**4 курс**

**Практическое занятие № 22**

***Прочитайте текст и выполните послетекстовые задания:***

**THE CONCEPT OF ELECTRIC CURRENT**

In the beginning of the 17th century Sir William Gilbert discovered that many substances could be electrified by friction. Gilbert named this effect “electric” after the word “electron” — the Greek name for amber. In 1756 the great Russian scientist М. V. Lomonosov was the first to make theoretical analysis of electrical phenomena.

At present the nature of electrification is explained by the electron theory. According to the modern theory all matter is composed of atoms or tiny particles. There are many kinds of atoms. Each atom consists of a nucleus, a small positively charged mass and a number of lighter negatively charged particles called electrons, which revolve around the nucleus. Normally each atom of a substance is electrically neutral, or it has equal amounts of negative and positive charges, i.e. produces no electrical effects. If the number of negative charges is not equal to the number of positive charges, the matter will produce electrical effects.

When an electric charge is at rest it is spoken of as static electricity, but when it is in motion it is referred to as an electric current. In most cases, an electric current is described as a flow of electric charges along a conductor.

Not all substances are good conductors of electricity, as a general rule metals are good conductors of electricity, whereas nonmetals are poor conductors. The poorest of conductors are commonly called insulators or nonconductors. There are a large number of substances that are neither good conductors of electricity nor good insulators. These substances are called semi-conductors.

An electric current which flows in the same direction through a conductor or a current which does not change its polarity is called a direct current or a continuous current. Its abbreviation is D. C. An alternating current (A. C.) flows first in one direction and then in the other.

An electric circuit is a path through which an electric current flows. This is a complete path along which electrons can transmit their charges. An electric circuit includes a battery, generator, or magnetic means for producing current flow. Some portion of the circuit is made to do useful work.

The circuit is said to be open when no charges can move due to a break in the path. The circuit is said to be closed when no break exists—when switches are closed and all connections are properly made.

Special symbols are used to show electrical systems. There is a wide range of these symbols. There are some of them which are used when we draw circuits. Look at Fig. 5. And now look at the diagram of series, and parallel arrangements (Fig. 6).

**Задание 1. Найдите в тексте и выпишите:**

1. интернационализмы; 2. термины по электричеству

**Задание 2. Дайте краткие определения следующих понятий:**

an atom, static electricity, electric current, direct current, alternating current, an electric circuit, an open circuit, a closed circuit

**Задание 3. Выполните следующие действия:**

1. drawcircuitsymbols;
2. draw series and parallel arrangements (cells in series, cells in parallel and etc.)

**Грамматика.  Повторение: Видовременные формы глаголов**

**Задание 4. Вставьте *to write* в нужной форме.**

1. We often ... letters to our parents.
2. What ... you ... now?
3. Yesterday they ...... tests from 10 till12 o'clock.
4. I ...... some letters last week.
5. What ... you ... tomorrow at 10?
6. When I came to her, she ... ... а letter.
7. .. . you ... letters tomorrow?
8. I ... not ... this letter now. I … … it in some days.
9. ... he ... his home task now?
10. What ... she ... in the evening yesterday?
11. As а rule, he ... tests well.

**Практическое занятие № 23**

**Прочитайте тексты и выполните  послетекстовые задания.**

**Mains AC circuits and switchboards**

Where an AC supply enters a building, it is connected to a switchboard. This has a number of switches to allow different circuits in the building to be switched on and off. Circuits include power circuits. These supply the power sockets (or sockets) for the plugs on appliances. Usually, a circuit-breaker is fitted to each circuit. This is a safety switch that switches off automatically if there is a problem. This may happen if a person touches a live conductor, or if there is a short circuit. A short circuit is when current flows directly from a live conductor to a neutral conductor -for example, due to damaged insulation. Circuit breakers also allow circuits to be switched off manually, to isolate them (switch them off safely) -for example, before maintenance work.

Note: The equipment in switchboards is often called switchgear.

**Printed and integrated circuits**

The circuits in electrical appliances are often printed circuits, on printed circuit boards (PCBs). These are populated with (fitted with) electrical components. Many appliances also contain small, complex integrated circuits often called microchips (or chips) made from silicon

wafers (very thin pieces of silicon). They act as semiconductors, which can be positively charged at certain points on their surface and negatively charged at other points. This principle is used to make very small circuits.

**Задание 1. Переведите на русский язык следующие слова и словосочетания**

AC supply, switchboard, switch, switch on/off, socket, plug, appliances, circuit-breaker, be fitted, a short circuit, live conductor, neutral conductor, damaged insulation, manually, maintenance, switchgear;

printed circuit, integrated circuit, silicon wafer, semiconductor, surface.

**Задание 2. Переведите текст 2 на русский язык.**

**Задание 3. Посмотрите на данную ниже инструкцию по установке розетки. Прочитайте и переведите текст, обращая внимание на рисунки.**

**Задание 4. Скажите по-английски как называются предметы на рисунках 1, 2, 3.**

Например, a) is called a chisel. b) is called plaster.

**Задание 5. Ответьтенавопросы.**

1) What tools do you use for marking out the recess?

2) What tools do you use for removing the plaster and brickwork?

3) How do you remove brickwork? (Answer: «First, you …. Then, you ….»)

4) What do you do after you place the box in the recess?

5) You place the cable in the channel. Then what do you put in the channel?

6) What do you put on the plaster?

7) How do you fix the cable to the socket? (Answer: «First, you … Then, you ...»)



**Практическое занятие № 24.**

**Прочитайте текст и выполните задания после него**

**ROBOTS IN MANUFACTURING**

Today most robots are used in manufacturing operations. The applications of robots can be divided into three categories:

1. material handling

2. processing operations

3. assembly and inspection.

Material-handling is the transfer of material and loading and unloading of machines. Material-transfer applications require the robot to move materials or work parts from one to another. Many of these tasks are relatively simple: robots pick up parts from one conveyor and place them on another. Other transfer operations are more complex, such as placing parts in an arrangement that can be calculated by the robot. Machine loading and unloading operations utilize a robot to load and unload parts. This requires the robot to be equipped with a gripper

that can grasp parts. Usually the gripper must be designed specifically for the particular part geometry.

In robotic processing operations, the robot manipulates a tool to perform a process on the work part. Examples of such applications include spot welding, continuous arc welding and spray painting. Spot welding of automobile bodies is one of the most common applications of industrial robots. The robot positions a spot welder against the automobile panels and frames to join them. Arc welding is a continuous process in which robot moves the welding rod along the welding seam. Spray painting is the manipulation of a spray-painting gun over the surface of the object to be coated. Other operations in this category include grinding and polishing in which a rotating spindle serves as the robot's tool.

The third application area of industrial robots is assembly and inspection. The use of robots in assembly is expected to increase because of the high cost of manual labour. But the design of the product is an important aspect of robotic assembly. Assembly methods that are satisfactory for humans are not always suitable for robots. Screws and nuts are widely used for fastening in manual assembly, but the same operations are extremely difficult for an one-armed robot.

Inspection is another area of factory operations in which the utilization of robots is growing. In a typical inspection job, the robot positions a sensor with respect to the work part and determines whether the part answers the quality specifications. In nearly all industrial robotic applications, the robot provides a substitute for human labour. There are certain characteristics of industrial jobs performed by humans that can be done by robots:

1. the operation is repetitive, involving the same basic work motions every cycle,

 2. the operation is hazardous or uncomfortable for the human worker (for example: spray painting, spot welding, arc welding, and certain machine loading and unloading tasks),

3. the workpiece or tool is too heavy and difficult to handle,

4. the operation allows the robot to be used on two or three shifts.

**Vocabulary:**

handling — обращение

spray painting — окраска распылением

transfer — передача, перенос

frame — рама

location — местонахождение

spray-painting gun — распылитель краски

pick up — брать, подбирать

grinding — шлифование

arrangement — расположение

polishing — полирование

to utilize — утилизировать, находить применение

spindle — шпиндель

gripper — захват

manual — ручной

to grasp — схватывать

labour — труд

spot welding — точечная сварка

hazardous — опасный

shift — смена

continuous — непрерывный

arc welding — электродуговая сварка

**Задание 1. Ответьте на вопросы к тексту:**

1. How are robots used in manufacturing?

2. What is «material handling»?

3. What does a robot need to be equipped with to do loading and unloading operations?

4. What does robot manipulate in robotic processing operation?

5. What is the most common application of robots in automobile manufacturing?

6. What operations could be done by robot in car manufacturing industry?

7. What are the main reasons to use robots in production?

8. How can robots inspect the quality of production?

9. What operations could be done by robots in hazardous or uncomfortable for the human workers conditions?

**Задание 2. Переведите на английский язык предложения из текста:**

1. Существует несколько различных сфер использования автоматизации в производстве.

2. Для использования жесткой автоматизации необходимы большие инвестиции.

3. Жесткая автоматизация широко используется в химической промышленности.

4. Станки с числовым программным управлением — хороший пример программируемой

автоматизации.

5. Гибкая автоматизация делает возможным перепрограммирование оборудования.

6. Время простоя оборудования оборачивается большими убытками.

7. Использование гибкой автоматизации делает возможным производство разнообразной продукции.

**Грамматика. Сложное подлежащее.**

**Задание 3. Переведите предложения, обращая внимание на перевод «Сложного подлежащего» (См. таблицу ниже).**

1. Light is proved to travel in straight lines.
2. Popov is known to be the inventor of radio in Russia.
3. Faraday is believed to be a great English physicist.
4. He is believed to be a very talented person.
5. Forging processes are expected to be performed at various temperatures.
6. This device is sure to have changed the world.

**Сложное подлежащее**

В состав **Сложного подлежащего** входит имя существительное (в общем падеже) или местоимение (в именительном падеже) и инфинитив. Все предложение имеет следующую структуру:

Thevalueissaidtochange. – Говорят, что это значение меняется.

Не isexpectedtocome. - Ожидают, что он придет.

т. е. между существительным и инфинитивом стоит сказуемое предложения, выражающее мнение, суждение или предположение.

Мнение, суждение, предположение в таком предложении может быть выражено следующими глаголами:

1) в страдательном залоге:

|  |  |  |  |
| --- | --- | --- | --- |
| This value | is expectedis assumedis reportedis consideredis provedis foundetc. | to change(to be changing)(tohavechanged) | Известно, …Предполагают,Ожидают, …Допускают,…Сообщают,…Считают, …Доказано, …Найдено, …и т. д. |

2) в действительном залоге:

|  |  |  |  |
| --- | --- | --- | --- |
| This value | seemsappearsturns outprovesis likelyis unlikelyis sureis certain | to change(to be changing)(tohavechanged) | По-видимому …Оказывается…“““”Вероятно …Маловероятно …Безусловно …Непременно… |

Перевод английского предложения следует начинать со сказуемого предложения и переводить его неопределенно-личным предложением «Известно …», «Находят …», «Считают …» и т. д., за

которым следует придаточное предложение с союзом **что**.

This device appears to be of some interest. - По-видимому, этот прибор представляет интерес.

It is supposed to be used in our experiment. - Предполагается, что он будет использован в нашем эксперименте.

**Практическое занятие № 25**

**Текст 1**

**Прочитайте текст и выполните задания к нему.**

**Electric Lines and Their Efficiency**

Wires are used to deliver electric power and to interconnect different components of electrical installations. Conductors used for electric wiring are commonly produced of copper and aluminium.

Aluminium is widely used nowadays due to its low cost. Copper is also widely used in electrical engineering but its cost is much higher.

 Wires connecting the components of various installations may be insulated. They may also be used without insulation. Since in short lengths of wire power loss is exceedingly low one can ignore it. In long wires (longer than 10 m), power loss cannot be ignored since it is rather high. Power loss in a line should not exceed a definite value. If this value is exceeded the line becomes inefficient. One should know that the efficiency of a line is not constant – it may change. The value of the line efficiency depends on the load: the greater the load the lower is the line efficiency. At voltage losses of 2 to 5 per cent the efficiency of a line is 98-95 per cent. Protecting devices, fuses and relays are used to protect the circuit against overcurrents and short-circuits.

**Задание 1. Дайте русский эквивалент данных слов**

Line, station, engineer, engineering.

**Задание 2. Образуйте от данных глаголов существительные**

Model: toact – action

To ignore, to depend, to cost, to produce, to use, to lose.

**Задание 3. Переведите следующие словосочетания и предложения на русский язык.**

1. Line efficiency, voltage loss, power station, interdependent values, interconnected sources, changing power efficiency, exceedingly high power losses, exceedingly inefficient energy sources.
2. One can ignore these exceedingly low power losses.
3. One should take into consideration the interdependence of these values.
4. One should not ignore the high cost of these installations.

**Задание 4. Используя текст, переведите следующие словосочетания на английский язык.**

Передавать электрический ток; для электропроводки; из меди и алюминия; благодаря невысокой стоимости; электротехника; без изоляции; потеря энергии; можно не принимать во внимание;

степень эффективности линии; зависит от нагрузки; перегрузки и короткие замыкания.

**Задание 5. Закончите предложения, выберите из предложенных вариантов. Запишите цифру и букву.**

1. Aluminium is used due to its ........

a. high cost b. low cost and high efficiency

1. Cross-section of different conductors ........

a. varies b. is the same

1. Power loss can be ignored ........

a. in short wires b. in long wires

1. A definite value of loss ........

a. can be exceeded b. should not be exceeded

1. Electriclinesnowadaysare ........

a. efficient b. inefficient

1. Installationsareprotected ........

a. by switches b. by fuses

**Задание 6. Ответьте на вопросы, используя текст.**

1. Why is aluminium widely used nowadays?
2. Is its cost very low or comparatively low?
3. What is the cross-section of copper conductors?
4. May one ignore power loss in short wire? Why?
5. What does the efficiency of a line depend on?
6. What are fuses used for?
7. When does a line become inefficient?

**Текст 2**

**Прочитайте текст и выполните задания к нему.**

Fuses

Fuses are widely used nowadays as protection devices. They are utilized in various circuits, electrical equipment and installations. Fuses serve to protect them against overcurrents and short-circuits.

There are different types of fuses in use nowadays. Of them, quartzsand fuses serve for voltages up to 500 volts; fuses of this kind are produced with current ratings of 15 to 60 amp and of 100 to 350 amp.

Fuses are commonly used in low-voltage industrial installations rated up to 1,000 V. Fuse protection is based on a very simple principle: in case of a short-circuit or overcurrent, when the maximum value of current has been exceeded, the fusible link of a fuse is heated to its melting point. This opens the circuit and disconnects the circuit from the power source. In case of a fault, one should replace the faulty fusible element by a new one. Fuses are used both in direct current (d.c.) and alternating current (a.c.) circuits.

**Задание 1. Дайте русский эквивалент данных слов**

Quartz, base, principle, stress.

**Задание 2. Закончите предложения, выберите из предложенных вариантов. Запишите цифру и букву.**

1. A fuse serves ........

a. as a load b. as a protection

2. Fuses are used ........

a. for d.c. only b. for both a.c. and d.c.

3. In case of a fault ........

a. the whole fuse should be replaced b. the faulty link should be

replaced

4. Fuse protection is based on ........

a. a simple principle b. a complex principle

**Задание 3. Переведите следующие словосочетания на английский язык, используя текст.**

Защитные приборы; используются в различных электрических цепях, электрооборудовании и установках; перегрузки и короткие замыкания; низковольтные промышленные установки; звено плавкого предохранителя; нагревается до точки плавления; источник тока; в случае дефекта; следует заменить; постоянный ток; переменный ток.

**Задание 4. Ответьте на вопросы, используя текст.**

1. What does a fuse serve for?

2. For what type of current are fuses used?

3. What should be done in case of a faulty fuse?

4. What principle is fuse protection based on?

**Грамматика**

**Задание 5. Прочитайте и переведите на русский язык следующие словосочетания, обращая внимание на причастия.**

a. the student attending all the lectures, the plan containing many details, the workers building a new house, the engineer using a new method, the car developing the speed of 80 km, the plant producing machinery;

b. using new methods, constructing new machines, achieving good results, discovering new lands, using new equipment, receiving important information, moving at high speed;

c. having calculated the distance, having returned home, having found the new way, having developed the speed of 120 km, having passed all the examinations;

d. the achieved results, all developed countries, the research made in the laboratory, the film shown to the students, the letter sent to his parents.

**Задание 6. Переведите следующие словосочетания на английский язык:**

a. профессор, читающий лекцию; студент, изучающий английский язык; мальчики, играющие на улице;

b. студент, спрошенный преподавателем; книга, взятая в библиотеке; машина, сконструированная молодым инженером;

c. изучая иностранный язык, читая книгу, строя дороги, увеличивая скорость, устанавливая новое оборудование, применяя новые методы;

d. изучив один иностранный язык; прочитав интересную книгу, закончив работу, построив дорогу.