



Theoretical study material for the exam towards a recreational drone license - Civil Aviation Authority



Main topics



Meteorology

Weather conditions affecting the drone



Technical knowledge

System limitations, logic, etc.



Legality

Regulations and AIP (publication of domestic aviation information)



Definitions

- “**Drone**” - "Glider" whose take-off mass is used for sports and recreation only, including any load that it carries or that is attached to it, that weighs less than 150 kilograms. A drone can be of the multi-bladed type (multicopter), fixed wing, rotary wing (helicopter), etc. - for the full definition, read the Flight Regulations (Operation of drone), 2024.
- “**Large drone**” – drone whose weight at takeoff, including any load that it carries or that is attached to it, is greater than 25 kilograms.
- “**Small drone**” - drone whose weight at takeoff, including any load that it carries or that is attached to it in any other way, is 250 grams at most.
- “**Recreational drone license**” – license that enables operating a drone (for sports and recreation only).
- “**Commercial drone license**” – license that enables operating an UAV (commercial operation).
- “**UAV**” – unmanned aerial vehicle (commercial operation).



Definitions (cont'd)

- "**No-fly zone**" - airspace with defined dimensions, as published in the AIP, in which the flight of aircraft is prohibited.
- "**Restricted flight area**" - airspace with defined dimensions, as published in the AIP, in which the flight of aircraft is restricted in accordance with defined conditions.
- "**Area dangerous for flight**" - airspace with defined dimensions, as published in AIP or in NOTAM, in which there may be, within defined periods of time, activities dangerous to the flight of aircraft.
- "**Special**" - operating a drone not in accordance with specific provisions detailed in the regulations (for example - flying in eye contact), and/or if the drone is a "large drone".
- "**Populated area**" – area within the territory of a settlement that is used mainly for residential, industrial, commercial or recreational purposes.
- "**Infrastructure**" - any of the following:
 - Populated area
 - Any site where a drone strike could endanger a person's life or property



Definitions (cont'd)

- "**Direct eye contact**" - situation in which the person operating the drone or the observer, as the case may be, sees the drone by himself, including with the aid of corrective lenses but without any aid other than corrective lenses, continuously during the entire operation in a way that allows, at any given moment during operation, all of the following:
 - To determine all of the following in relation to flying:
 - Location
 - Attitude
 - Altitude
 - Direction of flight
- "**Flight visibility**" - the average horizontal diagonal distance from the location of the person operating the drone, from which it is possible to see and identify the following, as the case may be:
 - During the day - object conspicuous to the eye even if it is not illuminated
 - At night - object conspicuous to the eye that is illuminated
- **AIP** - Aeronautical Information Publication published on the website of Civil Aviation Authority of Israel.
- **NOTAM** - Notice to Airmen, provisional aeronautical publication published on the website of Israel Airports Authority.



Flight Regulations (Drone Operation), 2024

Recreational drone license:

• Conditions for obtaining recreational drone license:

- The applicant is at least 12 years old.
- He reads, speaks and understands the Hebrew language or the English language, as well as the technical English language accepted in aviation for the purpose of operating a drone.
- He has professional knowledge as required for the safe operation of drone and has proven this by passing a test on professional aviation knowledge that was carried out on the Civil Aviation Authority's examination and registration website.
- The director is entitled to refuse granting the applicant a recreational drone license for a period not exceeding one year from the date of the application submission if it turns out that one of the following is true with regard of the applicant for the license:
 - He provided false or incorrect information regarding his application for obtaining a recreational drone license.
 - He may operate a drone under circumstances that may endanger the life or property of those who are not directly involved in operating the drone.



Flight Regulations (Drone Operation), 2024

Obligation of registration and marking:

- It is required to register in CAAI's examination and registration system **every** drone except for "small drone".
- It is required to mark on the drone the registration number assigned to it, except for "small drone".

Guidelines regarding the drone marking:

- The markings for the drone identification should be placed on an external surface of the drone body so that they would be visible and legible to the person holding the drone and in a way that ensures that they remain fixed on it during the entire flight.
- The registration will be valid for 4 years; however, the registered owner may request to extend the validity of the registration certificate for additional periods of 4 years.
- It is required to notify CAAI no later than 14 days of any change or event (such as: the drone is destroyed, stolen, sold or the registered owner has died).
- The details that are required to be filled in when registering a drone are the manufacturer's details, model, identification number assigned by the manufacturer (if any) or serial number of the flight controller.



Flight Regulations (Drone Operation), 2024

Operation of drone by those who have not yet turned 12

- The registered owner may allow those under the age of 12 to operate a drone if they meet these conditions:
 - He is at least 16 years old and has a recreational drone license.
 - He will ensure that the drone is operated in accordance with the regulations
 - He will be located near the supervised and not more than two meters from him, so that he can immediately take direct control of the drone at any given moment
 - He will scan the airspace in which the drone is operated, since the beginning of its operation and during it, looking for safety hazards that may cause a collision, such as aircraft, gliders or obstacles.
 - There is direct eye contact with the drone during its entire operation.

Checking the suitability for safe flight

- The drone must be inspected close to its operation in order to determine that it is suitable for safe operation, including in accordance with the manufacturer's instructions, if any, and found that it is indeed suitable for safe operation. Such inspection should include, among other things, each of the following:
 - Integrity and serviceability of casing and propellers – cracks / fractures, separation of surfaces and inspection of missing or loose components.
 - Integrity and serviceability of the power and drive system - fuel leakage / distortion of battery packs, significant change in the noise of engines, decrease in the capacity of the power supply that is capable to impair the ability of safe operation.
 - Integrity of the electrical system.
 - Integrity of the control station, communication links and components used to control the drone, including checking that commands sent from the control station are received in their entirety and implemented accurately and immediately in the drone.



Flight Regulations (Drone Operation), 2024

Health fitness for safe operation and prohibition of the use of alcohol and dangerous drugs

- No person should operate a drone, no person should act as observer, and no person should participate directly in the operation of drone if he is in a physical or mental condition that may interfere with its safe operation or damage it.
- No person should operate a drone or act an observer when he is drinking an intoxicating drink, when he is under the influence of alcohol or when his body contains a dangerous drug or a metabolic product of dangerous drug.

Prohibition of dangerous operation

- No person should operate a drone in a way that may cause danger to human life or property, and in general it should not be operated in violation of the regulations.
- No person should throw an object from a drone and no person should spray material from a drone.
- It is necessary to fly at least 5 km from any fire and rescue incident or a traffic accident, and 1 km from a prison service incident.

Prohibition of operating a drone from aircraft, multicopters, vehicles or vessels in motion

- It is forbidden to operate a drone from an aircraft or a manned glider in motion.
- It is forbidden to operate a drone from vehicles in motion or vessels in motion, whether motorized or non-motorized, unless the drone is operated over an area that is not a populated area.



Flight Regulations (Drone Operation), 2024

Prohibition of operating drone at night and at dusk

- It is not permitted to fly a drone at night, unless the pilot also holds a commercial drone license (a license that is obtained in class and is suitable for commercial work) based on the UAV regulations, in any case the drone should not be flown over 50 meters.
- It is only permitted to fly a drone at dusk if the drone has flashing lights on, which are visible at a distance of at least 5 kilometers and draws attention to the drone and direct eye contact is maintained, so that the said lights are visible during operation.

Operation with direct eye contact

- It is required to always maintain direct eye contact with the drone.
- Pilot is also allowed to fly a drone without eye contact when assisted by observer who meets the following conditions:
 - He is 16 years old at least.
 - The pilot and observer are located near each other, so that both have the same field of vision in relation to the drone and in relation to the environment in which it is operated.
 - Continuous and effective communication is maintained between them for the purpose of ensuring operational safety.
 - They coordinate the execution of the following actions by continuously by scanning the airspace in search of safety hazards and eye contact with the drone.



Flight Regulations (Drone Operation), 2024

Prohibition of operating several drones at the same time

- No person should operate more than one drone at the same time, and no person should act as observer for more than one drone at the same time.

Prohibition of carrying dangerous material

- No person should operate a drone carrying a dangerous material.

Collision prevention and right of way

- No person should operate a drone in the vicinity of an aircraft or another multicopter, if it creates a risk of collision between the drone and the other aircraft or multicopter.
- Whoever operates a drone should grant the right of way to any manned aircraft and any manned glider, including clearing the airspace around the aircraft or glider to which the right of way is granted, and should refrain from passing over, under or in front of the said aircraft or glider, unless that can be done in a way that enables safe operation.
- If a person realizes that he is operating a drone in the vicinity of an aircraft or other glider that has the potential to create a risk of collision between them, he should land the drone immediately and should not resume operating it unless all of the following are met:
 - The other aircraft or glider has left the airspace designated for operation
 - He has checked the air information for the airspace in AIP and in NOTAM (publication of provisional aviation information) and has reviewed the airspace again.



Flight Regulations (Drone Operation), 2024

Operation over a person or infrastructure

- It is forbidden to fly over a person, it is necessary to stay at least 50 meters away from a person who does not directly participate in the drone operation.
- It is forbidden to fly over a moving vehicle whether it is motorized or not.
- It is forbidden to fly over infrastructure.
- It is forbidden to fly at a distance of less than 150 meters from the infrastructure unless the infrastructure is owned or held by the person who operates the drone, or unless the owner or holder of the infrastructure has agreed to that.

Operation over a person or infrastructure with a small drone

- It is allowed to fly over a person or infrastructure with a small drone if the following conditions are met:
 - The drone has no visible moving parts that could cause damage to a person or property in the event of collision.
 - The drone is operated so that during its flight the drone does not stay over a person in an open area or over a moving vehicle. For this matter, "stays" - includes hovering and flying repeatedly or in circles over a person in an open area or over a vehicle, as the case may be, and in the case of a person in an open area - except for a short and one-time passage over him, when such a passage is intended for a point – to - point flight .



Flight Regulations (Drone Operation), 2024

Operation in violation of air traffic regulations

- It is forbidden to fly in no-fly zone or in area dangerous for flying unless the CAAI director has approved the required operation.
- It is forbidden to fly In area restricted to flight - except in accordance with the conditions and limitations established for that area or with the approval of the entity controlling that area, the entity using that area and the appropriate CAAI unit, as published in AIP or NOTAM.
- It is forbidden to fly contrary to NOTAM regarding flight restrictions in certain areas, except in accordance with those restrictions or with the approval of the entity controlling that area, the entity using that area and the appropriate CAAI unit, as published in NOTAM.

Operation in certain airspaces and near an airport, airstrip or operating area

- It is forbidden to fly in the control zone, the airfield control zone or the airfield control zone.
- It is forbidden to fly in an area where the distance between its borders and any point on an airport runway or an airstrip is less than 2 kilometers (or a greater distance if such is determined in AIP).
- It is forbidden to fly during the day at a distance of less than 500 meters from the training area which, according to AIP, is intended for small drones.
- If the flight of the drone has been approved in advance by the appropriate CAAI unit or by the person appointed for this in AIP regarding that area or zone, or otherwise determined in advance in AIP, it should be allowed to fly in these areas on the basis of the received approval.



Flight Regulations (Drone Operation), 2024

General restrictions on drone operation

- Drone speed relative to the ground should not exceed 87 knots.
- Drone flight altitude should not exceed 50 meters above the surface.
- The distance between the person operating the drone rudder and the drone should be small and allow flying with direct eye contact, and in any case no more than 500 meters.
- Flight visibility should be maintained of at least 3 km.
- Minimal distance of 150 meters in the vertical plane should be maintained between the drone and a cloud.
- The pilot should be able immediately to operate the drone by himself.

Actions required before operation

- Assessment of the environment - weather conditions, checking the airspace, checking for obstacles.
- Briefing of operation participants
- Checking the serviceability of drone components and the control position.



Aviation Law and AIP

Several additional points based on the Aviation Law, 2011

- In the event of emergency that requires the consideration of the commanding pilot, immediate action should be taken for protecting human life or preserving safety, even if this would result in a deviation from any law regarding the aircraft operation.
- "Aviation accident" is an event related to the aircraft operation or inspection operations on an aircraft, which occurred in the course of aircraft operation or maintenance, during which one of the following occurred:
 - A person is killed or seriously injured.
 - The aircraft is seriously damaged or structurally damaged.
 - The aircraft is missing or unreachable.

Several additional points based on Chapter 09 of AIP

- Based on the conditions in section 5 (c) - Reduced separations: it is required to maintain separations from other aircraft / glider under the following conditions:
 - Required vertical separation - no less than 200 feet.
 - Required horizontal and longitudinal separation - not less than 250 meters.



Technical Knowledge and Logic

Flying without GPS

- In order to fully understand how the drone would behave without receiving GPS satellite signal, read the manufacturer's instructions.
- In a large part of multi-blade drones (multicopters), maintaining altitude and the flight condition would be kept balanced, but there would be difficult to maintain the position in space.
- There are various blockages / disruptions that would affect the flight, and this should be checked first on the ground, and in any case it is forbidden to fly when there is a suspicion of dangerous flight.
- The most correct way in most cases if there is a loss of GPS is to fly while maintaining eye contact until landing in a safe place. Note that the use of automatic location-based methods can cause the drone loss or landing in an uncontrolled place.
- In order to obtain accurate position, the drone requires reception of at least 3 satellites and at least 4 satellites for altitude.

Rotors of multi-blade drone (multicopter)

- It should be noted that although the rotors are usually the same in size and shape, there are differences in the location of their angle of attack and therefore the location of their mounting has significance. Most drones have markings on the rotors that allow to know how to mount them correctly. It is necessary to use the manufacturer's instructions in order to understand how to mount the rotors correctly.
- Most multi-bladed drones (multicopters) have 4 rotors; if one of the rotors stops working the drone will be uncontrollable and will most likely crash quickly and in an uncontrollable manner, therefore it is very important to have them in good condition and operate above a safe area in accordance with the regulations.
- The movement control of the multi-blade (multicopters) is made possible by changing the thrust and power of each rotor separately in relation to other rotors, while each two adjacent motors are rotating in opposite directions.



Technical Knowledge and Logic

Energy

- Batteries are a part that is sensitive to temperatures, drops or tears and should be handled gently, and their serviceability should be checked before every takeoff.
- If the battery is found to be swollen, it is forbidden to use anymore.
- In a large number of drones, an alert would be received in the drone control system that would send a warning to the pilot about critical battery values. In many cases the drone would return to land in a pre-defined place or would land right on the place because at a certain value the drone will crash.

Return Home Logic (RH)

- Most drones are capable of planning a point in advance to which the drone would fly and land if there is no communication with the plane or in case of certain faults.
- It is necessary to verify (if it exists in the system) that the pilot enters a safe point and there would be a direct line between that point and the expected flight path.



Technical Knowledge and Logic

Drone serviceability and general guidelines

- Before and after takeoff, check that the drone is in good condition; if there is anything wrong or if there is any doubt, it should be checked with an authorized laboratory and sent for repair if necessary.
- In any case, it is always necessary to operate in accordance with the manufacturer's instructions; it should be noted that if there are manufacturer's instructions that contradict what is allowed in the regulations or laws, it is necessary to follow the laws and regulations.
- It is allowed to add or remove parts to the drone or even build a drone at home as long as the flying is carried out safely and all regulations and laws can be met.
- Most of the drones have 2 red lights in the front of the drone and 2 green lights in the back, which can be used to tell the direction of the drone's flight at night.

Compass direction

- In order for a drone to fly properly, accurate compass direction is required.
- It is required to carry out compass calibration at the beginning of the flight day or in accordance with the manufacturer's instructions.
- It should be noted that in the vicinity of high voltage lines there could be effects on the compass direction which can cause unsafe flying, so it is necessary to stay away from the environment of high voltage lines.



Technical Knowledge and Logic

Speed

- When calculating flight time between points, the ground speed that is usually displayed on the control station should be considered. Parameters that affect the ground speed are the strength and direction of the wind.
- Calibrated air speed and true air speed are the speeds intended for describing the drone speed within the airspace in which it is flying and are significant for calculating the amount of lift created on the wings and critical in the context of pitching. It is mainly relevant to the flight of a fixed wing aircraft and not of a multi-blade drone (multicopter).



Meteorology

Types of clouds and their effect

- Cirrus - high stratified cloud accompanied by strong wind and jet streams.
- Cumulonimbus - cloud that will accompany stormy weather, strong winds, sleet and rain / hail.

Weather phenomena

- Wind shear - a change in speed and/or wind direction in vertical or horizontal direction or both at a rapid rate.
- Air density
 - Increase in air density (for example, with a decrease in altitude) - will increase the lift.
 - Decrease in air density (for example, with an increase in altitude) - will lower the lift.
- Rain – it is necessary to be familiar with the manufacturer's instructions and fly the drone in accordance with them: to avoid as far as possible flying in the rain. In many cases it is not possible to estimate the fall in millimeters (in this way the manufacturer's instructions would usually specify the limitations). Rain can cause a loss of control of the drone.
- Wind - it is necessary to fly in accordance with the manufacturer's limits; the wind must be taken into account when calculating the flight time and the flight time of any route.
- Temperature - it is necessary to fly in accordance with the manufacturer's limits; it is necessary to note that extreme temperature can cause damage to the battery (especially at high temperature) and can cause a decline in battery performance (especially at low temperature).



Good luck!



The presented information is only general and does not constitute professional or legal advice