**ВОПРОСЫ ДЛЯ ПОДГОТОВКИ К ЭКЗАМЕНУ**

**ПО УЧЕБНОЙ ДИСЦИПЛИНЕ**

**Иностранный язык в профессиональной деятельности**

для студентов 3 курса по специальности

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**Раздел 1 Использование иностранного языка в повседневной жизни и профессиональной деятельности.**

**Практические задания:**

1. Прочитать и перевести текст. Ответить на вопросы по тексту.

**How ICAO Works**

The following description is given by ICAO itself:

"According to the terms of the Convention, the Organization is made up of an Assembly, a Council of limited membership with various subordinate bodies and a Secretariat. The Chief Officers are the President of the Council and the Secretary General.

The Assembly, composed of representatives from all Contracting States, is the sovereign body of ICAO. It meets every three years, reviewing in detail the work of the Organization and setting policy for the coming years. It also votes a triennial budget.

The Council, the governing body which is elected by the Assembly for a three-year term, is composed of 36 States. The Assembly chooses the Council Member States under three headings: States of chief importance in air transport, States which make the largest contribution to the provision of facilities for air navigation, and States whose designation will ensure that all major areas of the world are represented. As the governing body, the Council gives continuing direction to the work of ICAO. It is in the Council that Standards and Recommended Practices are adopted and incorporated as Annexes to the Convention on International Civil Aviation. The Council is assisted by the Air Navigation Commission (technical matters), the Air Transport Committee (economic matters), the Committee on Joint Support of Air Navigation Services and the Finance Committee.

The Secretariat, headed by a Secretary General, is divided into five main divisions: the Air Navigation Bureau, the Air Transport Bureau, the Technical Co-operation Bureau, the Legal Bureau, and the Bureau of Administration and Services. In order that the work of the Secretariat shall reflect a truly international approach, professional personnel are recruited on a broad geographical basis.

ICAO works in close co-operation with other members of the United Nations family such as the World Meteorological Organization (WMO), the International Telecommunication Union (ITU), the Universal Postal Union, the World Health Organization (WHO) and the International Maritime Organization (IMO). Non-governmental organisations which also participate in ICAO's work include the International Air Transport Association International Air Transport Association (IATA), the Airports Council International (ACI), the International Federation of Air Line Pilots' Associations International Federation of AirLine Pilots Associations (IFALPA), and the International Council of Aircraft Owner and Pilot Associations (IAOPA)."

ICAO is responsible for:

Safety

Registration

Airworthiness

Prevention of economic waste

Fair competition

Standardisation

Aviation Law

**Questions:**

1. What is ICAO?
2. Of what parts is the ICAO made up?
3. What is the purpose of ICAO?
4. What does the ICAO regulate?
5. Why is ICAO important?
6. Выполнить лексико-грамматические задания:

Fill in the gaps using the words given below in a proper form:

**stimulus criterion medium minimum spectrum basis phenomenon analysis datum curriculum**

1. There has never been a serious study of these …

2. World War Ι provided a … for the creation of large-scale aircraft industries.

3. Aviation became a national resource and military … for performance and reliability were introduced.

4. The reporting, investigation and … is a highly effective means of providing safety.

5. Lessons learned from incident reporting should have timely and wide distribution through the various forms of … .

6. The selection of the optimum characteristics of the “man-machine” system requires an evaluation of a large number of … .

7. Proper separation … between aircraft in flight should be provided in order to enhance safety.

8. If the potentially hazardous activities are planned to take place on a regular or continuing …, a coordinating group should be given the task of ensuring that the operational needs of all parties concerned are adequately coordinated.

9. Manuals, procedures and specific training have become an important part of the human factors … .

10. ICAO assists Contracting States to develop their own civil aviation facilities, providing guidance on training … .

**Практические задания:**

1. Прочитать и перевести текст. Ответить на вопросы по тексту.

**Airplane Stability. Axes Of Rotation**

Stability is the inherent ability of a body, after its equilibrium is disturbed, to develop forces or moments that tend to return the body to its original position. In other words, a stable airplane tends to return to the original condition of flight if disturbed by a force such as turbulent air. This means that a stable airplane is easy to fly; however, this does not mean that a pilot can depend entirely on stability to return the airplane to the original condition. Even in the most stable airplanes, there are conditions that will require the use of airplane controls to return the airplane to the desired attitude.

Stability is classified into three types: (1) positive, (2) neutral, and (3) negative.

*Positive* stability can be illustrated by aball inside of a bowl. If the ball is displaced from its normal resting place at the bottom of the bowl, it will eventually return to its original position at the bottom of the bowl.

*Neutral* stability can be illustrated by aball on a flat plane. If the ball is displaced, it will come to rest at some new, neutral position and show no tendency to return to its original position.

*Negative* stability is in fact instability andcan be illustrated by a ball on the top of an inverted bowl. Even the slightest displacement of the ball will activate greater forces which will cause the ball to continue moving in the direction of the applied force.

It should be obvious that airplanes should display positive stability, or perhaps neutral stability, but never negative stability.

Stability may be further classified as static and/or dynamic. *Static* stability means that if the airplane's equilibrium is disturbed, forces will be activated which will initially tend to return the airplane to its original position. However, these restoring forces may be so great that they will force the airplane beyond the original position and continue in that direction.

On the other hand, *dynamic* stability is a property which dampers the oscillations set up by a statically stable airplane, enabling the oscillations to become smaller and smaller in magnitude until the airplane eventually settles down to its original condition of flight .

Therefore an airplane should possess *positive* stability which is both *static* and *dynamic* in nature.

**Axes of Rotation.** The airplane has three axesof rotation around which movement takes place. These are (1) lateral axis – an imaginary line from wingtip to wingtip, (2) longitudinal axis – an imagi-nary line from the nose to the tail, and (3) vertical axis – an imaginary line extending vertically through the intersection of the lateral and longitudinal axes. The airplane can rotate around all three axes simultaneously or it can rotate around just one axis. These axes are imaginary axes around which the airplane turns, much as a wheel would turn around axes positioned in these same three planes.

The three axes intersect at the center of gravi-ty and each one is perpendicular to the other two.

Rotation about the lateral axis is called pitch, and is controlled by the elevators. This rotation is referred to as longitudinal control or longitudinal stability.

Rotation about the longitudinal axis is called roll, and is controlled by the ailerons. This rotation is referred to as lateral control or lateral stability.

Rotation about the vertical axis is called yaw and is controlled by the rudder. This rotation is referred to as directional control or directional stability.

Stability of the airplane then, is the combina-tion of forces that act around these three axes to keep the pitch attitude of the airplane in a normal level flight attitude with respect to the horizon, the wings level, and the nose of the airplane direc-tionally straight along the desired path of flight.

**Questions:**

1. What is stability?
2. How is stability classified?
3. What does static stability mean?
4. Why should an airplane possess positive stability?
5. How many axes of rotation does an airplane have?
6. What is lateral control?
7. Выполнить лексико-грамматические задания:

Match the terms on the left with their meanings on the right:

|  |  |  |
| --- | --- | --- |
| 1. stability | a. | around them movement takes place |
| 2. pitch | b. | an imaginary line from the nose to the tail |
| 3. roll | c. | rotation about the lateral axis |
| 4. yaw | d. | an imaginary line from wingtip to wingtip |
| 5. axes of rotation | e. | rotation about the longitudinal axis |
| 6. lateral axis | f. | an imaginary line extending vertically through the intersection of the lateral and longitudinal axis |
| 7. longitudinal axis | g. | rotation about the vertical axis |
| 8. vertical axis | h. | tendency to resume original attitude after upset |

1. Передайте содержание текста в краткой форме:

**Alexander Pokryshkin: The air ace who terrorised the Luftwaffe**

For Pokryshkin, the struggle for air superiority over the Luftwaffe was almost an obsession. Air combat tactics developed by Russian fighter pilot Alexander Pokryshkin proved to be the decisive factor in the powerful Luftwaffe’s defeat, which ultimately ground down the German blitzkrieg.

The Red Army’s victory against the Wehrmacht was made possible after the Russian air force defeated the almighty Luftwaffe in a titanic clash that dwarfed the Battle of Britain. The credit for Russia’s success in the skies goes to Alexander Pokryshkin who single handedly changed the obsolete Soviet tactics that were in place when the Germans launched their blitzkrieg in 1941.

There are bold pilots and there are old pilots, but there are no old bold pilots. That popular saying was more or less true because fighter pilots had a high attrition rate during World War II. But Pokryshkin bucked that trend. He was not only a great tactician but also a fearless pilot who led from the front and remained a fighter till the last days of the war.

During the war the Russian fighter pilot made 650 sorties, participated in 139 air battles and was the second leading air ace in the Soviet and Allied forces, with an official record of 59 downed enemy planes. He retired as marshal of Soviet aviation.

However, Pokryshkin’s spectacular career almost never got airborne in Joseph Stalin’s dystopian dictatorship. His criticism of the ineffectual official air warfare doctrine – that led to huge losses in the Voyenno-Vozdushnye Sily (VVS, literally Military Air Forces) against the Luftwaffe in 1941 – made him a target of the establishment. He was grounded when his superiors discovered he was teaching his fellow pilots new tactics he had developed. A long spell in the gulag seemed inevitable.

However, the early setbacks against the Germans – largely because of the result of Stalin's policies – had given the Soviet high command some independence. When the brass in Moscow checked out his tactics, Pokryshkin was promoted to squadron commander in the 55th Fighter Air Regiment of the 4th Air Army. It turned out to be one of the decisive decisions of the war.

By 1943 the Russian aerospace industry was delivering increasingly better aircraft such as the Yak-7B, La-5, Yak-9 and the legendary Il-2 Shturmovik which outgunned, outran and out-maneuvered the German planes. The problem was the outdated Soviet tactics. That changed with Pokryshkin’s arrival.

The air ace perfected his tactics during the heavy fighting over Kuban near Crimea in early 1943. The area saw some of the most intense air combat of World War II, with daily engagements of up to 200 aircraft in the air. In comparison the Battle of Britain was a mere sideshow, popularised by British propaganda which inflated German losses way beyond reality.

The VVS became a transformed machine. In Russian Aviation and Air Power in the Twentieth Century John Greenwood, Von Hardesty, Robin Higham say: "Pokryshkin's innovations played an important role in breaking the hold of outdated horizontal maneuvering and introducing vertical tactics that best took advantage of the qualities of the new Soviet aircraft.”

Pokryshkin realised the advantage of altitude. He devised a new flying formation called the Kuban Stepladder – a three-tier formation that placed patrolling fighters in mutually supporting low, middle and high altitudes.

Along with this, Russian commanders changed the attack priorities of their pilots. Instead of engaging German escort fighters first, they were directed to attack the slower bombers. This had a dramatic impact on the battle. Because the bombers were slower they were easier to attack and the Russian fighters went in for the kill. The sight of their prized bombers going down in flames over enemy territory tended to demoralise the German escort fighters. The Germans were then more likely to make rash moves, which would quickly end in a German rout.

The low and middle groups engaged enemy bombers and provided air cover for the ground forces while the high group took on the enemy fighters and provided high cover to the other two groups. “The low and middle groups could this fully focus on attacking the enemy because the high group covered them from surprise attacks from above,” says Russian Aviation and Air Power in the Twentieth Century.

Sergei Dolgushin, another Russian air force ace of World War II with 24 victories, defined what it takes to be a successful fighter pilot: “A love of hunting, a great desire to be the top dog.” In the death-defying battles over Kuban, Pokryshkin learned that sudden, swift attacks were the key to success and survival in the air.

Upon sighting German fighters, Pokryshkin was always the first to tear into them, creating a mess of their formations. His simple and direct tactical formula of “altitude-speed-maneuver-fire!” soon spread through the VVS and became the Soviet fighter pilots' formula for aerial victory.

It is a measure of how much the Germans feared him that they would refuse to engage with the Russian fighters if they knew Pokryshkin was around. In fact, when his unit moved into Ukraine he preferred to use the radio call signal Sotka (hundred), because he knew the Luftwaffe had ordered its pilots to stay on the ground if they knew he was in the air.

In conjunction with Pokryshkin’s tactics, another factor played a definitive role in the German defeat. This was the marked improvement in Russian theatre air defences.

The qualitative and quantitative improvement in air defence guns made it difficult for the German fighter and bomber units to enter the skies over the battlefield. The German ground forces had relied on the screaming sirens of the Stuka dive bombers, among other bombers, to create panic among enemy ranks. They had done it in Poland, the Netherlands and against the British Army in France. But against the Russians the Blitzkrieg had lost its most vital element – air support.

For Pokryshkin, the struggle for air superiority over the Luftwaffe was almost an obsession. And it paid dividends. So effective was the new VVS that air-to-air combat was the primary means for achieving air superiority and accounted for an astounding 77 per cent of all German aircraft destroyed during WW II. Pilots of Pokryshkin’s air division brought down as many as 1,147 enemy aircraft.

In 2003 at a festival devoted to the air ace in Moscow, Marshal of the Air Force Ivan Pstygo paid him this compliment: “Assault planes made their appearance only thanks to Pokryshkin.”

Even after the war Pokryshkin continued to suffer at the hands of the communist totalitarian regime. He was repeatedly passed up for promotion. Only after Stalin’s death was he finally promoted – to air marshal. Later he refused to support a glorified account of Russian Premier Leonid Brezhnev’s role in the Battle of Kuban, where Brezhnev had played a marginal role at best. Like a true hero he preferred truth to dishonour.

**Практические задания:**

* + - 1. Прочитать и перевести текст. Ответить на вопросы по тексту.

**How to Build a Quadcopter**



If you want to learn more about how a quadcopter works, instead of just how to fly it, you might want to learn how to build a quadcopter. Building your own drone requires more work, and more skill, than simply purchasing a ready-made quadcopter. However, it also rewards you with the satisfaction of knowing that the drone you are flying was made with your own hands. Plus, there are many kits and tutorials out there that are targeted toward beginners who either have flown drones but never built them, or those whose first experience ever with a drone is building one.

If you are going to successfully build a quadcopter, there are a few steps you need to follow. You can find more detailed instructions online, but the following steps are the most basic and important. Following them should allow you to put together a serviceable and fun quadcopter, regardless of your experience level.

**Choose between an RTF kit, an ARF kit, or a from scratch build.**

When you decide to build a quadcopter, you will quickly find that there are many options for putting together a drone. In particular, there are three approaches you can take. Selecting the one that is right for you needs to be your first step, because each approach comes with its own steps for a successful build.

The first, and simplest, approach is to choose an RTF quadcopter kit. These kits come with everything you need to fly the drone right out of the box (frame, controller, motors, transmitter, etc.). If you need anything to put the drone together, it will be tools like screwdrivers, and perhaps some connectors. In some cases, an RTF quadcopter will even already be assembled for you. If you want to actually build a drone, you may want to skip the pre-assembled drones and select an RTF kit that requires some assembly. However, because these kits come with everything you need (and at least some of the assembly done already) they are the easiest drones to put together.

ARF stands for “almost ready to fly” and refer to quadcopter kits that require some more parts to complete the kit. For example, you might need to add a controller, propellers, etc. in order to end up with a working quadcopter. These kits also require more assembly than do RTF quadcopter kits. While these kits offer more of a challenge while you build a drone, they still provide you with many of the parts you need and make it much easier to build a drone than if you constructed it from scratch.

A from-scratch drone build is out of reach for many beginning drone builders. The term refers to purchasing all of your own parts and putting them together yourself. The reason from-scratch builds are more difficult is because they require a deeper knowledge of the intricacies of the quadcopter. For example, in order to build a frame, you need to understand how the frame supports the weight and technology of the drone, and how to construct a frame that can withstand accidents.

In addition, all of the parts of a quadcopter must be compatible with each other. When you purchase a quadcopter kit, all of the pieces within the kit are already compatible, so you just have to worry about putting them together. When you are building from scratch, you have to make sure all the parts you buy are compatible. Despite its difficulty level, however, from scratch quadcopters allow you to incorporate any features you wish into your drone, and generally allow you to build a more sophisticated and advanced piece of machinery than is possible with a kit.

However, many beginners will find this type of from-scratch construction to be overwhelming and difficult. If you are a beginner, you may also want to select an almost-ready-to-fly or ready-to-fly quadcopter kit. These will come with all the pieces you need to put together a simple yet reliable drone, and they should come with the instructions you need to navigate the assembly.

**Select a quadcopter to build.**

Once you know whether you want to build an all-inclusive quadcopter kit or a more advanced one, you will need to choose the specific drone you will be putting together. One of the great things about building a drone is the fact that the sky is the limit as far as the capabilities you can incorporate into your quadcopter. And, often, you can build these capabilities into your drone for less than you would pay for a similar drone at a store.

However, keep in mind that the more features you include in your drone, the more complex it will be to build, and the more chances there are for you to make mistakes. For beginners to the drone hobby, adding special features can be a little too complicated to be accomplished successfully. For example, putting a frame together from scratch and adding cameras and FPV capabilities are advanced techniques that may require practice first.

As a result, if you are a beginning drone builder, you may want to choose a basic quadcopter to build. This does not mean selecting a boring or cheap drone. Instead, you should be able to find light weight, agile, small, and reliable quadcopters to put together. You can even find acrobatic quadcopters that are still simple to put together for beginners. The key is to locate a quadcopter that will allow you to get into the drone building hobby without feeling overwhelming or complicated.

Once you become more familiar with building a drone, you can add features to the drones you have already built, or gradually select more complicated quadcopters to put together. With time and practice, you may find yourself building functional, complex quadcopters entirely on your own. The key is to start where your ability level is, select a drone that has the features you want but is still manageable for you to build within your current skill level, and then decide what areas you want to challenge yourself in for your next drone build.

**Make sure you have all the pieces.**

Once you have selected a quadcopter to build, you will need to make sure you have all the pieces necessary to put it together. If you have chosen an RTF quadcopter kit, you might be able to skip this step and go directly to collecting the tools for your build. However, familiarize yourself with your kit first. Even some RTF kits have small parts that might be missing or need to be purchased (such as connectors).

If you have chosen an ARF quadcopter kit, you will need to look at the kit carefully to determine which pieces you need. For example, many ARF kits require you to purchase a controller separately. Make sure that you note not only which pieces are needed but also what requirements they should meet in order to be compatible with the rest of the kit. Otherwise, you might have difficulty building or operating your drone properly.

If you are building your quadcopter from scratch, you will need all of the major pieces listed below, and, possibly, additional items if you choose to add functionality like a camera or FPV. In fact, you will need to purchase every single item for your quadcopter separately. In order to do so successfully, you will need to make sure all of the parts are compatible with each other, and that they provide you with the specific functionality you are looking for in your drone. Consulting an exhaustive online tutorial or video can help you identify parts beyond the major ones listed below that will help you build your ideal quadcopter from scratch.

Following is a basic list of the parts you will have to have regardless of the type of drone you build. Other pieces might be required depending upon the specific drone you construct, but you should be able to find a list of these extra pieces on your tutorial or in the instructions for your kit. The specific types of these parts (for example, the specific type of battery that will work best) will depend upon the quadcopter you are putting together.

* Frame
* Motors (4)
* Propellers (4)
* Controller
* Electronic speed controls (4)
* Flight control board
* Radio transmitter and receiver
* Battery and charger
* Connectors and adaptors
* Hex screws
* Propeller spinners
* Propeller bolts
* Selective parts (Camera, FPV, propeller guards, LED lights, etc.)
* Select quality parts.

Regardless of whether you purchase your parts separately or buy a quadcopter kit, you need to choose quality parts. For instance, many quadcopter parts come from China, which is known for shipping lower quality pieces simply because these pieces can be made and sent for less. Instead of choosing the least expensive parts, think instead about how strong, durable, easy to use, and well-reviewed they are. You can find solid parts from China, and from other places, but you may have to do your research.

The same applies when you are researching quadcopter kits. Instead of choosing the least expensive kit, consider selecting a kit based on its proven quality and durability. Choose something that not only matches your skill level but that also has reviews that support its claims to being a quality product that will last you for the long term. The result in the end should be a stronger and longer-lasting quadcopter to enjoy.

Following is an overview of some of the other qualities you should look for in each part of your quadcopter. These characteristics will make it easier for you to put together a quadcopter that is easy to use and flies reliably.

**Frame**

While it is possible to build a frame from scratch, it is very difficult to do so. The reason is that the frame requires precise engineering in order to provide stable flight and in order to withstand crashes. With many high quality frames available for purchase, you would be wise to start with a fully constructed frame. Look for one that is light weight and durable. And, because all of your parts are going to be placed in or on the frame, select one that is easy to build on.

**Motors (4)**

Consider purchasing a motor that is neither inexpensive or very pricey. Motors in this price range tend to be reliable without costing you lots of money. Typically, a motor that is around 1000kV will suffice. Use the information that comes with the motor to decide what type of propellers and what kind of electronic speed controls (ESCs) you will need.

**Propellers (4**)

The motors you purchase should tell you what size and type of propellers will work best with them.

**Control Board**

The control board is the brain behind the quadcopter. As such, the type you buy will determine how much functionality and performance your quadcopter has. However, instead of purchasing the most expensive, and complex, control board out there, you should once again try to balance ease of use, cost, and functionality. As a beginning drone builder, you want a board that is easy to install, but also versatile enough to handle modifications you might make to the quadcopter later on. And while spending top dollar on a control board might be tempting, saving some money by purchasing a less expensive board can still leave you with a high quality and reliable part.

**Electronic Speed Controls (4)**

Again, the motors you purchase should tell you what type of electronic speed controls to buy.

**Radio transmitter and receiver**

Choose a transmitter that has at least 4 channels. If you foresee yourself making modifications on your quadcopter as your skill level increases, select a transmitter that has more than 4 channels so it can handle any changes you make later on.

**Battery and Charger**

The power the battery provides is described in a term called mAH. The higher the mAH, the more powerful the battery is. However, the higher the power, the heavier the battery tends to be. So, make sure that you select a battery that your quadcopter can handle, while providing enough power to give you a satisfactory flight.

As far as battery chargers go, choose a balance charger that will charge the cells in your battery at an even rate. The battery charger is also one area where the cost really does matter. Invest in a quality charger in order to reduce the risk of fire caused by poorly charging batteries.

Of course, if you select an RTF or ARF quadcopter kit, many of these parts will have been selected for you already. You can ensure the quality of these parts by buying a highly-rated quadcopter kit that has proven itself through solid reviews to deliver a high quality quadcopter. If you are building a drone from scratch, you will need to individually analyze the quality and suitability of each part.

**Questions**

1) Give a definition of the term ARF.

2) What can you use to decide what type of propellers and what kind of electronic speed controls (ESCs) you need?

3) Would you make a basic list of the quad parts you need regardless of the type of drone you build?

4) Why does the quad frame require precise engineering?

5) What can be described in the term mAH?

6) Define the term RTF.

7) Keeping in mind would-be modifications on your quadcopter, what kind of transmitter should you choose?

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