ФАКУЛЬТЕТ АЕРОНАВІГАЦІЇ, ЕЛЕКТРОНІКИ ТА ТЕЛЕКОМУНІКАЦІЙ

Кафедра авіаційної англійської мови

ЗАТВЕРДЖУЮ

Зав. кафедри _____ _____

(підпис) (ПІБ)

«_____»_____20___р.

Матеріали для самостійної підготовки студентів

до практичних занять

з дисципліни «Фахова іноземна мова»

Розробник: канд пед. наук,

доцент Людмила НЕМЛІЙ

Unit №1 The beginning of aviation

New vocabulary

- *airmail- авіапошта*
- *air route- маршрут польоту*
- *adverse- несприятливий*
- *collision- зіткнення*
- *combat- бойовий*
- *congestion-перевантаження*
- *dawn-світанок*
- *distrust- недовіра*
- *exacerbate-погіршувати*
- *ground-to-air radio complex- радіотехнічний комплекс 'земля-повітря'*
- *hearth- вогнище*
- *in the immediate vicinity- поблизу; поруч*
- *inevitably- неминуче*
- *low-power- низька потужність*
- *licensing program- ліцензійна програма*
- *limited visibility-обмежена видимість*
- *manoeuvre-маневр*
- *nodes of the network- вузли мережі*
- *priority in movement- перевага у русі*
- *reliable-надійний*
- *route-маршрут*
- *roughly- приблизно*
- *runway- злітно-посадкова смуга*
- *surveillance platform-засіб спостереження*
- *transatlantic- трансатлантичний*
- *transcontinental- трансконтинентальний*

- *true horizon- істинний горизонт*
- *turf- трав'яний покрив*
- *vehicle- транспортний засіб*
- *venture-ризикований*
- *visual flight rules- правила візуального польоту*

Exercise 1. Before you read the text speculate upon the questions:

1. How much do you know about the dawn of the aviation era?
2. Have you read the books or seen the movies about this period in human history?
3. What other sources of information do you find useful?

Text 1. Some facts from the history of aviation

When December 7, 1903, the first flight of the Wright brothers was successfully completed, the world did not pay special attention to this fact. It cannot be said that the newspapers of that time downplayed the achievements of the two brothers. In the early twentieth century, most people considered aviation as a field of activity for experimenters and adventurers. It was hard to believe that a small low-power aircraft of that time would one day become a useful means of transportation. **1.** …..Not following the rules, not having a certificate, enthusiasts began to build their aircraft (AC), which often collapsed. The public was afraid of these devices, and the average citizen believed that only stupid people would fly on them. Potential investors in the established industry did not want to risk investing in such an unforeseen and dangerous venture.

The dawn of the aviation era

Despite the atmosphere of fear and distrust, sky enthusiasts were able to demonstrate the benefits of their primitive aircraft. Already in 1911 for the first time, the mail was transported by air. The planes managed to carry out full-scale military operations in the First World War demonstrate their strengths as a surveillance platform and transport military system. **2.** …..In 1918, airmail service was tested for the first time with the involvement of military pilots and the use of combat aircraft. In 1919, experiments were initiated, as a result of which began the commercial use of aircraft to treat fields with pesticides. In the same year, the first transatlantic flight was made, and the world first heard about the experimental use of radio as a means of navigation. In 1918–1925, the transcontinental postal service was organized for the first time. Until 1923, most mails were transported during daylight hours because the safe, reliable form of navigation for flights at night did not yet exist. In 1921, the first experimental night flight was performed in the United States, using hearths located along the route. And in 1923, the 72-mile air route in Ohio was first illuminated by gas and electric lamps. The experiment was successful, and by 1924 most of the transcontinental air route had been illuminated. On this section of the route began to perform the first regular night flights.

In 1925–1927, contracts for the transportation of airmail were offered to private corporations in several countries at once, and commercial aviation became a reality. The status of commercial aviation in 1925–1935 stimulated the growth of the aviation industry, the creation of a fixed network of air routes and means of navigation. In addition, the image of aviation as a safe and convenient vehicle was intensively created. A licensing program for pilots and mechanics has been introduced, as well as a program regulation of the use of air routes. In May 1927, Charles Lindbergh attracted the attention of the world with his bold flight across the Atlantic. **3.** …. Many modern airlines appeared just then. Until the early 1930s, the world aviation community did not feel it special need for an organized air traffic control system (ATS). Almost all air traffic was performed during daylight hours in favourable weather conditions. Subsequently, there is a need for full

control over the flight, which, in turn, allowed to perform night flights in limited visibility. The method of seeing and being visible became the main one. That is, pilots could fly only when they saw another plane and hanged the trajectory in time to avoid a collision. According to this method, pilots could fly in the absence of clouds and only where visibility was at least 2 km. Today, this method is known as visual flight rules (VFR). Because the planes used by airlines in the 1930s were slow-moving, pilots could spot another plane and avoid a collision with it. **4.** …..But in the late 30's significantly improved the technical characteristics of aircraft, which allowed them to operate at night and in adverse weather conditions. Equipment was created that allowed the pilot to operate the aircraft without visual reference to the true horizon, as well as a system of ground-based radio navigation aids (navigation service), which ensured the flight without ground reference.

Because the planes eventually had landed at the airport, the airspace in the immediate vicinity of the airports inevitably became crowded. Soon there will be a need for some form of local ATC. The problem of airspace congestion was exacerbated by the fact that airports then only roughly resembled modern ones. Only a few airports in the 1930s were equipped with runways. **5…..** Flying over the airport, the pilots found out the direction of the wind and the state of the runway and decided from which direction to land. During landing, they focused on trying to outline the coordinates of other aircraft and determine which of them has priority in movement, and then manoeuvred so that the aircraft flying ahead had enough time to land and taxi by the time their own plane lands. In addition, the pilots had to constantly inspect the airfield to detect in time the aircraft flying on rising. An indicator was used to show the direction to the beacon for landing or taking off against the wind. On windy days, they were forced to land and take off in the same direction. In the windless days, the planes landed and took off in any direction. So, it was obvious that it was necessary to create a certain form of ATC around airports, otherwise, collisions were possible.

Exercise 2. Read text 1 and choose the most suitable sentence (A-E) for each gap (1-5):

A. During this year the first experimental ground-to-air radio complex was established, and in 1928 the first seven radio stations on airmail routes were established.

B. At that time, the creation of an organized ATS system was not considered necessary.

C. At the dawn of aviation experimentation, anyone with the ability to mechanics could design, build and fly an aircraft without being tested and without a pilot's license.

D. The airfield was usually a large rectangular piece of land covered with turf or slag.

E. After the war, numerous areas of application of aircraft were found.

Exercise 3. Find the given phrases in the text, explain their meaning and make sentences with them:

1. To carry out full-scale military operations;
2. to use hearths located along the route;
3. to avoid a collision;
4. to operate at night and in adverse weather conditions;
5. to operate the aircraft without visual reference to the true horizon;
6. to be equipped with runways;
7. to be exacerbated by the fact;
8. to be focused on trying to outline the coordinates of other aircraft;
9. to determine which of aircraft has the priority in movement;
10. to manoeuvre so that the aircraft flying ahead had enough time to land and taxi;
11. to inspect the airfield to detect in time the aircraft flying on the rise

Exercise 4. Correct the table about the most famous dates in the history of aviation

Date	Event
1. 1903,Dec 7th	a) The first transatlantic flight was made, and the world first heard about the experimental use of radio as a means of navigation.
2. 1911	b) Commercial aviation became a reality.
3. 1918	c) Mail was transported by air for the first time.
4. 1919	d) Experiments in agriculture were initiated resulting in the commercial use of aircraft to treat fields with pesticides.
5. 1919	e) Charles Lindbergh crossed the Atlantic Ocean.
6. 1918–1925	f) The first regular night flights were performed. They were illuminated by gas and electric lamps.
7. 1921	g) The first flight of the Wright brothers was successfully completed.
8. 1923-1924	h) The first experimental night flight was performed in the United States, using hearths located along the route.
9. 1925–1927	i) Airmail service was tested with the involvement of military pilots and the use of combat aircraft.
10. 1925–1935	j) Transcontinental postal service was organized.
11. 1927 May	k) The growth of the aviation industry. Creation of a fixed network of air routes and means of navigation.
12. The late 1930s	l) The technical characteristics of the aircraft were significantly improved, which allowed them to operate at night and in adverse weather conditions.

Exercise 5. Answer the questions:

1. What was the world's reaction to the fact that the first Wright brothers' flight was successfully completed? Why?

2. Why was aviation treated as an unforeseen and dangerous venture at the beginning of the XXth century?

3. What were the benefits of primitive aircraft demonstrated by sky enthusiasts at the dawn of aviation?

4. Why was the most mail transported during daylight hours until 1923?

5. How can you explain the growth of the aviation industry in 1925-1935?

6. What does the method of visual flight rules (VFR) mean?

7. Why was the method of visual flight rules the main one until the early 1930s?

8. What were the working conditions for pilots in the 1930s?

9. Why did the need for the ATC Service arise in the late 1930s?

Exercise 6. Match the terms with their definitions

1) a surveillance platform	a) is an important factor in all phases of flight, but especially when the aircraft is manoeuvring on or close to the ground,
2) a pilot license	b) is a set of regulations under which a pilot operates an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going
3) air transportation network	c) provides the key to ensuring that intrusion threats to base perimeters are detected and communicated as early as possible so that appropriate responses can be initiated without delay
4) visual flight rules	d) is similar to what a driver's license is for automobiles.
5) visibility	e) is an example of transport networks and spatial networks. The nodes of the network are the airports and the links represent direct flight routes between two airports.

Exercise 7. Define the following expressions:

1) A bold flight; 2) in the immediate vicinity of the airports; 3) the crowded airspace; 4) the problem of airspace congestion; 5) the state of the runway; 6) an

unforeseen and dangerous venture; 7) a large rectangular piece of land covered with turf or slag.

Don’t forget to make dialogues with them.

Exercise 8. Be ready to retell the text.

Exercise 9. Imagine yourself as a pilot in the early 1930th. Write an essay about your job.

Unit II. Pioneers of aviation

New vocabulary

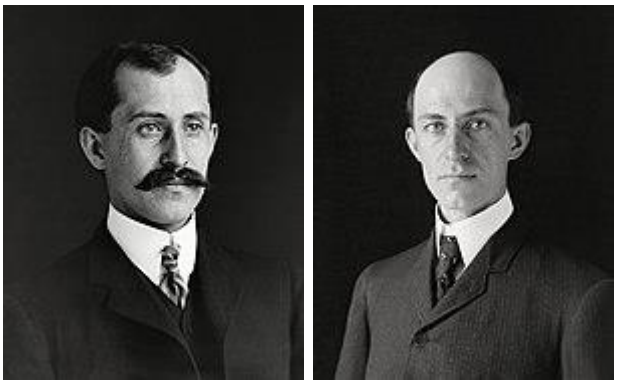
- *allow- дозволяти*
- *attempt- спроба*
- *assemble- збирати*
- *cherished desire- заповітне бажання*
- *coaster brakes- гальма з вільним ходом*
- *collide- зіткнутися*
- *combustion- згорання*
- *completion- завершення*
- *controlled tail feathers-кероване хвостове оперення*
- *cork- кора пробкового дуба*
- *decent- гідний*
- *due- належний*
- *experience- досвід*
- *hull-корпус*
- *ignite- загорятися*
- *jam- перешкоди*
- *glider- планер*
- *pay off- розплачуватися*
- *practicality- практичність*
- *realize- усвідомлювати*
- *rotate- обертати*
- *rubber band- прогумова стрічка*
- *rudder- кермо напрямку*
- *rummage- обшук; пошуки*
- *production- виробництво*
- *profit- прибуток*
- *prove- доводити*

- *shaft speed- частота обертання валу*
- *stability- стійкість*
- *spruce- ялина*
- *two-wheeled cars- двоколісні автомобілі*
- *unfinished- незавершений*
- *wings- крила*

Exercise 1

1. Have you ever heard about Wilbur and Orville Wright?
2. What are they famous for?
3. What inspired Wilbur and Orville Wright in their life?

Text 2. The Wright brothers



Orville (left) and Wilbur Wright in 1905

It all started back in 1867 near Newcastle, Indiana, when Wilbur Wright was born into the family on April 16. Four years later, on August 19, 1871, Orville Wright was born. Their father was a bishop, and because of his work, the family had to move frequently until 1884, when they settled in Dayton. In 1878, their father bought a toy - a "helicopter" for his younger children. **1.** …..Made of paper, bamboo and a cork with a round rubber band that rotated the motor, it was only about a foot (30 cm) long. Wilbur and Orville played with it until it broke, and then

built their own. In later years, they said that their games with this toy ignited a spark of interest in flying.

The brothers had a natural talent for solving complex technical problems. The "golden hands" and practicality went to the brothers from the mother. Susan Wright graduated from college with a degree in physics and mathematics. She could repair any technical device up to a sewing machine. Their grandfather had his own cart shop, and the boys often watched the work. **2.** ……At school, they started making kites, which they sold. The boys successfully complemented each other. Orville was a "generator" of ideas, while a thorough Wilbur made changes to the projects, bringing them to completion.

Taking advantage of the bicycle boom (bicycles were very popular at the time, but two-wheeled cars were rather unfinished and often broke down), in 1892 the brothers bought a mechanical press and opened a bicycle shop (where also repaired them), and in 1895 - its own production of bicycles. It is this experience, along with a good profit from the business allowed realizing a cherished desire - to create the world's first aircraft. The brothers had a dream, and they were not afraid to take risks. Work in the workshop, on the one hand, took the brothers almost all the time, and thus prevented them from designing aircraft. **3.** …..After all, when they could not get on the market the internal combustion engine they needed - powerful and light - they designed and manufactured it themselves. It is possible that their fruitful interest in the problem of dynamic stability of aircraft was partly due to their professional work with bicycles.

But the brothers became especially interested in aviation in the mid-1890s after learning about glider flights by German engineer Otto Lilienthal. The first glider, built by the Wright brothers, was tested in 1900 and proved to be extremely unsuccessful. Only a year later, fundamentally changing the design, it was possible to make quite a decent, suitable for flight, device. This was their second glider. At the end of 1901, the Wright brothers built a special "wind tunnel" (a prototype of a modern wind tunnel), in which they tested more than 200 structures of both the aircraft itself and its individual parts - the wings and hulls.

In 1902, the Wright brothers began to create the first motorized aeroplane, the engine for which they assembled themselves. Engine weight was 77 kg, shaft speed - 1200 rpm, and power - 12 horsepower. A systematic approach to the case paid off - in 1902 on a new glider-biplane with controlled tail feathers, the Wright brothers made several hundred successful flights.

During the construction of structures, its own wind tunnel came in handy, in which they conducted their research. In Dayton, with the help of mechanic Charles Taylor Wright, a 12-horsepower four-cylinder water-cooled internal combustion engine was built, and in the summer of 1903, an aeroplane was built on it, transported in parts to Kitty Hawk, and on December 14 attempted to take to the air. But the engine jammed during takeoff and had to be repaired for the next three days.

And here came this cherished moment: On December 17, at 10:35 a.m., in the presence of five witnesses, a plane piloted by Orville Wright took to the air and overcame 37 meters in 12 seconds. Three more tests were conducted on the same day, and during the last one Wilbur managed to fly 262 meters in 59 seconds. Here is what Orville wrote that day: “Around noon, Will embarked on his fourth and final flight. The first hundred feet of the car made jumps up and down as before, but by the time it flew 300 feet, Will felt that it was driven much better. **4.** ….However, after about 800 feet, the car again began to rummage through the pitch and in one of the throws down collided with the ground. The distance travelled was 852 feet; flight time - 59 seconds. The front steering frame was badly damaged, but the mainframe was not damaged at all. We estimate that the car can be brought back to airworthy condition in a day or two."

The aircraft was made of spruce planks, 6.4 meters long, 2.7 meters high, with a wingspan of 12.25 meters, with a rudder and two guide rudders. The propeller was driven by a chain transmission similar to a bicycle. Over the next two years, they continued to improve the design of the aeroplane and made more than 200 flights. May 22, 1906, received a patent for his invention. In 1908, they made a series of trips around the world, demonstrating the capabilities of their

aircraft. And in 1909, the brothers founded Wright, a company that manufactured aircraft and trained pilots. Brothers Wilbur and Orville Wright are rightly considered to be the inventors of the aeroplane: they were not the first to come off the ground in a heavier-than-air vehicle with a motor, but they were the first to learn to fly. They were the first to prove the suitability of the aircraft for practical tasks by lifting a passenger into the air.

Wilbur died at the age of 45, and Orville was lucky enough to live to see the era of jet engines and the beginning of spaceflight. **5.** ….. The life of the Wright brothers is instructive. This is a great example of the power of a dream. Today, humanity again needs active and purposeful dreamers who would solve large-scale problems: to finally make a breakthrough into outer space and cope with "global warming", to develop inexhaustible, environmentally friendly energy sources and provide a comfortable life for all earthlings, to end hunger and infectious diseases, defeat cancer and stop ageing. But for this, you still need to remove all obstacles to the dream and sincerely believe in what you are doing.

Exercise 2. Read text 2 and choose the most suitable sentence (A-E) for each gap (1-5):

A. But on the other hand, Wright were a practitioner, they were close to the problems of real production.

B. They liked it very much, because of this they spent all their free time with their grandfather in the workshop.

C. The next 400 or 500 feet of height remained virtually unchanged.

D. The device of the toy was based on the invention of the Frenchman - a pioneer of aviation Alfonso Peno.

E. Their brainchild, a small glider, cut off humanity's path to a stellar future without exaggeration.

Exercise 3. Read the text again and complete the following statements with the missing information

- powerful and light ……..;

- fruitful ……. in the problem;
- the ……. jammed during takeoff
- …….. was tested and proved to be extremely unsuccessful;
- fundamentally changing the…….;
- to make ……..…..quite a decent, suitable for flight;
- wings and hulls are the parts of the…….
- a systematic approach to the ……..;
- a …….. with a controlled tail feather;
- a 12-horsepower four-cylinder water-cooled internal combustion ……..;
- a cherished …….;
- the ……. jammed during takeoff;
- a cherished 1)…….; a cherished 2)…….

Exercise 4. Define the following words and expressions: A brainchild of smth; a stellar future; without exaggeration; to be instructive; to be brought back to airworthy condition; the power of a dream.

Exercise 5. Scan the text and fill in the gaps in the collocations. Make your own sentences and write them into a copybook

1. to be …… into the family;
2. to ignite a …….. of interest in something;
3. to be not afraid to ……. risks;
4. to prevent somebody ……something;
5. to get …… the market;
6. to be badly ……;
7. to bring (something) to …….. condition;
8. to be partly ……. to somebody's professional work;
9. to cut …….. a path to;
10. to come ……handy;
11. to rummage …… the pitch;

12.to collide ……the ground;

13.to receive a patent …… invention;

14.to demonstrate the capabilities ……. the aircraft;

15.to prove the suitability …….. something

16.to remove obstacles to ……..

17.to believe sincerely in ……..

Exercise 6. Answer the questions:

1. What do we know about the Wright brothers' childhood?
2. What were the boys talented in?
3. How did the brothers take advantage of the bicycle boom?
4. What was the brothers' cherished desire?
5. Were the inventors successful from the very beginning?
6. Can you describe the Wrights' aeroplane?
7. Why was the day of December 17 1903 glorious?
8. Were the Brothers Wilbur and Orville Wright the first to come off the ground in a heavier-than-air vehicle with a motor?
9. What was their role in the history of aviation?
10. Why is the life of the Wright brothers instructive?

Exercise 7. Read some supplementary information about the Wright brothers and fill in the gaps with the words: *manned, printing, attended, flew together, married, controlled, engine***.**

1. On December 17, 1903, the Wright brothers achieved the first powered, sustained and …….. aeroplane flight. They decided who would fly first with a coin toss. Wilbur won the toss, but his first attempt failed. Orville went second and managed to fly for 12 seconds. Later that day Wilbur flew their plane for 59 seconds, over a distance of 852 feet.

2. In 1889, brothers started a newspaper …… business. In 1892 they opened up a bicycle repair shop. Their bicycle business financed their work on inventing

the world's first controlled flight of a power-driven, ……, heavier than the aeroplane.

3. They designed their own bicycle with custom features like an oil-retaining wheel hub and coaster brakes, things still used today in modern bikes. The *Wright Flyer I* cost about $1,000 to make and the Wright brothers financed it entirely by themselves. It was made of spruce and had propellers and a specially designed……, cast mainly from lightweight aluminium. It was the first controlled and powered flying machine that could fly with the weight of humans. From this design, the modern aeroplane was born!

4. The Wright brothers only …… …… once (though both piloted the planes individually): on May 25, 1910, they took a six-minute flight piloted by Orville with Wilbur as his passenger. You can see this moment in the photo below.

5. Neither brother ……. college nor even obtained a high school diploma. Neither brother ever …….

Exercise 8. Imagine yourself as a witness of Orville Wright flight on the 17th of December 1903. Write a short essay about your flight experience

Exercise 9. What other pilots and inventors made their mark at the dawn of aviation do you know?

Unit III. Outstanding figures in aviation and astronautics

New vocabulary

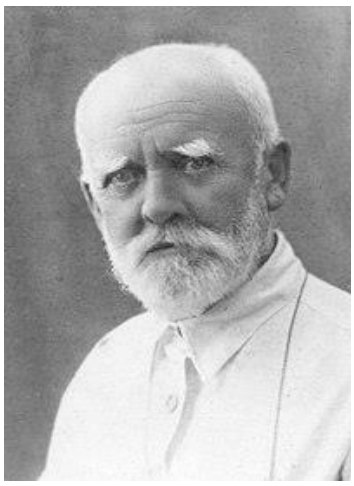
- *Accomplishments- досягнення;*
- *allocate- розподіляти; призначати*
- *approximate- приблизний*
- *ardent- палкий*
- *band-powered (helicopter)- гелікоптер-мускулоліт*
- *blows and bruises- удари та синці*
- *cliff- скеля*
- *(dis) assembling- (роз) збирати*
- *debriefing- підбиття підсумків*
- *determine- визначити*
- *descent- знижуватися*
- *despite (somebodies)- незважаючи на (когось)*
- *dust- пил*
- *emerging- виникаючий*
- *embrace- містити в собі*
- *equalizer- коригуючий пристрій*
- *(a) great love for art- велика любов до мистецтва*
- *financial backing from somebody- фінансова підтримка від когось*
- *happen-траплятися*
- *investigate- розслідувати*
- *physician-лікар*
- *psychiatrist- психіатр*
- *range- діапазон*
- *ravine- ущілина*
- *a set of rules- набір правил*
- *simultaneously-одночасно*

- *steep- крутий*

Exercise 1 The range of the first flight made by the Wright brothers was 37 meters, and it lasted 12 seconds. But this short flight opened a new era in human history. What facts about aviation development in Ukraine do you know?

Text 3. The origins of the Ukrainian aviation

The Wright brothers' flight happened surprisingly on time, because after it started the intensive development of aviation. One of the greatest pioneers and ardent advocates of the ideas of aeronautics and aviation in Ukraine was Professor Mikola Borisovich Delaunay.



Mikola Borisovich Delaunay

(1856 - 1931)

Since 1896 was interested in the glider flights of Otto Lilienthal, M.B. Delaunay learned from M.E. Zhukovsky and began systematic studies of models of gliders. In Kyiv Polytechnic Institute Delaunay he was the undisputed leader of the student aeronautics group, created in 1909, and soon Mikola Borisovich became one of the founders of Kyiv Aeronautics Society. In the academic year 1909/1910 in KPI M.B. Delaunay begun to read to students a course of lectures on the basics of Aeronautics, free of charge. **1.** ….And he never refused. The geography of his travels is impressive: Kharkiv, Poltava, Katerinoslav, Berdichev, Uman, Yelisavetgrad, Proskurov, Wilno, Orel. The movement for the creation of the aeronautic department was started. But it remained on the stage of talking because the government has not allocated money for it.

In spring 1909 professor Delaunay with his son and teachers KPI Hanytskym and Harfom built their first glider. **2.** …..Later, the other three gliders were built. In 1909 professor Delaunay led the Aeronautic Section in KPI which joined 200 enthusiasts. He has developed and taught courses on aeronautics. The society

members have studied the theoretical foundations and techniques of aircraft tried to build gliders and aeroplanes. During the period from 1909 to 1912, the Kyiv enthusiasts have created about 40 different types of aircraft and it was more than in any other city in Russian Imperia. Names of Kyiv aviation enthusiasts became known far beyond Ukraine and Kyiv. Dmitry Grigorovich, Pyotr Nesterov, Igor Sikorsky became famous all over the world.

In 1908 - 1910, his son Boris (1890 - 1980) was an active follower and supporter of M.B. Delaunay. For the money received from his father under his leadership, he built three gliders and tested them in the park of KPI and near the country home at Motovilovka. It has occurred that the biplane glider number 2 was the most successful, with lightweight (about 20 kg) at the wing area of 15 sqm. m and cost only 20 rubles. He had to make the descent on foot. **3.** ……About this glider, Boris Delaunay wrote a brochure "The cheap and light glider and methods to fly with it" (Kyiv, 1910). This brochure price of 30 kopecks was distributed throughout the Russian Empire and has become a popular tool for glider enthusiasts. It was published under the name of his father, because Boris, being the student, felt uncomfortable to put his name.

4. ……. For glider pilots who started solo flight, Boris Delaunay, remembering the experience of independent flight and inevitable at the same time blows and bruises, has formulated a set of rules: 1) never jump into a ravine; 2) do not jump from a cliff or steep roof; 3) always fly against the wind; 4) does not fly with the wind speed of more than 6 m / s; 5) before each flight always investigate with the dust, "the quality of the wind" and the velocity of the air and do not start flying if the wind speed varies in different places.

Boris Delaunay describes the feeling that embrace a person during the flight when you "see the ground, emerging from under your feet, and you are surprised that some unknown force, slowly raises and swings a glider in the air; the glider aviator - as a sailor on the ship; aviator associated with his glider, which gives it support high above the ground in the air. "

Critics have called attention to the richness of the brochure, and, in particular, on the advantages of the design - the possibility of its disassembling. It was also noted that the author was almost the first to formulate a set of rules for using the machine for a safe flight. **5**……"A few years ago a similar glider swing in 10 square meters could be bought in France for 1000 francs (375 rubles). Being able to get the metal parts from the factory, and making the device available to the drawings, the apparatus can be half or even cheaper as the carpenter work is paid much cheaper than in the West."

The experimental aircraft constructions and repairments the designers carried in Kyiv in their handicraft workshops. One of the most colourful figures in the Kyiv School of aircraft was a world-renowned designer of outstanding Igor Sikorsky.

Exercise 2. Read text about Mikola Borisovich Delaunay and choose the most suitable sentence (A-E) for each gap (1-5):

A. It was a biplane with equalizer controls.

B. The main advantage of the flight, according to the author, was his range, but not the height.

C. It can be easily disassembled into three parts, which was convenient for transport and storage.

D. The last paragraph "debriefing" was especially interesting:

E. The success of these lectures was so great that Mikola Borisovich was invited to read them in other universities and cities.

Exercise 3. Match the words into collocations according to Text 3.1.

1. Intensive	**a)** leader
2. Ardent	**b)** figure
3.Undisputed	**c)** construction
4. Experimental	**d)** blows and bruises
5.Glider	**e)** advantage
6. Colourful	**f)** flight

7. Inevitable	**g)** development
8. Independent	**h)** department
9. Systematic	**i)** advocate
10. Aeronautic	**j)** study
11. Main	k) aviator

Exercise 4. Be ready to discuss:

1. Prove the idea that "The Wright brothers' flight happened surprisingly on time" with your examples.
2. Find and present supplementary information about the student's aeronautics group, created in Kyiv in 1909.
3. What is the role of M.B. Delaunay in Ukrainian aviation development? Prove your ideas.

Igor Ivanovich Sikorsky

(1889 - 1972)

One of the brightest figures of the Kyiv school of aircraft construction is the world-famous outstanding designer Igor Ivanovich Sikorsky. He was born in Kyiv, (then the Russian Empire). **1.** … His father, Ivan Alexeevich Sikorsky, was a professor of psychology of Saint Vladimir University (now Taras Shevchenko National University), a psychiatrist with an international reputation. Sikorsky's mother, Mariya Stefanovna Sikorskaya was a physician who did not work professionally. While homeschooling young Igor, she gave him a great love for art, especially in the life and work of Leonardo da Vinci, and the stories of Jules Verne. In 1900, at age 11, he accompanied his father to Germany and through conversations with his

father, became interested in natural sciences. After returning home, Sikorsky began to experiment with model flying machines, and by age 12, he had made a small rubber band-powered helicopter. Sikorsky began studying at the Saint Petersburg Maritime Cadet Corps, in 1903, at the age of 14. In 1906, he determined that his future lay in engineering, so he resigned from the academy, despite his satisfactory standing, and left the Russian Empire to study in Paris. **2.** …..After the academic year, Sikorsky again accompanied his father to Germany in the summer of 1908, where he learned of the accomplishments of the Wright brothers' Flyer and Ferdinand von Zeppelin's rigid airship. Sikorsky later said about this event: "Within twenty-four hours, I decided to change my life's work. I would study aviation." In the summer of 1908, Igor Sikorsky began to develop his first helicopter, and with financial backing from his sister Olga, Sikorsky returned to Paris, the centre of the aviation world at the time, in 1909. Sikorsky met with aviation pioneers, to ask them questions about aircraft and flying. **3**……. Powered by a 25 horsepower Anzani engine, the helicopter used an upper and lower two-bladed lifting propeller that rotated in opposite directions at 160 rpm. The machine could only generate about 357 pounds (162 kg) of lift, not enough to lift the approximate 457 pounds (207 kg) weight. Despite his progress in solving technical problems of control, Sikorsky realized that the aircraft would never fly. He finally disassembled the aircraft in October 1909, after he determined that he could learn nothing more from the design. **4.** ……By the spring, helicopter No. 2 could lift its weight of 400 pounds (180 kg), but not the additional weight of an operator.

Simultaneously with the test of the helicopter in 1910, Igor Sikorsky began to create his first aeroplane. He joined forces with the son of a Kyiv merchant Fedor Ivanovich Bilinkin, who already had some experience in this matter. The biplane was named BIS №1 (Bilinkin, Jordan, Sikorsky). Then it was rebuilt into a BIS №2 aircraft, on which on June 3, 1910, in the presence of sports commissioners of the Kyiv Aeronautical Society, Igor Sikorsky performed a successful straight-line flight of 182 m at an altitude of 1.2 m for 12 s. **5.** ……

In summer 1913 world's first four-engine aircraft rose into the sky are created by a former KPI student I. Sikorsky. Later, in St.Petersburg, its modifications were created heavy aircrafts "Ilya Muromets". Foreign experts were forced to admit that Russia has become the leading power in the air. By the start of World War I in 1914, Sikorsky's aeroplane research and production business in Kyiv was flourishing, and his factory made bombers during the war. After the Revolution began in 1917, Igor Sikorsky fled his homeland, because the new government threatened to shoot him. He moved to France where he was offered a contract for the design of a new, more powerful Muromets-type plane. But in November 1918 the war ended and the French government stopped subsidizing military orders, he decided to move to the United States. After leaving the U.S. Igor Sikorsky developed more than 65 different designs of aircraft. Since 1939 and until his death he designed and built the best helicopters in the world.

Exercise 5. Read text about Igor Ivanovich Sikorsky and choose the most suitable sentence (A-E) for each gap (1-5): A. Subsequently, about 50 flights were made at an altitude of 10 m, but with a short duration.

B. In February next year, he undertook to build a second helicopter and his first aeroplane. **C.** In May, he returned to Russia and began designing his first helicopter, which he began testing in July.

D. He returned to the Russian Empire in 1907, enrolling at the Mechanical College of the Kyiv Polytechnic Institute. **E.** He was the youngest of five children.

Exercise 6. Find and present supplementary information about Cherkasy-born brothers Yevhen, Hryhoriy, Andriy and Ivan Kasyanenko who during the period from 1910 to 1921 created aircraft and Dmytro Pavlovych Hryhorovych, who was a well-known Ukrainian and Soviet aircraft designer, a prominent figure in the development of aviation in Kyiv.

Exercise 7. Find and present supplementary information about Leonid Konstantinovich Kadenyuk who was the first cosmonaut of independent Ukraine.

Unit IV Types of aircraft

New vocabulary

- *aerofoil- профіль крила*
- *average- середній*
- *balloon- повітряна куля*
- *blimps- аеростати*
- *buoyant, buoyancy- плавучість*
- *craft- судно*
- *deflate- здувати*
- *density- щільність*
- *dependent- залежний*
- *dirigible- дирижабль*
- *downwards, upwards- вниз, вгору*
- *envelope- конверт*
- *free-flying- вільний політ*
- *gain- набирати швидкість*
- *gasbag- газова подушка*
- *gondola- гондола*
- *in-flight handling-обслуговування в польоті*
- *moderately- помірно*
- *operating limit- ліміт експлуатації*
- *outer- зовнішній*
- *propulsion- рух вперед*
- *rigid, non-rigid- жорсткий, нежорсткий*
- *rotorcraft- гвинтокрил*
- *strain- механічна напруга*
- *steady- стійкий*
- *steerable- керований*

- *tether, tethered- прив'язувати, прив'язаний*
- *thrust- тяга*
- *tilt, tilting- нахиляти, нахил*
- *wing-shaped- крилоподібний*
- *zeppelin- дирижабль*

Exercise 1.

One of the most common questions in the aviation community, especially for beginning pilots and mechanics is: What are the aircraft categories and classifications? What do you know about it?

Text 4. Different classes and categories of aircraft

According to the Federal Aviation Administration (FAA), an aircraft category refers to the "intended use or operating limits" of a particular group of aircraft. The classification of the aircraft refers to a group of aircraft with the same types of characteristics. However, the class and category are dependent on whether you are talking about pilot certificate ratings or aircraft categories and classes.

4.1 Pilot Certificate Categories. There are several main classifications for FAA pilot licenses, certificates, and ratings. For instance, the most common are: Private Pilot (PP); Instrument Rating (IR); Commercial Pilot (CP); Airline Transport Pilot (ATP); Multi-Crew Pilot (MCP); Certified Flight Instructor (CFI). The Multi-Engine Rating (ME) is also common. Furthermore, there are other popular certificates, such as Sport and Recreational.

4.2 CFR 14 Aircraft Categories (Title 14 of the Code of Federal Regulations) When we talk about aircraft categories concerning the size and manoeuvrability of the aircraft, we are talking about the categories as they are listed under CFR 14.

Acrobatic. These aeroplanes have no flight manoeuvre restrictions other than limitations posed by certain flight tests. They have a maximum of nine seats, not including pilot seats and that weigh no more than 12,500 pounds.

Commuter. Defined as a multi-engine, propeller-driven aircraft with 19 or fewer passenger seats and weighing less than 19,000 pounds.

Experimental. Issued under a special airworthiness certificate. These aircraft are typically used for research and development, crew training, exhibition, air racing and market surveys. They can also include amateur-built or kit-built aircraft, and they can be light sport or unmanned aircraft.

Light Sport (LSA). Operates under a special airworthiness certificate. This is any sport aircraft that does not fall under the designations of kit-built, gyro-plane or transitioning ultralight.

Limited. Reserved for military aircraft that have been converted and/or modified for civilian use.

Normal. The aircraft contains nine or fewer seats and has a maximum takeoff weight of 12,500 pounds or less. Not approved for acrobatic flight.

Primary. These aircraft have special airworthiness certificates, and they are manufactured following a production certificate.

Restricted. Aircraft designed for a specific use, such as agriculture, forest services, aerial surveying and weather control.

Transport. More than 10 seats weighing more than 12,500 if jet engine. If piston-engine, greater than 19 seats and a maximum takeoff weight of more than 19,000 pounds.

Utility. Contains nine seats or less not including pilots and has a maximum takeoff weight of 12,500 pounds or less. These aeroplanes are approved for limited aerobatics.

Exercise 2. Answer the questions:

1. What do you know about pilot licenses, certificates, and ratings according to the Federal Aviation Administration (FAA)?
2. What can you say about different classes and categories of aircraft? What do they depend on?

3. What aircraft was designed for a specific use, such as agriculture, forest services?
4. What aircraft have been converted and/or modified for civilian use?
5. What aircraft have no flight manoeuvre restrictions other than limitations posed by certain flight tests?
6. What aircraft contains nine or fewer seats and has a maximum takeoff weight of 12,500 pounds or less?
7. What aircraft is issued under a special airworthiness certificate?

4.3 Aircraft Classifications. When we talk about aircraft classifications, we are talking about groups of aircraft that have similar flying characteristics when it comes to their propulsion, in-flight handling, and the way they land. Classifications also correspond closer to the airman certificate categories than they do the aircraft categories.

4.4 Lighter than air – aerostats. An aerostat is a lighter than air aircraft that gains its lift through the use of a buoyant gas. Aerostats include unpowered balloons and powered airships. **1.** …….A balloon may be free-flying or tethered. The average density of the craft is lower than the density of atmospheric air because its main component is one or more gasbags, a lightweight skin containing a lifting gas (including heated air as well as gases that have a lower density than air) to provide buoyancy, to which other components such as a gondola containing equipment or people are attached**. 2.** …..

A balloon was originally any aerostat, while the term airship was used for large, powered aircraft designs — usually fixed-wing. Nowadays a "balloon" is an unpowered aerostat and an "airship" is a powered one. A powered, steerable aerostat is called a dirigible. Sometimes this term is applied only to non-rigid balloons, and sometimes dirigible balloon is regarded as the definition of an airship (which may then be rigid or non-rigid). Non-rigid dirigibles are characterized by a moderately aerodynamic gasbag with stabilizing fins at the back. These soon became known as blimps. A blimp has no rigid internal structure: If a blimp deflates, it loses its shape. **3.** …..The nickname ‘blimp’ was adopted along with the

shape. In modern times, any small dirigible or airship is called a blimp, though a blimp may be unpowered as well as powered. A zeppelin is a rigid airship manufactured by a particular company, the "Zeppelin Airship Construction Company", founded by Count Ferdinand von Zeppelin. **4.** ……The term zeppelin is often associated with the German airships that conducted bombing raids during World War I, but while most of these ships were built by the Zeppelin Company, not all German WWI airships were zeppelins; the German military also used rigid airships of very different design built by the Schutte-Lanz and Parseval companies. One of history's most famous zeppelins was LZ-129 Hindenburg.

4.5 Heavier-than-air – aerodynes. Heavier-than-air aircraft, such as aeroplanes, must find some way to push air or gas downwards so that a reaction occurs (by Newton's laws of motion) to push the aircraft upwards. This dynamic movement through the air is the origin of the term '*aerodyne'*. There are two ways to produce dynamic upthrust — aerodynamic lift, and powered lift in the form of engine thrust. Aerodynamic lift involving wings is the most common, with fixed-wing aircraft being kept in the air by the forward movement of wings, and rotorcraft by spinning wing-shaped rotors sometimes called rotary wings. A wing is a flat, horizontal surface, usually shaped in cross-section as an aerofoil. To fly, air must flow over the wing and generate lift. A flexible wing is a wing made of fabric or thin sheet material, often stretched over a rigid frame. A kite is tethered to the ground and relies on the speed of the wind over its wings, which may be flexible or rigid, fixed, or rotary. **5.** ……V/STOL aircraft, such as the Harrier Jump Jet and Lockheed Martin F-35B take off and land vertically using the powered lift and transfer to aerodynamic lift in steady flight.

Exercise 3. Read texts 4.3-4.5 and choose the most suitable sentence (A-E) for each gap (1-5):

A. During World War II, this shape was widely adopted for tethered balloons; in windy weather, this both reduces the strain on the tether and stabilizes the balloon.

B. With powered lift, the aircraft directs its engine thrust vertically downward.

C. A balloon may be free-flying or tethered.

D. He is considered the father of the rigid airship, but not all rigid airships are "zeppelins," just as not all photocopiers are "Xerox" machines.

E. Especially with airships, the gasbags are often protected by an outer envelope.

Exercise 4. Scan texts 4.3-4.5 and fill in the gaps in the collocations.

1). To gain ….. through the use of gas; 2) to include unpowered balloons and powered ……; 3) to be protected by an outer …; 4) to be used for large, powered aircraft …; 5) to be regarded as the … of an airship; 6) to be characterized by a moderately … gasbag; 7) to be adopted for … balloons; 8) to conduct bombing … during World War I; 9) to push air or gas downwards so that a reaction …(by Newton's laws of motion) to push the aircraft upwards; 9) to be the … of the term aerodyne; 10) there are two ways to produce …. upthrust — aerodynamic lift, and …. lift in the form of engine thrust; 11) to direct the engine …… vertically downward.

Exercise 5. Read the texts again and complete the following statements with the missing information.

1) A … may be free-flying or tethered.

2) A powered, steerable … is called a dirigible.

3) A …has no rigid internal structure.

4) A ... is a rigid airship manufactured by a particular company.

5) A … is a flat, horizontal surface, usually shaped in cross-section as an aerofoil.

6) A … wing is a wing made of fabric or thin sheet material, often stretched over a rigid frame.

7) A …is a forerunner of fixed-wing aircraft.

8) The first heavier-than-air craft capable of controlled free-flight were ……..

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