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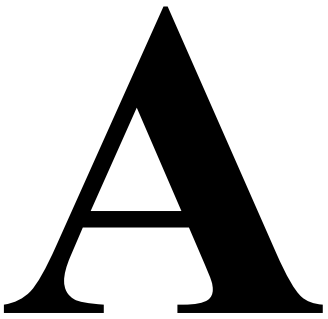
Кафедра «Гуманитарные дисциплины»

АНГЛИЙСКИЙ ЯЗЫК

Методические рекомендации к практическим занятиям для студентов направления подготовки 13.03.02 «Электроэнергетика и электротехника» дневной формы обучения

ЗАДАНИЯ ДЛЯ ОБУЧЕНИЯ ПРОФЕССИОНАЛЬНО-ОРИЕНТИРОВАННОМУ ЧТЕНИЮ НА АНГЛИЙСКОМ ЯЗЫКЕ



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Составители: ст. преподаватель Е. В. Грицаева;
ст. преподаватель Ж. А. Полева

Рецензент ст. преподаватель Е. Н. Мельникова

Задания для обучения чтению профессионально-ориентированных текстов на английском языке представляют собой часть единого учебно- методического комплекса для работы со студентами направления подготовки 13.03.02 «Электроэнергетика и электротехника». Учебный материал и система упражнений направлены на развитие навыков ознакомительного и изучающего чтения, перевода, говорения и реферирования на английском языке. Данные задания могут использоваться для работы на аудиторных занятиях, а также для самостоятельной работы студента.

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Ответственный за выпуск Е. В. Грицаева

Корректор И. В. Голубцова

Компьютерная верстка Е. В. Ковалевская

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Text 1. Nature of electric current

In the modern conception of the constitution of matter it is composed of atoms. The atom is made up of a positive nucleus surrounded by negative charges of electricity, called electrons, which revolve about the nucleus at tremendous speeds. The nucleus consists of a number of protons, each with a single positive charge, and, except for hydrogen, one or more neutrons, which have no charge. The atom is neutral when it contains equal numbers of electrons and protons. A negatively charged body contains more electrons than protons. A positively charged body is one which contains fewer electrons than its normal number.

When the two ends of a conductor are connected to two points at different potentials, such as the terminals of a battery, we say that there is an electric current in the conductor. What actually happens?

The conductor has equal numbers of positive and negative charges in its atoms, and we want to know how the charges can be made to produce a current. The atoms in metals are packed so closely that they overlap to some extent, so that it is comparatively easy for the outer electrons to pass from one atom to another if a small force is applied to them. The battery causes a potential difference between the ends of the wire, and thus provides forces that make the negative electrons in the wire move toward the point of higher potential. This electron flow toward the positive electrode is the electric current. Naturally materials differ considerably in the ease with which electrons can be made to migrate from atom to atom.

The current will not flow unless there is an electric circuit. The magnitude of the current depends simply on the rate of flow of electrons along the conductor.

2 Прочтите и выучите:

nucleus – ядро
charge – заряд
to revolve – вращаться
speed – скорость
hydrogen – водород
neutron – нейтрон
conductor – проводник
battery – аккумулятор; батарея
current – ток, поток
outer – внешний, отдаленный
to cause – причинять, вызывать
wire – проволока
circuit – схема; сеть; цепь
terminals – зажим, конец

3 Составьте предложения, используя слова и выражения:

a negatively charged body; from negative to positive; from one atom to another; a number of protons; a single positive charge; equal number and protons; to differ in the ease.

4 Прочтите следующие диалоги и найдите английские эквиваленты следующим фразам:

ядро окружено; размышлять, обдумывать, наблюдать; количество отрицательных зарядов; зафиксированный результат наблюдений; на самом деле, в действительности; насколько мне известно; положительно заряженные частицы; если кусок янтаря потереть о мех; маятник; притягивать легкие предметы; позднее было обнаружено; общеизвестный факт; различные

вещества; наиболее существенная составная часть вещества; кулон; единица измерения.

– When was the first recorded observation about electricity made?

– As far as I know it was made by the Greek philosopher Thales.

– What did he state, I wonder?

– Don't you know? He stated that a piece of amber rubbed with fur attracted light objects such as feathers and bits of straw.

– Did he make any experiments?

– No, as far as it is known Thales liked to speculate but he did not experiment systematically. Twenty two centuries elapsed before there was any progress.

– Oh, it was just about the time that Galileo discovered the laws of the pendulum and accelerated bodies. So it was at the time when the study of magnetism and of electrical phenomena began.

– How was it found out that some substances can be "electrified"?

– It is a well-known fact that having been rubbed many substances behaved like amber did.

– Can only similar substances become electrified or acquire electrical charges, being touched together and then separated?

– No. Later on it was discovered that any of two dissimilar substances could be electrified. As a matter of fact rubbing is not essential. It merely forces the two substances into close contact.

– What do you know about the nucleus, the proton and the electron?

– In the electrical system there is a nucleus containing positively charged particles. These particles are called protons. The nucleus is surrounded by lighter negatively charged units – electrons. So, the most essential constituent of matter is made up of electrically charged particles.

– When matter is neutral?

- Everybody knows that matter having equal amounts of both charges is neutral – that it produces no electrical effects.

– And what happens if the number of negative charges is unlike the number of positive ones?

– Well, then the matter will produce electrical effects. Having lost some of its electrons, the atom has a positive charge; having an excess of electrons – it has a negative charge.

– So, as a matter of fact you do know the material.

– When will electrons move?

– If given a path, electrons dislodged from the parent atom, will move.

– Well, what do you know about the electric current?

– The electric current is a quantity of electrons flowing in a circuit per second of time.

– And what is the unit of measure for current?

– The unit of measure for current is the ampere. One coulomb passing a point in a circuit per second, the current strength is 1 ampere. The ampere is therefore a rate unit.

Text 2. Electromotive force

When free electrons are dislodged from the atoms, electrical energy is released and made available to do work. Chemical reaction, friction, heat and electromagnetic induction will cause electrons to move from one atom to another. Scientists proved electrical energy to be released from matter by chemical reaction (batteries), heat (thermocouples), electromagnetic induction (generators), and friction (static generators). Whenever energy in any form is released, a force is developed. Electrical energy being released, a force called electromotive force (e.m.f.) is developed. And e. m. f. is present, then, whenever free electrons are moved from atoms, any of the above named methods being used to produce such electron motion.

If the force exerts its effort always in one direction, it is called direct; the force changing its direction of exertion periodically is referred to as alternating.
The chemical reaction in a dry cell produces a negative charge or potential on the zinc. This charge being always negative, the e.m.f. is undirectional (one way). Heat and friction, too are sources of a unidirectional force. Electromagnetic induction, however, is certain to produce an alternating force.

If the south of a bar magnet (see the figure) is passed into a coil of wire connected to a force-measuring instrument (voltmeter), the meter needle will move in one direction. If the south pole of the magnet is withdrawn from the coil, the needle will move toward the opposite side of the meter, thus showing the force to be alternating. The direction of force effort is seen to be dependent upon the direction in which the field is cut. The magnitude of the electrical force depends on the conditions at the source, such as the number of magnetic lines of force per unit of time.

In the battery, the determining factors are kinds of electrolytes and the kind of the metals to be used for the plates. The common dry cell is found to develop 1.5 volts of electrical force regardless of the size of the cell. Large amounts of force can be obtained only by putting many cells in series.

The force developed by the generator depends on the number of coils in the armature, on the speed of the armature, and on the strength of the magnetic field from the field magnets, i.e., the number of lines of magnetic force cut by a coil per second. The volt is known to be the unit of measure for electrical force.

Wherever an e. m. f. is developed, there is also a field of energy called an electrostatic field. This field can be detected by an electroscope, the strength being measured by an electrometer.

2 Прочтите и выучите:

termocouple – термопара, термоэлемент
cell – элемент
alternating – переменный, синусоидальный
undirectional – однонаправленный
armature – якорь (магнита или машины)
plate – пластина, полоса
meter – счетчик; измерительный прибор
in series – последовательно
induction – индукция

coil – катушка
needle – игла, стрелка

3 Найдите в тексте синонимы следующим словам:

to make, substance, to name, force, to indicate, movement, to receive, amount, since, usual, to apply, velocity, dimension, to define.

4 Дайте английские эквиваленты следующим словам:

зависеть от, заставлять, при этих условиях, за единицу времени, всякий раз когда, где бы ни, независимо от, имеется в наличии, вышеупомянутый, по отношению к, больше чем.

5 Найдите конструкции с инфинитивом в следующих предложениях и переведите предложения на русский язык:

1. A compensator allows the motor to take an excess current without putting a heavy overload on the mains. 2. We know water to flow with less resistance in a large pipe than in one of small section. 3. If we double the force pushing the electrons around the circuit, we expect them to move twice as fast, all other things being equal. 4. To produce a current of one ampere in a copper wire one millimeter in diameter we need that the average velocity of the electrons be only about 001 cm. per second. 5. The only way to stop or control the anode current is to decrease or remove the anode voltage. 6. When the temperature becomes high enough for the atoms to evaporate, the material or solid that they compose rapidly disintegrates. 7. A conducting material allows a continuous current to pass through it under the action of a continuous e. m. f.

Text 3. Flow of electricity

Whenever an electric field is set up in a substance by any means whatever a displacement of the electricity in that substance always takes place, the nature of the displacement depending upon the nature of the substance. In every case the positive electricity within the substance is displaced in the direction of the field intensity, the negative electricity being in the opposite direction, until an opposing force of some kind is set up which just balances the forces due to the impressed field.

Conductors of electricity. According to electronic theory, the electron is responsible for a flow of current of electricity. Good conductors are considered to be those substances in which there are present free electrons in constant but indiscriminate motion between the atoms. Under the action of an electromotive force, these free electrons move in some definite direction, resulting in a constant stream of electrons flowing at a phenomenally rapid rate in the conductor. In the case of a unidirectional or direct current, this electronic stream is always in one direction, while with alternating current the electronic stream reverses its direction of motion with regular frequency. All pure metals are good conductors of electricity, silver being the best since it offers the least resistance to a flow of current of electricity. We know copper to be very nearly as good a conductor as silver and, being very much cheaper, it is extensively used for electrical apparatus of all kinds. It is universally employed in all automobile electrical equipment.

Roughly speaking a conductor is a body which readily permits the passage of an electric current, an insulator being a body which offers a very high resistance to the passage of the current. As a matter of fact, there is no sharp distinction between conductors and insulators, however, a material which for some cases would be regarded as an insulator would, in other circumstances, be regarded as a conductor. A substance which is a good insulator at law temperatures may be a fair conductor at high temperatures.

Glass is the most striking illustration of this change of character with the change of temperature; at ordinary temperature it ranks high with the very best insulators. If glass be heated in some way to a red heat, it becomes a fair conductor and will permit the passage of enough current to melt itself.

2 Прочтите и выучите:

undirectional – однонаправленный
indiscriminate – беспорядочный, смешанный
insulator – изолятор

3 Прочтите и переведите следующие слова:

responsible – responsibility, accessible – accessibility, possible – possibility, applicable – applicability, measurable – measurability, available – availability.

4 Переведите следующие пары слов, обращая внимание на значение приставок *mis*, *dis*, *un*, *im*, *in*, *ir* :

to use – to misuse, to match – to mismatch, to cover – to discover, to appear – to disappear, usual – unusual, common – uncommon, perfect – imperfect, possible – impossible, dependent – independent, discriminate – indiscriminate, regular – irregular, respectively – irrespectively, legal – illegal.

5 Найдите в тексте английские эквиваленты следующих слов: такой, как; конечно; по сути; взад и вперед; причина этого в том; более или менее приводить к (чему-либо); где бы ни; например; пока; следовательно.

6 Определите форму и функции герундия и переведите следующие предложения:

1. Before switching on current for a test the circuit should be thoroughly checked over to see that it is in accordance with the circuit diagram, particular care being take that ammeters are not directly across the mains. 2. If the atom should progress one way or the other, it would result in the copper itself being carried from one end of the wire to the other and then through the battery. 3. On joining the upper ends of the metals with a metal wire we caused the current to flow through the wire. 4. The use of a cooling medium prevents the device from overheating. 5. The most common method of magnetizing permanent magnets is to insert the magnets in a suitable exciting coil and to cause a large current to flow in the coil. 6. The new method could be used with great advantage without the machine being overheated. 7. The meter being highly accurate is of the greatest importance for getting the necessary experimental data. 8. We know of silver and copper being very good conductors of electricity. 9. Breaking the circuit

causes sparking as a result of the coil current flow. 10. Not stopping the machine will prevent too rapid cooling with subsequent freezing of the bearings or warping of the shaft. 11. The dynamomotor is compact, light and highly efficient because of the armature reaction being small. 12. When a bar of iron is thrust into a fire it becomes heated due to the atoms comprising the bar becoming agitated.

Text 4. Electric generators. Direct-current generators

A device for converting mechanical energy into electric energy is called a generator. The essential parts of a generator are: a) the magnetic field, which is produced by permanent magnets or electromagnets; and b) a moving coil of copper wire, called the armature, wound on a drum.

The construction and operation of a. d. c. generator are practically the same as those of alternators, the main differences being the commutator action, the method of field excitation and the necessity of always having the armature – the rotating member. This latter is required to permit the commutator to function.

The commutator consists of a number of wedge-shaped copper segments fitted together around one end of the armature. The segments are separated from each other by some insulating material. As a matter of fact thin sheets of mica are widely used. The two terminals of each armature coil are connected to adjacent commutator segments.

In practice, the brushes make contact on the outer surface of the commutators. The commutator progressively switches the brushes from one end of an armature coil to the other end, just as the coil starts to enter the opposite pole area. Thus although the direction of electron movement in the coil has reversed, the opposite end of the coil has been connected to the external circuit, direct current flowing out through the brush.

Direct-current generators are usually self-excited, some of the energy generated by the armature being used to energize the field windings. This is impossible in alternators, because the direction of the field flux must be constant; therefore direct current is required as a field excitation source.

Sufficient residual magnetism remains in the field poles to generate a small voltage when the armature starts to revolve. This current, fed into the field windings, is found to strengthen the magnetic field, which in tern causes more voltage to be developed in the armature. This process continues until the generator has been brought up to operating speed.

D. c. generators are used for electrolytic processes. Large d. c. generators are used in certain manufacturing processes, such as steel making. Generators of small capacities are used for various special purposes, such as welding, train lighting, communication systems, automobile generators, etc.

2 Прочтите и выучите:

coil – катушка
rotating – вращающийся
drum – барабан
a. d. c. generator – генератор постоянного тока
alternator – альтернатор, генератор переменного тока

excitation – возбуждение
wound – разрез, насечка
armature – якорь

3 Ответьте на следующие вопросы, пользуясь информацией из предыдущего текста:

1. What is the difference between the construction and operation of a direct current generator and those oa alternators? 2. What segments does a commutator consist of? 3. How are the segments separated from each other? 4. What are the two terminals of each armature coil connected to? 5. How does the commutator operate? 6. How are direct-current generators usually excited? 7. Why is this impossible in alternators? 8. What does sufficient residual magnetism in the field poles generate? 9. In what way is more voltage developed in the armature? 10. How long does this process continue?

Text 5. Alternating-current generators

The principles underlying magnetism, electromagnetism and electromagnetic induction are combined in the creation of electrical energy from mechanical energy (generators) and in the creation of mechanical energy from electrical energy (motors). The generator consists of an outer frame or yoke to which are attached the pole pieces, always even in number, about which are erected the field windings. A cylinder of laminated iron called the armature, with longitudinal slots to contain the armature coils, is mounted on bearings so that it can rotate in the magnetic field set up by the pole pieces. One end of the armature terminates in a pair of slip rings. These are solid brass alloy rings fixed to the armature, the respective armature coil terminals being connected to each ring. Carbon brushes rest upon the slip rings in order to provide the current with a path to an external circuit.

We know the field poles to be wound with wire in such a direction that the magnetic field strength is increased when direct current from an outside source is supplied to the field windings. A variable resistance, referred to as a field rheostat, is placed in this circuit to permit control of the field strength.

Armature. The armature of a generator is rotated in the magnetic field between the field poles by some mechanical device. This may be a steam engine, a gasoline engine, an electric motor or some other agency. The rotation of the armature upon which the armature coils are wound causes the coils to cut the magnetic lines of force between the field poles. In as much as the direction of electron flow is determined by the direction of conductor movement in relation to magnetic flux, current will flow in opposite directions in the opposite coil sides. This occurs because during one half revolution one side is moving up through the field, the other side moving down through it. In the next half revolution, however, the first side moves down through the field, while the second moves up. It is apparent that alternating current is generated and fed through the slip rings and brushes to the external circuit.

Frequency. The number of times per second the current reverses itself is known to be its frequency and is determined by the speed of the armature and the number of field poles. Thus a generator with two sets of field poles, whose armature turns 1 complete revolution per second (rps), would have frequency of 2 cycles. With one set of field poles, an armature must turn 2 rps to attain the same frequency.

2 Прочтите и выучите:

yoke – ярмо, хомут, скоба, зажим
laminated – слоистый, пластинчатый
longitudinal – продольный
in as much – так как
slot – паз, щель
slip ring – контактное кольцо
rps – обороты в минуту
revolution –оборот, вращение
agency – действие, средство
rheostat – реостат
brass – латунь, желтая медь
solid – твердый, сплошной

3 Прослушайте следующие слова и повторите их:

brass, class, pass, path; out, about, outer, outside, found wound amount; pair, bearing; generator, operator, alternator, to laminate, to terminate, terminal, armature, variable, gasoline, agency, frequency; to attain, alloy, to occur, control, apparent; longitudinal.

4 Найдите в тексте синонимы к следующим словам:

to end, to supply, road, force, to name, to allow, to take place, to define, as, velocity, full, to reach, instrument, evident.

5 Найдите в тексте антонимы к следующим словам:

inside, up, internal, odd, to decrease.

Text 6. Transformers

Unlike the generator, a transformer cannot be used to convert mechanical energy into electrical energy, it being able to transform electrical energy from one circuit at the same or some other voltage.

Essentially, a transformer consists of two coils, not electrically connected to each other, but wound over a common core. The core may also be of open type or it may be merely a tube of some insulating material, the latter being referred to as an air core.

If a varying voltage be applied to the primary coil, the electromagnetic field set up around the coil will rise and fall in accordance with the e.m.f. variations applied. This moving field cuts the turns in the secondary coil and induces an e.m.f. therein. The value of this induced e.m.f. depends upon the strength of the applied e.m.f. and the ratio of secondary turns to primary turns. Should there be twice as many turns in the secondary as in the primary, the voltage in the secondary would be twice that applied to the primary. If there were half as many turns in the secondary, the voltage would be half that applied to the primary. This voltage step up or step down in proportion to turn ratio will hold good for all combinations. Where the voltage is raised, however, amperage is lost in the same proportions, and vice versa . Therefore, the power in watts supplied to the transformer is the same as that drawn from it, assuming the transformer to be 100 per cent efficient. The copper losses, or ohmic resistance of the windings, and the core losses due to induction of eddy currents in the core material, as well as hysteresis or molecular friction caused by changing polarity of the current applied, all combined to reduce modern transformer efficiency to about 90 percent.

Transformers are classed according to the use they are designed for. Where it is desired to step up a low-voltage a.c. supply to a value useful for radio receivers and

transmitters, a power transformer is used. The windings are sufficiently heavy to carry the current without undue heating, and the secondary may consist of two or more separate windings to provide various voltages from the one input source.

As the iron core increases, the inductive reactance of the transformer increases, and inasmuch as this type of reactance also increases. With the frequency of the applied alternating current, there is a limit to the frequencies that can be efficiently used in transformers with metallic cores. Where very high frequency alternating current is used, such as in the r-f circuits of receivers and transmitters, air core transformers must be used to eliminate prohibitive core losses.

2 Прочтите и выучите:

to convert – преобразовывать
coil – электромагнитная катушка
insulating material – изоляционный материал
to induce – индуцировать
eddy – вихрь, завихрение
core losses – потери в магнитной системе
inductive reactance – индуктивное сопротивление
voltage – напряжение
core – магнитный сердечник
amperage – амперная нагрузка
turn – виток

3 Прочтите следующие слова вслух и назовите их эквиваленты на русском языке:

generator	refer	strength	primary	assume	winding	efficiency
circuit	apply	ratio	secondary	hysteresis	prohibitive	

4 В приведенных ниже предложениях найдите ошибки и исправьте их, используя следующие выражения:

It’s true. Exactly so. Definitely so. That’s right – если предложение содержит достоверную информацию;
Nothing of the kind. That’s wrong. It’s false. On the contrary – если предложение содержит недостоверную информацию.

1. A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled electrical conductors.
2. A current passing through the primary coil creates a magnetic field.
3. The voltage induced across the secondary coil may be calculated from Ohm’s law of induction.
4. If the secondary coil is attached to a load that allows current to flow, electrical power is transmitted from the primary circuit to the secondary circuit.
5. All the incoming energy is transformed from the primary circuit to the magnetic field and into the secondary circuit.

6. Transformers for use at power or audio frequencies typically do not have any cores made of high permeability silicon steel.

7. Ferromagnetic materials are good insulators and a solid core made from such a material also constitutes a single short-circuited turn throughout its entire length.

8. A small transformer, such as a plug-in “wall-wart” or power adapter type used for high-power consumer electronics.

9. Each time the magnetic field is reversed, a small amount of energy is lost due to hysteresis within the core.

10. Powdered iron cores are used in circuits that operate above main frequencies and up to a few tens of kilohertz.

5 Заполните пропуски в тексте необходимыми предлогами и выполните письменный перевод на русский язык.

A key application … transformers is to increase voltage before transmitting electrical energy … long distances through wires. Wires have resistance and so dissipate electrical at a rate proportional to the square … the current through the wire. …. transforming electrical power to a high-voltage (and therefore low-current) form for transmission and back again afterwards, transformers enable economic transmission of power … long distances. Consequently, transformers have shaped the electricity supply industry, permitting generation to be located remotely … points of demand. All but a tiny fraction … the world's electrical power has passed … a series of transformers by the time it reaches the consumer. Transformers are used extensively … electronic products to step down the supply voltage to a level suitable … the low voltage circuits they contain. The transformer also electrically isolates the end user from contact … the supply voltage.

Signal and audio transformers are used to couple stages of amplifiers and to match devices such as microphones and record player cartridges … the input impedance of amplifiers. Audio transformers allowed telephone circuits to carry on a two-way conversation over a single pair of wires. Transformers are also used when it is necessary to couple a differential-mode signal … a ground-referenced signal, and … isolation between external cables and internal circuits.

Text 7. Batteries

Batteries as continuous sources of electrical energy are the result of a long series of experiments which started with the discoveries of Alessandro Volta more than one hundred years ago. Today battery cells are manufactured in two common forms, dry cells being used in flash lights, portable radios, etc., wet cells being used in automobiles, airplanes, boats, etc.

We know each cell of every battery to have two terminals: one negative, the other positive. The difference of potential between the terminals of every dry cell, regardless of size, is approximately 1.5 volts The larger the cell, the greater the amount of energy stored within in. The available energy in dry cells becoming exhausted, they are thrown away and new ones are secured, but when storage batteries become exhausted, they are recharged.

The difference of potential between the terminals of any dry or wet cell depends in principle upon the particular chemicals used in its construction, whereas the total charge capacity depends upon the quantity of chemicals present.

The negative terminal of a dry cell is the zinc metal container in which all chemical ingredients are sealed, whereas the positive terminal is a round carbon rod, the end of which protrudes through the surface at one end. The positive electrode of a storage cell is known to be set of lead grills filled with porous lead dioxide and fastened together with a single terminal. The negative electrode consists of a set of parallel grills filled with spongy lead. When these two sets of plates are put together with glass or wood separators and the entire ensemble immersed in dilute sulphuric acid, chemical activity between the lead and acid gives rise to electric charges.

2 Прочтите и выучите:

dry cell – сухой элемент
flash light – импульсное освещение
wet cell – элемент с жидким электролитом
terminal – клемма, полюс
grill – решетка
lead storage cell – свинцовый элемент
protrude – выступать
storage battery – аккумуляторная батарея
dilute – разбавленный
plate – пластина
protrude – выступать

3 Прочтите следующие слова вслух и назовите их эквиваленты на русском языке:

Alessandro Volta	discovery	difference	regardless
approximately	exhausted	particular	chemicals
charge capacity	zinc	carbon	negative
protrude	ensemble	electrode	

4 Закончите предложения, используя данные ниже слова, при необходимости меняя их грамматическую форму:

to provide, to refer, strong, to invent, to be, to run, to transfer, to charge, to use, liquid, to coat.

1. The first battery … in 1800 by Alessandro Volta.
2. Near the end of the 19th century, the invention of dry cell batteries, which replaced … electrolyte with a paste, made portable electrical devices practical.
3. In the modern sense of the term, a battery is a device that … a current by means of an electrochemical reaction, wherein electrons … from one chemical to another.
4. However, the original usage of the term not to an electrochemical cell but to a set of linked Leyden jars, which, in the 18th century were used by scientists as a means of storing charge.
5. Leyden jars … the first capacitors, and basically consisted of a glass jar whose inner and outer surfaces with metal foil, and had an … electrode through its center.
6. They could … with a static generator, and … by touching a conductor to its electrode.
7. Scientists could obtain … discharges by linking the electrodes of multiple jars together.
8. It was Benjamin Franklin who, in 1748, first … the word "battery" to describe a similar assembly of glass plates with lead sheets pasted on either surface.

5 Выберите из предложенных определений одно, наиболее точно отражающее значение выделенного слова, в каждом из следующих предложений:

1. Batteries as continuous **sources** of electrical energy are the result of a long series of experiments which started with the discoveries of Alessandro Volta more than one hundred years ago.

a) the point or place from which something originates;

b) any person, book, organization, etc., from which information, evidence, etc., is obtained;

c) the electrode region in a field-effect transistor from which majority carriers flow into the interelectrode conductivity channel;

2. Today battery **cells** are manufactured in two common forms, dry cells being used in flash lights, portable radios, etc.

a) a small simple room, as in a prison, convent, monastery, or asylum;

b) a device for converting chemical energy into electrical energy, usually consisting of a container with two electrodes immersed in an electrolyte;

3. The **difference** of potential between the terminals of every dry cell, regardless of size, is approximately 1.5 volts.

a) the state or quality of being unlike;

b) a disagreement or argument;

c) a degree of distinctness, as between two people or things;

4. The difference of potential between the terminals of any dry or wet cell depends in principle upon the **particular** chemicals used in its construction.

a) exacting or difficult to please, esp. in details;

b) of or belonging to a single or specific person, thing, category, etc., specific;

5. The negative terminal of a dry cell is the zinc metal container in which all chemical ingredients are sealed, whereas the positive terminal is a round carbon **rod**.

a) a switch or bundle of switches used to administer corporal punishment;

b) a metal shaft that transmits power in axial reciprocating motion;

c) a slim cylinder of metal, wood, etc.;

6. The positive electrode of a storage cell is known to be set of lead **grills**.

a) a device on a cooker that radiates heat downwards for grilling meat, fish, etc.;

b) a device with parallel bars of thin metal.

Text 8. Electric motors (1)

There is a wide variety of d. c. and a. c. motors. There are shunt motors, series motors, synchronous motors, induction motors, single-, two-, and three-phase motors. They are used to drive various machines. A ball-bearing fully-enclosed fan-cooled direct-current motor is shown in Fig. 3.

Direct-current motors are of three principal kinds, and are named according to the manner in which their field coils are connected to the armature. They are named respectively: series, shunt, and compound.

In the series motors the field windings and armature are connected in series with each other. All the current which passes through the armature passes through the field coils. The field windings are therefore composed of a few

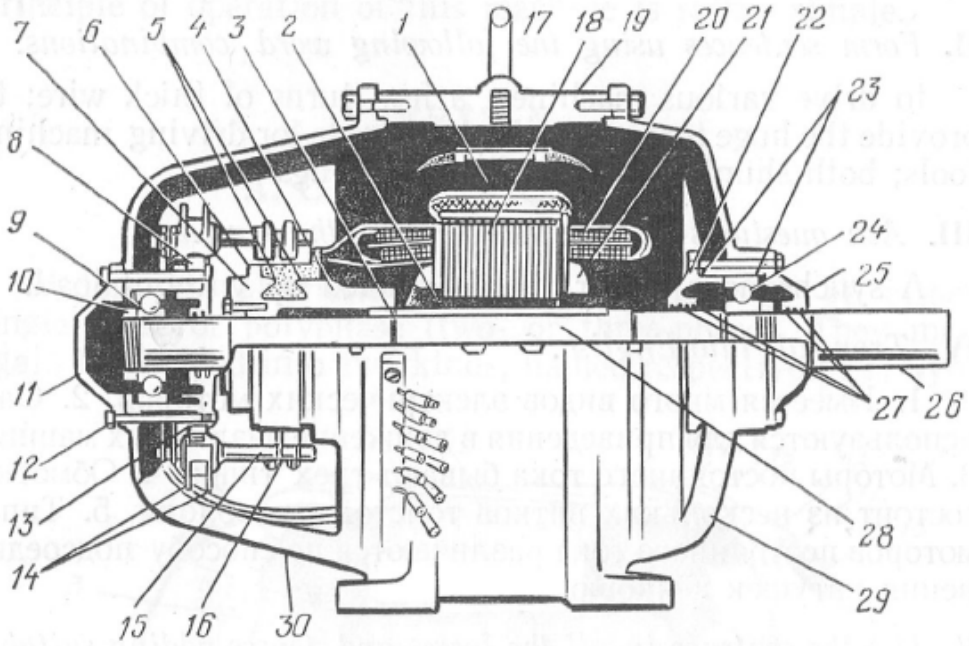

Fig. 3. A Ball-Bearing Fully - Enclosed Fan-Cooled Direct-Current Motor

1. field coil; *2*. armature spider; *3*. commutator key; *4*. commutator sleeve; *5*. commutator mica V rings; *6*. commutator bars; *7*. commutator metal V ring; *8*. front inner bearing cap; *9*. bearing lock washer; *10*. bearing lock nut; *11*. front outer bearing cap; *12*. bearing assembly screw; *13*. brush yoke; *14*. brush stud insulation; *15*. brush holder stud; *16*. brush holder; *17*. eye bolt; *18*. armature laminations; *19*. frame; *20*. armature coils; *21*. armature end plate; *22*. back inner bearing cap; *23*. vellumoid gaskets; *24*. ball bearing; *25*. back outer bearing cap; *26*. armature shaft; *27*. grease seal; *28*. armature key; *29*. back bearing bracket; *30*. front bearing bracket

turns of thick wire. Starting under heavy load, a series motor will take a large current to provide the huge torque required.

The field coils of shunt motors are connected direct across the brushes, hence they have the full voltage of the mains applied to them. The shunt motor may be called a constant speed motor, and is suitable for driving machine tools, lathes, wood-working machines and any machines requiring a steady speed.

A compound motor has both shunt and series field windings and therefore partakes of the nature of both types of motors.

1. Form sentences using the following word combinations:

to drive various machines; a few turns of thick wire; to provide the huge torque required; suitable for driving machine tools; both shunt and series field windings.

A synchronous motor can be started up without load.

2 Переведите предложения на английский язык:

1. Имеется много видов электрических моторов.
2. Они используются для приведения в движение различных машин.
3. Моторы постоянного тока бывают 3 типов.
4. Обмотка состоит из нескольких витков толстой проволоки.
5. Типы моторов постоянного тока различаются по способу подсоединения катушек к якорю.

3 Постройте предложения по модели:

M o d e l: T.: When rubbing a piece of amber, the ancient people made it attract light materials.

St.: When the ancient people were rubbing a piece of amber, they made it attract light materials.

1. When connected direct across the brushes, the field coils have the full voltage of the mains.
2. When found in free state, metals were widely used by primitive man.
3. When speaking about the problems of utilizing solar energy, we should stress their aim.
4. When considering the chemical properties of metals, we must mention that they vary widely in the degree of chemical activity.
5. If told in detail, the principle of operation of this machine is rather simple.

Text 9. Electric motors (2)

Motors for alternating-current circuits may be either single-phase or polyphase (two-or three-phase). They may again be divided into two kinds:

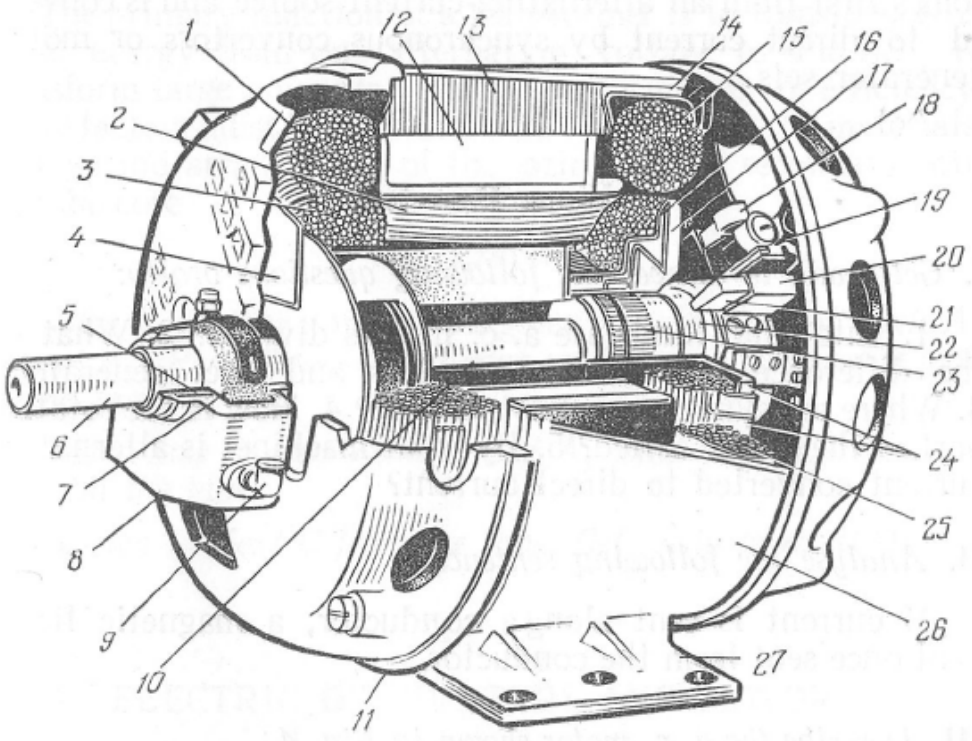

Fig. 4. Cutaway Section of an Induction Motor

1. stator winding; *2*. winding in rotor slot; *3*. rotor winding; *4*. governor weights; *5*. bearing; *6*. shaft; *7*. wool yarn; *8*. oil well; *9*. oil cup; *10*. governor rods; *11*. bearing bracket; *12*. slot in stator; *13*. stator core; *14*. insulation; *15*. stator winding; *16*. mica commutator ring; *17*. face of commutator; *18*. brush holder springs; *19*. brush lifting device; *20*. brush holder; *21*. carbon brush; *22*. spring barrel; *23*. short circuiting segments; *24*. leads from rotor coils to commutator bars; *25*. stator windings; *26*. frame; *27*. base

Synchronous; II. Non-or asynchronous, ordinarily called induction motors. The most widely used a.c. motor is the induction motor.

It has two main parts: a) the stationary winding or stator, which sets up a rotating magnetic field, and b) the rotating part of the motor, i.e. the rotor. The rotor of a commercial a.c. motor consists of an iron core with large copper bars placed in slots around the circumference and connected at both ends to copper rings. This is called a squirrel-cage rotor.

When a rotor is placed in a rotating magnetic field, a large current is induced in it.

A.c. motors are exactly similar in construction to a.c. generators and may be called inverted alternators, since the same machine may be used as either a generator or a motor.

Synchronous motors are very suitable for large powers, where the machine can be started up without load, and once started run for long periods.

For supplying direct-current power networks, the supply comes first from an alternating-current source and is converted to direct current by synchronous convertors or motor-generator sets.

1 Ответьте на вопросы:

1.Into what kinds are a.c. motors devided?
2.What is the difference between a.c. motors and a.c. generators?
3. Where are synchronous motors used?
4. How is the rotating part of the motor called?
5. By what machines is alternating current converted to direct current?

Text 10. Electric generators and motors

A device for converting mechanical energy into electric energy is called a generator.

The function of a motor is just the reverse, that is, it transforms electric energy into mechanical energy.

The enormous energy of steam engines, gas engines and water turbines can now be transformed into electricity and transmitted many miles.

The generator has revolutionized modern industry by furnishing cheap electricity.

The essential parts of a generator are: a) the magnetic field, which is produced by permanent magnets or electromagnets; and b) a moving

Coil of copper wire, called the armature, wound on a drum.

D.c. generators are used for electrolytic processes.

Large d.c. generators are used for manufacturing processes, such as steel making.

Generators of small capacities are used for various special purposes, such as welding, automobile generators, train lighting, communication systems, etc.

1 Постройте следующие предложения используя пассивную конструкцию по образцу:

Model: Electronic devices have revolutionized life.

Life has been revolutionized by electronic devices.

1. Our engineers have developed many new devices.
2. We use boilers for many purposes.
3. The application of electronics is changing the entire life of people.
4. Our engineers will design and construct new thermal power stations.

2 Измените предложения в пассивном залоге на активный залог по модели:

Model: Human-like thinking is done by electronics.
Electronics does human-like thinking.

1. A new phenomenon of electricity was discovered by Edison.
2. Computers are used by engineers in all branches of economy.
3. Large atomic power stations are being constructed by the engineers of the USA and the UK.
4. Tremendous hydro-potential will be seen by the delegates in Russia.

Text 11. Single-phase induction motors

Types of Single-Phase Motors. Great numbers of motors of comparatively small horsepower rating are designed to operate when connected to a single-phase source. Most of them, built in fractional-horsepower sizes, are technically termed small motors, a small motor being defined as "a motor built in a frame smaller than that having a continuous rating of hp, open type, at 1,700 to 1,800 rpm". Single-phase motors are known to perform a great variety of useful services in the home, the office, the factory, in business establishments, on the farm, and many other places where electricity is available. The requirements of the numerous applications differing so widely, the motor-manufacturing industry has developed several types of such machines, each type having operating characteristics that meet definite demands. For example, one operates satisfactory on direct current or any frequency up to 60cycles; another rotates at absolutely constant speed, regardless of the load; another develops considerate starting torque; and still another, although not capable of developing much starting torque, is nevertheless extremely cheap to make and very rugged.

The type of motor that performs with about equal satisfaction on direct current or alternating current up to 60 cycles is considered to be familiar d-c series motor. It is common practice that such motors are generally constructed in small sizes, operate at high speed, and include special design features, so that commutation and armature-reactance difficulties are minimized. Since they may be connected to any of the commonly available sources of supply, they are appropriately referred to as universal motors.

The induction principle is applied to several types of single-phase motor. This principle involves the production of a revolving magnetic field, several methods having been developed for doing this in single-phase motors. One of these methods is employed in the shaded-pole motor, an extremely popular small motor used in low-starting-torque applications. The so-called reluctance-start motor is a second type of machine, made in rather limited numbers in small sizes, that utilizes still another method to create the effect of rotating poles.

The split-phase type is considered perhaps to be most widely used of all motors connected to single-phase sources of supply. It is manufactured in a great many sizes and styles, offering the user a choice of a number of desirable operating characteristics. There are, for example, (1) standard split-phase motors, (2) motors that employ the capacitors during the starting period only, and (3) motors that make use of one or more capacitors for starting and running duty.

Repulsion, repulsion induction, and repulsion-start motors are other types of single-phase machines that were widely applied until recent years. They have been largely replaced by split-phase motors of the capacitor type because the latter can be designed to perform as well as the repulsion types, offering in addition such advantages as lower cost and trouble-free service.

Synchronous motors, as the name implies, operate at synchronous speed for all values of load. There are several constructions of such machines, although they are usually manufactured in very small ratings. Depending upon the way in which they are made or their principle of operation, they have special names such as reluctance motors, subsynchronous-reluctance motors, and hysteresis motors.

2 Прочтите и выучите:

single-phase motor – однофазный электродвигатель
fractional-horsepower – маломощный
establishment – учреждение, организация
regardless – безотносительно
starting torque – пусковой момент
rugged – прочный
universal motor – универсальный электродвигатель
shaded-pole motor – электродвигатель с расщепленными полюсами
split-phase motor – электродвигатель с расщепленной фазой
reluctance motor – реактивный, синхронный электродвигатель
capacitor – конденсатор
repulsion-start induction motor – (однофазный) асинхронный электродвигатель с репульсионным пуском
hysteresis motor – гистерезисный электродвигатель

3 Прочтите следующие слова и приведите их эквиваленты на русском языке:

comparatively	limited	variety	create
application	motor-manufacturing	demand	several
considerate	source	trouble-free	employ
extremely	replace		

4 Найдите в тексте синонимы к следующим словам:

to link, dimension, to be called, to determine, to do, demand, the use, for instance, stable, irrespective of, almost, velocity, usually, to make use of, may be, some.

5 Прочтите текст еще раз и ответьте на вопросы:

1. What kinds of motors are technically referred as “small motors”?
2. Under what conditions are they designed to operate?
3. Where can single-phase motors be used?
4. What types of such machines have been developed by the motor-manufacturing industry?
5. What type of motor works equally well both on direct and alternating current up to 60 cycles?

Text 12. Polyphase induction motors

Induction-Motor Principle. In the electric motor, conversion of electrical power (or energy) to mechanical power (or energy) is known to take place in the rotating part of the machine. In the d-c motor and in one type of a-c motors, the electrical power is conducted directly to the rotor through brushes and a commutator; in this respect it is possible to designate such a machine as a conduction motor. In the most common type of a-c motors electrical power is not conducted to the rotor directly; the rotor receives its power inductively in exactly the same way as the secondary of a transformer receives its power. It is for this reason that motors of this type are known as induction motors. In fact, it will become apparent, as the analysis proceeds, that it will be extremely useful to think of an induction motor as a sort of rotating transformer, i.e., one in which poles are located near the edge of the disk, the compass will rotate if the disk is made to spin, or the disk will rotate if the compass is made to spin. The direction of the induced rotation in one element is always the same as that imparted to the other. Such an experiment can be readily performed if a simple copper or aluminum disk and a rather large compass are both mounted on the same vertical stem so that each may be rotated in its own bearing independently of the other. There is no more effective way to demonstrate the principle of the induction motor, of which there are several types. If the disk were rotated, the compass would follow at a speed always less than that of the disk; if the compass were rotated, the disk would follow the former at a lower speed.

It should be clearly understood that motor action (rotation of the disk) is developed by induction. The current in the rotor (disk) is the result of electromagnetic induction, which, it will be remembered; requires that there be relative motion between flux and conductors. Thus, if the mechanical load on the rotor increases, the rotor slows down; this slowing down means greater relative motion between flux and rotor, a greater voltage and current, and hence more power to take care of the added load. In other words, the power developed by the rotor automatically adjusts itself to the power required to drive the load.

In the actual motor, the rotor is obviously not a disk, but a well designed structure consisting of a laminated core containing a winding; nor is the main field a single concentrated pole moved by hand, but an even number of poles formed by a distributed winding in a slotted stator. The stator poles are formed by the interaction of the fields of two or three phases, their result being the creation of an effect that is equivalent to a set of revolving poles.

Прочтите и выучите:

rotor – ротор
brush – щетка, подвижный, скользящий контакт
commutator – коллектор электродвигателя
induction motor – асинхронный электродвигатель
to pivot – вращаться, вертеться
relative motion – относительное движение
axe – ось
flux – поток
to spin – быстро вращаться
added load – добавочная нагрузка

2 Поставьте слова в необходимом порядке так, чтобы получились предложения:

1. understood, should be, that, It, developed, clearly, induction, the motor, is, by, action.

2. developed, automatically, required, In other words, adjusts, the power, rotor, to drive, the, by, power, to, the, itself, load, the.

3. motors, for, known, reason, are, It, motors, is, this, of, type, this, as, induction, that.

4. rotation, The direction, the, element, in, imparted, is, that, one, the same, as, of, always, to the other, induced.

5. exactly, a transformer, The rotor, its, inductively, in the same, as, secondary, way, of, receives, the, power, receives, its, power.

6. are, two, or, The, fields, three, stator, the, poles, formed, the, of, interaction, phases, of, by.

7. discovered, The principle, was, induction motor, of, 1824, first, in.

8. directly, electrical power, to, through, and, is, brushes, a commutator, The, conducted, rotor, the.

3 Восстановите логический порядок предложений.

1. If the compass were rotated, the disk would follow the former at a lower speed.

2. The direction of the induced rotation in one element is always the same as that imparted to the other.

3. If the disk were rotated, the compass would follow at a speed always less than that of the disk.

4. Such an experiment can be readily performed if a simple copper or aluminum disk and a rather large compass are both mounted on the same vertical stem.

5. If a non-magnetic disk and a compass are pivoted with their axes parallel, so that one or both of the compass poles are located near the edge of the disk, the compass will rotate if the disk is made to spin, or the disk will rotate if the compass is made to spin.

6. Each may be rotated in its own bearing independently of the other.

4 Найдите в тексте инфинитивы и определите их функции в предложении.

5 Переведите на английский язык следующие предложения:

1. В какой части электрического двигателя происходит преобразование электрической энергии в механическую?
2. В каком двигателе электрическая энергия подводится прямо к ротору через щетки и коллектор?
3. Как ротор получает свою энергию в большинстве двигателей переменного тока?
4. Как называются такие двигатели?
5. Как можно продемонстрировать принцип индукционного двигателя?
6. В результате чего появляется ток в роторе?
7. Когда ротор замедляется?

Additional texts for reading and translation

Text 1

The electric motor was first developed in the 1830s, 30 years after the first battery. Interestingly the motor was developed before the first dynamo or generator. Thomas Davenport of Vermont developed the first real electric motor in 1834 although Joseph Henry and Michael Faraday created early motion devices using electromagnetic fields.

Thomas Davenport was born in Williamstown, Vermont, USA. He became an apprentice to a blacksmith at age 14. Later on he set up his own blacksmith shop in Brandon, Vermont. There was a local iron industry in Brandon and Davenport married the daughter of a local merchant. He loved books and acquired all the books he could find on electricity and magnetism.

At age 29 Davenport visited the Penfield Iron Works in New York where he observed the first commercial electromagnet in use. The powerful electromagnet was built by Joseph Henry and could lift up to 750 pounds of iron. The device was used to separate different purity's of iron in the mining process. The Penfield Iron Works was an important center for mining in the United States at the time. The iron sands there were so pure in natural form, that it made the perfect material for Joseph Henry's magnets as well as a myriad of other industrial uses. The railroads which were growing at the time needed the highest quality of iron to be found, this economic motive helped the iron works to invest in the new electromagnet technology.

Davenport decided to buy one magnet of his own. He sold his brother's horse and used his savings to buy one of Henry's magnets. Once he had the magnet he took it apart and studied it's construction.

The early "motors" created spinning disks or levers that rocked back and forth. These devices could not do any work for humankind but were important for leading the way to better motors in the future.

Text 2

Classification of Single-Phase Motors. Single-phase motors generally have low horsepower ratings and are used to operate mechanical devices and machines requiring a comparatively small amount of power. Their greatest fields of application are in the fractional-horsepower range, that is, below 1 hp. Motors larger than the latter, up to perhaps 10 hp, are sometimes used on farms and in small shops and factories where polyphase power is not available. Polyphase motors generally have better operating characteristics than single-phase machines and cost less per horsepower, so that it is usually true that single-phase motors are used in the larger sizes only because of two- or three-phase service not being available.

In the single-phase classification may be listed the following types of motors: shaded-pole, reluctance, split-phase (with or without capacitor starting), repulsion, repulsion-start, repulsion-induction, series (a-c only or universal), and synchronous.

Shaded-pole and reluctance motors are built in very small sizes from about 1/500 to 1/6 hp; they are cheap to construct, have low starting torque, little overload capacity, and low efficiency and may be speed-controlled.

Standard split-phase motors are manufactured in sizes up to 3/4 hp; they are comparatively low in cost, have fair starting torque, not much overload capacity, and fair efficiency, and operate at nearly constant speed. Split-phase motors equipped with capacitors have high starting torque and may or may not be arranged to continue to run with a capacitor. Their capacitor being used only during the starting period, they are called capacitor-start split-phase motors; two values of capacitor being provided, one for starting and another for running, they are referred to as two-value capacitor motors. However, whether or not these motors are provided with capacitors, they are all, nevertheless, split-phase motors.

Text 3

Series motors are usually constructed for service on direct or alternating current up to 60 cycles, in which case they are called universal motors. When properly designed, they will operate with complete satisfaction on direct or alternating current, developing high starting torque, having excellent overload capacity and good efficiency, and permitting the speed to be controlled over very wide limits. Such motors are not as trouble-free as those described above (shaded-pole, reluctance, and split-phase types), because they have the usual commutator and brushes and their, accompanying commutation problems.

Synchronous motors, as the name implies, operate at synchronous speed, that is, a definite, constant speed determined only by the frequency of the supply and the number of poles on the machine. They have very little starting torque, practically no overload capacity, and are quite inefficient; they have, however, the one important characteristic possessed by none of the motors previously discussed, that is, absolute constancy of speed, a requirement that is very important for timing devices.

Text 4

Classification of Polyphase Motors. Polyphase motors, that is, machines served with two- or three-phase power, may be classified as follows: induction (squirrel-cage or wound-rotor types), commutator, or synchronous.

Squirrel-cage induction motors are widely used because of their having, generally speaking, desirable all-purpose characteristics. They are comparatively low in cost per horsepower, have good starting torque and overload capacity, are highly efficient, and are particularly rugged and trouble-free. These motors will operate in an atmosphere containing dirt, moisture, or corrosive or explosive fumes and can even be constructed to perform submerged in oil or water. They are, practically speaking, constant-speed motors in the sense that change in load does not affect the speed by more than about 5 per cent. Such motors are, however, of a disadvantage when it becomes necessary to control the speed, because it is usually difficult or expensive, from the standpoint of additional equipment, to do so. When speed control becomes a necessary requirement of an application, the squirrel-cage rotor is often replaced by a wound rotor, its winding ends being connected to slip rings. Speed control is then accomplished by connecting a resistor controller to the brushes riding on the slip rings; the greater the resistance inserted, the lower the speed, and vice versa. Wound-rotor motors, therefore, differ from squirrel-cage motors only by the construction of the rotor, the stator of both types being exactly similar. In addition to its speed-control feature, the wound-rotor induction motor also develops considerably more starting torque. It does, however, have a lower full-load efficiency and a greater speed variation with load changes than does the squirrel-cage type of motor.

Text 5

The Top 5 Inventions of All Time.

While some people are lucky enough to discover the “next” penicillin, most inventions come from those who’ve dedicated their lives, or at least a significant portion of them, to understanding and expertise in a particular field. As you’ll see in the following list, the top 5 inventions of all time are no accident.

Admittedly, there are countless inventions that have had a similarly notable impact - the battery, the camera, GPS - some of which are even incorporated into the below-mentioned inventions. But when considering the developmental impacts resulting from each, the following five inventions are hard to beat.

The Internet. Invented in 1969 (and not by Al Gore), the World Wide Web grew from just four users in 1969 to 50,000 in 1988. From there, a million in 1991 and 500 million by 2001. Today there are over 1.2 billion people (roughly 19 percent of the world) connected online. And whether it’s used for social media, shopping or to find information, the Internet has forever changed the landscape of the world, arguably making it considerably smaller in the process.

The Barcode. First invented by a student in the early 1950s, barcodes were originally intended to provide a kind of visual Morse code. Retailers were initially slow to adopt the technology, which at the time was somewhat unreliable. But that changed

in the early 1970s when the same student, Norman Woodland, devised the Universal Product Code while working for IBM. Since then, the familiar black stripes have appeared on everything from orange juice to a pair of designer sunglasses, revolutionizing sales and inventory management in the space of less than one square inch.

Internal Combustion Engine. The significance of the internal combustion engine may have fallen from grace in the hybrid, fuel-efficient world of today. But with its first rumbling in 1859, its significance has left a permanent mark on the development and modernization of society, in particular farming and manufacturing. Without the internal combustion engine, we would not be able to drive, fly or travel by train. We would not be able to build factories, sail across oceans or even cut the grass in our front yards. Étienne Lenoir, a Belgian inventor, gets the credit for producing the first working internal combustion engine. He then converted it to a steam engine in 1859. At the time, it was capable of producing a measly one horsepower and was almost inoperably inefficient. But since then, manufacturers have continuously redefined the basic design, creating the countless generations and billions of engines that have been built since.

LASER – short for Light Amplification by Stimulated Emission of Radiation – is used in everything from home blue ray players to advanced weaponry. Albert Einstein was the first one to initiate its development in 1917 when he proposed that atoms could be stimulated to emit photons in a single direction. Three decades later, this phenomenon was first observed. And in 1960, Theodore Maiman, a physicist, built the first working laser. Maiman's laser was based around a ruby crystal that was said to emit light "brighter than the center of the sun."

Mobile Phone. There are now more than two billion mobile phones in the world. And in Europe, the number of mobile phones outnumbers the people living there (in some countries 2 to 1!). The first device was introduced by Bell Laboratories in Missouri in 1947. Since then, similar to any other device that has evolved into modern life, the cell phone has undergone widespread refinements, shrinking in size while increasing in power, range and complexity. Today, everything from modern business negotiations to those long distance calls home at Thanksgiving are made affordable with the technology of the mobile phone.

Discussion

1. What invention is the most/least important to you?
2. How did these inventions change our lives?

Summarizing

Complete the following sentences to summarize the text above:

1. Most inventions come from those who …
2. There are countless inventions …
3. When considering the developmental impacts …
4. The World Wide Web grew from …
5. The Internet has forever changed …
6. Norman Woodland devised the …
7. Without the internal combustion engine …
8. Manufacturers have continuously redefined …

9. LASER is used in everything …
10. The cell phone has undergone …
11. Today, everything from modern business negotiations …

Useful Sentences for Summaries

First		argues	
At the beginning	the author	writes, states	that
In the first part	the reporter	points out	what
In the introduction		explains, mentions	why
	the reader	is informed	
In the next part			
In the main part	the reader is informed about	the theory	
Second;	the author goes on with	the data / question	that
Then; Afterwards	we are told about	the statistics	what
Moreover;	we read / hear about	the belief	why
In addition to that	the author examines	the argument	if
Further on	analyses	the opinion / topic	
Next	discusses	the problem	
In the end	the author	emphasises	
Finally	the writer	concludes	that
At last	the journalist	finds the solution adds / stresses	what why
As a conclusion	the reporter the scientist	pretends hints	
Summing up his / her thoughts			

VOCABULARY

accelerate – ускорять
acquire – приобретать
adjust – регулировать, приспособлять
align – выравнивать, регулировать
amplifier – усилитель
armature – якорь (магнита или машины)
assembly – блок, узел

axis – (pl.. axes) - ось
bearing – подшипник
bias – смещать, смещение
bilateral – двухсторонний
binary system – двоичная система
bond – связь
break up – разбиваться, распадаться
brush – щетка
bulb – колба
capacitance – емкость, емкостное сопротивление
capacity reactance – емкостное сопротивление
cathode-ray tube – катодно-лучевая лампа
carrier frequency – несущая частота carrier voltage – напряжение несущей
cavity – резонатор, объемный резонатор, полость
cell – элемент
circuit – цепь, контур
circuit breaker – автоматический выключатель, прерыватель цепи
cling – цепляться, прилипать
closed circuit – замкнутая цепь
coil – эл. катушка
distort – искажать, искривлять
electromotive – электродвижущий
e.m.f. – electro-motive force – электродвижущая сила
facilitate – облегчать, продвигать
filament – нить накала, волосок
field winding – обмотка возбуждения
flashover – короткое замыкание между щетками, перекрытие изолятора дугой
flux – поток
full-wave type rectifier – двухполупериодный выпрямитель
gear train – зубчатая передача, часовой механизм
glow-lamp – лампа накаливания, лампа тлеющего разряда
half-sine wave – полусинусоидальная кривая
half-wave rectifier – полупериодный выпрямитель
horsepower – лошадиная сила, мощность (в лошад. силах)
hysteresis – эл. гистерезис, отставание фаз
ignite – зажигать (-ся), загораться ignition зажигание, вспышка; воспламенение
impurity – примесь, засорение
in as much as – так как; ввиду того, что ...
incandescence – накал, каление
interchangeability – взаимозаменяемость, сменность
interface – граница, контактная поверхность
interpose – вставлять, вводить между
interlacing – сплетение, переплетение
interrelation – взаимоотношение, отношение
impedance – полное сопротивление, импеданс

junction – соединение, переход
knock loose – выбивать
longitudinal – продольный
loop – петля
magnetic flux – магнитная индукция
magneto-motive – магнетодвижущийся
m.m.f. – magnetomotive force
majority carrier – основной носитель заряда
moving coil instrument – магнитоэлектрический прибор
mutual inductance – взаимоиндукция
oscillator – генератор, гетеродин, осциллятор
persistence of vision – инерционность зрительного восприятия
power supply system – система питания мощностью
spark gap – разрядник, искровой промежуток
split phase motor – двигатель с расщепленной фазой
spool – шпуля для катушки возбуждения; катушка обмотки возбуждения
swamping resistance – поглотительное напряжение, добавочное сопротивление вольтметра

GENERAL FORMULAS
(общеупотребительные фразы)

Well...; Well now ... – Ну…; Ну что же ...
Let me see/ Let me think. – Постойте, дайте подумать.
Just a minute / Just a moment. – Сейчас, минуточку.
By the way (by the by) /Incidentally. – Между прочим.
I see. – *Понятно.*
I say / Look here. – Послушайте.
They say. – *Говорят.*
First; Second; Third ... – *Во-первых; во-вторых; в третьих ...*
First of all. – *Прежде всего.*
Speaking of... / Talking of... – Говоря о ...; Кстати о ...
To my mind. – По-моему.
In my opinion. – *По моему мнению.*
It seems to те. – *Мне кажется.*
As far as I know /remember. – *Насколько мне известно / я помню.*
As far as I can see. – *Насколько я понимаю.*
I suppose /1 believe /1 guess... – Полагаю, что ...
I wonder. – *Интересно, хотелось бы знать.*
You see/ You know. – *Видите ли ..., понимаете.*
I don't quite follow you. – *Я не совсем вас понимаю.*
What do you mean*? – Что вы имеете в виду?*
What does it mean ? – Что это значит?
I mean to say ... – *Я имею в виду... Я хочу сказать ...*
What do you think of... – Что вы думаете о ...

It's not to the point. – *Это не по существу.*
Keep to the point. – *Говорите по существу.*
You've got it all wrong. – Вы совершенно неправильно все поняли.
Not exactly. – *Не совсем так.*
The way things are ... – *Судя по тому, как обстоят дела ...*
Generally speaking ... – *Вообще говоря ...*
As a matter of fact. – *По существу, по сути дела.*
In fact... – *Фактически, в действительности.*
In a way... – *В некотором роде, как-то*
The matter/ the thing/ is that... – Дело в том, что ...
Under the circumstances ... – При данных обстоятельствах ...
In (this, that,any) case. – В этом (таком, любом) случае.
On one hand – С одной стороны.
On the other hand – С другой стороны.
Above all – Прежде всего.
More than that – Больше того, кроме того.
... and so on and so forth – ... и так далее, и тому подобное.
On the whole (All in all). – В целом (В общем).
After all... – В конечном счете.
In short – Короче говоря.
That explains it. – Тогда понятно.
In (this, that,any) case. – В этом (таком, любом) случае.
On one hand – С одной стороны.
On the other hand – С другой стороны.
Above all – Прежде всего.
More than that – Больше того, кроме того.
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On the whole (All in all). – В целом (В общем).
After all... – В конечном счете.
In short – Короче говоря.
That explains it. – Тогда понятно.

Greetings

Hello / Hi. – Привет.
How do you do. – Здравствуйте.
I haven't seen you for ages. – Не видел вас вечность.
It's a long time since I saw you last. – Давно мы не виделись.
It's good (How nice) to see you again. – Хорошо повидаться снова.
I'm glad we've met. – Я рад, что мы встретились.
Why, if it isn't Ann! – Неужели это Анна!
What a pleasant surprise! – Какой приятный сюрприз!
Never expected to meet you here. – Не ожидал тебя здесь встретить.
How are you getting on ? – Как ты поживаешь?
How are you doing? – Как ты поживаешь, как дела?
How is life? – Как жизнь?

How are things with you? – Как дела у тебя?
How is everybody at home? – Как поживают твои домашние?

Possible answers

Fine, I`m Fine, Just Fine. – Прекрасно.
I'm doing fine. – У меня все замечательно.
Very well/perfectly well. – Очень хорошо.
Not bad (could be worse / better). – Неплохо (могло быть хуже / лучше).
No complaints. – Не жалуюсь.
So-so/I'm (just) middling/ Middling. – Так себе.
I'm feeling out of sorts. – Я неважно себя чувствую.
I'm not up to the mark. – Я чувствую себя не совсем хорошо.
Life is going its usual way. – Жизнь идет своим чередом.

Parting

Good bye/ Bye bye/ Bye. – До свидания.
Good bye for the present / Bye for now / So long. – До свидания, пока.
See you tomorrow. – Увидимся завтра.
See you again / soon / later. – Увидимся (позже).
Good luck to you. – Желаю удачи.
All the best. – Желаю удачи.
A happy weekend to you. – Удачных выходных.
The same to you. – И вам того же.
Keep well. – Будьте здоровы; не болейте.
Well, I'd better be off. – Мне, пожалуй, пора.
It's (high) time to go home. – (Давно) пора домой.
Remember me to / Give my regards to... – Передавайте привет ...

Making An Introduction

May I introduce Mr. K. to you? – Можно представить Вам Мистера К.?
Allow me to introduce myself (to you). – Позвольте представиться.
Let me introduce you to my colleague. – Позвольте представить Вас моему коллеге.
(Please) will you introduce me to your sister. – Будьте добры, познакомьте меня с Вашей сестрой.
I'd like to meet (Dr. M). – Я бы хотел познакомиться (с доктором М).
Are you acquainted with Miss. K? – Вы знакомы с мисс К. ?
I'm glad to get acquainted with you. – Рад познакомиться с Вами.
Is this name familiar to you? – Вам знакомо это имя?
Here is my visiting card. – Вот моя визитная карточка.
Glad to meet you. – Рад познакомиться с Вами.
Pleased to know you . – Приятно познакомиться с Вами.
With pleasure. – С удовольствием.
The other day / One of the days. – На днях.
I wonder who that man is? – Интересно, кто этот человек?
What's your trade /profession / occupation ? – Какая у Вас специальность?
What does he do (for a living)? – Кто он (по профессии)?

Thanks

Thanks a lot / Many thanks. – Большое спасибо.
Thank you for reminding me / for coming. – Спасибо, что напомнили / пришли.
That's very kind of you. – Очень мило с Вашей стороны.
I'm very grateful to you. – Я Вам благодарен.
I'm very much obliged to you |... – Я Вам очень признателен.
Thank you. You've been very helpful. – Спасибо, Вы мне очень помогли.
You've done me a great favour. – Вы оказали мне огромную услугу.
I can never thank you enough. – Просто не знаю, как Вас благодарить.

Possible replies

Don't mention it / That's all right / Not at all. – Не стоит благодарности.
It's a pleasure. – Мне приятно (оказать Вам услугу).
The pleasure was mine. – Это я Вас должен благодарить.
You are (always) welcome. – Всегда готов помочь.
Please, don't thank me. – Не благодарите меня, пожалуйста.
That's really nothing. – Это пустяк.
No trouble at all. – Никакого беспокойства.

Requests

Please...; Will you ...?; Will you please...! – Пожалуйста, ...
Be so kind as to ... – Будьте любезны ...
Would you (kindly) ...? Would you please ...? – Не будете ли Вы любезны...
Would you be so good as to... ? – Не будете ли Вы так добры ...
Would you mind (+ Ving) ? – Вы не будете возражать, если ...?
Could I trouble you for ... – Можно Вас побеспокоить?
Could you do me a favour? – Не сделаете ли Вы мне одолжение?
May I ask you to... ? – Можно Вас попросить ...?
May 1 trouble you for...? – Могу я Вас побеспокоить ...?
I should be much obliged if... – Я был бы Вам очень обязан, если бы...

Possible positive replies

Why, yes. – Конечно.
Why, certainly/ of course/sure / naturally. – Конечно, естественно.
Not at all/ not in the least. – Ничуть! Ни в коей мере!
With pleasure! – С удовольствием!
By all means. – Конечно, обязательно.
All right/OK. – Хорошо, ладно.
Here you are. Here it is. – Вот, пожалуйста.
No trouble at all. – Ничуть не трудно, никакого беспокойства.

Possible negative replies

(No), I'm afraid I can't – Боюсь, я не смогу.
I'd rather not. – Пожалуй нет.
Don't! Please, don't! – Пожалуйста, не надо.
Would you mind not doing it. – Пожалуйста, не делайте этого.
Try not to ... – Постарайтесь не ...

Apologies

I'm sorry. – Простите; виноват.
Sorry I've kept you waiting. – Простите, что заставил Вас ждать.
Sorry to trouble / disturb you. – Простите за беспокойство.
I'm very sorry. I do hope I haven't hurt you. – Виноват; надеюсь я Вас не ушиб.
Excuse me. Forgive me. – Извините меня.
Excuse my troubling you. – Извините, что беспокою Вас.
Excuse me for a moment. I shan't be long. – Извините, я ненадолго отлучусь.
Excuse my back. – Простите, что (сижу) к Вам спиной.
Pardon me. I didn't mean any harm. – Извините, я ничего плохого не имел в виду.
I beg your pardon for being so rude (for being late). – Прошу извинить меня за то, что я был так груб (что опоздал).
I apologize. I didn't really mean what I said. – Прошу прощения. Я не то хотел сказать.
I must apologize. It's my fault. – Я должен извиниться. Это моя вина.

Possible replies to apologies

It's quite all right. Forget it. – Ну что Вы!
Oh, that's all right. Don't worry. – Ничего, все в порядке. Не волнуйтесь.
Not at all. – Ничего (нисколько), пожалуйста.
Never mind. – Ничего, пустяки (забудьте).
(There's) no harm done. – Никто не пострадал. Все благополучно.
No need to be sorry. – Незачем извиняться.
It's no trouble (at all). – Никакого беспокойства.
You needn't (apologize). Why should you? – Ну что Вы! Не надо. Зачем?
It's nothing to speak of. – Стоит ли об этом говорить.
It's unforgivable. How could you! – Непростительно! Как Вы могли!
It's a lame excuse / That is no excuse. – Это слабая отговорка.

Congratulatons and Wishes

My heartiest (best) congratulations to you on ... – Сердечно поздравляю Вас…
I wish you all the happiness in the world! – Желаю Вам большого счастья!
I wish you luck! – Желаю удачи!
Good luck to you! – Желаю удачи!
I wish you a speedy recovery. – Желаю Вам быстрого выздоровления!
All the best! – Всего наилучшего!
Best wishes for... – Наилучшие пожелания к ...
May all your dreams come true! – Пусть сбудутся все Ваши желания!
A very enjoyable holiday to you! – Желаю весело провести каникулы!
Have a good time! – Желаю хорошо провести время!
Many happy returns of the day! – Поздравляю с Днём рождения!
Happy New Year! – С Новым годом!
Merry Christmas! – Веселого Рождества!

Agreement and Disagreement

That's (all) right. – Хорошо. Правильно.
You are right! Right you are! – Вы правы!
I agree to any terms. – Согласен на любые условия.
I agree to your proposal. – Согласен с Вашим предложением.
Agreed! (That's) Settled! – Решено! Договорились!
That's a good idea. – Хорошая мысль.
That suits me. – Это меня устраивает.
That's just what I think. – Это как раз то, что я думаю.
That's just what 1 was going to say. – Это как раз то, что я хотел сказать.
That's it! Exactly so! Quite so! – Вот именно! Да, так оно и есть!
I am of the same opinion. – Я того же мнения.
It goes without saying. – Само собой разумеется.
By all means. – Конечно.
Let it be so. Very well then. – Пусть будет так. Так и быть.
Why not! I don't mind. – Почему бы и нет. Я не возражаю.
I have nothing against it. – Ничего не имею против.
I have no objections. – Не имею возражений.
Certainly / Decidedly not. – Конечно, нет. Безусловно, нет.
You are wrong. You are mistaken. – Вы не правы. Вы ошибаетесь.
I can't agree (I disagree) with you. – Не могу согласиться. Не согласен.
I'm of different opinion. – Я другого мнения.
Iam against it. I object to it. – Я против. Возражаю.
That won't do! – Меня это не устраивает!
That won't work!It wouldn't work! – Из этого ничего не выйдет!
It's out of the question. – Об этом не может быть и речи.
By no means. On no account. – Ни в коем случае.
Under no circumstances. – Ни при каких обстоятельствах.
It isn't worth talking about. – Стоит ли говорить об этом.
I see no reason to do it. – Не вижу оснований делать это.
Rubbish! – Чепуха! Ерунда! Вздор!

Regret. Sympathy

Come, come! I There, there! – Ну, довольно! Успокойся!
I'm so sorry for you (about it). – Мне Вас так жаль. Я очень огорчен.
I sympathize with you. – Я Вам очень сочувствую.
What a pity! – Какая жалость!
How dreadful! How awful! – Какой ужас! Ужасно!
You don't say so! (You don't mean it!). – Да ну! Не может быть! Неужели!
Relax! Cheer up! – Не унывай! Выше голову!
I wish I could do smth. for you. –Я бы охотно что-нибудь сделал для Вас.
Could I help you in anyway? – Могу ли я чем-нибудь Вам помочь?
Don't worry. Take it easy. – Не беспокойся. Смотри на вещи проще.
Don't be downhearted. – Не падайте духом.

Don’t let that upset / distress you. – Пусть это Вас не огорчает.
Calm down. – Успокойтесь.
Don’t take it so much to heart. – Не принимайте все близко к сердцу.
Don’t get upset. – Не расстраивайтесь.
Keep your temper. – Возьмите себя в руки.
Pull yourself together. – Возьмите себя в руки.
Things do happen. – Всякое бывает.
Things will come right. – Все обойдется. Все будет хорошо.
If I were you I shouldn’t... – На Вашем месте я не стал бы ...
You’d better... – Вам бы лучше...
TIt can’t be helped. – Что ж, ничего не поделаешь.
You’ll get over it. – Вы это переживете.

Warning. Reprimands

Take care! Look out! Look ahead! – Берегись! Осторожно!
Keep your eyes open. – Не зевай. (Смотри в оба.)
Mind the steps. – Осторожнее, там ступеньки.
There, now. Didn’t I tell you! – Вот видите. Разве я не говорил Вам!
I must warn you. – Я должен предупредить Вас.
It’s too bad of you. – Это очень нехорошо с Вашей стороны.
I won’t have it. – Я этого не потерплю.
You mustn’t do such things! – Вы не должны этого делать!
Mark my words. – Запомни мои слова.
This is not to happen again. – Чтобы больше это не повторялось.
Don’t you dare! If you dare! – Посмей только!
You’ll get into trouble. – Вы когда-нибудь наживете себе беду.
Stop interfering into other people’s affairs. – Прекрати вмешиваться в чужие дела.
Don’t what me. – Не приставайте ко мне с расспросами.
Don’t let me down! – Не подводите меня!

Anger. Quarrel

I’m angry with you. – Я на тебя сержусь.
I’m beside myself with rage. – Я вне себя от злости (гнева).
It will drive me mad. – Это меня с ума сведет.
It’s ridiculous! – Это смешно!
How annoying! – Какая досада!
Shame on you! – Как вам не стыдно!
How dare you! – Как вы смеете!
You’ve gone too far. – Вы забываетесь.
You always find fault with me. – Вы всегда придираетесь ко мне.
I’m fed up. – С меня хватит.
I like that! – Хорошенькое дело!
There it is! There you are – Вот оно что! Ну и ну! Дожили!

Leave me alonel! – Оставьте меня в покое!
What does it matter to you? – Какое Вам дело?
It's none of your business! – Не Ваше дело!
Mind your own business. – Не лезь в чужие дела.
I can't stand him. – Я его терпеть не могу.
Control yourself. – Возьми себя в руки.
Keep your temper. – Возьми себя в руки.

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