СГАУ:Ш(у)
У 913

Учебные задания по английскому языку по теме "Эксплуатация летательных аппаратов" [Текст] / Федер. агентство по образованию, Самар. гос. аэрокосм. ун-т им. С. П. Королева ; [сост. А. Г. Лещенко, Г. В. Любаева]. - Самара : [б. и.], 2005. - 56 с. - 22.38 р.
ГРНТИ 16.41.21**ББК** СГАУ:Ш(075) + Ш143.21-923

UNIT 1

1. Причастие 1 (или наречие + причастие 1) – левое определение

Назовите признаки указанной синтаксической формы и переведите речевые отрезки:

a) an increasing interest — a moving object
an increasing speed — a moving vehicle

b) widely varying conditions — constantly increasing weights
widely varying ranges — constantly increasing speeds

c) fast moving particles — a slow burning fuel
fast moving air — a slow operating device

2. Причастие 2 (или наречие + причастие 2) – левое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки:

a) the observed data — the transmitted signal
the observed phenomena — the transmitted information

b) a highly developed industry — a fully ionized gas
a heavily armed plane — a partially changed operation

c) much-needed information — little changed direction
much-used material — little improved thrust

3. Причастие 1 и причастие 2 – левое определение

Переведите речевые отрезки, учитывая особенности перевода причастия 1 и причастия 2 в функции левого определения:

compressing gases — heating parts
compressed gases — heated parts

4. Существительное (одно/несколько) – левое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки, учитывая синтаксическую связь между определением и определяемым словом:

a) test instrument is...
an instrument test is...

a system weight was...
a weight system was...

a metal surface can be...
a surface metal can be...

a signal generator must be...
a generator signal must be...

b) a test instrument location is...
an instrument test location is...

a surface metal quality was...
a metal surface conductivity was...

5. Прилагательное – левое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки, учитывая зависимость прилагательного от его формы и сочетания с определяемыми словами:

a) a strong signal is...
a strong metal is...

a heavy load vas...
a heavy sky vas...

b) a most reliable device is...
a most successful flight is...

the most reliable device vas...
the most successful flight was...

c) the lowest possible temperature can be...
the shortest possible distance has...

the least possible consumption must be...
the most possible density has.. .

6. Прилагательное + существительное – левое определение

Переведите речевые отрезки, учитывая связь первого компонента определения с определяемым существительным:

a large time interval
a high surface temperature
a strong resonance signal

several designed kinds
different air speeds
various engine requirement

7. Наречие + прилагательное – левое определение

Переведите речевые отрезки, учитывая зависимость перевода наречия от прилагательного:

an increasingly important quality
an increasingly large distance

a perfectly compressible gas
a perfectly attractive idea

highly accurate information
highly useful data

a largely experimental device
a largely useful phenomenon

8. Наречия “far”, “little”, “much”, “still” + прилагательное в сравнительной степени – левое определение

Переведите речевые отрезки, учитывая зависимость перевода наречия от прилагательного:

a) a far wider sphere
a far heavier load

b) a little longer distance
a little more accuracy

c) a much shorter distance
a much less mass

d) a still smaller mass
a still faster speed

9. Существительное с окончанием “-’s” – левое определение

Переведите речевые отрезки, учитывая синтаксическую связь между словами:

a) Mendeleyev’s table
Newton’s law

b) a mile’s distance
an hour’s period

10. Слова “the only”, “the very”– левое определение

Переведите речевые отрезки, учитывая синтаксическую. Связь между словами:

a) the only course
the only possibility
the only way

b) the very existence
the very cost
the very change

11. Вероятность сочетаемости глагола “to be” в личной форме

Назовите возможные сочетания глагольных форм “is”, “are”, “was”, “were” со словами в скобках и переведите:

1. The engine is... (develop, to be developed, developing, develops, developed, will develop, can develop, to develop).
2. The rockets are... (carries, carried, carrying, to carry, can carry, to be carried, carry).
3. The designer was... (directs, directing, directed, can direct, will direct, to direct)/
4. Investigations were... (proving, proved, prove, to prove, can prove, will prove, proves, to be proved).

12. Вероятность сочетаемости глагола “to have” в личной форме

Назовите возможные сочетания глагольных форм “has”, “have”, “had” со словами в скобках и переведите:

1. The speed has... (influences, influenced, influencing, influence, to influence, will influence, been influenced, to be influenced).
2. The vehicles have... (receive, to receive, received, been received, will receive, to be received).
3. Progress in aircraft design had... (prove, proved, to prove, proving, will prove, to be proved, been proved).

13. Видо-временные и залоговые формы глагола и их перевод

Назовите видо-временные и залоговые форму глаголов и переведите:

1. The aircraft engine id developing... The aircraft engine was to developed... The aircraft engine will develop thrust... The aircraft engines are developed... The aircraft engines are to be developed... The aircraft engines are to develop... The aircraft engines were developing... The aircraft engines were developed... The aircraft engines were to develop...
2. The device has performed... The device has to perform... The device will have to perform... The device has been developed... The device has to be developed... The device will have been developed...

1. Существительное + причастие 1 – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a) an electron-emitting source – источник, испускающий электроны
b) a Venus-orbiting probe – станция, летающая вокруг Венеры

a) a man-carrying module
a load-carrying missile

b) an Earth-orbiting satellite
a Moon-orbiting laboratory

2. Слова “ever”, “never”, “self” + причастие 1 – левое определение

Переведите речевые отрезки, учитывая, что “ever” приобретает усилительное значение; ”never” приобретает усилительно-отрицательное значение; “self” указывает на самостоятельность выполнения действий:

Например: a) ever-widening circles – все более расширяющиеся круги
b) a never-ceasing noise – никогда не умолкающий шум
c) a self-recording device – самозаписывающее устройство

a) ever-increasing circles
ever-reducing weights

b) never-ending changes
never-reducing loads

b) a self-controlling instrument
a self-blanching device

3. Существительное + причастие 2 – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a gas-cooled system – система, охлаждаемая газом

man-made observation
motor-driving boat
rocket-powered rocket
ground-based aids
surface-launched missiles
earth-obtained data

4. Прилагательное (указывающее на высоту, ширину, длины или форму) + прилагательное с суффиксом -ed – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a low-powered transmitter – передатчик, имеющий низкую мощность

high-powered satellites
round-shaped meteorites
long-lived instruments
short-lived particles

5. Существительное + “by” + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a layer-by-layer packing – укладка слоями (слой за слоем)

step-by-step decision
point-by-point addition

6. Существительное + “of” + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a rate-of-climb indicator – указатель скорости набора высоты

rate-of-turn gyroscope
noise-of-signal magnitude

7. Существительное + “to” + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: an Earth-to orbit mission – выведение КЛА с земли на орбиту

lift-to-drag ratio	point-to-point navigation
signal-to-noise ratio	orbit-to-orbit propulsion system

8. Существительное + “free” – левое определение

Переведите данные речевые отрезки, учитывая особенности перевода данного определения:

Например: an air-free environment – среди без воздуха

gravity-free environment	friction-free movement
noise-free operation	water-free surface

9. Слова “above”, “upper”, “outer”, “inner” – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: the above information – выше приведенная информация

the above description	the outer walls
the upper limit	the inner surface

10.Существительное с окончанием “-’s” + прилагательное – левое определение

Переведите речевые отрезки, учитывая, что перевод начинается с прилагательного:

Например: natures fundamental particles – основные частицы природы

the Earth’s atmospheric pressure	Newton’s second low
Einstein’s general theory	Mendeleyev’s periodic table

11.Существительное + существительное – левое определение

Переведите речевые отрезки, учитывая синтаксическую связь между существительными, соединенными дефисом:

Например: data-record system – системы, регистрирующие данные

a cathode-ray tube
a phrase-angle measurement
a square-wave generator
a laboratory-type testor

12.Существительное + “and” + существительное (или прилагательное + “and” + прилагательное) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: the wave and particle properties – волновые и корпоскулярные свойства

a) fuel and oil tanks
   ground-and space-based programs
b) electrical and electromagnetic influence
   solar-sell and nuclear-power supplies

13.Числительное + существительное (одно/несколько) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a two-way communication – двусторонняя связь

a two-element tube
a 12-man space station
a two-stage rocket
a three-year course

14.Числительное + название единицы измерения – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

Например: a one-ampere current – ток в один ампер

a) an eight-foot piece
b) a 30-m diameter
a 1500-lb spacecraft
a 2.5-mi distance

1. Слово “way” и его сочетания

Переведите речевые отрезки, выбирая соответствующее значение слова “way” (дорога, путь, способ):

1. to be in the way in the development; 2. To have one’s own way of the development; 3. To make way to the development; 4. To give way to a new concept; 5. to lead the way to a new concept.

2. Слова “time, “times” и их сочетания

Переведите речевые отрезки, исходя из значений time (время; период); times (эпоха; времена); time(s) (раз; умноженное); at times (иногда):

a) space and time, present and future time, half the time, to think all the time, the time of the day
b) in old times, in prehistoric times
c) million times, million times larger, two times the size, three times five
d) at times there requires a change

3. Слова “result in” и “result from”

Переведите речевые отрезки, учитывая противоположное значение слов result in (приводить к чему-либо) и result from (получаться в результате чего-либо):

a) to result in the advance of silence (the compression)
b) to result from the contradiction (the advance of science)

4. Слова “front, “back” и их сочетания

Переведите речевые отрезки, исходя из значений front (передний) и back (задний):

a) front area (part, wheel) in front of the plane (engine, craft)
b) a back sit (number, side) in the back of the engine (vehicle)

5. Слова “early”, “late” и их сочетания перед хронологическими датами

Переведите речевые отрезки, исходя из значений early (в начале); late (в конце); as early as, as late as (еще, уже); of late (недавний, последний):

a) early in the year, in the early 1950’s, as early as 1950
b) of late year, in the late 1960’s, as late as 1960

6. Предлоги “against”, “among”, “behind”, “over”, with”, “without”

Переведите речевые отрезки, учитывая значения предлогов against (против, по отношению; на фоне; н, к, с); along (по, вдоль, с, наряду); among (посреди, между, у); behind (сзади, за, после); over (над, выше, по всему, через, за, по сравнению, по ту сторону; в течение; свыше, сверх); with (с, при, у); without (без, вне, за):

a) against the war (the advent, the introduction)
against the sky (the sea, the sun)

to run against the wind, to press against the surface, to move against the other object

b) along the wing (the fuselage, the surface)
along the path (the distance, the road)
along with the success (the advance, the improvement)

c) among the hills (the mountains, different achievements)

d) behind the pilot (the wing, the clouds)
behind the advance (the concept, the opportunity)

e) over the wing (the surface, the balloon)
over the road (the river, the mountains)
over the past seven years (the test period, a month)
all over the world (the surface, the range)
to have an advance over the piston engine

f) with the advent (the opportunity, the angle)

g) without any drop (any rise, errors, exceptions)

7. Слова с префиксом “fore-”

Переведите слова, учитывая значение префикса fore- (пред-, заранее, впереди):

forerunner *n*; forefront *n*; foreword *n*; foresee *v*; foretell *v*; forego *v*; foregoing *a*; foremost *a*.

8. Слова с префиксами “in-”, “out-”

Переведите слова, учитывая значения префиксов in- (в-, внутри), out- (вне-, пере-):

a) inboard *a*; inbuilt *a*; inborn *a*; include *v*; inclose *v*; input *n*
b) outbalance *v*; outbreak *n*; outdated *a*; outcome *n*; output *n*

9. Слова, имеющие одинаковый корень в английском и русском языках
Переведите слова:

(1) helicopter *n*; start *v*; stable *a*; controllable *a*; maneuverable *a*; potential *n*; distance *n*; transportation *n*; modern *a*; characteristic *n*; experiment *v*; series *n*; barrier *n*; double *v*; technological *a*; constant *a*; turbulent *a*; configuration *n*

(2) palliative *n*; vector *n*; control *v*; vertical *a*; system *n*; economic *a*; test *n*;

practical *a*; chemical *a*; turbine *n*; gravitational *a*; base *n*; transmitter *n*; interplanetary *a*

10.Ознакомьтесь с терминами основного текста

streamlining	обтекаемость
bracing	крепление
undercarriage	шасси
struts and wires	расчалки и растяжки
high-wing monoplane	моноплан с низким расположением крыла
low-wing monoplane	моноплан с высоким расположением крыла
shock wave	скачок уплотнения; ударная волна
trim	балансировка
buffeting	бафтинг, тряска
sweptback wing	крыло прямой стреловидности
variable-swept wing	крыло изменяемой стреловидности
variable-geometry wing	крыло изменяемой геометрии
runway	взлетно-посадочная полоса
landing strip	посадочная полоса
tricycle undercarriage	трехколесное шасси
wheel brake	колесный тормоз
airbrake	аэродинамический тормоз
wing slot	щелевой закрылок
vectored thrust	тяга, регулируемая по величине и направлению
hovering	висение; парение
jet lift	подъемная сила, создаваемая реактивной струной
cruise	крейсерский полет, полет на крейсерском режиме
gross weight	общий вес
fuel tanks	топливные баки
shunting	переброска

Milestones of flight

In the 14th century Leonardo da Vinci foresaw the possibility of the man-made airplane and man-made helicopter.

Man started with the non-power driven machines. A hot air balloon was the first vehicle to lift man from the surface of the Earth. The there appeared winged heavier-then-air craft. Yet, the achievement of man-directed flight came with the engine.

The aerostatics of lighter-then-air activity has given way almost completely to the airplane. A first powered flight in a man-carrying airplane has been made by A. F. Mjaisky in 1884. It was 19 years before the Wright's brothers flight. The Mojaisy and

Wright airplanes led the way into the air age. These airplanes had all essential features of the modern airplane. However, it was to take many years* before the airplane developed into a successful, stable, controllable, highly maneuverable and reliable machine.

The airplane has a long and varied history. The First World War stimulated the development of aviation and shoved the potential of the airplane. It was proved that the airplane could cover distances in shorter time than other methods of transportation could.

Progress in aircraft design has been directed primarily at speed, and yet more speed. Speed and more speed in plane travel became the order of the day**.

Aircraft speeds had made rapid advances. The maximum level of flight speed of a piston-propeller aircraft was 490 m. p. h. (M=0.64). Modern planes, however, travel at supersonic speeds: supersonic means any speed grated than that of sound, but hypersonic begins at M-5. (The Mach number (M) refers to the speed at which an aircraft is traveling in relation to the speed of sound.) So speed has become a main characteristic of aeronautical development.

The demand for increased speed was met by many widely different developments. Research began to follow two lines: one which dealt with aerodynamics and the other with the power plant.

Airplane designers were experimenting with new types of internal and external constructions: wing areas and front areas was reduced; streamlining was improved; external bracing was eliminated; undercarriages became retractable. The biplane using two horizontal systems connected by a series of struts and wires gave way to the high-wing monoplane and later to the low-wing monoplane.

However air speed increases stem chiefly from engine research and development.

Airplane speed has received great impetus with the advantage of the jet age. Jet propulsion had broken down most of the barriers*** to further advanced in the speed of the man-carrying vehicles. The advent of the jet had brought a new level of speed. This newest mode of transport comes almost to doubling the speed of earlier conventional aircraft. In the early 950s it was clear that the days of the piston-engined aircraft were numbered.

It is easily understandable that any technological advance is accompanied by some difficulties. The new era of fast, high-flying jets brought with it great benefits, opportunities and challengers. Along the path of progress, the technical effort required has multiplied many times. This has resulted in the evolution of several airplane and engine designs to achieve the flight efficiency.

Near the speed of sound the density of air is no longer**** constant of the compression of the air takes place in front of the airplane. The compressed air comes up against the airplane with shock. This result in a shock wave, representing a sharp

———

* it was to take many years – потребовалось много лет

** the order of the day – насущная задача

*** barrier – препятствие

**** no longer – больше не

dividing line causing a sudden drop in the speed of airflow, and an increase in the ___ pressure and density of air. The airflow behind the shock wave becomes turbulent, as a result there is a lost of lift, increase of drag, change of trim, violent buffering and sometimes considerable pressure on the control surfaces. This has brought into being a new wing from, that of the jet's sweptback wings.

However, the sweptback wing is desirable under certain flight conditions but undesirable under others. At present there appeared delta-wing airplanes. With such wings the planes can fly several times faster then the speed of the sound. However, the delta-wing configuration gives rise to a number of aerodynamic complications at low speeds.

Aircraft designers are seeking ways of changing the sweptback angle during the flight. At present the ever-increasing efforts in the development of variable-swept wings are strongly apparent. A plane with a variable-geometry wing combines contradictory qualities of planes with straight and swept wings. It has better flying characteristics in varying flying conditions: variable-swept wings provide high lift-to-drag ratios at both subsonic and supersonic speeds.

The jet engine which brought the aircraft with the highest top speeds at the same time caused the most acute landing and approach problems. Takeoff was as much a difficulty. Designers found themselves facing the age old problem of giving higher top speeds without impossible landing characteristics.

The problem was that of length of runways and landing strips. The runways were extended to lengths of three kilometers and more. Besides the high-speed aircraft requires a long, specially prepared runway. Much effort is being devoted by scientists, engineers and designers to the means whereby* they can somehow obtain the shortest takeoff and landing. All palliatives** had been tried. The tricycle undercarriage with its means of splitting the air from the main wings after touchdown, the wheel brakes, the airbrakes and the wing slots. These things were bringing with them new problems to be solved. Some advances thoughts were expressed about the possibility of aircraft commonly called VTOL***, that is, an aircraft which will land and take off without forward run. The idea was that of using thrust to obtain direct lift for a man-carrying vehicle. An associated plan was the use of vectored thrust.

Vectored thrust means thrust that can be controlled and have its direction changed. It seems to offer a means of using the same engine both for the vertical takeoff and the vertical descent and for hovering and for forward propulsion.

Thus the two vertical takeoff types will have either vectored thrust or direct jet lift. Recently there came into existence an aircraft with a short run. A short run type has a wing system which can be deployed in one certain manner for takeoff and for landing and in another different manner for high speed cruise.

The new jet propulsion system gave rise to its own engine system problems, for ____

____

* whereby – тем самым

** palliatives – средства, методы

*** VTOL (Vertical Takeoff and Landing) – самолет с вертикальным взлетом и посадкой

instance, the fuel consumption problem. Jet engines are good appetizers*.

Fuel makes up a big part of modern jet airplane's total gross weight. The largest jets have fuel tanks in the wings storing in excess of 21,000 gallons of fuel. The fuel required for takeoff, climb and acceleration represents an important 26% of the total fuel load.

Thus nowadays the reduction of fuel consumption is problem number one because power-to-weight ratio of specific weight has always been and remains the critical factor in prime movers for aircraft.

The scientist all over the world are trying to find an economic fuel. Some scientists speak of atomic planes that will circle the Earth eighty times on one pound of fuel. Nuclear energy for propulsion will go away** with a large bulk of fuel. Besides nuclear aircraft has three- or four-fold improvement in performance over the present day chemical aircraft. The first tests of nuclear-powered aircraft are no longer in the realm of the impossible though the practical difficulties of handing such a device are obvious.

Increases in speed have offered many associated advantages, among them the possibility of escaping from the gravity of the Earth being the most important. However, no ordinary flying machines are of the use for space travel. Aircraft, of either old or new design, cannot operate except when they have air around them. Gas turbine engines cannot run outside the atmosphere. With the advent of the rocket engine it became possible. It was the rocket that broke the gravitational bonds which had held man to the Earth.

The step into space from the airplane was a very large one indeed. Yet, it was aviation that gave the propulsion rocket its opportunities for full development.

The first manned space flight was made on the 12th April 1961. It was Vostok 1 carrying Yuri Gagarin that introduced the era of manned space flight. That was a milestone of great and lasting significance.

Nowadays different plans for a system of manned orbital bases, nuclear rocket for translunar and interplanetary journeys, and orbit-to-orbit propulsion system for shunting heavy payloads to different orbits are worked at.

Recently the Space Shuttle has been called the keystone to the practical age of space travel. There is no doubt*** that its development represent the next great opportunity and challenge for mankind in the field of flight.

1. Причастие 1 и причастие 2 – левое определение

Переведите речевые отрезки, учитывая особенности перевода данных определений:

A. (1) compressing flows	compressed flows
controlling devices	controlled devices
(2) heating parts	heated parts
covering surface	covered surface

———

* are good appetizers – потребляют много топлива

** will go away – избавит

*** there is no doubt – нет сомнения

B. 1. The recording instruments ratio all the received data to the Earth.
2. The recorded history of man covers only some 6000 years.
3. The observed polarization of starling provides important evidence (данные) of existence of galactic magnetic fields.
4. The observing balloon has various practical limitations.
5. In a hydrogen bomb explosion the reaction takes place in an uncontrolled manner.
6. The controlling mechanism provides the error elimination.
7. A guided missile is a pilotless flying plane or craft.

2. Наречие + причастие – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) a constantly reflecting object (surface, region)
a rapidly flying glider (aircraft, vehicle)
an instantly resulting achievement (elimination, impetus)
a fast moving wing (aircrew, flow)
(2) a properly descending parachute (aircraft, glider)
a straightly landing helicopter (aircraft, vehicle)
a fast operating tool (device, machine)
B. 1. We may consider light as a flight of fast moving particles.
2. A straightly landing vehicle has great prospects.
3. Rapidly advancing technology of satellites has made critical the need for smaller electronic components.

3. **Слова “ever”, “never”, “self” + причастие 1 – левое определение**

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) a) an ever-eliminating number (feature difference)
an ever-changing drag (shape, line)
b) the never-ending change (airflow, advent)
the never-eliminating error (opportunity, angle)
c)a self-controlling device (mechanism, instrument)
a self-balancing level (lift, weight)
(2) a) an ever-increasing runway (slot, storage)
b) a never-changing angle (manner, approach)
c) a self-controlling takeoff (climb, descent)
B. 1. An ever-lasting significance of small fuel consumption give rise to many problems
2. A self-controlling device operates properly in all modes of work.

3. The never-ending struggle (борьба) of man to learn as much as he can about his planet and about the universal "facts of life" gives impetus to the advent of new concepts.
4. In our ever-changing Universe new thoughts, experiences (опыты) and relates make statistic facts impossible.

4. Существительное + причастие – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) a load carrying aircraft (helicopter, balloon)
a drag-forming surface (cover, undercarriage)
a power-producing element (shock, airflow)
(2) an angle-forming action (approach, descent)

B. 1. The instrument-carrying balloons have gathered (собирать) a great many valuable data.
2. The efficiency of a thrust-producing jet of air is the propulsion work divided by the kinetic energy.
3. The Earth-orbiting vehicle is used for many scientific purposes.
4. Practically all electron tubes make use of an electron-emitting source.
5. A magnetic field surrounds a current-carrying wire.
6. The lift-generating system of VTOL aircraft should be powerful.

5. Прилагательные типа "instrumented", "manned", "winged" и т.п. – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) an instrumented flight (aircraft, balloon)
a manned control (flight, rocket)
(2) a winged flight (rise, lift)
an instrumented descent (climb, control)

B. 1. Instrumented space probes can deepen and increase our knowledge.
2. Many unmanned rockets explored the Moon before man set foot on the Moon's surface.
3. The intense "storms" are dangerous for manned space flights.
4. N. E. Zhukovski was deeply concerned with winged flight.
5. The early ideas led to the first powered flight.
6. Pressurized cabin is required for high-attitude flights.

6**. Наречие + причастие – левое определение**

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) a) a mechanically produced lift (streamline, control)
a specially constructed wing (undercarriage, landing gear)
a fully controlled retraction (shock, mode)
b) a full-sized aircraft (helicopter, airflow)
a low-powered transmitter (aircraft, balloon)
a high-powered aircraft (satellite, vehicle)
much-needed information (impetus, elimination)
well-understood conception (achievement, impetus)
(2) a) a partially-controlled reaction (deployed, landing)
a widely used wheel brake (manner, undercarriage)
b) much-needed knowledge (offer, rise)
well-understood opportunity (desire, manner)
a low-powered aircraft (tank, take-off)

B. (1) 1. Mechanically produced electric current differs from the chemically produced current.
2. The aim was to produce a successfully powered model.
3. Properly operated airplane can land without the help of its engine.
4. A well-trained designer can foresee many faults of the system.
(2) 1. The atmosphere has nearly unlimited freedom of mouvement.
2. These problems will demand well-directed engineering effort.
3.The exploration has given as much-needed knowledge of the Earth's origin.
4. We must develop fully automated equipment to provide much lower costs of aircraft service.

7. **Существительное + причастие – левое определение**

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. 1. the Earth-based astronomy (observation, control)
2. a radar-equipped aircraft
3. a balloon-born instrument
4. a motor-driven machine

B. 1. During World War 2 there appeared rocket-powered, gyrocontrolled missiles.
2. Gun-fired shells travel in a ballistic trajectory.
3. Ordinary piston-engined aircraft cannot fly at the altitude of 50 miles.
4. Rocket is a jet-propelled vehicle.
5. During World War 2 the Japanese also tried an air-launched, radio-controlled, rocket-assisted glide bomb.
6. In 1903 Konstantin Tsiolkovsky described a rocket-driven vehicle for space travel.
7. Error-operated systems are often complex.
8. The propeller-driven aircraft has some advantages.

8. **Прилагательное + существительное – левое определение**

Переведите речевые отрезки, учитывая особенности определения данного
определения:

A. a) electromagnetic field studies (lines)
suitable source advent (offer)
b) atmospheric pressure magnitude calculation (increase)

B. 1. There must be provision of clear approach surfaces at the end of the runway.
2. The maximum electron densities in the ionosphere decrease greatly during the night.

9. **Прилагательное "most" – левое определение или его часть**

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) most achievements (craft, advents)
the most important achievements (craft, advents)
a most important achievement (craft, advent)
(2) most opportunities (desires, approaches)
the most acute desires (contradictions, thoughts)
a most acute desire (contradiction, thought)
B. 1. Most instruments have printed scales.
2. Most electrical instruments are designed to operate properly in their a vertical or a horizontal position.
3. Most present-day electrometers employ electrometer tubes or hybrid configurations.
4. Hydrogen is the most abundant element in the Universe.
5. Titanium is a most useful structural material.

10. **Прилагательное в превосходной степени + possible – левое определение**

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. (1) the lowest possible temperature (angle, drop)
the thinnest possible wire (wing, airflow)
(2) the simplest possible atom (made, manner)
the highest possible speed (climb, specific impulse)
B. 1. Hydrogen is a chemical element with the simplest possible atom.
2. Absolute zero is the lowest possible temperature.
3. Even in the largest possible orbit the electron has only a certain energy.

11. Прилагательные "high", "low", short" и т. п. + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) high-altitude equipment (vehicles, balloons)
high-thrust devices (engines, aircraft)
short-length trip (travel, runway)
short-range missile (rocket, shell)
low-pressure mode (conditions, elimination)
low-visibility conditions (environment, realm)
b) small-scale investigation (test, exploration)
full-scale experiment (measurement, helicopter)
c) short-term application (benefit, advent)
long-term function (advent, rise)

B. 1. High-altitude ascent in hydrogen balloons are possible.
2. The other possible motor for short-range missile work is the ramjet.
3. the jets gain time on long-length trips, on short- and medium-length trips they lose it.
4. Some problems are associated with the large-diameter rotors.
5. these problems have been explored in both small-scale and full-scale investigations.
6. Success with the variable-diameter approach can offer interesting applications to VTOL.

12. Наречие + прилагательное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) extremely low pressure (voltage, climb)
relatively high altitude (drop, rise)
highly accurate landing (takeoff, approach)
extremely low pressure magnitude (increase)
relatively high air pressure (volume)
highly sensitive instrument indications (requirements)
b) now-familiar shape (advent, mode)
once-logical limit (control, desire)
now-familiar shape (advent)
once-logical drag limit (rise)

B. 1. Relatively high powers also imply (требовать) high fuel consumption and noise levels.
2. Speeds of conventional helicopters have risen far beyond many once-logical limits.
3. the now-familiar rotor provides the improvement of helicopter performance.
4. A fairly large development effort is continuing on the new concept.
5. Recent years saw extremely rapid growth of commercial air transport.

13. Числительное + существительное (одно/несколько) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

1. The two-level storage system comprises two devices, a drum (барабан) and a disk.
2. A two-element electron tube has some advantages.
3. An airplane may do a three-point landing.
4. A piston engine works on a four-cycle principle.

14. Числительное + название единицы измерения – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) a 30-m diameter; a 15-ft antenna; a 1500-lb spacecraft; a 2.5-deg beam; a 200-nmi orbit
   b) a one-ampere current; an eight-foot diameter; a nineteenth-century science; the eleven-year cycle;
B. 1. In 1956 Joffe developed solar-powered forty- and one-hundred-watt thermoelectric converts.
   2. Twenty-eight-volt panels are common in space power applications.
   3. It was a six-hour flight.
   4. 20^{th} century concepts to solving environmental problems are aerospace and electronic.
   5. The layers of the ionosphere change with the eleven-year cycle of sun-spot variation.

15. Существительное (одно/несколько) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) a figure elimination
   an elimination figure
   a test mode
   a mode text
   a stability control
   a control stability
   an angle rise
   a rise angle
   b) a weather satellite
   a weather satellite system
   a weather satellite system control
   a weather satellite system control opportunity
   an instrument accuracy
   an instrument accuracy opportunity
   an instrument accuracy opportunity rise

an instrument accuracy opportunity rise desire

B. 1. A comet provides a plasma laboratory.
2. Wave drag occurs at supersonic speeds.
3. The performance characteristics of aircraft have a direct influence on the runway length.
4. The guidance system signals the engine to stop when it develops a certain speed, altitude and direction.
5. At present we may say that only a few generations of helicopter transport vehicle have been developed.

16. Существительное с окончанием "'-s" + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) the earth's atmosphere drag
the missile's guidance opportunity
b) today's engineering profession
tomorrow's design opportunities

B. 1. The Earth's atmosphere layer consists of a thin belt of encircling gases.
2. The missile's guidance devices direct the missile to its target.
3. Today's engineering profession covers many new areas of technical speciality.

17. Существительное + существительное (одно/несколько) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. 1. radar-frequency pulses
2. airplane-design progress
3. aircraft-position location

B. 1. Airplane design progress is directly depend on our advances in understanding of aerodynamic laws.
2. Good progress have been made with wind-tunnel test programs and analytical studies.
3. Blade-angle changes have been studied too.
4. Rotor-design innovations (нововведения) include the now-familiar hinges (бесшарнирный) rotor, the jet-flap rotor and the circulation-control rotor.
5. The disadvantage of all propeller aircraft is cruise-speed limitations.

18. Существительное + "by", 'of", "to" + существительное – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) side-by-side devices
step-by-step arrangement
b) rate-of-climb amount
accuracy-of-control indication
c) surface-to-surface missile
Earth-to-orbit mission
day-to-day operations

B. 1. The major objection to VTOL aircraft for commercial operations is relatively low payload-to-gross weight ratio.
2. The tilt-rotor configuration in which two side-by-side rotors at the wing tips may give lift and propulsion has been studied extensively.
3. A signal-to-noise ratio must be small.

19. Существительное + "and" + существительное (или прилагательное + "and" + прилагательное) – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. a) a fuel and oil tanks
range and endurance problem
b) a long and wide runway
an electric and magnetic influence

B. 1. Practically every advancement in the aerospace industry has depended on new and better materials.
2. Aviation and transportation experts say that we need STOL (Short Takeoff and Landing) aircraft services.
3. STOL will provide efficient and economical transportation of cargo and passengers.

20. Слова "above", "upper", "outer", "inner" – левое определение

Переведите речевые отрезки, учитывая особенности перевода данного определения:

A. 1. the above cases (description, information)
2. the upper limit (cover, surface)
3. the outer space (walls, sides)
4. the inner positions (surfaces, changes)

B. 1. The upper atmosphere has some radiation zones.
2. The flight into outer space is a complex problem

ЛЕКСИЧЕСКИЕ ЯВЛЕНИЯ

1. Знакомые слова, встречающиеся в основном тексте

1. Переведите выделенные слова, исходя из значений слов, приведенных в скобках:

(1) **possibility** *n* (possible *a* – возможный); **appear** *v* (appearance *n* – появление); **advance** *n* (advance *v* – передвигаться вперед); **relation** *n* (reliable *a* – относительный); **demand** *v* (demand *n* – требование); **reliable** *a* (reliability *n* – надежность); **mean** *v* (meaning *n* – значение); **refer** *v* (reference *n* – отношение); **follow** *v* (follower *n* – последователь); **improve** *v* (improvement *n* – улучшение); **connect** *v* (connection *n* – соединение); **require** *v* (requirement *n* – требование); **multiply** *v* (multiplication *n* – умножение)

(2) **extend** *v* (extent *n* – протяженность); **propel** *v* (propulsion *n* – движение); **consume** *v* (consumption *n* – потребление); **operate** *v* (operation *n* – действие); **excessive** *a* (excess *n* – избыток); **improvement** *n* (improve *v* – улучшать); **perform** *v* (performance *n* – выполнение); **significance** *n* (significant *a* – важный); **introduce** *v* (introduction *n* – введение); **prepare** *v* (preparation *n* – подготовка)

2. Переведите выделенные слова, исходя из значений их антонимов:

(1) **rapid** (slow – медленный); **internal** (external – внешний); **late** (early – ранний); **increase** (decrease – уменьшать); **loss** (gain – приобретение, выигрыш); **certain** (uncertain – неопределенный); **straight** (bent, swept – изогнутый)

(2) **dense** (rare – разреженный); **descend** (ascend – подниматься); **top** (low – низкий); **landing** (takeoff – взлет); **impossible** (possible – возможный); **ordinary** (extraordinary – необычный); **full** (partial – частичный); **outside** (inside – внутренний); heavy (light – легкий)

3. Переведите выделенные глаголы, исходя из значений существительных, имеющих с ними одинаковое написание:

(1) **power** (power – мощность); **cover** (cover – покрышка); **progress** (progress – развитие); **speed** (speed – скорость); **advance** (advance – усовершенствование, развитие); **level** (level – уровень); **sound (so**und – звук); **demand** (demand – требование); **research** (research – исследование); **increase** (increase – увеличение); **drop** (drop – падение); **rise** (rise – подъем); **number** (number – число)

(2) **cause** (cause – причина); **split** (split – расщепление); **change** (change – изменение); **circle** (circle – круг); **offer** (offer – предложение); **escape** (escape – утечка, уход)

2. Новые слова из основного текста

Переведите выделенные слова, исходя из значений слов, приведенных в скобках:

(1) **achievement** *n* (achieve *v* – достигать); **controllable** *a* (control *v* – управлять); **covering** *n* (cover *v* – покрывать); **eliminate** *v* (elimination *n* – исключение); **stem** *n* (stem *v* – брать начало, происходить); **drop** *n* (drop *v* –

падать); **desirable** *a* (desire *v* – желать); **retraction** *n* (retract *v* – втягивать); **sharp** *a* (sharp *n* – острота)

(2) **flow** *n* (flow *v* – течь); **contradictory** *a* (contradiction *n* – противоречие); **approach** *n* (approach *v* – приближаться); **offer** *n* (offer *v* – предлагать); **descent** *n* (descent *v* – спускаться); **deployment** *n* (deploy *v* – разворачивать); **storage** *n* (store *v* – хранить); **exception** *n* (except *v* – исключать); **fold** *n* (fold *v* – складывать)

3. Слово “way” и его сочетания

Переведите предложения, учитывая контекстуальное значение слова “way”:

1. This is the way to do it.
2. Which way are you looking for?
3. The work was well done in a way.
4. The way of experimenting was right.
5. The satellites prepared the way for space travel.
6. It is possible to focus an electron beam in the same way as light rays.
7. Radio waves have been used in various ways for the observation of the planets and stars.
8. There are many ways in which a missile to its target properly.
9. Some missiles have guidance devices which guide them all the way.

4. Слова “time”, “times” и их сочетания

Переведите предложения. учитывая контекстуальное значение слов “time”, “times”:

1. The electron behaves at times like a particle, at times like a wave.
2. Radium is thousand of times more active than the uranium.
3. Positive ions are many times heavier than an electron.
4. Hydrogen is 14 times lighter than air.
5. The experimenters spent a lot of time over that work.
6. All the time they worked.
7. Four times three equals twelve.
8. Space and time are fundamental conceptions.
9. In recent times ideas about the upper layers of the atmosphere have changed.
10. Since the time of Galileo knowledge of the Universe has increased rapidly.
11. A helium atom is approximately four times as massive a hydrogen atom.

5. Слово ”over”

Переведите предложения, учитывая контекстуальное значение слова “over”:

1. The air moving over the wing must travel a greater distance than the air under the lower surface.
2. Nuclear propulsion systems of high thrust-to-weight ratio give more prospects over current chemical systems.
3. There is a distinct advantage of thermoelectricity over the solar battery.
4. Radiation may transfer heat energy over great distances.
5. Electromagnetic radiation occurs over a wide spectrum of wave length.
6. This method permits to achieve the result over a rather short period of time.
7. The existence of infrared radiation was realized over a century age.

ДОПОЛНИТЕЛЬНЫЕ ТЕКСТЫ

The Jet Propulsion System

The new jet propulsion system gave a fresh impetus to speed development. Jets are simpler in construction and performance than any present-day piston driven engine. The action in a jet-engine is the acceleration of gas leaving the nozzle; the reaction is thrust. The fuel and compressed air are mixed and burning in combustion chambers and the expanded heat is jetted through a nozzle to the rear.

Jet propulsion is the same as propulsion either by turbine and jet, or by rocket. Both are forms of reaction propulsion. The difference between the rocket and the turbojet is that the rocket carries its own oxygen, whereas the turbojet must breather in the oxygen from the surrounding air,. Rocket fuel must therefore include an oxidant.

The turbojet is a gas turbine which exerts thrust by means of a jet of gases emerging from a nozzle. There is the centrifugal flow turbojet; a gas turbine having a centrifugal compressor which takes in air and whirls it outside to be turned and sent to the combustion chambers and then to the turbine. Second, there is the axial-flow turbojet in which the axial compressor takes in air but, instead of whirling it outwards so that it must be turned by the outer means to flow along to combustion chambers and the turbine, it is already flowing in that direction. It is flowing parallel to the axis of the engine. The air is taken in and accelerated and pushed along a line which is parallel to the axis of the engine and therefore parallel to the line of flight of the whole aircraft.

Air entering an axial-flow turbojet does not have to turn corners so much as air entering a centrifugal-flow turbojet. The axial-flow unit must be more efficient than the centrifugal-flow unit. The centrifugal-flow engine is simpler and more rugged.

There is another form of jet power unit, the ramjet. This drives by the same means as both the jet and the rocket. It uses a form of direct-reaction propulsion. The ramjet relies upon the forward motion of the aircraft.

Текст 2

Ramjet

There exists another form of get power unit, the ramjet. This drives by the same means as both the jet and the rocket. It uses a form of direct reaction propulsion. A

weight of gas displayed in a reward direction and there is the equal and opposite reaction which gives the aircraft movement in a forward direction; but the ramjet, instead of relying upon a rotating compressor to compress the air before it is mixed with the fuel in the combustion chambers \, relies upon the forward motion of the aircraft.

The moving forward thrusts the intake aperture (отверстие) of the ramjet into the air and so the aperture is the filled with air and that air is compressed more or less according to be pace (скорость) at which it is being forward. The ramjet relies upon compressed air in the order to develop power. If the aircraft is stationary there is no compression of the air in the ramjet mouth (входное устройство) and therefore no power from ramjet. It follows that there must be an initial movement given to the aircraft. This can be in several different ways. The aircraft can be sent into the air and given its initial movement by means of catapult, or else (или же) the aircraft can be taken up to a height, attached (прикреплять) underneath another aircraft and then released. It can use the height to drive (пикировать) and thus to gain as a consequence of the action of gravity.

Both methods have been used for starting flights with ramjets.

Текст 3

Some Fuel Problems

The new era of fast high-flying jets brought with it many problems. The high fuel consumption is problem number one.

The jets suffer from high fuel consumption. A 10,00-pound thrust engine consumes a lot of fuel. For example, the largest jets have fuel tanks in the wings capable of storing in the excess of 21,000 gallons of fuel. Twenty-one thousand gallons is the equivalent capacity of five or six of the refueling trucks one normally around an airport.

There were experts who said that jet air-lines could never come into general use because it was uneconomical.

But note the fuel consumption was exceptionally high only relative to duration in the air, not to distance covered. High fuel consumption is a relative matter; it can be low relative to kilometers covered; yet high relative to time in the air. They cover distances in short period of time.

Still, fuel makes up a big part of the total gross weight of the airplane. while power-to-weight ratio or specific weight has always been a critical factor in prime moves for aircraft.

Besides, there exists a problem of the fuel choice. Power for aerial propulsion is known to be produced by using the oxygen of atmospheric air as a chemical reactant in the combustion with some fuel, e. g. a hydrocarbon such as gasoline or kerosene. Regular jet engines can definitely be used for speeds up to two or three times of sound. But at two thousand mph hydrocarbon fuel will begin to boil. Also at altitudes of 10,000 feet or more, there is very “little’ air for the jet to “sallow”.

There is a great future in nuclear energy. However, there appear many problems of utilizing atomic energy. It is well-known fact that the radiation from any atomic

pile is dangerous, and the power plant must be properly shielded. The shielding for the plane will weight about the same as the engine, fuel load and tanks of our present big planes. Eventually the research performed in the field will give satisfactory solutions.

There exists one more problem. This is the problem of fueling and refueling the jet planes. Jet airplanes have been designed so that they are capable of being fueled at the rate of one to two thousand gallons per minute from four hoses thought underwing pressure-fueling points. At some airports there are installed large underground hydrant-type fueling systems. With such an installation fuel is pumped underground from a remotely located fuel-tank system to the airplane location and from there directly into the airplane fuel tanks. The problem of refueling the plane is solved by plane-to-plane or in-the-air refueling.

There is still a lot to be done in the field and rockets with improved fuels and less complex engines. Scientists seem to be able to handle such problem.

UNIT 2

1. Причастие 1 – правое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки:

1. The forces acting on the balloon are…
2. The contradictions causing the change were…
3. The pressure varying at the different altitudes depends…
4. The line covering the entire surfaces moves…
5. The approach ensuring the landing in the all-weather conditions is…

2. Причастие 1 – правое определение и причастие 1 – составная часть обстоятельственного самостоятельного причастного оборота

Назовите признаки указанных синтаксических функций и переведите речевые отрезки:

1. The airplane rising into the air was…
   The airplane rising into the air, the experimenters watched…
2. Varied motions of air occurring in some cases are…
   Varied motions of air occurring in some cases, the designers had to consider…
3. The partial eliminations of drag providing higher efficiency was…
   The partial eliminations of drag providing higher efficiency, the aircraft could…
4. The force requiring the wing deployment brought to…
   The force requiring the wing deployment, the designer had to…

3. Причастие 2 – правое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки:

a) 1.The device offered by the laboratory was…
   2. The accuracy required from the weapon depends…
   3. The airflow set up behind the wing was…
   4. The undercarriage retracted during the flight cannot…
b) 1. The wing tired was…
   2. The angle reduced is…
   3. The speed achieves equals…
   4. The force required amount to…
c) 1. The surface acted upon by the force must be…
   2. The performance of the aircraft dealt with in the paper shows…
   3. The approach relied upon offers…
   4. The contradictions referred to required…
d) 1. The parachute drop watched by many people was…
   2. The error followed by the device failure has to be eliminated…
   3. The free balloon influence by different airflows could not lift…
   4. The runway approached by a landing plane must have…
   5. The problem faced by the designer requires…

4. Причастие 2 – правое определение и личная форма глагола в прошедшем времени

Назовите признаки причастия 2 и личной формы глагола и переведите речевые отрезки:

1. The rocket engine provided the system of control is…
   The rocket engine provided the propulsive force for…
2. The reaction caused by heating was…
   The reaction caused an explosion of…
3. The measurement of pressure required was desirable.
   The measurement of pressure required accuracy.
4. The mode offered gave rise to…
   The mode offered many advantages.

5. Герундий – правое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки:

a) 1. The aim of eliminating an excessive is…
   2. The opportunity of achieving great flight efficiency means…
   3. The manner of measuring the shock waves stems…
b) 1. The capacity for performing experiments demands…
   2. The airflow for lifting the glider is achieved…

3. The runway for receiving heavily loaded aircraft must…

6. Существительное (одно/несколько) – правое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки, учитывая особенности ее перевода:

a) 1. the line of a telephone, the line of hills, the line of trees, the line of development, the line of study, a line of the page
2. the face of a building, the face of the Moon, the face of a cube, the face of a watch, in the face of difficulties

b) 1. The shape of the wing — the wing of a new shape
2. the mode of the development — the development of a new mode
3. the opportunity of a bulk — the bulk of the opportunity
4. the impetus of the advent — the advent of the impetus

c) 1. a wide range of different kinds of concepts of the possibilities of the storage of a fuel
2. the determination of the capacity of the tanks of the plane
3. the opportunity of the achievement of the speed of the lift of the aircraft

7. Инфинитив – правое определение

Назовите признаки указанной синтаксической функции и переведите речевые отрезки, учитывая особенности ее перевода:

1. The bank angle to be achieved equals…
2. The contradiction to be eliminated gives rise to…
3. The pressure to be considered drops…
4. The information to be stored…

8. Слова ‘that”, “those” и “one” – слова-заместители существительного

Назовите признаки слов-заместителей и переведите предложения:

1. The weight of the neutron is like that of the proton.
2. Our atmospheric ocean is a turbulent one.
3. The shorter wavelength tend to be absorbed faster than the longer ones.
4. The simplest materials are those which contain only the kind of a atom.
5. A third method of changing solar energy directly to electricity is that of thermionic conversion.

9. Определительные придаточные предложения с союзами и союзными словами “that that и “which”

Назовите признаки союзов и союзных слов “that” и “which” и переведите предложения:

a) 1. An electron is a fundamental particle that exists in every atom.
2. The laver of the ionosphere that returns long waves back to earth is more effective and higher at night.
3. Physics is a science that deals with the phenomena of matter and energy.

b) 1. The advent of the missile which forms a highly destructing weapon is of great military importance.
2. There are really three axes about which an airplane can operate.
3. There a re many ways in which a missile gets to its target properly.
4. Petroleum (нефть) is a mixture from which petrol, kerosene and oil are obtained.

10. Бессоюзные придаточные предложения

Назовите признаки данного типа предложений и переведите их:

1. The computer compares the information it receives with other information it stores.
2. Most of the information got about other galaxies comes through ratio telescopes.
3. The designer considers the weight the aircraft has during takeoff and landing.

1. Причастие 1 в страдательном залоге – правое определение

Переведите речевые отрезки, учитывая особенности перевода данной формы причастия:

Например: The being considered
Учитываемое сопротивление; сопротивление, которое учитывается

1. The metal surface being chosen has…
2. The design concept being considered was…
3. The performance of the rocket-powered spacecraft being achieved was…
4. The construction of new airports being described was…
5. Low-visibility conditions being associated with weather changes must be…

2. Прилагательные типа “available”, “close”, “common”, “necessary”, “present” и т.п. - правое определение.

Переведите речевые отрезки с прилагательными available (имеющийся), close (близкий), common (присущий), necessary (необходимый), present (имеющийся) и т.п., учитывая отсутствие/наличие пояснительных слов после них.

Например a) The opportunity available can provide…
Имеющаяся (возникшая) возможность может дать…
b) The opportunity available as a result of an experiment can provide
Возможность, возникшая (которая возникла) в результате проведения эксперимента, может дать…

a) 1. The shock, wave available is…
2. The mode common was…
3. The elimination necessary stems from…
4. The contradiction present was...
b) 1. The runway lengths available at present amount to…
2. Wheel brakes common to most vehicles are...
3. The slot necessary to reduce the speed is…
4. The opportunity present for the development of an aircraft gives rise to…
5. The drag close to the maximum eliminated…

3. Сочетания типа “in use”, “in operation”, “in existence”, “in question”, “under development”, “under way” и т.п.- правое определение.

Переведите речевые отрезки, учитывая, что данные сочетания переводятся причастиями или определительными придаточными предложениями.

Например: The covering in use was…
Используемое покрытие было….
Покрытие, которое использовалось, было…

a) 1. The undercarriage in use retracts…
2. The opportunity in question gives rise…
3. The wheel brake in existence offers…
4. The wing in operation can deploy…
5. The exception in question shows…
b) 1. The fuel under consideration is stored…
2. The aircraft under development can climb…
3. The airflow under investigation stems from…
4. The design of a new aircraft under way requires…

4. Причастие 2 типа “known”, “supposed”, “expected” и т.п. +инфинитив- правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения.

Например: The wing to support the plane in the air is a surface…
Крыло, которое, как известно, поддерживает самолет в воздухе, является плоскостью…

1. The airflow known to be turbulent accompanies
2. The aircraft expected to cover long distances is…
3. The advent of new slots believed to influence the wing shape offers.
4. The process supposed to accompany the reaction brings into being
5. The opportunity assumed to be achieved depends…

5. Приложение - правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения.

Например: The wing, the surface extending on both sides of the fuselage, gives…

Крыло, а именно поверхность, выступающая по обе стороны фюзеляжа, создает…

1. The Earth's nearest neighbour, the Moon, is…
2. The proton, the particle of a possible charge, is…
3. An aircraft, a flying vehicle, can provide…
4. M.V.Lomonosov, a great Russian scientist, was born…

6. Слова "likely", "certain", "sure" и т.п. + инфинитив – правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения.

Например: The mode likely to be set up gives…
Режим, который, вероятно, будет установлен, дает…

1. The shape likely to diminish the drag gives rise to…
2. The contradiction certain to appear brings into being…
3. The runway ready to be used offers…
4. The new approach sure to provide some advantages contradicts…

7. Числительное + название единицы измерения + прилагательное типа "long", "wide" и т.п. – правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения.

Например: The road five kilometers long.
Дорога длиной в пять километров.

1. A runway three miles long offers…
2. A slot ten inches wide proves…
3. The river ten feet deep gives the opportunity…

8. Прилагательное + "enough" + инфинитив- правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения.

Например: The approach new enough to be considered…
Метод, достаточно новый, чтобы его рассмотреть…
1. The undercarriage heavy enough to withstand…
2. The impetus strong enough to give rise…
3. The angle large enough to change…

1. Слово “scale”.

Переведите речевые отрезки, выбирая соответствующее значение слова scale (размер, масштаб, величина, степень):

1. a scale in centimeters; 2. to change on a large scale; 3. a full-scale model; 4. the scale of preparation.

2. Слово “due” и его сочетания.

Переведите речевые отрезки, исходя из значений due(нужный, правильный); due to (из-за, благодаря); to be due to(обусловливать);

1. a due course(realm, retraction); 2. due to the advent(the impetus, the drag); 3. is due to the angle(the deployment, the drop).

3. Словосочетания “a lot (of)”, “a great deal (of)”, “a good deal (of)”, “a number (of)”, имеющие значение “много”.

Переведите речевые отрезки с данными словосочетаниями:

1. a lot of achievements (contradictions, opportunities)
2. a great (a good) deal of drag (thrust, lift)
3. a number of descents (exceptions, runways).

4. Слова с префиксами “dis-“, “in-“, “un-“

Переведите слова, учитывая отрицательное значение префиксов:

a) disadvantage n; disbelieve v; discharge n; disarm v; disability n;
b) inaccurate a; incapable a; indirect a; independent a; inconstant a
c) uneasy a; untold n; unequal a; unfixed a.

5. Слова с префиксами “pre-“, “post-“

Переведите слова, учитывая значение префиксов pre- (до-, пред-, заранее); post- (после, по-):

a) preheat v (heat-нагревать); preconception n (conception-мнение); precondition n (condition- условие); predetermine v (determine-определять); prehistoric a(historic-исторический);

b)post-date v(date-датировать); post-graduate n(graduate-окончивший вуз); post-war a (war-война).

6. Слова с суффиксом "-ward(s)"

Переведите слова, учитывая, что суффикс "-ward(s)" имеет значение направления:

downward(s), backward(s), out ward(s), northward(s),southward(s).

7. Слова, имеющие одинаковый корень в английском и русском языках

Переведите слова:

(1) modern a; gaseous a; traditionally adv; aeronautics n; discuss v; popularly adv; meteorology n; tornado n; hurricane n; industrial adv; astrophysics n; stimulus n; criterion n; minimize v; catastrophic a; theory n; hypothesis n; propeller n; stability n; basis n; nature n; gas n; dynamics n; turbulence n; photograph v; optical a; automatic a; limit n;

(2) fundamental a; chord n; arch n; configuration n; specially adv; generate v; critical a; composition n; chemical a; reaction n; metallurgical a; structural a; metal n; serious a; region n; result n.

8.

air-conditioning	кондиционирование воздуха
*aerofoil	аэродинамическая поверхность
*boundary layer	пограничный слой
turbofan	самолет с турбовентиляторным двигателем
*vortice	вихрь
body-wing interference	аэродинамическое воздействие фюзеляжа и крыла
expansion wave	волна расширения
bluntness	затупленность
pointed wedge	заостренный клин
chord	хорда
*leading edge	передняя кромка
*cruising	крейсерский полет
discontinuity	резкое изменение
shock stall	волновой срыв(потока)
boost-glider	ракетоплан

High-Speed Aerodynamics.

Aerodynamics, the science of air or any other gaseous fluid in motion, provides a good example of a rapidly expanding modern science.

"Aerodynamics" is traditionally associated with the airplane. In fact, aerodynamics is by no means restricted to the airplane. Aerodynamics can be usefully applied to field than aerodynamics. It discusses very varied motions of air occurring in other fields which are not popularly associated with aerodynamics such as meteorology (for such phenomena as winds, tornadoes and hurricanes (ураган)), industrial aerodynamics (for the effects of on bridges, buildings and ships superstructures(надводная часть корабля)) and astrophysics (for the gaseous motions amongst the stars).it is true, aerodynamics is most closely linked with aeronautics which has provided its greatest stimulus.

The airplane is able to rise in the air and to keep in the air because of the forces working on it, the motion itself maintaining them. They are: lift, the upward acting force; weight or gravity, the downward acting force; thrust, the forward acting force; and drag, the backward acting force. Drag and weight are forces inherent in anything lifted from the Earth and moved in through the air.

In aeronautics aerodynamic science in question appears in its most highly developed form. The reasons for this are: (1) the need for a very efficient vehicle which cannot afford any surplus(избыточный) weight, (2) the need to pre-calculate every aspect of required flight performance and ensure that the design will meet it, (3) the paramount criterion of safety, to minimize the chance catastrophic error being detected for the first time in actual flight.

Aerodynamics associated with the airplane deals not only with the disturbances set up in the air by moving bodies and aerodynamic forces created on them, but with the stability and performance of flight and pressures on the surface of the airplane.

In short, in an airplane, a vehicle under consideration, there are seven basic features supposed to be determined largely by aerodynamics: provision of enough lift; efficiency of lift in relation to drag; efficiency of propeller or jets; stability control; air-conditioning; determination of local air pressures and heating over the surface of stressing.

There have been three major advances in aerodynamics theory, all of which emerged during the first half of the 20^{th} century. These are: aerofoil theory, which extended Zhukovski's hypothesis to complete airplane wings and propellers, boundary layer theory, which is the basis of understanding the nature of air resistance created near the boundary of a moving body, and gas dynamics, which describes the behavior of the air when compressibility and temperature changes become important as in supersonic speed.

Each part of present-day aerodynamic knowledge has a history of research.

It is flow visualization (зд. непосредственное наблюдение) that can explain some of the aerodynamic phenomena necessary to know. In the early days of flight there were no means of observing the flow itself over the plane: the possibilities of been a peculiar hindrance to understanding its motion. Besides, there must be a lot of instruments capable of measuring the speed oscillation, the temperature and other phenomena. The methods of measuring, however, were crude (несовершенный,

грубый, приблизительный, неточный). Knowledge was most derived by trial and error at those days.

Fortunately, nowadays there are many ways showing the motion of the air. The air can be photographed directly, using optical systems sensitive to density changes. There appeared new kinds of aerodynamic tubes. Automatic calculating machines common nowadays produce enormous quantities of data, previously beyond solution within the average lifetime.

It is evident that in our days both flight velocity and altitude have increased far above the limit considered possible before. Air speeds have risen fifty-fold thus offering untold prospects for further exploration and great problems available.

At moderate speeds the changes of air density and temperature caused by motion are almost negligible. But if we go to higher speeds, the value of M=5, the changes of density and temperature caused by compression or expansion of the air become very noticeable. The essential difference between an incompressible fluid and a compressible fluid is that in the former the propagation of pressure is instantaneous, whereas in the latter the propagation takes place with finite velocity.

The first airplanes known to have had propellers were not so complicated aerodynamically as jets, turbojets, turbofans now in common use. When jets are tilted to provide part-lift and part-thrust, the aerodynamics becomes even more challenging. A modern airplane frequently changes speed and direction. In order to create the right lift, drag and side forces airplane must be placed at the at the control angle to the oncoming airflow.

The changes of air velocity lead to the aerodynamic pressures, forces and moments. Therefore, the structure must be strung enough to with stand the air pressure on the surface.

The ramjet considered to be the engine of tomorrow presents complex problems from the aerodynamic viewpoint.

Although all the basic aerodynamic features of the subsonic aircraft are also found in the supersonic airplane, e.g. lift, vortices, boundary layers, body-wing interference and propulsion, the existence of shock and expansion waves introduce fundamental difference. Their wave drag can add about 50% to all other drags put together. The wave drag of a body or wing increases rapidly with its “bluntness”, hence supersonic bodies are long and pointed wedges whose maximum thickness may as little as 1/30ht of the chord. If the wing plane shape is swept back to lie behind the shock waves, the flow over the wing leading edge is subsonic and drag rise is lessened.

Besides, the shape ultimately chosen for the supersonic airplane must also be controllable at low speeds. New configurations have been tried, including the very long narrow delta, a wing shaped like a “Gothic” arch, and a variable-geometry wing which can be swept back for supersonic flight and forward for takeoff and airplane, have a very much lower aerodynamic lift-drag efficiency than subsonic airplane.

The heat generated in the supersonic boundary creates several critical problems unknown in the subsonic airplane. At Mach 2.2 cruising at 60000 ft, the skin temperature can be 170C rising to 400C at Mach 3.2. As the temperature of gas near the aircraft increases due to high speed and the gas pressure diminishes due to high altitude, we cannot consider the air as a single fluid of definite composition. We must

take account of the chemical reactions of various species in the air. The problem in question can be considered from two points of view: the aerodynamic solution, by introducing new shapes, giving reduced heat transfer; special techniques, by removal of heat, by cooling the skin with gas or liquid; and the metal-surgical solution, by adopting radically different high-temperature structural metals.

Another serious worry about supersonic flight in the destructiveness of shock waves as they sweep out (срываться) of a part below and behind the airplane. Shock wave will occur in the supersonic flow region. As the flow may become supersonic in certain portions of the wing a large pressure change may occur. This large change in pressure may be considered as a surface of discontinuity known to be as shock wave. As a result, a separation of flow may occur. This phenomena is known as shock stall which will cause a decrease of lift and an excessive increase of drag.

Hypersonic speeds give rise to new airplane shape's investigation. There are two types of these shapes: the first has very thin, highly sweptback wings with semi-circular body beneath. The idea behind this is that the body shock wave creates a region of increased pressure which passes across the underside of the wing, thus increasing its lift, while the down turned wing tips further deflect any side flow downwards. The lift-drag ratio may exceed 6.

The other shape is wingless. Such vehicles are boost-gliders, that is, they are docket-boosted to a maximum speed which is reached when all propellant is burnt, and therefore glide with engines off (выключенный двигатель).

The space flight brought into being some new aerodynamic problems. The large increase of free electrons above 250000 ft and the reduced air mass density give rise to high electrical conductivity; indeed electrical currents have been detected, some consisting of millions of amperes. The high electron concentration also affects the air drag of moving objects above about 250 miles.

A great many features of this region still remain to be discovered. There appeared new fields of aerodynamics, magneto hydrodynamics (M.H.D.) is one of them.

Magneto hydrodynamics is the study of the motion of an electrically conducting fluid in the presence of a magnetic field. Examples of this type of flow have been found in the rarefied upper atmosphere and the Earth's magnetic field.

The practical interest in M.H.D. for aeronautics and spacecraft arises from the ionization of airflow past bodies moving at and above satellite speeds, and the prospect of producing M.H.D. controlling forces, cooling systems and airflow measuring devices.

M.H.D. effects are not only confined to the upper atmosphere near the Earth but are important in the depth of space on the gigantic scale of stars and galaxies.

In aeronautics and space flight M.H.D. forces become comparable with aerodynamic forces when the magnetic and kinetic energy terms are of the same order of magnitude. In an M.H.D. airflow there can be shock waves, vortices and a magnetic Reynolds number.

The application of M.H.D. to aeronautics is still only in its infancy, but experiments have already shown some interesting effects.

1. Причастие 1 в действительном залоге и причастие 1 в страдательном залоге - правые определения.

Переведите речевые отрезки, учитывая особенности перевода данных форм причастия 1:

A. (1) 1. The radar detecting the enemy was…
The radar being detected by the enemy was…
2. The wire linking the ends presents…
The wire being linked presents…
(2) 1. The angle diminishing the lift equals…
The angle being diminished equals…
2. The space confining the action was…
The space being confined was..

B. (1) 1. The inertia force acting on a fluid element is equal to the rate of change of the momentum in unit time.
2. Wing is the force being afforded by the air movements.
3. Winds are the dominant force disturbing many engineering constructions.
4. The Venus atmosphere being much heavier and thicker (than on mars) also could be arranged.
(2) 1. A tornado is a violent natural vortex reacting down from clouds to land or sea.
2. The wave being transmitted upwards is reflected back to the Earth again.
3. The information being received by geodetic satellites provides incomparable data.
4. Wind flowing past a structure can cause oscillation of many kinds.

2. Причастие 2-правое определение.

Переведите предложения, учитывая наличие/отсутствие пояснительных слов после причастия 2:

1. The accuracy required from the weapon also depends on the warhead (боевая часть) carried.
2. The distance traveled id a linear function of the time.
3. The propulsion system provides the forward force needed to overcome drag and inertia.
4. 2600 miles an hour will probably be the maximum speed reached safely below an altitude of 50 000 feet.
5. Kepler’s description of the moon was the very first based on new knowledge revealed by the telescope.
6. Specific fuel consumption is a measure of the power development to fuel consumed.
7. The most important fuels found in the Earth’s crust (кора) are coal, oil and nuclear fuel.

8. Titanium dioxide is material principally used for the dielectric has a low temperature coefficient.

3. Причастия 2 типа “influenced”, “approached”, “followed”, “faced”, “watched” и т.п.-правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения:

1. The achievements in the field of aeronautics influenced и the space exploration show that…
2. The runway approached from the South must be…
3. The explosion followed by the disturbance of air can be compared…
4. The boundary layer faced by the designers emerges…
5. The oscillations of an electric current watched with the help of new technique were…

4. Причастия 2 типа “known”, “supposed”, “believed”, “expected” и т.п.+ инфинитив –правое определение.

Переведите предложения, учитывая особенности перевода данного определения:

1. The Earth is the only planet known to contain liquid water.
2. Engines vary in the power expected to be developed.
3. The materials supposed to be used for the structure of an airplane must have a high ratio of strength to weight.
4. The vehicle believed to be powered by rocket propulsion will go to other planets.

5. Причастия типа “available”, “inherent”, “present”, “similar” и т.п.- правое определение.

Переведите речевые отрезки, учитывая отсутствие/наличие пояснительных слов после прилагательных:

A. (1) 1. The restriction present influences…
The restriction present on the voltage influences…
2. The disturbance inherent emerges…
The disturbance inherent to the airflow emerges…
3. The detection possible can afford…
The detection possible with this instrument can afford…
(2) 1. The interference peculiar is confined…
The interference peculiar to the sound is confined…
2. The technique available is adopted…
The technique available for a test is adopted…

3. The booster necessary is used…
The booster necessary to accelerate the vehicle is used…

B. (1) 1. This figure displays one of the weight to the proton.
2. Neutrons are particles equal in weight to the proton.
3. The reactor suitable for aircraft must have a low weight.
4. Each substance present in the liquid air can boil off as a gas.

(2) 1. There are two possible assembly techniques available.
2. The symbols represent the elements present.
3. There is no evidence necessary for precise judgment(суждение).
4. On Mars we specified craters similar to the Moon's.

6. Сочетания типа "in use", "in question", "in operation", "in service" , "in existence", " under consideration", "under development" и т.п.-правое определение.

Переведите речевые отрезки, учитывая особенности перевода данного определения:

a) 1.The interference under consideration diminishes…
2. The technique under way confines…
3. The cooling system under development transfers…

b) 1. The skin in operation compares…
2. The scale in operation compares…
3. The thickness in question affords…

(1) 1. Thermionic emission is the basis of operation of most vacuum tubes in operation.
2. The standard frequencies in use for communication worries the scientists.
3. The problems in question are related to planetary interiors.

(2) 1. The phenomenon under consideration worries the scientists.
2. The book deals with the navigation systems currently under development.
3. Experiments now in progress concern the heat transfer.

7. Прилагательное + "enough"+инфинитив - правое определение.

Переведите предложения, учитывая особенности перевода данного определения:

1. In 19th century there appeared a glider large enough to carry a man.
2. The engine light enough and powerful enough to fly was needed.
3. The airplane strong enough to withstand a violent mixture of shock waves and turbulence was built.
4. Mars' atmosphere dense enough to support the clouds is really very thin.

8. Числительное + название единицы измерения + прилагательное типа "long", "high" и т.п. - правое определение.

Переведите предложения, учитывая особенности перевода данного определения:

1. 100 000 000 atoms make a row (ряд) about one inch long.
2. A day is twenty-four hours long.
3. The pressure of the atmosphere supports a column of water 34 feet high.

9. Инфинитив- правое определение.

Переведите предложения, учитывая особенности перевода данного определения:

1. Kepler was the first to discover the exact laws governing the movements of the planets.
2. In space there is an airless vacuum, no heat to be generated by the aircraft's speed.
3. Reynolds was not first to observe and analyze the phenomenon of turbulent flow.
4. In solid-propellant rockets the propellant to be burned is contained within the combustion chamber.

10. Определение к словам-заместителям.

Назовите признаки слов-заместителей и переведите предложения:

1. The exploration of space by radio wave is more efficient than that which other means provide.
2. The waves that we use during the daytime are shorter than those which we use at night.
3. The speed of the surface-to-air guided missiles is more than twice that of sound.
4. A polar molecule is one in which one end or part is possible (ornegative0 in relation to another.
5. Drag power is that needed to push the airplane through the air.

11. Приложение – правое определение.

Переведите предложения, учитывая особенности перевода данного определения:

1. "Space Shuttle", a means for navigating space by a reusable space vehicle, is under development.
2. Above the atmosphere there is another source of heat – solar radiation.
3. Friction and compression, both of which increase with speed, also generate an enormous amount of aerodynamic heat.

4. Geology, or earth science, is the study of the structure and shape of the Earth's crust.

5. In 1913 Lord Rutherhold, a new Zealand physicist, discovered the proton.

6. Pluto, the most distant planet, is relatively unknown.

7. Frederick Soddy found that any chemical element could have a number of varieties, isotopes.

1. Переведите выделенные слова, исходя из значений слов, приведенных в скобках:

(1) **motion** *n* (motive *a*-движущийся); **safety** *n* (safe a- безопасный); **expand** *v* (expansion *n* –расширение); **behavior** *n* (behave *v*- вести себя); **apply** *v* (application *n* –применение); **trial** *n* (try *v*- пытаться); **require** *v* (requirement *n* – требование).

Дополнительные тексты

Heat barrier.

As air is compressed at high speeds, a temperature rise takes place. The energy of the moving body transformed into a temperature is known as the heat barrier.

The temperature rise in question is directly proportional to the square of the supersonic velocity. Therefore as the speed of sound is doubled the ram temperature is increased four times.

The standard temperature at sea level is considered to be 59 Fahrenheit. This temperature decreases with altitude up to 46 500 feet, after which is about 88 F at 760 miles per hour, 29 hotter than the standard sea-level temperature.

The ram temperature is about 260 F at 1300 miles per hour and about 1000 F at 2600 miles per hour.

There appears a most serious complication connected with the strength of structural materials used for the vehicle, that is, the problem of ablation (плавление) allowing the surface to burn away and evaporate. Turing from the actual structure of the vehicle to the state of the air through which it moves, an immediate consequence of the high temperatures generated within it is a drastic change in its thermodynamic properties from those at ordinary temperatures.

Mach number.

Since the speed of sound plays a big role in determining shock waves and air-flow characteristics at high speeds, the ratio of flight speed to the speed of sound in significant. This ratio is called Mach number in honor of Austrian scientist, Ernst Mach, who first pointed out its importance in 1887.

If a vehicle travels at a speed twice the speed of sound, it has a flight speed of Mach 2.0. If a vehicle has a speed half that of sound, it has a flight speed of Mach 0.5.

The Mach number M in question is an important parameter for high speed flow. It characterizes the compressibility effect of high speed flow.

If we go to higher speed the changes of density caused by compression or expansion of the air become very noticeable.

In the supersonic flow region shock wave will occur. That is, a large pressure change may occur. The large pressure change in question may be considered as a surface of discontinuity known as shock wave.

The shock wave may interact with the boundary layer over the body. As a result a separation of flow may occur. The phenomenon under consideration is known as shock wave, which will cause a decrease of lift and an excessive increase of drag.

Unit III

1. Enounce the following words and memorize them:

1. airplane – самолет
2. source – источник
3. unit – система, блок
4. body – корпус
5. wing – крыло
6. crew – экипаж
7. plant – установка
8. flight – полет
9. fuselage – фюзеляж
10. surface –плоскость
11. passenger – пассажир
12. cargo-груз
13. structure – конструкция
14. tail unit – хвостовое оперение
15. ground – земля
16. shock – удар
17. control – управление
18. the power plant – двигатель
19. a landing gear – шасси
20. the lifting surface – несущая плоскость
21. smooth – ровный
22. structural unit – конструктивный узел
23. consist of – состоять из
24. namely – а именно
25. provide – снабжать, обеспечивать

26. propel – двигать
27. thus – таким образом
28. house – вмещать
29. equipment – оборудование
30.support – поддерживать
31. therefore – поэтому
32. air – воздух
33. stability – устойчивость
34. reduce – уменьшать
35. hence – следовательно, отсюда

2. Read and translate the text.

Principal structural units of the airplane.

The airplane consist of five principal structural units, namely, the power plant, the fuselage, the wings, the tail unit and landing gear.

The power plant is a source of power. It provides power for flight and propels the airplane. Thus, we may say, the function of the power plant is to provide power for flight and propels the airplane.

The fuselage is the central body of the airplane. It houses all the passengers, crew, cargo and equipment. It supports the tail unit and wings. The function of the fuselage, therefore, is to house all the passengers, crew, cargo and equipment, and support the tail unit and wings.

The wings are the supporting and lifting surface of the airplane. The function of the wings is to support the airplane in the air.

The tail unit provides stability and control of the airplane. Hence its function is to provide stability and control of the airplane.

The landing gear is a structure which supports the airplane on the ground. Its function is to support the airplane on the ground and to reduce shock of landing.

3. Change the sentences to the plural:

Model. This power plant is of modern design. These power plants are of modern design.

1. That airplane takes a passenger. 2. That structural unit is a wing. 3. The fuselage has a passenger compartment. 4. That landing gear retracts into the fuselage. 5. The tail unit provides stability and control of the airplane. 6. That is the support. 7. This aircraft engine is of modern design.

4. Write questions to the answers:

1. What…..? Those are structural units of the airplane.
2. What…..? That is a power plant.
3. What…..? Those are landing gear wheels.
4. Where.....? The airplane is on the runway.
5. Are…..? There are wings.
6. Where…..? The passengers are on board.

5. Enounce the following words and memorize them:

1. airfoil – аэродинамическая поверхность
2. move – двигать
3. when – когда
4. part – часть
5. pass – проходить
6. above – наверху
7. create – создавать, творить
8. suction – всасывание, разрежение
9. pressure – давление
10. direction – направление
11. backward – назад, в обратном направлении
12. upward – вверх
13. downward – вниз
14. force – сила
15. lift – подъемная сила, поднимать
16. drag – лобовое сопротивление
17. right angles – прямые углы
18. perpendicular – перпендикулярный
19. relative wind – набегающий поток(воздуха)
20. useful – полезный
21. useless – бесполезный
22. resist – оказывать сопротивление
23. through – через

6. Read and translate the text.

The airfoils.

Look at the pictures. These pictures show airfoils. These airfoils are moving in the air. When the airfoil is moving in the air, part of the sir passes above and part passes below the airfoil (Fig. 1). The passing air creates suctions and pressures (Fig.2). The pressing air is acting in all directions backwards, upwards and downwards. It is individual forces, which are acting on the airfoil. The forces which is acting upwards is the lift. And the force which is acting backward is the drag. So, we may say, that the lift is acting upward, and the drag is acting backward. The lift and the drag are acting at right angles to each other (Fig 3.) so the lift is acting in the direction perpendicular to the relative wind, and the drag is acting parallel to the relative wing. The lift is a useful farce. The drag is a useless force. The lift is supporting the airplane in the air, and the drag is resisting the motion through the air.

7. Answer these questions:

1. What do the pictures show? 2. Do the pictures show airplane? Do the pictures show airfoils? 4. Are the airfoils moving in the air? 5. What is moving in the air? 6.

Where are the airfoils moving? 7. What is passing above the airfoils? 8. Where is a part of the air passing? 9. Does the passing air create pressures and suctions? 10. Is the air passing through the airfoil? 11. Is the passing air acting all directories? Etc.

8. Use the present continuous tense:

1. The air (pass) below the airfoil. 2. The airplane (fly) in the air. 3. The drag (act) parallel to the relative wind. 4. The lift (act) perpendicular to the relative wind. 5. The lift (support) the airplane in the air.

9. Memorize the following words:

1. airplane – самолет
2. airport – аэропорт
3. turboprop – турбовинтовой пассажирский самолет, лайнер
4. to be ready for – быть готовым к
5. take-off – взлет, взлетать
6. another – другой
7. runway – взлетно-посадочная полоса (ВВП)
8. to prepare – готовить
9. also – также
10. to park – ставить на стоянку
11. gate position – место стоянки на перроне (аэровокзала)
12. ramp – стояночная площадка
13. airfield – аэродром, взлетное поле
14. to make out – распознавать, различать
15. navigation light – навигационный огонь
16. recent – недавний
17. arrival – вновь прибывший
18. vehicle – транспортное средство
19. to surround – окружать
20. various – разнообразный
21. servicing – обслуживание
22. truck – грузовой автомобиль
23. fueling – заправка горючим
24. to deliver – доставлять
25. oil – масло
26. hydraulic fluid – гидравлическая жидкость
27. to wait for – ждать
28. near – около, рядом
29. barrier – барьер, шлагбаум
30. bench – скамейка
31. to stroll – прогуливаться
32. flowered – клумба
33. control surfaces плоскости управления
34. wheel – колесо

35. propeller – воздушный винт
36. cockpit – кабина в самолете

10. Read and translate the following text:

This is an airport. There are many airplane there. One can see some airplane parked at gate positions on the ramp. One big turboprop airliner is ready for take-off. Farther out on the airfield and runways one can make out the navigation light of other planes – recent arrivals, with engines running.

There are some vehicles surrounding airplanes on the ground. These are various servicing trucks. They used for aircraft fueling, oil and hydraulic fluid delivering and so on. There are also many people in the airport. They are waiting for their airlines. Some are standing near the barrier, some are sitting on the benches and some are strolling near them. There are many flowerbeds in front of the airport buildings.

11. Substitute the given words for the subject and the properform of the verb "to be".

Model. an airplane-> There is an airplane on the runway.

Airplane wings; control surfaces; a landing gear; a tail unit; a fuselage; landing gear wheels; propellers; airfoils; power plants; turboprop airlines.

12. Change these statements to questions:

1. There are many passengers on board. 2. There is engine in the fuselage. 3. There are airlines in the airport. 4. There is an airplane on the runway. 5. There are two wheels in the landing gear. 6.There is a tail on the fuselage. 7. There are controls in the cockpit.

13. Translate the text.

Forces which act on the airplane in flight.

When the airplane is in flight some force act on it. These forces are due to the moving air. When the air moves it encounter an airfoil. Part of the air passes above and part below the airfoil. This passing air creates pressures and suctions. The air pressure acts in all direction, that is, upward, downward and backward. Therefore, the reaction of the air on the airfoil is not entirely a useful force.

For the purpose of analysis we usually replace these individual forces by one single forces which we can call the resultant force. The magnitude of this resultant force is equal to the sum of the magnitudes of all the individual forces and its direction is the average of the directions of the little individual force.

It is very convent to replace the single resultant force by two component forces which act at right angles to each other. The first of these component is the lift. The lift is that component of the resultant force which acts in a direction perpendicular to

the direction of the relative wind. The other force is the drag It acts parallel to the relative wind.

The resultant force and its components have the same relation to one another as the hypotenuse and the two sides of right triangle. So, the square of the magnitude of the resultant force is always equal to the sum of the squares of the magnitudes of the two components. Thus, if the lift on a certain model airfoil is 6 lb., and the drag is 1 lb., the resultant force is 6.08 lb.

If an airplane is flying on a level course, the lift force acts vertically and supports the airplane, and the drag acts horizontally backward and resist the motion of the airplane through the air, the lift is the useful force and the drag is a useless force. As the air offers resistance to the body, which is moving through it, we not obtain a lift force without a corresponding drag force.

The object of the designer of the airfoil is to obtain the maximum lift and the minimum drag. The best airfoil is that which gives the highest ratio of the lift to the drag.

The actual forces are the innumerable pressures and suctions, which are distributed over the whole area of the wing. These individual forces depend on the angle of attack of the airfoil. The lift increases when the angle of attack of the increases from a small angle up to the angle (the stall). After that the lift decreases.

14. Answer the following questions in full sentence patterns:

1. Do any forces act on the airplane in flight? 2. Due to what are these forces produced? 3. what does the passing air create? 4. Doe the air pressure act in all directions? 5. What is the magnitude of the resultant force equal to? 6. What acts perpendicular to the relative wind? 7. What acts parallel to the relative wind? 8. Do we obtain the lift without the drag?

15. Fill in the blanks with the missing words using text:

1. When the airplane is in … some forces act on it. These forces are due to the … air. 2. Part of the air passes … and part… the airfoil. This passing air creates …and suctions. 3. We usually replace these individual… by one single force which we call the … force. The magnitude of this resultant… is… to the sum of the … of all the … forces. 4. The … is that component of the …force which …in a direction perpendicular to the direction of the …wind. 5. The drag … … to the relative wind. 6. The lift is a … force, and the drag is a … force.

16. Translate the following into English using the present continuous or present indefinite tense.

1. Различные силы действуют на самолет в полете. 2. Давление воздуха действует во всех направлениях. 3. Подъемная сила действует перпендикулярно относительно потока воздуха. 4. Мы не получаем подъемной силы без соответствующей силы лобового сопротивления. 5. Подъемная сила- это

полезная сила. 6. Подъемная сила крыла зависит от угла атаки. 7. подъемная сила увеличивается, когда увеличивается угол атаки.

17. Memorize the following words:

1. the design of the wing – конструкция крыла
2. the span of the wing – размах крыла
3. the angle of the attack – угол атаки
4. the tips of the wing – концевые части крыла
5. the members of the wing – элементы крыла
6. the longitudinal axis of the airplane – продольная ось самолета
7. on each side of the fuselage – на каждой стороне, по обе стороны
8. on one side – на одной стороне
9. on the other side – на другой стороне
10. in the rear – позади
11. loads acting on the wing – нагрузки, действующие на крыло
12. the ribs and the stringers – нервюры (ребра) и стрингеры
13. between the metal sheets – между металлическими листами
14. the direction of the wing – направление ветра
15. leading edge – передняя кромка
16. trailing edge – задняя кромка
17. chord – хорда
18. sweepback – стреловидность
19. spar – лонжерон
20. skin – обшивка
21. streamlined – обтекаемый
22. transfer – передавать
23. reinforce – усиливать
24. to extend – простираться, выпускать (шасси)
25. equally – равно, в равной степени
26. term – термин, значение
27. refer – передний
28. front – передний
29. aspect ratio – относительное ударение
30. mean – означать, средний
31. dihedral on - угол поперечного V(крыльев)
32. sweptback angle of the wing – стреловидность крыла
33. to depend on – зависеть от
34. size – размер
35. weight – вес
36. use of the airplane – назначение самолета
37. span-wise (chord-wise) – по размаху (хорде) крыла
38. the wing of stressed-skin construction – конструкция крыла с работающей обшивкой
39. box-type – коробчатого типа
40. sandwich skin – обшивка с заполнителем

41. serve as – служить в качестве
42. fuel tank – бензобак
43. consist of – состоять из
44. honeycomb core – сотовый наполнитель
45. tip of the wing – носок крыла
46. multi-spar wing – многолонжеронное крыло.

18. Read and translate the text:

Wing structure

This is the wing tip. This is the length from one tip to another. The name of this length id the span.

There are the leading edges. This is the trailing edge. The distance from the leading edge to the trailing edge is the chord. This is the chord line and that is the direction of the longitudinal axis of the airplane. This is a perpendicular to the longitudinal axis. The angle between perpendicular and the wing is the sweepback angle. These are spars, ribs and skin.

Spare form the structural foundation of the wing. The ribs give the wing a special streamlined shape. The ribs transfer sir loads from the skin to the spars. The stringers reinforce the skin (covering). This is also carries a part of wing stresses.

The wing is principal structural of the airplane.

19. Substitute subject or object pronouns for the underlines words:

Model: Do you study English? Do you study it?

1. The wing is principal unit of the airplane? 2. The wing supports the airplane in flight. 3. The span is the length of the wing. 4. These terms refer to the wings. 5. Do the spars form the structural foundation of the wing? 6. The ribs give the wing a special streamlined shape. 7. The ribs transfer air loads from the skin to the spars. 8. The stringers go between the spars. 9. The stringers reinforce the skin. 10 The skin transfers the loads to the ribs.

20. Learn by heart:

The design of the wing depends on the size, weight, and the use of the airplane. The wings of modern airplane are of all-metal construction. The principal members of the wing structure are spars, stringers, ribs, and skin(covering).

The spars are span-wise members of the wing structure. They form the structural foundation of the wing.

21. Read and translate the text:

The wing is the principal structural unit of the airplane. It extends equally on each side of the fuselage. Its function is to create a lift and support the airplane in flight.

Let’s consider some of terms, which refer to the wing.

The span. It is the length of the wing from the tip on the side to the tip on the other side.

The leading edge. It is the front edge of the wing.

The chord. It is the distance from the leading edge to the trailing edge.

The aspect ratio. It is the ratio of the span to the mean chord.

The angel of attack. It is the angel between the chord and the direction of then wind.

The dihedral angle. It is the angle between the wing and a perpendicular to the longitudinal axis of the airplane.

The design of the wing depends on the size, weight and use of the airplane. The wings of modern airplanes are of all-metal construction. The principal members of the wing structure are: spars, stringers, ribs, and skin (covering).

The spars are span-wise members of the wing structure. They form the structural foundation of the wing. The skin and the ribs transfer all the air loads, which act on the wing in flight, to the spars.

The ribs are chord-wise member of the wing structure. They give the wing a special streamlines share and transfer air loads from the skin to the spars.

The stringers are span-members. They go parallel and between the spars. They reinforce the skin.

Modern airplanes use some new types of wings, namely, box-type, and sandwich type.

Our airplanes, such as TU-104, AN-10, IL-18 use box-type wings. The wing of the IL-18 served as fuel tank. Other airplanes have fuel tanks in wing boxes.

Multi-spar wings have no stringers have fuel tanks in wing boxes.

A sandwich construction consists of two thin metal sheets with a honeycomb core between them.

22. Put in the missing words:

1. The of the wing depends on the size, weight of the …. 2. The wings of … airplanes are of all-metal …. 3. The principal …of the wing structure are: spars, stringers, …, and skin (covering).4. The spars are …members of the … structure. 5. The skin and the ribs …all the air loads, which act on the wing … on the wing in …, to the …. 6. The stringers go …and between the …. 7. Modern …use some new …of wings, namely, box-type, multi-spar type, and … type. 8. The wing of the IL-18 …as fuel tank. 9. Multi-spar wings have no …, and often no ribs.

23. Find English equivalents in the text for the lowing phrases and learn them:

Носок крыла, передняя кромка, крыло с работающей обшивкой, многолонжеронное крыло, бензобак, стреловидность крыла.

24. Translate into English using the world and phrases from the text “The wing”

1. Крыло самолета простирается по обе стороны фюзеляжа.
2. Они рассматривают сейчас функцию крыла.
3. Функция крыла – поддерживать самолет в полете.
4. Крыло создает подъемную силу.
5. Обшивка и нервюры передают всю нагрузку на лонжероны.
6. Нервюры придают крылу специальную обтекаемую форму.
7. Работающая обшивка несет часть нагрузки, действующей на крыло.

25. Repeat after your teacher the following words and phrases and memorize them:

1. single – единый, единственный
2. manufacture- изготовление
3. assembly – сборка
4. section – сечение, разрез, отделение, отсек
5. center section – средний (центральный) отсек
6. port plane – левая плоскость
7. main – главный
8. starboard plane – правая плоскость
9. flap – закрылок
10. subdivide – подразделять
11. further – дальше, далее
12. proper – собственный, правильный
13. aileron – элерон
14. attach – прикреплять
15. outer – внешний
16. outboard panel – наружная плоскость
17. similar – подобный, похожий
18. inboard – внутренний, расположенный в корневой части (крыла)
19. hinge – крепить на шарнирах
20. trailing edge – задняя кромка
21. slot – прорезь, щель
22. passage – переход, проход
23. maintain – удерживать
24. permit – позволять
25. in addition – кроме
26. arrangement – расположение, устройство
27. width – ширина
28. integral – цельный
29. separate – отдельный
30. fit – пригонять
31. snugly – тесно
32. respective – соответственный
33. damage – поломка, повреждение
34. track – направляющая
35. plain flap – плоский закрылок

26. Read and translate the text:

The wing

The airplane wing does not consist of one single piece from one wing tip to the other, as the manufacture and assembly of such a wing is difficult. In addition, it is a difficult and costly business to replace a damaged part of such a wing. Usually the wing consists of thee main sections. They are: the centre section (or center panel) which extends across the fuselage and projects outward at each side, and the outer main planes (or other panel). The centre panel may be an integral part of the fuselage or it may be a separate unit. When it is a separate unit it fits so snugly to the fuselage as if they are on one unit. The outer panel are subdivided further into their respective components, such as main planes proper, ailerons, flaps and wing tips. The wing tips are small units bolted to the outer end of the outboard panel. This construction provides an easy method of correcting damage.

The aileron construction is similar to the wing construction. The wing flap are large airfoil hinged to the trailing edge of the wing. There are four types of flaps: plain flaps, split trailing edge flaps, slotted flaps and Fowler flaps.

The plain flap when in neutral position appears almost to be a part of the wing itself, but its hinge permits it to move downward as desired.

In the split trailing edge type the lower half of the trailing edge of the wing can deflect upward to increase the drag without increasing the lift. With the slotted flaps the entire rear part of the airfoil can deflect downward.

The Fowler flap is an arrangement by which the lower part of the trailing edge of the wing rolls back on a track. This movement increases the effective width of the wing.

The wing may have slots. Slots passages through the airfoil near the leading edge. The slots help proper flow of air above the wings, and this permits the airplane to fly at a higher angle of attack.

27. Repeat after your teacher and memorize:

1. surface – поверхность
2. fixed – постоянный, неподвижный
3. directional control – управление по курсу
4. fin – киль
5. cantilever – консольный
6. attach – прикреплять
7. rudder – руль поворота
8. elevator- руль высоты

28. Pick out the verb in each sentence and say whither it is in the Active or passive Voice:

1. The tail unit consists of two surfaces. 2. The horizontal surface is known as stabilizer. 3. The rudder is attached to the vertical stabilizer. 4. The fin provides directional stability. 5. Both stabilizer are similar to wings in construction. 6. The rudder is operated from the cockpit.

29. Use only the present tense (active or passive):

1. Directional stability (provide) by the fin. 2. The horizontal stabilizer (serve) as a support for the elevators. 3. Metal skin (attach) to spars and ribs. 4. The rudder (provide) directional control. 5. The rudder to the vertical stabilizer.

30. Change the verbs from the active to the passive form:

1. A vertical stabilizer provides directional stability of the airplane in flight. 2. We attach the rudder to the fin. 3. The fuselage does not support the airplane. 4. The wings do not propel the airplane.

31. Join the following pairs of sentences using the past participle. Do not orally. (Student A reads the sentences. Student B joins the two sentences. Student C translates into Russian).

Model: Student A: The article is translated. It is interesting.
Student B: The translated article is interesting.
Student C: Переведенная статья интересная.

1. This vertical surface is fixed. It is the fin. 2. The flap is deflected. It increases the lift. 3. The engine is repaired. It operates well. 4. The spar is damaged. It is removed. 5. The landing gear is retracted. It does not create the drag.

32. Read and translate the text:

The tail unit.

The tail unit consists of two surfaces. One is vertical and the other is horizontal. They are usually of symmetrical airfoil section. Each is divided into two parts, the front part is fixed. The rear part is in the form of a flap which is operated providing directorial control. The vertical surface is called the “fin”. The horizontal surface is known as the “stabilizer”.

Both stabilizer are very similar to wing in construction.

They are usually of all metal construction of the cantilever type. They have two main members: spars and ribs to which metal skin is attached. The vertical stabilizer or fin provides longitudinal stability of the airplane in flight. It serves as a support for the elevators.

33. Answer the following questions:

1. What surfaces does the tail unit consist of? 2. What is the function of the tail unit? 3. Which part of the tail unit is operated? 4. What control does the tail unit provide? 5. Which surfaces called is called the fin? 6. What stability does the vertical provide? 7. What is the rudder attached to? 8. What stability does horizontal stabilizer provide?

34. Change the verbs from the active to the passive form:

1. The elevator provides horizontal control. 2. We attach the rudder to the vertical stabilizer. 3. The students studies the tail unit at the last lesson. 4. The pilot operates the flaps form the cockpit. 5. The wing creates the lift. 6. The landing gear supports the airplane on the ground. 7. The landing gear does not create the lift.

35. Translate the following sentences into Russian:

1. Deflected down the flap increases the lift of the wing. 2. The engineer watched the landing gear being repaired. 3. We saw the fuel tank filled 4. The airplane controlled by the experienced crew made safety landing. 5. The control used are reliable.

36. Find English equivalents for the following phrases in the text and learn them:

цельнометаллическая конструкция, стабилизатор, обеспечивать продольную устойчивость, служить в качестве опоры, путевая устойчивость, прикреплять, вертикальная плоскость в полете.

The fuselage.

This is the fuselage. It is the central body of the airplane. The function of the fuselage is to carry the crew, controls, equipment, passengers and cargo.

This is the cockpit, these are the passenger cabins, and these are the baggage compartments. The fuselage also supports the tail unit and carries the landing gear. The fuselage with stands different loads in flight. It has a streamlined share to reduce the drag.

The fuselage of modern airplane is of all metal construction. A very common type is monocoque type of construction.

Monocoque is a structure made in the form of a shell and the skin of this shell is sufficient to provide the necessary strength and stiffness. The skin of a sandwich construction is especially suitable for such types of a fuselage. But most of all metal airplanes have some longitudinal members: longerons and stringers riveted to the skin to reinforce the latter. The longitudinal members are help apart by bulkheads and formers, which dive the fuselage its shape.

Such a construction is sometimes called the semimonocoque type of construction.

The monocoque type has the following advantages: it dives more clear space for the cabin and provides the possibility for perfect streamlining.

All structural members of the fuselage are made of aluminum alloys, titanium alloys, and alloys steel.