

ФЕДЕРАЛЬНОЕ АГЕНТСТВО ВОЗДУШНОГО ТРАНСПОРТА
(РОСАВИАЦИЯ)

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ
УНИВЕРСИТЕТ ГРАЖДАНСКОЙ АВИАЦИИ» (МГТУ ГА)

Кафедра специальной языковой подготовки

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ИНОСТРАННЫЙ ЯЗЫК. АНГЛИЙСКИЙ ЯЗЫК

Учебно-методическое пособие
(сборник упражнений)

*для студентов I–II курсов
специальности 25.05.05
всех форм обучения*

Москва
ИД Академии Жуковского
2021

УДК 811.111
ББК Чи (Англ.)
Ш16

Рецензент:

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Ш16

Иностранный язык. Английский язык [Текст] : учебно-методическое пособие (сборник упражнений) / А.К. Шадьбаева. – М.: ИД Академии Жуковского, 2021. – 56 с.

Данное учебно-методическое пособие издается в соответствии с рабочей программой учебной дисциплины «Иностранный язык» по учебному плану для студентов I–II курсов специальности 25.05.05 всех форм обучения.

Рассмотрено и одобрено на заседаниях кафедры 15.04.2021 г. и методического совета 20.04.2021 г.

УДК 811.111
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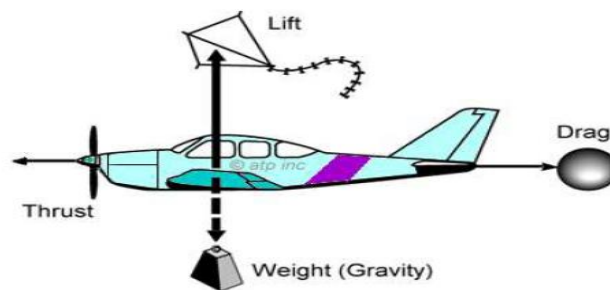
UNIT 1 PRINCIPLES OF FLIGHT

Task1. Read and translate the text.

What makes flight possible? There are certain laws of nature or physics that are applied to any object that is lifted from the Earth and moved through the air. To analyze and predict airplane performance under various operating conditions, it is important that pilots gain as much knowledge as possible concerning the laws and principles that apply to flight. If, for example, the pilot allows the airplane to fly too fast, damage to the airplane's structure might come about. If the pilot allows the airplane to fly too slow, the airplane can lose its lift and simply fall from the sky. It's the pilot's job to manage the airplane between these (and other) extremes. When approaching any extreme limits of the flight condition, the pilot must have a good understanding of what's about to happen.

When in flight, there are certain forces acting on the airplane. It is the primary task of a pilot to control these forces so as to direct the airplane's speed and flight path in a safe and efficient manner. To do this the pilot must understand these forces and their effects. Among the aerodynamic forces acting on an airplane during flight, four are considered to be basic because they act upon the airplane during all maneuvers. These basic forces are:

- Lift
- Weight (Gravity)
- Thrust
- Drag



Lift is the upward force created by an airfoil when it is moved through the air. Although lift may be exerted to some extent by many external parts of the airplane, there are three principal airfoils on an airplane—the wing, propeller, and horizontal tail surfaces. The aircraft's wings provide the necessary lift. Air passes over and under the wings. Passing over the top surface of the wing, air must travel a greater distance and speeds up. The increase in speed creates an area of low pressure over the wings and over the aircraft in general, while a zone of higher pressure is created under the wings. It is the low pressure area which pulls the aircraft upward.

Gravity is the downward force which tends to draw all bodies vertically toward the center of the Earth. The airplane's center of gravity (CG) is the point on the airplane at which all weight is considered to be concentrated. For example, if an airplane was suspended from a rope attached to the center of gravity, the airplane would balance. The location of the center of gravity depends upon the

location and weight of the load placed in the airplane. This is controlled through weight and balance calculations made by the pilot prior to flight. The exact location of the center of gravity is important during flight, because of its effect on airplane stability and performance.

The propeller, acting as an airfoil, produces the thrust, or forward force that pulls (pushes) the airplane through the air. It receives its power directly from the engine, and is designed to displace a large mass of air to the rear. It is this rearward displacement that develops the forward thrust that carries the airplane through the air. This thrust must be strong enough to counteract the forces of drag and to give the airplane the desired forward motion. The direction of this thrust force is referred to as the thrust line. Thrust is provided by the engines and propels the aircraft forward.

Drag is the rearward acting force which resists the forward movement of the airplane through the air. Drag acts parallel to and in the same direction as the relative wind. Every part of the airplane which is exposed to the air while the airplane is in motion produces some resistance and contributes to the total drag. Drag is caused by friction as air passes over and around the aircraft structure.

All the forces must be in balance, in order to make the flight steady and smooth.

Task2. Answer the questions.

1. What should a pilot know in order to predict airplane performance under various operating conditions?
2. What can happen to the airplane if it flies either too fast or too slow?
3. Name the forces acting on an airplane in flight?
4. What is lift created by?
5. Name the principle airfoils of an airplane.
6. Which direction does gravity act in?
7. What does the center of gravity location depend on?
8. Which flight parameters does the center of gravity location effect?
9. What produces thrust?
10. Which force must thrust counteract?
11. How does drag act?
12. When can the flight be steady and smooth?

Task3. Translate the following words and phrases into Russian.

Predict; airplane performance; various operating conditions; airplane's structure; lose lift; approach; extreme limits; forces acting on the airplane; aerodynamic forces; act upon the airplane; an airfoil; external parts of the airplane; horizontal tail surfaces; an area of low pressure over the wings; the center of gravity; weight and balance calculations; airplane stability and performance; to displace; to the rear; to counteract; the desired forward motion; rearward acting force; to resist; the forward movement; friction;

Task4. Translate the following words and phrases into English and prepare them for dictation.

аэродинамические силы; воздействие на самолет; характеристики самолета; различные условия эксплуатации; конструкция самолета; устойчивость и характеристики самолета; потеря подъемной силы; заход на посадку; крайние пределы; силы, действующие на самолет; движение вперед; аэродинамический профиль; внешние части самолета; смещение; назад; противодействие; горизонтальные хвостовые поверхности; область низкого давления над крыльями; центр тяжести; расчеты веса и баланса; желаемое движение вперед; сила, действующая назад; сопротивление; трение; прогнозировать;

Task5. Fill in the following information about flight using the language contained in the above passage.

1. What.....possible?
2. Flight by four factors called
 - A.
 - B.
 - C.
 - D.
3. It is..... which causes lift.
4. It is which causes drag.
5. Thrust by the aircraft's engines and is the force which

Task6. Match the terms and the definitions.

1.	Acceleration	a.	the angle between the chord line of the wing and the direction of the relative wind
2.	Airfoil	b.	one of the various forces or parts of a combination of forces.
3.	Angle of Attack	c.	the speed or rate of movement in a certain direction.
4.	Camber	d.	the total surface of the wing (square feet), which includes control surfaces and may include wing area covered by the fuselage (main body of the airplane), and engine nacelles
5.	Chord	e.	the maximum distance from wingtip to wingtip
6.	Component	f.	the force involved in overcoming inertia, and which is defined as a change of velocity per unit of time
7.	Speed	g.	an imaginary straight line drawn from the leading edge to the trailing edge of a cross section of an airfoil
8.	Velocity	h.	the distance traveled in a given time.
9.	Wing Area	i.	any surface designed to obtain reaction such as lift from the air through which it moves.

10	Wingspan	j.	curvature of the airfoil from the leading edge to the trailing edge
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Task7. Fill in the gaps with the words from the box.

Branch; resistance; coefficient; drag; surface; amount; streamlined; laminar; turbulent; designed; helicopter; profiles; velocity.

The _____ of fluid dynamics concerned with airflow - called aerodynamics - is relevant to the design of aircraft, vehicles and structures.

Aerodynamic drag (or drag) is the _____ of an object to the airflow. It is measured by the drag _____. Objects with a low drag coefficient have little force exerted on them by the airflow. We say they are streamlined. There are different types of _____:

- Form drag is due to the shape of the object.
- Skin friction is the drag caused by air flowing over the _____ of the object.
- Pressure drag is the pressure differential between the air upstream of the object

(flowing towards it) and the air downstream of it (flowing away behind it). The lower-pressure zone close behind a moving object is often called the slipstream.

- Interference drag depends on the _____ of turbulence around the object.

In aerodynamics, engineers focus on the airflow in the boundary layer - the air close to the surface of an object. If the object is _____, the airflow in the boundary layer will be _____, following a direct, clean path. With a less streamlined object, the airflow will be _____, flowing in a disturbed, messy fashion. A turbulent flow produces more drag than a laminar flow, and generates a bigger wake, the V-shaped zone of turbulent air behind the object. Wakes contain vortices. A vortex is a twisting flow - like water going down the plughole in a bath.

Airfoils are components _____ to make air flow in specific ways. They include:

- aircraft wings, which generate lift - that is, upward aerodynamic force;
- the blades of plane propellers, and _____ rotor blades, which generate thrust to propel aircraft through the air;

Airfoils have specially designed _____ (cross-sectional shapes), often with their leading edge - the front edge, relative to the airflow — shaped differently to their trailing edge, at the rear. The behaviour of air around an aerofoil depends on the _____ of the airflow, and also on the angle of attack (or pitch) of the aerofoil - its angle relative to the airflow.

Grammar

Nouns

Countable nouns

component/components • cycle/cycles • defect/defects
factory/factories • line/lines • machine/machines

Uncountable nouns

dust • environment • friction • harm • inhalation • waste

Task 8.

a. Make up the plural forms of the following nouns.

Flap, tab, loss, approach, fix, flash, velocity, axis, phenomenon, aircraft, series, force, slat, cause, area, datum, setting, movement, path, angle, altitude, engine, wing, flight.

b. Match the words with the Russian equivalents.

Траектория, вкладка, потеря, самолет, вспышка, скорость, установка, ось, явление, крыло, сила, предкрылок, исправление, причина, исходные данные, движение, угол, область, закрылок, серия, высота, двигатель, полет, сближение.

Task 9. Complete the sentences using the plurals of the words in brackets.

1. There are certain _____ of nature or physics that are applied to any object that is lifted from the Earth and moved through the air. (law)
2. It is important to predict airplane performance under various operating _____. (condition)
3. When in flight, there are certain _____ acting on the airplane. (force)
4. Air passes over and under the _____. (wing)
5. The low pressure area pulls the _____ upward. (aircraft)
6. Weight and balance _____ are made by the pilot prior to flight. (calculation)
7. Airfoils have specially designed _____. (profile)

Task 10. Choose the correct form.

1. The *computers/computer* are set to control stability in light of flight parameters.
2. The pilot needs to trim the *aircraft/aircrafts* continuously during take-off.
3. A *gusts/gust* of wind can cause the aircraft to sideslip (slip to the side).
4. The aircraft rolls when one *wings/wing* moves up and the opposite wing down.
5. The aircraft yaws to the left or right around its vertical *axes/axis*.
6. The pilot can pitch the *nose/noses* up or down. Wind can pitch the nose up or down.
7. We exert *pressures/pressure* on an object.
8. The *pilot/pilots* performs the proper actions to bring the aircraft back (to return the aircraft to stable conditions).
9. The *aircraft/aircrafts* moves laterally.
10. The pilot raises the horizontal *elevator/elevators* to force the tail down.

11. The pilot lowers the horizontal elevators to force the *tail/tails* up.

Task11. Find the words in the text which mean the same.

Used, raised, to study carefully, different, obtain, quickly, give, go faster, equilibrium, aircraft body, drag, overall, disposition, vital, back.

Task12. Make up all types of questions to the sentences.

1. Drag acts parallel to and in the same direction as the relative wind.
2. The pilot's job to manage the airplane between extremes.
3. All the forces must be in balance, in order to make the flight steady and smooth.

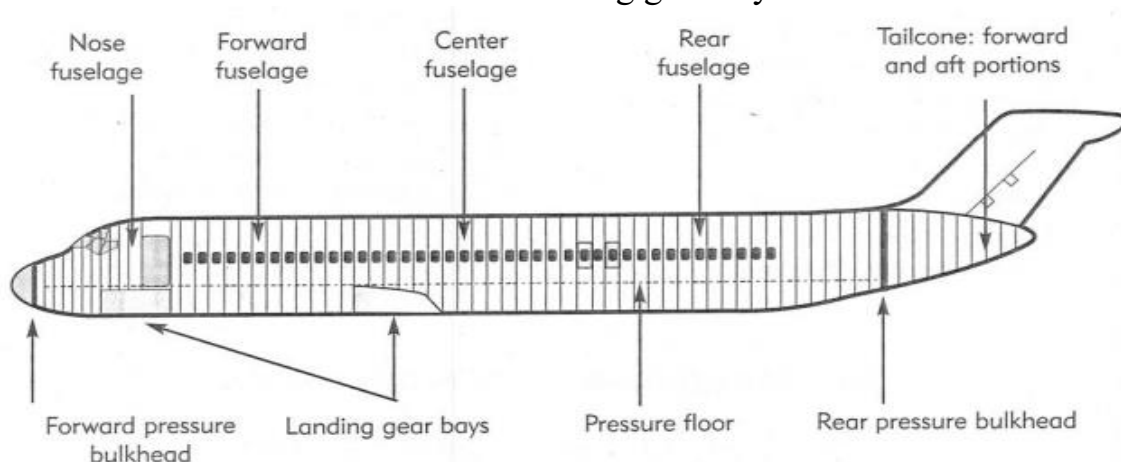
Task13. Make oral presentation on the following topics:

1. Forces of flight.
2. Streamlining: a way to reduce drag
3. Factors governing lift

UNIT 2 AIRCRAFT STRUCTURES IN MORE DETAIL

Task1. Read and translate the text.

The aircraft fuselage is made up of 3 main sections: the forward fuselage, the center fuselage and the rear fuselage. Each section is composed of individual frames, fitted together to make up the total section. Most passenger aircraft feature a circular-section fuselage measuring from 3.5m to 5.6 or 6m in diameter. The under floor area, beneath the pressure floor, usually has at least 2 large holds reserved for containerized loads, and in some instances, pallets. The most recent aircraft feature compartments which are arranged at a convenient height enabling easy access for maintenance personnel. In the under floor area are also found avionics, electric, air conditioning, fuel and hydraulic systems. The fuselage sections also contain the nose and main landing gear bays.



An aircraft's wings are designed to provide the necessary lift. On a Boeing 747 wingspan measures nearly 60 m. To ensure proper aerodynamic functioning, wings are swept back at an angle, for instance 37° on the 747. Flaps, slats (also called leading edge flaps) and spoilers (air brakes) are used to modify lift. At take-off, when maximum lift is required, the flaps are fully extended, resulting in an increase in wing area of 20% and an increase in lift of 80%. On some Airbus models, fully extended flaps prolong chord (straight line between leading and trailing edges) by 25%. On landing, flaps are fully extended down, with spoilers also fully raised.

Wings are mounted at an angle (for instance, 7° on the large Boeing 747) to the horizon for improved aerodynamic features. This is the dihedral angle.

The number of slats and flaps and their configuration vary depending on the aircraft. Flaps on the trailing edge ride on tracks and are deployed in take off phase to improve lift. Spoilers are raised to disrupt airflow on the upper wing surfaces and when deployed on landing result in lift spoilage (they are also called lift dumpers because of this). When used in flight their deployment results in a rapid decrease of speed and increased rate of descent (hence spoilers are also referred to as speed brakes).

Ailerons are used in roll. An upward movement causes reduced lift; a downward movement provides increased lift.

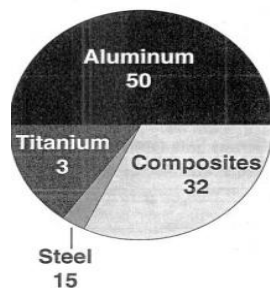
Besides their importance in generating lift, wings also house the aircraft's fuel tanks located within the wing boxes.

Task2. Answer the questions

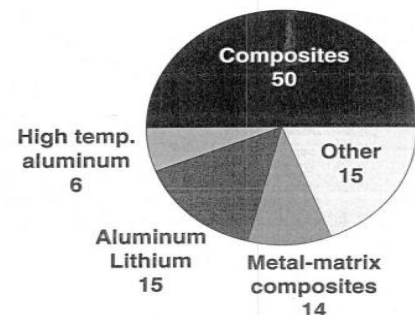
1. How many sections is the aircraft fuselage made up of?
2. What is the diameter of most passenger aircraft?
3. What can be found in under floor area?
4. Name all parts of the fuselage.
5. What should a properly designed wing provide?
6. Why are wings swept back?
7. What is used to modify lift?
8. At what stage of the flight are the flaps fully extended?
9. What does the number of slats and flaps vary from?
10. What is called lift dumpers?
11. How does the movement of ailerons effect lift?
12. Where are fuel tanks located?
13. What materials are used for construction of subsonic and supersonic aircraft?

Materials used in aircraft construction

SUBSONIC AIRCRAFT



SUPERSONIC AIRCRAFT



Figures represent percentage of materials used in overall aircraft construction.

Task3. Translate the following words and phrases into Russian.

the forward fuselage; the center fuselage; the rear fuselage; individual frames; compose; feature; circular-section fuselage; pressure floor; containerized loads; convenient height; enable; easy access; maintenance personnel; avionics; landing gear bays; wingspan; measure; ensure; proper aerodynamic functioning; flaps; slats; extend; prolong chord; configuration; deploy; take off phase; to disrupt airflow; rapid; decrease of speed; increased rate of descent; in roll; generate lift.

Task4. Translate the following words and phrases into English and prepare them for dictation.

увеличенная скорость снижения; в крене; создавать подъемную силу; носовая часть фюзеляжа; центральная часть фюзеляжа; надлежащее аэродинамическое функционирование; задняя часть фюзеляжа; отдельный каркас; герметичный пол; давать возможность; для нарушения воздушного потока; легкий доступ; обслуживающий персонал; авионика; отсеки шасси; размах крыльев; измерять; обеспечивать; закрылки; составлять; характеристика; фюзеляж круглого сечения; предкрылки; вытягивать; удлинять хорду; конфигурация; развертывание; фаза взлета; быстрое; снижение скорости; контейнерные грузы; удобная высота;

Task5. Complete each sentence

- a. Three main sections
- b. Individual components, called frames ...
- c. The passenger compartments and the storage compartments are separated by...
- d. The area beneath the passenger cabin...
- e. A matter of great importance for baggage handlers and ground maintenance crews is ...
- f. Landing gear is located
- g. Aft of the rear pressure bulkhead

Task6. Complete the following sentences using the structures given in the box.

-is made of (+ material) - is made up of (+ components) - is composed of (material or components) - consists of (+ parts, elements) - comprises (+ the components) - is divided into (parts, sections) - is separated into (parts, sections)
--

1. The vertical stabilizer _____ of two parts: the fin and the rudder.
2. Two parts _____ the horizontal stabilizer: the fin, foremost and the rudder, rearmost (or aft most).

3. Two parts _____ the horizontal stabilizer: the fin, the foremost component, and the rudder, the aft most.
4. The system _____ 3 independent units.

Task7. What is the word or expression?

1. The straight line joining leading edge and trailing edge:
2. The angle wings make to the horizon:
3. Allow and guide the extension and retraction of flaps:
4. Used in flight to reduce speed:
5. Used upon landing to reduce lift:

Grammar

Present simple and Present continuous

	<i>Positive</i>	<i>Negative</i>	<i>Question</i>
<i>Present simple active</i>	We receive raw materials from our suppliers.	The supervisor doesn't prepare the papers.	Where do you store finished goods?
<i>Present simple passive</i>	All goods are received at this depot.	The bill of lading isn't dispatched.	Where are the goods stored?
<i>Present continuous active</i>	The supervisor is checking the delivery.	I am not sending out a bill of lading with this shipment.	When are we moving to the new depot?
<i>Present continuous passive</i>	Goods are being unloaded over there.	At present the pallets are not being reused.	Why are those crates being moved?

Present perfect

	<i>Positive</i>	<i>Negative</i>	<i>Question</i>
<i>Present perfect active</i>	Our contractor has built a supporting wall.	They have not drained the water yet.	How many tunnels have they dug?
<i>Present perfect passive</i>	The walls have been built.	The water has not been drained.	Has the cable been laid?
<i>Present perfect continuous active</i>	The supervisor has been checking the walls today.	I have not been working on that site since last year.	How long have they been excavating at the site?

Task8. Choose the correct verb form in each of the following.

1. In this process, the mixture *is heated/is heating* to 120°C.
2. Once the salts are *dissolving/have dissolved*, the heat is reduced.
3. Several people *have survived/are surviving* the earthquake and *are treating/are being treated* in hospital at the moment.
4. For security purposes the employees *change/are changing* their passwords regularly.
5. Up until now people in this area *have taken/take* waste plastic to recycling centers, but at present we *have tried/are trying* a curbside collection system.

Task9. Complete the answers by putting the verb in brackets into the appropriate present tense in the active or passive.

1. A: Do you normally hold these products in stock?
B: No. They normally..... to order. (make)
2. A: Is the chief engineer here at the moment?
B: I'm afraid not. He currently the plant in the north of Scotland. (inspect)
3. A: Can I see the new design?
B: Yes, of course. It just off the production line. (come)
4. A: How many units do you produce a month?
B: We 5,000 units a month and only a very small number(produce)
(reject)
5. A: How long have you been using imported raw materials?
B: We (import) rayon for many years but we only just (begin) using imported polyester.
6. A: Is this the natural color of the fabric?
B: No, this fabric (dye).
7. A: And how long will it be kept in store?
B: Not long at all. We (dispatch) this load tomorrow afternoon.

Task10. Complete the following text with the correct form of the verbs in brackets.

Over the past ten years, this area (*experience*) severe flooding. Houses (*damage*) and roads (*destroy*). The local authority (*decide*) to introduce a flood control system. At present our workforce (*build*) a dam on the west side of the town and dikes along the river bank(*heighten*). We must complete the work within two months, so at present we (*work*) 24 hours a day. We (*believe*) that these measures will solve the problem in the short term but on 1st May we (*start*) work on a new watercourse. The plans already..... (*draw up*) and we (*be*) ready to start next week.

Task11. Reorder the words to make passive sentences.

1. are main the together spliced three assemblies
2. fitted the has yet cockpit been?
3. can now tested the systems electrical be
4. by people robots will replaced be
5. painted white the blue and aircraft was

Task12. Match the words in the box with the definitions

Fuselage, wings, landing gear, rudder, struts, power plant, propeller, skin, fin, flaps

- a. large surfaces which project horizontally from the main body of the plane
- b. the equipment which moves the aircraft forward
- c. equipment which supports the aircraft on the ground
- d. the main longitudinal body of the plane
- e. the covering surface of the main body
- f. strong rods or bars that are attached to the wings
- g. small, hinged control surfaces on the wings
- h. fixed vertical surface at the back
- i. pitched blades on the front of the power plant
- j. hinged vertical surface at the back of the plane

Task13. Make up all types of questions to the sentences.

1. We receive raw materials from our suppliers.
2. The bill of lading is dispatched.
3. Our contractor has built a supporting wall.
4. The supervisor has been checking the walls today.

Task14. Make oral presentation on the following topics:

1. Aircraft structure
2. Fuselage construction
3. Structural parts of the wing

UNIT 3 AIRCRAFT SYSTEMS

Task1. Read and translate the text.

Oil system

• the engine-driven oil pump supplies oil from the sump or tank through oil lines, passages and galleries to the moving parts of the engine to keep them lubricated and thereby avoid damage. The pump is the primary component of the system because it keeps the oil circulating throughout the engine.

- the pressure relief valve is a spring-loaded device which opens to relieve pressure if the pressure set on the valve is exceeded. The valve enables oil to return to the pump inlet.
- oil filters are provided on all systems. Their purpose is to remove foreign particles, impurities, carbon particles and dust and dirt from the circulating oil. Oil picks up such impurities as it travels through the engine. Oil filters are inspected regularly and replaced at prescribed intervals.
- the oil filter by pass valve is located within the oil filter housing. The purpose of this valve is to allow oil to bypass the filter if the filter becomes clogged. It thus prevents the flow of oil from being impeded or stopped.
- the sump is a reservoir fastened to the lower part of the engine casing.

Hydraulic system

Hydraulic systems in aircraft provide a means for the operation of aircraft components. The operation of landing gear, flaps, flight control surfaces, and brakes is largely accomplished with hydraulic power systems. Hydraulic system complexity varies from small aircraft that require fluid only for manual operation of the wheel brakes to large transport aircraft where the systems are large and complex. To achieve the necessary redundancy and reliability, the system may consist of several subsystems. Each subsystem has a power generating device (pump) reservoir, accumulator, heat exchanger, filtering system, etc. System operating pressure may vary from a couple hundred pounds per square inch (psi) in small aircraft and rotorcraft to 5,000 psi in large transports.

Cabin pressurization and air conditioning systems

The air conditioning system depends on compressed air from the engines, the APU or any ground supply unit. On wide body jets, a typical system is made up of two separate air conditioning bypass packs located in the fuselage center section. A pneumatic system controller together with bleed air pre coolers ensures proper supply to packs of compressed air from the engines via a pneumatic duct. Air bled from engines is too hot and compressed to be used to pressurize or cool the cabin, although it is suitable for other uses. Part of the bled air is tapped and sent to the air conditioning packs which supply air to the cabin at required pressure and temperature.

During cruise phase, both fresh air and recycled cabin air deliver about 7200 ft³ per minute (3400 liters per second). In the passenger cabins air circulates by being drawn in at floor level and expelled overhead at storage compartment level.

During on-ground and in-flight periods, the passenger compartment can be heated to 20-21°C. Similarly, the air conditioning system is designed to cool the passenger cabin to 25-27°C with maximum humidity ranging between 65% and 60% when the outside temperature exceeds 30°C.

Separate temperature controls are located in the cockpit and the passenger compartments. The cockpit receives a continual flow of fresh air. Cockpit crew members also have individual air outlets available at their seats. The cockpit is also equipped with adjustable outlets allowing for windshield defogging.

Task2. Answer the questions.

1. What are the main components of the aircraft oil system?
2. Why is the pump a primary component of the oil system?
3. When does the pressure relief valve open?
4. What is the purpose of the filters?
5. What is the purpose of the bypass valve?
6. What kind of power accomplishes the operation of landing gear, flaps, flight control surfaces, and brakes?
7. What does the complexity of hydraulic system vary from?
8. What is a typical air conditioning system on wide body jets made up of?
9. What temperature can the passenger compartment be heated during on-ground and in-flight periods?
10. What kind of air is used to pressurize or cool the cabin?

Task3. Translate the following words and phrases into Russian.

the engine-driven oil pump; the sump; through oil lines; to keep lubricated; avoid damage; the pressure relief valve; a spring-loaded device; oil filters; to remove foreign particles, impurities, carbon particles; the oil filter by pass valve; become clogged; to prevent; the engine casing; flight control surfaces; complexity; vary; redundancy and reliability; power generating device (pump); accumulator; heat exchanger; filtering system; APU; pneumatic system controller; a pneumatic duct; humidity; adjustable outlet; windshield defogging.

Task4. Translate the following words and phrases into English and prepare them for dictation.

масляный насос с приводом от двигателя; поддон; через маслопроводы; для поддержания смазки; во избежание повреждения; клапан сброса давления; подпружиненное устройство; масляные фильтры; для удаления посторонних частиц, примесей, частиц углерода; масляный фильтр перепускного клапана; засоряется; для предотвращения; кожух двигателя; поверхности управления полетом; сложность; изменяются; избыточность и надежность; устройство для выработки энергии (насос); аккумулятор; теплообменник; система фильтрации; наземная силовая установка; контроллер пневматической системы; пневматический канал; влажность; регулируемый выпуск; запотевание лобового стекла.

Task5. Fill in the blanks using verbs from the box to obtain a complete description.

An example of a typical cooling system

Prevent, happen, occur, cool, provide, drive, heat up, transform, convert

The piston engine (1) the propeller and thus, (2) chemical energy of the fuel into heat and pressure energy through combustion with air. Heat and

pressure energy' are (3) into mechanical energy needed to (4) the propeller. But the engine (5) , leading to high engine temperatures. In some engines, it is airflow which (6) the engine. Cylinders are fitted with cooling fans which increase the exposed surface area, allowing better cooling. Uneven cooling sometimes (7)..... . To (8) this from (9) Certain key features are (10)

Task6. Complete this table of verbs and nouns.

	<i>verb</i>	<i>Noun</i>
1		Production
2	measure	
3	connect	
4		Lubrication
5	develop	
6	fit	
7	assembly	
8		Inspection
9	align	
10	maintain	
11		Installation

Task7. Choose the correct prepositions to complete the sentences.

- The switch must be moved *in / to* the OFF position before the plate is unscrewed.
- Hydraulic fluid flows *under / through* the line.
- Fuel is pumped *from / out* one tank to another.
- Faulty components must be removed *up / from* the engine and replaced immediately.
- The piston is forced *out of / in* the chamber by the fluid.
- Before take-off, the aircraft's fuel tanks are filled *with / by* kerosene.
- The hydraulic fluid is stored *in / on* a special container.
- The pilot presses *up / down* the brake pedal to slow the aircraft.
- The check valve prevents oil flowing by gravity *into / in* the engine.
- A valve piston is installed *in / between* the check valve and the inner end of the filter.

Task8. Reorder the words in these sentences.

- cool / the function / is / of the compressor / the coils / to keep
- contains / a / filter / so that / is used / the freshened air / no dirt
- sends / into the room or air-conditioned area /the fan / the air
- humidity and temperature / the hygrometer / respectively / measure / and the thermostat
- are compared / values / values / the required / the measured / with
- an / and recirculating / AC / a comfortable atmosphere / air / by / provides / cooling and drying

7. the air / excess moisture / condense / to / is cooled
8. the reheater / are activated / and cooler / as required

Task9. Match the words to make compound nouns.

1 air	a coil
2 electric	b control
3 automatic temperature	c air
4 hot-water	d conditioning system
5 recirculated	e temperature
6 fresh	f moisture
7 outside air	g heating element
8 condensed excess	h air

Grammar

Adjectives and adverbs

1. Here are some typical adjective endings and adjective forms:

-ate/-ite	accurate	-ic	scientific
-ful	harmful	-ous	dangerous
-al/-ial	artificial	-ing	mining
-ive	active	-ed	finished
-able/-ible	renewable	-ant/-ent	transparent

2. Other adjectives, particularly short ones, do not have special endings

bad • big • good • old • small • young

3. Most adverbs are formed by adding “ly” to the adjective

adjective	harmful	active	scientific	dangerous	transparent	artificial
adverb	harmfully	actively	scientifically	dangerously	transparently	artificially

4. Some adjectives have the same form as adverbs

early • fast • hard • late • straight

Task10. Form an adjective from the following words by adding the correct suffix: -ful, -ie, -ous, -y, -ant, -al, -able, -ent, -ed, -ial, -ive, -ible.

Danger; dirt; magnet; rely; origin; experiment; wash; flex; expense; excel; resist; use; industry.

Task11. Complete the following sentences with the adjective and adverb in brackets. Use each word once only.

1. The system will shut down..... (automatic/ automatically)
2. New testing methods have made the process much more Quality control now runs more (efficient/efficiently)
3. Our aim is to ensure..... operation at the plant. The manufacturing process should run..... (smooth/smoothly)

4 Demand for electricity is lower in the evening. Statistics show that there is a fall in demand after 10 p.m. (*general/generally*)

5. People are becoming more interested in friendly products. There is a growing

interest in issues. (*environmental/environmentally*)

6 Safety procedures must be observed to avoid accidents. The manager in a coal mine must be about activities underground. (*strict/strictly*)

Task12. Here is part of a presentation about the textile industry in the UK. Choose the correct word in bold.

The number of people who work in the textile **manufactured/manufacturing** industry in the UK has fallen **considerable/considerably** over the last 50 years. Today, it employs **approximately/approximate** 130,000 people. Textiles for clothing and carpets have always been **important/importantly** but today there is **increasing/increasingly** trade in fabrics for **industrial/industrially** applications. Fabrics are used **increasing/increasingly** in the healthcare and automotive industries. The export of wool and **woolen/wool** products has remained fairly **constantly/constant** over the last 15 years. UK also has a **significant/significantly** silk industry, which produces over 70 million pounds worth of goods **annual/annually**. The UK linen trade has an **excellent/excellently** reputation for quality and service and British exports remain very **healthy/healthily**. The UK expertise in chemistry is **extensive/extensively** and this is **important/importantly** to the **dying/dyed** industry. The manufacturing of dyestuffs is **relative/relatively** strong. The sale of carpets contributes to the sale of textiles **significant/significantly**. The carpet industry has **particular/particularly** strengths in the **high/highly** quality end of the market.

Task12. Make up questions to the underlined parts of the sentences.

1. The air conditioning system depends on compressed air from the engines. (3)

2. The pump is the primary component of the system because it keeps the oil circulating throughout the engine. (3)

3. Hydraulic systems in aircraft provide a means for the operation of aircraft components. (3)

Task13. Make a presentation on one of the following topics:

1. Cabin pressurization and air conditioning systems

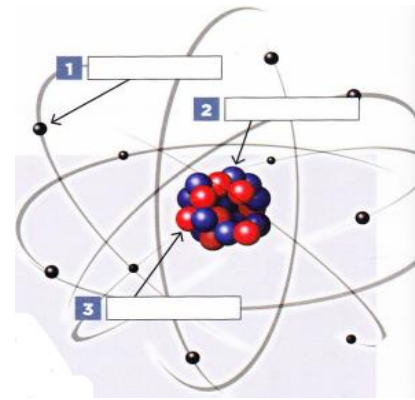
2. Oil system of the aircraft

3. Hydraulic system of the aircraft

UNIT 4 BASICS OF ELECTRICITY

Task1. Read and translate the text, label the picture with the name of each part.

All substances, solids, liquids or gases, are composed of one or more of the chemical elements. Each element is composed of identical atoms. Each atom is composed of a small central nucleus consisting of protons and neutrons around which orbit shells of electrons.



These electrons are very much smaller than protons and neutrons. The electrons in the outermost shell are called valence electrons and the electrical properties of the substance depend on the number of these electrons. Neutrons have no electric charge, but protons have a positive charge while electrons have a negative charge. In some substances, usually metals, the valence electrons are free to move from one atom to another and this is what constitutes an electric current.

There are two types of current: Direct current (DC) and Alternating current (AC).

Direct current is a continuous flow of electrons in one direction and it never changes its direction until the power is stopped or switched off.

Alternating current constantly changes its direction because of the way it is generated. The term 'frequency' is used to indicate how many times the current changes its direction in one second. Alternating current has a great advantage over direct current because it can be transmitted over very long distances through small wires, by making energy high voltage and low current.

There are several quantities that are important when we are talking about electric current. **Volts (V)** - so named after the Italian physicist Alessandro Volta - measure the difference of electric potential between two points on a conducting wire. **Amperes (A)** measure the amount of current flowing through a conductor, that is to say the number of electrons passing a point in a conductor in one second. **Coulomb (C)** measures the quantity of charge transferred in one second by a steady current of one ampere. Power is the rate at which work is performed and it is measured in **watts (W)**. A **Kilowatt (kW)**, which is equal to one thousand watts, is used to measure the amount of used or available energy. The amount of electrical energy consumed in one hour at the constant rate of one kilowatt is called kilowatt-hour.

Task2. Answer the questions.

1. What are all substances composed of?
2. What types of substances do you know?
3. Name the constituent parts of an atom.
4. What are the electrons in the outermost shell called?
5. What do the electrical properties of the substance depend on?

6. What constitutes an electric current?
7. What types of electric current do you know?
8. Compare the flow of electrons in Direct current and Alternating current.
9. Name units of measurement of electric current?
- 10 What do these units measure?

Task3. Translate the following words and phrases into Russian.

Substances; solids; liquids; identical atoms; central nucleus; outermost shell; electric charge; valence electrons; direct current; alternating current; direction; advantage; be transmitted; through small wires; high voltage; low current; quantities; electric potential; a conducting wire; the amount of current; quantity of charge; steady current; the rate; available energy;

Task4. Translate the following words and phrases into English and prepare them for dictation.

электрический заряд; валентные электроны; жидкости; идентичные атомы; центральное ядро; вещества; электрический потенциал; низкий ток; проводящий провод; твердые тела; внешняя оболочка; переменный ток; направление; преимущество; передаваться; через небольшие провода; высокое напряжение; количество; количество тока; количество заряда; постоянный ток; скорость; доступная энергия; постоянный ток.

Task5. Read the text again and complete the sentences with the missing information.

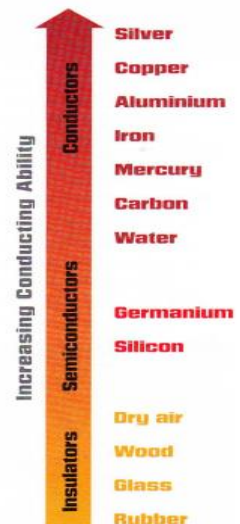
1. Elements make up
2. Identical atoms
3. Atoms consist of and
4. Inside there are and, while outside
5. Shells
6. Valence electrons
7. Neutrons do not have
8. Electricity is generated when

Task6. Read the text and decide if the following statements are true (T) or false (F), then correct the false ones.

Electricity consists of a flow of free electrons along a conductor. To produce this current flow, a generator is placed at the end of the conductor in order to move the charge.

Conductors

Electricity needs a material which allows a current to pass through easily, which offers little resistance to the flow and is full of free electrons. This material is called a conductor and can be in the form of a bar, tube or sheet. The most commonly used



conductors are wires, available in many sizes and thicknesses. They are coated with insulating materials such as plastic.

Semiconductors

Semiconductors such as silicon and germanium are used in transistors and their conductivity is halfway in between a conductor and an insulator. Small quantities of other substances, called impurities, are introduced in the material to reduce the conductivity.

Insulators

A material which contains very few electrons is called an insulator. Glass, rubber, dry wood and plastic resist the flow of electric charge, and as such they are good insulating materials.

1. A flow of electrons moving inside a conductor creates an electric current.
2. A generator is used to move the charges.
3. Electrons can easily pass through any material.
4. Any material is a good conductor.
5. Conductors are coated with insulators.
6. The presence of free electrons affects the conductivity of materials.
7. Impurities are introduced to increase conductivity.
8. Insulating materials resist the flow of electrons.

Task7. Fill in the table with proper information.

<i>Unit of measurement</i>	<i>What does it measure?</i>
1.	the number of electrons passing a given point in a conductor in one second
2.	the quantity of electricity transferred by a steady current of one ampere
3.	the amount of electric energy used
4.	the difference of potential between two points on a conductor
5.	rate at which work is done

Grammar

Comparison of adjectives

If the positive adjective has one syllable or two syllables, we form the comparative by adding -er and the superlative by adding -est:

<i>positive</i>	<i>comparative</i>	<i>Superlative</i>
<i>safe</i>	<i>safer</i>	<i>safest</i>
<i>clean</i>	<i>cleaner</i>	<i>cleanest</i>
<i>healthy</i>	<i>healthier</i>	<i>healthiest</i>
<i>narrow</i>	<i>narrower</i>	<i>narrowest</i>

For adjectives with more than two syllables, we form the comparative with **more** and the superlative with **most**:

positive	comparative	Superlative
<i>dangerous</i>	<i>more dangerous</i>	<i>most dangerous</i>
<i>flammable</i>	<i>more flammable</i>	<i>most flammable</i>

There is a small group of adjectives with irregular comparative and superlative forms:

positive	<i>good</i>	<i>bad</i>	<i>little</i>	<i>much</i>	<i>far</i>
comparative	<i>better</i>	<i>worse</i>	<i>less</i>	<i>more</i>	<i>farther/furthest</i>
superlative	<i>best</i>	<i>worst</i>	<i>least</i>	<i>most</i>	<i>farthest/furthest</i>

Task8. Complete the table..

adjective	comparative	superlative
<i>Accurate</i>		
<i>Pure</i>		
<i>stable</i>		
<i>Hard</i>		
<i>Heavy</i>		
<i>Thin</i>		
<i>far</i>		
<i>impractical</i>		
<i>bad</i>		

Task9. Five of the sentences below contain a mistake. Find the mistake and correct it.

1. This silk fabric is the best quality we produce.
2. Following the fire, many more people have been affected by smoke as we had originally thought.
3. Pollution of the ground is most serious in area A than in area B.
4. Please wear ear protection because it's noisier here than in the other areas.
5. The locked cabinet contains some of most poisonous chemicals.
6. That was the loudest explosion I've ever heard.
7. These chemicals should be kept in good containers than these.
8. Sending the goods by air is certainly the most quick but it's also the most expensive.

Task10. Use the information from the table to complete the sentences below.

Bridge	Type of bridge	Length of span in meters	Built
<i>Humber Bridge, England</i>	<i>suspension</i>	<i>1410</i>	<i>1981</i>
<i>Golden Gate Bridge, USA</i>	<i>suspension</i>	<i>1280</i>	<i>1937</i>
<i>Verrazano Narrows, USA</i>	<i>suspension</i>	<i>1298</i>	<i>1964</i>
<i>Quebec Bridge, Canada</i>	<i>cantilever</i>	<i>549</i>	<i>1917</i>
<i>Firth of Forth Railway Bridge, Scotland</i>	<i>cantilever</i>	<i>521</i>	<i>1890</i>
<i>Commodore John Barry, USA</i>	<i>cantilever</i>	<i>501</i>	<i>1974</i>
<i>New River Gorge, USA</i>	<i>steel arch</i>	<i>518</i>	<i>1981</i>
<i>Sydney Harbour Bridge, Australia</i>	<i>steel arch</i>	<i>509</i>	<i>1932</i>

The Humber Bridge is the (*long*) bridge listed in the table above. It is (*long*) than the Golden Gate Bridge in the USA but it isn't as (*old*). The Verrazano Narrows Bridge in the USA is (*new*) than the Golden Gate Bridge but

..... (*old*) than the Humber Bridge. The (*long*) cantilever bridge is the Quebec Bridge in Canada. It is 28 meters (*long*) than the Firth of Forth Railway Bridge in Scotland which is over 110 years (*old*). The (*new*) cantilever bridge is the Commodore John Barry which is also the (*short*). The Sydney Harbour Bridge is (*short*) and (*old*) than the New River Gorge.




Task11. Make up questions to the given sentences.

1. We hope to finish configuring the system by Wednesday evening.
2. We will need to shut down the system next Monday.
3. We have a few vacancies for engineers to work in aircraft industry.

Task12. Make oral presentations on the following topics:

1. Structure of atom
2. Types of electric current
3. Classification of materials by their conductivity.
4. Units of electric current measurement.

Task13. Practice making comparisons.

aircraft	AIRBUS A300 	BOEING 747 	LOCKHEED L1011 
parameters	B4-100	100-200-300 series	
PASSENGER LOAD	251	500-650	330
RANGE	3,890 km	6,460-10,500 km	8,520 km
OVERALL LENGTH	53.6 m	70.66 m	50.04 m
OVERALL HEIGHT	16.5 m	19.33 m	18.86 m
WINGSPAN	44.8 m	59.64 m	50.9 m
MTOW (TONNES)*	150	332-377	225

UNIT 5 ELECTRIC CIRCUITS

Task1. Read the text and label the picture with the name of each part.

An electric circuit or network is a pathway through which the electric current can flow. A simple circuit consists of a power source, two conducting wires, each one attached to a terminal of the source and a device through which electricity can flow. This device is called a load and it's attached to the wires. If all the parts are properly connected, the current flows and the lamp lights up. This kind of circuit is

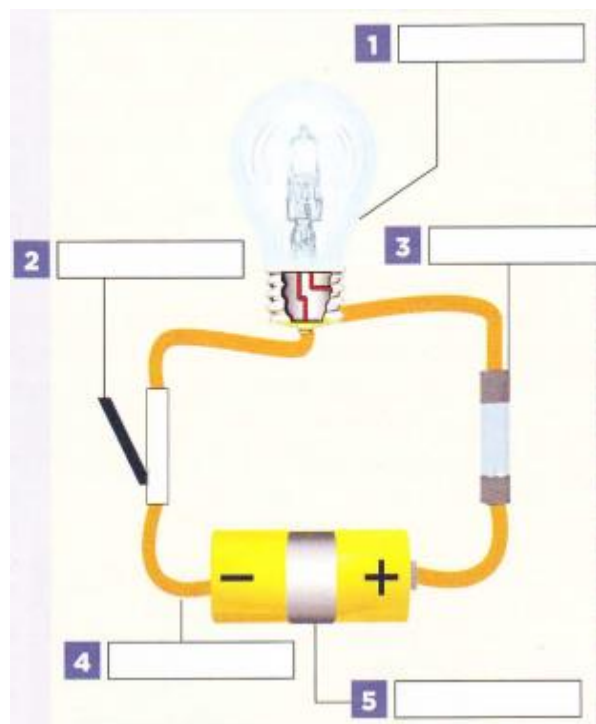
called 'closed'. On the contrary, if the wires are disconnected the circuit is called 'open' or 'broken'. The circuit can be opened and closed by a device called a switch. Loads can turn electrical energy into a more useful form. Some examples are:

- light bulbs, which change electrical energy into light energy;
- electric motors, which change electrical energy into mechanical energy;
- speakers, which change energy into sound.

The source provides the electrical energy

used by the load. It can be a storage battery or a generator. The switch interrupts the current delivered to the load by the source and allows us to control the flow.

When an abnormally high amount of current passes through a network, you get a short circuit. This may occur when there is a drop in the resistance or a broken

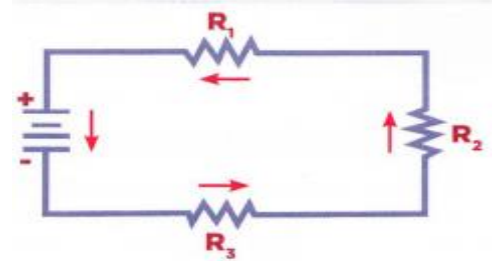


insulation. In order to prevent short circuits, it is best to use fuses, which melt when too much current flows through them, interrupting in this way the circuit.

The components of a circuit can be wired in two different ways: series or parallel.

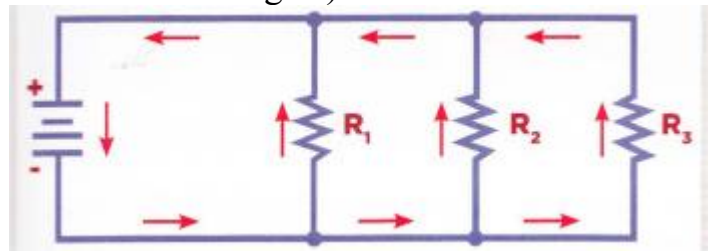
If components are arranged one after another to form a single path between the terminals and the components, the circuit is known as a series circuit.

In this type of circuit, the current flows from the negative terminal to the positive terminal, passing through all the other components of the circuit. This means that the amount of energy passing through all the components in the series is the same. The main disadvantage of a series circuit is that when a single component in the path burns out, the entire circuit stops operating (e.g. Christmas tree lights).



A parallel circuit consists of several paths connecting the different components. Each separate path is called a branch of the circuit. Current from the source divides and flows through the different branches. Unlike

series circuits, if one of the components in the parallel circuit burns out, the other paths continue to operate. Parallel circuits are commonly used to connect appliances at home, so that each socket can function independently.



For example, you don't have to turn on the light in your room for the TV socket to work.

A fuse can be added to an electric circuit to protect it from the effects of undue power. This safety device, which is made of a heat-sensitive alloy, is

connected in series with the circuit it has to protect. If an excessive amount of current flows through the circuit, the alloy will liquefy and open the circuit. A circuit breaker is fundamental in a house to protect circuits against overloading, overheating and short circuits. The advantage of a circuit breaker is that it can be reset after the overloading by replacing the fuse. A professional electrician should always provide his customers with a map of the electric circuit in the house so that it will be easier to work on it in case of faults.



Task2. Answer the following questions.

1. What does a simple circuit consist of?
2. What happens to the lamp in a closed circuit?

3. Can you name some examples of loads?
4. What is a generator?
5. What is the function of a switch?
6. When does a short circuit occur?
7. What can we use to prevent short circuits?
8. How does a fuse work?
9. What types of circuits do you know?
10. How do they vary?
11. What is the function of a circuit breaker?
12. Why are fuses and circuit breakers important?
13. What are some different types of fuses?

Task3. Translate the following words and phrases into Russian.

An electric circuit; a pathway; a power source; conducting wires; attached to; a terminal; on the contrary; disconnected; mechanical energy; storage battery; a generator; interrupt; an abnormally high amount of current; short circuit; a drop in the resistance; fuse; melt; a series circuit; disadvantage; burn out; parallel circuit; to connect; appliances; heat-sensitive alloy; liquefy; overloading; be reset; in case of faults.

Task4. Translate the following words and phrases into English and prepare them for dictation.

Электрическая цепь; путь; источник питания; проводящие провода; присоединен к; клемма; наоборот; отключен; механическая энергия; аккумуляторная батарея; генератор; прерывание; аномально большое количество тока; короткое замыкание; падение сопротивления; предохранитель; расплавиться; последовательная цепь; недостаток; выгорание; параллельная цепь; для подключения; приборы; термочувствительный сплав; плавить; перегрузка; повторный запуск; в случае неисправностей.

Task5. Match the words with their definitions.

- | | |
|-------------------|--|
| 1. load | a. a device which interrupts the circuit |
| 2. switch | b. a circuit in which wires are disconnected |
| 3. source | c. a device which provides power |
| 4. fuse | d. a complete circuit with no breaks at all |
| 5. closed circuit | e. a device which consumes electric power |
| 6. broken circuit | f. a protective device |

Task6. Find in the text the synonyms for the following words:

1. excessive,
2. reacting to high temperatures,
3. to melt,
4. to load up,
5. adjusted,
6. clients.

Task7. Choose where the words best fit the blanks.

1. *circuit breaker / cartridge fuse*

- A. A is usually made out of glass and metal.
- B. You don't need to replace a every time there is a power surge.

2. *ground fault/single pole breaker*

- A. The can only handle 120-volts.
- B. The short circuit was caused by a

3. *overload/fuse*

- A. The power went out because of an electrical
- B. You need to replace the as soon as it is blown.

Task8. Choose the right compound for the following:

Panelboard, watertight, rainproof, switchboard, superconductors, explosionproof, overload, dustproof

- 1. a board consisting of a number of panels
- 2. material that does not allow water to get into it
- 3. material that doesn't allow rain to get into it
- 4. a board consisting of a number of electrical switches
- 5. conductors which are perfect, conducting a current without a battery
- 6. material that will not be damaged in an explosion
- 7. current which is greater than the load for which the system or mechanism was intended
- 8. material that does not allow dust to get into it

Grammar

Past tenses

Past simple and Past continuous

	Positive	Negative	Question
Past simple active	Last year we began a new study.	We didn't develop the software ourselves.	Where did you record the results?
Past simple passive	The performance of the air bags was assessed.	The results weren't recorded.	Where were the findings published?
Past continuous active	While the analyst was carrying out the test...	... the other technicians were not recording the results.	What were you doing during the test phase?
Past continuous passive	While the test was being carried out the results were not being recorded.	Why were the findings being written down?

Past perfect

	<i>Positive</i>	<i>Negative</i>	<i>Question</i>
<i>Past perfect active</i>	After we had compiled the results...	Because they had not recorded the data...	Had they carried out all the tests?
<i>Past perfect passive</i>	... after the results had been compiled.	... because the data had not been recorded.	Had all the tests been carried out?
<i>Past perfect continuous active</i>	The analyst had been checking the walls yesterday	We had not been evaluating the physical characteristics ..	How long had you been working on the project?

Task9. Six of the following sentences contain mistakes. Find the mistakes and correct them.

1. Sydney Harbor Bridge was building in 1932.
2. While they were carrying out tests in the laboratories, researchers were analyzing past results.
3. The first real road builders in Britain was the Romans.
4. The Romans built roads of layers of broken stones of various sizes and were covering them with flat stones.
5. The system didn't working because the loudspeaker had been wrongly connected.
6. Before factories were told to stop polluting the environment, waste was being dumped in rivers and in the sea.
7. Louis Pasteur was discovering the action of germs while he was studying fermentation in wines.
8. The production process had already been shut down when the leak in the fuel tank was found.
9. Nuclear energy began to be used from the mid-1950s.
10. In the second half of the 20th century, the electronics industry transforming the way we work in factories.

Task10. Make past tense questions and answers using the words given.

1. When / be / fibre optics / first / develop?
2. The boxes / break / because they / make / of low quality materials.
3. The power supply / cut off / because / cables / come down / during the storm.
4. They / not complete / the foundations / by the time the building materials / arrive.
5. When / they / install / the solar panels?
6. be / this / the first hydroelectric scheme/ in Scotland?
7. They / not use / wood chip / for heating / when the engineer / visit / the factory.
8. How / they / produce / gas / before they / discover / North Sea gas?

9. be / the oil pollution along the coastline / cause / by an oil tanker spillage?
10. How / they prepare access to this mine?

Task11. Complete the following report of an accident which happened in a factory with the correct form of the verbs in brackets.

On Friday morning at 9.25 a worker in the chemical plant (find) by a female colleague. He (lie) on the floor. His colleague (check) that he still breathe) and then (call) the emergency services. The injured man (take) to hospital where he later (recover).

An investigation at the factory (find) that a bottle containing a dangerous chemical liquid (leave) open. Vapour from the liquid (escape) into the air. While he had been working in the room he (become) unwell. He (become) drowsy and then (fall) unconscious. Investigating officers are interviewing everyone who (work) in the factory that morning.

Task12. Make up questions to the given sentences.

1. Current flows to and from the commutator through small carbon blocks called brushes.
2. The standard design of the bicycle has been in existence for about 100 years.
3. In recent years, aircraft manufacturers such as Boeing have been experimenting with composite materials like Cheval and carbon fibres.

Task13. Speak on the following topics:

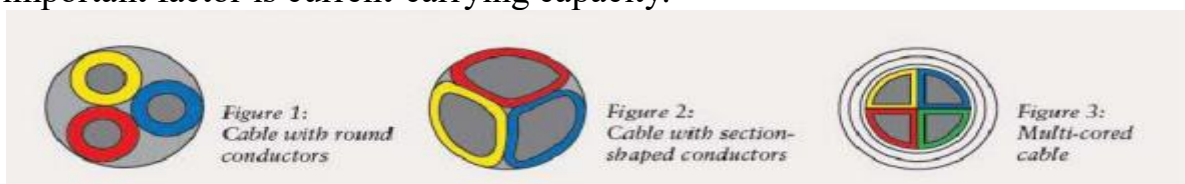
1. Electric circuit and its parts.
2. Types of electric circuits
3. Fuse and circuit breakers.

UNIT 6 CABLE CONSIDERATIONS

Task1. Read and translate the text.

The thousands of electrical components installed in a modern passenger jet would be useless without something like 250 kilometers: of wires, cables and busbars to connect them with each other, as well as with a power source.

The main elements of a cable are the core, which consists of the conductor and its insulation sleeve, and the protective covering or sheath. For conductors, the most important factor is current-carrying capacity.



Copper has a higher conductivity than aluminium, so a copper conductor will carry more current than an aluminium conductor of the same size. However, aluminium

is lighter than copper, so it is used in aircraft when possible. The conductor may be solid metal or, if flexibility is required, it may consist of several smaller conductors (strands) fitted inside the insulation sleeve.

The greater the cross-section of a conductor, the more current it will carry. A flatter shape has a larger surface area, so it can dissipate heat more easily and carry a larger current. Figures 1, 2 and 3 compare the cross-sections of different types of cable. The sector-shaped conductors make a better use of space than round conductors, and consequently can carry a higher current. A filler is used to fill in spaces to give a circular cross-section.

In a multi-cored cable, conductors must be insulated from each other. The main materials used for insulation are cotton, PVC, vinyl, Teflon and Rockbestos. The protective covering includes sheathing and armouring. Sheathing protects the cable from hazards, such as water, oil, acid or corrosion. The material used for sheathing depends on the nature of the insulation material. Heavier cable 'armouring' usually consists of steel wire or tape wound around the cable separated from the cores by a layer of bedding material.

One problem with all insulating materials is that they can break down at high voltages. In other words, they start to behave like conductors. This breakdown voltage is also affected by the temperature: the higher the temperature, the lower the breakdown voltage. Another is mechanical damage, such as abrasion or impact, especially to heavy-duty cable. Armouring avoids this, and the bedding material prevents the armour from damaging the insulation on the conductor by acting as a shock absorber when the cable is being moved.

Task2. Answer the questions.

1. What connects the thousands of electrical components installed in a modern passenger jet with each other, as well as with a power source?
2. What are the main elements of a cable?
3. What is the most important factor for conductors?
4. Why will a copper conductor of the same size carry more current than an aluminium conductor?
5. Why is aluminium used in aircraft when possible?
6. How does the cross-section of a conductor depend on the current it carries?
7. What kind of insulation must there be in a multi-cored cable?
8. What are the main materials used for insulation?
9. What does the material used for sheathing depend on?
10. What kind of problem do all insulating materials face?
11. What kind of mechanical damage is dangerous for insulating materials?

Task3. Translate the following words and phrases into Russian.

Install; wires, cables and busbars; core; insulation sleeve; protective covering; current-carrying capacity; conductivity; solid metal; flexibility; cross-section of a conductor; surface area; dissipate heat; sector-shaped conductors; filler; multi-cored cable; armouring; bedding material; affect; abrasion; heavy-duty cable;

Task4. Translate the following words and phrases into English and prepare them for dictation.

Устанавливать; провода, кабели и шины; сердцевина; изоляционная оболочка; защитное покрытие; токопроводящая способность; проводимость; твердый металл; гибкость; поперечное сечение проводника; площадь поверхности; рассеивать тепло; секторные проводники; наполнитель; многожильный кабель; армирование; опорный материал; воздействие; истирание; сверхмощный кабель;

Task5. Match the following verbs with the correct noun phrase. There may be more than one correct answer.

<i>verb</i>	<i>noun/noun phrase</i>
dissipate	several layers
carry	heat
make use of	a conductor
insulate	damage
protect something from	a shock absorber
consist of	the conductor from its protective sheath
separate	a current
act as	space

Task6. Now read the text in detail. What types/features of conductors and cables provide the following?

Lightness, efficient heat dissipation, protection from impact, flexibility, good conductivity, space-saving, protection for the cable against the armour, protection against corrosion, a circular cross-section, high current-carrying capacity.

Task7. Circle the correct word to complete each sentence.

1. Copper is *more conducive* / *conductive* than aluminium.
2. The *insulation* / *isolation* sleeve fits around the core of the cable.
3. *Sector/section-shaped* conductors make better use of space than round ones.
4. Conductors which have a large surface area can *dissipate* / *dispute* heat more easily.
5. A *filter/filler* avoids empty space inside the cable.
6. A layer of *bedding/beading* material may separate the core of the cable from its protective armour.

Task8. Rewrite the sentences below, using the noun phrase given to make more formal sentences.

1. The best use of space is to design an overall circular shape for a cable.
A circular cross-section
2. Cables normally have a sheath or armour that prevents damage.
A protective covering
3. If there is an emergency such as a fire, it puts high demands on a cable.

Emergency operating conditions

4. The amount of current that a conductor can carry is different for different conductors.

Current-carrying capacity

5. Several types of material are used to insulate the conductor.

Insulation sleeves

6. The way that insulating materials break down at high voltages is affected by high temperatures.

Breakdown voltage

Task9. Read the text and decide if these statements are true or false.

Control Cables – Inspection/Check

I. General

1. Use these procedures to verify the integrity of the control cable system. The procedures must be performed along the entire cable run in each system. To ensure verification of the portions of the cables that are in contact with pulleys and quadrants, the control cables must be moved by operation of the applicable system's controls, to expose those portions of the cables.

2. The first task is an inspection of the control cable.

3. The second task is an inspection of the control cable fittings.

4. The third task is an inspection of the pulleys.

5. These three tasks may be performed concurrently at one location of the cable system on the airplane if desired for convenience.

II. Inspection of the Control Cable

1. Clean the cables (as necessary) for the inspection.

2. Perform a detailed visual inspection to make sure that the cable does not contact parts other than pulleys, quadrants, cable seals or grommets installed to control the cable routing. The minimum cable clearance from other parts is 0.20 inches, except 0.10 inches within 10 inches of a pulley quadrant. Look for evidence of contact with other parts. Correct the condition if evidence of contact is found.

3. Perform a detailed visual inspection of the cable runs for incorrect routing, twists and kinks in the wire rope, or other damage.

4. Perform a detailed visual inspection of the cable. To do a check for broken wires, rub a cloth along the cable. The cloth will identify broken wires by catching on them.

III. Replace the cable if:

1. The individual wires in each strand appear to blend together (outer wires worn 40 to 50 percent).

2. If a kink or permanent twist is found.

3. If there is any sign of corrosion.

4. There are two or more broken wires in 12 continuous inches of cable.

5. There are three or more broken wires anywhere in the total cable assembly.
6. Replace the 7x19 cable assembly if there are four or more broken wires in 12 continuous inches, or six or more broken wires anywhere in the total cable assembly.

1. You shouldn't move the cables during inspection. *True/False*
2. You should check the whole length of the cable. *True/False*
3. You should not inspect the cable fittings at the same time as you inspect the cable. *True/False*
4. The three inspection tasks can be carried out in the same place. *True/False*
5. Cables should come into contact with the pulley wheels. *True/False*
6. A cloth can be used to find breaks in the cable wires. *True/False*
7. Cables must always be replaced if they have small twists in them. *True/False*
8. You should replace any cable with more than two broken wires. *True/False*
9. Corroded cable must always be replaced. *True/False*
10. 7 x 19 cable should be replaced if there are six or more broken wires in the total cable assembly. *True/False*

Grammar

The Future Simple Tense will + Infinitive

<i>positive</i>	<i>Negative</i>	<i>question</i>
I will work	I will not work	Will I work?
He will work	He will not work	Will he work?
She will work	She will not work	Will she work?
It will work	It will not work	Will it work?
We will work	We will not work	Will we work?
You will work	You will not work	Will you work?
They will work	They will not work	Will they work?

Task10. Match these present tense situations with the future intention.

1. The building materials are being delivered.
2. There is a backlog of orders.
3. We're shutting down production.
4. The workers need different interesting jobs to do.
5. This is a very slow manual processor.
6. There have been too many faulty goods recently.
 - a. We're going to replace the faulty machine.
 - b. We're going to build a new warehouse.
 - c. The assembly line is going to be inspected.
 - d. We're going to automate it in the near future.
 - e. The workers are going to work overtime.
 - f. We're going to introduce job rotation.

Task11. In the following situations choose the correct sentence, a) or b).

1. You are reminding a colleague about the program for tomorrow.
 - a. Remember that you'll meet the supplier at 12 o'clock.
 - b. Remember that you're meeting the supplier at 12 o'clock.
2. Two colleagues are discussing the future visit by inspectors.
 - a. The inspectors won't allow us to store chemicals in this cupboard.
 - b. The inspectors are not allowing us to store chemicals in this cupboard.
3. Designers are discussing the car models with airbags.
 - a. The use of airbags is going to save more lives in the future.
 - b. The use of airbags is saving more lives in the future.
4. Two managers need the results from some research before November.
 - a. They won't be able to complete the research before November.
 - b. They aren't completing the research before November.
5. A senior manager isn't looking forward to next week because he's worried about the tests.
 - a. Tests will be carried out next week.
 - b. Tests are being carried out next week.

Task12. Make up all types of questions to the following sentences.

1. The results of the tests will be available next year.
2. They are preparing the preliminary forms next month.
3. We are going to lay the network cables next Tuesday.
4. The file server will be delivered on Friday.

Task13. Make up a speech on any of the following topics:

1. Cables and wires.
2. Types of conductors.
3. Potential problems with conductors.

Task14. A salesman is describing a new product to a customer. Complete what they say with will or won't and a verb from the box.

give • operate • deal • take • be • contact
install • provide • need • revolutionize • warm • see

S: This is an excellent new material which (a) _____ the use of solar panels.

C: I see, and how many hours of sunshine (b) _____ we _____ to produce energy?

S: It (c) _____ necessary to have sunshine. It (d) _____ in daylight only.

C: (e) _____ it _____ enough energy to warm the building in winter?

S: It (f) _____ the building but you may need additional heating when it is very cold.

C: What about installation?

S: We (g) _____ it for you. It (h) _____ long and you (i) _____ soon _____ how effective it is. We (j) _____ you a three year guarantee and if there are any problems we (k) _____ with them immediately.

C: When will you be able to install it?

S: As soon as we receive your order we (l) _____ you to discuss a suitable date.

UNIT 7 OHM'S LAW

Task 1. Read and translate the text.

Ohm's Law states that the current flowing in a circuit is directly proportional to the applied potential difference and inversely proportional to the resistance in the circuit.

In other words by doubling the voltage across a circuit the current will also double. However if the resistance is doubled the current will fall by half. In this mathematical relationship, the unit of resistance is measured in Ohms.

The Ohm's Law formula or equation is very straightforward. Ohm's law can be expressed in a mathematical form:

$$V=IR$$

Where:

V = voltage expressed in Volts

I = current expressed in Amps

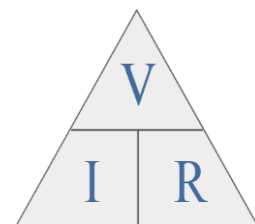
R = resistance expressed in Ohms

The formula can be manipulated so, that if any two quantities are known the third can be calculated.

To help remember the formula it is possible to use a triangle with one side horizontal and the peak at the top like a pyramid. This is sometimes known as the Ohm's law triangle.

In the top corner of the Ohm's law triangle is the letter V, in the left hand corner, the letter I, and in the right hand bottom corner, R.

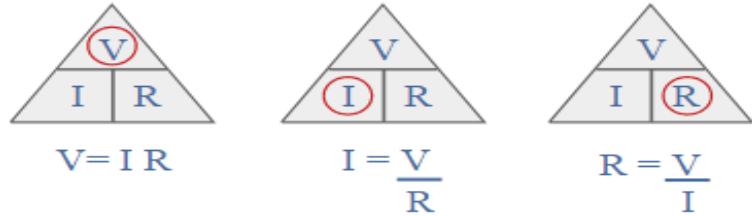
To use the triangle, cover up the unknown quantity and then, calculate it from the other two. If they are in line they are multiplied, but if one is on top of the other then they should be



divided. In other words if current has to be calculated the voltage is divided by the resistance i.e. V/R and so forth.

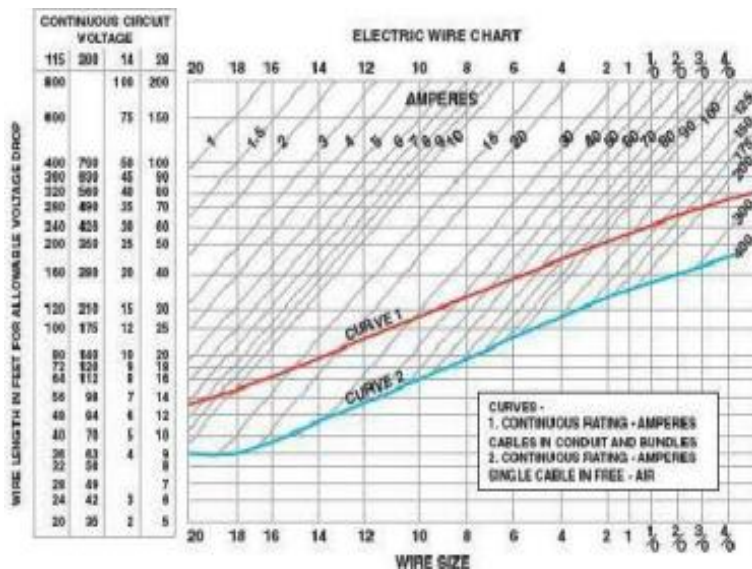
Ohm's Law is one of the most basic concepts within electrical and electronic engineering. The concept of an item having a certain resistance which determines the amount of current that flows through it for a certain voltage is the key to the operation virtually all circuits.

The most important thing to remember about Ohm's law is that you must always do the calculations in terms of volts, amperes, and ohms. For example: if you measure the current in milliamps (which you usually will in electronic circuits), you must convert the milliamps to amperes by dividing by 1,000. For example, 250 mA is 0.25 A.



Task2. Now read the second part of the text, which explains the chart. Follow the example calculation on the chart.

A key consideration when selecting a conductor is that the longer the conductor, the greater its resistance. Resistance in the conductor means that there will be a voltage drop at the end. To avoid this, the conductor used must be as thick and/or short as possible. The table above is used to decide which size of wire is suitable for a given length.



The larger the wire size number is, the less current it is capable of carrying. For example, assume the requirement is to find the nearest safe wire size for a 30-foot-long bundled cable in a conduit which has to conduct a 28-volt supply to a 1-kilowatt actuator motor. From the formulae above:

$$I = W/V. \text{ Therefore, the current, in amps, is } 1000/28 = 35.71.$$

With this information, go to the Wire Size chart. Look at AMPERES at the top, and go to the value of 35.71 on the diagonal lines. Then follow the diagonal down until it meets Curve 1 (conduit cable readings) at 30 ft according to the fourth column {28 V} on the left-hand axis. The reading is between 8 and 10; the nearest safe wire size is taken as 8 (the lower number is chosen for safety).

Task3. Answer the questions to the text.

1. State the Ohm's Law.
2. What will happen to the current if the voltage across a circuit doubles?
3. What will happen if the resistance is doubled?
4. In what units is the resistance measured?
5. How can Ohm's law be expressed?
6. What is voltage expressed in?
7. What is current expressed in?
8. How is resistance expressed in?
9. How can the formula be manipulated?
10. What is the Ohm's law triangle?
11. How can we use the triangle?
12. Which concept is the key to the operation virtually all circuits?
13. What is the most important thing to remember about Ohm's law?
14. What is a key consideration when selecting a conductor?
15. What does resistance in the conductor mean?
16. What type of the conductor must be used to avoid voltage drop at the end?
17. What is the relationship between the wire size number and the current it is capable of carrying?

Task4. Translate the following words and phrases from the text into Russian.

Circuit; to be directly proportional; the applied potential difference; inversely proportional; resistance; doubling; mathematical relationship; to be measured; equation; straightforward; to calculate; triangle; quantity; and so forth; basic concept; electrical and electronic engineering; to determine; to convert; a key consideration; to select; to avoid; thick; requirement;

Task5. Translate the following words and phrases from the text into English and prepare them for dictation.

применяемая разность потенциалов; схема; быть прямо пропорциональной; обратно пропорциональная; избегать; толстый; удвоение; математическая зависимость; прямолинейно; вычислять; треугольник; количество; основная концепция; измеряться; уравнение; электрическая и электронная техника; определять; преобразовывать; ключевое соображение; выбирать;; требование; сопротивление; и так далее;

Task6. Expand these sentences using may or will.

1. moving machinery / damage / cabling
2. larger cross-section / cable / more current / carry
3. single solid conductor / not bend / easily / several smaller conductors
4. liquids / corrode / cabling
5. in most cases / bedding / used / separate / armour / insulation
6. if insulation / break down / it / start / to conduct

Task7. Complete these sentences in a similar way.

The longer the conductor, the greater its resistance.

1. high temp. / low breakdown voltage
2. large surface area / good heat dissipation
3. high wire size no. / small conductor
4. gas dense / temp, rises
5. less energy used / efficient machine

Task8. Complete the sentences with one of the following words or phrases.

As; like; e.g.; i.e.; such as; including; in other words

1. A cat's muscles act its shock absorbers on landing.
2. All accidents, damage and personal injury, must be reported.
3. The cooling gas becomes more dense, it gets heavier.
4. The four colour codes, blue, red, yellow and green, must be known to all staff.
5. Halon does not work other extinguishing agents.
6. Cutting tools saws and shears need to be sharpened regularly.
7. Procedures must be followed in case of emergency, fire.
8. All employees, non-technical staff, must be tested.

Grammar

Obligation and requirements

1. *Oblige someone to do something*

compel • demand • force • make
oblige • require

2. *Oblige someone not to do something*

ban • forbid • prohibit

3. *Obligated to do something*

be forced to • be required to • be supposed to
have to • must • need to

4. *Obligated not to do something*

be prohibited from • cannot • may not
must not • not be allowed to • not be permitted to

Task 9

Each of the following sentences contains a mistake. Find the mistakes and correct them.

1. You needn't to enclose the invoice. It will be sent separately.
2. The customer will be needed to pay import duty before he can get the goods.
3. When bacteria were found in the food plant, the government made the company to shut down production.
4. They don't required to wear safety clothes in this area.
5. Without just-in-time manufacturing, we would be permitted to hold large stocks of components.

6. Children are not allowed entering this area.

Task10. Choose one correct sentence for each picture.



- a. You must go to this point if there is a fire.
- b. You are required to wear a hard hat in this area.
- c. Authorized personnel are obliged to enter.
- d. You mustn't consume these.
- e. A fire extinguisher needs to be placed here.
- f. People without authorization are prohibited from entering.
- g. You can get fire-fighting equipment here.
- h. Smoking is not allowed after this point.



Task11. Make up all types of questions to the following sentences.

- 1. The results of the tests will be available next year.
- 2. They are preparing the preliminary forms next month.
- 3. We are going to lay the network cables next Tuesday.
- 4. The file server will be delivered on Friday.

Task12. Match one part of a sentence from A and one from B to form sentences of ability and inability.

A

- Improving quality control will enable us
- Shortage of space prevents us from
- Regulations prohibit
- A machine breakdown means that we can't
- Old copper cables are incapable of
- Using a videophone allows you to
- Mobile phones can
- A firewall is used to stop

B

- the storage of chemicals in plastic containers.
- carrying the volume of data required today.
- see the person you are talking to.
- producing more product lines.
- now be used to send emails.
- to become more profitable.
- unauthorized users accessing a network.
- finish the order this week.

Task12. Below is an extract from a letter from an insurance agent to a manufacturing company about regulations, Complete the extract by choosing the correct word from the box.

needn't • permit • permitted • forcing • have • supposed
prohibited • require • must (2) • banned

Following my visit to your factory last week, I am writing to confirm what we discussed. It is important that these points are followed; otherwise the insurance cover will not be valid.

- All empty crates (a) _____ not be stacked in the production area. They are a health and safety problem and we will not (b) _____ you to leave them there.
- The government has (c) _____ the dumping of waste chemicals in waste sites and are (d) _____ companies to apply for a licence for waste disposal. However, prior to disposal, these chemicals (e) _____ to be stored in sealed containers in a designated area away from the main plant.
- Containers that contain flammable materials (f) _____ be at least 100 metres from the building.
- Present air conditioning systems are adequate, so you (g) _____ make any changes there.
- Walls are (h) _____ to be kept clear of dust, so we (i) _____ you to arrange to have the walls dusted and cleaned.
- The use of water fire extinguishers is still (j) _____, but they are (k) _____ from use near or on electrical equipment.

Task13. Put the following words in the correct order to form sentences.

1. The goods/ until next week/ won't /be delivered/ probably.
2. I'm/ these crates/ sure/ are strong enough/ absolutely/ that.
3. The goods/ to remain in the warehouse/ unlikely / for long/ are.
4. It/ take long/ to load the ship/ shouldn't.
5. They/ be sent by air freight/ won't/ definitely.
6. The goods/ in transit/ before four days/ may.
7. They're/ the volume of imports/ quite/ to increase/ likely.

Task14. Make up types of questions to the following sentences.

1. Glass fibre optics will very probably be replaced by plastic in the near future.
2. Washing machines and dishwashers are certain to become more energy-efficient.
3. A mat foundation can't possibly support a high building.
4. We may need extra sound-deadening material in these walls.

Task15. Make oral presentations on the following topics.

1. Ohm's Law
2. Ohms Law triangle

UNIT 8 POWER SYSTEMS

Task1. Read and translate the text.

DC power system

DC power is three-way: primary DC power is supplied by the dual-role starter-generator (SG); a nickel-cadmium battery forms the secondary DC power source; external DC power can be supplied via an EPU connection. When a connected EPU is brought online, the generator and battery are isolated from the system.

Starter-generator

The SG is a dual-role unit mounted on the engine accessory drive housing. SG output is supplied to the aircraft systems at a regulated 28 V DC. During flight, or with the aircraft on the ground with the engine operating, all DC power is obtained from the SG, which also trickle-charges the aircraft battery. If the SG malfunctions, or is inadvertently switched off, the battery is automatically brought online. If the generator output exceeds 32 V, a voltage regulator automatically disconnects the system from the generator and reconnects it to the battery. With the engine shut down, DC power is obtained from the battery or an EPU.

Battery

The 24-volt 40 amp/hour nickel-cadmium battery is located in the rear fuselage.

It only comes online when there is no output from the SG or the EPU. In order to reduce the risk caused by battery overheating, there is an over-temperature warning system which lights up the BAT HOT caption on the cockpit annunciator LCD display panel when the battery temperature reaches 700.

External power supply

A minimum of 24 V and maximum of 28 V power can be supplied to the aircraft via the EPU connection. When external power is supplied to the aircraft DC system, the battery is isolated from the system to prevent the possibility of it discharging through the EPU.

Most of the onboard equipment is powered by the DC system.

AC power system

Some of the flight instruments and avionics require an AC supply. The AC generation system consists of two transistorized static inverters, which each convert the 28 V DC supply to 26 V AC and 115 V AC at a frequency of 400 hertz. Only one inverter is online at a time, the other serving as an emergency backup.

Task2. What do the following numbers from the text refer to?

32 V 400 hertz 115 V 700 26 V 40 amp/h 24 V

Task3. Complete each dictionary definition with a word from the box.

DC inverter generator AC online EPU

a. equipment for supplying electricity to an aircraft using a separate battery unit stored on the ground: short for External Power Unit.

- b. in operation, working, functioning, be ~ be operational: (computers) be working using the Internet, (systems in general) bring ~ put into operation.
- c. rotating machine that converts mechanical energy into electrical energy, e.g., starter ~
- d. electrical device that converts direct current into alternating current.
- e. alternating electric current that changes direction with a regular frequency, as in domestic mains electricity.
- f. a direct electric current that flows steadily in one direction

Task4. Discuss the following questions.

1. What systems or functions in an aircraft require an electricity supply?
2. How is power supplied to them?
3. What ways does DC power have?
4. When are the generator and battery isolated from the system?
5. What is all DC power obtained from during flight or with the aircraft on the ground with the engine operating?
6. When is the battery brought online automatically?
7. When does a voltage regulator automatically disconnect the system from the generator?
8. What is DC power obtained from with the engine shut down?
9. Where is the 24-volt 40 amp/hour nickel-cadmium battery located?
10. What is an over-temperature warning system for?
11. Why is the battery isolated from the system when external power is supplied to the aircraft DC system?
12. What does the AC generation system consist of?

Task5. What do the following acronyms from the text mean?

DC; SG; EPN; LCD; AC

Task6. Translate the following words and phrases into Russian.

DC power system; dual-role starter- generator; a nickel-cadmium battery; the secondary DC power source; EPU connection; generator and battery; dual-role unit; mount; the engine accessory drive housing; obtain; trickle-charges; malfunction; inadvertently; switch off; reconnect; the engine shut down; nickel-cadmium battery; in the rear fuselage; to reduce the risk; an over-temperature warning system; annunciator; to prevent; the possibility of discharging; transistorized static inverters; convert; an emergency backup.

Task7. Translate the following words and phrases into English and prepare them for dictation.

Система питания постоянного тока; двухролевой стартер - генератор; никель-кадмиевая батарея; вторичный источник питания постоянного тока; подключение блока аварийного энергопитания; генератор и батарея; двухролевой блок; крепление; корпус привода вспомогательного

оборудования двигателя; получение; струйные заряды; неисправность; непреднамеренное отключение; повторное подключение; выключение двигателя; никель-кадмиевая батарея; в задней части фюзеляжа; для снижения риска; система предупреждения о перегреве; сигнализатор; для предотвращения; возможность разрядки; транзисторные статические инверторы; преобразование; аварийное резервное копирование.

Task 8

Read the following reports about minor accidents that pilots had when taking off or landing. Decide what the main cause of each accident was, e.g., pilot error, weather conditions, mechanical failure. Make up all types of questions to the given passages.

1. While taxiing along the runway, the pilot reported that a sudden gust of wind made it difficult to control the aircraft, which subsequently nosed over. Two witnesses reported an “extremely strong wind” that rattled building roofs at the time of the accident.

Main cause:

2. The pilot stated that he was unable to start the engine after many attempts. He adjusted the throttle, increasing it, and then tried again to start the engine. The engine ran rough for the first few rotations and then the rpms increased rapidly. The aircraft started to pivot around the left main gear, but the pilot was unable to retard the throttle. The aircraft continued to turn to the left, running onto a grassy area and hitting a utility pole. Investigation revealed that the hand brake only engages the left brake on the aircraft.

Main cause:

3. The pilot claimed that the engine lost power during the initial take-off climb at an altitude of about 130 feet. He managed to make an emergency landing in a soybean field, but the nose gear collapsed. Inspection of the airplane did not reveal any mechanical malfunction that would have resulted in the loss of engine power. The temperature and dew point reported at 46 miles northeast of the accident site were both 59 degrees. The pilot reported he accidentally turned on the cabin heat instead of the carburetor heat when the loss of power occurred.

Main cause:

4. Shortly before landing, as the pilot was about to perform her pre-landing checklist, she said the “engine cut out completely.” The pilot turned towards the runway and switched the fuel selector over to the right-hand fuel tank, but the engine did not restart. The aircraft touched down to the right of the approach end of the runway at about a 10-degree angle. It then ran down a grassy slope and then crossed a taxiway perpendicular to the runway. It finally came to a stop facing the runway. Later examination of the fuel system revealed that the left fuel tank was empty and the right fuel tank was approximately half-full. The Airport Manager reported that he had moved the fuel selector from the left tank position to the off position. The pilot reported she used the right tank for taxi and climb and the left tank for cruise.

Main cause:

Grammar

Prepositions

Of time

after • at • before • between • by • during • for
from ...in • on • since • to • until/till • up to

Of place

at • from • in • into • on • out of • to

Task9. Five of the following sentences contain mistakes. Find the mistakes and correct them.

1. The interim report was completed to the end of last month.
2. These products have been on the market since nearly ten years.
3. The meeting has been arranged for 16th April at 10 a.m.
4. The results will be evaluated after the tests have been completed.
5. We intend to continue production during the new machinery is installed.
6. The road will be closed from 7 p.m and 7 a.m.
7. The jacquard 100mfor weaving cloth was created at 1801.
8. During the 19th and 20th centuries great advances were made in treating illnesses.

Task10. Complete these sentences by putting the word on the right in the correct position.

- | | |
|--|---------|
| 1. Once it has been thoroughly cleaned it can be put together. | back |
| 2. Someone has put the wires here instead here. | of |
| 3. If it's the right way, you'll see a red marker. | up |
| 4. Fill a discrepancy form and show it to me before you leave. | in |
| 5. The bolts have been taken and replaced with the wrong size. | out |
| 6. Cracks and abrasion damage disc surface. | on |
| 7. I've installed a new circuit the selector. | in |
| 8. The cable needs to pass this hole and connect to the block. | through |

Task11. Complete the following texts using the correct preposition. You may have to use some prepositions more than once.

between • from • on • along
above • through • to

Signals pass a telephone the local exchange copper cables. Most exchanges are linked by optical fibre cables which the signals travel as pulses of laser light. Microwave beams sent dishes tall towers, link some signals. International calls go undersea optical fibre cables or via satellites high the Earth.

around • at • of • from • to

Refrigerators keep food a temperature about 5 ° C. They work by evaporation. When a liquid changes..... a vapor, it takes heat its surroundings. In a fridge, the cooling process is done by a refrigerant which circulates a system sealed pipes.

Task12. Complete the following telephone conversation by adding the correct prepositions of time. If no preposition is required, leave the space blank.

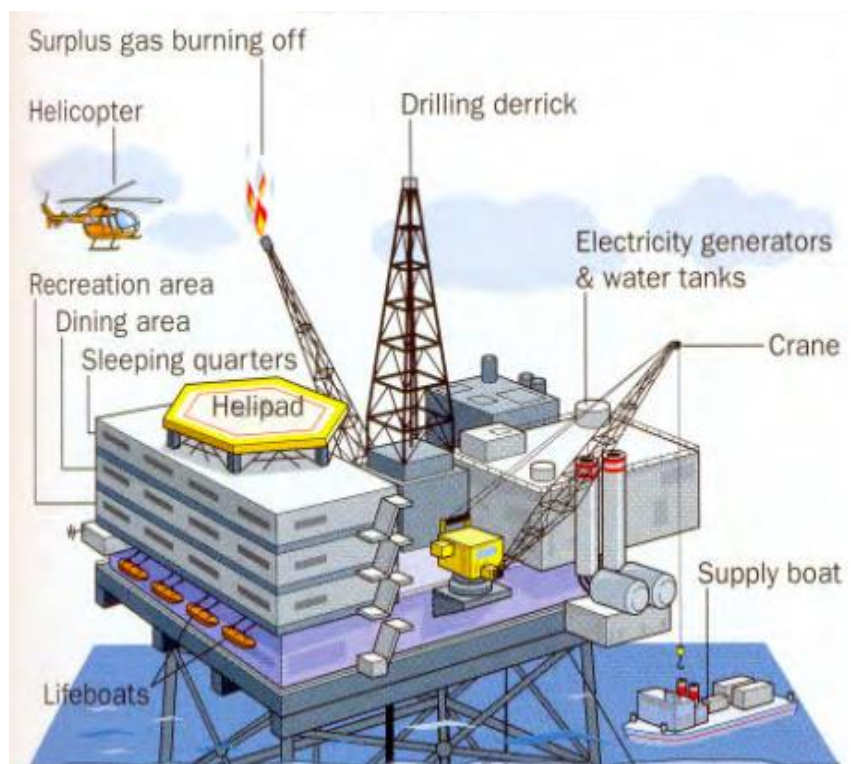
ERIK: I was wondering if we could arrange a meeting (a) _____ next week?
 MIRJAM: Yes, of course! I'm going to Washington (b) _____ Friday evening so can we arrange something (c) _____ that?
 ERIK: Eh, Yes. I'm pretty busy (d) _____ the beginning (e) _____ the week but perhaps we could meet some time (f) _____ Wednesday?
 MIRJAM: Could we meet (g) _____ the morning (h) _____ 9.30?
 ERIK: That's fine. I should have received the test results we've been waiting for (i) _____ then.
 MIRJAM: I'm looking forward to seeing the latest results. I haven't heard anything (j) _____ we spoke (k) _____ last month.

Task13. Complete the following description of an oil rig with the correct prepositions. Choose from those in the box. You will need to use some more than once.

above • on • in • from • to • in between
 around • close to • of • beside • at • along • below

The Magnus oil rig stands huge steel legs resting the seabed. To prevent movement, a large anchor is firmly embedded the seabed.

A production platform is built sea level. the centre the platform, the well, is the drilling derrick. Oil and gas are separated the bottom the derrick and a pipeline takes oil the platform



shore. Helicopters carrying operators land the helipad located on one side of the platform. this pad there is an accommodation block.

The recreation area is found the first level and the top floor the workers sleeping quarters are to be found. The dining area is on the floor the Walkways run of the accommodation block and the outside of the platform. Lifeboats can be found the accommodation block. Supply boats, carrying supplies for the rig, can tie up one side the rig and goods are lifted the boats using a crane. Drinking water is stored large tanks located the electricity generators.

Task14. Make up all types of questions to the following sentences.

1. The aircraft touched down to the right of the approach end of the runway at about a 10-degree angle.
2. The pilot claimed that the engine lost power during the initial take-off climb.
3. The pilot accidentally turned on the cabin heat instead of the carburetor heat when the loss of power occurred.

UNIT 9 SAFETY AT WORK

Task1. Read and translate the text.

Attention must be paid to safety in order to ensure a safe working practice in factories. Workers must be aware of the dangers and risks that exist all around them: two out of every three industrial accidents are caused by individual carelessness. In order to avoid or reduce accidents, both protective and precautionary measures must be followed while working.

Each country has specific regulations concerning health and safety at work.

The objectives of the rules are:

- to secure the health, safety and welfare of people at work;
- to protect people in the work place against risks to health or safety in connection to their work activities;
- to control the keeping and use of dangerous substances;
- to control the emission of dangerous gases into the atmosphere.

The rules define general duties of employers, employees, suppliers of goods and substances for use at work, and people who manage and maintain work premises. In particular, every employer has to ensure the health, safety and welfare at work of all the employees, visitors, the general public and clients. Employers have to ensure the absence of risk to health in connection with the use, handling or storage of items and substances, as well as provide adequate facilities for a safe working environment. It is also very important to provide employees with proper instructions and training so that they will be able to cope with any problem that may occur at work.

Employees, on their part, should always behave responsibly at work and take care of themselves and other people who may be affected by their actions.

Moreover, they should cooperate with employers to enable them to perform their duties or requirements under the rules.

Although electricity is a part of everyday life, it still has many hazards. Following a few safety rules can save your life. Electricity shocks people when their bodies become part of an electric path between

- a live wire and the ground
- two live wires with opposite charges

Being shocked can cause serious burns. It can also paralyze muscles. Electrocutation is also a major risk when working with electricity. To reduce electrical safety hazards always

- de-energize power source before working with electrical equipment
- follow lockout/tagout procedures

Remember: all electricity, including static electricity can be dangerous. Never take risks.

Task2. Answer the questions.

1. Why is it important to ensure a safe working environment?
2. Which law regulates workers' welfare?
3. What do the rules define?
4. What are the duties of employers?
5. Why is it important to provide employees with adequate training?
6. How can employees contribute to a safe working environment?
7. What are some of the hazards of working with electricity?
8. What are some of the risks people may take when doing electrical repairs?
9. What health problems can electrical shock cause?
10. What should a worker do to reduce electrical safety hazards?

Task3. Match the words (1-4) with the definitions (A-D).

1. shock; 2. lockout/tagout procedure ; 3. paralyze; 4. hazard

- A. something that is not safe
- B. to make the muscles stop moving
- C. to pass electricity through the body
- D. a rule to lock energy sources and label electrical equipment when it's being repaired

Task4. Read the text again and match the words with their definitions.

1. precautionary measure; 2. carelessness; 3. welfare; 4. duty; 5. premises; 6. to cope with

- a. a responsibility or task that you have to do as part of your job
- b. to deal effectively with a difficult situation
- c. the buildings and land occupied by a business

- d. poor attention to an activity, which results in harm or errors
- e. action taken in order to prevent something dangerous from happening
- f. the health, comfort and well-being of a person or group

Task5. Read the sentence pair. Choose where the words best fit the blanks.

1. *burn / live wire*

- A. Touching a is very dangerous.
- B. A serious should be seen by a doctor.

2. *de-energize / electrocution*

- A. Electricians sockets before they work on them.
- B. can be prevented by following safety rules.

3. *risk / static electricity*

- A. often builds up on door knobs.
- B. There is always a of getting hurt at work.

Task6. Read the text and complete it with the words in the box. Retell the text.

tidy; fire; gloves; concentration; first aid; protection; brush; operate

MACHINERY

- Be sure to understand how to every machine you are going to use.
- Never use machinery when you are in a room alone.
- Use all the required in the place of work.
- Check that the safety devices are working. If they are not working, ask for them to be repaired immediately.
 - Do not talk to anybody who is operating a machine. is important at all times.
- Turn off the electricity before cleaning a machine.

TOOLS

- Report any damage to the tools used at work.
 - See that tools are correctly set.

DRESS

- Before starting work, wear protective clothing.
- Always wear safety glasses, and boots when using a machine.

WORKSHOP

- Keep the workshop, do not leave rubbish around and do not throw cigarette ends or ashes into the rubbish bin.
- The area around machines must be kept clear to avoid falling.
 - Tools and protective clothing should be put away when not in use.
 - Clean machines after use with a not with your hands.

ACCIDENT PROCEDURES

Make sure you know where to assemble in the event of stop buttons are located and where the emergency

- Check where the fire extinguishers are in your workplace and how they work, in order to be able to use them in case of fire.

- Do not shout or run as this can lead to panic, and inform the supervisor immediately if any accident occurs.

- Never administer unless you have been trained to do so.

Task7. Decide if the following rules are true (T) or false (F), then correct the false ones.

1. Use machinery only when other people are in the workplace.
2. People mustn't talk in the workplace.
3. Turn off electricity after a machine has been cleaned.
4. Wear safety boots before arriving in a workplace.
5. Always wear sunglasses when using a machine.
6. Damaged tools can be dangerous.
7. Report to the supervisor about damaged equipment.
8. In case of fire ask the supervisor where the emergency stop buttons are located.
9. In case of fire shout to catch other people's attention.
10. Anyone can give first aid in case of an accident.

Task8. Read the text about safety signs and colors and complete the table with the correct sign category. Be ready to speak on different safety colors.

Safety signs and colors are useful tools to help protect the health and safety of employees and workplace visitors. Safety signs are used to draw attention to health and safety hazards, to point out hazards which may not be obvious and to remind employees where personal protective equipment must be worn.




Color attracts attention and can be used extensively for safety purposes. For example, color can be used as an additional safety measure to identify the contents of pipes and the nature of the hazard. Different combinations of colors are used to indicate the various types of hazards. For example, the red color is used to indicate a definite hazard, while a potential hazard is communicated by the color yellow.

When employees are aware of the hazards around them and take the necessary precautions, the possibility of an injury, illness or other loss is minimized.

As shown in the table below, there are three basic sign categories used in the workplace:

- warning, to indicate definite or potential hazards;
- regulatory, to indicate which actions are prohibited or mandatory;
- information, to provide general information and directions.

Each category is distinguished by its shape and can be divided into subcategories having different colors.

Category	Subcategory	Colour
 1 A circle indicates that an order is in force.	- Prohibition: it forbids an action. - Mandatory: it requires an action.	Red and black on white White on black
 2 A triangle indicates caution or danger.	- Caution: it indicates a potential hazard. - Danger: it indicates a definite hazard.	Black on yellow White on red
 3 A square indicates information.	- Emergency: it indicates first aid, health, fire protection and emergency equipment. - General information: it indicates permission or public information.	White on green White on blue

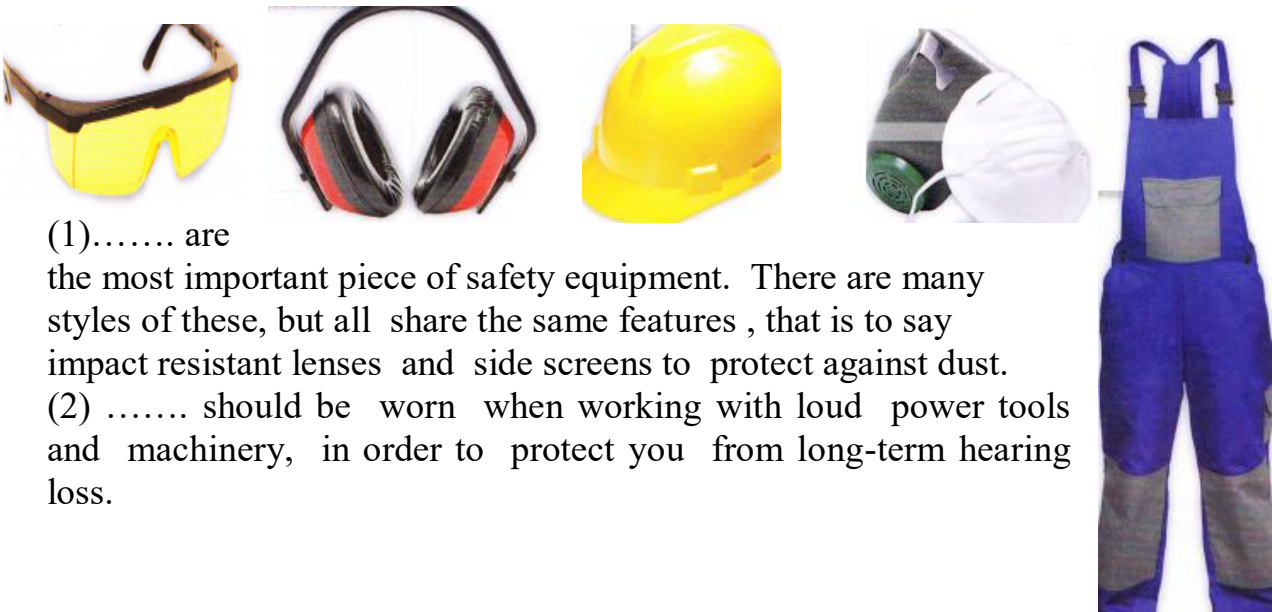
Task9. Match each sign with its meaning and write the correct subcategory for each of them.

- a. slippery when wet
- b. high voltage
- c. first aid station
- d. head protection must be worn
- e. cafeteria
- f. no smoking area



Task10. Match the words in the box with the correct description.

hearing; protection; hard hats; respirator; safety; glasses; face shield; overall



(1)..... are the most important piece of safety equipment. There are many styles of these, but all share the same features, that is to say impact resistant lenses and side screens to protect against dust.

(2) should be worn when working with loud power tools and machinery, in order to protect you from long-term hearing loss.

(3) are predominantly used in workplace environments such as building sites. They protect the head from injury by falling objects, impact with other objects, debris, bad weather and electric shock.

(4) When working with chemicals or machinery which makes dust, it is advisable to wear a face mask, to keep these fine particles away from the face. When spraying varnish or paint, this is a better choice, to protect you from any harmful effects of using these chemicals.

(5) It must be worn when using machinery which gives off sparks or little parts. It is comfortable, can be flipped up when not needed, and will keep most of the flying chips away from your face.

(6) You should always wear proper clothing, like an (6) ___. Comfortable, long-sleeved shirts and long trousers combined with good safety boots will each provide a layer of protection.



Task11. Name the protective devices mentioned above and explain their protective functions.

Task12. Read the text about fire safety procedures and put the actions in the correct order.

A fire safety plan is required in all public buildings, from schools, hospitals, supermarkets to workplaces. Evacuation drills are a very important part of the staff training associated with emergency evacuation procedures.

The drill should be checked, recording the time required to complete the evacuation, and noting any problems and deficiencies.

What to do in case of fire ...

- If you see fire or smoke, do not panic. Remain calm and move quickly, but do not run.
- Alert the responsible staff and telephone the correct national emergency number. Have someone meet the firefighters to tell them where the fire is. They can lose valuable minutes if they have to find it themselves.
- Rescue any people in immediate danger only if it is safe to do so.
- If practicable, close all doors and windows to contain the fire.



- Try to extinguish the fire using appropriate firefighting equipment only if it is safe to do so.
- Follow the instructions of your supervisor and prepare to evacuate if necessary.
- Save records if possible.
- Evacuate your area and check all rooms, especially changing rooms, toilets, storage areas, etc.
- Do a head count of all staff and report any people unaccounted for to the supervisor.

a. Close all doors and windows.

b. Do a head count of all staff and visitors.

- c. Evacuate your area and check all rooms.
- d. Meet the firefighters and give them details about the fire.
- e. Save records.
- f. Prepare to evacuate.
- g. Remain calm and move quickly.
- h. Report any people unaccounted for to the supervisor.
- i. Rescue any people in immediate danger.
- j. Telephone the correct national emergency number.
- k. Try to extinguish the fire using appropriate firefighting equipment.

Grammar

Giving orders and instructions

1. Use the imperative form

Be quiet!

Take care!

Listen!

Sit down.

Get me something to drink.

2. You should soften the imperative form with let's or please

Let's go now, shall we?

Let's take a break, shall we?

Please listen to what I'm saying

3. Use a modal verb to turn the order into a request

Could you bring me that file, please?

Could you pick up the kids from school, please?

Can you come here please?

Can you do something for me?

Will you keep quiet please?

Would you wait here until I'm back?

Task13. Change the following sentences into orders and instructions.

- a. Close all doors and windows.
- b. Do a head count of all staff and visitors.
- c. Evacuate your area and check all rooms.
- d. Meet the firefighters and give them details about the fire.
- e. Save records.
- f. Prepare to evacuate.
- g. Remain calm and move quickly.
- h. Report any people unaccounted for to the supervisor.
- i. Rescue any people in immediate danger.
- j. Telephone the correct national emergency number.
- k. Try to extinguish the fire using appropriate firefighting equipment.

Task14. Translate the following words into Russian.

be aware; industrial accidents; to avoid; precautionary measures; fundamental rules; welfare of people at work; use of dangerous substances; the emission of dangerous gases; safe working environment; to cope; behave responsibly; hazards; electricity shocks; wires with opposite charges; de-energize power source; safety signs personal protective equipment; safety purposes; safety measure; a definite hazard; a potential hazard; take the necessary precautions; regulatory; hearing protection; hard hats; respirator; safety glasses; face shield; overall;

Task15. Translate the following words into English and prepare them for dictation.

принять необходимые меры предосторожности; промышленные аварии; избегать; спецодежда; меры предосторожности; основные правила; благосостояние людей рсправляться; вести себя ответственно; опасности; удары электрическим током; провода с противоположными зарядами; обесточить источник питания; использование опасных веществ; знаки безопасности средства индивидуальной защиты; цели безопасности; меры безопасности; определенная опасность; потенциальная опасность; нормативные; защита слуха; каски; респиратор; защитные очки; защитная маска;

Task16. Make up all possible types of questions to the following sentences:

1. You should always wear proper clothing, like an overall.
2. When spraying varnish or paint, this is a better choice, to protect you from any harmful effects of using these chemicals.
3. Different combinations of colors are used to indicate the various types of hazards.

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**Иностранный язык.
АНГЛИЙСКИЙ ЯЗЫК**

Учебно-методическое пособие

В авторской редакции

Подписано в печать 06.10.2021 г.

Формат 60x84/16 Печ. л. 3,5 Усл. печ. л. 3,255

Заказ № 830/0709-УМП11 Тираж 50 экз.

Московский государственный технический университет ГА
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