4. What is the function of the secondary winding?
5. What type of transformer is called a step-up transformer?
6. What type of transformer is used for high-frequency currents?
7. What type of transformer is called a step-down transformer?
8. What type of transformer is used for low-frequency currents?
9. What is the relation between the number of turns in the windings and the value of current?
10. What are common troubles in a transformer?
11. What should be done in case a transformer has a trouble?

6. Read about current transformers. Answer the questions that follow.

Current Transformers

Current transformers are used for operating ammeters, wattmeters, and other measuring devices. They produce in the meters a current lower than the measured current but proportional to it.

Current transformers also insulate the instrument from the circuit which is being measured. This is necessary for high voltage circuits.

- **What is a current transformer used for?**
- **What type of current does it produce?**

7. Read the text and find in it the answer to the question that follows it.

High-Frequency Current

Alternating current with frequency of 50 c/s is widely used in industry. Therefore this frequency is called an industrial frequency and the current, an industrial frequency current.

During sound transmission, current flowing in telephone wires changes with the frequency of sound oscillations, which ranges from 50 to 10,000 c/s. The currents of such frequencies are called audio- or low-frequency currents.

Radio transmission is based on the use of alternating currents with frequencies of hundreds, thousands, millions and even tens of million cycles per second. These currents called high-frequency currents are produced by means of an oscillatory circuit consisting of a coil and a capacitor. Moving along the turns now in one direction now in another, the electric charges oscillate in an oscillatory circuit.

- **By what means are high-frequency currents obtained?**

8. Read the text and find in it the answer to the question that follows it.

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Владелец: Шебзухова Татьяна Александровна
Действителен: с 20.08.2021 по 20.08.2022

In the electric generating field, as well as in the electric-transmission and storage-technology areas, considerable attention is focused on the use of superconductivity conductors. Cooling an electric conductor to temperatures close to absolute zero (-273°C) results in the conductors' losing their resistance to electric current. Accordingly, their ohmic losses also drop greatly. Current densities of tens of millions amperes per sq. cm can be tolerated in such conductors.

Cryogenic technology being now mastered, one can foresee the possibility of supercooling not only generators but also underground transmission lines and storage coils.

- **Are these statements true or false?**

- a) Conductors can never lose their resistance to the flow of electric current.
- b) Generators and underground transmission lines can be supercooled.

9. Read the text and find in it the answer to the question that follows it.

Metals Used as Conductors

The use of electricity depends upon a means of conducting it from its source to the point where it is to be used. Copper has been used as a conductor since the beginning of the industry and no proper substitute has been found. Only one metal, silver, is more efficient, but it has too high cost to be extensively used.

Aluminium, because of its lightness, is used in common practice for transmission lines where long spans are necessary. It has, compared to other metals, a conducting capacity of about 60 per cent of that of copper.

- **Why cannot silver be extensively used?**

10. Think of three questions of your own about each of the given sentences. Put them down.

1. Electric charges are acted upon by forces when they move in the magnetic field.

2. Copper has been used as a conductor since the beginning of the industry.

3. Nuclear reactors decrease air and land pollution but they increase thermal and radiation pollution.

11. Use the word in brackets. What are the meanings of the word time in the sentences?

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1. The experiment (repeat) many times.

2. The power which (radiate) as light is almost three times as great as that radiated as heat.

3. It (know) that iron molecules are magnets at all times.

4. Under ordinary room lightning the resistance of transistors (*decrease*) millions of times.
3. Ruby crystals about ten centimetres long can (*intensify*) light ten times.
6. The density of a semiconductor laser radiation (*be*) hundreds of times as great as that of the ruby laser.
7. The power which (*transmit*) along a wire is the product of the voltage times the amperage.

12. Copy the following sentences. Underline the predicates (ones in the Passive Voice with two lines). Translate the sentences into Russian.

1. A gas-cooled reactor is a nuclear reactor in which the coolant is a gas.
2. The lowest temperature theoretically possible is called the absolute zero.
3. What do substation power supply circuits depend on?
4. The transmission lines are interconnected in switching stations. These network interconnections are referred to as buses.
5. In a power network the large blocks of electric power are transmitted on the grid of transmission lines. From the grid, power is being subdivided into smaller blocks and fed into the subtransmission parts of the power network. Finally, the consumers are being serviced from the distribution network.
6. The energy industry is undergoing considerable development.
7. The world power capacity is doubling about per decade.
8. Development of nuclear power plants for civil use began in the mid-1950s.
9. In order to meet demands for power during the day, utilities have been turning to other forms of hydroelectric systems.
10. In the electric generating field as well as in the electric transmission and storage-technology areas considerable attention is concentrated on the use of superconducting conductors because of their ability of losing their resistance under certain conditions, namely at temperatures close to absolute zero (-273°C).
11. The maximum voltage applied to a dielectric material without causing it to break down and expressed in volts per mm is termed its dielectric strength.
12. Electrical loads or consumers in power installations are the various arrangements and installations that are used to transform electric power into mechanical, heat and chemical power, or energy.

Electric Motors

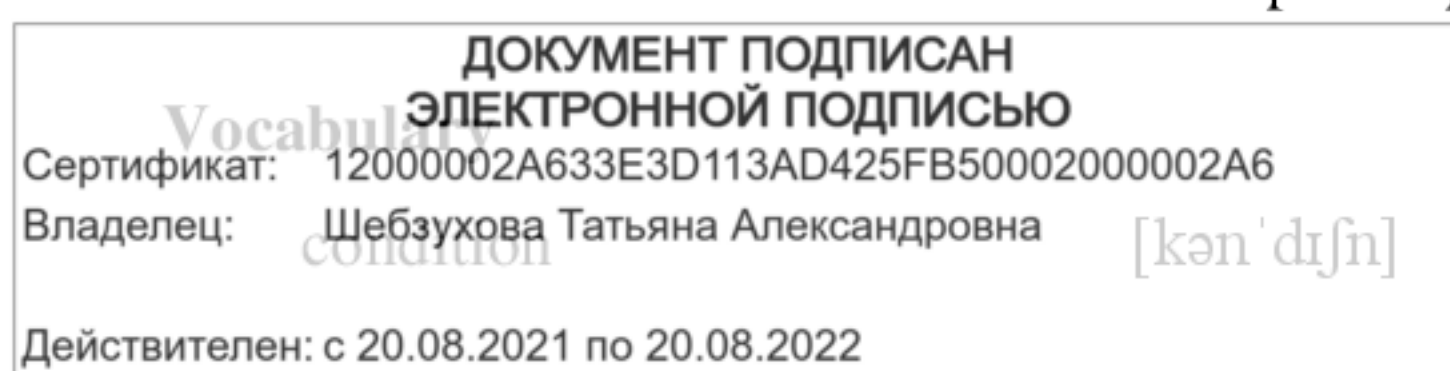
Motors are used for converting different forms of energy into mechanical energy.

The main part of a motor is a coil or armature. The armature is placed between the poles of a powerful magnet. When a motor is put into operation current starts flowing through the coil (armature) and the armature starts rotating.

Electric motors are used practically in every branch of industry, transport, and agriculture. Naturally, they are produced in many different designs. They are used in industrial plants, aim operate under different conditions.

Each motor is supplied with a nameplate which bears machine ratings: output power, voltage, the rated current, the starting current, the power factor, the efficiency, and the rated torque.

These motor ratings should be taken into consideration since they are necessary for the users. On them depends the length of motors' service life, which is normally equal to about 10 years, provided that the operating conditions are normal. Naturally, under abnormal conditions the service life becomes much shorter: motors operate poorly and may have different faults.



УСЛОВИЕ

| | | |
|-----------|---------------|---------------------------|
| plant | [plɑ:nt] | завод |
| pole | | полюс |
| torque | [tɔ:k] | вращение, момент вращения |
| poor | [puə] | бедный, плохой |
| nameplate | ['neɪmpleɪt] | (заводская) табличка |

13. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

14. Read the words and put down their Russian equivalents. Then translate them back into English.

| | | |
|---------------|-----------|-------|
| ['ɪndəstri] | industry | _____ |
| ['sə:vɪs] | service | _____ |
| ['trænsɜ:t] | transport | _____ |
| ['məʊtə] | motor | _____ |
| ['præktɪkəl] | practical | _____ |
| [pəʊ'tenʃəl] | potential | _____ |

15. Give the Russian for:

| | |
|-------------------|-------|
| magnet pole | _____ |
| different conduit | _____ |
| machine ratings | _____ |
| rated torque | _____ |
| service life | _____ |
| poor operation | _____ |

16. Form adjectives and adverbs. Translate them into Russian.

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| | | |
|---------------------|-------|-------|
| power – | _____ | _____ |
| b.care – careless | _____ | _____ |
| use – | _____ | _____ |
| power – | _____ | _____ |
| wire – | _____ | _____ |
| c.normal – normally | _____ | _____ |
| practical – | _____ | _____ |
| potential – | _____ | _____ |
| abnormal – | _____ | _____ |
| poor – | _____ | _____ |

17. Answer these questions:

1. What types of magnets are used in heavy industry?
2. How long is motors' service life under normal conditions?
3. Are motors used in every branch of industry?
4. What are the main types of motors in use nowadays?

18. Complete the sentences using the correct variant:

- | | |
|---|--|
| 1. Motors are used | a) for transmitting energy. b) for converting energy. |
| 2. Motor's main part is | a) the frame. b) the armature. c) the stator. |
| 3. The armature is placed | a) between the poles of the magnet. b) about the poles of the magnet. |
| 4. Motors' service life becomes shorter | a) under normal conditions. b) under abnormal conditions. |
| 5. Faulty motors operate | a) normally. b) poorly. |

19. Answer these questions. Use them in a talk with your groupmate:

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3. Where is the armature placed?
4. What ratings does the nameplate of a motor bear?
5. Under what conditions does a motor operate normally (poorly)?

20. Read about energy resources of today. Write three questions about the text and ask your groupmate to answer them.

Energy Resources of Today

People are energy-rich today. Solar energy is considered to be a potentially limitless source of clean energy. The waters of the world contain potential fuel – in the form of a special isotope of hydrogen – deuterium. It is sufficient to power fusion reactors for thousands of years.

21. Read the text and find in it the answer to the question that follows it.

Solar Energy

The Sun radiates to our planet great amounts of energy. This energy input fuels all our biological processes and is the original source for hydropower, wind power, and fossil fuel resources. Environmentally and economically, the Sun is our greatest energy source. Why then is the direct use of solar energy so limited for industrial, domestic, commercial, and transportation purposes?

First, solar energy arrives in small quantities – only about one kW per square meter; second, it does not arrive at all during night hours. Third, it is very difficult to transform it into useful energy forms except low-grade heat.

- **Why is the direct use of solar energy limited nowadays?**

22. Read the text and find in it the answers to the questions that follow it.

The capacity of a capacitor is measured in farads. A capacitor has a capacity of one farad when a charge of one coulomb increases the potential between its plates by one volt.

The capacity depends on four things:

- first, the higher the voltage used to charge the capacitor the more energy it will store;
- second, the larger the size of plates and the greater their number the more energy will be stored;
- third, the closer are the positive and negative plates the greater is the charge;
- fourth, some insulators store greater charge than others.

- **What does the capacity of a capacitor depend on?**
- **Give the title to the text.**

23. Read the following sentences, containing the Subjunctive Mood forms. Which of the sentences refer to the Present (the Future) and which to the Past?

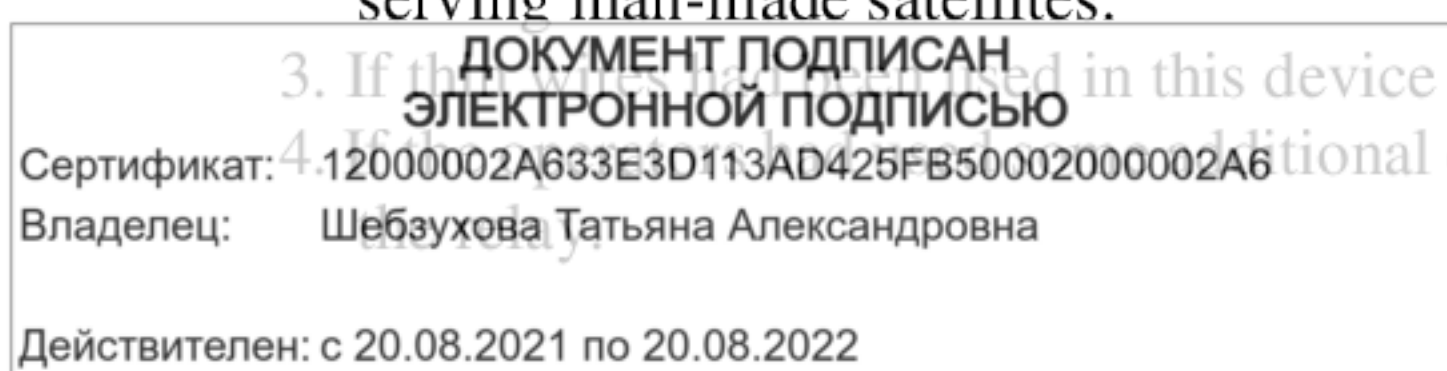
1. Zero-resistance transmission lines would be very economical!
2. Without these means of communication the scientists would have great difficulties in observing man-made satellites.

3. If the wires had been fused in this device the wires would have melted.

4. If the wires had been fused in this device the wires would have melted.

5. If the wires had been fused in this device the wires would have melted.

6. If the wires had been fused in this device the wires would have melted.



5. We know a moving magnet to induce a current in a wire, the effect being stronger if the wire were in the form of a coil.
6. It was a job one could have done much better.
7. Without the Sun there would be no light, no heat, no energy of any kind.
8. Oxygen is an element of greatest importance to the Earth as all living things would die without it.
9. If it were not for lasers a great number of technological developments would not have taken place.
10. In some hot countries the use of only one percent of the solar energy would serve an enormous source of energy.
11. No subject is more surprising than magnetism; what would you think if you found that on mixing ebonite and bakelite in some definite proportions a good conductor is formed or that a mixture of copper and iron forms a good insulator?

24. Put down the title corresponding thematically to each of the given descriptions.

1) *Titles:* Electric Motor; Synchronous Motor; Asynchronous Motor; Induction Motor.

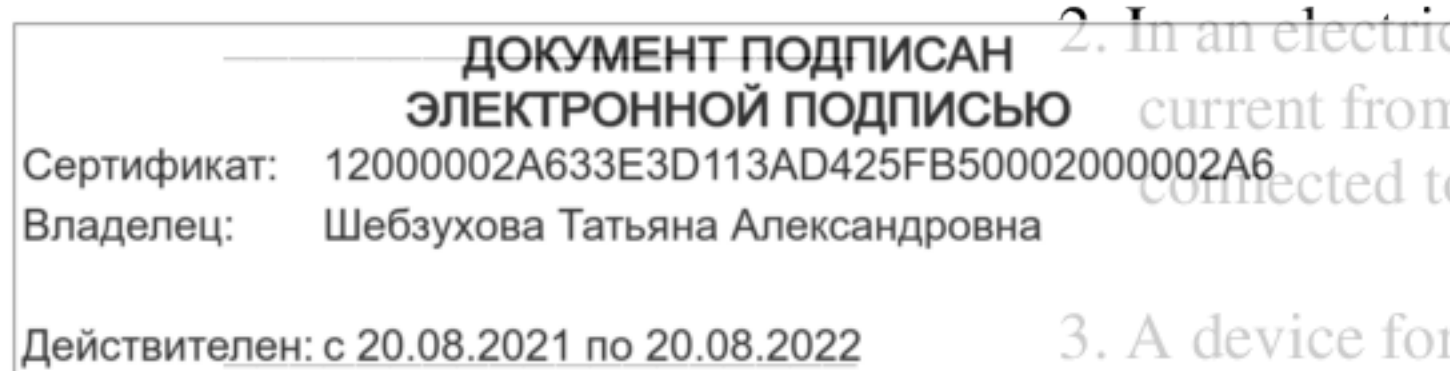
- | | |
|-------|--|
| _____ | 1. An a.c. motor in which the rotation takes place in synchronism with the rotating element of the generator supplying the operating current; |
| _____ | 2. A machine for transforming electric power into utilizable mechanical power; |
| _____ | 3. An a.c. motor in which the rotation is not synchronous with the rotating element of the generator supplying the driving current; |
| _____ | 4. An asynchronous a.c. motor in which the current flowing in the winding of the secondary winding is induced electromagnetically by the current flowing in the primary one. |

2) *Titles:* Control Power T; Air-blast T; Oil-cooled T.

- | | |
|-------|--|
| _____ | 1. A T which is cooled, when operating, by a flow of oil through its framework; |
| _____ | 2. A T which is cooled, when operating, by a blast of air delivered through its framework; |
| _____ | 3. A T which serves as the source for a.c. control power for operating a.c. devices. |

3) *Titles:* Feeder; Commutator; Converter.

- | | |
|-------|--|
| _____ | 1. A machine which operates by means of a rotating commutator to convert a.c. into d.c. for distribution; |
| _____ | 2. In an electric distributing system, a supply conductor carrying current from a power-house to main conductors, and not itself connected to motors, lamps, or translating devices; |
| _____ | 3. A device for changing the direction of a current. |



4) *Titles:* Series Generator; Shunt Generator; Turbo-alternator; Compound Motor.

- | | |
|-------|---|
| _____ | 1. A machine which generates an electric current (usually a dynamo electric generator, both a shunt winding and a series winding are on its field magnets); |
| _____ | 2. A machine consisting of an a.c. generator mounted upon the shaft of a steam turbine; |
| _____ | 3. A generator whose field-magnet winding is connected in series with or in succession to its armature; |
| _____ | 4. A generator whose field-magnet winding is connected in shunt to, or in parallel with its armature. |

Faults of Motors and Ways of Their Repair

Motors may have different faults. A faulty motor does not start, or, when it is started, it operates at an excessive speed.

Its brushes may spark and its windings and the commutator may be overheated and burnt. Besides, a motor may produce an abnormal noise, etc. All these and other faults should be detected and repaired.

In case the motor does not start it may have different faults (see the table):

Table

| <i>Possible causes of faults</i> | <i>Ways of repair</i> |
|--|--|
| 1. Fuses are faulty. | 1. Replace the fuses. |
| 2. Motor is overloaded. | 2. Reduce motor load. |
| 3. Circuit in armature winding has an open. | 3. Repair the armature winding. |
| <i>In case the motor, when started, stops:</i> | |
| 1. Rheostat is shorted. | 1. Check the rheostat and repair it. |
| 2. Rheostat switches from one position to another. | 2. Slow down operation of rheostat handle. |
| <i>Brushes may spark in case:</i> | |
| 1. Motor is overloaded. | 1. Reduce the load and remove overload. |
| 2. Brushes are in poor condition. | 2. Replace the brushes. |
| 3. Pressure is low. | 3. Adjust the pressure. |
| 4. Pressure is too high. | 4. Adjust the pressure. |
| <i>In case the armature winding is overheated:</i> | |

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| | |
|--|---|
| 1. Motor is overloaded. | 1. Remove the overload. |
| 2. Ventilation fails to operate properly. | 2. Check for slowing down the speed of the motor. |
| <i>In case of abnormal motor speed:</i> | |
| 1. Motor is overloaded. | 1. Reduce the load. |
| 2. Rotor circuit has poor contact. | 2. Repair the shorting mechanism. |
| <i>In case rotor brushes against stator:</i> | |
| Rotor brushes against stator. | Adjust air gap. |

Vocabulary

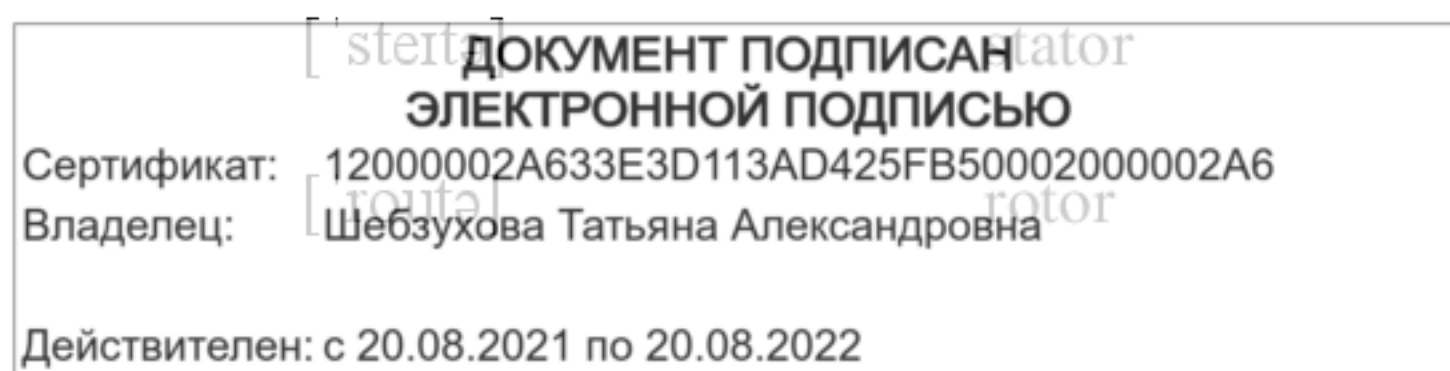
| | | |
|-----------|------------|-------------------------|
| to repair | [rɪˈpeə] | ремонтировать |
| brush | [brʌʃ] | щетка |
| gap | | зазор, люфт |
| spark | | искра |
| speed | | скорость |
| noise | [nɔɪz] | шум |
| slow | | медленный |
| excessive | [ɪkˈsesɪv] | избыточный |
| check | | проверка |
| to adjust | | регулировать, подгонять |

25. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

26. Read the words and put down their Russian equivalents:

[ˈkɒmjʊtətə] commutator



| | | |
|------------|------------|-------|
| ['kɒntækt] | contact | _____ |
| [kən'tækt] | to contact | _____ |
| ['prəʊses] | process | _____ |

27. Put down the verbs corresponding to the given nouns and translate them:

| | | |
|---------------------|----------|-----------|
| check | to check | проверять |
| spark | _____ | _____ |
| brush | _____ | _____ |
| repair | _____ | _____ |
| slow (<i>adj</i>) | _____ | _____ |

28. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

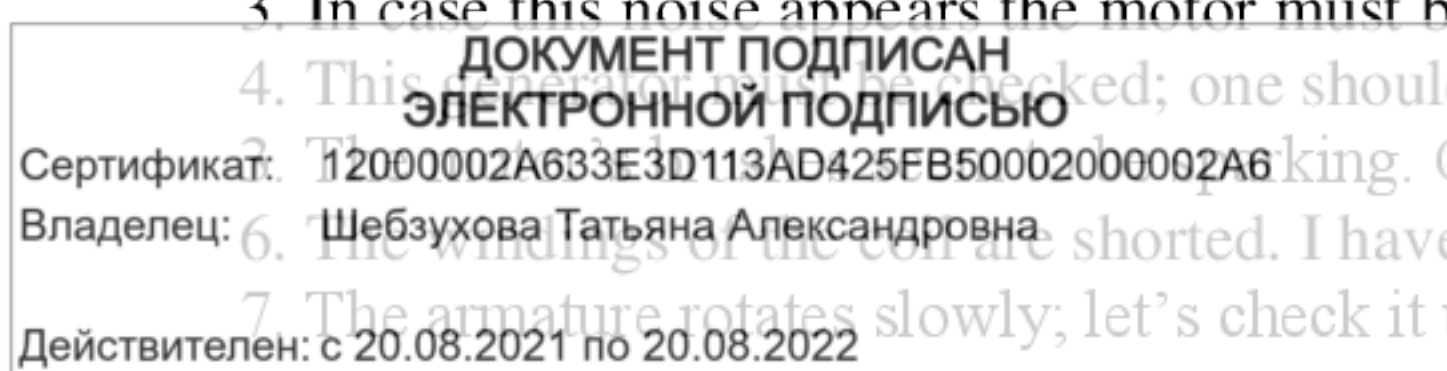
| | |
|-----------------|-------|
| air gap | _____ |
| brush sparks | _____ |
| slow speed | _____ |
| excessive speed | _____ |
| safety devices | _____ |

29. Answer these questions:

1. What do motors' faults result from?
2. Are there any faults that can be ignored?
3. What makes motors' service life shorter?
4. What does voltage supply stop result in?
5. What processes show the (dis)advantages of devices?

30. Are the words: *spark, short, slow, brush, fault, load, test* nouns? Are they verbs? Translate the sentences into Russian:

1. New motors are given a no-load and under a load tests.
2. When the motor is tested it should produce no abnormal noise.
3. In case this noise appears the motor must be disconnected.
4. This device should be checked; one should give it a test.
5. The sparks are too much. Can you see the sparks?
6. The windings of the coil are shorted. I have detected a short in the windings.
7. The armature rotates slowly; let's check it up!



8. The speed of rotation is too excessive; it must be slowed down.
9. In case the rotor brushes against the stator, the motor operates slowly. The faulty brushes should be replaced.

31. Complete the sentences using the correct variant:

- | | |
|--------------------------------|--|
| 1. A motor with a fault | a) operates normally. b) operates poorly. |
| 2. Motor brushes spark in case | a) they are in normal conditions. b) they are in poor conditions. |
| 3. Burnt commutator should be | a) replaced. b) repaired. |
| 4. Brushes may spade in case | a) pressure is low. b) pressure is excessive. |
| 5. Air gap is adjusted in case | a) the rotor brushes against the stator. b) the stator brushes against the rotor. |

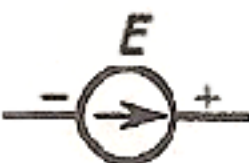

32. Answer these questions:





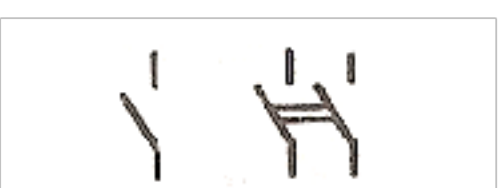

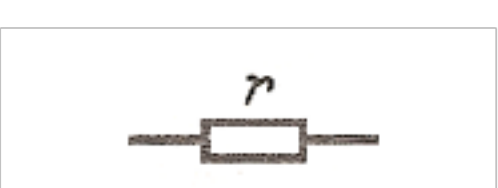





1. When does a motor operate poorly?
2. What should be done in case the motor is overloaded?
3. What should be done in case the fuses are faulty?
4. What should be done in case the rheostat is shorted?
5. What should be done in case the brushes spark?
6. What should be done in case the pressure is low?
7. What should be done in case the ventilation does not operate?
8. What should be done in case the rotor brushes against stator?

33. Say a few words about your electrical engineering laboratory. Are there any faulty devices in it? Have a talk with your groupmate about the faults and the ways to repair them.

34. You know that all electrical devices and installations are constructed of a certain number of components. To these components belong electric power sources, wires, cables, buses, switches, fuses, resistors, rheostats, capacitors, transformers, motors and others.

35. Let us have a talk about these components. Speak with your groupmates about their types, their use, operation, possible faults and ways of their repair. Use the table below:

| <i>Circuit components</i> | | <i>Symbols</i> |
|--|--|---|
| Electric energy source | |  |
| <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">ДОКУМЕНТ ПОДПИСАН ЭЛЕКТРОННОЙ ПОДПИСЬЮ</p> <p>Сертификат: 12000002A633E3D113AD425FB50002000002A6</p> <p>Владелец: Шебзухова Татьяна Александровна</p> <p>Действителен: с 20.08.2021 по 20.08.2022</p> </div> | |  |

| | |
|---|---|
| D.c. motor |  |
| Chemical power source (primary or storage cell) |  |
| Electric lamp |  |
| Electric connection, removable and permanent |  |
| Switches, single- and double-pole switches |  |
| Fuse |  |
| Load, resistor |  |
| Safety earthing system |  |
| Rheostat, or variable resistor |  |
| Transformer, air-core T |  |
| Iron-core T |  |
| Capacitor, fixed C, variable C |  |

36. Draw schemes of circuits and devices constructed from these components. Have a talk

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with you and about them:

1. Connect four resistors, two voltage sources and a switch in series. Speak about the construction and the operation of the circuit.

2. Connect several resistors and cells in series-parallel. Suppose that one of the resistors gets open; what does it result in? Suppose that a whole set gets open. What does it result in?
3. Measure the value of current (voltage, power, resistance) in the circuit. Use proper meters. Speak about the way you connect the meters to the circuit.
4. Take the proper components and construct an earthing protection system. Draw its scheme. Speak about its operation.
5. Draw a scheme of a thermal relay. What components are necessary for it?
6. Draw a scheme of an overhead transmission line. Speak about its operation. What are its possible faults?
7. Draw a scheme of a substation. Speak about its operation and about its possible faults. What are the ways of their repair?

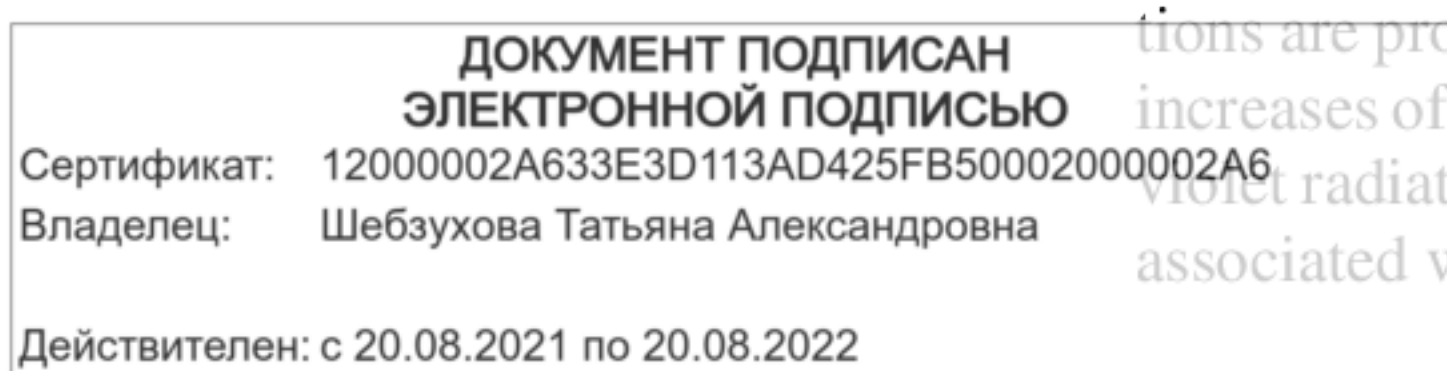
37. Put down the title corresponding thematically to each of the given descriptions.

1) *Titles:* Conduction; Conductor; Conductivity; Sound; Circuit; Copper; Silver; Engine.

- | | |
|-------|---|
| _____ | 1. A device for converting one form of energy into another especially for converting other forms of energy into mechanical (i.e. kinetic) energy. |
| _____ | 2. The transmission of heat from places of higher to places of lower temperature in a substance. |
| _____ | 3. The reciprocal of the resistivity or specific resistance of a conductor. |
| _____ | 4. A body capable of carrying an electric current. |
| _____ | 5. A red metal. It is unaffected by water or steam. |
| _____ | 6. The complete part with an electric current across it. |
| _____ | 7. White, rather soft metal. The best-known conductor of electricity. |
| _____ | 8. A physiological sensation received by the ear. It is caused by a vibrating source and transmitted as a wave motion through air. |

2) *Titles:* Electric Field; Direct Current; Alternating Current; Electromagnetic Radiation; Continuous Wave; Electromagnetic Spectrum.

- | | |
|-------|--|
| _____ | 1. Radiation consisting of waves of energy associated with electric and magnetic fields. This radiation is emitted by matter in units called photons. |
| _____ | 2. The range of frequencies over which electro-magnetic radiations are propagated. The lowest frequencies are radio waves, increases of frequency produce infrared radiation, light, ultra-violet radiation, X-rays, gamma-rays and finally the radiation associated with cosmic rays. |



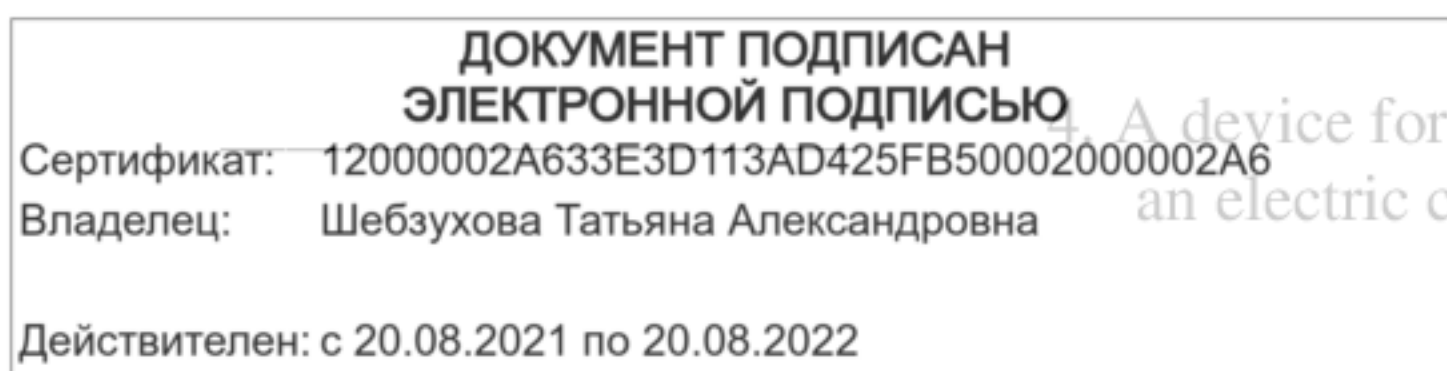
- _____
- _____
- _____
- _____
3. Radio or radar transmissions which are generated continuously and not in short pulses.
 4. An electric current flowing always in the same direction.
 5. A flow of electricity which, after reaching a maximum in one direction, decreases, finally reaching a maximum in the opposite direction, the cycle being repeated continuously. The number of such cycles per second is the frequency.
 6. The region near an electric charge, in which a force is acting on a charged particle.

3) *Titles:* Energy; Electrical Energy; Chemical Energy; Radiant Energy; Kinetic Energy; Potential Energy.

- _____
- _____
- _____
- _____
- _____
- _____
1. The capacity for doing work.
 2. That part of the energy stored within an atom or molecule which can be released by a chemical reaction.
 3. The energy which a body possesses by virtue of its position. It is measured by the amount of work the body performs in passing from that position to a standard position in which the energy is considered to be zero.
 4. The energy which a body possesses by virtue of its motion.
 5. The energy that is transmitted in the form of radiation.
 6. The energy associated with electric charges and their movements. It is measured in watt seconds (joules) or kilowatt-hours.

4) *Titles:* Accumulator; Cell; Primary Cell; Solar Cell.

- _____
- _____
- _____
1. Device for producing an electric current by chemical reaction.
 2. A storage battery. A device for «storing» electricity. An electric current is passed between two plates in a liquid; this causes chemical changes in the plates and the liquid. When the changes are complete, the device is charged.
 3. Semiconductor devices which are made from thin slices of silicon. Almost all Russian and American satellites have used such cells to supply on-board electrical power. Although the efficiency of these cells is no more than 10%, they provide a reliable electric power source that lasts for years on a satellite.



A device for producing an electromotive force and delivering an electric current as the result of a chemical reaction.

Раздел 5. Power Systems and Environmental Protection/Энергосистемы и защита окружающей среды

Практическое занятие №10. Тема 10. Complex of Energy Resources: Electric Power Consumers. Power Systems / Комплекс энергетических ресурсов: Потребители электроэнергии. Энергосистемы.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

Актуальность темы: обусловлена необходимостью овладения УК-4.

Теоретическая часть:

Electric Power Consumers and Power Systems

An electric power consumer is an enterprise utilizing electric power. Its operating characteristics vary during the hours of day, days and nights, days of week and seasons.

All electric power consumers are divided into groups with common load characteristics. To the first group belong municipal consumers with a predominant lighting load: dwelling houses, hospitals, theatres, street lighting systems, mines, etc.

To the second group belong industrial consumers with a predominant power load (electric motors): industrial plants, mines, etc.

To the third group belongs transport, for example, electrified railways. The fourth consists of agricultural consumers, for example, electrotractors.

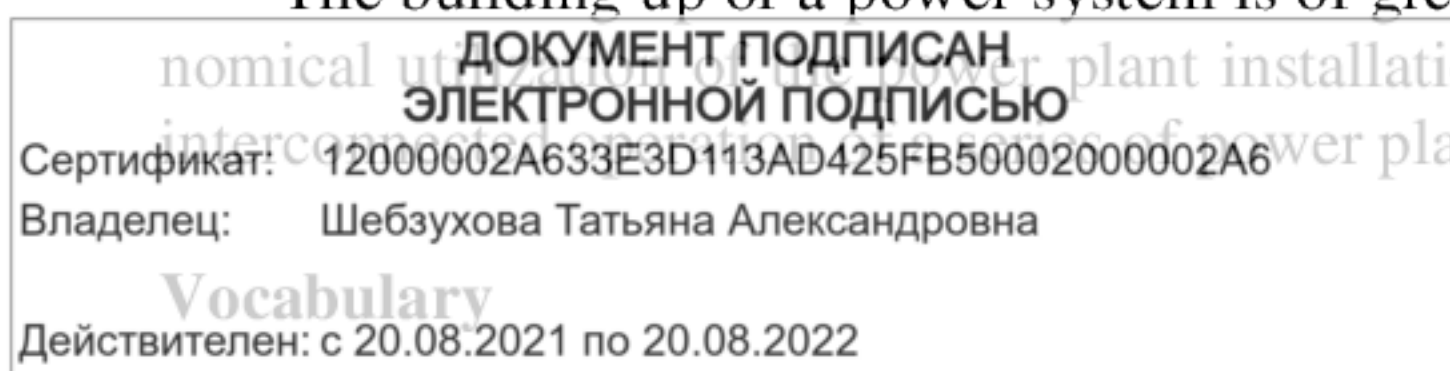
The operating load conditions of each group are determined by the load graph. The load graph shows the consumption of power during different periods of day, month, and year. On the load graph the time of the maximum loads and minimum loads is given.

Large industrial areas with cities are supplied from electric networks fed by electric power plants. These plants are interconnected for operation in parallel and located in different parts of the given area. They may include some large thermal and hydroelectric power plants.

The sum total of the electric power plants, the networks that interconnect them and the power utilizing devices of the consumers, is called a power system. All the components of a power system are interrelated by the common processes of protection, distribution, and consumption of both electric and heat power.

In a power system, all the parallelly operating plants carry the total load of all the consumers supplied by the given system.

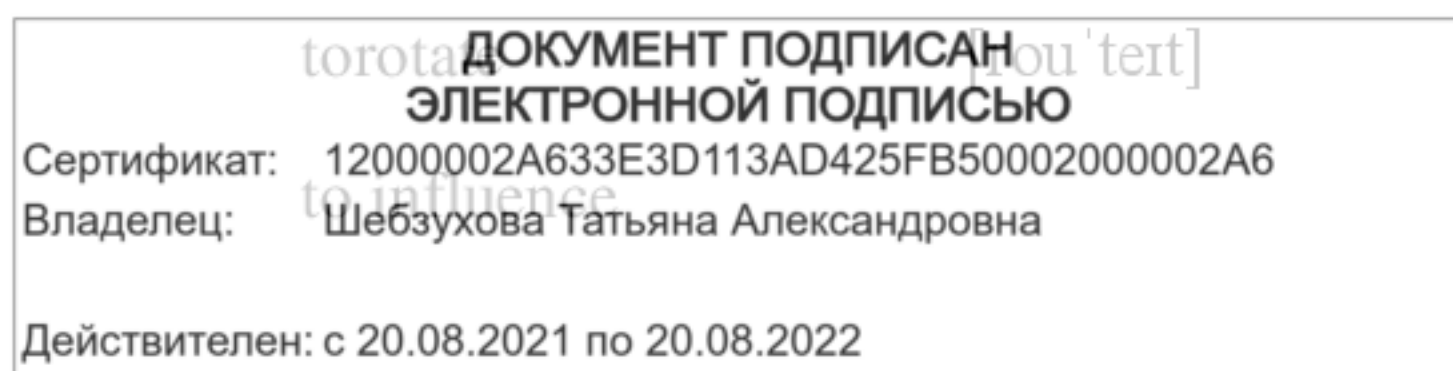
The building up of a power system is of great importance for the national economy. An economical utilization of the power plant installations and of the sources of power is achieved by interconnecting the power plants in a common power distribution system.



| | | |
|----------------|----------------|------------------------------------|
| to achieve | [ə'tʃi:v] | достигать |
| to belong (to) | | принадлежать, относиться (к) |
| to feed | | снабжать, питать |
| to determine | [dɪ'tə:mɪn] | определять |
| to relate | | относиться (к), быть связанным (с) |
| predominant | [prɪ'dɒmɪnənt] | преобладающий |
| graph | [grɑ:f] | кривая, график |
| national | | народное хозяйство |
| auxiliary | [ɔ:g'zɪlɪəri] | вспомогательный, добавочный |
| breaker | | выключатель, прерыватель |
| busbar | | собираательная шина |
| feeder | | фидер |
| flexible | | гибкий |
| to comprise | [kəm'praɪz] | включать в себя |
| to distribute | [dɪ'strɪbjʊ:t] | распределять |
| as ... to | | что касается |
| as well as | | так же, как и |
| blade | | лопасть |
| level | | уровень |
| magnitude | [ˈmæɡnɪtju:d] | величина |
| head | [hed] | (зд.) верх, верхушка |
| plant | [plɑ:nt] | станция, завод |
| runner | | ротор |
| shaft | [ʃɑ:ft] | привод, вал |

вращать(ся)

влиять



to fluctuate

['flʌktʃueɪt]

колебаться

Вопросы и задания:

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

2. Read the words and put down their Russian equivalents. Then translate them back into English (orally).

[,kæɪrɪktə 'rɪstɪk]

characteristic –

[mju: 'nɪsɪpl]

municipal –

[ɪ 'lektɪfaɪ]

to electrify –

['haɪdrəʊ]

hydro –

['pɪərɪəd]

period –

3. Distribute the words below into three columns:

action

process

doer

utilizer, protect, distribution, utilize, protection, distributor, consumption, consume, utilization, consumer

4. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

a. load graph

lighting load

power load

b. power utilizing devices

parallelly operating plants

enterprises utilizing power

5. Complete the sentences translating the words in brackets:

1. Water turbine (запорная) are called hydroturbines.

2. Load (условия) operating load (условия).

3. Economical (экономичность) of electric power (достигается) by interconnected operation of power plants.

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6. Answer these questions:

1. What enterprises are called electric power consumers?
2. When do their operating characteristics vary?
3. What consumers belong to the four different groups?
4. What conditions does the load graph determine?
5. What type of system is called a power system?
6. What processes interconnect the components of a power system?
7. In what way is an economical utilization of power installations achieved?

7. Describe a power system and its operation.

8. Read and translate:

Substations

A substation is designed to receive energy from a power system, convert it and distribute it to the feeders. Thus a substation serves as a distribution centre. Substations feed (supply) various consumers provided that their basic load characteristics are similar. Therefore the energy is distributed without transformation of the voltage supplied.

Common substations comprise isolators, switchgear buses, oil circuit breakers, fuses, power and instrument transformers and reactors.

Substations are classed into step up and step down ones. The step up substation includes transformers that increase the voltage. Connected to the busbars of the substation are the power transmission lines of power plants of the system.

As to step down substations, they reduce the voltage to 10 or 6 kV. At this voltage the power is supplied to the distribution centres and to the transformer substations of power consumers.

A transformer substation serves for transmitting and distributing electric power. It comprises a storage battery, control devices and auxiliary structures.

Transformer substations are classed into indoor and outdoor; both types are used for feeding industrial enterprises. Compared to other types of substations, transformer substations have certain advantages. They have flexible construction and easy and reliable operation. In case of a fault in the left-hand section, the main circuit breaker opens while the normally open section circuit breaker closes and puts the voltage of the section to normal. Power from a substation is delivered to distribution centres.

9. Put down the Russian equivalents of these word combinations. Translate them back into English (orally).

circuit breaker

auxiliary units

distribution centre

flexible construction

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hydraulic as well as solar sources of energy

as to phase-word motors

10. Fill in *as well as*, *as to* and translate the sentences:

1. Excessive starting current may result in fluctuations in the voltage ... in other faults of the motor.
2. ... A.C. motors they are subdivided into single- and three-phase motors.

11. Complete the sentences using the correct variant:

- | | |
|--|--|
| 1. A substation serves | a) to consume energy. b) to distribute energy. c) to convert energy. |
| 2. A substation feeds consumers | a) with various load characteristics. b) with similar load characteristics. |
| 3. The lines of power plants are connected | a) to the busbars. b) to the switchgear. |
| 4. A substation comprises | a) the main elements. b) the main and auxiliary elements. |
| 5. Flexible construction is | a) an advantage. b) a disadvantage. |

12. Pair work. Put these questions to your groupmate, and ask him/her to answer them.

1. What does a substation serve for?
2. What type of consumers does a substation feed?
3. What parts are the power transmission lines connected to?
4. What components does a substation comprise?
5. What types are substations classed into?
6. What are advantages of a transformer substation?

Electric Power Plants

1. Electric power is generated at electric power plants. The main unit of an electric power plant comprises a prime mover and the generator which it rotates. In order to actuate the prime mover energy is required. Many different sources of energy are in use nowadays. To these sources belong heat obtained by burning fuels, pressure due to the flow of air (wind), solar heat, etc.

2. According to the kind of energy used by the prime mover, power plants are divided into groups. Thermal, hydraulic (water-power) and wind plants form these groups.

3. According to the kind of prime mover, electric power plants are classed as

a) Steam turbines serve as prime movers. The main generating units at steam turbine plants are the turbo-generators. Steam turbine plants belong to the modern, high-capacity class of power plants.

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b) Steam engine plants, in which the prime mover is a piston type steam engine. Nowadays no large generating plants of industrial importance are constructed with such prime movers. They are used only for local power supply.

c) Diesel-engine plants in them diesel internal combustion engines are installed. These plants are also of small capacity, they are employed for local power supply.

d) Hydroelectric power plants employ water turbines as prime movers. Therefore they are called hydroturbine plants. Their main generating unit is the hydrogenerator.

4. Modern wind-electric power plants utilize various turbines; these plants as well as the small capacity hydroelectric power plants are widely used in agriculture.

13. Переведите и запомните следующие словосочетания: small capacity hydroelectric power plant, diesel internal combustion engine, wind power plant, steam turbine plant, hydraulic power plant; solar generator, wind power, combustion engine, solid fuel, solar heat, prime mover; diesel-engine, water-power, wind-electric, piston-type, high capacity.

14. Прочтите и переведите текст; скажите, на каких станциях можно вырабатывать электроэнергию, используйте словосочетания due to, according to.

15. Прочтите текст еще раз и скажите, как называются станции, вырабатывающие электрическую энергию, исходя из источника движущей силы.

16. Расскажите, в чем состоит сходство и различие паротурбинных и паропоршневых установок.

17. Прочтите третий абзац текста и скажите, в чем состоит разница между паропоршневыми и дизельными установками.

18. В чем состоит сходство и различие в принципах работы паротурбинных и гидроэлектрических установок.

19. Прочтите текст и скажите, эксплуатация каких из упомянутых электростанций наиболее, по вашему мнению, благоприятна для окружающей среды, обоснуйте свое мнение, используя в ответе следующие словосочетания: In my opinion, I think, to my mind.

20. Расскажите, что вы знаете об электростанциях.

Практическое занятие № 11.

Тема 11. Electric Energy Production:

Hydroelectric Power Plants. Thermal Power-Station /

Производство электрической энергии:

Гидроэлектростанции. Тепловая электростанция.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

Актуальность темы: обусловлена необходимостью овладения УК-4.

Теоретическая часть:

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Hydroelectric power plants are built on rivers. Large-capacity hydroelectric power plants are commonly located at considerable distances from the consumers of electric power.

The production process at these plants is rather simple: the water flows into the hydroturbine runner, acts upon the runner blades and rotates the runner and the turbine shaft.

The generator shaft is connected to the turbine runner shaft. The difference in the water level influences the power capacity of a plant, i.e. the magnitude of the water head and the daily inflow of water fluctuates considerably according to the season.

The production process is different at power plants of different constructions and of different kinds. In atomic power plants, for example, it is not so simple as in hydroelectric plants.

Vocabulary

| | |
|-----------------------------------|----------------------|
| blade | ЛОПАСТЬ |
| fluctuate | КОЛЕБАТЬСЯ |
| head | ГОЛОВА |
| i.e. – id est [Id 'est] – that is | ТО ЕСТЬ, ТО ЖЕ САМОЕ |
| influence | ОКАЗАТЬ ВЛИЯНИЕ |
| level | УРОВЕНЬ |
| magnitude | ВЕЛИЧИНА |
| runner | БЕГУН |
| season | СЕЗОН |

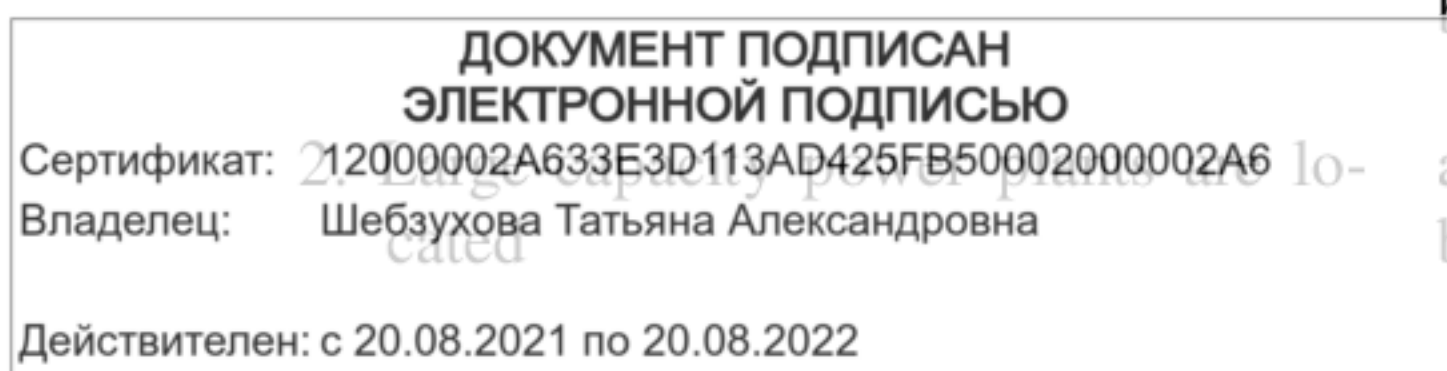
Вопросы и задания:

1. Переведите и запомните следующие словосочетания: fuel expenditure, water head, turbine blades, level influence, level change, blade size, runner blade, turbine shaft, generator shaft, water-head magnitude, water level change influence, thermal power plant, hydroelectric power plant production process, plant's power capacity, regional power plant, large industrial region supply.
2. Прочтите и переведите текст; сравните особенности расположения гидростанций, паро-поршневых и дизельных установок относительно потребителей электрической энергии.
3. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally).

| | |
|-----------------------------|-------|
| runner blade | _____ |
| turbine runner | _____ |
| turbine shaft | _____ |
| water level | _____ |
| water head | _____ |
| large capacity power plant | _____ |
| magnitude of the water head | _____ |
| daily inflow of water | _____ |
| turbine runner shaft | _____ |

4. Complete the sentences using the correct variant:

1. Hydroelectric power plants are built
 - a) on rivers.
 - b) on waterfalls.



- a) at a short distance from consumers of power.
- b) at a considerable distance from consumers of power.

- | | |
|----------------------------------|--|
| 3. The production | a) is very complex. process at the plants b) is rather simple. |
| 4. The power capacity of a plant | a) remains constant. b) changes considerably. c) is influenced by the difference in the water level. |
| 5. The daily inflow of water | a) fluctuates according to the consumption. b) fluctuates according to the season. |
| 6. The production process | a) depends upon the construction of the plant. b) is the same at power plants of different constructions. |

5. Pair work. Put these questions to your groupmate and ask him/her to answer them:

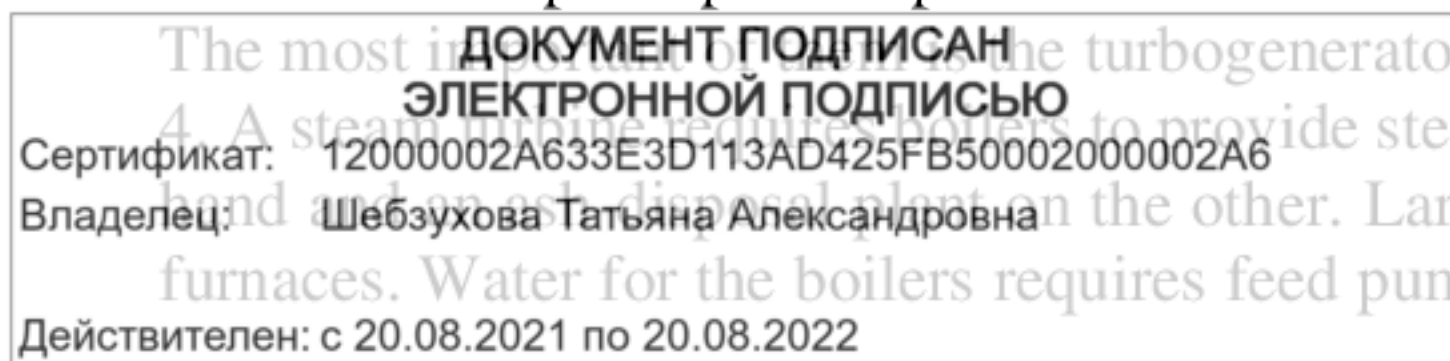
1. On what sites are hydroelectric power plants built?
2. Are large-capacity plants located far from consumers of power?
3. Is the production process at the plants simple or is it complex?
4. What influences the power capacity of a plant?
5. According to what factors does the daily inflow of water fluctuate?
6. Does the production process at the plant depend on its construction?
7. Do you know that a thermal power plant seldom has an efficiency more than 40%?

6. Прочтите текст еще раз и скажите, в чем, по вашему мнению, состоит сходство ветряных энергоустановок и гидроэлектростанций малой мощности.
7. Прочтите третий абзац текста и скажите о факторе влияния на энергетическую мощность гидроэлектростанции.
8. Расскажите о производственном процессе на гидроэлектростанции, используйте следующие глаголы в ответе: to flow into, to act upon, to rotate, to connect to, to influence, to fluctuate.
9. Расскажите о сходстве и различии гидроэлектростанций малой и высокой мощности.
10. Расскажите о конструкции гидроэлектростанции, используйте схему поперечного разреза, имеющуюся в тексте.
11. Расскажите, какую информацию вы извлекли, прочитав текст Hydroelectric Power Plants.
12. Переведите и запомните следующие слова и словосочетания: current, boiler, steam, equipment, generator, fuel, installation, mighty, generation, supply, integration, fan; power engineering, power system, power-station, coal handling, boiler house, turbine house, flue gases, cooling water, at a number of thermal power stations, power machine building industry, heat-and-power plants, total power output, feed pump.
13. Прочтите и переведите текст; выпишите существительные в роли определения и расскажите о составляющих компонентах теплоэлектростанции.

Thermal Power-Station

1. A modern thermal power-station is known to consist of four principal components namely, coal handling and storage, boiler house, turbine house, switchgear.
2. If you have not seen a power-station boiler it will be difficult for you to imagine its enormous size.
3. Besides the principal components mentioned above there are many additional parts of the plant.

The most important part of the station is the turbogenerator in which the current is actually generated. Boilers need a coal-handling plant on the one hand and an ash-disposal plant on the other. Large fans are quite necessary to provide air for the furnaces. Water for the boilers requires feed pumps. Steam must be condensed after it has passed



through the turbines, and this requires large quantities of cooling water. The flue gases carry dust which must be removed by cleaning the gases before they go into the open air.

5. A modern thermal power-station is equipped with one or more turbine generator units which convert heat energy into electric energy. The steam to drive the turbine which, in its turn, turns the rotor or revolving part of the generator is generated in boilers heated by furnaces in which one of three fuels may be used—coal, oil and natural gas. Coal continues to be the most important and the most economical of these fuels.

6. Large installations with mighty turbogenerators are operating at a number of thermal power-stations in Russia. It is necessary to point out that the power machine building industry has started to manufacture even greater capacity installations for thermal power-stations.

7. At present great attention is paid to combined generation of heat and electricity at heat-and-power plants and to centralized heat supply. One of the world's largest heat-and-power installations is operating at the Moskovskaya thermal power-station-25.

8. Thermal power-stations are considered to be the basis of power industry. More than 80% of the country's total power output comes from the above stations. It is necessary to say that separate power-stations in our country are integrated into power systems. Integration of power systems is a higher stage in scientific and technical development of power engineering.

14. Прочтите четвертый абзац текста, выделите глаголы в неопределенной форме, определите их функции и скажите, что нужно для работы паровой турбины, используйте в ответе эти глаголы.

15. Прочтите пятый абзац текста, обратите внимание на слово turn, расскажите о принципе работы турбогенератора.

16. Прочтите текст и выпишите ключевые слова, относящиеся к устройству и работе теплоэлектростанции.

17. Прочтите текст еще раз и скажите, какие источники энергии являются основой работы теплоэлектростанции.

18. На основании знаний принципов работы атомной станции, гидростанции, теплоэлектростанции скажите о их воздействии на окружающую среду, используйте слова radiation, insulation, fluegases, headofwater, toflood.

19. Расскажите, какой вклад в энергетику нашей страны вносят теплоэлектростанции.

20. Расскажите о работе теплоэлектростанции.

Практическое занятие № 12.
Тема 12. The Use of Various Energy:
Solar Power Plant. Tidal Energy /
Использование различных видов энергии:
Солнечная электростанция. Энергия приливов.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке. Актуальность темы обусловлена необходимостью овладения УК-4.

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| ДОКУМЕНТ ПОДПИСАН ЭЛЕКТРОННОЙ ПОДПИСЬЮ | |
| Сертификат: | 12000002A633E3D113AD425FB50002000002A6 |
| Владелец: | Шебзухова Татьяна Александровна |
| Действителен: с 20.08.2021 по 20.08.2022 | |

Теоретическая часть:

Solar Power Plant

1. This project has supported the construction of a PV power plant, which is the first of its type in the world. All the components of the plant were developed during the previous projects and now, in this latest project, the size of the concentrators has been increased to full commercial dimensions. These new, modular units consist of two 75 metres long rows of PV cells. The new units use reflecting instead of refracting technology, have single-axis tracking and encapsulated modules.
2. The new plant, named EUCLIDES, has eight units, each with two rows of concentrators 72 metres long and 2.9 metres wide. The two rows in each unit share a single tracking carriage. Each unit is rated at 62 kWp, giving a total rating of 480 kWp. Each tracker has an output of 750 V. In the concentrator units themselves, the cells are interconnected and encapsulated, just like flat modules, and the concentration of optics are mirrors instead of the Fresnel lenses used in all previous PV units.
3. The new design provides a more constant output than that from flat panels, and this means that a better price should be obtained for the electricity produced.
4. There is a growing interest in green electricity (generated from renewable sources) among consumers. In the Netherlands, increasing demand from consumers for PV systems to supply electricity at their own premises offers an opportunity to market centralised PV system, which have, until recently, gained little support. More development work needs to be done to improve the appropriate technology for grid connected PV systems and this project will bring together Italian electricity company ENEL, with their expertise in the operation of centralised PV systems and the marketing expertise of Dutch energy company EDON. The technology will be demonstrated to the general public and commercial end-users.
5. The new system, the first ground-based central PV system in the Netherlands, will be installed on top of a concrete storage tank for drinking water, and will consist of three units, each with a capacity of 60 kWp, giving a total capacity of 180 kWp. This project aims to demonstrate the role that sales of green electricity can play in driving the development of PV, and other renewable projects.

Vocabulary

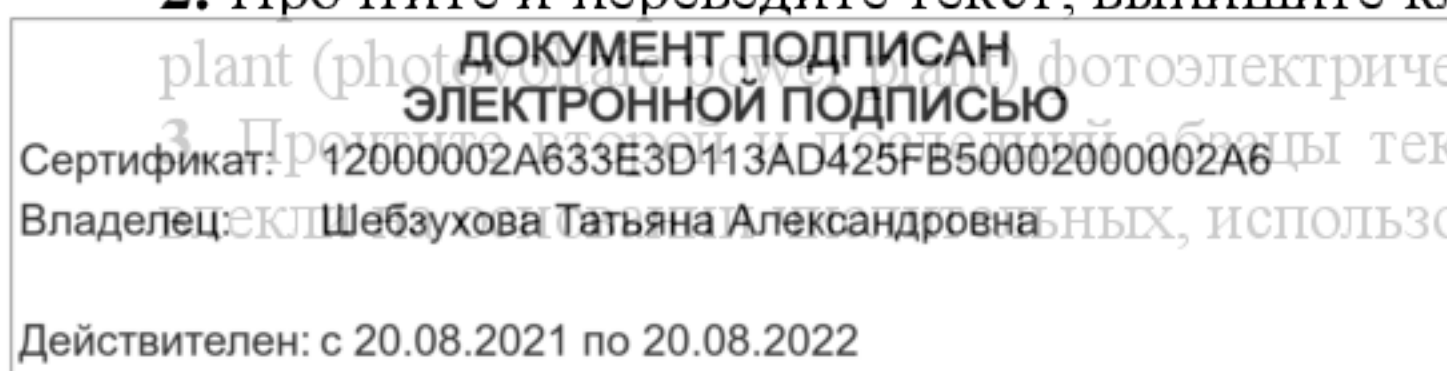
| | |
|-------------------|------------------------|
| component | составная часть |
| dimension | измерение |
| encapsulate | инкапсулировать |
| Euclides | Евклид |
| expertise | экспертиза |
| kWp – kilowatt | кВт - киловатт |
| project | проект |
| project | проект |
| PV – Photovoltaic | PV - фотоэлектрический |
| renewable | возобновляемый |
| supply | поставка |

Вопросы и задания:

1. Переведите и запомните следующие слова и словосочетания: concentrator, technology, to reflect, to refract, to focus; previous project, latest project, reflecting technology, refracting technology, modular unit, photovoltaic power, photovoltaic power plant, single-axis tracking, encapsulated module, grid-connected PV system, solar technology, solar power, ground-based system, end-user.

2. Прочтите и переведите текст; выпишите ключевые слова, относящиеся к устройству PV plant (photovoltaic power plant) фотоэлектрической энергоустановки.

3. Прочтите текст и объясните, какую информацию вы извлекли из текста, используя ключевые слова, использованные автором.

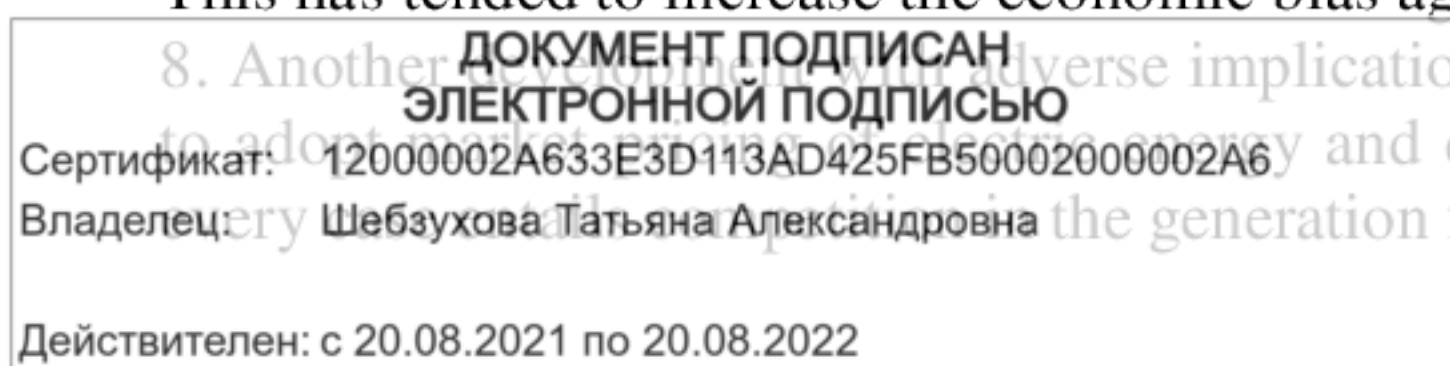


4. Из первых трех абзацев выпишите причастия (PI, PII) в роли определения, используйте их в описании устройства PV plant.
5. При переводе третьего абзаца обратите внимание на степени сравнения прилагательных и скажите, что нового вы узнали о достоинстве нового проекта с экономической точки зрения.
6. Прочтите четвертый абзац текста и скажите, какие источники энергии относятся к категории «зеленого» электричества, назовите их.
7. Скажите о перспективах сотрудничества компании ENEL и компании EDON, используйте в ответе слова *expertise in the operation, marketing expertise, to supply, to improve*.
8. В пятом абзаце текста содержится информация, выраженная с помощью глаголов в Future Simple, расскажите о работе, ведущейся в Нидерландах, в области использования солнечной энергии.
9. Выскажите свое мнение о перспективах развития солнечной энергии в мире, используя следующие выражения: *as far as I know, I think, to my mind, in my opinion, to start with, the fact is, I believe*.
10. Прочтите и переведите текст; выпишите ключевые слова, относящиеся к теме.

Tidal Energy

1. Over the past three decades the feasibility of using ocean tides to generate electric power has been investigated at many sites.
2. By far the largest tidal plant in service is Rance (France), with a capacity of 240 MW and an annual output exceeding 500 GWh. Others include the 20 MW Annapolis plant in Canada, several small units in China with total capacity of about 5 MW and a 400 kW experimental unit near Murmansk in Russia.
3. Most designs, existing or proposed, have opted for a single tidal basin to create hydraulic heads and propeller turbines to extract energy therefrom. Linked and paired basins have also been considered. Innovative approaches have included extraction of energy directly from tide races using a variety of prime movers.
4. The main obstacle to development is economic. Capital costs are high in relation to output: a consequence of the low and variable heads available at even the best sites. Heads available at the turbine vary throughout each tidal cycle, averaging less than 70% of the maximum. As a result, installed capacity is underutilized, typical capacity factors tending to fall in the range 0.23 to 0.37. Low heads imply that civil as well as mechanical engineering components must be large in comparison to output. For such reasons, tidal plants are likely to be practicable only where energy is concentrated by large tides and where physical features permit construction of tidal basins at low cost.
5. Significant capital-cost reductions through improved design and construction techniques have been achieved over the past three decades. In China a somewhat different approach has been taken: tidal plants have been built as part of broader schemes of resource utilization – typically land reclamation or aquaculture.
6. In a world increasingly sensitive to environmental factors, tidal plants must avoid unacceptable impacts. Tidal power is non-polluting and in this respect superior to thermal generation. Beyond that, it is difficult to generalize. No serious long-term impacts are known to have been caused by the Rance tidal power plant, but large developments in the Bay of Fundy would, it has been predicted, perturb the tidal regime, with impacts on New England shorelines.
7. In recent years, commercial acceptance of combined-cycle generation based on combustion turbines has reduced the potential economic and environmental costs of meeting future capacity and energy demands through thermal plants wherever natural gas is available at competitive prices. This has tended to increase the economic bias against tidal power.

8. Another adverse implication for tidal power is the trend in many countries to adopt market-based pricing and dispense with regulatory pricing. This in almost every case is inimical to the generation function. Under such conditions, competitors



will be under strong compulsion to choose plant types having the shortest construction times and the lowest unit capital costs.

9. Such factors render construction of new tidal generation capacity unlikely during the near future, unless strong incentives such as emission caps or carbon taxes are imposed.

Примечания

to investigate – исследовать

to exceed – превышать

to extract – извлекать

innovative approach – новаторский подход

to imply – подразумевать

to predict – предсказывать

to perturb – нарушать

to dispense – распределять

TWh – Tera Watt hours

11. Переведите и запомните следующие слова и словосочетания: tidal, capacity, output, impact, reclamation, generation, annual, to opt, to extract, to meet; propeller turbines, combustion turbines, tidal power plant, prime movers, capital costs, capital-cost reductions, construction techniques, tidal cycle, land reclamation, non-polluting power, long-term impacts, combined-cycle generation, thermal plant, environmental factors, total capacity, hydraulic heads, tide race.

12. Прочтите третий абзац и скажите, что может препятствовать развитию использования энергии приливов, используйте слова in relation to, available at, as a result, as well as.

13. Скажите, как в Китае решена проблема затрат на использование энергии, вырабатываемой на приливных электростанциях.

14. Сравните влияние на окружающую среду приливных и тепловых электростанций, используйте слова non-polluting, superior to, difficult.

15. Что, по вашему мнению, может препятствовать развитию приливной энергетики, при ответе используйте глаголы to reduce, to increase, to adopt.

16. Охарактеризуйте работу приливной электростанции на реке Рейнс и о перспективах воздействия такого типа станции на окружающую среду.

17. Выскажите свое мнение о будущем приливных электростанций и их доле в общем производстве электричества в нашей стране.

Практическое занятие № 13.

Тема 13. Prospects for the Development of Geothermal Technology: Geothermal Development. Wind Energy /

Перспективы развития геотермальных технологий: Геотермальное развитие. Энергия ветра.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: способами профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

Сертификат: 12000002A633E3D113AD425FB50002000002A6

Владелец: Шебухова Татьяна Александровна

Действителен: с 20.08.2021 по 20.08.2022

необходимость овладения УК-4.

Теоретическая часть: Geothermal Development

1. Geothermal heat pumps, or ground-source heat pumps, for heating and cooling buildings are a rapidly growing example of a geothermal direct use application. The technology has developed almost without publicity in recent years to become a significant new factor in the supply equation. This is an electrically-based technology that allows high efficiency, reversible, water-source heat pumps to be installed in buildings in most geographical and geological locations (worldwide). The combination of increasing levels of electrical generation efficiency, with the impressive energy **amplification**¹ of geothermal heat pumps means that space heating can be delivered with effective efficiencies that **exceed**² 100%. The "additional" energy is supplied from the ground. In addition these systems also offer highly efficient cooling. The types of buildings that are using ground-source heating and cooling in this manner range from small utility or public housing, through to very large (MW-sized) institutional or commercial buildings. This technology can offer up to 40% reductions in CO₂ emissions against competing technologies. If all of the electricity is supplied from non-fossil sources, there are no CO₂ emissions associated with heating and cooling a building.

2. Recently, several large-scale **arrays**³ have been installed to feed larger systems where suitable supplies of deep geothermal water are not available. In the largest development to date, 4000 units – each with its own borehole – have been established on a US Army base in Louisiana to provide heating and cooling. The concept was developed independently in the US and Europe and, although Sweden and Switzerland have installed many thousands of units to provide winter heating in houses, the pace of installation in the USA and Canada during the last fifteen years **has overtaken**⁴ the European rate. There are now believed to be well over a quarter of a million installations in place in North America.

3. While the main activity is currently in the USA, there are a growing number of installations in Canada, Sweden, Switzerland, Austria and Germany. Smaller numbers are being installed in other European countries, and in Australia. The Geothermal Heat Pump Consortium currently has over 750 institutional, corporate and commercial members, and 40 international members from countries including Australia, Canada, China, Croatia, Finland, Germany, India, Japan, the Netherlands, Poland, Russia, Sweden, Turkey, and the UK.

4. Ground-source heat pumps are perhaps the first indication of the seventh age of geothermal technology, breaking the final barrier of geographical availability. To sum up: geothermal technology offers many benefits - clean, indigenous, firm energy - but suffers from economic uncertainties and geographical limitations. These problems are being actively addressed and future prospects seem bright.

Примечания

1 amplification – усиление;

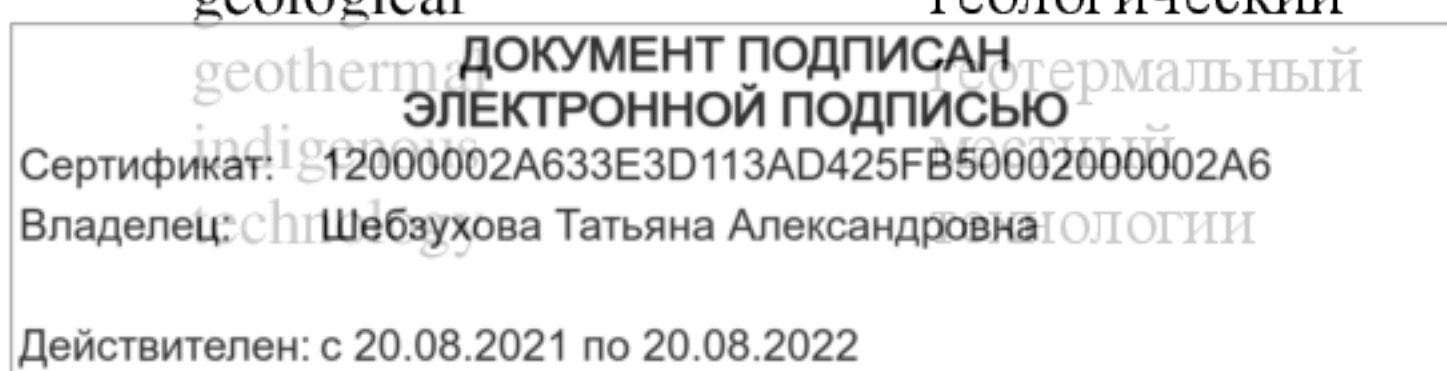
2 exceed – превышают;

3 arrays – структуры;

4 has overtaken – обогнал.

Vocabulary

| | |
|---------------|----------------|
| amplification | усиление |
| application | применение |
| borehole | скважинный |
| commercial | коммерческая |
| efficiency | эффективность |
| geographical | географический |
| geological | геологический |



Вопросы задания:

1. Переведите и запомните следующие слова и словосочетания: application, generation, amplification, heating, cooling, installation, availability, uncertainty; to address, to include, to develop, to overtake, to range, to establish, to provide, to feed; geothermal heat pump, ground-source heat pump, water-source heat pump, electrically-based technology, electrical generation efficiency, non-fossil sources, large-scale arrays, geothermal technology, geographical limitation.
2. Прочтите и переведите текст; выпишите ключевые слова, относящиеся к сфере применения геотермальной энергии.
3. Выпишите из всего текста существительные в роли определения, относящиеся к геотермальной технологии.
4. Из первого абзаца текста выпишите условное предложение о связи экологии и производства электричества.
5. Прочтите второй абзац текста, обратите внимание на слово *date* и подберите соответствующий английский синоним.
6. Прочтите третий абзац текста, обратите внимание на слова *the pace* и *the rate*, объясните, о чем идет речь.
7. Прочтите четвертый абзац и скажите, на каких континентах идет интенсивное развитие геотермальной энергии, обратите внимание на произношение географических названий.
8. Прочтите пятый абзац и скажите, какую информацию вы извлекли из порядковых числительных, использованных в тексте.
9. В последнем абзаце автор дает оценку перспективам развития геотермальной технологии, выразите свое мнение по этому вопросу, используйте в ответе *I think, to my mind, I am sure that, there is no reason to deny* и т.д.
10. Расскажите, что вы знаете о геотермальной энергии и геотермальной технологии.
11. Переведите и запомните следующие слова и словосочетания: development, speed, installation, technology, turbine, average, mean, monitoring, impact; wind turbine, wind farm, the former... the latter, offshore wind energy, floating jack-up barge, the grid network, electronic control system, expensive grid strengthening measures, the average annual output, mean wind speeds, standard turbine, enhanced rotor diameter, rock-socketed steel, monopole foundations.
12. Прочтите и переведите текст; выпишите ключевые слова, относящиеся к использованию энергии ветра.

Wind Energy

1. Wind turbines are now a relatively common sight across Europe, with countries such as Denmark, the Netherlands, Germany, UK, Spain and latterly France, all investing in wind farms. Offshore wind development, although far less advanced, is the greatest prize in this field. However, relative costs of offshore compared to **onshore** are higher.
2. This project is aimed to demonstrate the economic as well as a technical viability of offshore wind energy. The former was achieved through the innovative use of a floating **jack-up** barge which reduced the time and costs of installation. The latter was achieved mainly through the incorporation of new electronic control systems which improved the **compatibility** with the grid network, and reduced the need for expensive grid strengthening measures.
3. Five turbines were installed, about 4 km off the coast of Gotland. Each turbine is rated at 500 kW. The average annual output is some 8 GWh/y, from mean wind speeds of 8 m/s. Rock-socketed steel mono-pile foundations, to water depths of 5 to 6.5 m were used to secure the turbines. Total construction time was only 35 days. Monitoring of impacts on local flora and fauna, such as the seal population, is also being carried out.
4. Wind energy developments have, in the past, been concentrated in areas of the world which offer higher than average wind speeds. Often, this means that developments take place in remote and/or the economic attractiveness of utilizing sites with lower wind speeds is increased by the use of valuable (бесценный). This project will design, manufacture, install, test and measure the impact of two 1 MW turbines which have been specially

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adapted for use in low wind speed areas. The aim is to increase power production by up to 22%, compared to a standard turbine, mainly through the technological adaptations which allow for an enhanced rotor diameter, with a swept area of 2,830 m², and an increase in tower height from 50 to 70 m. The new turbine is installed at a site in Central Sweden.

Примечания

1 onshore – береговой;

2 jack-up – самоподнимающийся;

3 compatibility – совместимость

13. В первом абзаце текста обратите внимание на степени сравнения прилагательных и скажите, какую информацию о ветряных разработках они дают.

14. Прочтите второй абзац текста и расскажите о вне береговых ветряных разработках, используя глаголы to aim, to achieve, to reduce, to improve.

15. Расскажите, что обеспечивает устойчивость конструкций ветряков на побережье о-ва Готланд и о достоинствах данного сооружения.

16. Расскажите о разработках ветряков для районов с низкой скоростью ветра, используйте технические характеристики.

17. Прочтите текст еще раз и расскажите, какую новую для себя информацию вы извлекли, используйте следующие словосочетания: I don't think...; I am sure that...; There is no reason to deny...; I am in complete agreement...

Практическое занятие № 14. Тема 14. Nuclear Energy and the Environment: Atomic Power Plants. Environmental Protection / Ядерная энергия и окружающая среда: Атомные электростанции. Защита окружающей среды.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

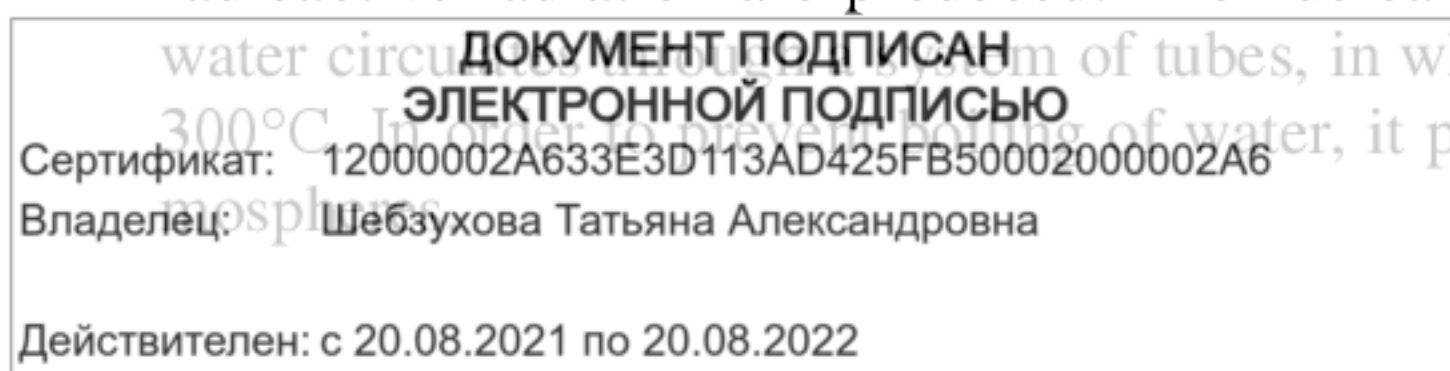
владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

Актуальность темы: обусловлена необходимостью овладения УК-4.

Теоретическая часть: Atomic Power Plant

Atomic power plants are modern installations. They consist of several main units and a great number of auxiliary ones.

In a nuclear reactor uranium is utilized as a fuel. During operation process powerful heat and radioactive radiation are produced. The nuclear reactor is cooled by water circulation. Cooling water circulates through a system of tubes, in which the water is heated to a temperature of 250-300°C. In order to prevent boiling of water, it passes into the reactor at a pressure up to 150 atmospheres.



A steam generator includes a series of heat exchangers comprising tubes. The water heated in the reactor is delivered into the heat exchanger tubes. The water to be converted into steam flows outside these tubes. The steam produced is fed into the turbogenerator.

Besides, an atomic power plant comprises a common turbogenerator, a steam condenser with circulating water and a switchboard.

Atomic power plants have their advantages as well as disadvantages. The reactors and steam generators operate in them noiselessly; the atmosphere is not polluted by dust and smoke. As to the fuel consumption, it is of no special importance and there is no problem of fuel transportation.

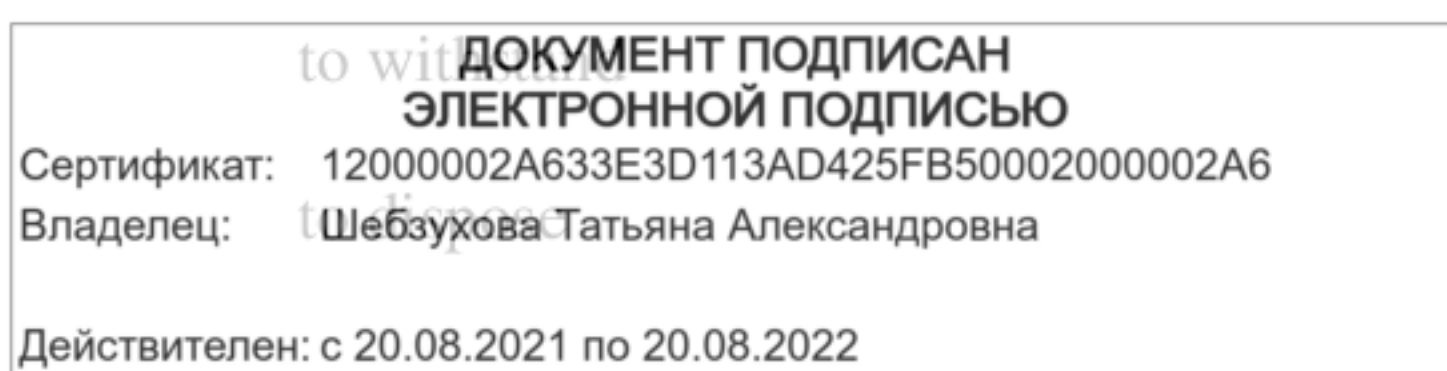
The disadvantage of power plants utilizing nuclear fuel is their radiation. Radioactive radiation produced in the reactors is dangerous for attending personnel. Therefore, the reactors and steam generators are installed underground. They are also shielded by thick (up to 1.5 m) concrete walls. All their controls are operated by means of automatic devices. These measures serve to protect people from radioactive radiation.

Vocabulary

| | | |
|---------------------|------------------|------------------------|
| exchanger | [ɪks'tʃeɪndʒə] | теплообменник |
| steam | | пар |
| tube | | труба, лампа |
| dust | | пыль |
| attending personnel | [ˌpə:səˈnel] | обслуживающий персонал |
| to deliver | | поставлять |
| to pollute | | загрязнить |
| to shield | [ʃiːld] | защищать |
| concrete | [ˈkɒŋkri:t] | бетон |
| environment | [ɪnˈvaɪərənmənt] | окружающая среда |
| fission | [ˈfɪʃən] | расщепление |
| (stainless) steel | | (нержавеющая) сталь |
| vessel | | сосуд |
| waste | | отходы |
| to confine | [kənˈfaɪn] | заключать |
| to release | [rɪˈliːz] | выпускать, освобождать |

противостоять

устранять, убирать



Вопросы и задания:

1. a) Cover the right column and read the English words. Translate them into Russian and check your translation.

b) Cover the left column and translate the Russian words back into English.

2. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally).

a. auxiliary units

steam generator

heat exchanger

fuel consumption

b. water to be heated in the reactor

water to be converted into steam

steam to be fed into the
turbogenerator

c. the polluted atmosphere

utilized nuclear fuel

shielded concrete walls

3. Complete the sentences using the correct variant:

1. A nuclear reactor is used in

a) wind-power plants.

b) atomic power plants.

2. A nuclear reactor is cooled by

a) water circulating in tubes.

b) oil circulating in tubes.

3. Water is passed into the reactor

a) at a low pressure.

b) at a high pressure.

4. High pressure

a) activates boiling of water.

b) prevents boiling of water.

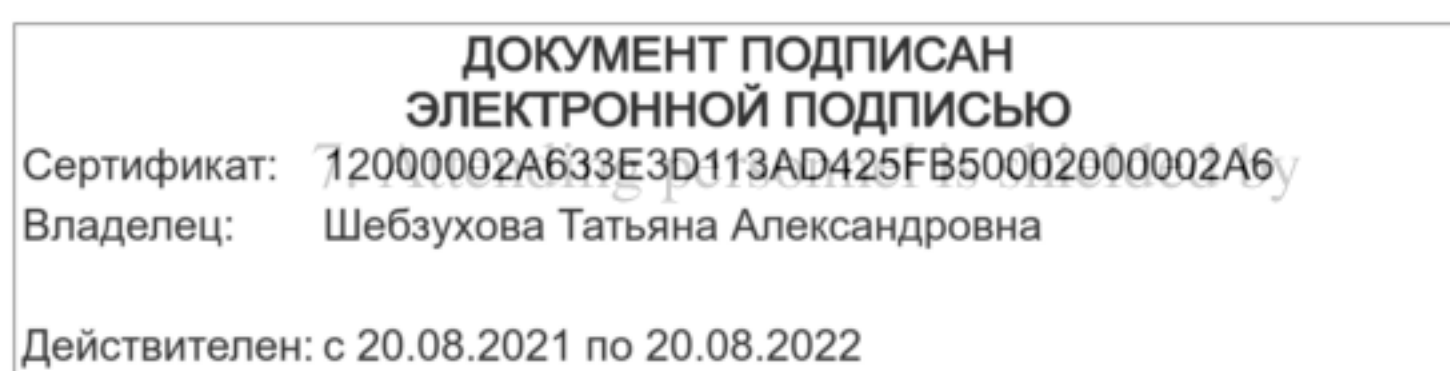
6. Circulating water flows

a) inside the heat exchangers.

b) outside the heat exchangers.

a) thick concrete walls.

b) thick metal walls.



4. Pair work. Put these questions to your groupmate and ask him/her to answer them:

1. What are the main units of an atomic power plant?
2. By what means is the nuclear reactor cooled?
3. At what pressure does the water pass into the reactor?
4. What types of power plants pollute the air with dust and smoke?
5. Why is it necessary to protect attending personnel?
6. By what means is it done?

5. Read and translate:

Protection Against Environmental Pollution

Any operating nuclear power plant releases fission products into the environment, which causes environmental pollution.

To prevent the harmful effects of nuclear power release, the nuclear power plants are supplied with protective installations that serve as barriers to the pollution.

First, the nuclear fuel and the fission products are confined within sealed tubes made of stainless steel or zirconium. Then the assembly of tubes is placed in a steel reactor vessel. And finally the steel reactor vessel is placed in a large steel and concrete housing.

As to the hot radioactive waste products they are disposed in heavily shielded cylinders. The cylinders are buried 305 to 610 metres underground.

6. Put down the Russian equivalents of these word combinations. Then translate them back into English (orally):

| | |
|--------------------|-------|
| nuclear fuel | _____ |
| nuclear fission | _____ |
| steel vessel | _____ |
| reactor vessel | _____ |
| fission release | _____ |
| sealed tubes | _____ |
| concrete housing | _____ |
| waste products | _____ |
| nuclear waste | _____ |
| shielded cylinders | _____ |

7. Complete the sentences using the correct variant:

| | |
|---|--|
| ДОКУМЕНТ ПОДПИСАН ЭЛЕКТРОННОЙ ПОДПИСЬЮ | |
| Сертификат: | 12000002A633E3D113AD425FB50002000002A6 |
| Владелец: | Шебзухова Татьяна Александровна |
| Действителен: с 20.08.2021 по 20.08.2022 | |

- a) liquid products.
- b) fission products.

- | | |
|---|--|
| 2. Operating nuclear power plants | a) pollute the environment. b) prevent the pollution. |
| 3. The protective power plant installations | a) produce the release of fission products. b) prevent the release of fission products. |
| 4. The sealed tubes are made of | a) bronze. b) stainless steel. |
| 5. The fission products are confined | a) within sealed tubes. b) within open tubes. |
| 6. The steel reactor vessel is placed | a) in a concrete housing. b) in a zirconium housing. |
| 7. The waste products are disposed | a) in an open vessel. b) in shielded cylinders. |

8. Pair work. Put these questions to your groupmate and let him/her answer them:

1. What kind of products does the operating nuclear power plant release?
2. What installations are used to prevent the harmful effects of a nuclear power plant operation?
3. What material are the tubes made of?
4. Where are the fission products confined?
5. In what part of the installation is the reactor vessel placed?
6. In what way are the hot radioactive waste products disposed?

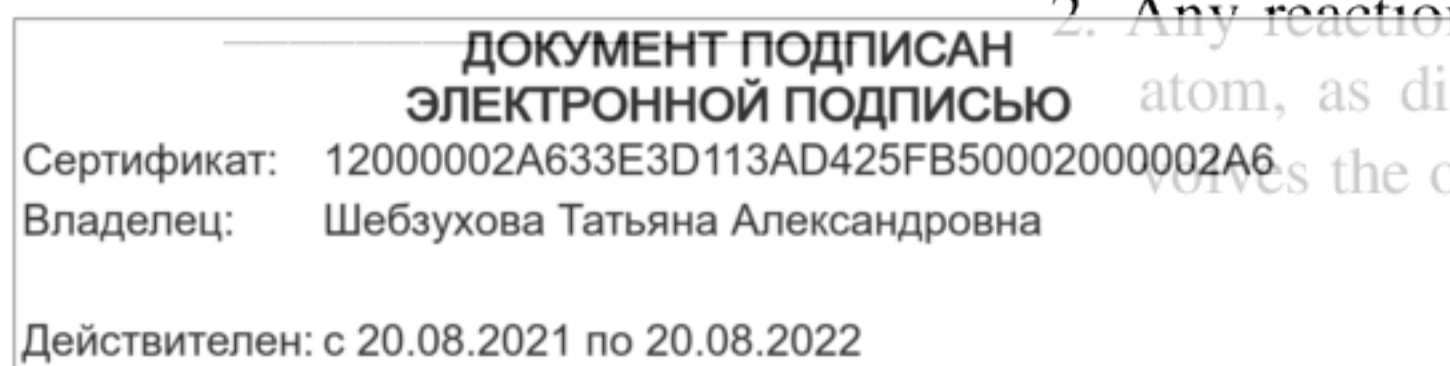
9. Give the English equivalents of the prepositions and conjunctions in brackets and translate the sentences.

1. The energy (для) a nuclear power plant comes (из) the heat released (во время) fissioning of uranium (в) a nuclear reactor.
2. There are two main differences (между) a nuclear power plant and a steam-electric power plant. The nuclear power plant uses a nuclear fuel (вместо) a fossil fuel, and it uses a reactor (вместо) a boiler.
3. (Из-за) their high fuel consumption gas turbines are more expensive to operate than steam turbines.
4. The radioactive pollution produced (в) a reactor has all three forms: gaseous, liquid and solid.
3. The beta particles are dangerous for man (так как) they penetrate deep (в) the matter.
6. Pump-turbine units are used (как для) pumping the water (так и для) driving electric generators.

10. Put down the title corresponding thematically to each of the given descriptions.

1) *Titles:* Nuclear Fuel; Nuclear Power; Nuclear Reaction.

- | | |
|---------------------------|---|
| <p>_____</p> <p>_____</p> | <p>1. A substance which undergoes nuclear fission or nuclear fusion in a nuclear reactor, a nuclear weapon, or a star.</p> <p>2. Any reaction which involves a change in the nucleus of an atom, as distinct from a chemical reaction which only involves the orbital electrons. Such reactions occur naturally –</p> |
|---------------------------|---|



on the Earth, in radioactive elements, and in the stars, as thermonuclear reactions. They are also produced in nuclear reactors, and nuclear weapons.

_____ 3. Electric or motive power produced from a unit in which the primary energy source is a nuclear reactor.

2) *Titles:* Pressured-Water Reactor (PWR); Boiling-Water Reactor (BWR).

_____ 1. This is a pressure-vessel reactor fuelled with enriched uranium. The reactor is a thermal one, moderated and cooled with ordinary (light) water. The heat in the reactor is extracted by the boiling water as it passes through the core, and the steam is passed directly to the turbine of the energy conversion cycle.

_____ 2. The primary reactor vessel of this reactor is operated at considerable overpressure, which suppresses boiling of the cooling water.

3) *Titles:* Nuclear Fusion; Nuclear Fission; Nuclear Charge; Nuclear Energy.

_____ 1. Energy released during a nuclear reaction as the result of the conversion of mass into energy. Energy of this kind is released in nuclear reactors and nuclear weapons.

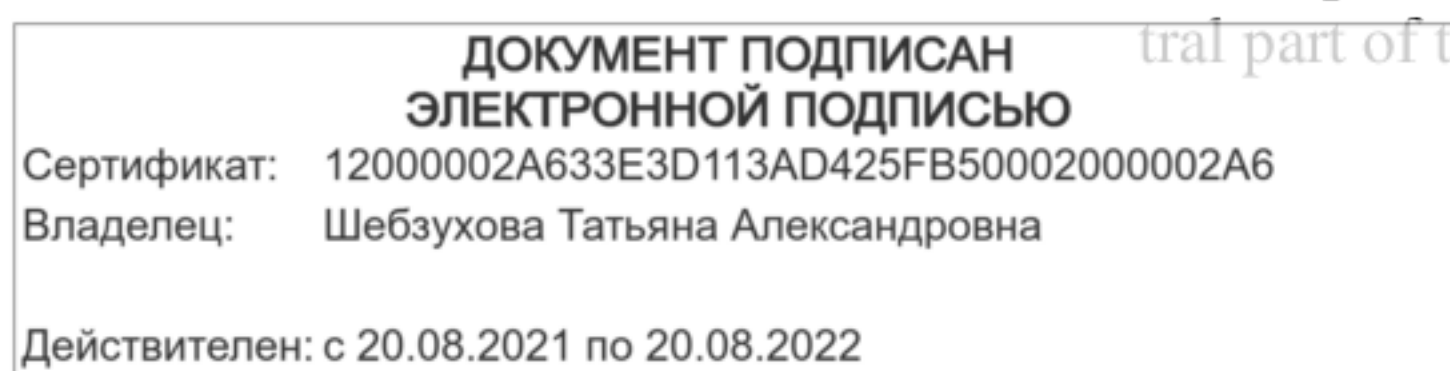
_____ 2. A reaction between light atomic nuclei as a result of which a heavier nucleus is formed and a large quantity of nuclear energy is released. The temperatures necessary for fusion reactions are extremely high. Reactions of this kind are believed to be the source of the energy of the stars (including the Sun).

_____ 3. A nuclear reaction in which a heavy atomic nucleus (e.g. uranium) splits into two approximately equal parts, at the same time emitting neutrons and releasing very large amounts of nuclear energy.

_____ 4. The positive electric charge on the nucleus of an atom. Numerically it is equal to the atomic number of the element, to the number of protons in the nucleus, and to the number of electrons surrounding the nucleus in the neutral atom.

4) *Titles:* Analog Computer; Computer; Digital Computer; Central Processing Unit.

_____ 1. The central electronic unit in a computer which processes input information, and information from the store, and produces the output information. This unit and the store form the central part of the computer.



- _____
2. A computer in which numerical magnitudes are represented by physical quantities such as electric current, voltage, or resistance.
- _____
3. An electronic device which accents data, applies a series of logical processes to it, and supplies the results of these processes as information. The device is used to perform mathematical calculations at a very high speed. This makes them useful for various purposes, such as office calculations, control of industrial processes, and the control of flight paths.
- _____
4. A computer which operates on data in the form of digits rather than the physical quantities.

11. Read the texts and find in them the answers to the questions that follow.

a) Windscale Accident

Throughout the years, accidents causing a release of radioactive material to the environment have occurred. Since World War II all over the world large scale nuclear facilities have been built and operated both for civil and defense purposes. Some of the sites on which these facilities were located are heavily contaminated with radioactive substances.

One of the first nuclear reactor accidents of environmental concern was the Windscale accident in October 1957. During the accident the military air-cooled graphite-moderated natural-uranium reactor used for plutonium production caught fire during the liberation of energy in the graphite. Emission from the Windscale lasted for 18 hours. Radioactive material was detectable in many parts of Western Europe but the majority of it was deposited in the United Kingdom.

- How long did the emission from the Windscale reactor last?
- What did the emission result in?

b) Chernobyl Accident

The accident, which was of global concern was the accident in Ukraine in the Chernobyl power plant located in Polesye on the River Pripyat.

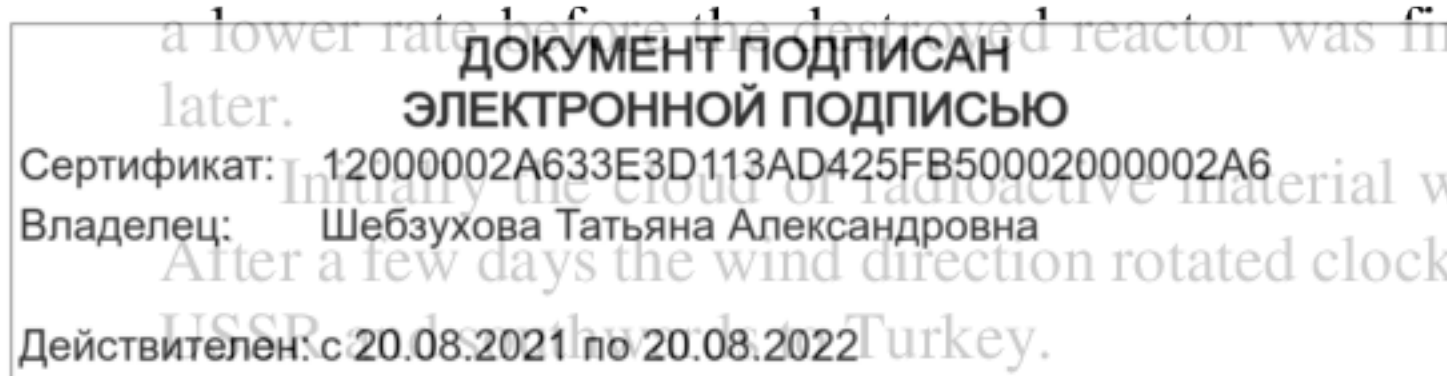
On 26 April, 1986, Unit 4 of the Chernobyl nuclear plant suffered a major accident. The Chernobyl 4 reactor was a graphite-moderated, light-water-cooled system. The installed electrical generating capacity was 1 GW. The accident followed some engineering tests of a generator.

During the tests, basic operating safety rules were being violated. Most control rods were withdrawn from the core and the safety systems were switched off. Two explosions and a fire that followed them damaged the reactor and the containment building. The graphite started to burn. Explosive energy was released, which resulted in the 1000 ton cover plate of the reactor being lifted up.

A prolonged release of large quantities of radioactive products transported by the cloud from Chernobyl was detected not only in northern and southern Europe but also in Canada, Japan, and the US.

The major part of the release took place over the period of about ten days. There were two peaks in release rate (26th April and 5th May). Later on, the release continued for many weeks at a lower rate before the destroyed reactor was finally sealed, which took place some five months later.

Initially the cloud of radioactive material was carried over the Baltic Sea into Scandinavia. After a few days the wind direction rotated clockwise and the cloud travelled eastwards across the USSR and through Turkey.



The total mass of the radioactive particles released in the accident was about 6000-8000 Kg. More than half of it was deposited near the plant but the rest travelled thousands of kilometres (see Fig. 26).

There is no doubt that the nuclear plant accidents offer a number of lessons to be learnt.

At present, over 200 nuclear power reactors for commercial electricity production operate in Europe.

The accident at the Chernobyl nuclear plant has shown that largescale accidents in nuclear power plants can lead to contamination of the entire continent.

- **What was the cause of the Chernobyl accident?**
- **What was the path of the radioactive material released in the accident?**
- **What can accidents at the nuclear plants lead to?**
- **Make a talk on the Chernobyl accidents.**

Практическое занятие № 15.

Тема 15. The Ways of Using Renewable Energy in Future: Nuclear Reactor and Power Generation.

The Use of Wastes. /

Способы использования возобновляемой энергии в будущем:

Ядерный реактор и производство электроэнергии.

Использование отходов.

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

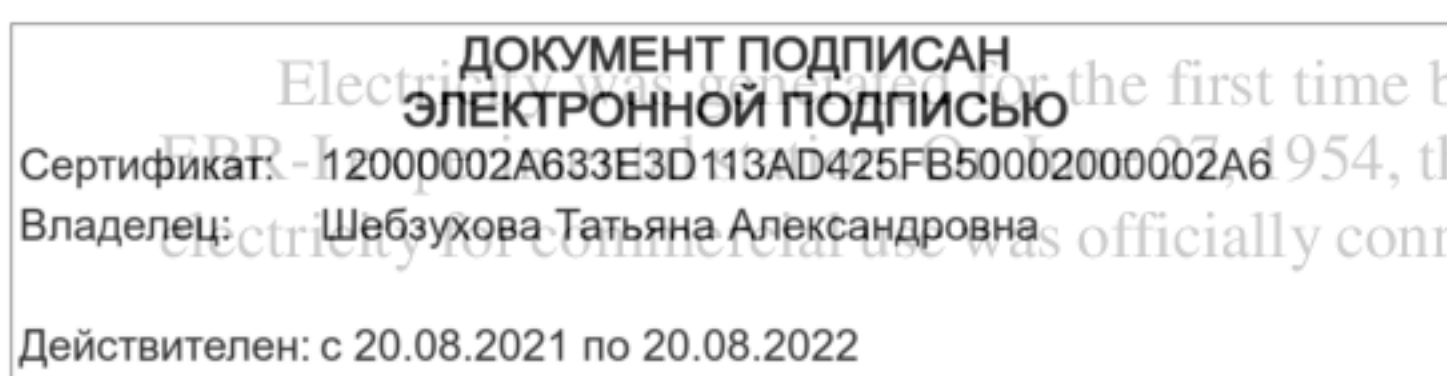
Актуальность темы: обусловлена необходимостью овладения УК-4.

Теоретическая часть:

A nuclear power plant (NPP) is a thermal power station in which the heat source is one or more nuclear reactors generating nuclear power.

Nuclear power plants are base load stations, which work best when the power output is constant (although boiling water reactors can come down to half power at night). Their units range in power from about 40 MWe to almost 2000 MWe, typical of new units under construction in 2005 being in the range 600-1200 MWe.

As of 2005 there are 441 nuclear power reactors in operation around the world [1], which together produce about one-sixth of the world's electric power



Oblast, Russia. The Shippingport Reactor (Pennsylvania) was the first commercial nuclear generator to become operational in the United States.

Nuclear power plants are classified according to the type of reactor used. However some installations have several independent units, and these may use different classes of reactor. In addition, some of the plant-types below in the future may have passively safe features.

Fission power reactors generate heat by nuclear fission of fissile isotopes of uranium and plutonium.

They may be further divided into three classes:

- **Thermal reactors** use a neutron moderator to slow or *moderate* the rate of production of fast neutrons by fission, to increase the probability that they will produce another fission and thus sustain the chain reaction.
- **Fast reactors** sustain the chain reaction without needing a neutron moderator.
- **Subcritical reactors** use an outside source of neutrons rather than a chain reaction to produce fission. As of 2004 this was a theoretical concept, and no prototype had been proposed or built to generate electric power by this means, although some laboratory demonstrations and several feasibility studies had been conducted.

Although some of the earliest nuclear power reactors were fast reactors, they have not as a class achieved the success of thermal reactors.

Fast reactors have the advantages that their fuel cycle can use all of the uranium in natural uranium, and also transmute the longer-lived radioisotopes in their waste to faster-decaying materials. For these reasons they are inherently more sustainable as an energy source than thermal reactors. See fast breeder reactor. Because most fast reactors have historically been used for plutonium production, they are associated with nuclear proliferation concerns.

More than twenty prototype fast reactors have been built in the USA, UK, USSR, France, Germany, Japan, and India, and as of 2004 one was under construction in China.

Vocabulary

| | |
|----------------------|--------------------------|
| nuclear power plant | атомная электростанция |
| nuclear fission | ядерное деление |
| to transmit | передавать |
| thermal reactors | тепловые реакторы |
| fast reactors | быстрые реакторы |
| greenhouse gas | парниковый газ |
| stock piling of fuel | складирование топлива |
| current | ток |
| running costs | эксплуатационные расходы |
| leakages | leakages |
| disposal | удаление |
| to classify | классифицировать |
| the chain reaction | цепная реакция |
| an accident | несчастный случай |

to claim

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ

требовать

Сертификат: 12000002A633E3D113AD425FB50002000002A6P

Владелец: Шебзухова Татьяна Александровна

Вопросы и задания:

Действителен: с 20.08.2021 по 20.08.2022

1. Прочитайте и переведите текст.

Advantages and disadvantages

Advantages of NPPs are:

- Essentially no greenhouse gas emissions
- Does not produce air pollutants such as carbon monoxide, sulfur dioxide, mercury, nitrogen oxides or particulates
- The quantity of waste produced is small
- Small number of accidents
- Low fuel costs
- Large fuel reserves
- Ease of transport and stockpiling of fuel
- Future designs may be small and modular (SSTAR, etc.)

Disadvantages are:

- Nuclear waste produced is dangerous for thousands of years
- Consequences of an accident might be disastrous
- Risk of nuclear proliferation associated with some designs
- High capital costs
- In the past long construction periods, imposing large finance costs and delaying return on investment
- High maintenance costs
- High cost of decommissioning plants
- Current designs are all large-scale

Nuclear power is highly controversial, enough so that the building of new nuclear power stations has ceased in Europe (except Finland). Almost all the advantages and disadvantages are disputed in some degree by the advocates for and against nuclear power.

The cost benefits of nuclear power are also in dispute. It is generally agreed that the capital costs of nuclear power are high and the cost of the necessary fuel is low compared to other fuel sources. Proponents claim that nuclear power has low running costs, opponents claim that the numerous safety systems required significantly increase running costs.

Disposal of spent fuel and other nuclear waste is claimed by some as an advantage of nuclear power, claiming that the waste is small in quantity compared to that generated by competing technologies, and the cost of disposal small compared to the value of the power produced. Others list it as a disadvantage, claiming that the environment cannot be adequately protected from the risk of future leakages from long-term storage.

2. Найдите в тексте английские эквиваленты следующих слов и выражений. На базе текста составьте с ними предложения: источник тепла, атомные реакторы, экспериментальная станция, энергетические системы, классифицировать, ядерное деление, нейтронное замедление, учения, по этим причинам, преимущества и недостатки, ртуть, накопление топ-

ЛИВА.

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ

Сертификат: 12000002A633E3D113AD425FB50002000002A6

Владелец: Шебзухова Татьяна Александровна

Действителен: с 20.08.2021 по 20.08.2022

3. Закончите предложения в соответствии с текстом, используя следующие слова и выражения: to the type of reactor used, into three classes, to become operational in the United States, are also in dispute, were fast reactors.

1. The Shippingport Reactor (Pennsylvania) was the first commercial nuclear generator.....
2. Nuclear power plants are classified according....
3. They may be further divided.....
4. Although some of the earliest nuclear power reactors
5. The cost benefits of nuclear power.....

4. Составьте предложения из следующих слов и словосочетаний:

1. the chain, Fast reactors, a neutron, reaction, without, needing, moderator.
2. produced, for thousands, Nuclear, is, dangerous, of years, waste.
3. proliferation, Risk, of nuclear, designs, associated, with, some.
4. designs, Current, large-scale, are, all.
5. Nuclear, controversial, power, is, highly,

5. Согласитесь или не согласитесь со следующими высказываниями. Обоснуйте свое мнение, пользуясь текстом:

1. Nuclear power plants are base load stations, which work best when the power output is constant.
2. As of 2005 there are 551 nuclear power reactors in operation around the world.
3. Nuclear power plants are classified according to the type of reactor used.
4. Fission power reactors generate heat by nuclear fission of fissile isotopes of uranium and plutonium.
5. They may be further divided into five classes.

6. Найдите в тексте слова, которые соответствуют следующим определениям и в соответствии с прочитанным текстом письменно составьте с ними предложения:

- the splitting of the nucleus of an atom to produce a large amount of energy.
- Coal, oil, or petrol that is burned in order to provide power.
- A place, where investigations are made.
- An amount of money that is needed in order to buy something.
- A possibility that something unpleasant might happen.

7. Каждое слово в английском языке имеет несколько значений, которые зависят от контекста и ситуации, в которых оно применяется, также оно может быть как глаголом, так и существительным, поэтому вам предлагается выполнить следующие задания:

ИЗДАНИЕ: ДОКУМЕНТ ПОДПИСАН ЭЛЕКТРОННОЙ ПОДПИСЬЮ

Сертификат: 12000002A633E3D113AD425FB50002000002A6

Владелец: Шебзухова Татьяна Александровна

Действителен: с 20.08.2021 по 20.08.2022

Используя англо-русский словарь, изучите статьи о словах "dispute" и "agree". Выпишите сложные слова и производные, приведенные в статьях;

- Укажите количество определений, приведенных в статьях;
- Выпишите из текста предложения с данными словами и укажите, какое из значений они имеют в данном контексте.

8. Соедините слова левой колонки с подходящим определением в правой и составьте свои предложения с этими словами:

- | | |
|-------------------|--------------------|
| 1. Type | 1. a supplement to |
| 2. Different | 2. Structure |
| 3. in addition to | 3. quick |
| 4. Fast | 4. kind, sort |
| 5. construction | 5. various |

9. Ответьте на вопросы.

1. What is a nuclear power station?
2. How many nuclear reactors are there in operation now?
3. When was electricity generated by the world's first nuclear power plant?
4. Where was electricity generated by the world's first nuclear power plant?
5. What was the first commercial nuclear generator?
6. How many reactors are there? Name them.
7. What are Fast reactors? Describe them
8. What are the advantages of NPP?
9. What are the disadvantages of NPP?

1. Прочтите и переведите текст:

The Ways of Using Renewable Energy in Future

Presenting five of the most imaginative new ideas for alternative energy sources. Each is under intensive current study, mostly with Government funding. "Power tower" to generate electricity from steam using water heated by solar energy. Heliostats – the bank of computer controlled mirrors at the base of tower – focus sun's rays on pipes containing water, located in the cylinder at top of tower. Steam under pressure then drives a turbine generator at base. Now in the preliminary experiment ' stage, an operating tower generating electricity for a city of 5,000 homes may be built by 1980. One of the biggest problems will be developing heat storing capacity for cloudy days. Four major firms are competing in the study: Honeywell, McDonnell Douglas, Martin-Madietta and Boeing. Space colonies powered by solar energy, reflected by hinged mirrors along the sides. Designed by Gerard K. O'Neill, the colonies; are about 19 miles long and four miles in diameter. "Giromill" to generate electricity from wind energy. Vertical windmills offer several advantages over conventional, horizontal axis versions: they are more stable in high winds, do not have to be adjusted for changes in wind direction and may be cheaper to build. Blades are tapered like an airplane wing. A typical Giromill to create 100 kilowatts of electricity in a 15 mile per hour wind (about right to service 40 homes) would have blades 130 feet high, mounted on a rotor with a diameter of 100 feet. In high winds, blades could be released to rotate freely. The McDonnell Douglas Corporation has won a contract to study the design. Ocean Thermal Energy Plant OTEP ships may help solve the food crisis as well as the energy crisis. By using the energy derived from ocean thermal gradients to make ammonia, at about one-third the present cost, OTEP ships could help compensate for expected fertilizer and natural gas shortfalls a decade hence. Johns Hopkins University Applied Physics Laboratory is studying the possibilities.

One of the keys to developing new energy technologies is materials research. IBM has developed a new type of light absorbing surface – shown here in electron micrograph – made of vapor-deposited tungsten. Some 96 per cent of the light incident at the appropriate angle is absorbed, and the material can operate at high operating temperatures (more than 900 degrees F.).

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ
Сертификат: 12000002A633E3D113AD425FB50002000002A6
Владелец: Шебзухова Татьяна Александровна
imaginative – изобретательный
Действителен: с 20.08.2021 по 20.08.2022

hinge – прикреплять на петлях; висеть; вращаться на петлях
axis – ось, pl. axes
taper – суживать(ся) к концу; заострять
release – освободить, (тех.) расцеплять
fertilizer – удобрение
shortfall – (разг.) дефицит, недостача
tungsten – вольфрам

2. Прочтите и выполните письменный перевод текста:

The way one city plans to make use of its wastes

A futuristic structure just completed here is described as "the first full-scale pyrolysis solid-waste disposal and resource-recovery system in the world. " Using the latest technology, this plant is designed to handle 1000 tons of refuse daily, more than half the total collected by the city. At the moment, it is being tested to work out the "bugs" in its unique design. When in full operation, now expected within six months, trash will roll in by truck at a rate of 50 tons per hour. After shredding, it will be baked at 1,800 degrees Fahrenheit. Gases from this "pyrolysis" will be mixed with air and burned to produce steam expected to meet half the heating, air-conditioning needs of many downtown buildings. Mineral harvest. Solids remaining after pyrolysis will be culled for usable products. Around 70 tons of iron and steel will be extracted daily with huge magnets. Another 170 tons of "glassy aggregate" will be recovered, to be used primarily for road building. Remaining will be about 80 tons of carbon char residue, which be buried in a landfill or possibly used as a solid conditioner.

(U.S. News World Report, Washington, D.C.)

Примечания

futuristic – футуристический
pyrolysis – пиролиз
shred – кромсать; резать/рвать на клочки
downtown – деловой район города
char – что-либо обуглившееся; обжигать, обугливать(ся).

Практическое занятие № 16.

Тема 16. Electricity Meters / Счетчики электроэнергии

Цель: формирование у студентов коммуникативной компетенции для осуществления профессиональной коммуникации.

В результате освоения темы студент должен:

знать: лексику профессиональной направленности; нормы употребления лексики английского языка в профессиональной сфере; особенности грамматики профессионального английского языка;

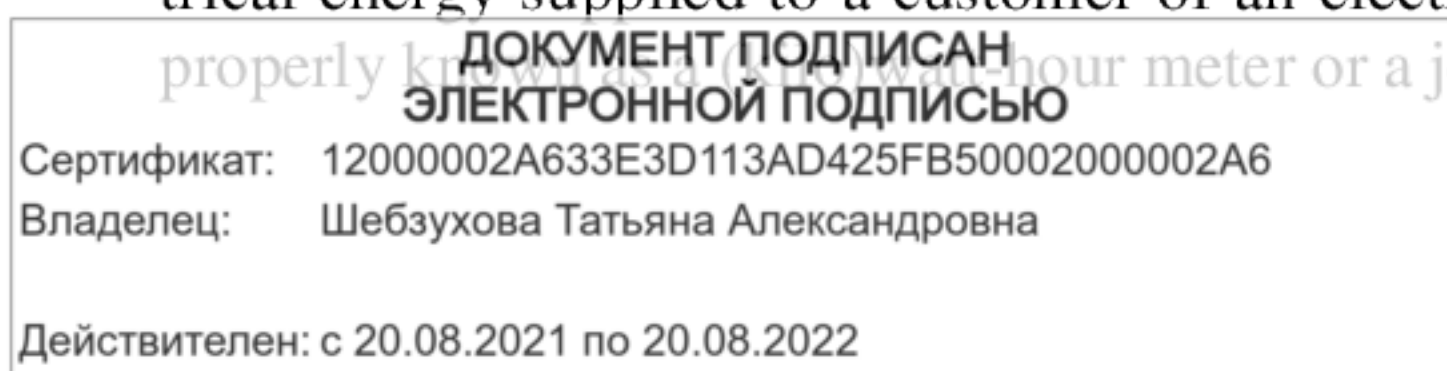
уметь: осуществлять профессиональную коммуникацию в устной и письменной формах на английском языке; читать и переводить специальную литературу для пополнения профессиональных знаний;

владеть: навыками профессионального общения на английском языке; способами пополнения профессиональных знаний из оригинальных источников на английском языке.

Актуальность темы: обусловлена необходимостью овладения УК-4.

Теоретическая часть:

An **electricity meter** is generally taken to be a device which measures the amount of electrical energy supplied to a customer of an electricity company. The most common type is more properly known as a kilowatt-hour meter or a joule meter.



Modern electricity meters operate by continuously measuring the instantaneous voltage (volts) and current (amperes) and finding the product of these to give instantaneous electrical power (watts) which is then integrated against time to give energy used (joules, kilowatt-hours etc).

The most common type of electricity meter is the electromechanical induction meter. This consists of an aluminium disc which is acted upon by two coils. One coil is connected in such a way that it produces a magnetic flux in proportion to the voltage and the other produces a magnetic flux in proportion to the current. This produces eddy currents in the disc and the effect is such that a force is exerted on the disc in proportion to the product of the instantaneous current and voltage. A permanent magnet exerts an opposing force proportional to the speed of rotation of the disc - this acts as a brake which causes the disc to stop spinning when power stops being drawn rather than allowing it to spin faster and faster. This causes the disc to rotate at a speed proportional to the power being used.

The aluminium disc is supported by a spindle which has a worm gear which drives the register. The register is a series of dials which record the amount of power used. The dials may be of the cyclometer type where for each dial a single digit is shown through a window in the face of the meter, or of the pointer type where a pointer indicates each digit. It should be noted that with the dial pointer type, adjacent pointers generally rotate in opposite directions due to the gearing mechanism.

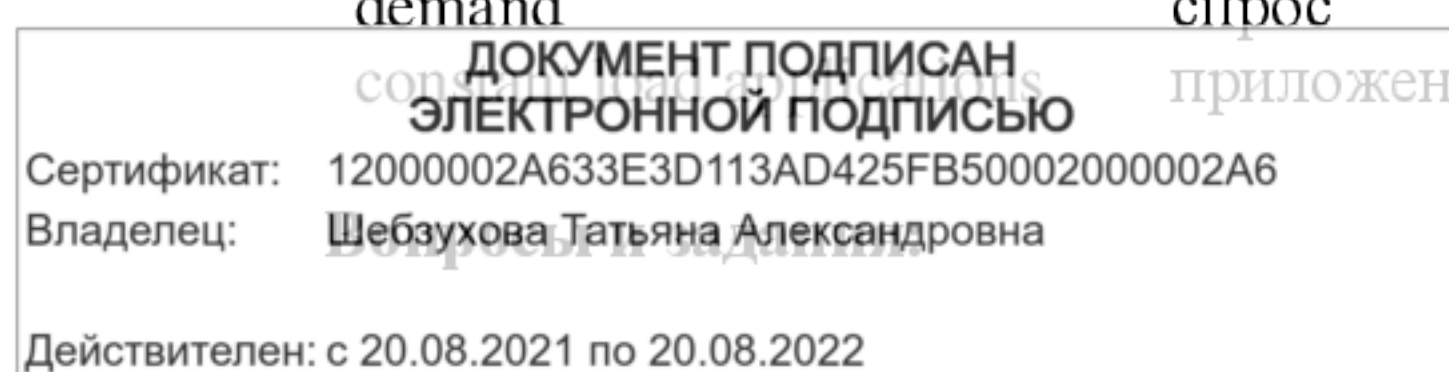
Some newer meters are solid state and display the power used on an LCD. Most solid-state meters use a current transformer to measure the current. This means that the main current-carrying conductors need not pass through the meter itself and so the meter can be located remotely from the main current-carrying conductors, which is a particular advantage in large-power installations. It is also possible to use remote current transformers with electromechanical meters though this is less common.

Solid state meters can also record other parameters of the load and supply such as maximum demand, power factor and reactive power used etc.

Vocabulary

| | |
|-----------------------|-------------------------|
| an electricity meter | счетчик электроэнергии |
| to measure | измерять |
| in proportion | в пропорции |
| to rotate | вращать |
| a surplus | избыток |
| customers | клиенты |
| facilitated | облегченный |
| multiple registers | несколько регистров |
| to permit | разрешить |
| electricity grid | электросеть |
| accurate measurement | точное измерение |
| electricity retailers | продавцы электроэнергии |
| different tariffs | разные тарифы |
| domestic meters | бытовые счетчики |
| demand | спрос |

приложения с постоянной нагрузкой



1. Найдите в тексте английские эквиваленты следующих слов и выражений. На базе текста составьте с ними предложения: катушка, магнитный поток, вихревые токи, вращать, винтовой привод, противоположная сторона, дефицит, соответствующий, тарифы, количество энергии, запасы, длина времени.

Variable-rate meters

Electricity retailers may wish to charge customers different tariffs at different times of the day. This is because there is generally a surplus of electricity at times of low demand, such as during the night. Such tariffs are facilitated by time of use meters which incorporate or are connected to a time switch and which have multiple registers. The popularity of such tariffs has declined in recent years, at least in the domestic market, due to the deficiencies of storage heaters and the low cost of natural gas.

Domestic variable-rate meters normally only permit two tariffs ("peak" and "off-peak") and in such installations a simple electromechanical time switch may be used. Large commercial and industrial premises may use electronic meters which record power usage in blocks of half an hour or less. This is because on most electricity grids there are demand surges throughout the day, and the power company may wish to give incentives to large customers to reduce demand at these times. These demand surges often corresponding to meal times or, famously, to intervals in popular television programmes.

Other types of electricity meter

In addition to the types of meter described above which directly measure the amount of energy used, other types of meter are available.

Meters which measure the amount of charge(coulombs) used, known as amp-hour meters, were used in the early days of electrification. These were dependant upon the supply voltage remaining constant for accurate measurement of energy usage which is not a likely circumstance with most supplies.

Some meters measured only the length of time for which current flowed, with no measurement of the magnitude of voltage or current being made. These were only suited for constant load applications.

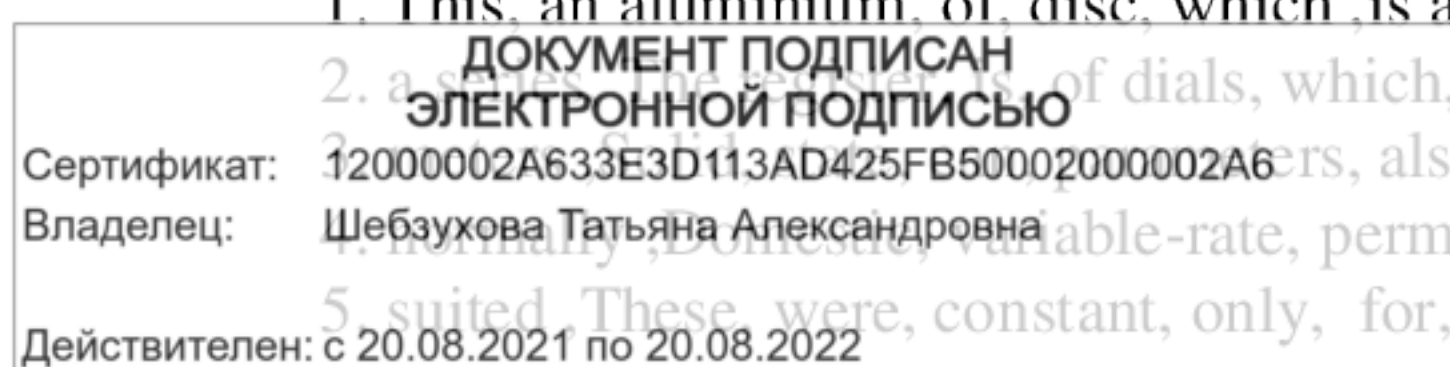
Neither type is likely to be found in electricity retail use today.

2. Закончите предложения в соответствии с текстом, используя следующие слова и выражения: the electromechanical induction meter, for which current flowed, the power used on an LCD, the instantaneous voltage (volts), tariffs at different times of the day.

1. Modern electricity meters operate by continuously measuring
2. The most common type of electricity meter is
3. Some newer meters are solid state and display
4. Electricity retailers may wish to charge customers different
5. Some meters measured only the length of time

3. Составьте предложения из следующих слов и словосочетаний:

1. This, an aluminium, of disc, which, is acted, consists, upon by two coils.
2. a surplus, of dials, which, the amount, record, of power used.
3. other, record, other of the load
4. normally, Domestic, variable-rate, permit, meters only, two tariffs
5. suited, These, were, constant, only, for, load applications.



4. Письменно переведите абзац: «An electricity meter ... due to the gearing mechanism.»

5. Согласитесь или не согласитесь со следующими высказываниями. Обоснуйте свое мнение, пользуясь текстом:

1. The most common type is more properly known as a (kilo) watt-day meter.
2. The aluminium disc is supported by a spindle which has a worm gear.
3. The dials may be of the cyclometer type.
4. Most solid-state meters use a water transformer to measure the current.
5. Domestic variable-rate meters normally only permit one tariffs

6. Найдите в тексте слова, которые соответствуют следующим определениям и в соответствии с прочитанным текстом письменно составьте с ними предложения:

-a thick spiral of wire through which an electrical current is passed.

- is a unit of measurement of electrical power

- People who buys electricity.

-people who sell electricity

- A need for electricity

7. Каждое слово в английском языке имеет несколько значений, которые зависят от контекста и ситуации, в которых оно применяется, также оно может быть как глаголом, так и существительным, поэтому вам предлагается выполнить следующие задания:

- Пользуясь англо-русским словарем, изучите статьи о слова “gear” и “brake”
- Выпишите сложные слова и производные, приведенные в статьях;
- Укажите количество определений, приведенных в статьях;
- Выпишите из текста предложения с данными словами и укажите, какое из значений они имеют в данном контексте.

8. Соедините слова левой колонки с подходящим определением в правой и составьте свои предложения с этими словами:

- | | |
|---------------|------------------------------|
| 1. Device | 1. benefit. |
| 2. to measure | 2. prmanent. |
| 3. to produce | 3 mechanism. |
| 4. Advantage | 4. to find the size of smth. |
| 5. Constant | 5. to generate. |

9. Письменно кратко изложите содержание текста на русском языке.

10. Ответьте на вопросы.

1. What is an electrical meter?
2. What is the most common type of meter?
3. What does the aluminium disc have?
4. What is the register?
5. What does LCD mean?
6. What can solid meter also record?
7. How many domestic variable-rate meters permit?
8. What do you know?
9. What kind of meter do you have at you home?

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11. Перескажите текст.

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Владелец: Шебзухова Татьяна Александровна

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СПИСОК РЕКОМЕНДУЕМОЙ ЛИТЕРАТУРЫ

Перечень основной литературы

1. Луговая А.Л. Английский язык для студентов энергетических специальностей: учеб. пособие / А.Л. Луговая. – 5-е изд., стер. – М.: Высш. шк., 2009. – 150 с.: ил.

2. Макеева М.Н. Английский для бакалавров (в области техники и технологий): учебное пособие / М.Н. Макеева, О.Н. Морозова, Л.П. Циленко. – Тамбов: Изд-во ФГБОУ ВПО «ТГТУ», 2012. – 80 с.

Перечень дополнительной литературы

1. Кадулина Л.Б. Английский язык для инженерных факультетов. English for Engineering Faculties: учебное пособие / Л.Б. Кадулина, Л.Е. Лычковская, Е.Р. Менгардт, О.И. Тараканова. – Томский государственный университет систем управления и радиоэлектроники, 2015. – 350 с.

2. Мошкина Т.Г. Английский язык для курсантов военных специальностей радиотехнических направлений: учебное пособие / Т.Г. Мошкина, О.В. Шагалина. – Красноярск: Сиб. федер. ун-т., 2011. – 140 с.

Перечень ресурсов информационно-телекоммуникационной сети «Интернет», необходимых для освоения дисциплины

1. <http://www.bbc.co.uk> - ресурсы и материалы BBC

2. <http://www.s-english.ru> – ресурсы для изучения английского языка

3. <http://www.engvid.com> - ресурсы для изучения английского языка

4. <http://www.english-globe.ru> - ресурсы для изучения английского языка

5. <https://www.englex.ru> - платформа для интерактивного изучения английского языка

6. <http://www.biblioclub.ru> - Университетская Библиотека онлайн

ДОКУМЕНТ ПОДПИСАН
ЭЛЕКТРОННОЙ ПОДПИСЬЮ

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Владелец: Шебзухова Татьяна Александровна

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СПИСОК НАИБОЛЕЕ ЧАСТО ВСТРЕЧАЮЩИХСЯ СОКРАЩЕНИЙ

A, a – ampere – ампер
Å – Angstrom – ангстрем (10⁻⁸ см, 10⁻¹⁰ м)
A.C. (a.c.) – alternating current – переменный ток
a.f. – audio frequency – звуковая частота
A.F.C. – automatic frequency control – автоматическая подстройка частоты (АПЧ)
a-hr – ampere-hour – ампер/час
°C – centigrade – градус Цельсия
Cal – kilogram-calorie – большая калория
cm. p. s. – centimeters per second – см/с
c.p. – candle power – свеча
c.p.s. – cycles per second – герц
db – decibel – децибел
D.C. (d.c.) – direct current – постоянный ток
dia. – diametre – диаметр
dm. – decimeter – дециметр
e.g. – exempli gratia – например
emf – э.д.с.
etc. – и т.д.
F – farad 1) фарада, 2) градус Фаренгейта
f.s.d. – full size detail – деталь в натуральную величину
g – грамм
g. r. – gear ratio – передаточное число, отношение
h. f. (r. f.) – high frequency (ratio frequency) – звуковая частота
hi-fi – high fidelity – высокая точность звуковоспроизведения
h. p. – 1) horsepower – лошадиная сила;
2) high pressure – высокое давление
h. v. – high voltage – высокое напряжение
i.c. – internal combustion – внутреннего сгорания (*о двигателе*)
i.e. – id est = that is – то есть
i. f. – intermediate frequency – промежуточная частота
Kc/s – kilocycles per second – килогерц
kg – kilogram – килограмм
kgf – kilogram force – килограмм (кг, ед. силы)
kg/sq. cm – kilogram per square centimetre – атмосфера (ед. давления)
kV/a-hr – kilovolt ampere-hour – киловольт-ампер/час
kW – kilowatt – киловатт
kW – hr – киловатт/час
j – joule – джоуль
lb. – pound – фунт
lit. – litre – литр
lm – lumen – люмен
l.p. – low pressure – низкое давление
l.v. – low voltage – низкое напряжение

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Владелец: Шебзухова Татьяна Александровна
mA – milliamperere – миллиампер
Действителен: с 20.08.2021 по 20.08.2022

μA – microampere – микроампер
Mc/s – megacycles per second – мегагерц
μfd – microfarad – микрофарада
μH – microhenry – микрогенри
mi – mile – миля
min. – minute – минута
mm Hg – миллиметр ртутного столба
No.; Nos – number(s) – номер(а)
pc., pcs – piece(s) – штука (и)
pf – picofarad – пикофарада
ppm – parts per million – частей на миллион
p.s.f. – pounds per square foot – фунтов на кв. фут
p.s.i. – pounds per square inch – фунтов на кв. дюйм
Qty – quantity – количество
r. f. – radio frequency – высокая частота, радиочастота
r.p.m. – revolutions per minute – оборотов в минуту
r.p.s. – revolutions per second – оборотов в секунду
sc. – scale – шкала
sec. – second – секунда
St. Std – State Standard (ГОСТ)
Std – Standard (ОСТ)
s.w. – specific weight – удельный вес
t – ton – тонна
tf – ton force – тоннасила
tm – ton moment – тонна момент
V – вольт
v.f. – video frequency – видеочастота
vs – versus – против
v.v. – variable voltage – переменное (регулируемое) напряжение
W – watt – ватт
w.g. – wire gauge – проволочный калибр
yd. – yard – ярд

ЕДИНИЦЫ ИЗМЕРЕНИЯ (UNITS OF MEASUREMENT)

Меры длины (Linear Measures)

Дюйм inch in. 2.54 cm

Фут foot ft (12 in.) 30.48 cm

Ярд yard yd (3 ft) 91.44 cm

Миля mile mi. (1760 yd) 1609.33 m

Мильморская nautical mile naut.mi. (6080 ft) 1853.18 m (knot)

Меры веса (Measures of Weights)

Драхма dram dr. 1.77 g

Унция ounce oz (16 dr.) 28.35 g

Фунт pound lb. (16 oz) 435.59 g

Стон stone st. (14 lb.) 6.53 kg

Квартер quarter qr (28 lb.) 12.7 kg

Центнер hundredweight hwt (112 lb.) 50.8 kg

Тонна большая ton t (20 hwt) 1016.048 kg

Меры объема жидких и сыпучих тел (Measures of Volume)

Джилл gill 0.14 l

Пинта pint pt (4 gills) 0.57 l

Кварта quart qt (2 pt) 1.14 l

Галлон gallon gal. (4 qt) 4.55 l

Бушель bushel bsh. (8 gal.) 36.37 l

Квортер quarter qr (8 bsh.) 290.94 l

Меры площади (Square Measures)

Кв. дюйм square inch sq. in. 6.45 cm²

Кв. фут square foot sq. ft (144 sq. in.) 9.29 cm²

Кв. ярд square yard sq. yd (9 sq. ft) 0.836 cm²

Акр acre ac. (4840 sq. yd) 0.4 hectare

Кв. миля square mile sq. mi. (640 ac.) 2.59 km²

Меры объема (Cubic Measures)

Куб. дюйм cubic inch c. in. 16.39 cm³

Куб. фут cubic foot c. ft (1728 c. in.) 28.32 cm³

Куб. ярд cubic yard c. yd (27 c. ft) 764.53 dm³

Тонна регистровая register ton reg.t. (100 c. ft) 2.83 m³

Time

60 seconds = 1 minute

60 minutes = 1 hour

24 hours = 1 day

7 days = 1 week

Angles

60 seconds (60'') = 1 minute (1')

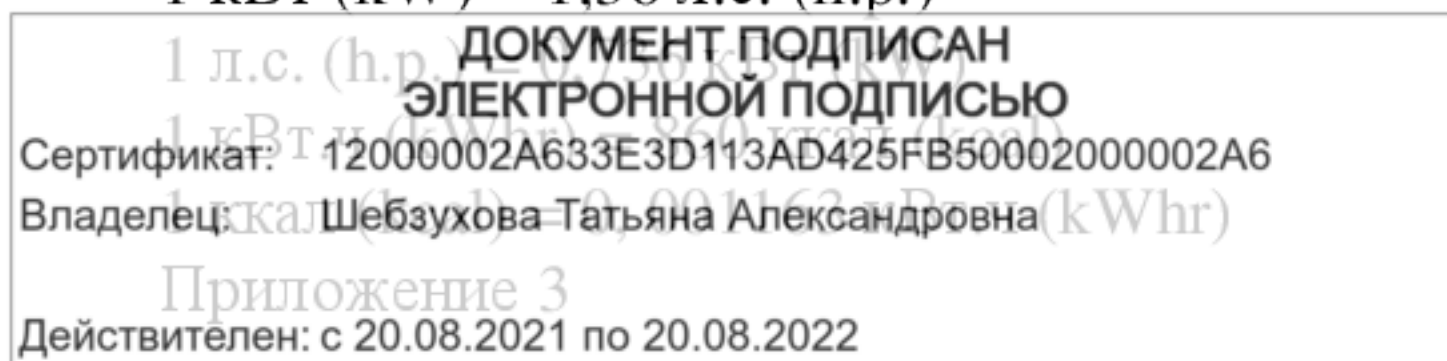
60 minutes (60') = 1 degree (1°)

90 degree (90°) = 1 right angle

360 degree (360°) = 1 circle

4 right angles = 1 circle

1 кВт (kW) = 1,36 л.с. (h.p.)



ЛАТИНИЗМЫ

(латинские слова и выражения,
употребляемые в оригинале без перевода)

ibidem (ib., ibid) = in the cited source –тамже

in situ = at the site – наместе

per se = by itself – самопосебе

conditio sine qua non = indispensable condition –непрерывноеусловие

via = through – путем

in vitro = in a test tube – впробирке

statusquo = initialcondition– исходноеположение, в первоначальном виде

sui generis = in its kind – всвоемроде

ergo = consequently – следовательно

proviso = on condition that – приусловии

sic! = important! – важно; подлинник

c. = circa ['sWkq] – примерно, около

i.e. = id est – то есть

etc. = et cetēra – ит. д.

e.g. = example gratiā – например

viz. = videlicet – а именно, то есть

v.v. = vice versa – наоборот

v.s. = vide supra – см. выше

v.i. = vide infra – см. ниже

vid. = vide – смотри

u.i. = ut infra – как указано ниже

p.m. = post meridiem – послеполудня

a.m. = ante meridiem – дополудня

p.a. = per annum – вгод

n.l. = non licet – недопустимо

c.v. = curriculum vitae – жизнеописание

ДОКУМЕНТ ПОДПИСАН
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Владелец: Шебзухова Татьяна Александровна

Действителен: с 20.08.2021 по 20.08.2022

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

Федеральное государственное автономное
образовательное учреждение высшего образования
«СЕВЕРО-КАВКАЗСКИЙ ФЕДЕРАЛЬНЫЙ УНИВЕРСИТЕТ»
Пятигорский институт (филиал) СКФУ

Методические указания

по организации и проведению самостоятельной работы обучающихся
по дисциплине «ИНОСТРАННЫЙ ЯЗЫК В СФЕРЕ
ПРОФЕССИОНАЛЬНОЙ КОММУНИКАЦИИ»
для студентов направления подготовки
13.03.02 Электроэнергетика и электротехника

**ДОКУМЕНТ ПОДПИСАН
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СОДЕРЖАНИЕ

Введение

1. Общая характеристика самостоятельной работы обучающегося при изучении дисциплины «Иностранный язык в сфере профессиональной коммуникации»
 2. План-график выполнения самостоятельной работы
 3. Контрольные точки и виды отчетности по ним
 4. Методические указания по изучению теоретического материала
 5. Методические указания по видам работ, предусмотренных рабочей программой дисциплины
 - 5.1. Методические указания по подготовке к практическим занятиям
 - 5.2. Методические указания по составлению глоссария по тексту
- Список рекомендуемой литературы

**ДОКУМЕНТ ПОДПИСАН
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ВВЕДЕНИЕ

Основной целью самостоятельной работы студентов является повышение исходного уровня владения иностранным языком, достигнутого на предыдущей ступени образования, и овладение студентами необходимыми достаточным уровнем коммуникативной компетенции для решения задач межличностного и межкультурного взаимодействия. Изучение иностранного языка призвано также обеспечить:

- повышение уровня учебной автономии и способности к самообразованию;
- развитие когнитивных и исследовательских умений;
- развитие информационной культуры;
- расширение кругозора и повышение общей культуры студентов.

Самостоятельная работа студентов занимает важное место в учебной научно-исследовательской деятельности студентов. Без самостоятельной работы невозможно не только овладение любой вузовской дисциплиной, но и формирование специалиста как профессионала. В широком смысле под самостоятельной работой следует понимать совокупность всей самостоятельной деятельности студентов, как в учебной аудитории, так и в нее, в контакте с преподавателем и в его отсутствие.

Усиление роли самостоятельной работы студентов означает принципиальный пересмотр организации учебно-воспитательного процесса в вузе, который должен строиться так, чтобы развивать умение учиться, формировать у студента способности к саморазвитию, творческому применению полученных знаний, способам адаптации к профессиональной деятельности в современном мире.

**ДОКУМЕНТ ПОДПИСАН
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1. ОБЩАЯ ХАРАКТЕРИСТИКА САМОСТОЯТЕЛЬНОЙ РАБОТЫ ОБУЧАЮЩЕГОСЯ ПРИ ИЗУЧЕНИИ ДИСЦИПЛИНЫ «ИНОСТРАННЫЙ ЯЗЫК В СФЕРЕ ПРОФЕССИОНАЛЬНОЙ КОММУНИКАЦИИ»

Под самостоятельной работой студентов (СРС) понимается совокупность всей самостоятельной деятельности студентов, как в учебной аудитории, так и за ее пределами, в контакте с преподавателем и в его отсутствие.

Цель самостоятельной работы студента – научиться осмысленно и самостоятельно работать с учебным материалом и научной информацией, овладеть фундаментальными знаниями, умениями и навыками в сферах академической, профессиональной и социально-гуманитарной деятельности, сформировать основы самоорганизации и самовоспитания с тем, чтобы привить умение в дальнейшем непрерывно повышать свою профессиональную квалификацию.

Задачами СРС являются:

- систематизация и закрепление полученных теоретических знаний и практических умений;
- углубление и расширение теоретических знаний;
- формирование умений использовать учебно-справочную литературу;
- развитие познавательных способностей и активности студентов: творческой инициативы, самостоятельности, ответственности и организованности;
- формирование самостоятельности мышления, способностей к саморазвитию, самосовершенствованию и самореализации;
- развитие исследовательских умений;
- использование материала, собранного и полученного в ходе самостоятельных занятий на практических занятиях, для эффективной подготовки к зачетам и экзаменам.

Основными видами самостоятельной работы студентов являются:

- *самостоятельное изучение литературы;*

Цель: самостоятельно детально изучить темы, представленные в рабочей программе.

Задачи: приобретение навыка работы с источниками и литературой; умения грамотно составлять конспекты и пользоваться ими; выявлять различные точки зрения на проблему и степень ее разработанности в литературе.

- *подготовка к практическим занятиям* (выполнение домашних заданий) и к собеседованию по индивидуальным заданиям;

Цель: углубление знания учебного материала.

Задачи: освоить отдельные вопросы в рамках изучаемой дисциплины; грамотность, последовательность и рациональность изложения подготовленного материала во время практического занятия.

- *составление глоссария по тексту.*

Цель: составить базу новых лексических единиц.

Задачи:

- самостоятельная поэтапная отработка учебных элементов;
- развитие практических умений;
- формирование умений использовать информационные источники: справочную и специальную литературу.

Приступая к **самостоятельному изучению литературы** по учебной дисциплине «Иностранный язык в сфере профессиональной коммуникации», необходимо: ознакомиться с рабочей программой; взять в библиотеке рекомендованные учебники и учебные пособия;

получить документ, подписанный преподавателем в электронном виде методические указания к практическим занятиям, задания для самостоятельной работы, а также новую тетрадь для конспектирования теоретических и практических заданий.

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Для изучения дисциплины предлагается список основной и дополнительной литературы. Основная литература предназначена для обязательного изучения, дополнительная – поможет более глубоко освоить отдельные вопросы в рамках изучаемой дисциплины.

В ходе **подготовки к практическим занятиям** студент обязан осуществлять конспектирование учебного материала, особое внимание, обращая на теорию, формулировки, раскрывающие содержание тех или иных грамматических и языковых понятий. В рабочих конспектах желательно оставлять поля, на которых следует делать пометки, дополнять материал, формулировать выводы и практические рекомендации.

Самостоятельная работа студентов над материалом учебной дисциплины является неотъемлемой частью учебного процесса и должна предполагать углубление знания учебного материала, излагаемого на аудиторных занятиях, и приобретение дополнительных знаний по отдельным вопросам самостоятельно.

Конспект темы – письменный текст, в котором кратко и последовательно изложено содержание основного источника информации. Конспектировать — значит приводить к некоему порядку сведения, почерпнутые из оригинала. В основе процесса лежит систематизация

прочитанного или услышанного. Записи могут делаться как в виде точных выдержек, цитат, так и в форме свободной подачи смысла.

Индивидуальные задания призваны расширить кругозор студентов, углубить их знания и развить умения исследовательской деятельности, проявить элементы творчества.

Собеседование – средство контроля, организованное как специальная беседа преподавателя со студентом на темы, связанные с изучаемой дисциплиной, и рассчитанное на выяснение объема знаний обучающегося по определенному разделу, теме, проблеме и т.п.

Глоссарий - словарь, который помогает осваивать новые лексические единицы по теме. В глоссарий необходимо добавлять специальную терминологию, аббревиатуры и сокращения, фразеологические единицы и пр.

Каждый вид самостоятельной работы имеет определенные формы отчетности.

В ходе выполнения самостоятельной работы студент должен продемонстрировать сформированность компетенции:

| Код | Формулировка: |
|------|---|
| УК-4 | способность к осуществлению деловой коммуникации в устной и письменной формах на государственном языке Российской Федерации и иностранном(ых) языке(ах) |

2. ПЛАН-ГРАФИК ВЫПОЛНЕНИЯ САМОСТОЯТЕЛЬНОЙ РАБОТЫ

| Коды реализуемых компетенций, индикатора (ов) | Вид деятельности студентов | Средства и технологии оценки | Объем часов, в том числе | | |
|---|---|-----------------------------------|--------------------------|------------------------------------|-------|
| | | | СРС | Контактная работа с преподавателем | Всего |
| 2 семестр | | | | | |
| УК-4 ИД-1 ИД-2 ИД-3 | Самостоятельное изучение литературы по темам 1-16 | Собеседование | 20,25 | 2,25 | 22,5 |
| УК-4 ИД-1 | Подготовка к практическим занятиям | Индивидуальные творческие задания | 4,05 | 0,45 | 4,5 |
| УК-4 | Составление | Собеседование | 2,7 | 0,3 | 3 |

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| | | | | | |
|----------------------|------------------------|--|----|---|----|
| ИД-1 ИД-2 ИД-3 | гlossария по тексту | | | | |
| Итого за 2 семестр | | | 27 | 3 | 30 |
| Итого | | | 27 | 3 | 30 |

3. КОНТРОЛЬНЫЕ ТОЧКИ И ВИДЫ ОТЧЕТНОСТИ ПО НИМ

В рамках рейтинговой системы успеваемость обучающихся по каждой дисциплине оценивается в ходе текущего контроля и промежуточной аттестации.

Текущий контроль

Рейтинговая оценка знаний студента

| № п/п | Вид деятельности студентов | Сроки выполнения | Количество баллов |
|---------------------------|--------------------------------------|---------------------|----------------------|
| 2 семестр | | | |
| 1 | Собеседование по темам 1-6 | 5 неделя | 15 |
| 2 | Собеседование по темам 7- 11 | 10 неделя | 15 |
| 3 | Индивидуальное задание по темам 1-18 | 14 неделя | 25 |
| Итого за 2 семестр | | | 55 |

4. МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ИЗУЧЕНИЮ ТЕОРЕТИЧЕСКОГО МАТЕРИАЛА

Изучение любого раздела следует начинать с ознакомления с вопросами плана изучения темы. При изучении теоретического материала необходимо использовать рекомендуемую основную и дополнительную литературу для лучшего усвоения материала.

Осваивать теорию следует в соответствии с той последовательностью, которая представлена в плане самостоятельных и практических занятий.

Для успешного освоения дисциплины, необходимо самостоятельно детально изучить представленные темы по рекомендуемым источникам информации:

| № п/п | Виды самостоятельной работы | Рекомендуемые источники информации (№ источника) | | | |
|----------|--|---|----------------|--------------|----------------------|
| | | Основная | Дополнительная | Методическая | Интернет- ресурсы |
| 1 | Самостоятельное изучение литературы по темам: 1-18 | 1 | 1, 2 | 1, 2 | 1-6 |
| 2 | Подготовка к практическим занятиям по темам: 2-18 | 1 | 1, 2 | 1, 2 | 1-6 |
| 3 | Составление гlossария по тексту | 1 | 1, 2 | 1, 2 | 1-6 |

Методика работы с литературой предусматривает ведение записи прочитанного в виде плана-конспекта, опорного конспекта и т.д. Это позволит сделать знания системными, зафиксировать и закрепить их в памяти.

Конспект – сложный способ изложения содержания книги или статьи в логической

последовательности. Документ подписан
всесторонне, объективно, содержание книги, статьи, текста, грамматического материала. По-
этому умение составлять план, тезисы, делать
выписки и другие записи определяет и тех-
нологию составления конспекта.

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в себе предыдущие виды записи, позволяет
статьи, текста, грамматического материала. По-
этому умение составлять план, тезисы, делать
выписки и другие записи определяет и тех-
нологию составления конспекта.

Методические указания по составлению конспекта

1. Внимательно прочитайте текст. Уточните в справочной литературе или словаре непонятные слова. При записи не забудьте вынести справочные данные на поля конспекта;
2. Выделите главное, составьте план;
3. Кратко сформулируйте основные положения текста;
4. Законспектируйте материал, четко следуя пунктам плана. При конспектировании старайтесь выразить мысль своими словами. Записи следует вести четко, ясно.
5. Грамотно записывайте цитаты. Цитируя, учитывайте лаконичность, значимость мысли.

В тексте конспекта желательно приводить не только тезисные положения, но и их доказательства. При оформлении конспекта необходимо стремиться к емкости каждого предложения. Мысли автора книги следует излагать кратко, заботясь о стиле и выразительности написанного. Для уточнения и дополнения необходимо оставлять поля.

Процедура проверки конспекта включает в себя перечень вопросов базового и повышенного уровней для собеседования.

Методические рекомендации по представлению и оформлению результатов собеседования

Собеседование представляет собой индивидуальную беседу с каждым студентом по предложенным вопросам с последующей оценкой их подготовки. Целью данной формы занятия является осуществление текущего контроля знаний по теме. В задачи собеседования входит приобретение навыка работы с источниками и литературой; умения грамотно составлять конспекты и пользоваться ими; выявлять различные точки зрения на проблему и степень ее разработанности в литературе.

Собеседование предполагает обязательное конспектирование текста или грамматического материала, а также проработку всей предложенной литературы по теме.

Вопросы для собеседования и критерии оценивания приведены в ФОС данной дисциплины.

5. МЕТОДИЧЕСКИЕ УКАЗАНИЯ ПО ВИДАМ РАБОТ, ПРЕДУСМОТРЕННЫХ РАБОЧЕЙ ПРОГРАММОЙ ДИСЦИПЛИНЫ

5.1. Подготовка к практическим занятиям

Методические указания по подготовке к практическим занятиям.

К самостоятельной работе относится подготовка к практическому занятию и выполнение домашнего задания.

Домашнее задание состоит из индивидуальных заданий, процедура проверки которых включает в себя перечень практических упражнений и вопросов для собеседования.

Итоговый продукт самостоятельной работы: индивидуальное задание.

Средства и технологии оценки: собеседование.

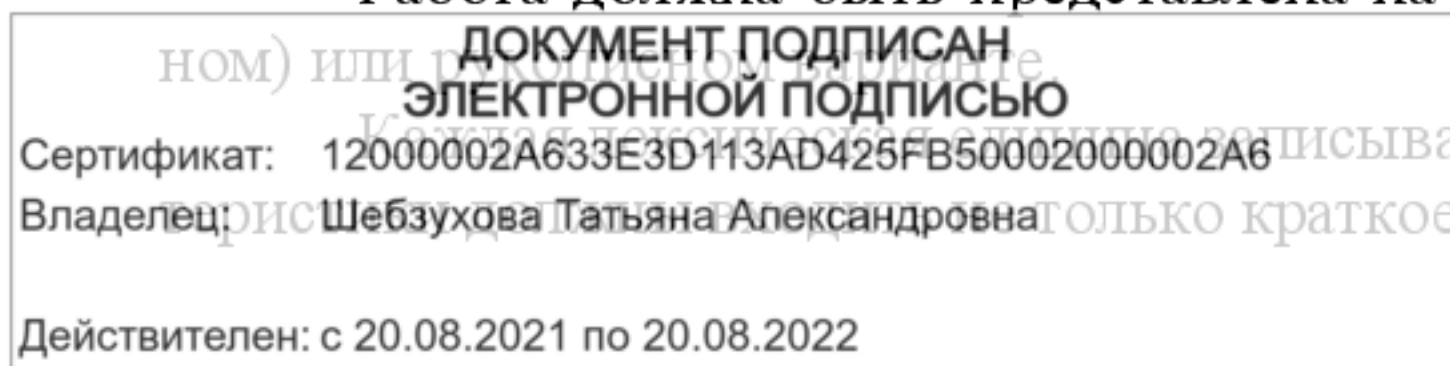
5.2. Методические указания по составлению глоссария по тексту

Подобно любому словарю глоссарий состоит из автономных лексических единиц, расположенных:

- по алфавиту;
- по мере появления терминов в тексте или задании;
- в соответствии с темой изучаемого раздела дисциплины.

Для составления глоссария по заданной теме нужно найти информацию с разных источников (сеть Internet, энциклопедии, практические пособия, учебная литература), изучить ее и составить в рукописном варианте или пользуясь текстовым процессором.

Работа должна быть представлена на бумаге формата А4 в печатном (компьютер-



ется на отдельной строчке. В состав ее характерного толкования, но и комментарии, примеры, по-

ясняющие цитаты, ссылки на литературу. Главным отличием глоссария от обычных словарей является формирование его в качестве единого комплекса информации в соответствии с исследовательской или практической задачей.

Рекомендации по составлению глоссария:

- **Главное правило глоссария – достоверность.** Пояснение должно наиболее точно отражать суть лексической единицы.
- **Пояснение должно быть корректным и понятным.** Нельзя использовать откровенные жаргонизмы, но и слишком сложный научный текст может только запутать пользователя.
- **Учитывать все варианты.** Если один и тот же термин может иметь несколько равнозначных значений, нужно учитывать все варианты, и на конкретных примерах приводить значение термина в том или ином контексте.

Итоговый продукт самостоятельной работы: словарная статья.

Средства и технологии оценки: собеседование.

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2. <http://www.s-english.ru> – ресурсы для изучения английского языка
3. <http://www.engvid.com> - ресурсы для изучения английского языка
4. <http://www.english-globe.ru> - ресурсы для изучения английского языка
5. <https://www.english-ex.ru> - платформа для интерактивного изучения английского языка
6. <http://www.biblioclub.ru> - Университетская Библиотека онлайн

ДОКУМЕНТ ПОДПИСАН ЭЛЕКТРОННОЙ ПОДПИСЬЮ

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